REVIEW OF APPLICATION FOR CERTIFICATION BY THE LOW IMPACT HYDROPOWER INSTITUTE OF THE BOLTON FALLS PROJECT

Prepared by Stephen Byrne
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I. INTRODUCTION

This report summarizes the review findings of the application submitted by Green Mountain Power Corporation (GMP, Applicant or Licensee) to the Low Impact Hydropower Institute (LIHI) for certification of the Bolton Falls Hydroelectric Project (FERC No. 2879, Project). The Bolton Falls Project is a 6.962-MW facility that operates in a run-of-river mode with a continuous minimum flow of 100 cfs and is located on the Winooski River at river mile 43 in Washington County, Vermont. On January 26, 2024, LIHI received a complete application package for certification of the Project. This current review was conducted using the 2nd Edition LIHI Certification Handbook.

II. PROJECT'S GEOGRAPHIC LOCATION

The Bolton Falls Project is located on the 90-mile-long Winooski River in Washington County, Vermont (Figure 1). The Project dam is the 4th dam on the Winooski River upstream of the river mouth at Lake Champlain and the 6th active dam downstream from the river's headwaters; there are 8 partially or fully breached dams upstream of the Project. Other LIHI Certified projects on the river include LIHI #16 – Winooski One/Chace Mill, LIHI #146 – Essex 19, both downstream and LIHI #77 – Winooski 8 located upstream of Bolton Falls.

Land use adjacent to and within the Project boundary is primarily upland deciduous, mixed, or evergreen forest, and woody wetlands. Developed land parcels are primarily located on the north side of the Project boundary. At the Project, the total drainage area is approximately 821 square miles (mi^2), which is approximately 76% of the drainage area at the Winooski River's mouth (1,080 mi^2) where it enters Lake Champlain.

