New Hampshire Department of Environmental Services
WATER QUALITY CERTIFICATION
In Fulfillment of
NH RSA 485-A:12, III

Certification Number	WQC 2021-FERC-002
Activity Name	Lower Great Falls Hydroelectric Project (FERC Project No. 4451)
Activity Location **(of Project Dam)**	Somersworth, New Hampshire (Strafford, County) Berwick, Maine (York County)
Potentially Affected Surface Waters Near the Activity **(other affected surface waters may exist)**	Salmon Falls River: NHIMP600030406-03 (impoundment upstream of Dam) NHRIV600030406-04 (immediately downstream of Dam) Unnamed wetlands
Owner/Applicant	City of Somersworth, New Hampshire and Green Mountain Power are co-licensees and collectively are the Applicant
Agent Filing Application on Behalf of Owner/Applicant	John Greenan, P.E. Green Mountain Power 2152 Post Road Rutland, VT 05701
Applicable Federal License or Permit Requiring Section 401 water quality certification	Federal Energy Regulatory Commission (FERC) - Subsequent License for Minor Water Power Project
Decision (subject to Conditions below)	Approved
Date of Issuance	April 4, 2022

A. INTRODUCTION

Green Mountain Power (GMP), on behalf itself and its co-licensee, the City of Somersworth, New Hampshire (collectively the Applicant), has applied for a license from the Federal Energy Regulatory Commission (FERC) to continue operation and maintenance of the Lower Great Falls Hydroelectric Project (Project or Activity) located on the Salmon Falls River in City of Somersworth, in Strafford County New Hampshire and Town of Berwick in York County Maine. The Project has a total installed generating capacity of 1.28 megawatts (MW) and is proposed to be operated run-of-river. A more complete description of the Activity is provided in Findings D-3 through D-6 of this certification.

In accordance with the Section 401 of the federal Clean Water Act (CWA) and New Hampshire law (RSA 485-A:12, III) the Applicant has applied for a water quality certification (WQC or certification) from the New Hampshire Department of Environmental Services (NHDES). The purpose of the certification is to provide assurance that discharges from the proposed Activity will comply with New Hampshire surface water quality standards (NH RSA 485-A:8 and NH Code of Administrative Rules Env-Wq 1700). Additional details are provided

herein.

This certification includes the following:

Documents cited in this certification that were filed with FERC, can be accessed on the FERC elibrary by date or FERC Accession Number.

B. DECISION

Based on the facts, laws, findings and conditions included herein, NHDES has determined that there is reasonable assurance that construction and operation of the proposed Activity will be conducted in a manner which will not violate New Hampshire surface water quality standards (RSA 485-A:8 and Env-Wq 1700) [1]. NHDES hereby issues this certification in accordance with RSA 485-A:12, III, subject to the conditions in Section E of this certification.

C. FACTS AND LAWS

Federal 401 Certification Laws and Regulations

C-1. Section 401(a)(1) of the federal Clean Water Act (CWA) (33 U.S.C. §1341(a)(1)) requires 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 or will originate…that any such discharge will comply with the applicable provisions of the CWA. The CWA provision most applicable for this Project is compliance with state surface water quality standards. CWA section 303 (33 U.S.C § 1313).

C-2. Section 401(d) (33 U.S.C §1341(d)), of the CWA provides that: "Any certification provided under this section [401] shall set forth any effluent limitations and other limitations, and monitoring requirements necessary to ensure that any applicant for a Federal license or permit will comply with [enumerated provisions of the CWA]… and with any other appropriate requirement of State law set forth in such certification, and shall become a condition on any Federal license or permit subject to the provisions of this section."

[1] This language is required by federal regulations. See Fact C-5.

C-3. According to a 1994 U.S. Supreme Court decision [2], although §401(a) refers to compliance of the "discharge" with certain provisions of the CWA, §401(d) expands the State's authority in that it provides that any certification shall set forth "any effluent limitations and other limitations … necessary to ensure that any applicant" will comply with various provisions of the Act and appropriate state law requirements. That is "…401(d) is most reasonable read as authorizing additional conditions and limitations on the activity as a whole once the threshold condition, the existence of a discharge, is satisfied".

C-4. Federal regulations regarding Section 401 water quality certification may be found in the Code of Federal Regulations (CFR), Title 40, PART 121 (40 CFR 121) titled "State Certification of Activities Requiring a Federal License or Permit". On July 13, 2020, the U.S. Environmental Protection Agency (EPA) published final revisions to this rule in the Federal Register (Vol. 85, No. 134, pages 42210 to 42287), which became effective on September 11, 2020 (2020 Rule). As indicated on EPA's website, on October 21, 2021, the U.S. District Court for the Northern District of California issued an order [3] remanding and vacating EPA's 2020 Rule. The vacatur is nationwide. The order requires a temporary return to EPA's 1971 Rule until EPA finalizes a new certification rule.

C-5. 40 CFR 121.2(a)(3) through (5)) of EPA's 1971 Rule require the following to be included in certifications:

"(3) A statement that there is a reasonable assurance that the activity will be conducted in a manner which will not violate applicable water quality standards;
(4) A statement of any conditions which the certifying agency deems necessary or desirable with respect to the discharge of the activity; and
(5) Such other information as the certifying agency may determine to be appropriate."

The term "discharge" is not defined in EPA's 1971 Rule.

C-6. 40 CFR 121.2(b) of EPA's 1971 Rule states the following with regards to modification of certifications:

"(b) The certifying agency may modify the certification in such manner as may be agreed upon by the certifying agency, the licensing or permitting agency, and the Regional Administrator [4]."

C-7. The term "discharge," as applied under section 401 of the Clean Water Act means the potential for a discharge. It does not need to be a certainty, only that it may occur should the federal license or permit be granted. Further, the discharge does not need to involve the addition of pollutants (such as water released from the tailrace of a dam). As the U.S. Supreme Court has stated "[w]hen it applies to water, 'discharge' commonly means a 'flowing or issuing out'" and an addition of a pollutant is not "fundamental to any discharge." [5]

C-8. The CWA Section 502(7) (33 U.S.C. §1362(7)) defines "navigable waters," as "waters of the United States".

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[2] *PUD No. 1 of Jefferson County v. Washington Department of Ecology*, 511 U.S. 700, 712 (1994).

[3] In re Clean Water Act Rulemaking, No. 20-cv-4636, et al. (Oct. 21, 2021)

[4] 40 CFR 121.1(d) of EPA's 1971 Rule defines "Regional Administrator" as "…the Regional designee appointed by the Administrator, Environmental Protection Agency".

[5] The Supreme Court case that is referred to is *S.D. Warren Co. v. Maine Board of Environmental Protection et al*, 547 U.S. 370, 126 S. Ct. 1853 (2006).

C-9. Waters of the United States are defined in 40 CFR §122.2.

State 401 Certification Law

C-10. NH RSA 485-A:12, III, states: "No activity, including construction and operation of facilities, that requires certification under section 401 of the Clean Water Act and that may result in a discharge, as that term is applied under section 401 of the Clean Water Act, to surface waters of the state may commence unless the department certifies that any such discharge complies with the state surface water quality standards applicable to the classification for the receiving surface water body. The department shall provide its response to a request for certification to the federal agency or authority responsible for issuing the license, permit, or registration that requires the certification under section 401 of the Clean Water Act. Certification shall include any conditions on, modifications to, or monitoring of the proposed activity necessary to provide assurance that the proposed discharge complies with applicable surface water quality standards. The department may enforce compliance with any such conditions, modifications, or monitoring requirements as provided in RSA 485-A:22."

State Surface Water Quality Standards [6]

C-11. NH RSA 485-A:8 and Env-Wq 1700 (Surface Water Quality Standards), together fulfill the requirements of Section 303 of the Clean Water Act (CWA) (33 U.S.C 1313) that the State of New Hampshire adopt water quality standards consistent with the provisions of the CWA.

C-12. Env-Wq 1701.01 Purpose. "The purpose of these rules is to establish water quality standards for the state's surface water uses as set forth in RSA 485-A:8, I, II, III and V. These standards are intended to protect public health and welfare, enhance the quality of water and serve the purposes of the federal Clean Water Act, 33 U.S.C. 1251 et seq., and RSA 485-A. These standards provide for the protection and propagation of fish, shellfish, and wildlife, and provide for such uses as recreational activities in and on the surface waters, public water supplies, agricultural and industrial uses, and navigation in accord with RSA 485-A:8, I and II."

C-13. Env-Wq 1701.02, titled "Applicability," states that these rules shall apply to:

> "(a) All surface waters; and
> (b) Any person who:
> (1) Causes any point or nonpoint source discharge of any pollutant to surface waters;
> (2) Undertakes hydrologic modifications, such as dam construction or water withdrawals; or
> (3) Undertakes any other activity that affects the beneficial uses or the water quality of surface waters."

C-14. Env-Wq 1702.44 defines surface waters as "surface waters of the state" as defined in NH RSA 485-A:2, XIV and waters of the United States as defined in 40 CFR 122.2.

NH RSA 485-A:2, XIV defines "surface waters of the state" as "perennial and seasonal streams, lakes, ponds and tidal waters within the jurisdiction of the state, including all streams, lakes, or ponds bordering on the state, marshes, watercourses and other bodies of water, natural or artificial."

[6] All New Hampshire surface water quality standards apply to the Activity. The standards specifically called out in the certification should not be interpreted as the only standards that may apply.

NH RSA 482-A:2, X. defines "Wetlands" as "[a]n area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal conditions does support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

C-15. Env-Wq 1702.07 states that ""Best management practices" means those practices that are determined, after problem assessment and examination of all alternative practices and technological, economic and institutional considerations, to be the most effective practicable means of preventing or reducing the amount of pollution generated by point or nonpoint sources to a level compatible with water quality goals."

C-16. Env-Wq 1702.05 states that ""Benthic community" means the community of plants and animals that live on, over, or in the substrate of the surface water."

C-17. Env-Wq 1702.06 states that ""Benthic deposit" means any sludge, sediment, or other organic or inorganic accumulations on the bottom of the surface water."

C-18. Env-Wq 1702.08 states that ""Biological integrity" means the ability of an aquatic ecosystem to support and maintain a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of a region."

C-19. Env-Wq 1702.26 states that ""Mixing zone" means a defined area or volume of the surface water surrounding or adjacent to a wastewater discharge where the surface water, as a result of the discharge, might not meet all applicable water quality standards."

C-20. Env-Wq 1702.15 states that ""Cultural eutrophication" means the human-induced addition of wastes that contain nutrients to surface waters, resulting in excessive plant growth or a decrease in dissolved oxygen, or both."

C-21. Env-Wq 1702.17 states that ""Designated uses" means those uses specified in water quality standards for each water body or segment whether or not such uses are presently occurring. The term includes the following:

(a) "Swimming and other recreation in and on the water, meaning the surface water is suitable for swimming, wading, boating of all types, fishing, surfing, and similar activities;
(b) Fish consumption, meaning the surface water can support a population of fish free from toxicants and pathogens that could pose a human health risk to consumers;
(c) Shellfish consumption, meaning the tidal surface water can support a population of shellfish free from toxicants and pathogens that could pose a human health risk to consumers;
(d) Aquatic life integrity, meaning the surface water can support aquatic life, including a balanced, integrated, and adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of the region;
(e) Wildlife, meaning the surface water can provide habitat capable of supporting any life stage or activity of undomesticated fauna on a regular or periodic basis; and
(f) Potential drinking water supply, meaning the surface water could be suitable for human intake and meet state and federal drinking water requirements after adequate treatment."

C-22. Env-Wq 1702.18 states that ""Discharge" means:

(a) "The addition, introduction, leaking, spilling, or emitting of a pollutant to surface waters,

either directly or indirectly through the groundwater, whether done intentionally, unintentionally, negligently or otherwise; or

(b) The placing of a pollutant in a location where the pollutant is likely to enter surface waters."

C-23. Env-Wq 1702.22 states that ""Existing uses" means those uses, other than assimilation waste transport, that actually occurred in the waterbody on or after November 28, 1975, whether or not they are included in the water quality standards."

C-24. Env-Wq 1702.33 states that ""Nuisance species" means any species of flora or fauna living in or near the water whose noxious characteristics or presence in sufficient number or mass prevent or interfere with a designated use of those surface waters."

C-25. Env-Wq 1702.37 states that "Point source" means a discernible, confined, and discrete conveyance from which pollutants are or might be discharged, excluding return flows from irrigated agriculture or agricultural stormwater runoff. The term includes, but is not limited to, a pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft.

C-26. Env-Wq 1702.38 states that ""Pollutant" means "pollutant" as defined in 40 CFR 122.2." According to 40 CFR 122.2, "pollutant" means "dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water."

C-27. Env-Wq 1703.01 titled "Water Use Classifications; Designated Uses" states the following:

(a) All surface waters shall be classified as provided in RSA 485-A:8, based on the standards established therein for class A and class B waters. Each classification shall identify the most sensitive use it is intended to protect.
(b) All surface waters shall be restored to meet the water quality criteria for their designated classification including existing and designated uses, and to maintain the chemical, physical, and biological integrity of surface waters.
(c) All surface waters shall provide, wherever attainable, for the protection and propagation of fish, shellfish and wildlife, and for recreation in and on the surface waters.
(d) Unless high or low flows are caused by naturally-occurring conditions, surface water quantity shall be maintained at levels that protect existing uses and designated uses.

C-28. Env-Wq 1703.03 titled "General Water Quality" includes the following:

"(a) The presence of pollutants in the surface waters shall not justify further introduction of pollutants from point or nonpoint sources, alone or in any combination."

(c)(1) "All surface waters shall be free from substances in kind or quantity that:

a. Settle to form harmful benthic deposits;
b. Float as foam, debris, scum or other visible substances;
c. Produce odor, color, taste or turbidity that is not naturally occurring and would render the surface water unsuitable for its designated uses;
d. Result in the dominance of nuisance species; or
e. Interfere with recreational activities."

C-29. Env-Wq 1703.06 includes water quality criteria for bacteria.

