

VERMONT AGENCY OF NATURAL RESOURCES

Water Quality Certification (33 U.S.C. § 1341)

In the matter of: Green Mountain Power Corporation
163 Acorn Lane
Colchester, Vermont 05446

APPLICATION FOR BOLTON FALLS HYDROELECTRIC PROJECT

Section 401 of the federal Clean Water Act requires that any Applicant for a federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters, shall provide the licensing or permitting agency a certification from the State in which the discharge originates that any such discharge will comply with other substantive provisions of the Clean Water Act. 33 U.S.C. § 1341(a)(1). The certifying State may set forth any effluent limitations and other limitations, and monitoring requirements necessary to assure that any applicant for a federal license or permit will comply with the Clean Water Act and with any other appropriate requirement of State law. 33 U.S.C. § 1341(d). In Vermont, the Agency of Natural Resources is the certifying agency of the State for purposes of Section 401 of the Clean Water Act. 10 V.S.A. § 1004. The Secretary of Natural Resources has delegated the authority to make certification determinations to the Department of Environmental Conservation (Department).

The Department has reviewed a water quality certification application dated January 22, 2021 and filed by the Green Mountain Power Corporation (GMP or the Applicant) for the Bolton Falls Hydroelectric Project (the Project). The supporting documentation for the certification application includes the Applicant's Federal Energy Regulatory Commission (FERC) license application (FERC No. 2879) dated January 30, 2020, other supporting documents filed by the Applicant in support of the application, and a bypass flow demonstration on November 29, 2021. The record for this decision includes the June 1, 2020, and August 11, 2020, FERC Additional Information Request (AIR) responses; the FERC Draft Environmental Assessment (EA) dated August 13, 2021; and many other documents related to the Project and its relicensing filed through October 1, 2021.

The current application is subject to review under the Vermont Water Quality Standards promulgated by the Agency of Natural Resources and effective beginning January 15, 2017 (Environmental Protection Rule, Chapter 29A) (Standards). (Standards, Section 29A-101 Applicability).

The Department, based on the application and record before it, makes the following findings and conclusions.

I. Applicable Statutes and Regulations

A. Applicable provisions of the Vermont Water Quality Standards

1. The Vermont Water Quality Standards (Environmental Protection Rule, Chapter 29A) (Standards) are promulgated by the Secretary of the Vermont Agency of Natural Resources pursuant to 10 V.S.A., Chapter 47, Water Pollution Control. Section 1252 of Chapter 47 provides for the

classification of designated uses as either Class A(1), A(2), B(1) or B(2) and authorizes the adoption of standards of water quality to achieve the purpose of classification.

2. All waters of the State shall be managed to support their designated and existing uses. (Standards, Section 29A-104(b)).
3. The designated uses are: aquatic biota and wildlife that may utilize or are present in the waters; aquatic habitat to support aquatic biota, wildlife, or plant life; the use of waters for swimming and other primary contact recreation; the use of waters for boating and related recreational uses; the use of waters for fishing and related recreational uses; the use of waters for the enjoyment of aesthetic conditions; the use of the water for public water source; and the use of water for irrigation of crops and other agricultural uses. (Standards, § 29A-104(d)).
4. The affected reaches of the Winooski River including the impoundment, bypass and downstream reach, have been classified as Class B(2) for all uses.
5. The Antidegradation Policy in the Standards requires that “[a]ll waters shall be managed in accordance with [Standards] to protect, maintain, and improve water quality.” (Standards, Section 29A-105).
6. The Winooski River is designated as cold water fish habitat. (Standards, Section 29A-308).
7. In waters designated as cold water fish habitat, the dissolved oxygen (DO) standard is not less than 7 mg/L and 75 percent saturation at all times, nor less than 95 percent saturation during late egg maturation and larval development of salmonids in waters that the Secretary determines are salmonid spawning or nursery areas important to the establishment or maintenance of the fishery resource. In all other waters designated as a cold water fish habitat, the standard is not less than 6 mg/L and 70 percent saturation at all times. (Standards, Section 29A-302(5)(A)).
8. The general temperature standard for waters is “[c]hange 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.” (Standards, Section 29A-302(1)(A)).
9. In waters designated as cold water fish habitat and classified as Class B(2) for the fishing use, the total increase from ambient temperature due to all discharges and activities shall not exceed 1.0° F. (Standards, Section 29A-302(1)(B)(iii)).
10. The turbidity standard as an annual average under dry weather base-flow conditions is 10 NTU for cold water fish habitat. (Standards, Section §29A-302(4)(A)).
11. The management objectives for waters classified as Class B(2) for aquatic biota and wildlife are “Waters shall be managed to achieve and maintain good biological integrity.” (Standards, Section 29A-306(a)(3)(A)). The Class B(2) criteria for aquatic biota and wildlife use, require “[c]hange 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.” (Standards, Section 29A-306(a)(3)(B)).
12. The management objectives for waters classified as Class B(2) for aquatic habitat are “[w]aters shall be managed to achieve and maintain high quality aquatic habitat. The physical habitat

structure, stream processes, and flow characteristics of rivers and streams and physical character and water level of lakes and ponds necessary to fully support all life-cycle functions of aquatic biota and wildlife, including overwintering and reproductive requirements, are maintained and protected.” (Standards, Section 29A-306(b)(3)(A)). The Class B(2) criteria for aquatic habitat use in rivers and streams are “[c]hanges 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. (Standards, Section 29A-306(b)(3)(B)(i)). Additionally, “waters shall comply with the Hydrology Criteria in Section 29A-304” of the Standards. (Standards, Section 29A-306(b)(3)(B)(iii)).

13. The Hydrology Policy in the Standards requires that “[t]he proper management of water resources now and for the future requires careful consideration of the interruption of the natural flow regime and the fluctuation of water levels resulting from the construction of new, and the operation of existing, dams, diversions, and other control structures.” (Standards, Section 29A-103(f)(1)).
14. To effectively implement the hydrology policy, hydrology criteria shall be achieved and maintained, where applicable. The hydrology criteria require for waters classified as Class B(2) for aquatic habitat that “[a]ny 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.” The preferred method for ensuring compliance with this subsection is a site-specific flow study. In the absence of a site-specific study, the use of general hydrologic standards is also accepted. (Standards, Section 29A-304(b)(3)).
15. The management objective for waters classified as Class B(2) for aesthetics is “[w]aters shall be managed to achieve and maintain good aesthetic quality.” (Standards, Section 29A-306(c)(3)(A)). The Class B(2) criteria for aesthetics use in rivers and streams are “[w]ater character, flows, water level, bed and channel characteristics, and flowing and falling water of good aesthetic value.” (Standards, Section 29A-306(c)(3)(B)(i)).
16. The management objective for waters classified as Class B(2) for boating is “[w]aters shall be managed to achieve and maintain a level of water quality compatible with good quality boating (Standards, Section 29A-306(d)(3)(A)). The Class B(2) criteria for boating use is “waters shall comply with the Hydrology Criteria in Section 29A-304 of these rules.” (Standards, Section 29A-306(d)(3)(B)).
17. The management objectives for waters classified as Class B(2) for swimming and other primary contact recreation are “[w]here sustained direct contact with the water occurs, waters shall be managed to achieve and maintain a level of water quality compatible with good quality swimming and other primary contact recreation with very little risk of illness or injury from conditions that are a result of human activities.” (Standards, Section 29A-306(f)(3)(A)).
18. The management objectives for waters classified as Class B(2) for fishing are “[w]aters shall be managed to achieve and maintain a level of water quality compatible with good quality fishing. (Standards, Section 29A-306(e)(3)(A)). The criteria for fishing are “measures of wild salmonid densities, biomass, and age composition indicative of good population levels” and compliance with the temperature criteria in Section 29A-302(B) of the Standards. ((Standards, Sections 29A-306(e)(3)(B)(i)) and 29A-306(e)(3)(B)(ii)).