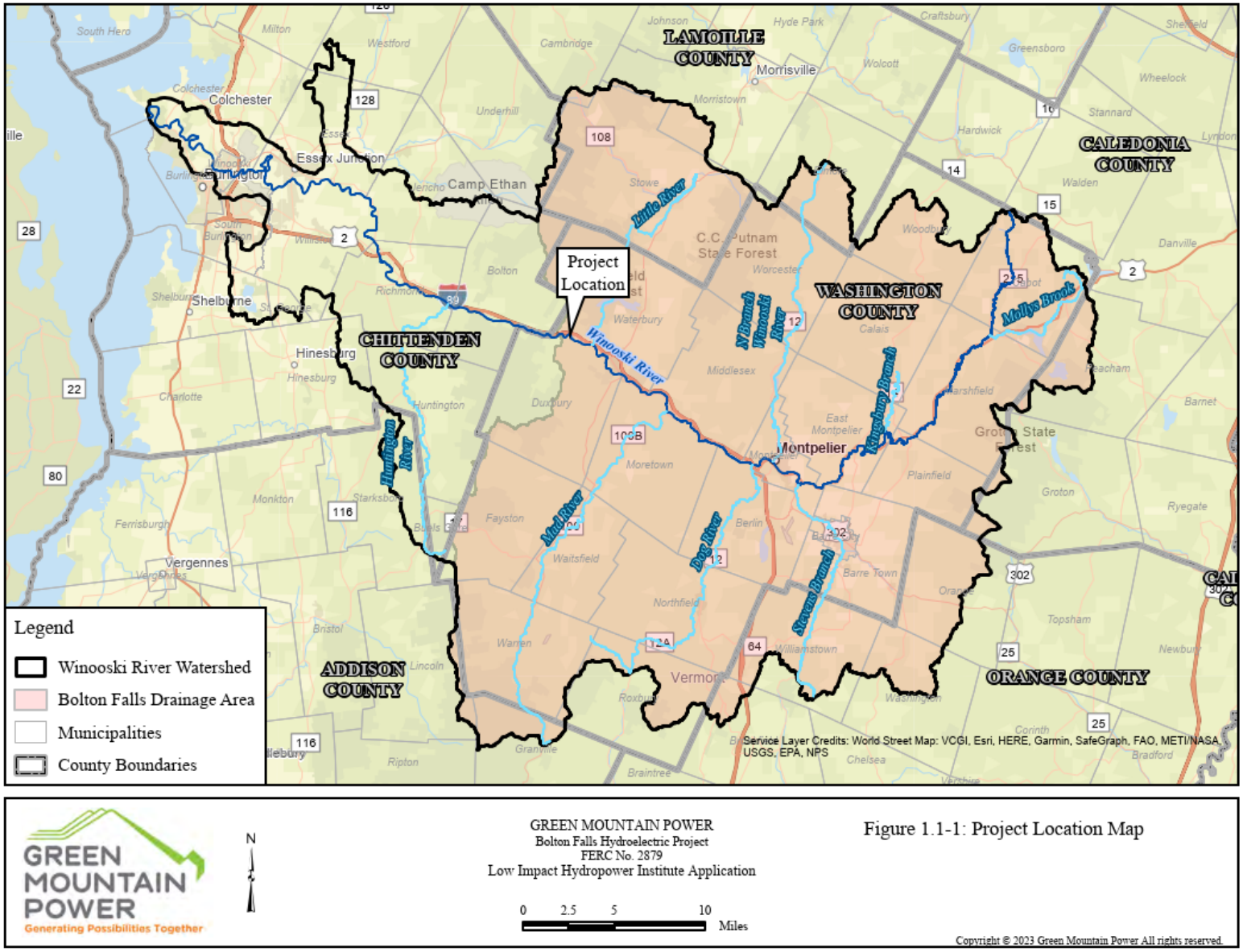

Figure 1. – Bolton Falls Project Location

III. PROJECT AND IMMEDIATE SITE CHARACTERISTICS

The Bolton Falls dam was originally constructed in 1898 as a rock-filled timber crib dam, and the Project began generating electricity in 1899 with its two turbine-generator units. The Project fell into despair around 1938 and ceased generation. In 1985 the Project was redeveloped and began generating again in 1986. The Project consists of: (1) a 2.1-mile-long impoundment with a storage capacity of 300 acre-feet at a normal full pool elevation of 397 feet; (2) a 92-foot-high, 275-foot-long timber crib dam with a maximum crest elevation of 397 feet when the 5-foot-high rubber bladder atop the dam is inflated and a maximum elevation of 392 feet when the rubber bladder is deflated; (3) a 196-foot-long concrete spillway with a crest elevation of 392 feet; (4) a forebay with two concrete intakes, each fitted with 27-foot-wide, 43-foot-high trash racks with 3-inch clear spacing; (5) two 10-foot-diameter, 120-foot-long steel penstocks encased in concrete; (6) a 73-foot-long, 57-foot-wide powerhouse containing two horizontal, 3,481-kilowatt Kaplan turbines for a total installed capacity of 6,962 kilowatts; (7) a 75-foot-long, 36-inch-diameter bypass pipe located on the left side of the spillway base (when looking downstream); (8) a 130-foot-long, 5-kilovolt underground transmission line that connects to an adjacent switchyard; (9) a 600-foot-long, 34.5-kilovolt overhead transmission line connecting to a second switchyard that interconnects with the regional grid; and (10) appurtenant facilities (Figures 2-4).

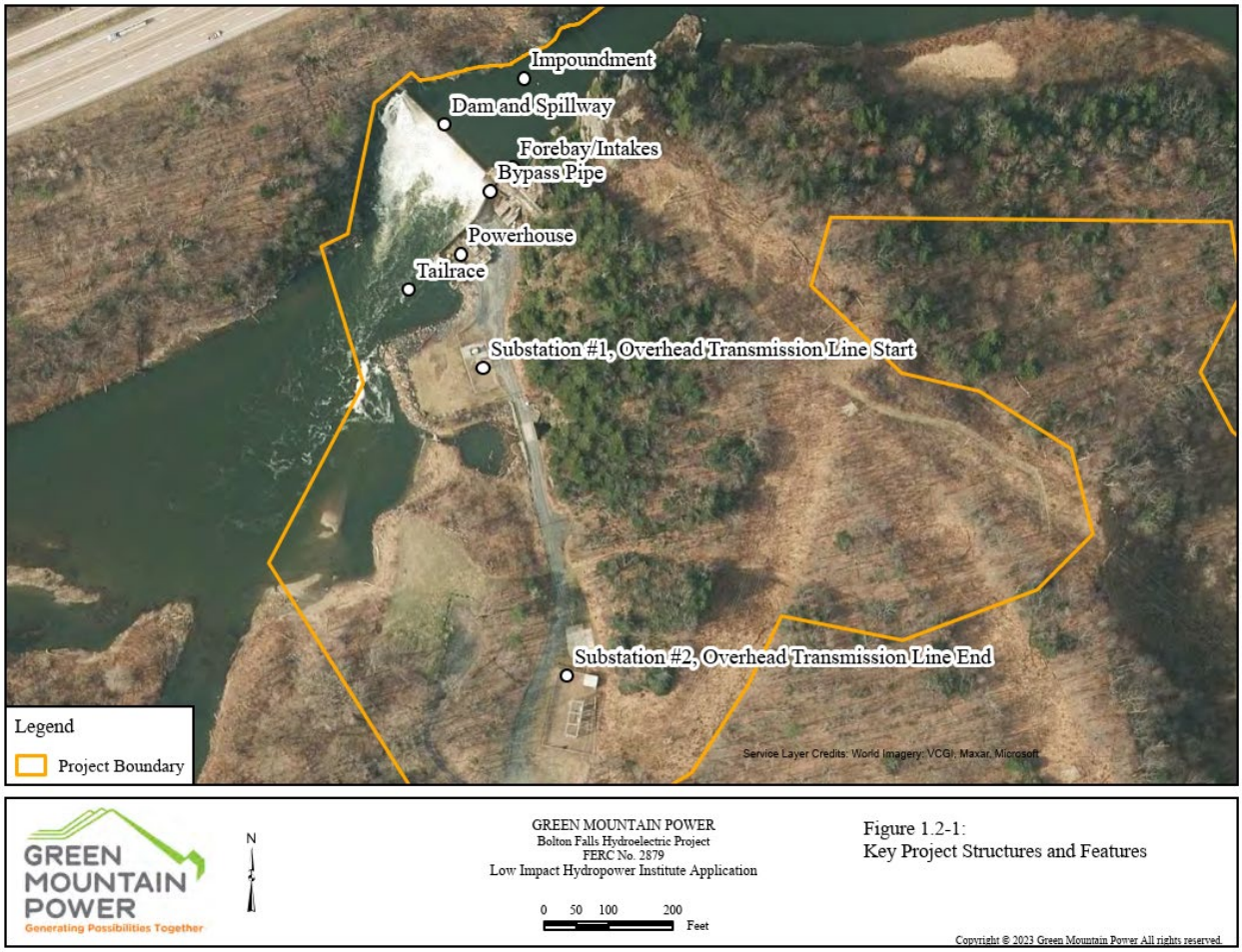

Figure 2. – Photograph of Bolton Falls Project (aerial) showing the Impoundment, Dam, Bypassed Reach, Powerhouse, and Tailrace.

Figure 3. – Photograph of Bolton Falls Dam Spillway from top of left abutment.

Figure 4. – Photograph of Bolton Falls Project Dam, Bypassed Reach, Powerhouse, Tailrace and Minimum Flow Pipes.