C-30. Env-Wq 1703.07 titled "Dissolved Oxygen" includes the following:

> "(a) Class A waters shall have a dissolved oxygen content of at least 75% saturation, based on a daily average, and an instantaneous minimum of at least 6 mg/l at any place or time except as naturally occurs.
> (b) Except as naturally occurs and subject to (c) and (e), below, class B waters shall have a dissolved oxygen content of:
> (1) At least 75% of saturation, as specified in RSA 485-A:8, II, based on a daily average; and
> (2) An instantaneous minimum dissolved oxygen concentration of at least 5 mg/l.
> (c) In areas identified by the New Hampshire fish and game department (NHF&G) as cold water fish spawning areas of species whose early life stages are buried in the gravel on the bed of the surface water, the 7 day mean dissolved oxygen concentration shall be at least 9.5 mg/l and the instantaneous minimum dissolved oxygen concentration shall be at least 8 mg/l for the period from October 1 of one year to May 14 of the next year, provided that the time period shall be extended to June 30 for a specific discharge to a specific waterbody if modeling done in consultation with the NHF&G determines the extended period is necessary to protect spring spawners or late hatches of fall spawners, or both.
> (d) Unless naturally occurring or subject to (a), above, surface waters within the top 25 percent of depth of thermally unstratified lakes, ponds, impoundments, and reservoirs or within the epilimnion shall contain a dissolved oxygen content of at least 75 percent saturation, based on a daily average and an instantaneous minimum dissolved oxygen content of at least 5 mg/l. Unless naturally occurring, the dissolved oxygen content below those depths shall be consistent with that necessary to maintain and protect existing and designated uses.
> (e) As specified in RSA 485-A:8, III, waters in a temporary partial use area established under RSA 485-A:8, II as a surface water that is receiving a combined sewer overflow discharge shall contain not less than 5 parts per million of dissolved oxygen for the duration of the discharge and up to 3 days following cessation of the discharge."

C-31. Env-Wq 1703.08 titled "Benthic Deposits" states the following:

> "(a) Class A waters shall contain no benthic deposits, unless naturally occurring.
> (b) Class B waters shall contain no benthic deposits that have a detrimental impact on the benthic community, unless naturally occurring."

C-32. Env-Wq, 1703.09, 1703.10 and 1703.12 include water quality criteria for oil and grease, color and slicks, odors, and surface floating solids, respectively.

C-33. Env-Wq 1703.11 titled "Turbidity" states the following:

> "(a) Class A waters shall contain no turbidity, unless naturally occurring.
> (b) Class B waters shall not exceed naturally occurring conditions by more than 10 NTUs.
> (c) Turbidity in waters identified in RSA 485-A:8, III shall comply with the applicable long-term combined sewer overflow plan prepared in accordance with Env-Wq 1703.05(c).
> (d) For purposes of state enforcement actions, if a discharge causes or contributes to an increase in turbidity of 10 NTUs or more above the turbidity of the receiving water upstream of the discharge or otherwise outside of the visible discharge, a violation of the turbidity standard shall be deemed to have occurred."

C-34. Env-Wq 1703.13 titled "Temperature" states the following:

"(a) There shall be no change in temperature in class A waters, unless naturally occurring.
(b) Temperature in class B waters shall be in accordance with RSA 485-A:8, II, and VIII."

NH RSA-A:8, II states the following for Class B waters "Any stream temperature increase associated with the discharge of treated sewage, waste or cooling water, water diversions, or releases shall not be such as to appreciably interfere with the uses assigned to this class."

NH RSA-A:8, VIII states the following: "In prescribing minimum treatment provisions for thermal wastes discharged to interstate waters, the department shall adhere to the water quality requirements and recommendations of the New Hampshire fish and game department, the New England Interstate Water Pollution Control Commission, or the United States Environmental Protection Agency, whichever requirements and recommendations provide the most effective level of thermal pollution control."

C-35. Env-Wq 1703.14, titled "Nutrients" states the following:

"(a) Class A waters shall contain no phosphorous or nitrogen unless naturally occurring.
(b) Class B waters shall contain no phosphorous or nitrogen in such concentrations that would impair any existing or designated uses, unless naturally occurring.
(c) Existing discharges containing either phosphorous or nitrogen which encourage cultural eutrophication shall be treated to remove phosphorus or nitrogen to ensure attainment and maintenance of water quality standards.
(d) There shall be no new or increased discharge of phosphorous into lakes or ponds.
(e) There shall be no new or increased discharge(s) containing phosphorous or nitrogen to tributaries of lakes or ponds that would contribute to cultural eutrophication or growth of weeds or algae in such lakes and ponds."

C-36. Nutrient Numeric Thresholds: New Hampshire does not currently have numeric surface water quality citeria for nutrients (total phosphorus and total nitrogen) in regulation (i.e., Env-Wq 1700) but has established numeric thresholds for nutrient response parameters such as chlorophyll-a that are used for surface water quality assessments. These numeric thresholds are included in the State's Consolidated Assessment and Listing Methodology or CALM[7]. The CALM states the following regarding the numeric chlorophyll-a threshold established to protect the recreation designated use: "Excessive algal growth (high biomass and high chlorophyll-a values) can impair the public safety and aesthetic enjoyment of surface waters. The General Water Quality Criteria (Env-Wq 1703.03) require that surface waters be free of substances which: produce color or turbidity making the water unsuitable for the designated use or interfere with recreational activities (Env-Wq 1703.03 (c)(1) c & e). For assessment purposes, chlorophyll-a concentrations in excess of 15 µg/L in fresh water and 20 µg/L in salt water are indicators of excessive algal growth that interferes with recreational activities."

C-37. Env-Wq 1703.18, titled "pH" states the following:

"(a) The pH of Class A waters shall be as naturally occurs.
(b) As specified in RSA 485-A:8, II, the pH of Class B waters shall be 6.5 to 8.0, unless due to natural causes.
(c) As specified in RSA 485-A:8, III, the pH of waters in temporary partial use areas shall be 6.0

[7] State of New Hampshire 2018 Section 305(b) and 303(d) Consolidated Assessment and Listing Methodology. New Hampshire Department of Environmental Services. R-WD-19-04. 2018 CALM (nh.gov).

to 9.0 unless due to natural causes."

C-38. Env-Wq 1703.19, titled "Biological and Aquatic Community Integrity" states the following:

"(a) All surface waters shall support and maintain a balanced, integrated and adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of a region.
(b) Differences from naturally-occurring conditions shall be limited to non-detrimental differences in community structure and function."

C-39. Env-Wq 1703.21 titled "Water Quality Criteria for Toxic Substances" states the following:

"(a) Unless naturally occurring or allowed under part Env-Wq 1707, all surface waters shall be free from toxic substances or chemical constituents in concentrations or combinations that:

(1) Injure or are inimical to plants, animals, humans or aquatic life; or
(2) Persist in the environment or accumulate in aquatic organisms to levels that result in harmful concentrations in:
a. Edible portions of fish, shellfish, or other aquatic life; or
b. Wildlife that might consume aquatic life."

C-40. Antidegradation provisions are included in Env-Wq 1702 and Env-Wq 1708.

a. Env-Wq 1702.03 states that ""Antidegradation" means a provision of the water quality standards that maintains and protects existing water quality and uses."
b. Env-Wq 1708.02 states that "Antidegradation shall apply to: (a) Any proposed new or increased activity, including point source and nonpoint source discharges of pollutants, that would lower water quality or adversely affect the existing or designated uses; (b) Any proposed increase in loadings to a waterbody when the proposal is associated with existing activities; (c) Any increase in flow alteration over an existing alteration; and (d) Any hydrologic modifications, such as dam construction and water withdrawals."
c. Antidegradation applies to all parameters as evidenced by Env-Wq 1708.08 (Assessing Waterbodies) which states "The applicant shall characterize the existing water quality and determine if there is remaining assimilative capacity for each parameter in question."
d. According to Env-Wq 1708.03 (b), "A proposed discharge or activity shall not eliminate any existing uses or the water quality needed to maintain and protect those uses."
e. Env-Wq 1702.04 states that ""Assimilative capacity" means the amount of a pollutant or combination of pollutants that can safely be released to a waterbody without causing violations of applicable water quality criteria or negatively impacting uses."
f. Env-Wq 1708.08 describes the process for assessing waterbodies to determine if there is remaining assimilative capacity for each parameter in question.
g. Env-Wq 1708.09 titled "Significant or Insignificant Determination" states the following: "(a) Any discharge or activity that is projected to use 20% or more of the remaining assimilative capacity for a water quality parameter, in terms of either concentration or mass of pollutants, or volume or flow rate for water quantity, shall be considered a significant lowering of water quality.
(b) The department shall not approve a discharge or activity that will cause a significant lowering of water quality unless the applicant demonstrates, in accordance with Env-Wq

1708.10, that the proposed lowering of water quality is necessary to achieve important economic or social development in the area where the waterbody is located."

h. Env-Wq 1708.01(b)(1), in general, states that: For significant changes in water quality, where the quality of the surface waters exceeds levels necessary to support propagation of fish, shellfish, and wildlife, and recreation in and on the water, that quality shall be maintained and protected unless the department finds, after full satisfaction of the intergovernmental coordination and public participation provisions and the analysis required by Env-Wq 1708.10, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the surface waters are located. In allowing such degradation or lower water quality, the department shall ensure water quality adequate to fully protect existing uses. Further, the department shall ensure that the highest statutory and regulatory requirements shall be achieved for all new and existing point sources and that all cost effective and reasonable best management practices for nonpoint source control shall be implemented.

i. Env-Wq 1708.01(b)(2) states the following: "The department shall not approve any proposed discharge or activity that might cause degradation or lower water quality, without such conditions as are necessary to ensure that: a. Water quality will be adequate to protect existing uses; b The highest statutory and regulatory requirements will be achieved for all new and existing point sources; and c All cost effective and reasonable best management practices for nonpoint source control will be implemented."

C-41. Env-Wq 1708.04 titled "Protection of Water Quality in ORW" states the following:

"(a) Surface waters of national forests and surface waters designated as natural under NH RSA 483:7-a, I, shall be considered outstanding resource waters (ORW).
(b) Subject to (c), below, water quality shall be maintained and protected in surface waters that constitute ORW.
(c) The department shall allow a limited point or nonpoint source discharge to an ORW only if:
    (1) The discharge will result in no more than temporary and short-term changes in water quality, wherein "temporary and short-term" means that degradation is limited to the shortest possible time;
    (2) The discharge will not permanently degrade water quality or result at any time in water quality lower than that necessary to protect the existing and designated uses in the ORW; and
    (3) All practical means of minimizing water quality degradation are implemented."

C-42. Env-Wq 1708.05 titled "Protection of Class A Waters" states the following:

"(a) As specified in RSA 485-A:8, I, discharges of sewage or waste to class A waters shall be prohibited.
(b) Proposed new or increased activities that the department determines do not involve the discharge of sewage or waste shall be reviewed in accordance with this part."

C-43. Env-Wq 1708.06 titled "Protection of Water Quality in High Quality Waters" states the following:

"(a) Subject to (b) through (d) below, high quality waters shall be maintained and protected.
(b) The department shall evaluate and authorize insignificant changes in water quality as specified in Env-Wq 1708.09.
(c) The department shall allow degradation of significant increments of water quality, as

determined in accordance with Env-Wq 1708.09, in high quality waters only if the applicant can demonstrate to the department, in accordance with Env-Wq 1708.10, that allowing the water quality degradation is necessary to accommodate important economic or social development in the area in which the receiving water is located.

(d) If the waterbody is Class A Water, the requirements of Env-Wq 1708.05 shall also apply."

C-44. Env-Wq 1708.12(a) states the ""transfer" means the intentional conveyance of water from one surface water to another surface water for the purpose of increasing volume of water available for withdrawal from the receiving surface water. The term does not include the transfer of stormwater, for the purpose of managing stormwater during construction, between basins created or otherwise lawfully used for stormwater detention or treatment, or both, and does not include the discharge of stormwater from a detention or treatment basin to a surface water."

C-45. The Salmon Falls River in the vicinity of the Project Activity is Class B. NH Chapter Law 1961, 40:1, X and 1967, 147:15.

Designated River, Water Use Registration and Reporting, and Water Conservation Plans

C-46. A "Designated River" is a river that is managed and protected for its outstanding natural and cultural resources in accordance with the Rivers Management and Protection Act (RSA 483).

C-47. Env-Wq 2102 includes requirements for Water Use Registration and Reporting (WURR).

C-48. NH RSA 485:61 regarding Rules for Water Conservation, states the following:

"I. The department shall adopt rules, pursuant to RSA 541-A, for water conservation practices for water users. These rules shall strike a reasonable balance between environmental, energy, and economic impacts and be consistent with current industry standards and practices for different types of water users.

II. The water conservation rules in paragraph I of this section shall apply to all new permit applicants and applications for water withdrawals subject to the provisions of RSA 485:3, RSA 485:48, RSA 485-C:21 and section 401 of the Clean Water Act.

III. Water conservation rules shall be consistent with applicable state or federal rules and regulations. Water Conservation Rules were adopted May 14, 2005 and currently codified as Env-Wq 2101."

C-49. Env-Wq 2101.24 entitled "Water Conservation Plan Required," states the following:

"(a) The applicants for approval of a source that would be a conservation source shall submit a water conservation plan that demonstrates compliance with the applicable provisions of Env-Wq 2101.05 through Env-Wq 2101.22 in accordance with the following:"

"(5) For a new withdrawal from a surface water associated with a project requiring a 401 Water Quality Certification, the water conservation plan shall be submitted prior to or in conjunction with the application for a 401 Water Quality Certification pursuant to Section 401 of the federal Clean Water Act;

(6) For a new withdrawal from a surface water that requires water quality certification pursuant to RSA 485-A:12, IV, the water conservation plan shall be submitted prior to or in conjunction with the certification request."

Env-Wq 2101.23, entitled Waivers, allows NHDES to grant waivers of certain provisions in Env-Wq 2101 provided the person requesting the waiver submits a written request to NHDES that includes the information specified in Env-Wq 2101.23(d).

Instream Flow Guidance

C-50. In 2010, NHDES published guidance (hereinafter called the 2010 instream flow guidance or 2010 ISF guidance) for estimating instream flow requirements for the protection of aquatic life.