II. Factual Findings

A. Background and General Setting

19. The Bolton Falls Hydroelectric Project is an existing licensed project located on the Winooski River in Vermont. The Winooski River is the largest tributary to Lake Champlain. The Winooski River flows 90 miles in a mostly western direction from the Town of Cabot in the east to its terminus in Lake Champlain in the Town of Colchester. The Winooski River has a total drainage area of 1080 square miles, and the Project has a watershed size of 821 square miles.
20. There are several major tributaries to the Winooski including the Stevens River, North Branch of the Winooski River, Dog River, Mad River, Little River and the Huntington River. There are 13 hydroelectric projects located on the mainstem and tributaries of the Winooski River. Three hydroelectric generation projects are located downstream of the Project on the mainstem of the Winooski River, with another three projects located upstream on the mainstem. The remainder are located on tributaries to the Winooski River.
21. The Bolton Falls Hydroelectric Project is owned and operated by Green Mountain Power Corporation (GMP). The Project is located in the Towns of Waterbury and Duxbury.
22. The Project site was originally developed in 1899 with two turbine generator units (units 1 & 2), and between 1905-1906 a third turbine generator unit (unit 3) was added. The Project was heavily damaged by the November 1927 flood which washed away part of the powerhouse including unit 2. The Project continued to operate with units 1 and 3 until the Project ceased operation in 1938. The Project was abandoned in 1939. The current dam and powerhouse were reconstructed between 1985 and 1986 as part of the recommissioning of the Project.
23. This site was originally licensed by FERC on February 5, 1982, as Project No. 2879, with the term of the license running through January 31, 2022.

B. Project and Civil Works

24. The Project dam is a 92-foot-high, 275-foot-wide timber crib dam buttressed with a masonry wall on the downstream face. The dam spillway is capped with 196-foot-long reinforced concrete overflow spillway with a crest elevation of 392.0 feet, and a 5-foot-high inflatable rubber dam with a maximum crest elevation of 397.0 feet. There is a concrete-capped masonry tower with a maximum elevation of 412.0 feet as well as a lower level on the upstream face at an elevation of 400.0 feet which allows access to the intake area. The dam includes two 4.0-foot-wide by 4.5-foot-high sluiceways in the masonry buttress section for drainage of the timber crib dam with an invert elevation of 347.0 feet. The dam creates an approximately 59-acre impoundment at an elevation of 397.0 feet and extends upstream approximately 2 miles.
25. The Project forebay consist of two separate concrete intakes leading to a 10-foot diameter penstock. The bottom of the intakes are at an elevation of 360.0 feet with the top of the intake at an elevation of 389.1 feet. The intake structure is equipped with trashracks that are 27-foot-wide by 43-foot-high at a 70-degree angle with 3-inch clear spacing and a raking system.
26. The two penstocks are each 10-foot-diameter and 120-foot-long and are made of steel and encased in concrete. The two penstocks enter the powerhouse delivering water directly to each

generating unit. Additionally, there is a 36-inch diameter steel bypass pipe with an invert elevation of 383 feet that discharges near the left side of the spillway base. It has a maximum hydraulic capacity of 114 cfs at normal pool elevation of 397.0 feet.

27. The powerhouse was constructed between 1985-1986 and is located on river left downstream of the dam. It is a reinforced concrete structure approximately 73-feet-long by 57-feet-wide. Within the powerhouse, there are two horizontal Kaplan turbines each with a generating capacity of 3,750 kW. Both turbines have a hydraulic range of 365 cfs to 1,200 cfs. The total combined capacity of the Project is 7,500 kW with a hydraulic capacity of 365 cfs to 2,400 cfs.
28. The generators are horizontal shaft synchronous type, operating at 277 rpm at 4,160 volts. There is a 130-foot long, 5 kV underground transmission line from the powerhouse to an adjacent switchyard. The generators are connected to a 34.5/4.16 kV transformer in the switchyard. There is also a 34.5 kV transmission line that is approximately 600 feet long that runs to a second switchyard with a 34.5/4.16 kV transformer.

C. River Hydrology

29. The Winooski River is the largest tributary watershed to Lake Champlain. The Winooski River begins in the town of Cabot, flows in a mostly western direction to the town of Colchester where it enters Lake Champlain. The watershed drains an area of 1,080 square miles and six counties.
30. There are six U.S. Geological Survey (USGS) gaging stations that have historically operated on the Winooski River. Three USGS gaging stations are currently operating on the mainstem of the Winooski River. The two closest being USGS 04288040 Winooski River Crossett Brook at Waterbury Vermont with a watershed size of 379 square miles (upstream) and USGS 04290500 Winooski River near Essex Junction, Vermont with a watershed size of 1,044 square miles (downstream).
31. Hydrologic information is tabulated below (Table 1) for the Project. The statistics were calculated using the most recent 30 years of daily streamflow data from four USGS gages within the contributing area: Little River (04289000), Mad River (04288000), Dog River (04287000), and Winooski River (04288040). The total streamflow from these subwatersheds accounts for 88% of the drainage area (722.5 square miles (sq. mi.)) at the Project. Flows from the ungaged portion were estimated using the unregulated Mad and Dog River streamflow in cfs/sq. mi. and applied to the remaining 98.5 sq. mi. of drainage area. The statistics are also reflective of flow regulation occurring upstream within the Winooski and Little River subwatersheds.

Table 1. Estimated hydrologic statistics for the Bolton Falls Hydroelectric Project. Statistics were estimated using surrounding USGS gages and prorated to the Project site.

Statistic	Winooski River at Bolton Falls Hydro
Drainage Area (sq. miles)	821
Annual Runoff (inches)	26.8
10% Exceedance Flow (cfs)	3,328.5
50% Exceedance Flow (cfs)	899.1
90% Exceedance Flow (cfs)	295.1
7Q10 (cfs)	135.9

D. Current License Conditions

32. The Bolton Falls Hydroelectric Project is currently licensed to operate as a peaking facility, with a minimum flow of 300 cfs, or inflow if less, in the tailrace and a maximum generation flow of 2,600 cfs, or inflow if greater. The current license allows the impoundment to be drawn down six feet from an elevation of 397.0 feet to a minimum of 391.0 feet for the purpose of generation. Currently, no spillage or flow is required to be released into the bypassed reach of river. However, the applicant indicates that the Project is typically operated in an automated run-of-river mode to maintain a constant impoundment elevation of 397.0 feet.

E. Applicant’s Proposal

33. The Applicant is proposing to operate in an automated run-of-river mode. During normal flow conditions, the impoundment will be maintained at either elevation 397.0 or 397.25 feet during times of aesthetic spill.

34. The Applicant is proposing to provide 75 cfs via spillage into the bypassed reach during daylight hours April 1st through December 15th. Leakage of an unknown amount, but estimated to be between 0 to 16 cfs based on ambient conditions, will continue to be provided during the remaining period (December 16th through March 31st), and during nighttime hours.

35. Nighttime is defined as one half-hour after sunset to one-half hour before sunrise, based on the middle date of each month. The proposed times for each month are specified by the Applicant in finding 37.

36. GMP is not proposing to add capacity or to make any major modification to the Project facilities.

37. Within the license application the Applicant is proposing to include the following conditions;

Impoundment Levels

Except as temporarily modified by (1) Approved maintenance and dam safety monitoring activities, (2) extreme hydrologic conditions, as defined below, or (3) agreement between GMP, the Vermont Agency of Natural Resources, and appropriate state and/or federal fisheries management agencies, the Project will be operated in run-of-river mode with the impoundment level maintained at elevation 397.0 feet, under normal flow conditions, during periods when

aesthetic spillage is not required. During periods when aesthetic spillage over the dam is required, the Project will be operated in run-of-river mode with the impoundment level maintained at elevation 397.25 feet, under normal flow conditions.

“Extreme Hydrologic Conditions” means the occurrence of events beyond GMP’s control such as, but not limited to, abnormal precipitation, extreme runoff, flood conditions, ice conditions or other hydrologic conditions such that the operational restrictions and requirements contained herein are impracticable to achieve or are inconsistent with the safe operation of the Project.