IV. ZONES OF EFFECT AND STANDARDS SELECTED

Three Zones of Effect (ZOEs) were designated by the Applicant and were determined to be appropriate (Figure 5). Zone 1 includes the Project impoundment, Zone 2 includes the bypassed reach between the dam and the tailrace, and Zone 3 includes the tailrace and downstream reach. Table 1 shows the Standards selected for each criterion for the eight ZOEs. Where applicable, reviewer recommendations for alternate standards are shown in **red**.

Table 1. Standards Matrix for the Bolton Falls Project

	Zone:	1: Impoundment	2: Bypassed Reach	2: Downstream Reach
	River Mile Extent:	RM 44.51 to RM 43.01	RM 43.01 to RM 43.0	RM 43.0 to RM 40.9
Criterion		**Standard Selected**	**Standard Selected**	**Standard Selected**
A	**Ecological Flows**	2	2	2
B	**Water Quality**	2	2	2
C	**Upstream Fish Passage**	1	~~1~~,**2**	~~1~~,**2**
D	**Downstream Fish Passage**	2	2	1
E	**Shoreline and Watershed Protection**	~~1~~,**2**	1	1
F	**Threatened and Endangered Species**	2	2	2
G	**Cultural and Historic Resources**	2	2	2
H	**Recreational Resources**	2	~~2~~,**1**	2

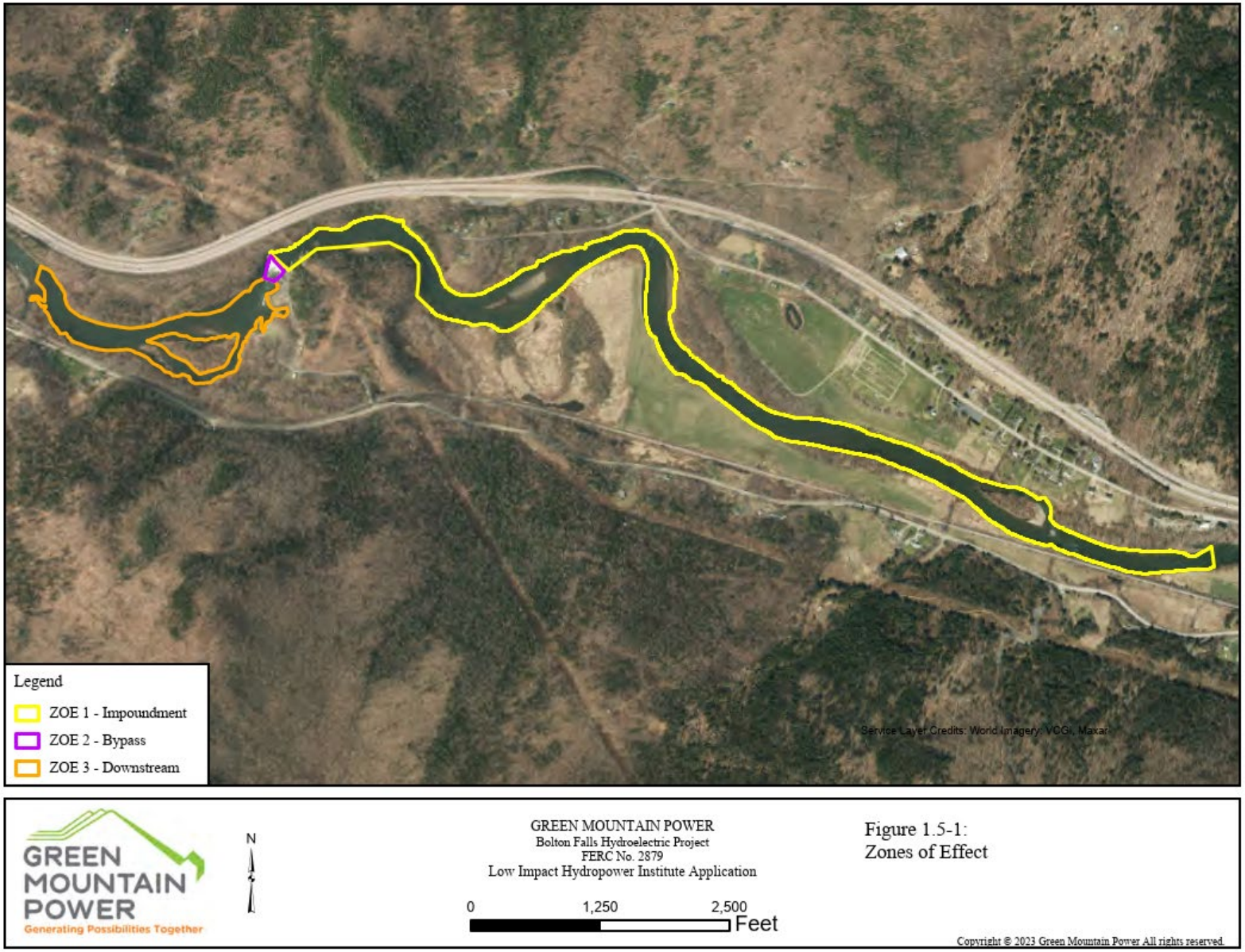

Figure 5 – Bolton Falls Project Zones of Effect.

V. REGULATORY AND COMPLIANCE STATUS

The Bolton Falls Project was issued an License Order from FERC on October 2, 2022 and was granted a Section 401 Water Quality Certificate (WQC) from the Vermont Department of Environmental Conservation (Vermont DEC) on January 19 2022. The 2022 License Order was subsequently amended on May 17, 2023 per the replacement of the two turbine-generator units.