CWA Section 303(d) List, TMDLs and Requirements for Impaired Waters

C-51. Section 303(d) of the Clean Water Act (33 U.S.C. 1313(d)) and the regulations promulgated thereunder (40 C.F.R. 130.0 – 40 C.F.R. 130.11) require states to identify and list surface waters that are violating state water quality standards (i.e., Section 303(d) List) that do not have an approved Total Maximum Daily Load (TMDL) for the pollutants causing impairment. For these water quality-impaired waters, states must establish TMDLs for the pollutants causing the impairments and submit the list of impaired surface waters and TMDLs to the U.S. Environmental Protection Agency (EPA) for approval. TMDLs include source identification, determination of the allowable load and pollutant reductions (by source) necessary to meet the allowable load. Once a TMDL is conducted, the pollutant/surface water is transferred to the list of impaired waters with approved TMDLs (known as Category 4A waters). The Section 303(d) List is, therefore, a subset of all impaired waters. The most recent Section 303(d) list of impaired waters submitted to EPA is the 2018 Section 303(d) List. A list of all impaired waters is available through the NHDES website.

C-52. On December 20, 2007, EPA approved the Northeast Regional Mercury TMDL which addressed mercury impairments in all New Hampshire fresh surface waters.

C-53. On September 21, 2010, EPA approved the Statewide Bacteria TMDL for 394 surface waters listed as impaired on the 2008 303(d) List of impaired waters.

C-54. On November 22, 1999, EPA approved A Phased TMDL For the Salmon Falls River Watershed Use Attainability Analysis for the Lower Salmon Falls River May 1999 by the Maine Department of Environmental Protection.

C-55. When a surface water does not meet water quality standards (i.e., when it is impaired), Env-Wq 1703.01 (b) (see Fact C-27) states that "All surface waters shall be restored to meet the water quality criteria for their designated classification including existing and designated uses, and to maintain the chemical, physical, and biological integrity of surface waters." Further, the addition of pollutants causing or contributing to impairment should be avoided as indicated in the following regulation and statute:

> Env-Wq 1703.03 (a) (see Fact C-28) states that "The presence of pollutants in the surface waters shall not justify further introduction of pollutants from point or nonpoint sources, alone or in any combination."
>
> NH RSA 485-A:12 (I) (Enforcement of Classification) states that "After adoption of a given classification for a stream, lake, pond, tidal water, or section of such water, the department shall enforce such classification by appropriate action in the courts of the state, and it shall be unlawful for any person or persons to dispose of any sewage, industrial, or other wastes,

> either alone or in conjunction with any other person or persons, in such a manner as will lower the quality of the waters of the stream, lake, pond, tidal water, or section of such water below the minimum requirements of the adopted classification."

Section 401 Water Quality Certification Application and Other Relevant Information

C-56. On April 30, 2020, and pursuant to 18 CFR Section 4.61, the Applicant filed with the Federal Energy Regulatory Commission (FERC) an Application for a Subsequent License for Minor Water Power Project for the Lower Great Falls Hydroelectric Project, FERC No. 4451 (also referred to herein as the Final License Application or FLA) [8].

C-57. On April 6, 2021, the Applicant filed an "Offer of Settlement" [9] with FERC that consisted of the Settlement Agreement for Prescription for Fishways for American Shad and River Herring ("LGF Settlement Agreement"), executed by and between the Applicant and U.S. Department of Interior, Fish and Wildlife Service ("USFWS"), and an accompanying Explanatory Statement.

C-58. On April 14, 2021, the U.S. Department of Interior (USDI) through the U.S. Fish and Wildlife Service (USFWS) filed comments, recommendations and prescriptions [10] for the Activity with FERC to prevent loss of, or damage to, fish and wildlife resources. The document includes the USFWS' Federal Power Act (FPA) Section 10(j) recommendations [11] (16 U.S.C. § 803) and the USFWS' preliminary fishway prescriptions in accordance with the Section 18 of the FPA [12] (16 U.S.C. §811). Section 10(j)

C-59. On April 16, 2021, the U.S. Department of Interior through the U.S. Fish and Wildlife Service (USFWS) filed "Preliminary Prescription for Fishways Pursuant to Section 18 of the Federal Power Act" [13], 16 U.S.C. §811 which states in part "…the Commission shall require the construction, maintenance and operation by a licensee at its own expense of… such fishways as may be prescribed by the Secretary of Commerce or the Secretary of the Interior".

C-60. On April 6, 2021, the New Hampshire Department of Environmental Services (NHDES) received an application for a CWA Section 401 water quality certification (WQC) for the Activity (aka, certification application or certification request)[14]. The certification application included the following:

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[8] Final License Application: FERC Accession No. 20200430-5032.
[9] Offer of Settlement: FERC Accession No. 20210406-6199.
[10] USFWS Section 10(j) recommendations and Section 18 preliminary fishway prescriptions: FERC Accession Number 20200414-5060.
[11] Section 10(j) of the FPA requires FERC to consider federal and state fish and wildlife agency recommendations pursuant to the Fish and Wildlife Coordination Act to protect, mitigate damages to, and enhance fish and wildlife resources. "That in order to adequately and equitably protect, mitigate damages to, and enhance, fish and wildlife (including related spawning grounds and habitat) affected by the development, operation, and management of the project, each license issued under this Part shall include conditions for such protection, mitigation, and enhancement. Subject to paragraph (2), such conditions shall be based on recommendations received pursuant to the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.) from the National Marine Fisheries Service, the United States Fish and Wildlife Service, and State fish and wildlife agencies". FERC can alter or reject Section 10(j) recommendations by following prescribed procedures in Section 10(j)(2).
[12] Section 18 of the FPA authorizes the USFWS or NMFS to prescribe upstream and downstream fishway passage requirements. "The Commission shall require the construction, maintenance, and operation by a licensee at its own expense of such lights and signals as may be directed by the Secretary of the Department in which the Coast Guard is operating, and such fishways as may be prescribed by the Secretary of the Interior or the Secretary of Commerce, as appropriate". Section 18 fishway prescriptions are mandatory; FERC cannot alter them.
[13] USFWS FPA Section 18 Preliminary Fishway Prescription: FERC Accession No. 20210416-5084.
[14] 401 WQC Application: FERC Accession No. 20210406-6188.

Attachment 1 - Responses to Additional Submittal Information
Attachment 2 - Names and Addresses of Adjoining Riparian or Littoral Abutters based on Available Tax Mapping
Attachment 3 - Final License Application (Volume 1)
Attachment 4 - Final License Application (Volume 2)
Attachment 5 - Final License Application (Volume 3)
Attachment 6 - Response to FERC Additional Information Request, October 13, 2020
Attachment 7 - Response to NHDES and MDEP Comments on the Water Quality Monitoring Initial Study Report, June 27, 2019
Attachment 8 - WQC Addendum: § 121.5 Certification Request

The record for this certification decision includes the information provided in the certification application as well as information filed with FERC for this relicensing through February 8, 2022.

C-61. On April 21, 2021, FERC issued a "Notice of Waiver Period for Water Quality Certification Application" which stated that if NHDES did not act on the certification application by April 7, 2022, NHDES' certifying authority would be deemed waived pursuant to section 401(a)(1) of the Clean Water Act, 33 U.S.C. § 1341(a)(1) [15].

C-62. Natural Resource Agencies include, but are not limited to, NHDES, NHFGD, USFWS of USDI, NMFS of the NOAA, MEDEP, MDMR and MEDIFW as defined in footnote 16.

C-63. NHDES issued a draft section 401 Water Quality Certification for public comment from February 18, 2022 to 4 p.m. on March 24, 2022.

D. FINDINGS

D-1. The Applicant has submitted an Application for a Subsequent License for Minor Water Power Project for the Lower Great Falls Hydroelectric Project, FERC No. 4451(also referred to herein as the Final License Application or FLA) to the Federal Energy Regulatory Commission (FERC) (see Fact C-56).

D-2. The Applicant has submitted a request to NHDES for a Clean Water Act (CWA) Section 401 water quality certification (aka, WQC or certification) (see Fact C-60).

Existing and Proposed Project Facilities and Operation

D-3. *Background:*

The Lower Great Falls Project is located on the Salmon Falls River in Strafford County, New Hampshire and York County, Maine. The majority of the infrastructure including the intake, penstock and powerhouse is located within the City of Somersworth, New Hampshire. The left abutment is located in the Town of Berwick, Maine. The Project dam is located at approximately river mile 3.1 and is the third dam on the mainstem of the Salmon Falls River. At the Project dam, the total drainage area is

[15] Date to act on certification application: FERC Accession No. 20210421-3010

[16] NHDES means New Hampshire Department of Environmental Services; NHFGD means New Hampshire Fish and Game Department; USFWS means United States Fish and Wildlife Service of the US Department of Interior (USDI); NMFS means National Marine Fisheries Service of the National Oceanic and Atmospheric Administration (NOAA); MEDEP means the Maine Department of Environmental Protection; MDMR means Maine Department of Marine Resources; and MEDIFW means the Maine Department of Inland Fisheries and Wildlife.

approximately 220 square miles, which is about 93.2% of the Salmon Falls watershed which extends into Maine and New Hampshire. The Salmon Falls River begins at Great East Lake and flows south-southwest for approximately 38 miles along the border between Maine and New Hampshire which is the approximate middle of the river. The Salmon Falls River and the Cocheco River join in Dover, New Hampshire, approximately 4.9 miles downstream from the Project, to form the Piscataqua River. The Piscataqua River flows for approximately 10.5 miles before reaching Portsmouth Harbor, which empties into the Gulf of Maine. The median annual inflow at the Project is approximately 214 to 277 cfs depending on the U.S. Geological Survey (USGS) gages used in the analysis (from page A-11 in the FLA - see Fact C-56).

D-4. *Existing Project Facilities (from Fact C-56):*

a. *Dam:* An approximate 32-foot-high stone and masonry dam that has a total length of 297 feet (consisting of a 50-foot long left abutment, a 176-foot long spillway section, and a 71-foot long right abutment), a spillway with a crest elevation of 102.4 feet, NGVD 29 and 4-foot high wooden flashboards with steel pins, resulting in a normal pond elevation of 106.4 feet, NGVD 29, at the top of the flashboards; two 8-foot- wide by 8-foot-high low level outlet gates, one of which is operational, with sill elevations of 84.9 feet, NGVD 1929 that control flow into two 7-foot diameter bypass pipes that are operated manually by a hydraulic unit mounted to the gate structure that is run by a dedicated portable generator; two (12-inch and 4-inch diameter) pipes located at the base of the Project dam at an approximate invert elevation of 75.0 feet, NGVD 29 that are left open and cannot be currently regulated; and a 5.25-feet-wide by 4-feet-high trash gate with a sill elevation of 102.4 feet, NGVD 29 that is located adjacent to the intake structure with a manually operated screw stem operator that is typically used to sluice debris and is also opened when the impoundment level rises approximately 10-inches above the flashboards during high flow periods.
b. *Impoundment:* An impoundment that extends approximately 1.1 miles upstream of the Project dam with a gross volume of 584 acre-feet an approximate surface area of 40 acres at the normal pond elevation of 106.4 feet, NGVD 29 and a maximum depth of approximately 20 feet.
c. *Intake Works*: A 40.5-foot wide by 20-foot-high concrete intake structure with a wooden-deck that includes four (4) steel frame gates with a sloping steel trashrack with 2-inch bar spacing; two (2) pairs of 5-foot-wide by 10.5-foot-high gates with a sill elevation of 92.0 feet that control flow to each penstock and are hand operated with a chain hoist suspended from a monorail.
d. *Penstocks:* Two buried penstocks that extend approximately 200-225 feet from the intake structure to the powerhouse. At the intake structure both penstocks have an 8.5-foot diameter. The left penstock bifurcates approximately 120 feet downstream of the intake structure into a 5-foot-4-inch diameter penstock (Unit 4) and a 7-foot-7-inch penstock (Unit 3), both with lengths of 85 feet. The right penstock bifurcates approximately 140 feet downstream of the intake structure into a 7-foot diameter penstock (Unit 2) and a 7-foot-7-inch diameter penstock (Unit 1), both with lengths of 85 feet.
e. *Powerhouse:* A 30-foot by 46-foot concrete and brick powerhouse with a wood frame superstructure that is located approximately 250 feet downstream of the Project dam and includes the 4 vertical James Leffel Co. Type "F" Francis turbines, generators, controls, and station switchgear. The minimum and maximum hydraulic capacities of turbines are 60 cfs and 199 cfs per unit respectively for turbines 1 and 3 and 60 cfs and 152 cfs per unit respectively for turbines 2 and 4. The full range of hydraulic capacity is therefore 60 cfs to 702 cfs.
f. *Tailrace:* An approximate 55-feet- wide and 30-feet- long tailrace.
g. *Bypass Reach:* An approximate 250-foot-long bypass reach that extends between the dam and the tailrace.
h. *Transmission Line:* a 26-foot-long underground transmission line that stretches to an Eversource

Energy pole-mounted air break.

D-5. *Existing Project Operation (from Fact C-56):*

The Project has a generating capacity of 1.28 MW and is operated in automatic mode as a run-of-river facility with no storage or flood control capacity. A pond level sensor is installed near the intake to monitor and ensure the Project impoundment is maintained at the flashboard crest elevation of 106.4 feet (NGVD 29) and to regulate the turbine operation. When inflow is within the hydraulic capacity of the turbines (60 to 702 cfs), and the Project is generating, the pond level control system limits the impoundment fluctuations to approximately 0.5 feet (see pages A-24 to A-34 in Fact C-56). Based on the annual flow duration curves on pages E-72 and E-77 in Fact C-56*),* the Project can generate power approximately 65 to 70 percent of the year while passing just the minimum required flow in the bypass reach (discussed next).

The Project maintains a continuous minimum flow of 6.05 cfs or inflow, whichever is less, in the bypass reach. The minimum flow is passed via the two (12-inch and 4-inch diameter) pipes located at the base of the Project dam.