Bypass Minimum Flows

Except as temporarily modified by (1) approved maintenance and dam safety monitoring activities, (2) extreme hydrologic conditions, as defined above, (3) or agreement between GMP, the Vermont Agency of Natural Resources, and appropriate state and/or federal agencies, a bypass minimum flow of 75 cfs or inflow, whichever is less, shall be provided, via spillage over the Project dam, during daylight hours from April 1 through December 15. Leakage flow will be provided during nighttime hours from April 1 through December 15. Leakage flow from the Project will be provided at all times from December 16 through March 31.

Nighttime is defined as one half-hour after sunset to one-half hour before sunrise, based on the middle date of each month, as shown below.

<i>Month</i>	<i>Night Start</i>	<i>Night End</i>
<i>January</i>	<i>17:08</i>	<i>6:55</i>
<i>February</i>	<i>17:51</i>	<i>6:23</i>
<i>March</i>	<i>19:28</i>	<i>6:35</i>
<i>April</i>	<i>20:07</i>	<i>5:39</i>
<i>May</i>	<i>20:43</i>	<i>4:55</i>
<i>June</i>	<i>21:09</i>	<i>4:37</i>
<i>July</i>	<i>21:05</i>	<i>4:52</i>
<i>August</i>	<i>20:28</i>	<i>5:25</i>
<i>September</i>	<i>19:33</i>	<i>6:01</i>
<i>October</i>	<i>18:38</i>	<i>6:37</i>
<i>November</i>	<i>16:55</i>	<i>6:18</i>
<i>December</i>	<i>16:43</i>	<i>6:52</i>

- 38. The Applicant is proposing additional environmental measures, which include continuing to operate and maintain the canoe portage put-in and take-out, in addition to operating and maintaining the day use recreation area.
- 39. The Applicant will implement a recreation management plan which includes but is not limited to, relocating the existing parking area out of the floodplain, improving the portage landing, adding signage, and adding two picnic tables.

F. Current Status

- 40. In September 2020, the U.S. Environmental Protection Agency approved a list of waters considered to be impaired based on water quality monitoring efforts and in need of total

maximum daily load (TMDL) development to address the pollution. The Department submitted the list under Section 303(d) of the federal Clean Water Act. According to the State of Vermont's 2020 303(d) list of impaired surface waters in need of TDML, there are no listed waters within or near the Project affected area (State of Vermont 2020 303(d) List of Waters, Part A – Impaired Surface Waters in Need of TMDL, September 2020).

41. The Agency's publication *Hydropower in Vermont, An Assessment of Environmental Problems and Opportunities* is a state comprehensive plan.¹ The plan indicated that hydroelectric development has a significant impact on Vermont streams. Artificial regulation of natural stream flows and the lack of adequate minimum flow at sites were found to have reduced to a large extent the success of the state's initiatives to restore the beneficial values and uses for which the affected waters are managed under the federal Clean Water Act and Vermont law.
42. Vermont's *Wildlife Action Plan* lists freshwater mussels as a species of greatest conservation need and high priority.² Dams are identified as a threat to the species as they fragment and remove habitat, as in many cases river habitat is converted to reservoirs. Additionally, the plan notes hydropower dams can create unnatural frequency of water level and velocity changes. A high priority strategy for protection of freshwater mussels identified in the plan is to work with dam operators and owners to reduce impacts of dam operations on mussels.

G. Water Chemistry

43. There are fourteen wastewater discharges upstream of the Project in the Winooski watershed. Four are located on the mainstem and ten on tributaries. The Waterbury Wastewater Treatment Facility is the closest, approximately 3 miles upstream from the Project. Additionally, there are eleven wastewater discharges downstream of the Project on the mainstem of the Winooski River.
44. There is no water withdrawn from the mainstem of the Winooski River for the purposes of public drinking water upstream of the Project. There are some withdrawals for drinking water located on tributaries to the Winooski River, including the Village of Waterbury, Montpelier, Barre, and by the Mountain Water Company for Sugarbush Resort. Additional water withdrawals occur in the Winooski basin for the purposes of snowmaking generally between November and March of every year.
45. Water quality data has been collected sporadically within the Project area. These occasions include the licensing of the Bolton Falls Hydroelectric Project, and the relicensing of the Waterbury Reservoir Hydroelectric Project (FERC No. 2090). Long term water quality monitoring takes place near the Waterbury Wastewater Treatment Facility upstream of the Project, and near the Richmond Wastewater Treatment Plant downstream of the Project. Macroinvertebrate data have also been sporadically collected within the Winooski River. Sample collections closer to the Project have occurred between 1991 and 2015.
46. As part of the Project relicensing the Applicant conducted a water quality study in 2018. Data loggers were deployed to continuously collect water temperature and dissolved oxygen (DO) on

¹ DesMueles and Parks. 1988. *Hydropower in Vermont. An assessment of Environmental Problems and Opportunities*. Vermont Department of Environmental Conservation. Montpelier, Vermont.

² Vermont Fish & Wildlife Department. 2015. *Vermont Wildlife Action Plan 2015*. Vermont Fish & Wildlife Department. Montpelier, VT.

15-minute intervals at 7 locations near the Project. Data loggers were deployed from June 1 to September 30 immediately upstream of the Project, two within the Project impoundment, one logger near the Project intake, one within the Project tailrace, one within the bypassed reach, and lastly one downstream of the Project tailrace.

47. During periods of August and September DO did not meet Vermont Water Quality Standards. These locations included upstream of the Project, within the impoundment, in the bypass reach, in the tailrace and downstream of the Project. The Applicant proposes that this is not due to Project operations because the Project was not operating during those instances. Instead DO below Standards occurred because of either low flow within the Winooski River or maintenance activities.
48. Some low DO readings may have been due to biofouling as indicated by rapid increases in DO concentrations coinciding with data logger checks (data download and replacement). Because biofouling can occur gradually, when the data became inaccurate is unknown.
49. Additionally, some instances of DO being below Standards in the tailrace occurred during Project generation and during impoundment drawdown maintenance (June 1, 2018). Generation was above 1 MW and DO fell below 6 mg/L. Within the same maintenance event (5/29/2018-6/28/2018), DO again fell below Standards starting June 20th, and generally remained low until the data logger was checked on June 27th, at which point DO returned to above 6 mg/L. Maintenance activities are considered part of Project operations.
50. Temperature patterns observed indicated that generally, there is a diurnal pattern of increasing and decreasing temperatures, with the greatest diurnal fluctuation occurring upstream. 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. The cumulative impacts from the Waterbury Reservoir Hydroelectric Project may buffer the temperature effects due to the Project.
51. Additional water quality data was collected within the bypassed reach and provides a snapshot of DO and temperature. The samples were taken between 0956 and 1118 on July 22, 2019. Winooski River flows were 864 cfs, and there was an unknown amount of leakage flowed to the bypassed reach. Spillage into the bypassed reach had occurred approximately 30 hours earlier. The onetime spot measurements indicated that the area sampled in the bypassed reach was relatively uniform in both DO (above 6 mg/L) and temperature.

H. Aquatic Biota

52. The Winooski River is classified by the State of Vermont as Class B(2) for the aquatic biota designated uses and is designated as a cold water fish habitat. The term aquatic biota means all organisms that, as part of their natural life cycles, live in or on waters. (Standards, Section 29A-102(5)). Aquatic biota include fish, aquatic insects, amphibians, and some reptiles, such as turtles.
53. The Winooski River supports a diverse fish community influenced by its confluence with Lake Champlain. In the vicinity of the Project the river supports rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*), white sucker (*Catostomus commersonii*), fallfish (*Semotilus corporalis*), longnose dace (*Rhinichthys cataractae*), yellow

perch (*Perca flavescens*), pumpkinseed (*Lepomis gibbosus*), and smallmouth bass (*Micropterus dolomieu*).

54. Downstream of the Project, landlocked Atlantic salmon (*Salmo salar*) are present. Currently salmon are trapped at the Winooski One Hydroelectric Project (FERC No. 2756) and released above the Essex No. 19 Hydroelectric Project (FERC No. 2513). The Project represents the upper end of the reach that is accessible to salmon.
55. The Vermont Fish and Wildlife Department stocks brown and rainbow trout in the Winooski River annually. However, it is assumed that little to no reproduction occurs in the Project area due to the limited extent of gravel.