VI. PUBLIC COMMENT RECEIVED OR SOLICITED BY LIHI

The application was posted for public comment on January 30, 2024, and the notice was forwarded to agencies and stakeholders listed in the application. The deadline for submission of comments was March 30, 2024. No comments were received. Based on the completeness of the application and documents available on the FERC elibrary, I did not need to contact resource agencies.

VII. DETAILED CRITERIA REVIEW

A. ECOLOGICAL FLOW REGIMES

Goal: The flow regimes in riverine reaches that are affected by the facility support habitat and other conditions suitable for healthy fish and wildlife resources.

Assessment of Criterion Passage: The Applicant appropriately selected Standard A-2, Agency Recommendation for all Zones.

The two closest operating stream gages to the Project are U.S. Geological Survey (USGS) Gage no. 04286000 – Winooski River at Montpelier, VT located about 16 miles upstream and USGS gage USGS Gage No. 04290500 – Winooski River near Essex Junction, VT located about 25 miles downstream. The downstream Essex Junction gage is used by the Applicant to estimate flow data. The drainage area at the Project is about 821 square miles and the average annual flow is 1,421 cubic feet per second (cfs). Daily inflow to the impoundment varies seasonally based upon Winooski River flows, the operation of upstream hydroelectric dams, and regulated and unregulated tributary inflow. The next upstream dam on the Winooski River is GMP's Middlesex No. 2 Dam, which is not regulated by FERC and approximately 6.5 river miles upstream from the Bolton Falls Dam. Major tributaries between these two dams include the Little Winooski River (or Little River), about 2.25 river miles upstream of the dam and the Mad River about 9 river miles upstream. Just upstream on the Little Winooski River is the Waterbury Hydroelectric Project (FERC No. 2090, LIHI #148), which, prior to being relicensed in 2016, operated in a store and release (peaking) mode and largely drove operation at the Bolton Falls Project. Since being relicensed, the Waterbury Project has begun transitioning to a run-of-river operating mode; however, it currently operates in a store and release mode from January through

mid-May. The Moretown No. 8 Hydroelectric Project (FERC No. 5944) is approximately 1.5 miles upstream of the confluence on the Mad River and operates in a run-of-river mode.

Zone 1 is the 59-acre impoundment that has an effective storage of 210 acre-ft, a gross storage capacity of 300 acre-feet, and is maintained at elevation 397.29 ft. from approximately April 1 through November 30 (ice-out period) and at elevation 397.0 ft. from approximately December 1 through March 31 (ice-in period). Impoundment water surface elevations are maintained per License Article 403 and WQC Condition B. Article 403 and WQC Condition B also require the Licensee to limit any planned, non-emergency maintenance activities that require the impoundment to be drawn down below the specified limits between November 1 and August 15 to protect Eastern pearlshell mussels in the impoundment.

Condition B of the WQC requires that the Project operate in a run-of-river mode, such that outflow equals inflow on an instantaneous basis. Compliance with the run-of-river operations is monitored pursuant to the Flow Management Plan required by Article 402 and WQC Condition C. This plan was filed with the Commission on May 15, 2023[1] and was approved by the Commission on August 28, 2023[2]. Compliance monitoring includes the use of a Programmable Logic Controller (PLC) that controls headpond water level as river flows vary by modulating the turbine gate setting. A pressure transducer in the impoundment determines the water level and transmits the information to the PLC for appropriate action. On-site computers enable electronic data collection and storage and facilitate report printing for monitoring purposes.

Operating the project in an instantaneous run-of-river mode where outflow always equals inflow minimizes the potential for any minor fluctuations or fish stranding and maintains relatively stable impoundment levels. This mode of operation protects shoreline habitat and fish and other aquatic organisms that rely on near-shore habitat in the impoundment for spawning, foraging, and cover.

Zone 2 is the approximately 150-foot-long bypassed reach downstream of Bolton Falls Dam. Condition B of the WQC requires that when generating, the Project must spill 100 cfs continuously year-round in the bypass reach. When the Project is not operating, all inflow is spilled over the dam. Due to operational difficulties associated with spilling 100 cfs over the rubber bladder atop the dam during winter (such as ice forming on the downstream side of the rubber bladder), the Licensee typically passes the minimum flow through the bypass pipe instead. The minimum bypass flow requirement at the Project is based upon a bypass habitat assessment and aesthetic flow study conducted by the Licensee during relicensing to evaluate the relationship between aquatic habitat and flow within the bypass reach, as well as the aesthetic quality of spill over the Project dam. According to FERC's 2022 Environmental Assessment, the

[1] 20230515-5061
[2] 20230828-3049

Vermont Agency of Natural Resources (Vermont ANR) concluded that spillage flow of 100 cfs would provide high-quality aquatic habitat in the bypassed reach by maintaining a broken water surface across 45 percent of the reach, active circulation across 83 percent of the reach, and notably, that these improved conditions were distributed across the entire channel. Vermont ANR commented during the Project's relicensing that the large pool downstream of the dam is important to the fishery as it offers deep water habitat which is currently limited in the Winooski River downstream of the Project and can provide cover and stable habitat conditions for overwintering trout and other fish[3]. This bypass flow also provides for safe downstream fish passage. Compliance with the minimum flow requirements is implemented via the Applicant's Flow Monitoring Plan mentioned previously.

Zone 3 is the Bolton Falls powerhouse tailrace and downstream area and extends approximately 1.5 miles downstream to the confluence with Ridley Brook. The tailrace area is approximately 650 feet in length and 450 feet in width at the downstream end. The deeper tailrace channel flows along river-right (when looking downstream). The river-left area widens out into shallow gravel bars with areas of exposed sand and mud depending on flow and water level. The Winooski River further downstream of the Project is largely comprised of shallow riffle and run habitat. The run-of-river operations and minimum bypass flow minimize the Project's operational effects on flow downstream by ensuring aquatic habitat remains wetted and flowing.