The Project is operated under an average head of 32 feet, which includes 4-foot flashboards. The flashboards on the spillway crest are constructed of wood and held in place with steel pins. Flashboards are typically replaced as-needed after high-flow events. During installation/repair of the spillway flashboards, the Project impoundment is temporarily drawn down by increasing generation flows above inflow rates, during a time when streamflow conditions allow. The impoundment is lowered just below the permanent spillway crest (elevation 102.3 feet, NGVD 29) to allow operations personnel to safely work on the spillway crest. Flashboards and pins are then repaired or replaced as needed. When restoring the elevation of the impoundment, the Applicant typically passes the majority of inflow (approximately 90% of total flow) as generation flow through the Project turbines, allowing the impoundment to slowly rise and prevent dewatering of the river reach below the dam, as the remaining 10% of inflow is used to refill the impoundment. Under normal flow conditions, it typically requires 18 to 24 hours to refill the impoundment. During these temporary drawdowns, the bypass minimum flow is maintained by the aforementioned discharge pipes located at the base of the dam. From 2005 through 2019 (15 years), the flashboards failed one to five times per year for a total of 29 times (an average of approximately two times per year (Table A.1.3.1-1 in *Fact C-56)*. During this period, it took a total of 1241 days (an average and median of approximately 43 and 14 days per year respectively) to repair the flashboards.

When Project inflow exceeds the maximum hydraulic capacity of the Project (702 cfs), the impoundment level is allowed to rise over the flashboard crest to pass the excess inflow, as needed. When water rises to approximately 10-inches above the flashboard crest, the trash sluice and low level outlet gate are operated to help regulate the Project impoundment level, as needed, to avoid damage to the flashboards, if possible.

D-6. *Applicant's Proposed Project Operation and Environmental Measures (from Fact C-56):* The Applicant proposes to do the following:

a. Continue to operate the Project in a run-of-river mode using automatic pond level control and maintain the Project impoundment water level at the flashboard crest elevation of 106.4 feet, NGVD 29, under typical operating and flow conditions;
b. release a minimum flow of 30 cfs or inflow, whichever is less, into the bypass channel below the Project upon the effective date of the subsequent FERC license;

c. except as noted in items (d) and (e) below, continue to pass a portion (10 cfs) of the proposed minimum bypass flow via the two (12-inch and 4-inch diameter) pipes located at the base of the Project dam, while the remaining portion (20 cfs) would be passed via a proposed cut-out in the flashboards on the right side of the spillway;
d. during the downstream migratory fish passage season for American Eel (i.e., September and October), pass the proposed minimum flow through the proposed downstream fish passage facility[17], and additional flow would be provided via the two pipes at the base of the dam, as flow through these pipes cannot be regulated;
e. during flashboard repair, pass the proposed minimum bypass flow via a combination of the two (12-inch and 4-inch diameter) pipes at the base of the dam (10 cfs) and the low level gate (20 cfs), which is described Finding D-4;
f. within 4 years of effective date of the subsequent FERC license, implement nighttime turbine shutdowns to enhance downstream passage of silver stage American eels by shutting turbines down from 8:00 pm to 4:00 am for three (3) consecutive nights following rain accumulations of 0.5 inches or more over a 24-hour period during the months of September and October;
g. conduct a two-season American Eel ramp siting study to be initiated in the first full passage season after the effective date of the subsequent FERC license;
h. install and operate (from May 1 to September 15 annually) an Upstream American Eel ramp within 4 years of the effective date of the subsequent FERC license;
i. install and operate a downstream fish passage structure within 4 years of the effective date of the subsequent FERC license; and
j. consult with the NH and ME State Historic Preservation Officer before beginning any land-disturbing activities or alterations to know historic structures within the Project boundary.

CWA Section 401 WQC Required

D-7. The Salmon Falls River is a water of the United States (see Facts C-8, C-9).

D-8. The Activity may include discharges from upstream of the Project dam to downstream of the dam including, but not limited to, through the turbines, various gates and/or over the dam spillway (see Fact C-7 and Findings D-4, D-5, and D-6).

D-9. Because the Activity may involve discharges (as that term is used in the CWA) to a water of the United States in New Hampshire, and because the Activity requires a federal license or permit, a CWA section 401 water quality certification (aka certification) is required from New Hampshire (see Findings D-1, D-2, D-7, and D-8).

D-10. The New Hampshire Department of Environmental Services (NHDES) is the authority (aka certifying authority) responsible for issuing CWA Section 401 water quality certifications in New Hampshire [18] (see Fact C-10).

State Authority for Certification Conditions, Modifications and Monitoring

D-11. RSA 485-A:12, III (Fact C-10) states the following: "Certification shall include any conditions on, modifications to, or monitoring of the proposed activity necessary to provide assurance that the

[17] Based on current USFWS engineering design criteria, the flow through the downstream fish passage facility is reported to be approximately 35 cfs.
[18] Because the Project also discharges to Maine waters, it is NHDES' understanding that MEDEP will also issue a CWA section 401 water quality certification.

proposed discharge complies with applicable surface water quality standards." Monitoring includes, but is not limited to, the following:

- monitoring to determine compliance with conditions in this certification;
- on-site inspections;
- development, submission and implementation of monitoring plans;
- analysis, preparation and submittal of reports summarizing monitoring results;
- notifying appropriate authorities in a timely manner when excursions from conditions in this certification occur; and
- uploading monitoring data into the NHDES Environmental Database (EMD) so that is readily accessible to the public and useable by NHDES for surface water quality assessments required by section 305(b) and 303(d) of the federal Clean Water Act.

Potential Environmental Impacts of Hydroelectric Projects

D-12. The following description of potential environmental impacts of hydroelectric projects is from a summary report of the 2010 summit meeting on Environmental Mitigation Technology for Hydropower [19]. "Although hydroelectric power plants have many advantages over other energy sources, they also have potential environmental impacts (Table 1). Most of the adverse impacts of dams are caused by habitat alterations. Reservoirs associated with large dams can inundate large areas of terrestrial and river habitat. Diverting water from the stream channel or curtailing reservoir releases in order to store water for future electrical generation can dry out streamside (riparian) vegetation. Insufficient water releases degrade habitat for fish and other aquatic organisms in the river below the dam. Water in a reservoir is stagnant compared to that in a free-flowing river. Consequently, water-borne sediments and nutrients can be trapped, resulting in the undesirable proliferation of algae and aquatic weeds (eutrophication) and a change in water quality in the reservoir and in reservoir releases. In some cases, water spilled from high dams may become supersaturated with nitrogen gas resulting in gas-bubble disease in aquatic organisms inhabiting the tailwaters. Hydropower projects can also affect aquatic organisms directly. The dam can block upstream movements of fish, which can have severe consequences for anadromous fish (e.g., salmon, steelhead, American shad), catadromous fish (e.g., American eels), or riverine fish that make seasonal migrations to spawn (e.g., sturgeon and paddlefish). Fish moving downstream may be drawn into the power plant intake flow (entrained). Entrained fish are exposed to physical stresses (pressure changes, shear, turbulence, strike) as they pass through the turbine that may cause disorientation, physiological stress, injury, or mortality."

Potentially Affected Surface Waters and Applicable Water Quality Standards

D-13. NHDES has assigned Assessment Unit (AU) identification numbers to many, but not all surface water waters in New Hampshire, with many surface waters divided into smaller segments based on their characteristics. AUs (where available) for surface waters located immediately upstream and downstream of the Activity are shown in the table below. Because these surface waters are located closest to the Activity, the designated uses (e.g., aquatic life integrity) in these surface waters have the most potential to be impacted by the Activity. It is possible, however, that other surface waters may also be affected by the Activity (e.g., flow alterations caused by the Activity may also affect aquatic habitat in river reaches further downstream, and lack of adequate fish passage can impact fish communities located further upstream and downstream).

[19] Environmental Mitigation Technology for Hydropower: Summary Report on Summit Meeting Convened by Oak Ridge National Laboratory, the National Hydropower Association, and the Hydropower Research Foundation. Washington, D.C. June 2-3, 2010. EMTSSummit4.pdf (hydro.org)

Assessment Unit ID	Description
NHIMP600030406-03	Salmon Falls River – Lower Great Falls Dam impoundment
NHRIV600030406-03	Salmon Falls River - riverine segment immediately downstream of Lower Great Falls Dam
	Unnamed wetlands along the riverbanks of each of the above Assessment Units.

D-14. New Hampshire surface water quality standards are summarized in Facts C-11 through C-45 and apply to all New Hampshire surface waters as defined in Fact C-14, including the potentially affected surface waters identified in Finding D-13.

D-15. The potentially affected surface waters (see Finding D-13) are classified as Class B (see Fact C-45).

D-16. The goal of Class A and B surface waters is to support the designated uses defined in Env-Wq 1702.17, which include swimming and recreation in and on the water, fish consumption, shellfish consumption (for tidal waters), aquatic life integrity, wildlife, and after adequate treatment as a water supply (see Fact C-21). Designated uses apply "…whether or not such uses are presently occurring" (Env-Wq 1702.17 – see Fact C-21).

D-17. The Activity is not within ¼ mile of a Designated River under the Designated Rivers Program (RSA 483, see Fact C-46). As such, the Activity is not within the jurisdiction of the Designated Rivers Program.

D-18. The surface waters in the vicinity of the Activity are not Outstanding Resource Waters (Env-Wq 1708.04, see Fact C-41)

D-19. The Salmon Falls River is a warmwater fishery with diadromous fish, however, the NHFGD does stock trout upstream of the Milton Three Ponds Dam[20], which is upstream of the Project.

Rare, Threatened and Endangered Species

D-20. Table E.6.1.2-1 beginning on page E-130 of the FLA (see Fact C-56) lists the federal and state rare, threatened and endangered species found in the Project region as well as species of special concern in New Hampshire and Maine.

Federal Rare, Threatened and Endangered Species: Based on the USFWS' ECOS-IPaC website[21], the USFWS reported the following three federally threatened species in its FPA Section 10(j) recommendation letter (see Fact C-58): The northern long-eared bat (NLEB; *Myotis septentrionalis*), red knot (*Calidris canutus rufa*), and the small whorled pogonia (*Isotria medeoloides*). The USFWS's Section 10(j) recommendations include conditions to protect the these federally threatened species (see Fact C-58).

State Rare, Threatened and Endangered Species: The following is from the Applicant's FLA, page E-128 (see Fact C-56).

> "Within the town of Somersworth, NH, five state endangered or threatened plant species have been recorded (NHNHB, 2018). Only one of these species, northern blazing star (*Liatris novae-*

[20] Email from NHFGD staff on April 13, 2020.
[21] USFWS ECOS-IPaC website https://ecos.fws.gov/ipac/

angliae var. novaeangliae) has been documented within the last twenty years. In addition, the New Hampshire Natural Heritage Bureau (NHNHB), upon request, performs data checks on known locations of rare species and exemplary natural communities for use in project planning and permitting. A NHNHB data check (personal correspondence, A. Lamb, October 5, 2016) of the Project's vicinity indicates that one endangered species have been historically recorded in the area, northern beggar ticks (*Bidens hyperborea*), a NH-endangered plant. The species is not federally listed.

NHNHB reported that the only record of northern beggar-ticks in this area was on September 22, 1923. This plant is associated with tidal areas, and the specimen was collected on the tidal shores of the Salmon Falls River. There is no evidence that tidal habitat was historically present within the Project area and tidal habitat is not present now. During consultation with NHNHB regarding the Rollinsford Hydroelectric Project, located downstream, NHNHB determined that their location records for this plant were not accurate and did not request that the Applicant study northern beggar-ticks habitat or occurrence further (personal communication, A. Lamb, January 31, 2017). The NHFGD and MDIFW also provided information on state-listed endangered, threatened, and special concern species in their respective states (G. Normandeau, NHNHB, personal communication, January 27, 2017; J. Maclaine, MDIFW, personal communication, January 17, 2017). Table E.6.1.2-1 details federal and state-listed species that may occur within the Project vicinity, based on agency consultation and available data."

Conditions E-10 through E-16 of this certification and the USFWS's Section 10(j) recommendations are expected to provide adequate protection for all aquatic species, including, but not limited to, federal and state rare, threatened and endangered species.

Water Chemistry

D-21. *Current surface water quality assessment*: According to the 2018 305(b)/303(d) lists of impaired waters (see Fact C-51), the following surface waters in the vicinity of the proposed Activity are listed as impaired. All impairments, with the exception of those highlighted in bold (which have approved TMDLs) and "Non-native Aquatic Plants," are on the Section 303(d) List. It should be noted that this assessment did not account for water quality monitoring conducted in 2018 for the Project (see Findings D-22 through D-33) as Project data was not input into the NHDES Environmental Monitoring Database (EMD) until May, 2021.

Assessment Unit (AU)	Waterbody Name	Cause of Impairment (Designated Use Impaired)
NHIMP600030406-03	Salmon Falls River – Lower Great Falls Dam impoundment	Non-native Aquatic Plants (AL) **Mercury (FC)** **Escherichia coli (PCR)**
NHRIV600030406-03	Salmon Falls River - riverine segment immediately downstream of Lower Great Falls Dam	Non-native Aquatic Plants (AL) pH (AL) **Mercury (FC)**
Notes: AL = Aquatic Life, PCR = Primary Recreation, SCR = Secondary Recreation, FC = Fish Consumption, SFC = Shellfish Consumption Impairments highlighted in bold have approved TMDLs. All other impairments are on the Section 303(d) List. All fresh surface waters are impaired mercury due to elevated levels of mercury in fish tissue which has resulted in statewide fish consumption advisory.		