Fish Passage and Protection

56. Currently there are no fish passage facilities at the Bolton Falls Hydroelectric Project. With the exception of landlocked Atlantic salmon, fish species in the vicinity of the Project do not require migration to complete their lifecycle. However, resident species do move both upstream and downstream.
57. As part of the relicensing, the Applicant conducted an entrainment, impingement, and mortality study for resident species. Target species included in the evaluation were rainbow trout, brown trout, brook trout, fallfish, longnose dace, golden shiner, white sucker, smallmouth bass, and slimy sculpin.
58. The intake structure is equipped with trashracks that are 27-feet-wide by 43-feet-high at a 70-degree angle with 3-inch clear spacing and a raking system. The estimated intake velocity in front of the trashracks is 2.07 feet per second at maximum generation.
59. The Applicant evaluated three passage routes: (1) over the dam; (2) through the bypass pipe; and (3) through the Project turbines. Species were evaluated for likelihood of encountering the trashracks at the Project based on life history traits.
60. Brook trout, fallfish, longnose dace, and slimy sculpin all had a low probability of encountering the intake. Rainbow trout, brown trout, and golden shiner had a low to moderate probability of encountering the intake. Smallmouth bass has a moderate chance of encountering the intake. White sucker was the only species to have a moderate to high chance of encountering the intake.
61. Fish species were evaluated for burst swim speed. If burst swim speed was greater than the velocity in front of the intake, it was assumed that individuals would be able to escape entrainment or impingement.
62. Most juvenile and adult target species have a burst swim speeds greater than the intake velocity. The exception is for golden shiner adults and juveniles and juvenile smallmouth bass. The Project operates at full capacity approximately 18% of the time, with an intake velocity of 2.07 ft/s at full capacity.
63. Additionally, fish were evaluated for survival through the Kaplan turbines at the Project. This analysis uses previous survival study estimates based on fish length. Depending on fish length, immediate survival is estimated to be between 87.2 and 95.4%. 48-hour survival is estimated to

be between 83.9 to 93.4%. Fish less than 8 inches have an estimated immediate and 48-hour survival of 94.8% and 93.4% respectively.

I. Aquatic Habitat

64. The Winooski River is classified by the State of Vermont as Class B(2) for the aquatic habitat designated use.
65. Waters designated as Class B(2) for aquatic habitat use shall be managed to achieve and maintain high quality aquatic habitat, characterized by the physical habitat structure, stream processes, and flow characteristics of rivers and streams and the physical character and water level of lakes and ponds necessary to protect and support all life-cycle functions of aquatic biota and wildlife, including overwintering and reproductive requirements. (Standards, Section 29A-306(b)(3)(A)).
66. The impoundment extends 2.1 miles upstream from the dam and has a surface area of 59 acres at normal pond elevation (397 feet msl). The depth in the impoundment varies and contains sand and gravel bars and islands.
67. The bypass reach is approximately 150 feet long and varies in width from approximately 120 to 200 feet wide. The reach is largely comprised of one large pool. There is no known bathymetry map of the bypass reach, but the bottom consists of highly irregular bedrock with depths up to 25 feet.
68. The bypass pool offers deep water habitat that is limited in this reach of the Winooski River which is largely comprised of shallow riffle and run habitat. Deep water pool habitat is an important habitat type for trout and other fish both spatially and temporally to provide both cover and stable habitat conditions. These conditions may be particularly important for overwintering habitat.
69. The powerhouse discharges into a 150 feet long reach of the Winooski River before the river channel widens. Additionally, there is a channel island that bifurcates flow into a north and south channel before rejoining on the downstream end of the island. The southern channel is primarily a flood chute and is likely only accessed during medium to high flow events. Both channels are characterized by run and riffle habitats with sand and gravel substrates.

Flow Needs for the Protection of Aquatic Habitat

70. The Applicant has proposed a run-of-river operating mode, meaning outflow will equal inflow, but did not specify an interval for which this would occur. Because the applicant has proposed to operate the project as an instantaneous run-of-river project, the Agency presumes the Applicant's intent is to not regulate flow below the Project, except for short term and unavoidable special circumstances such as during impoundment refilling following maintenance activities and Project shutdowns.
71. An instantaneous run-of-river project is one which does not operate out of storage, and therefore, does not artificially regulate streamflows below the project's tailrace. Outflow from the project is equal to inflow to the project on an instantaneous basis. The flow regime below the project is essentially the river's natural regime, except in special circumstances as outlined above.

72. The Bolton Falls Hydroelectric Project bypass reach is backwatered, with a large deep pool at the base of the dam. Under current operations no spillage is required to be provided to the bypassed reach.
73. The Applicant conducted a habitat study in the bypassed reach to evaluate a range of spillage flows at the dam to assure compliance with Class B(2) management objectives and criteria for the aquatic habitat designated use (Standards). The method used was a flow demonstration where an assessment team evaluated a series of flows ranging from leakage to 217 cfs to determine the percentage of broken water surface and active circulation in the reach at each flow.
74. The percentage of broken water surface in the reach ranged from 10-15% at leakage to 92% at a flow of 217 cfs with the largest increases between 75 cfs to 150 cfs (40 to 60 percent) and 150 cfs and 217 cfs (60 to 92 percent). The percent of the reach with active water circulation ranged from 25% at leakage and increased to 100% at the highest flow observed. The largest increase in active circulation was between 50 cfs and 75 cfs (50 to 75 percent) followed by the increase between 75 cfs and 150 cfs (75 to 92 percent) (Table 2).

Table 2. The habitat assessment team's consensus for the percentage of broken water surface and active water circulation for the Bolton Falls bypass reach for the first bypass habitat assessment (October 2019).

Spillage Flows (cfs)	Percent of Reach with Broken Surface	Percent of Reach with Active Circulation
0 (leakage)	10-15	25
15	25	35
50	33	50
75	40	75
150	60	92
217	92	100

75. At the suggestion of the Agency^{3, 4} an additional habitat study took place to evaluate the percent of reach with broken surface and percent of reach with active circulation for flows between 75 cfs and 150 cfs in November 2021. The same procedure (finding 73) was followed but different flows were evaluated. Flows of 75 cfs and 150 cfs were repeated to evaluate consistency between bypass habitat demonstrations.
76. The percentage of broken water surface ranged from 40-55% between 75 and 150 cfs. There was generally a consistent increase in percent of broken water surface between flows. The percentage of reach with active circulation ranged from 75-90% between flows of 75 and 150 cfs. The largest increase occurred between 75 cfs and 100 cfs, increasing by 8 percentage points (75% to 83%) (Table 3).

³ Bolton Falls Hydroelectric Project Pre-Filling Meeting Follow Up. Letter from VT DEC. January 21, 2021.

⁴ Bolton Falls Hydroelectric Project Comments on Draft EA. Letter from VT DEC. September 13, 2021.

Table 3. The habitat assessment consensus rating for the percentage of broken water surface and active water circulation for the Bolton Falls bypass reach for the second habitat assessment (November 2021).

Spillage Flows (cfs)	Percent of Reach with Broken Surface	Percent of Reach with Active Circulation
75	40	75
100	45	83
125	51	85
150	55	90

77. The Applicant is proposing to provide a minimum bypass flow of 75 cfs, or inflow, whichever is less, via spillage over the dam during daylight hours from April 1 through December 15 for aesthetic and aquatic habitat purposes, with leakage being provided the remainder of the time. The Applicant estimates that leakage typically ranges from 0 to 16 cfs depending on conditions.

Water Level Fluctuation in the Impoundment

78. The Bolton Falls Hydroelectric Project is proposing to operate in a run-of-river mode with the impoundment at an elevation of 397.0 feet during times of no spill and 397.25 feet for the remainder of the time. Run-of-river operations will result in little water level fluctuations within the impoundment during normal operations, except during times of raising or lowering the impoundment for spillage purposes.

79. The Applicant has indicated that it will need to periodically drawdown the impoundment for repairs and maintenance purposes. The Applicant has estimated a drawdown could occur between 0 to 10 times annually and in general the duration of the drawdown for maintenance varies from less than a day to a month. Additionally when the impoundment is lowered, it is typically five feet or less below the normal elevation of 397.0 feet.