A review of the FERC eLibrary record indicated that no violations of the minimum flows or run-of-river operations have occurred in the last 10 years. Based on my review of the application, supporting documentation, and publicly available information, the Project is operated in a manner such that it does not adversely affect fish and wildlife resources under the current flow regime. As such, the Project satisfies the Ecological Flow Regimes criterion.

B. WATER QUALITY

Goal: Water Quality is protected in waterbodies directly affected by the facility, including downstream reaches, bypassed reaches, and impoundments above dams and diversions.

Assessment of Criterion Passage: The Applicant appropriately selected Standard B-2, Agency Recommendation for all Zones.

The Winooski River within the Project boundary is not listed on Vermont DEC's current list of impaired waters; however, several segments upstream and downstream of the dam are listed as impaired and TMDLs are in place or being developed for those waters.[4] FERC noted in its 2022

[3] 2022 FERC EA at page 20.
[4] PriorityWatersList_PartA_303d_2022.pdf (vermont.gov)

EA[5] that 14 permitted wastewater discharges occur upstream from the Project (including four on the mainstem Winooski River), with the closest being the Waterbury Wastewater Treatment Facility located approximately three miles upstream of the Project dam. Eleven permitted wastewater discharges occur on the Winooski River downstream of the Project with the closest being the Richmond Wastewater Treatment Facility, located approximately 8.5 miles downstream.

The Winooski River in the vicinity of the Project is designated as Class B(2) water as well as a coldwater fishery. Class B(2) waters are meant to support the following designated and existing uses: aquatic biota and wildlife; aquatic habitat; aesthetics; public water supply, with filtration and disinfection or other required treatment; irrigation of crops and other agricultural uses; swimming and other primary contract recreation; and boating, fishing and other related recreational uses. Relevant water quality standards for Class B(2) waters and coldwater fish habitat are included in table 2 below.

Table 2. Water quality standards for Class B(2) waters and coldwater fish habitat.[6]

Parameter Criteria	**Parameter Criteria**
Dissolved Oxygen	Not less than 6 mg/l and 70% saturation at all times in all other waters designated as a cold-water fish habitat.
Temperature	General: The change or rate of change in temperature, either upward or downward, shall be controlled to ensure full support of aquatic biota, wildlife, and aquatic habitat uses. Class B(2) Cold Water: The total increase from the ambient temperature due to all discharges and activities shall not exceed 1.0° F.
Aquatic Biota and Wildlife	Change from the natural condition for aquatic macroinvertebrate and fish assemblages not exceeding moderate changes in the relative proportions of taxonomic, functional, tolerant, and intolerant aquatic organisms.
Aquatic Habitat	Rivers and Streams: Changes to flow characteristics, physical habitat structure, and stream processes limited to moderate differences from the natural condition and consistent with the full support of high-quality aquatic habitat.
Aesthetics	Water character, flows, water level, bed and channel characteristics, and flowing and falling water of good aesthetic value.
Boating	Waters shall be managed to achieve and maintain a level of water quality compatible with good quality boating.
Hydrology: Streamflow Protection	Any change from the natural flow regime shall provide for maintenance of flow characteristics that ensure the full support of uses and comply with the applicable water quality criteria.
Hydrology: High-flow Regime	No change from the natural flow regime that would result in runoff causing an increase in the frequency, magnitude, or duration of peak flows adversely affecting channel integrity or prevent the full support of uses
Water Level Fluctuation	Riverine impoundments may exhibit artificial variations in water level when

[5] 2022 FERC EA at page 17.
[6] 2022 FERC EA at pages 17-18.

	subject to water level management, but only to the extent that such variations ensure full support of uses.

In 2018, GMP monitored DO and water temperature from June 1 through September 30 at the following locations: upstream of the Project impoundment outside of the influence of the Project, at two locations in the impoundment upstream of the dam, near the intake, in the bypassed reach, in the tailrace, and in the Winooski River downstream of the tailrace. FERC's analysis of this data within the 2022 EA indicated that DO concentrations on average met or exceeded the state standards most of the time. There were several days in late August and early September when conditions fell below the state standards both above and below the dam when the Project was shut down due to low flows. DO subsequently increased and met the state standards after river flows increased and the Project began generating again. FERC's EA also notes that DO measurements near the intake, tailrace, and bypassed reach also fell below the state standard levels on occasions in early June during a period when GMP drew down the impoundment to make repairs to the inflatable rubber bladder (repairs lasted from May 29 through June 28)[7]. Temperature monitoring showed a diurnal pattern of increasing and decreasing temperatures, with the greatest diurnal fluctuation occurring upstream of the Project. During some periods of non-generation, water temperatures downstream of the Project were increased compared to upstream, coinciding with warmer water from the impoundment surface spilling over the dam. Downstream temperatures generally decreased at the onset of generation cycles as deeper water from the intake was released[8].

The run-of-river operations required by WQC Condition B generally minimizes large fluctuations in impoundment water surface elevations that can lead to shoreline erosion and degraded water quality. In addition, WQC Condition G and Article 403 require GMP to limit non-emergency drawdowns to the period between November 1 and August 15 to protect Eastern pearlshell mussels in the impoundment. These two requirements are supportive of the designated uses for Class B(2) waters. Similarly, the run-of-river operations and minimum flow of 100 cfs are supportive of the designated uses as they apply to the downstream reach, Zone 3.