When a surface water does not meet water quality standards (i.e., when it is impaired), the addition of pollutants causing or contributing to impairment should be avoided (see Fact C-55). As noted in the table above, all fresh surface waters in New Hampshire are impaired for mercury due to concentrations found in fish tissue which have resulted in a statewide fish consumption advisory. On December 20, 2007, EPA approved the Northeast Regional Mercury TMDL which addressed mercury impairments in all New Hampshire fresh surface waters (see Fact C-52). The primary source of mercury addressed in the TMDL is atmospheric deposition from in-state and out-of-state emissions. Atmospheric deposition from in-state and out-of-state emissions of fossil fuel byproducts can also cause low pH in rain (aka, acid rain) which can contribute to pH violations in surface waters. Other pollutant sources can also impact mercury concentrations and pH in surface waters. For example, excursions of pH criteria (see Fact C-37) can also be caused by excessive algal and/or macrophyte plant growth which can lead to increases in pH due to the uptake of carbon dioxide during photosynthesis and reductions in pH at night due to respiration and the release of carbon dioxide. On September 21, 2010, EPA approved the Statewide Bacteria TMDL for 394 surface waters, which included the Lower Great Falls impoundment (see Fact C-53). Sources of bacteria can be natural (e.g., waterfowl, wildlife) and non-natural (e.g., from anthropogenic sources such as stormwater runoff from agricultural and urbanized land uses). Finding D-34 discusses the Salmon Falls River TMDL that was primarily conducted to address dissolved oxygen and chlorophyll-a impairments in the Salmon Falls River. Finding D-55 discusses the non-native aquatic plants impairments of the surface waters impacted by the Project

D-22. From July 6, 2018 to September 25, 2018, the Applicant conducted a Water Quality Study that was requested by NHDES. The goals of the study were to 1) determine if the Project is impacting water quality in the Salmon Falls River upstream and downstream of the Project dam, and 2) to determine compliance with New Hampshire (and Maine) surface water quality standards. The objectives of the study were to 1) collect water temperature, dissolved oxygen, and pH in the Project impoundment as well as chlorophyll-a, nutrients, vertical temperature and dissolved oxygen profiles and Secchi disk data, and 2) collect continuous water temperature and dissolved oxygen (DO) and discrete samples of pH upstream of the Project impoundment and downstream of the Project dam. All objectives were to be conducted under various river flow, river temperature and Project operation conditions that included, but was not limited to, low flow and relatively high water temperatures.

D-23. Compared to long-term averages from 1981 to 2010, monthly averages in July, August and September 2018 were, respectively, 1.4°C, 2.5°C, and 2.1°C warmer than normal and had, respectively, 0.81, 0.93 and 0.70 more inches of rain than normal. Prorated river flow was predominantly below the long-term median daily flow in July and September and was predominantly above the long-term median flow in August [22].

D-24. Continuous measurements of Total Project inflow (see Figure 3.1.2-1 in the Water Quality (WQ) report included in the FLA (see Fact C-56)) was estimated by combining estimated turbine flow to estimated bypass reach flow. Turbine flow and bypass reach flow were calculated as follows:

- Turbine Flow was determined by relationship between turbine wicket gate opening (%) of each unit, (which is recorded at the Project) and flow. Note that an estimated 10 cfs of leakage was assumed through each of the two turbine units during non-generation periods. [23]

[22] Prorated flow statistics for the Project were determined by multiplying the daily average flows measured at the NHDES/USGS gage on the Salmon Falls River near Milton, NH (No. 01072100) for the period 1968-2005, by the drainage are at the Project (220 square miles) and dividing the result by the gage drainage area (108 square miles)

[23] GMP visually estimated that approximately 10 cfs leaks from the open penstock past the wicket gates of each of the

- Bypass Flow was calculated with rating curves that were developed from water stage recorder data (installed in the bypass reach from 6/21/18 to 10/23/18 to record in 15-minute intervals) and several streamflow measurements.

D-25. During the NHDES requested portion of the water quality study (July 6 to September 25, 2018), the lowest estimated total Project inflow based on the continuous measurements of turbine and bypass flow described above was approximately 22 cfs on September 2, and the highest estimated total Project inflow was approximately 537 cfs on August 5. For comparison, the lowest prorated daily estimated flow from the Milton Salmon Falls River gage was approximately 24 cfs between September 5 and September 8 and the highest prorated flow was approximately 470 cfs on August 5. To put this in perspective with regards to low flow, the 7Q10 low flow[24] in the vicinity of the Activity is estimated to be approximately 28.7 cfs based on the 1999 Salmon Falls River TMDL (Fact C-54). The study therefore captured river flows that were close to the estimated 7Q10 low flow.

D-26. During the water quality study only two of the four turbines were operable. Therefore, the effective maximum turbine hydraulic capacity during the study was 351 cfs, which is 50 percent of the total Project turbine hydraulic capacity of 702 cfs with all four turbines operating. Based on data provided by the Applicant on June 27, 2019, the minimum, maximum, average, median, and the 75th, 80th, 90th and 95th percentile bypass flow, turbine flow, inflow, impoundment elevation and total generation during the study are provided in the table below. As shown, the median turbine flow was 20.4 cfs, the maximum was approximately 325 cfs and 95 percent of the turbine flows were less than 209 cfs which are all well less than the maximum turbine hydraulic capacity of 702 cfs.

Statistic	Bypass Flow (cfs)	Total Turbine Flow (cfs)	Total Estimated Inflow (cfs)	Impoundment Elevation (ft, msl Datum)	Total Generation (kW)
Minimum	2.2	20.0	22.2	103.44	0
Maximum	496.8	325.3	628.4	106.31	612
Average	20.1	80.3	100.4	104.67	113
Median	7.6	20.4	62.8	104.65	17
75th percentile	19.8	138.2	149.3	105.01	211
80th percentile	27.2	139.4	162.2	105.07	216
90th percentile	42.8	156.0	205.6	105.31	241
95th percentile	80.0	209.0	288.5	105.53	401

D-27. Water quality monitoring was conducted in the upstream portion of the impoundment (site LGF-1), at the deep spot in the impoundment (site LGF-2), in the bypass channel (site LGF-3) and in the tailrace (site LGF-4). Monitoring did not occur in the riverine section just upstream of the impoundment[25] in a segment that was not influenced by the Project as originally intended. Consequently, a determination of how the Project impacts the quality of the Salmon Falls River as it enters Project influenced waters could

two functioning units (i.e., approximately 20 cfs leakage total) into the tailrace during periods of non-generation. The second penstock, currently in disrepair, leading to the two remaining units, was completely dewatered and sealed by the intake headgate during the 2018 Water Quality Study; thus, no leakage occurred at those units.

[24] The 7Q10 low flow is the average seven-day low flow that occurs, on average, once every ten years.

[25] Based on Figure 2.1-1 of the Water Quality Study report included in the FLA (see Fact C-56), the riverine section is estimated to begin approximately 800 feet upstream of LGF-1.

be estimated (based on results at LGF-1), but not definitively made.

D-28. Some of the DO and pH results could not be confirmed because records were either not made or not found for handheld meter post calibration verification on several occasions (Table 4.1-1 and 4.1-2 in the WQ report included in the FLA - see Fact C-56).

D-29. Continuous water temperature measurements collected during the Water Quality Study are summarized in the table below. As indicated, the study captured periods of relatively high water temperatures (i.e., generally considered to be water temperatures of 25 degrees Celsius (°C) or higher). Based on Figures 3.2.1.2-1a through Figures 3.2.1.2-1d in the WQ report included in the FLA (see Fact C-56), water temperature generally increased as flow decreased.

Temperature (°C)

Location	Minimum	Maximum	Average
Upper Impoundment (LGF-1)	16.2°C	28.2°C	23.1°C
Lower Impoundment (LGF-2)	17.2°C	27.3°C	22.3°C
Bypass Reach (LGF-3)	16.7°C	29.0°C	23.7°C
Tailrace (LGF-4)	17.1°C	28.8°C	23.5°C

D-30. A total of 10 water temperature and DO vertical profiles were collected during a 5-week period in the deep spot of the lower impoundment (LFG-2) from mid-July to mid-August. Each profile showed conditions of summer stratification, which often coincided with lower DO. Total water depth was approximately 5.5 to 6 meters. DO was greater than 5 mg/L in the upper 2.5 meters and dropped below 1 mg/L at depths below approximately 4 meters (from Figure 3.2.2-1 in the WQ report included in the FLA -see Fact C-56).

D-31. Continuous DO measurements collected during the Water Quality Study are summarized in the table below. As shown, DO occasionally fell below the 5 mg/L instantaneous minimum concentration criterion in the impoundment (LGF-2) and below the minimum 75 percent saturation daily average criterion in the impoundment (LGF-2) and bypass reach (LGF-3). The upper impoundment (LGF-1) and tailrace (LGF-4) did not exhibit any excursions of New Hampshire's DO criterion. All DO excursions occurred when the project was not generating, water temperatures were relatively high and river flows were relatively low (Figures 3.2.1.1-1a through 3.2.1.1-1d and Figures 3.2.1.1-2a through 3.2.1.1-2d in the FLA - see Fact C-56).

The single day when DO was below the 75% daily average criterion in the bypass (LGF-3) occurred on September 10 which was at the end of the September low flow period (September 1 - 10) when inflows was near the 7Q10 low flow and when water temperatures were between approximately 22.5°C to 24°C. After September 10, water temperature dropped to approximately 18°C by September 14. In the impoundment (LGF-2), daily DO averages were less than 75% saturation on September 8-10 (at the end of the 10- day low flow period), and all recorded DO concentrations below the instantaneous water quality standard of 5 mg/L occurred between September 8th and 9th when daily flows were approximately 24 and 25 cfs respectively.

As shown in the tables below, no continuous DO data was collected in July at LGF-2 due to instrument malfunction. According to page 21 of the Water Quality report in the FLA (see Fact C-56), "… although the data collection period was extended beyond the initial time-frame (i.e., July to mid-August) by 5 weeks, through to September 25th, the full extent of NH water quality violations may not have been captured. The 36 days of missing data would have been recorded during warmer summer months, and

as shown in Figure 3.1.2-1, average daily flows were also low for a longer period of time in July than in September (by 5 days). DO violations may have been found to be more significant in the impoundment had the July data been viable."

Dissolved Oxygen (mg/L)

Location	NH Water Quality Criterion	Minimum	Maximum	Excursions of NH Water Quality Criterion
Upper Impoundment (LGF-1)	≥ 5	7.6	10.1	None
Lower Impoundment (LGF-2)		3.6	9.6	24 of 3,824 values or 0.6% (Note: no data was collected on 42 days from 7/6/18-8/1/18 and 8/15/18 to 8/31/18 due to instrument malfunction)
Bypass Reach (LGF-3)		5.5	10.3	None
Tailrace (LGF-4)		6.5	9.8	None

Dissolved Oxygen (Daily Average Percent Saturation)

Location	NH Water Quality Criterion	Minimum	Maximum	Excursions of NH Water Quality Criterion
Upper Impoundment (LGF-1)	≥ 75	94.0	105.9	None
Lower Impoundment (LGF-2)		65.3	99.6	3 out of 38 days (no data was collected on 42 days from 7/6/18-7/31/18 and 8/15/18 to 8/31/18)
Bypass Reach (LGF-3)		71.6	101.0	1 day out of 82 days
Tailrace (LGF-4)		77.9	102.0	None

D-32. Continuous pH measurements at LGF-2 and 13 discrete pH measurements at LGF-1, LGF-3 and LGF-4 during the Water Quality Study are summarized in the table below. As shown in the table below, there were no excursions of the New Hampshire pH water quality criteria.

pH (pH units)

Location	NH Water Quality Criterion	Minimum	Maximum	Excursions of NH Water Quality Criterion
Upper Impoundment (LGF-1)	6.5 to 8.0	7.0	7.6	None
Lower Impoundment (LGF-2)		6.5	7.3	None
Bypass Reach (LGF-3)		6.8	7.5	None
Tailrace (LGF-4)		6.8	7.7	None

D-33. Ten samples of nutrients and chlorophyll-a were taken twice per week for 5 weeks in the impoundment (LGF-2). Secchi disk readings were also taken at the same days. Results are summarized in the table below. There were no excursions of New Hampshire's numeric chlorophyll-a threshold for recreation

(15 ug/L) specified in the NHDES Consolidated Assessment and Listing Methodology for recreation (see Fact C-36).

Statistic	Total Kjeldahl Nitrogen (ug/L)	Nitrite + Nitrate Nitrogen (ug/L)	Total Phosphorus 25% depth or mid-epilimnion (ug/L)	Total Phosphorus Mid-hypolimnion (ug/L)	Chlorphyll-a (ug/L)	Secchi Disk (meters)
Minimum	0.4	0.07	19	4	2	1.7
Maxmum	0.5	0.37	40	81	10	2.8
Average	0.5	0.22	25	26	4	2.3
Mean	0.5	0.20	22	19	4	2.3

D-34. The 1999 Salmon Falls River TMDL (SFR TMDL) (Fact C-54) set allowable loadings for ammonia-nitrogen, biochemical oxygen demand (BOD), and total phosphorus (TP) to address dissolved oxygen impairment and nutrient related issues (e.g., algal blooms) in the river. The TMDL established wastewater treatment plant (WWTP) effluent limits for ammonia-nitrogen, BOD and TP for Milton, Somersworth and Rollinsford New Hampshire, and for Berwick and South Berwick Maine. The Milton WWTP is located approximately 16.6 miles upstream of the Lower Great Falls dam. Both the Berwick and Somersworth WWTPs discharge below the Lower Great Falls dam and into the Rollinsford dam impoundment. The Rollinsford WWTP discharges to the South Berwick dam impoundment and effluent from the South Berwick WWTP discharges below the South Berwick dam (which is the head-of-tide dam).

D-35. The SFR TMDL, which is a phased TMDL, includes the following recommendations regarding re-evaluating the TMDL: "Re-evaluate 1st phase of TMDL after five years. If non-compliance of water quality standards continues to occur, modify TMDL. If compliance of standards occur, the phased TMDL becomes final." Since 2006, FB Environmental Associates has been conducting seasonal (summer) compliance monitoring for the Phased SFR TMDL on behalf of the municipalities of Somersworth and Rollinsford, New Hampshire, and Berwick and South Berwick, Maine. No revisions to the TMDL have been made.

D-36. The SFR TMDL also includes the following recommendation regarding dam releases to improve DO during summer low flow periods: "It is recommended that dam operational changes be implemented as a method of improving dissolved oxygen in impoundment bottom areas for one round of licensing (five years) as the first phase of the TMDL. During low flow conditions, the lower three impoundments of the Salmon Falls (South Berwick, Rollinsford, and Lower Great Falls) do not generate power and typically spill water. Although the spilling of water improves river dissolved oxygen below each dam, the routing of water over surface layers probably enhances chemical stratification in these impoundments which ultimately results in lower dissolved oxygen levels in bottom areas. It is proposed that a bottom release in addition to a surface release at each dam be implemented. This should result in lower layer dissolved oxygen complying with established criteria. It is not desirable to have entirely bottom releases at each dam, since this could lead to lower dissolved oxygen levels below each dam."