80. Maintenance activities are not seasonally planned as they are dependent on when repairs are needed. The timing and duration of a drawdown can have different effects on the habitat available within the impoundment. Spring lowering would result in loss of spawning and rearing habitat for some fish. Additionally, lowering the impoundment will have effects on mussel species, specifically the Eastern pearlshell (*Margaritifera margaritifera*, state threatened) which was observed in depths less than 5 feet.

J. Wildlife and Wetlands

81. Hydroelectric operations, namely water level fluctuations in impoundments, can affect wetland and shoreline vegetation. The Applicant is proposing to maintain a steady impoundment at either 397.0 or 397.25 feet elevation during normal Project operations.

82. There are wetlands identified within the Project boundary as classified by the U.S. Fish and Wildlife Service under the National Wetlands Inventory. Those located in the Winooski River include; two riverine, upper perennial, unconsolidated shore, seasonally flooded wetlands; lacustrine, limnetic, unconsolidated bottom, permanently flooded and impounded; and riverine, upper perennial, unconsolidated bottom, and permanently flooded.

83. Wetlands located adjacent to the Winooski River include; palustrine, forested, broad-leaved deciduous, temporary flooded; forested, broad-leaved deciduous/scrub-shrub broad-leaved deciduous seasonally flooded; riverine, unknown perennial, unconsolidated bottom, permanently flooded; and palustrine, scrub-shrub, broad-leaved deciduous, and temporary flooded.
84. Additionally, there are wetlands classified as Class II and protected under Vermont Statutes Annotated Title 10, Chapter 37 and the Vermont Wetland Rules. The wetlands identified are similar in location and dimensions to those identified by the National Wetlands Inventory. A proposed non-exempt activity within a wetland requires authorization from Vermont Department of Environmental Conservation. The operation of hydroelectric facilities in compliance with state and federal requirements is considered an allowed use under the Vermont Wetland Rules, and is generally permitted without a state wetlands permit (Vermont Wetland Rules Section 6.7). Conditions related to protection of aquatic habitat and biota may be imposed through this certification.
85. Due to the run-of-river operations, there is likely to be limited Project impacts on wetlands. Aquatic biota and wildlife in the wetland will likely be affected during Project maintenance. The effect and severity will depend on the duration and drawdown extent of any particular activity.

K. Rare, Threatened, and Endangered Species

86. Northern long-eared bat (*Myotis septentrionalis*) is federally listed as threatened and state-listed as endangered. This species winters in caves and cave-like structures, but summers in cavities, under bark or in hallows of live and dead trees. Tree maintenance has the potential to disrupt roosts between April 1st and October 31st. There are no known occurrence, habitat, or winter hibernacula of northern long-eared bat within a 1-mile radius of the Project boundary.
87. Eastern pearlshell (*Margaritifera margaritifera*) is a mussel that is state-listed as threatened and occurs within the Project impoundment and just downstream of the facility. Habitat preferences are small rivers with sand, fine gravel or a sand-gravel mix bottom. Eastern pearlshell are the longest-lived freshwater invertebrate in the animal kingdom.
88. The Applicant conducted an assessment on Eastern pearlshell mussels within the impoundment and downstream. Individual Eastern pearlshell mussels mostly occurred within the impoundment at varying substrates and water depths. The individuals were primarily larger, indicating little recruitment to the population. Some of the larger individuals located could be at least 40-50 years old, indicating survival under various conditions. However, the greatest concern for the individuals located within the impoundment are periodic maintenance drawdowns.
89. Additional Vermont ranked rare-uncommon plants were located during the relicensing of the Project.
90. Creeping lovegrass (*Eragrostis hypnoides*) are typically located on the shores of Lake Champlain or major rivers, in riverine-sandbar areas. This plant was observed in the day use area of the Project, where hundreds of individuals were located. It was observed, that because of public access to this area there were impacts to existing habitat, and within the highest-trafficked portions of the habitat creeping lovegrass was not present.

91. Stout goldenrod (*Solidago squarrosa*) are typically located on acidic ledges, cliffs or rock outcrops. During the survey, this plant was located on a rock outcrop upstream of the dam, and was likely one individual. There were some indications that the public was in the vicinity including trash and graffiti.
92. Hay sedge or silvery-flowered sedge (*Carex argyrantha*) are typically located in early successional sites. The hay sedge was located in the transmission line corridor, where maintenance mowing occurs. It is anticipated that this mowing allows the area to remain in early succession which is preferred by the hay sedge.

L. Shoreline Erosion

93. The Project impoundment extends approximately 2.1 miles upstream. The total shoreline length is approximately 4.2 miles. Much of the shoreline is either steep rock outcrops or vegetated banks.
94. The soils mapped around the impoundment include, fine sands, fine sandy loams, very fine sandy loams, loamy fine sands, and silt loams. The soils listed range from not highly erodible to highly erodible.
95. Because the Applicant proposes to operate the facility in a run-of-river mode and maintain the reservoir at either 397.0 feet elevation or 397.25 feet elevation, there will likely be limited erosion over and above what might naturally occur as a result of Project operations.

M. Recreation Use

96. The Project has two recreational facilities, the DeForge Hydroelectric Station Recreation Area and the portage trail. Both are operated and maintained by the Applicant. The DeForge Hydroelectric Station Recreation Area is a day use area and consists of a parking lot, a grassy picnic area with a grill, and river access just below the dam. The portage trail consists of a take-out upstream of the dam, an unimproved launch area downstream of the dam, and an approximately 0.5-mile trail connecting the take-out to the launch area downstream.
97. The parking area for the day use area has space to accommodate twelve vehicles with another small pullout along Power Plant Road near the portage trail that has space for two vehicles. There is a portable restroom on site along Power Plant Road just outside the gate to the powerhouse and dam.
98. The Applicant conducted a recreation study as part of the relicensing effort to (1) identify which recreational opportunities are being utilized (2) identify potential obstacles to recreational users, and (3) identify any recreational improvements to enhance future recreational opportunities.
99. The surveys indicate that most of the recreational use occurs at the day use area (92%) and only a small portion (8%) occurs at the portage trail. Annual recreational use is estimated at 7,422 recreation days with the majority (72%) occurring in the summer. The most popular recreational activities for the two recreation areas combined are boating (39%) followed by fishing from shore (25%) and wading/swimming (10%). The remainder was made up of picnicking, wildlife viewing, and sightseeing.

100. On average, only 1 of the 12 day-use parking lot spaces was occupied on a non-peak weekend at the Project. Occasionally the parking lot was observed to be utilized to full or near full capacity, including during the Onion River Race Ramble and the Fourth of July. It is anticipated that based on this usage, the day use area will be used at 9% capacity in 2060.
101. Most respondents to the survey questionnaire were extremely satisfied or moderately satisfied with the number and condition of the recreation facilities and opportunities. The survey questionnaire also invited individuals to suggest improvements to the recreational facility. The most common suggestion was to add toilets, followed by removing litter. Other suggestions included adding picnic tables, improving signage, and improving the portage landing.
102. The Applicant is proposing to continue to operate and maintain the two existing recreation sites. Additionally, a Recreation Management Plan (RMP) for the Project will be developed. The RMP will include additional measures to enhance recreation at the Project.
103. The Applicant states that the lower parking lot floods annually, and therefore plans to relocate the lower parking lot and expanding on the upper, or overflow, parking lot. This will reduce the number of vehicles from 34 to 22 (17 at the overflow lot and 5 at the informal pullout). The proposed parking lot would offer handicap parking.
104. Additional measures in the proposal include, reroute foot traffic away from creeping lovegrass, add picnic tables one of which will conform with the Americans with Disabilities Act, and improve signage. At the portage, the Applicant will construct a new take-out, improve signage, and clear brush.
105. Friends of the Winooski River submitted comments on the RMP proposed by the Applicant. Concerns included accessibility for those with limited mobility if the parking lot is relocated, in addition to suggestions on the portage landing upstream of Bolton Falls. The Applicant developed conceptual designs and cost estimates for alternatives raised by Friends of the Winooski River.
106. Based on the analysis the Applicant's preferred alternative was to adopt the changes proposed for the portage landing and construct a gravel lot at the informal overflow parking area with 16 standards and one accessible parking spaces and blocking vehicular access to the gravel access road leading to the existing Day Use Area lot. This access road would then be raised to reduce the slope to meet the U.S Forest Service Trail Accessibility Guidelines for accessible trails.