As requested by Vermont ANR, GMP collected additional spot water quality data in the bypassed reach to help determine if there is adequate flow and circulation throughout the bypassed reach during the summer low-flow period. All DO measurements at the sampling locations met the minimum levels established by the state's DO standards, and both temperature and DO were relatively uniform throughout the water column and aerially throughout the bypassed reach. The 100-cfs continuous minimum flow release into the bypassed reach, required by WQC condition B, maintains the aquatic habitat and water quality in the reach.

[7] 2022 FERC EA at page 18.
[8] Vermont DEC WQC at page 10.

Based on my review of the application, supporting documentation, and publicly available information, the Project is operated in a manner such that it does not adversely affect water quality in the impoundment, bypassed, or downstream reaches. As such, the Project satisfies the Water Quality criterion.

C. UPSTREAM FISH PASSAGE

Goal: The facility allows for the safe, timely, and effective upstream passage of migratory fish. This criterion is intended to ensure that migratory species can successfully complete their life cycles and maintain healthy populations in areas affected by the facility.

Assessment of Criterion Passage: The Applicant selected Standard C-1, Not Applicable/De Minimis Effect for all zones. For reasons discussed below this review finds that Standard C-2, Agency Recommendation is more appropriate for Zones 2 and 3.

In the Impoundment Zone there are no barriers to further upstream fish movement. The Project waters support a mix of coldwater and warmwater fish species. The Applicant presents a list of fishes in the Project area in Section 3.4 of its LIHI application. Due to downstream dams, there is limited migratory fish presence downstream of the Project. However, lake sturgeon, landlocked salmon and steelhead migrate from Lake Champlain into the Winooski River to spawn. The first dam on the Winooski River is the Winooski One/Chace Mill Dam (FERC No. 2756, LIHI #16) which was built on a natural falls area. Landlocked salmon and steelhead are trapped and hauled above the Winooski One Dam, while lake sturgeon are not collected or transported. Steelhead are released immediately upstream of the Winooski One Project while landlocked salmon are released above the Essex 19 Dam, LIHI #146 (next dam downstream from the Bolton Falls Dam), where they have access to about 26 miles of additional habitat including spawning habitat. According to FERC 2022 EA[9] no salmon spawning redds have been identified in the bypassed reach or downstream reach.

No requirements related to upstream fish passage were included in the FERC License for the Bolton Falls Project or the Vermont DEC WQC. License Article 405 however reserves the authority to prescribe fishways and therefore this review finds that standard C-2 is appropriate for the Zones 2 and 3. To date, the US Department of Interior has not exercised this authority. No recommendations were filed by resource agencies related to upstream fish passage during the licensing process of the Bolton Falls Project.

Based on my review of the application, supporting documentation, and publicly available information, the Project does not adversely impact upstream migrating fish and thus satisfies the Upstream Fish Passage criterion.

[9] 2022 FERC EA at page 21.

D. DOWNSTREAM FISH PASSAGE AND PROTECTION

Goal: The facility allows for the safe, timely, and effective downstream passage of migratory fish. For riverine (resident) fish, the facility minimizes loss of fish from reservoirs and upstream river reaches affected by Facility operations. Migratory species are able to successfully complete their life cycles and maintain healthy populations in the areas affected by the Facility.

Assessment of Criterion Passage: The Applicant appropriately selected Standard D-2, Agency Recommendation for the Impoundment and Bypassed Reach Zones and Standard D-1, Not Applicable/De Minimis Effect for the Downstream Zone.

Standard D-1, Not Applicable/De Minimis Effect is appropriate for the Downstream Zone because fish do not encounter any further Project-related barrier to downstream movement in this zone. Standard D-2, Agency Recommendation is appropriate for the Impoundment and Bypassed Reach Zones because the continuous minimum flow of 100 cfs over the spillway or through the bypass pipe, required by WQC Condition B, provides a means of downstream passage in both zones. In addition, Condition D of the WQC requires GMP to consult with the Vermont Fish and Wildlife Department prior to the next replacement of trashracks to determine appropriate bar clearance spacing and location.

Passing the continuous minimum flow over the dam or through the bypass pipe provides passage options to impoundment fish that do not involve passing through the powerhouse and risking mortality from turbine blade strikes. However, fish may be attracted to the intake at the penstock when inflows to the intake exceed the 100 cfs minimum flow being passed to the bypassed reach. The existing trashracks at the intake are currently 27 feet wide, 43 feet high, angled 70 degrees from the horizontal plane, and contain a total of 87, 0.5-inch-thick trashrack bars with a 3-inch clear spacing between the bars. Given the size range of fishes in the Project impoundment and the maximum length able to fit through the 3-inch trashrack spacing, adults and juveniles would be able to fit through the trashracks.[10] Therefore, while the potential for these fish to be impinged on the trashracks is very low, they would be susceptible to turbine entrainment. However, the burst swim speeds for juvenile and adult resident fish as presented in FERC's 2022 EA[11] indicates that most fish could overcome the maximum approach and through velocities at the trash racks (2.07 feet per second and 2.54 feet per second) and swim away. Fish species and life-stages with a greater likelihood of entrainment (i.e., golden shiners, juvenile white sucker, juvenile smallmouth bass, and juvenile sculpin) are expected to exhibit high turbine survival (greater than 90 percent) through the Project's Kaplan turbines.

[10] *See* table 7 of the 2022 FERC EA at page 33.
[11] *See* table 8 of the 2022 FERC EA at page 35.

On May 17, 2023, the 2022 License Order was amended to include the replacement of the turbine-generator units. As noted in the amendment, the proposed turbine runners would have a similar design to the existing runners (e.g., Kaplan-type design, diameter, number of blades, placement location within the turbine pit). Additionally, the installation of the proposed new units would decrease the overall hydraulic capacity at the project, from 1,200 cfs per unit to 1,105 cfs per unit. Therefore, any entrainment is expected to decrease given the smaller volume of water passing through the turbines and the decreased approach velocity at the intake, from 2.07 fps to 1.90 fps. Additionally, the proposed turbine runners would have the same number of blades and a lower rated speed (240 rotations per minute (rpm) versus the current 277 rpm). As the number of turbine blades and rated speed are directly correlated with turbine survival, Commission staff anticipated that turbine survival estimates under the proposed amendment would be slightly better than as currently licensed, and as reviewed in the 2022 EA[12].