As reported above, the Project impoundment does stratify in the summer (see Finding D-30) and there have been occasional excursions of New Hampshire's DO criteria in the Project impoundment and

bypass reach (Finding D-31). The DO excursions occurred during low flows when the Project was not generating power. As reported in Finding D-5, the Project currently releases approximately 6 cfs to the bypass reach through two (12-inch and 4-inch diameter) pipes located at the base of the Project dam.

D-37. The Project has altered the wetted natural river channel (deeper, wider) and associated discharge characteristics (slower, more stagnant) which makes the river more prone to adverse water quality impacts (Finding D-12). These alterations, combined with the effluent discharges containing nutrients and other pollutants from the upstream sources, has contributed to DO excursions of New Hampshire surface water quality standards in the Project impoundment and bypass reach during low flow conditions when the Project is not operating.

D-38. *Water Quality Improvement Plan (WQIP)*: As discussed above, the Project impoundment stratifies in the summer (see Finding D-30) and, based on the 2018 Water Quality Study, has resulted in occasional excursions of New Hampshire's DO criteria for the protection of the aquatic life designated use, in the Project impoundment as well as the bypass reach (Finding D-31). The DO excursions occurred during low flows when the Project was not generating power. Although the Project was not generating when the DO excursions occurred, the Project impoundment formed by the dam has resulted in a deeper, wider and slower moving section of the river that can stratify and is more prone to adverse water quality impacts such as low DO. It is possible that if the dam was not there, there would not have been DO excursions in the Project impoundment and bypass reach. This is supported by the fact that there were no DO excursions in the upper impoundment (LGF-2) (see Finding D-31). This is not to suggest that NHDES is advocating for the dam to removed, rather it is to make the point that the Project, even when not generating, can still be responsible for causing adverse changes in river water quality.

According to Env-Wq 1703.01(b), "[a]ll surface waters shall be restored to meet the water quality criteria for their designated classification including existing and designated uses, and to maintain the chemical, physical, and biological integrity of surface waters" (see Fact C-27). Therefore, to address the DO excursions, and any other excursions in the Project influenced waters that may arise in the future, it is appropriate to require the Applicant to prepare and implement a WQIP. The goal of the WQIP would be to ensure Project influenced waters (i.e., the Project impoundment, bypass reach and tailrace) comply with New Hampshire surface water quality standards for parameters that can be influenced by the Project. If the riverine segment immediately upstream (and beyond the influence) of the Project impoundment is not meeting water quality standards, the goal of the WQIP would be to ensure that the water quality associated with those parameters in the Project influenced waters is not any worse than in the upstream riverine segment. Parameters that can be influenced by the Project would include, but not be limited to, DO, temperature, pH, nutrients, chlorophyll-a and secchi disk. The WQIP would include proposed measures to achieve these goals, a plan to monitor the effectiveness of the improvement measures as well as a schedule for implementing the measures, conducting monitoring, and submitting a report that includes a summary of the measures implemented, monitoring results (with supporting information) and recommendations for next steps. RSA 485-A:12, III authorizes water quality monitoring (see Finding D-11). Condition E-14 addresses this Finding.

D-39. *Long-Term Water Quality Monitoring and Reporting:* Results of the 2018 Water Quality Study conducted by the Applicant indicated dissolved oxygen excursions in the Project impoundment. To determine if dissolved oxygen excursions continue in the future, additional monitoring is necessary during the term of the license. This is because FERC licenses are typically issued for 30 to 50 years and, during that time, conditions in the watershed that could affect water quality in the Project impoundment and Project discharges to the tailrace and bypass reach, can change. For example, due to climate change "[w]armer summer temperatures will likely lead to an increase in drought (through increased evaporation, heat

waves, and more frequent and extreme convective precipitation events)."[26] An increase in the frequency and magnitude of lower river flows and higher temperatures could result in an increase in the frequency and magnitude of dissolved oxygen excursions and higher water temperatures. To determine the impact of the Project and Project discharges on these parameters in the future, and if New Hampshire surface water quality standards are met, additional monitoring is needed. Condition E-15 addresses this need. Inclusion of monitoring conditions is authorized by RSA 485-A:12, III (see Fact C-10) which states the following: "Certification shall include any conditions on, modifications to, or monitoring of the proposed activity necessary to provide assurance that the proposed discharge complies with applicable surface water quality standards" (see Finding D-11).

As indicated in Condition E-15, NHDES is requiring water quality monitoring in the Salmon Falls River be conducted every five years beginning the fifth year after the license for the Project is reissued by FERC and ending five years prior to the expiration of the reissued license. Every five years is considered a reasonable interval between monitoring periods to track water quality changes and is also the maximum age of data for rivers specified in the NHDES Consolidated Assessment and Listing Methodology (see Fact C-51) that can be used by NHDES to affirmatively assess a water as being supportive of a designated use (such as aquatic life integrity). Ending monitoring five years prior to the expiration of the reissued license is proposed because within five years of license expiration, the Applicant will likely be required to conduct additional water quality studies for the next license renewal in accordance with FERC regulations. Initiating long-term monitoring the fifth year after the license is reissued by FERC assumes little to no monitoring is conducted in the first five years. If monitoring is conducted in the first five years, and depending on what it entails, NHDES will consider extending the start date for long-term monitoring.

The purpose of the monitoring is to 1) determine the future effects of Project operation during the duration of the new license, both spatially and temporally (in terms of flow, impoundment elevation and power generation) on water temperature and dissolved oxygen (mg/L and percent saturation), 2) to compare results to New Hampshire surface water quality standards, and 3) to determine if additional changes in Project operation are necessary to comply with surface water quality standards.

In each year that monitoring is conducted, Condition E-15 requires submittal of a monitoring and reporting plan to NHDES for review and approval. This is so the plan can be updated (if necessary) to conform to NHDES' latest monitoring protocols and/or to any changes in dissolved oxygen or temperature surface water quality standards. Condition E-15 also includes some specifics of what the monitoring and reporting plan shall include which are very similar to the monitoring and reporting protocols used to by the Applicant to prepare the 2018 Water Quality Study included in the Final License Application (see Fact C-56). This includes submittal of data in a working spreadsheet and input of all data into the NHDES Environmental Monitoring Database (EMD) so the data is accessible to the public and is available for use by NHDES to conduct surface water quality assessments required every two years by the Sections 305(b) and 303(d) of the federal Clean Water Act.

If results indicate that water quality standard excursions persist, the Applicant is required to submit a new or updated Water Quality Improvements Plan (WQIP) (see Finding D-38 and Condition E-14) and to update the flow and impoundment level monitoring and compliance plan (FICMP) (see Finding D-46 and Condition E-12).

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[26] Wake, Cameron P.; Burakowski, Elizabeth A.; Wilkinson, Peter; Hayhoe, Katharine; Stoner, Anne; Keeley, C.; and LaBranche, Julie, "Climate Change in Southern New Hampshire: Past, Present and Future" (2014). The Sustainability Institute. 2. https://scholars.unh.edu/sustainability/

Flow / Impoundment Management

D-40. *Applicant's Proposal*: As discussed in Finding D-6, the Applicant proposes to (1) continue to operate the Project in a run-of-river mode using an automatic pond level control system, and maintain the impoundment at the flashboard crest elevation of 106.4 feet NGVD 29; and (2) provide a minimum flow release of 30 cfs, or inflow, whichever is less into the bypassed reach.

D-41. *Run-of-River:* In their Section 10(j) recommendations filed with FERC (see Fact C-58) the USFWS recommended "that the Project operate in an instantaneous run-of-river mode whereby inflow to the Project equals outflow from the Project at all times and water levels above the dam are not drawn down for the purpose of generating power. Run-of-river operation may be temporarily modified if required by operating emergencies beyond the control of the Licensee, or for short periods upon mutual agreement between the Licensee, the Service, the New Hampshire Department of Environmental Services (NHDES), New Hampshire Fish and Game Department (NHFGD), National Marine Fisheries Service (NMFS), the Maine Department of Environmental Protection (MEDEP), and the Maine Department of Inland Fisheries and Wildlife (MDIFW)."

NHDES concurs with the USFWS' Section 10(j) recommendation to operate the Project in an instantaneous run-of-river mode whereby outflow (i.e., discharges) from the Activity equals inflow on an instantaneous basis except during emergencies beyond the control of the Applicant and for short periods upon mutual agreement with the resource agencies. Operating in this manner will minimize impoundment fluctuations and maintain a more natural flow regime downstream of the tailrace, which will protect habitat for a variety of aquatic and riparian species and help ensure compliance with State surface water quality standards including, but not limited to, "Biological and Aquatic Community Integrity" (Env-Wq 1703.19 – see Fact C-38) and Env-Wq 1703.01(d) regarding maintaining surface water quantity (e.g., flow) at levels that protect existing uses and designated uses (see Fact C-27). Condition E-10.a addresses this Finding.

D-42. *Impoundment Water Level:* When the Project is generating and inflow is within the hydraulic operating range of the turbines (60 cfs to 702 cfs), plus the required minimum bypass flow of 6.05 cfs the Applicant currently maintains a relatively "stable pond" by keeping the impoundment near the top of the flashboards (elevation 106.4 feet NGVD 29). This is accomplished via an automated pond level control system which regulates the flow (discharge) through the turbines so that inflow equals outflow. When inflow is within the hydraulic capacity of the turbines (60 to 702 cfs) plus the minimum bypass flow of 6.05 cfs, and the Project is generating, the time series plots in the FLA (see pages A-24 to A-34 in Fact C-56) showing impoundment water surface elevation indicate the impoundment fluctuates no more than approximately 0.5 feet. Based on the annual flow duration curves on pages E-72 and E-77 of the FLA (see Fact C-56), this situation occurs approximately 65 to 70 percent of the year. When inflow is below the minimum hydraulic turbine capacity (60 cfs) flow is spilled over the dam and through the 12-inch and 4-inch pipes at the base of the dam with a relatively small increase in water level above the top of flashboards. When flow is above the maximum turbine hydraulic capacity (702 cfs) plus the minimum required bypass flow, the impoundment level is allowed to rise as needed, to pass the excess flow over the flashboards until other gates are opened to limit water level rise and damage to the flashboards (see Finding D-5). Flashboard failure can also cause impoundment fluctuations. As indicated in Finding D-5, from 2005 through 2019, the flashboards failed one to five times per year with an average of approximately two times per year. During this period, it took 1241 days (an average of approximately 43 days per year) to repair the flashboards.

NHDES concurs with minimizing the frequency and magnitude of fluctuations in the impoundment by controlling discharges at the Project as much as possible, because it will help protect the flora and fauna in the littoral and riparian zones of the impoundment and help to assure compliance with State surface water quality standards including, but not limited to, "Biological and Aquatic Community Integrity" (Env-Wq 1703.19 – see Fact C-38). Condition E-10.c addresses this Finding.

D-43. *Impoundment Refill Procedures:* Following authorized drawdowns, a refill procedure is required to ensure adequate flow (i.e., discharge) from the Project is maintained downstream of the Project dam and adequate flow is available to refill the impoundment at an appropriate rate to protect aquatic habitat and aquatic life. In their Section 10(j) recommendations filed with FERC (see Fact C-58), the USFWS recommended that "the Licensees implement an impoundment refill protocol whereby, during impoundment refilling after drawdowns for maintenance or emergency purposes, a minimum of 90 percent of inflow is passed downstream of the dam and the impoundment is refilled on the remaining 10 percent of inflow to the Project. The Department's minimum bypass flow recommendation in specified in Recommendation 2 should be maintained during impoundment drawdown and refilling period. This refill protocol may be modified on a case-by-case basis with prior approval of the Service, NHDES, NHFGD, NMFS, MEDEP, and MDIFW." As reported in Finding D-5, during refill operations, the Applicant currently passes the approximately 90% of inflow through the Project turbines and uses the remaining 10% of inflow to refill the impoundment.

NHDES concurs with the USFWS' Section 10(j) recommended impoundment refill procedures because it will help to minimize dramatic and sudden reductions in downstream flow (i.e., discharges) due to Project operation (which can adversely impact habitat and aquatic life), while still providing sufficient flow to refill the pond to the normal elevation after impoundment refill. It will also ensure that the minimum bypass flow (or inflow, whichever is less), is provided during impoundment drawdown and refill periods These measures will help to maintain sufficient habitat for aquatic life and help to assure compliance with State surface water quality standards, including, but not limited to, "Biological and Aquatic Community Integrity" (Env-Wq 1703.19 – see Fact C-38) and Env-Wq 1703.01(d) regarding maintaining surface water quantity at levels that protect existing uses and designated uses (see Fact C-27). Condition E-10.d addresses this Finding.

D-44. *Impoundment Drawdown Rate During Scheduled Maintenance:* The NHFGD recommends controlling Project discharges when drawing the impoundment down for maintenance, so that the impoundment level decreases by no more than approximately six (6) inches per day. This is done to allow adequate time for the less mobile aquatic organisms (including, but not limited to mussels), to move and stay sufficiently submerged as the water level gradually recedes. During such impoundment drawdowns it is also important to maintain (as a minimum) the bypass reach conservation flow (see Finding C-39). NHDES also recommends that the Licensee be provided the opportunity to modify these maintenance impoundment drawdown procedures on a case-by-case basis with prior approval from NHFGD.

These measures will help to maintain sufficient habitat for aquatic life and help to assure compliance with State surface water quality standards, including, but not limited to, "Biological and Aquatic Community Integrity" (Env-Wq 1703.19 – see Fact C-38) and Env-Wq 1703.01(d) regarding maintaining surface water quantity at levels that protect existing uses and designated uses (see Fact C-27). Condition E-10.e addresses this Finding.

D-45. *Bypass Reach Conservation Flows:* The Activity includes a 250-foot-long bypass reach which extends between the dam and the tailrace. Currently, the Activity maintains a continuous minimum flow of 6.05 cfs or inflow, whichever is less, in the bypass reach. The minimum flow is passed via two (12-inch and 4-inch diameter) pipes located at the base of the Project dam at an approximate elevation of 75.0 feet,

NGVD 29. Flow affects the quality and quantity of aquatic habitat, and directly impacts aquatic biota (e.g., movement, stranding, spawning and tributary access). In 2018, the Applicant conducted a bypass reach flow study utilizing the Modified Instream Flow Incremental Methodology (IFIM). In the bypass reach, the Applicant mapped habitat, collected physical habitat data along three transects at four test flows (22 cfs, 37 cfs, 69 cfs and 79 cfs) and determined the bypass reach's habitat suitability for various target fish species and life stages. Results indicate that the bypass reach has a moderate gradient dominated by riffle habitat (64% of the total habitat area (which is approximately 44,000 square feet or one acre), followed by pool and run habitats which represented 25% and 11% of the total habitat area, respectively. The predominant substrate in the bypass reach is boulder and cobble.