N. Debris

107. The Applicant has provided little information on cleaning and disposal of trashrack debris and other Project-related debris. The Applicant notes that the Project is maintained daily including cleaning the trashracks and grounds keeping. The depositing or emission of debris and other solids to state waters violates Vermont's solid waste laws and Standards, Section 29A-303(1) and Section 29A-303(2). Debris may also impair aesthetics and boating.

O. Aesthetics

108. The Project's dam is a 92-foot-high, 275-foot-wide timber crib dam buttressed with a masonry wall on the downstream face. The dam spillway is capped with 196-foot-long reinforced concrete overflow spillway with a crest elevation of 392.0 feet, and a 5-foot high inflatable rubber dam

with a maximum crest elevation of 397.0 feet. Currently, no spillage flow is required. As a result, water is only spilled at the dam when flows are below the minimum hydraulic capacity or above the maximum hydraulic capacity of the Project.

109. An aesthetic flow assessment was done to evaluate a series of spillage flows over the Project dam. The spillage flows assessed by the evaluation team were 0 cfs (leakage), 15 cfs, 50 cfs, 75 cfs, 150 cfs, and 217 cfs.⁵ A flow of 75 cfs spilled over the dam provided good aesthetic value, providing spillage over the full width of the dam at this flow with variability in the thickness of the veil.
110. The Applicant is proposing to spill 75 cfs between April 15 to December 15 during daylight hours, and no spill for the remainder of the year when flows are in control of the Applicant. Nighttime hours are defined as one half hour after sunset to one half hour before sunrise based on the middle date of each month (finding 37).

III. Analysis

111. A state's 401 certification determination shall include a statement from the state that "there is a reasonable assurance that the activity will be conducted in a manner which will not violate applicable water quality standards." 40 C.F.R § 121.2(a)(3); Environmental Protection Rules, Chapter § 13.11(g). Accordingly, the Department may set forth limitations and other requirements necessary for it to find that there is reasonable assurance that the activity and project will be operated in a manner which will not violate the Vermont Water Quality Standards.
112. Continued operation of the Project may lead to violations of Standards. The aspects of operation that have the potential to cause violations of Standards are analyzed below to determine the limitations and requirements necessary to find that there is reasonable assurance that the discharge will not violate the Standards.
113. In addition to the specific items pertaining to the Application on review, if an activity was not presented in the Application and not consistent with the findings of this Certification, the Department reserves the right to review said activity to assure it will not cause a violation of Vermont Water Quality Standards (e.g., change in operation, maintenance drawdown, construction activity, etc.). In addition to specific operational conditions, other provisions like reporting, inspections, and flow monitoring will also be necessary to assure the discharge does not violate Vermont Water Quality Standards.

A. Water chemistry

114. Water quality sampling data gathered in the Project vicinity as part of the relicensing process indicate that Standards for dissolved oxygen were not met on occasion (finding 47-49) including areas upstream of the Project, within the impoundment, in the bypass reach in the tailrace, and downstream of the Project. DO in the bypass reach fell below Standards while the impoundment was drawn down for an extended duration due to maintenance activities. (Standards, Sections 29A-302(1)(B)(iii) and Section 29A-302(5)(A)). This indicates that when the bypass becomes stagnant dissolved oxygen falls below Standards.

⁵ Aesthetic Flow Study at Bolton Falls Dam. Updated Study Report. Bolton Falls Hydroelectric Project (FERC No. 2879). Gomez and Sullivan Engineers. December 2019.

115. Other occasions when dissolved oxygen fell below Standards could have occurred, in part, due to biofouling of the sensors. This was indicated by the rapid rise in dissolved oxygen concentrations when the loggers were checked and redeployed⁶.
116. To ensure that Project operations to meet dissolved oxygen Standards, this certification is being conditioned (condition B) to provide flow into the bypassed reach year-round.

B. Aquatic Biota

117. The Applicant conducted a fish impingement and entrainment study at the Project. The study concluded immediate survival of fish ranged from 87.2 – 95.4% and the 48-hour survival was estimated to be 83.9 – 93.4%. Fish smaller in length (less than 8 inches) had an estimated immediate survival of 94.8% and a 48-hour survival of 93.4%.
118. Fish survival estimates change based on the assumed length of individuals and the burst speed of the species. Aquatic biota is a designated use pursuant the Standards. In addition to some fish species being a popular game fish, some are Glochidia hosts for the state-threatened Eastern pearlshell mussel.
119. While not currently planned, over the course of the license it is likely that there will be a need to replace the trashrack. This certification is being conditioned (condition D) to consult with the Department of Vermont Fish and Wildlife should the trashracks be replaced. This will assure that a replacement would limit fish impingement and entrainment.
120. Macroinvertebrate data has been collected sporadically from 1991 to 2015 in the vicinity of the Project (finding 45). The community assessment ranged from good- fair to very good during that time. The Department of Environmental Conservation, as part of the watershed management division monitoring program, will continue to monitor the macroinvertebrate communities in the Winooski River.

C. Aquatic Habitat

121. The Applicant proposes to operate the development in run-of-river mode. Instantaneous run-of-river operations with outflow equal to inflow on a near instantaneous basis except for short term deviations will protect the natural flow regime below the Project and will support aquatic habitat in the impoundment and below the tailrace (Standards, Section 29A-306(b)(3)). This Certification is being conditioned such that the operating mode will be instantaneous run-of-river (finding 70 and 71, condition B).

Bypassed Reach

122. The Applicant is proposing to provide a minimum bypass flow of 75 cfs, or inflow, whichever is less, via spillage over the dam during daylight hours from April 1 through December 15, with leakage being provided the remainder of the time.

⁶ Bolton Falls Hydroelectric Project Response to Agency Comments on the Initial Study Report and Meeting. Letter from GMP. March 11, 2019. Attachment A.

123. The Applicant conducted a habitat study on two occasions to evaluate a range of spillage flows. The method used was a flow demonstration (finding 73). From 0 cfs (leakage) to 50 cfs, the broken water surface increased from 10-15% to 33%. The percent of reach with active circulation increased from 25% to 50%. At 50 cfs spillage, much of the bypassed reach remained stagnant.
124. At 75 cfs spillage, the percent of the reach with broken water surface increased to 40% and the percent of the reach with active circulation increased to 75%. At this flow on river left the whitewater current began to extend downstream from the base of the dam providing good conditions in terms of broken water surface and active circulation. However, on river right, the current did not extend very far downstream of the dam and did not provide much water circulation or broken water surface.
125. At 100 cfs spillage, the percent of the reach with broken water surface increased to 45% and active circulation increased to 83%. This flow provided an increase in active circulation and broken water surface which was especially apparent in the middle of the channel downstream of the dam where river left and river right channels converged closer to the dam face, in addition to increased circulation on river right. The Agency concludes that 100 cfs spillage provides high quality aquatic habitat in the bypassed reach of Bolton Falls.
126. With higher flows, the percent of reach with broken water surface and percent with active circulation continued to increase. At 150 cfs, there was a noticeable increase in turbulence at the base of the dam. The broken water surface and circulation at this flow extended downstream from the base of the dam on both river left and river right. At higher flows this trend continued.
127. The Agency is conditioning this certification (condition B) to pass 100 cfs continuously year-round into the bypassed reach for the protection of aquatic habitat. Additionally, the certification is being conditioned (condition C) to specify how this flow will be provided to the reach, including any seasonal considerations, within the flow management plan.