For the reasons above, and based on my review of the application, supporting documentation, and publicly available information, the Project does not appear to adversely affect downstream moving fish and has minimal loss of riverine fish from the Project reservoirs and upstream reaches, and thus satisfies the Downstream Fish Passage and Protection criterion.

E. SHORELINE AND WATERSHED PROTECTION

Goal*:* The Facility has demonstrated that enough action has been taken to protect, mitigate and enhance the condition of soils, vegetation and ecosystem functions on shoreline and watershed lands associated with the facility.

Assessment of Criterion Passage: The Applicant appropriately selected Standard E-1, Not Applicable/De Minimis Effect for the Bypassed Reach and Downstream Zones. For reasons discussed below, this review finds that Standard E-2, Agency Recommendation, is more appropriate for the Impoundment Zone.

The Bolton Falls FERC Project boundary covers approximately 33 acres of land and 58.3 acres of water. Land cover within the Project area is dominated by upland deciduous, mixed, or evergreen forest, and woody wetlands. Deciduous, mixed, and evergreen forests make up more than 75 percent of the watershed. Agriculture (pasture/hay and cultivated crops) accounts for approximately 10 percent while the remainder is classified as developed (8 percent), wetland (3 percent), shrub/scrub (1 percent) and open water, grassland/herbaceous, or barren land (each less than 1 percent).[13] Developed land parcels are primarily located on the north side of the Project boundary (See Figure 3.4.1-1 of the Bolton Falls Project's LIHI application). The riverbanks are vegetated with silver maple, green ash, American elm, willows, sedges, and rushes.

[12] 2023 License Amendment at page 9.
[13] 2022 FERC EA at page 13.

There is no Shoreline Management Plan for the Project, and no river segments are listed on the Wild and Scenic Rivers Act. There is also no critical habitat for threatened or endangered species within the Project boundary. However, the Winooski River from the Bolton Falls Dam downstream about 9 miles is listed on the Nationwide Rivers Inventory for having "outstandingly remarkable value" for geologic and archaeologic features.[14] Geologic features include segments possessing a unique diversity of geologic features, including Duck Brook cascades, large boulder outcrops, and an excellent example of glacial delta. Archaeological features include segments featuring a significant number and diversity of known prehistoric sites and historic mill sites. The run-of-river operations and minimum flow ensure that Project operations have a de minimis effect on the bypassed reach and downstream reach.

To protect aquatic biota and wildlife in the impoundment wetlands during maintenance-related drawdowns, Condition G of the WQC required GMP to develop a Water Level Management Plan to minimize any impact that may occur on wetlands and wetland habitat. The plan was filed with FERC on May 15, 2023[15], and supplemented on May 22, 2023[16], and subsequently approved on August 28, 2023[17]. Provisions in the plan that protect aquatic biota and wildlife in the impoundment wetlands include limiting drawdown rates to no more than 1 foot per hour, limiting drawdown depth and duration to the extent possible, and conducting drawdowns during daylight so observations can be made, and work stopped if sediment or turbidity visibly increased due to a drawdown.

Based on my review of the application, supporting documentation, and publicly available information, the Project's operation sufficiently protects the shoreline and watershed lands under the Applicant's control. Therefore, the Project satisfies the Shoreline and Watershed Protection criterion.

F. THREATENED AND ENDANGERED SPECIES PROTECTION

Goal: The facility does not negatively impact federal or state listed species.

Assessment of Criterion Passage: The Applicant appropriately selected Standard F-2, Finding of No Negative Effect, for all Zones.

A US Fish and Wildlife Service (FWS) IPaC report generated by the Applicant and included as Appendix D to the LIHI application, included the northern long-eared bat as a federally listed species (federally endangered) and the monarch butterfly as a candidate species as the only

[14] https://www.nps.gov/maps/full.html?mapId=8adbe798-0d7e-40fb-bd48-225513d64977.
[15] 20230515-5061.
[16] 20230522-5038.
[17] 20230828-3049.

species that may be present within one mile of the Project boundary. In addition, Eastern pearlshell mussel, a state listed threatened species, was identified within the Project impoundment and downstream of the Project dam during the recent FERC relicensing. No critical habitat is listed in the IPaC report.

Although there is no documentation of northern long-eared bat at the Project, and no known hibernacula sites occur within 0.25 mile of the Project, upland and wetland forest in the Project vicinity may provide suitable habitat for northern long-eared bat summer roosting and foraging activities. While the possibility of bats cannot be ruled out entirely, maintenance activities at the Project require only periodic mowing and tree trimming. Nothing in the record suggests that tree removal that occurs as part of Project operations would have the potential to affect NLEB maternity roost habitat.

In FERC's 2022 EA[18] Commission staff concluded that although relicensing the Project may affect the northern long-eared bat, it would not result in the prohibited incidental take of this species under the final ESA section 4(d) rule. The FWS concurred with staff's determination on September 12, 2022.[19] The Project has minimal effect on monarch butterflies due to the minimal outdoor maintenance activities of periodic mowing and tree trimming. Provisions of the Water Level Management Plan such as the seasonal restrictions for drawdowns, limiting drawdown rates to no more than 1 foot per hour, and limiting drawdown depth and duration to the extent possible all minimize Project maintenance related work on Eastern pearlshell mussels. Additionally, conducting drawdowns during daylight allows for both direct observation of mussels and increases in turbidity due to sedimentation further protect mussels.