The Applicant proposed a minimum bypass flow of 30 cfs or inflow, whichever is less (see Finding D-6). However, as shown on the weighted usable are (WUA) versus flow curves in Figures 6.2-1 through 6.2-3 in the Instream Flow report in the FLA (see Fact C-56), the "knee-of-the-curve" or "breakpoint" for the majority of the species and lifes stages evaluated occurred at a flow of 37 cfs and could have been higher if a different flow between 37 cfs and 69 cfs had been measured in the field. The WUA versus flow curves indicate that habitat in the bypass reach is maximized for many of the target species and life stages at a flow of 37 cfs. Further, as shown in the last column of the following table, as flow increases from 30 cfs to 37 cfs, there is a significant increase (4 to 14 percent), in the percent of maximum WUA gained.

Species/Life Stage	Maximum WUA Flow (cfs)	Habitat Area at Maximum WUA Flow (ft^2)	Total Wetted Area at Maximum WUA Flow (ft^2)	% of Total Habitat Available at the Peak WUA (%)	% of Maximum WUA at 30 cfs	% of Maximum WUA at 37 cfs	% Increase in Maximum WUA from 30 cfs to 37 cfs
Brown Trout							
Adult	37	8,739	42,094	21%	92%	100%	8%
American Shad/River Herring							
Spawning & Incubation	79	7,635	44,393	17%	72%	79%	7%
Fry	79	3,305	44,393	7%	88%	95%	7%
Juvenile	69	11,286	43,766	26%	91%	99%	8%
Adult	79	3,395	43,393	8%	84%	88%	4%
Sea Lamprey							
Spawning & Incubation	69	1,157	43,393	3%	41%	45%	4%
Longnose Dace							
Juvenile	37	5,712	42,094	14%	96%	100%	4%
Adult	79	11,609	44,393	26%	82%	93%	11%
Macroinvertebrates							
Ephemoroptera	37	13,498	42,094	32%	89%	100%	11%
Plecoptera	37	6,687	42,094	16%	87%	100%	13%
Trichoptera	37	14,522	42,094	34%	86%	100%	14%

Based the results of the bypass flow study, the USFWS' 10(j) recommendation (Fact C-58) stated the following:

> "To protect fish and aquatic resources in the Project's bypass reach, the Department recommends the Licensees provide a continuous conservation flow of 37 cfs to the bypass reach, or inflow, whichever is less. This criterion may be modified as part of the Department's

> Fish Passage Prescription in order to conform to the Service's fish passage design guidelines (USFWS 2019)."

NHDES concurs with the USFWS' recommended conservation flows in the bypass reach as these measures will help to maintain sufficient habitat for aquatic life and help to assure compliance with State surface water quality standards, including, but not limited to, "Biological and Aquatic Community Integrity" (Env-Wq 1703.19 – see Fact C-38) and Env-Wq 1703.01(d) regarding maintaining surface water quantity at levels that protect existing uses and designated uses (see Fact C-27). Condition E-10.b addresses this Finding.

D-46. *Flow and Impoundment Compliance Monitoring Plan:* The USFWS' 10(j) recommendations (see Fact C-58) included the following:

> The USFWS "…recommends the Licensee develop a plan for maintaining and monitoring run-of-river operation and minimum flow releases at the Project. The plan should include a description of the mechanisms and structures that will be used, the level of manual and automatic operation, the methods used for recording data on run-of-river operation and minimum flow releases, an implementation schedule, and a plan for maintaining the data for inspection by the Service, NHDES, NHFGD, NMFS, MEDEP and MDIFW. The plan should be provided for agency review and comment within 3 months of license issuance. Relevant operational data such as headpond elevation and station generation should be recorded hourly. Records should be maintained digitally for the term of any new license issued for the Project and made available for agency review within 72 hours of receiving a request"

NHDES concurs that development and implementation of a plan describing how flow and impoundment water level will be managed, monitored and reported (as allowed by RSA 485-A:12, III – see Finding D-11) will help determine if discharges from the Project comply with this certification and, therefore, comply with New Hampshire surface water quality standards (RSA 485-A:8 and Env-Wq 1700 – see Finding D-14). Condition E-12 addresses this Finding.

Water Use Registration and Reporting

D-47. Water Use Registration and Reporting: Based on discussions in March and April 2021 with staff in the NHDES Water Use Registration and Reporting program (WURRP), the Activity is currently registered with the WURRP and must continue to report under this program in accordance with Env-Wq 2102. The purpose of Env-Wq 2102 is to "…is to implement RSA 488 by establishing requirements relative to documenting the identity and location of water uses and collecting accurate water use data to support management of the state's water resources." Staff also stated that the Applicant should contact them to determine if a water conservation plan (in accordance with Env-Wq 2102.24) is required for the Activity. On February 21, 2022 the Applicant submitted a request to NHDES to waive the requirement under Env-Wq 2101.24(a)(5) to submit a water conservation plan to NHDES. On February 25, 2022, NHDES notified the Applicant in a letter that NHDES approved the waiver request, in accordance with Env-Wq 2101.23, and that the waiver was valid for no more than four years from the date of the approval, and prior to expiration of the waiver, the same waiver may be requested in order to be considered an extension of the original waiver approval. If a water conservation plan is not required, the Applicant will need to request a waiver in accordance with Env-Wq 2101.23 The WURRP provides valuable data for tracking discharges (such as those from the Project) to and withdrawal volumes from surface waters and other sources throughout the state. This water quantity data assists NHDES with managing water resources to help assure surface waters have sufficient water to support the designated uses (see Fact C-27) specified in the New Hampshire surface water quality standards (NH RSA 485-A:8

and Env-Wq 1700, see Finding D-14). Including a condition in this certification to require compliance with WURRP is authorized under RSA 485-A:12, III (see Finding D-11) . Condition E-9 addresses this Finding.

Fish Passage

D-48. *Fish Species:* "The Salmon Falls River, in the vicinity of the Project, is known to support at least 24 species of fish, and representative examples include macrohabitat generalists such as yellow perch (*Perca flavescens*), largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis machrochirus*), golden shiner (*Notemigonus crysoleucas*), brown bullhead (*Ameiurus nebulosus*), and redfin pickerel (*Esox americanus americanus*); the fluvial dependent white sucker (*Catostomus commersonii*) and fallfish (*Semotilus corporalis*), the catadromous American eel (*Anguilla rostrata*."
(Source: see Fact C-59.)

D-49. *Impact of Dams on Fish Migrations:* "…Dams can impact both upstream and downstream fish migration in rivers (Limburg and Waldman 2009, p. 961). Dams not only block or impede fish migration, but also alter the rivers' hydrology and aquatic habitat availability. Upstream of dams, where water flow is slowed, lake-like conditions, rather than riverine ones, prevail. Water flow downstream of dams, particularly at peaking hydroelectric projects, can be altered significantly (Limburg and Waldman 2009, p. 961) with dramatic changes in water depth and velocity occurring over short time periods. Depending on the severity and location of blockages and changes to hydrology, migratory fish populations can be severely reduced or extirpated due to dams (Limburg and Waldman 2009, p. 960)." (Source: see Fact C-59.)

D-50. *Current Status of Fish Passage Facilities:* There are currently no technical fish passage facilities at the Lower Great Falls Project, which is located at river mile 3.4. The following description of fish passage facilities downstream of the Project is from the USFWS's FPA Section 18 Preliminary Prescription for Fishways (see Finding D-53): "Presently, diadromous fish can ascend the Salmon Falls River up to the Rollinsford Dam (river mile 0.9) via the alosine (American shad, alewife, blueback herring) and eel fish passage facilities located at South Berwick (FERC No. 11163). Similarly, alosines and eel are provided safe egress at South Berwick, via the Project's downstream fish passage facilities. The Rollinsford Hydroelectric Project is currently a barrier to upstream migrating anadromous fish. However, the Service's preliminary section 18 fishway prescription in that project's licensing proceeding requires the development of upstream and downstream fish passage at that Project. Further, on January 31, 2021, the Town of Rollinsford, New Hampshire (Town), Licensee for the Rollinsford Project, GMP, and the U.S. Fish and Wildlife Service entered into a Settlement Agreement in which the Town agreed to provide anadromous fish passage at the Rollinsford Project. The agreed upon upstream fish passage measures include provisions to trap migrating American shad and river herring at the downstream South Berwick Project and distribute the fish upstream of the Rollinsford and Lower Great Falls projects. Therefore, it is likely that anadromous fish will be present upstream and downstream of the Lower Great Falls Project in the reasonably foreseeable future."

D-51. *Applicant's Proposed Fish Passage Measures:* The Applicant's proposed fish passage measures are discussed in Finding D-6.

D-52. *Settlement Agreement. Upstream Anadromous Fish Passage:* On April 6, 2021, the Applicant filed an "Offer of Settlement" with FERC that consisted of the Settlement Agreement for Prescription for Fishways for American Shad and River Herring executed by and between the Applicant and U.S. Department of Interior, Fish and Wildlife Service ("USFWS"), and an accompanying Explanatory Statement (see Fact C-57). The purpose of the Settlement Agreement is to memorialize and enact the

agreements of the Parties concerning the appropriate terms of Prescription for Fishways for American shad and river herring to be included in the Subsequent License for the Project ("Prescription") pursuant to section 18 of the FPA (16 U.S.C. § 811). The Settlement Agreement obligates the Applicant to construct and operate fish passage for American shad and river herring at the Project by March 15 of the fourth calendar year after entry into operation of permanent volitional upstream fishways for American shad and river herring at the Rollinsford Hydroelectric Project (FERC No. 3777) which is the next dam downstream of the Lower Great Falls Hydroelectric Project. The Settlement Agreement also requires USFWS to file a preliminary prescription for the Project consistent with the terms of the Settlement Agreement.

D-53. *USFWS Preliminary Prescription for Fishways:* On April 16, 2021, USFWS filed preliminary prescriptions for fishways (Preliminary Prescription document – see Fact C-59) with FERC in accordance with section 18 [12] of the FPA which authorizes the USFWS or NMFS to prescribe upstream and downstream fishway passage requirements (see footnote 12). Section 18 fishway prescriptions are mandatory, which means FERC must include them in the subsequent FERC license. The Preliminary Prescription document is the result of consultation among the Applicant, USFWS, NHFGD, MEDIFW, and MDMR and requires the Applicant, at its expense, to "…construct, operate, maintain, monitor, and periodically test the effectiveness of fishways for river herring, American shad and American eel (collectively, the "target species")". The Prescription also requires that the "..fishways will be designed, constructed, maintained, and operated (which includes project operations) to safely, timely, and effectively pass the target species upstream and downstream of the Project." Preliminary prescriptions for fishways are provided in section 11 of the Preliminary Prescription document which includes general requirements for upstream and downstream passage (11.1), design populations (11.2), fish passage operating periods (11.3), fishway operation and maintenance (11.4), inspection (11.5), scheduling (11.6), fish passage effectiveness measures (11.7), upstream anadromous fish passage and justification (11.8), upstream American eel passage and justification (11.9), downstream American eel passage and justification (11.10), and downstream anadromous fish passage and justification (11.11). Subject to change based on new information , evaluation of new literature and agency consultation, section 11.3 of Prescription includes the following periods when approved fish passage protective measures will be operational.

Species	Upstream Migration Period	Downstream Migration Period
Alosines, American shad, river herring	April 15 – July 15	June 1 – November 15
American eel	May 1 – October 31	August 15 – November 15

D-54. Adequate upstream and downstream anadromous fish and American eel passage is required to comply with State surface water quality standards, including, but not limited to, support of the aquatic life designated use (Env-Wq 1707.17(d) – Fact C-21), protection and propagation of fish (Env-Wq 1701.01 – see Fact C-12), and to help assure compliance with the "Biological and Aquatic Community Integrity" surface water quality standard (Env-Wq 1703.19 – see Fact C-38). Because the Project has created conditions and discharge characteristics that prevent adequate fish and eel passage up and downstream, and, therefore, compliance with State surface water quality standards, fish and eel passage conditions are necessary. It is expected that implementation of the fishway prescriptions USFWS's Preliminary Prescription document (Finding D-53), which include upstream and downstream passage for anadromous fish and American eel, and any future modifications to the fishway prescriptions that are acceptable to the USFWS, NHDES and NHFGD will result in compliance with state surface water quality standards relative to fish passage. Condition E-13 addresses this Finding.

Invasive Species

D-55. Water in impoundments created by dams is relatively stagnant compared to that in a free-flowing rivers. Consequently, water-borne sediments and nutrients can be trapped, resulting in the undesirable proliferation of algae and aquatic weeds (eutrophication) and a change in water quality in the impoundment and releases from the impoundment (see Finding D-12). Such slow moving conditions can contribute to the proliferation of invasive plant species. According to the 2018 305(b)/303(d) lists of impaired waters (see Finding D-21), the Project impoundment, the river segment immediately below the Project dam and the next downstream segment which is the impoundment created by the Rollinsford dam are impaired for the Aquatic Life Integrity Designated Use because of "Non-native aquatic plants" (i.e., invasive plant species). The following is from page E-118 of the FLA (see Fact C-56): "MDEP has identified non-native, invasive variable leaf milfoil (*Myriophyllum heterophyllum*) in the Salmon Falls River approximately 2.5 miles downstream of the Project near the Rollinsford Project. It was first identified in this location in 2011 and was last reported in 2016. NHDES identified the Salmon Falls River at the Lower Great Falls Dam as impaired for non-native aquatic plants in its 2018 Water Quality Assessment Report and has categorized it as a 4C water body, meaning that it does not meet standards due to non-pollutants (i.e. exotic weeds) NHDES, 2019a. Notes in the classification state that variable leaf milfoil is at a high density and coverage both upstream and downstream of the site, but that no action has been taken (NHDES, 2017). Variable leaf milfoil grows quickly by fragmentation to form dense mats along the surface of the water, which impairs recreational activities such as boating, fishing, and swimming (MDEP, 2016). NHDES has also observed European naiad *(Najas minor)* in the Salmon Falls River from Milton down through Dover which includes the Project area." If not properly monitored and managed, invasive species can result in detrimental differences in community structure that are not naturally occurring (which is a violation of Env-Wq 1703.19, Biological and Aquatic Community Integrity – see Fact C-38) and result in a dominance of nuisance species (which is a violation of Env-Wq 703(c)(1)(d), General Water Quality criteria – see Fact C-28). Condition E-16 addresses this Finding.