Water level fluctuation in the impoundment

128. The Applicant is proposing to operate the Project in an instantaneous run-of-river mode and maintain a steady impoundment at either 397.0 or 397.25 feet msl. However, maintenance activities will require lowering the water level in the impoundment. The Applicant has indicated that drawdowns could occur between 0 to 10 times annually. The duration of each would depend on the activity and vary from less than a day to a month and are not dependent on the season (finding 78 and 79).
129. Drawdown of the impoundment can impact aquatic habitat within the impoundment depending on season, additionally any impoundment lowering will have effects on mussel species specifically the state-threatened Eastern pearlshell (*M. margaritifera*). This certification is being conditioned (condition G) to develop a maintenance plan to address impoundment drawdowns for the protection of aquatic habitat within the impoundment.

D. Wetland and Wetland Habitat

130. With the Applicant proposing run-of-river operations, there is likely to be limited Project impacts on wetlands. Aquatic biota and wildlife in the wetlands will likely be affected during Project maintenance. The affect and severity of impacts will depend on the duration and

drawdown extent of any activity. As such, this certification is being conditioned (condition G) to develop a maintenance plan to minimize any impacts that may occur on wetlands and wetland habitat.

E. Rare, Threatened, and Endangered Species

131. The Northern long-eared bat is listed at both the state and federal level. There are no known occurrences (finding 86) in the Project area. The Applicant is not anticipating any tree clearing at the Project. If tree clearing is needed, the Applicant will consult with VTFWD and USFWS to determine any necessary mitigation measures. No additional measures as suggested by the VTFWD Natural Heritage Program or the USFWS.
132. Eastern pearlshell mussels are located both downstream of the Project and within the impoundment (finding 87). The Applicant is proposing to operate the facility in a run-of-river mode. It is assumed that the reduced flow fluctuations downstream of the Project and within the impoundment will provide some protection. However, the Applicant draws down the impoundment periodically for maintenance purposes. The Applicant states maintenance drawdowns occur anywhere between 0 and 10 times annually, with varying durations from less than a day to one month depending on the activity.
133. The Vermont Wildlife Action Plan identifies actions for the protection of freshwater mussel populations (finding 42). One of the threats identified are hydropower dams that create an unnatural frequency of water level changes. For the protection of the state-listed Eastern pearlshell mussel, this certification is being conditioned (condition G) to create a maintenance and repair work plan which shall include provisions for the protection of freshwater mussels.
134. Mitigation measures will also be taken to protect creeping lovegrass. This plant was observed in the day use areas (finding 90). The Applicant is proposing, within the recreation and management plan, to create signage and focus foot traffic to limit access to certain areas. This will help mitigate impacts on the creeping lovegrass within the recreational day use area. This certification is being conditioned (condition E) to develop a recreation and management plan which will include a schedule of proposed recreational enhancements including protection of the rare/uncommon species.
135. Two additional rare and uncommon plants were observed, stout golden rod and hay sedge (finding 91 and 92). These two species were found either in informal recreation areas or in areas with active management that likely enhances the habitat for the rare species. As such, the Applicant is not proposing to provide additional protection measures for either species.

F. Erosion

136. The Applicant proposes to operate the facility in a run-of-river mode and maintaining the reservoir at either 397.0 feet elevation or 397.25 feet elevation, there will likely be limited erosion over and above what might naturally occur because of Project operations. This certification is being conditioned to operate in a run-of-river mode (condition B) which assumes that the Project does not operate out of storage (finding 70).

G. Recreation

137. The Vermont Water Quality Standards require that waters achieve and maintain good quality that fully support boating, fishing, and other designated recreational uses. (Standards, Section 29A-306(d)(3)(A); Standards, Section 29A-306(e)(3)(A); and Standards, Section 29A-306(f)(3)(A)).
138. There are two recreation sites that are operated and maintained by the Applicant. As part of the Project relicensing, the Applicant conducted a recreation study and is proposing recreation enhancements (finding 98 - 102). These proposed changes are, in part, a result of the relicensing studies (improved signage, picnic tables, notice to remove litter) and flooding concerns (parking lot relocation).
139. Recreational users expressed concerns regarding access. Recreation is a designated use pursuant to the Standards. This certification is being condition (condition E) to develop a recreational management plan with approval from the Agency to assure the protection of creeping love grass (finding 90 and 134) and assure access for multiple user groups.

H. Debris Deposal

140. The Applicant removes debris from the trashrack daily (finding 107) but does not indicate how that debris is disposed. This Certification is being conditioned (condition F) to dispose of debris according to state laws and regulations.

I. Aesthetics

141. Aesthetics are a designated use that must be met continuously. The management objective for waters designated as Class B(2) for aesthetics is, “[w]aters shall be managed to achieve and maintain good aesthetic quality”. The criteria for rivers and streams are water character, flows, water level, bed and channel characteristics, and flowing and falling water of good aesthetic value (Standards 306(c)(3)(B)(i)).
142. The aesthetic flow assessment (finding 109) identified that 75 cfs of spillage over the dam provided good aesthetic value. Spillage at this flow created a full veil across the dam with variable thickness. In addition to the full veil, a cascade formed over the bedrock on river right.
143. In addition to the visual affects, spillage also offers an auditory experience during both the daytime and the nighttime hours. This certification is being conditioned (condition B) to provide 100 cfs continuous spillage to the bypassed reach to provide high quality aquatic habitat, which will also fully support the aesthetics use.

J. Antidegradation

144. Pursuant to the Antidegradation Policy set forth in Standards, Section 29A-105 and the Agency’s 2010 Interim Anti-Degradation Implementation Procedure (Procedure), the Secretary must determine whether a proposed discharge or activities are consistent with the Policy by applying the Procedure during the review of applications for any permit for a new discharge if during the application review process compliance with the Standards is evaluated pursuant to

applicable state or federal law. (Procedure III(A)). This includes water quality certifications required by Section 401 of the federal Clean Water Act for a federal license or permit for flow modifying activities. (Procedure III(B)(3)).

145. In making the determination that proposed activities are consistent with the Policy, the Secretary is required to use all credible and relevant information and the best professional judgment of Agency staff. (Procedure III(D)). Section VIII of the Procedure governs the Agency's review of Section 401 applications for flow-modifying activities. (Procedure VIII(A)(1)). The Secretary may have to review a single waterbody under multiple tiers of review depending on whether a waterbody is impaired or high quality for different parameters.
146. Tier 3 review is required if the project will discharge to an Outstanding Resource Water. (Procedure VIII(D)). This Project does not affect any Outstanding Resource Waters and therefore does not trigger a Tier 3 review under Section VIII of the Procedure.
147. This Project affects waters classified as B(2) for all designated uses, which are assumed to be high quality waters for certain parameters that trigger a Tier 2 review under Section VIII of the Procedure. (Procedure VIII(E)(1)(c)). Under Tier 2, the Secretary must determine whether the proposed discharge will result in a limited reduction in water quality in a high quality water by utilizing all credible and relevant information and the best professional judgment of Agency staff. (Procedure VIII(E)(2)(b)).
148. When conducting a Tier 2 review, the Secretary may consider, when appropriate, one or more of the following factors when determining if a proposed new discharge will result in a reduction in water quality: (i) the predicted change, if any, in ambient water quality criteria at the appropriate critical conditions; (ii) whether there is a change in total pollutant loadings; (iii) whether there is a reduction in available assimilative capacity; (iv) the nature, persistence and potential effects of the pollutant; (v) the ratio of stream flow to discharge flow (dilution ratio); (vi) the duration of discharge; (vii) whether there are impacts to aquatic biota or habitat that are capable of being detected in the applicable receiving water; (viii) the existing physical, chemical and biological data for the receiving water; (ix) degree of hydrologic or sediment regime modifications; and (x) any other flow modifications. (Procedure VIII(E)(2)(d)).
149. The Secretary considered the foregoing factors during the review of the Project to determine if the Project will result in a reduction of water quality. The principal impacts of the Project are its effects on aquatic habitat in the bypassed reach of the Winooski River, aesthetics, and the impacts of the continued operation of the Project resulting from water level management within the impoundment. Discharge of pollutants is not an issue because the changes in project operation will not result in a discharge of additional pollutants. Other ambient water quality criteria will improve or remain unchanged. As a result, factors (i), (ii), (iii), (iv), (v), and (vi) are not at issue. The Project has not supported the designated uses of aquatic habitat and aesthetics due to current water level management of the impoundment and lack of an adequate bypass flow. Condition B requires water level and flow management to operate in a true run-of-river with a continuous bypass flow. Additionally, Condition G requires the Applicant to develop a maintenance plan for impoundment drawdowns. These conditions and operational change will reduce the impacts on aquatic habitat and aesthetics at the facility.
150. This Certification does not authorize any activities that would result in a lowering of water quality for those parameters that are exceeding water quality Standards.