Based on my review of the application, supporting documentation, and publicly available information, the Project is unlikely to impact listed species, and therefore satisfies the Threatened and Endangered Species criterion.

G. CULTURAL AND HISTORIC RESOURCE PROTECTION

Goal: The facility does not unnecessarily impact cultural or historic resources that are associated with the Facility's lands and waters, including resources important to local indigenous populations, such as Native Americans.

Assessment of Criterion Passage: The Applicant appropriately selected Standard G-2, Approved Plan, for all Zones.

Based on GMP's assessment of historic resources within a 100-foot buffer of the Area of

[18] 2022 FERC EA at page 42.
[19] 20220912-3014.

Potential Effect (APE), the Bolton Falls Dam is the only historic resource in the area. The dam has been eligible for listing in the National Register of Historic Places since March 19, 1981, and may be eligible for nomination to the Historic American Engineering Record. No above-ground historic resources other than the dam were found by GMP based on a desktop review of the Vermont State Historic Sites and Structure Survey database. However, GMP completed additional systematic on-site pedestrian surveys of all the structures within the APE, as well as properties that are partially within the APE, but which contain structures that are outside the APE. Three new archaeological sites were discovered and are considered historic resources and are therefore eligible for listing in the National Register of Historic Places.

Both Article 407 of the FERC license and the Programmatic Agreement with the Vermont State Historic Preservation Office (SHPO) require GMP to implement the Project's Historic Properties Management Plan[20] to ensure that measures are in place to protect Project historic properties from adverse effects related to the operation and maintenance of Project facilities. Per Stipulation 1.D of the Programmatic Agreement, GMP is required to file an annual report with the VT SHPO of activities conducted under the implemented Historic Properties Management Plan. The Historic Properties Management Plan include mitigation measures such as: (1) management of known archaeological resources; (2) protocols for conducting additional archaeological review when undertakings have any potential to impact the historic properties within the Project area; and (3) consultation and reporting protocols with FERC, the Vermont SHPO, and Tribal Nations to minimize impacts to archeological resources due to Project maintenance and recreational activities.

Based on a review of the application, supporting documentation, and publicly available information, the Project does not appear to adversely affect cultural or historic resources and satisfies the Cultural and Historic Resource Protection criterion.

H. RECREATIONAL RESOURCES

Goal: The facility accommodates recreation activities on lands and waters controlled by the facility and provides recreational access to its associated lands and waters without fee or charge.

Assessment of Criterion Passage: The Applicant appropriately selected Standard H-2, Agency Recommendation for Zones 1 and 3, however for reasons discussed below this review finds that Standard H-1, Not Applicable/De Minimis Effect, is more appropriate for Zone 2, the Bypassed Reach.

Recreation facilities at the Project include a Day Use Area and a portage trail. The Day Use Area consists of a parking lot, a picnic area with one grill, and access to the river downstream of

[20] Final plan filed March 31, 2022.

the tailrace. The portage trail consists of a take-out approximately 0.4 miles upstream from the dam, a put-in area at the Day Use downstream access point and an approximately 0.5-mile trail connecting the take-out and put-in areas. Portions of the trail are wide enough to accommodate a motor vehicle, but it is typically closed to vehicular traffic. A portable restroom is also available to the public and located along Power Plant Road just outside of the gate to the powerhouse and dam. No recreational facilities or activities exist in the Bypassed Reach for safety reasons and therefore, this review finds that Standard H-1 is appropriate for this Zone.

During the project's relicensing, GMP proposed several recreational enhancements in its draft Recreation Management Plan. Those improvements included: (1) relocating the existing Day Use Area parking lot out of the floodplain; (2) implementing measures to redirect foot traffic at the Day Use Area away from creeping lovegrass, a state rare species; (3) adding two picnic tables and an information kiosk to the Day Use Area; (4) ensuring that signage at the take-out is adequate for boaters to find the site from the river; (5) constructing an improved take-out, including clearing vegetation, and grading; and (6) clearing brush along the portage trail and ensuring that signage is adequate for boaters to follow the trail to the downstream put-in.

Article 406 of the FERC license required GMP to develop its final Recreation Management Plan[21] that included the GMP proposed enhancements, as well as the following additional provisions: (1) install and maintain a picnic table that is accessible to persons with disabilities at the Day Use Area; (2) install a 12-foot-wide concrete level slab at the portage take-out; (3) develop design drawings for improving the slope of the existing Day Use Area access road to enhance access for persons with disabilities; and (4) include an implementation schedule for completing the above improvements within two years of license issuance. The recreation site improvements are planned to be completed in 2024. The existing and planned recreational amenities allow for local residents and tourists to enjoy the recreational facilities at the Project and as the planned enhancements are completed, the existing facilities will be accessible to persons with disabilities. The final Recreation Management Plan also includes provisions to file monitoring reports with the Commission. This monitoring will ensure that the recreation facilities are maintained and if usage increases to the point where additional capacity is needed, the plan will be revised in consultation with resource agencies to propose further facility upgrades.

Based on my review of the application, supporting documentation, and publicly available information, the Project satisfies the Recreational Resources criterion with the condition recommended below.

[21] Plan was filed on March 22, 2023 and approved on May 26, 2023.

VIII. GENERAL CONCLUSIONS AND REVIEWER RECOMMENDATION

Based on my review, I believe that the Project satisfies all the above environmental and social resource criteria and recommend it be certified for a period of 10 years with the following condition.

Condition 1: Until all planned recreation enhancements are completed, the facility Owner shall provide updates on the status of implementation of each enhancement in the annual compliance submittals to LIHI.