151. For those parameters for which the Winooski River is not exceeding water quality Standards, the Secretary must conduct a Tier 1 review. (Procedure VIII(F)).
152. Under Tier 1 review, the Secretary may identify existing uses and determine the conditions necessary to protect and maintain these uses. (Procedure VIII(F)). In determining the existing uses to be protected and maintained, the Secretary must consider the following factors: (a) aquatic biota and wildlife that utilize or are present in the waters; (b) habitat that supports existing aquatic biota, wildlife, or plant life; (c) the use of the waters for recreation or fishing; (d) the use of the water for water supply, or commercial activity that depends directly on the preservation of an existing high level of water quality; and (e) evidence of the uses' ecological significance in the functioning of the ecosystem or evidence of the uses' rarity. (Procedure VIII(F)(2)).
153. The Secretary considered all factors listed above and based on information supplied by the Applicant and Agency staff field investigations, identified the following existing uses: aquatic biota and wildlife; aquatic habitat; aesthetics; and recreation.
154. The existing dam and impoundment have changed the natural condition of the river at the Bolton Falls Hydroelectric Project. Currently, aquatic biota, wildlife and aquatic habitat, aesthetics and recreation are impacted within the impoundment, bypassed reach, and downstream of the facility due to flow fluctuations and insufficient flows in the bypass. However, the modifications to the project conditioned under this Certification will result in improvements to water quality and will protect and maintain existing uses, by assuring that adequate conservation flows are passed consistently and the water level within the impoundment and flow downstream are not fluctuated for the purpose of generation. These modifications include instituting bypass flows and true run-of-river operations at the Bolton Falls Hydroelectric Project.
155. The Secretary finds that development and operation of the Project as conditioned by this Certification will comply with the Vermont Water Quality Standards. Accordingly, the Secretary finds that the Project, as conditioned, meets the requirements of the Policy and Procedure relating to the protection and maintenance of high quality waters.

IV. 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. After examination of these materials, the Department certifies that there is reasonable assurance that operation of the Project, when done 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 113 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 with outflow equal to inflow on an instantaneous basis. 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 deviations, as further described in Finding 70 and incorporated by reference. When generating, the Project shall spill 100 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 operation, all flow shall be spilled at the dam.

See finding 70, 71, 74, 76, and 123-127 for a statement of necessity. 10 V.S.A. § 1258 & Vt. Code R. 12 030 026 § 29A-304 & § 29A-306 (b) & § 306 (c)(3)(B)(i).

- C. **Flow Management and Monitoring Plan.** The licensee shall develop within 180 days of the effective date of the FERC license, a flow management plan detailing how the Project will operate in a true run-of-river mode and seasonal flow management to comply with the conservation flow. 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 finding 113 and 127 for a statement of necessity. 10 V.S.A. § 1258 & Vt. Code R. 12 030 026 § 29A-304 & § 29A-306(b).

- D. **Trashracks.** Prior to the next replacement of the trashracks at the Project, the Applicant shall consult with the Fish and Wildlife Department with respect to the trashrack design and placement, to determine the appropriate bar clearance spacing and location. The Applicant shall file the trashrack design information with the Department of Environmental Conservation for approval prior to commencement of work.

See finding 57-63, and 119 for a statement of necessity. 10 V.S.A. § 1258 & Vt. Code R. 12 030 026 § 29A-306(a).

- E. **Recreational Facilities.** The Applicant shall develop within 180 days of the effective date of the FERC license, a plan and implementation schedule for recreation enhancements. The plan and schedule shall be developed in consultation with relevant stakeholders and shall be subject to approval by the Agency prior to implementation.

See finding 90, 102, 105, 134, 138, and 139 for a statement of necessity. 10 V.S.A § 5403 & 10 V.S.A. § 1258 & Vt. Code R. 12 030 026 § 29A- 103(b)(1)(G).

- F. **Debris Disposal.** Debris associated with Project operations shall be disposed of in accordance with state laws and regulations.

See finding 107 and 140 for a statement of necessity. 10 V.S.A. § 1258 & Vt. Code R. 12 030 026 § 29A-303(1).

- G. **Maintenance Plan and Repair Work.** The licensee shall develop within 180 days of the effective date of the FERC license, a water level management plan for when drawdowns are needed for planned maintenance activities at the Project. The plan shall include provisions that will be taken to protect freshwater mussels from being dewatered during these activities, and will protect aquatic biota and wildlife in wetlands impacted by maintenance-related drawdowns. The plans shall be subject to review and approval by the Agency prior to being submitted to FERC. Additionally, any Project maintenance or repair work, including drawdowns below the normal operating range to facilitate repair/maintenance work, shall be filed with the Department for prior review and approval, if said work may have a material adverse effect on water quality or cause less-than-full support of an existing use or a beneficial value or use of State waters.

See finding 80, 80, 87, 88, 129 and 133 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).

- H. **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 113 for a statement of necessity. 10 V.S.A § 1258 & Vt. Code R. 12 0330 026 § § 29A-104(a).

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

See finding 113 for a statement of necessity. 10 V.S.A § 1258 & Vt. Code R. 12 0330 026 § 29A-104(a).

- J. **Modification of Certification.** The conditions of this certification may be altered or amended by the Department to assure compliance with the Vermont Water Quality Standards and to respond to any changes in classification of management objectives for the waters affected by the Project, when authorized by law, and, if necessary, after notice and opportunity for hearing.

See finding 113 for a statement of necessity. 10 V.S.A § 1258 & Vt. Code R. 12 0330 026 § 29A-104(a).

Effective Date and Expiration of Certification

This certification shall become effective on the date of issuance, and the conditions of any certification shall become conditions of the federal permit (33 U.S.C. § 1341(d)). If the federal authority denies a permit, the certification becomes null and void. Otherwise, the certification runs for the terms of the federal license or permit.

Enforcement

Upon receipt of information that water quality standards are being violated as a consequence of the project's construction or operation or that one or more certification conditions has not been complied with, the Secretary, after consultation with the Applicant and notification of the appropriate federal permitting agency, may, after notice and opportunity for a public hearing, modify the Certification and provide a copy of such modification to the Applicant and the federal permitting agency.

Certification conditions are subject to enforcement mechanisms available to the federal agency issuing the license and to the state of Vermont. Other mechanisms under Vermont state law may also be used to correct or prevent adverse water quality impacts from construction or operation of activities for which certification has been issued.

Appeals

Pursuant to 10 V.S.A. Chapter 220, any appeal of this decision must be filed with the clerk of the Environmental Division of the Superior Court within 30 days of the date of the decision. An aggrieved person shall not appeal this decision unless the person submitted to the Secretary a written comment during the applicable public comment period or an oral comment at the public meeting conducted by the Secretary. Absent a determination to the contrary, an aggrieved person may only appeal issues related to the person's comments to the Secretary as prescribed by 10 V.S.A. § 8504(d)(2). The Notice of Appeal must specify the parties taking the appeal and the statutory provision under which each party claims party status; must designate the act or decision appealed from; must name the Environmental Division; and must be signed by the appellant or their attorney. In addition, the appeal must give the address or location and description of the property, project, or facility with which the appeal is concerned and the name of the Applicant or any permit involved in the appeal. The appellant must also serve a copy of the Notice of Appeal in accordance with Rule 5(b)(4)(B) of the Vermont Rules for Environmental Court Proceedings. For further information, see the Vermont Rules for Environmental Court Proceedings, available online at www.vermontjudiciary.org. The address for the Environmental Division is 32 Cherry Street, 2nd Floor, Suite 303; Burlington, VT 05401 (Tel. 802.951.1740).

Dated this 19th day of January 2022

Peter Walke, Commissioner
Vermont Department of Environmental Conservation

By

Peter LaFlamme, Director
Watershed Management Division