E. CERTIFICATION CONDITIONS

Unless otherwise authorized or directed by NHDES, the following conditions shall apply:

E-1. **Effective Date and Expiration of Certification:** This certification shall become effective on the date of issuance and shall remain effective for the term of the federal license or permit. Should the federal authority deny a license or permit, the certification becomes null and void.

E-2. **Conditions in Federal License or Permit:** Conditions of this certification shall become conditions of the federal license or permit (U.S.C. § 1314(d)).

(For an explanation and citations, see Fact C-2 and Finding D-1.)

E-3. **Compliance with Water Quality Standards:** The Activity shall not cause or contribute to a violation of New Hampshire surface water quality standards.

(For an explanation and citations, see Facts Fact C-2, C-55, and Finding D-14.)

E-4. **Proposed Modifications to the Activity:** The Applicant shall consult with and receive prior written approval from NHDES regarding any proposed modifications to the Activity that could have a significant or material effect on the findings or conditions of this certification, including any changes to operation of the Activity. If necessary, to assure compliance with New Hampshire surface water quality standards and associated management objectives, NHDES may alter or amend this certification in accordance with condition E-5.

(For an explanation and citations, see Fact C-2 and Finding D-11.)

E-5. **Modification of Certification**: The conditions of this certification may be altered or amended at any time by NHDES to assure compliance with New Hampshire surface water quality standards and associated management objectives, when authorized by law, and, if necessary, after notice and opportunity for hearing.

(For an explanation and citations, see Fact C-2 and Finding D-11.)

E-6. **Reopening of License**: NHDES reserves the right to request, at any time, that FERC reopen the license to consider modifications to the license to assure compliance with New Hampshire surface water quality standards.

E-7. **Compliance Inspections:** In accordance with applicable laws, the Applicant shall allow NHDES to inspect the Activity and affected surface waters to monitor compliance with the conditions of this certification.

(For an explanation and citations, see Fact C-2 and Finding D-11.)

E-8. **Transfer of Certification:** Should this certification be transferred to a new owner, contact information for the new owner (including name, address, phone number and email) shall be provided to NHDES within 30 days of the transfer.

E-9. **NHDES Water Use Registration and Reporting:** The Applicant shall register, measure, and report all withdrawals and discharges with the NHDES Water Use Registration and Reporting Program (WURRP) in accordance with RSA 488:3 and its supporting regulations in Env-Wq 2102 and submit, if necessary, a water conservation plan in accordance with Env-Wq 2101.24.

(For an explanation and citations, see Fact C-2 and Findings D-11 and D-47.)

E-10. **Flow / Impoundment Management:** The following requirements (items a. through e.) may be temporarily modified if required by operating emergencies beyond the control of the Applicant, as specified below, or as allowed in the approved Flow/Impoundment Compliance Monitoring Plan (FICMP) that is required by Condition E-12 of this Certification.

a. **Instantaneous Run-of-River Flow:** The Applicant shall operate the Activity in an instantaneous run-of-river mode whereby inflow to the Project equals outflow from the Project at all times and water levels above the dam are not drawn down for the purpose of generating power. Run-of-river operation may be temporarily modified if required by operating emergencies beyond the control of the Applicant or for short periods upon mutual agreement between NHDES, NHFGD, USFWS, NMFS, MEDEP, MDMR and MEDIFW.

(For an explanation and citations, see Fact C-2 and Findings D-11 and D-41.)

b. **Bypass Reach Conservation Flows:** The Applicant shall comply with the following bypass reach conservation flow requirements.

1. The Applicant shall provide a minimum continuous conservation flow in the bypass reach of 37 cfs, or inflow, whichever is less. Subject to approval by NHDES and NHFGD, this criterion may be modified as part of the USFWS's Fish Passage Prescription (see Condition E-13) in order to

conform to the USFWS's fish passage design guidelines [27], or other guidelines acceptable to the USFWS.

2. The manner in which the bypass flow is released to the bypass reach shall be acceptable to NHDES, NHFGD and USFWS. The Applicant shall provide evidence within 60 days of receiving a written request from NHDES (or other date acceptable to NHDES), that demonstrates, to the satisfaction of NHDES and NHFGD, that the bypass reach conservation flow is being provided. Such evidence may include, but is not limited to, hydraulic calculations and instream flow measurements.
3. The method and supporting information for passing the bypass conservation flows into the bypass reach, including any future modifications, shall be included in the Flow / Impoundment Compliance Monitoring Plan (see Condition E-12).
4. Flow in the bypass reach shall comply with New Hampshire surface water quality criteria, including, but not limited to, dissolved oxygen (Env-Wq 1703.07 – see Fact C-30).

(For an explanation and citations, see Fact C-2 and Findings D-11 and D-45.)

c. **Impoundment Water Level:** The target impoundment water elevation under normal operating conditions shall be the top of the flashboards (elevation 106.4 feet NGVD 29) plus any additional elevation required to pass the bypass reach conservation flow. The Applicant shall minimize the magnitude and frequency of fluctuations in the impoundment to the maximum extent practicable and shall not draw the water level in the impoundment down for the purpose of generating power. This requirement may be modified upon mutual agreement between NHDES, NHFGD, USFWS, MEDEP, MDMR and MEDIFW. If requested by NHDES, the Applicant shall submit a plan for NHDES approval to minimize the magnitude and frequency of impoundment fluctuations to the maximum extent practicable, due to factors that may include, but are not limited to, Project power generation and flashboard failure. The plan shall be submitted to NHDES within 90 days (or other date acceptable to NHDES) of when the NHDES issues the written request. The Applicant shall then implement the NHDES approved plan.

(For an explanation and citations, see Fact C-2 and Findings D-5, D-11 and D-42.)

d. **Impoundment Refill Procedure:** When refilling the impoundment after drawdown for maintenance or emergencies, the Applicant shall release 90 percent of the inflow downstream to the Salmon Falls River and utilize the remaining 10 percent of inflow to refill the impoundment. During impoundment refill, the bypass reach conservation flow specified in Condition E-10.b shall be maintained. This refill procedure may be modified upon mutual agreement between NHDES, NHFGD, USFWS, MEDEP, MDMR and MEDIFW.

(For an explanation and citations, see Fact C-2 and Findings D-11 and D-43.)

e. **Drawdown Procedure for Scheduled Maintenance:** When drawing the water level in the impoundment down for scheduled maintenance, the Applicant shall lower the impoundment water level no more than six (6) inches per day. During impoundment drawdown, the bypass reach conservation flow specified in Condition E-10.b shall be maintained. This drawdown procedure may be modified upon mutual agreement between NHDES and NHFGD.

[27] USFWS (U.S. Fish and Wildlife Service). 2019. Fish Passage Engineering Design Criteria. USFWS, Northeast Region R5, Hadley, Massachusetts. 135 pages + Appendices.

(For an explanation and citations, see Fact C-2 and Findings D-11 and D-44.)

E-11. **Flow/Impoundment– Notification and Annual Report:** The Applicant shall comply with the following notification and reporting requirements:

a. If the Activity causes a deviation from the flow/ impoundment management requirements in Condition E-10, the Applicant shall notify NHDES, NHFGD, USFWS, MEDEP, MDMR and MEDIFW no later than 24 hours after each such incident. The notification shall include, to the extent known, an explanation as to why the deviations occurred, a description of corrective actions taken, and how long it will take until operations will comply with Condition E-10.

b. Within 45 days after each incident, the Applicant shall submit a report to NHDES, NHFGD, USFWS, MEDEP, MDMR and MEDIFW that contains, to the extent possible, the cause, severity, and duration of the incident, any observed or reported adverse environmental impacts from the incident, pertinent data and a description of corrective measures.

c. By April 1 of each year (beginning the first April after the date the FERC license is reissued), the Applicant shall submit to NHDES, NHFGD, USFWS, MEDEP, MDMR and MEDIFW a summary report for the previous calendar year with appropriate tables, graphs, text and supporting documentation that demonstrates compliance with the flow/ impoundment management requirements in Condition E-10. Where excursions occurred, the summary shall indicate when the excursion occurred, the duration of the excursion and a description of corrective actions taken to prevent such excursions from reoccurring.

(For an explanation and citations, see Fact C-2 and Finding D-11)

E-12. F**low/Impoundment Compliance Monitoring Plan (FICMP):** Within 90 days of license issuance (or other date acceptable to NHDES) the Applicant shall develop, file and implement a flow and impoundment level monitoring and compliance plan (FICMP) that, as a minimum, includes the following:

a. a description of the level of manual, automatic, on-site and remote operation;
b. a detailed description of how the Project will be operated under all conditions (i.e., under normal operating conditions as well as during low flow, high flow, maintenance and emergency conditions) to maintain compliance with the flow and impoundment level management requirements in Condition E-10;
c. a description of how the bypass conservation flow will be maintained during scheduled drawdowns and the minimum impoundment level that will pass the conservation flows (including calculations);
d. a description of the mechanisms and structures (i.e., type, location and accuracy of all flow and impoundment elevation monitoring equipment and gages) to be used for maintaining compliance with operational requirements;
e. set point elevations for turning turbines on and off [28];
f. procedures for maintaining and calibrating monitoring equipment;
g. rating curves and calculations for all methods of releasing flow downstream (including a working excel spreadsheet);
h. procedures for collecting and recording continuous data (i.e., no less frequent than hourly and preferably every 15 minutes) on inflow, flow releases at the Project (i.e., conservation flows in the bypass reach, spillage and turbine discharge), and impoundment levels.

[28] Set point elevations for providing conservation flows should account for the accuracy of the pond level sensor equipment. For example, if the accuracy is +/- 0.01 feet, the sensor should be set 0.01 feet above the elevation determined

The FICMP, including any proposed revisions, shall be developed in consultation with NHDES, NHFGD, USFWS, MEDEP, MDMR and MEDIFW, and submitted to NHDES for review and approval. The FICMP shall be kept up-to-date so that it reflects current operation. When revisions are made, the Applicant shall submit the updated FICMP to NHDES for approval within 10 days (or other date acceptable to NHDES) of making the revisions. If NHDES requests the FICMP to be updated, the Applicant shall submit the updated FICMP to NHDES for approval within 30 days (or other date acceptable to NHDES) of receiving a written request from NHDES to update the FICMP. The Applicant shall implement the approved FICMP.

(For an explanation and citations, see Fact C-2 and Findings D-11 and D-46.)

E-13. **Fish Passage:** The Applicant shall comply with the USFWS' "Preliminary Prescription for Fishways" [10] (which includes prescriptions for upstream and downstream passage for anadromous fish and American eel - see Finding C-59), and any modifications made to the preliminary prescriptions that are acceptable to the USFWS, NHFGD and NHDES. Unless modifications are made that are acceptable to USFWS, NHFGD and NHDES, upstream and downstream fish passage protective measures shall be operational during the periods shown in the following table.

Species	Upstream Migration Period	Downstream Migration Period
Alosines, American shad, river herring	April 15 – July 15	June 1 – November 15
American eel	May 1 – October 31	August 15 – November 15

(For an explanation and citations, see Fact C-2, and Findings D-11, and D-48 through D-54.)

E-14. **Water Quality Improvement Plan (WQIP):** Within 90 days of License issuance by FERC (or other date acceptable to NHDES) the Applicant shall submit a WQIP to NHDES for approval. The goal of the WQIP is for Project influenced waters (i.e., the Project impoundment, bypass reach and tailrace) to comply with New Hampshire surface water quality standards for parameters that can be influenced by the Project. If the riverine segment immediately upstream (and beyond the influence) of the Project impoundment is not meeting water quality standards for any of those parameters, the goal is for water quality in the Project influenced waters to not be any worse than in the upstream riverine segment. Parameters that can be influenced by the Project include, but are not limited to, DO, temperature, pH, nutrients, chlorophyll-a and secchi disk. The WQIP shall include proposed measures to achieve the goals, a plan to monitor the effectiveness of the improvement measures and a schedule for measure implementation, monitoring to determine the effectiveness of the implemented measures, and submittal of reports to NHDES for approval that includes a summary of the implementation measures, monitoring results (with supporting information including a working spreadsheet if requested by NHDES) and recommendations for next steps. The Applicant shall then implement the approved WQIP. NHDES reserves the right to require a new or updated WQIP should improvement measures not prove to be effective and/or new water quality issues arise. In such cases, the Applicant shall submit a new or updated WQIP within 90 days (or other date acceptable to NHDES) of when the Applicant receives a written request from NHDES to submit a new or updated WQIP for NHDES approval. The Applicant shall incorporate any changes to Project operation included in the approved WQIP, in the Flow/Impoundment Compliance Monitoring Plan (FICMP) and submit the updated FICMP to NHDES for approval as specified in Condition E-12. `

(For an explanation and citations, see Fact C-2 and Findings D-11, D-14 and D-38.)

E-15. **Long Term Water Quality Monitoring and Reporting:** Unless otherwise authorized by NHDES, the Applicant shall conduct water quality monitoring in the Salmon Falls River every five years beginning the fifth year after issuance of the FERC license and ending five years prior to the expiration of the issued license. The purpose of the monitoring is to 1) determine the future effects of Project operation during the duration of the issued license, both spatially and temporally (in terms of flow, impoundment elevation and power generation) on water temperature and dissolved oxygen (mg/L and percent saturation), 2) to compare results to New Hampshire surface water quality standards, and 3) to determine if additional changes in Project operation are necessary to comply with surface water quality standards.

At least 90 days prior to monitoring in each year monitoring is conducted, the Applicant shall submit a monitoring and reporting plan to NHDES for review and approval that describes, in detail, how, when and where monitoring will be conducted, and results reported. The Applicant shall then implement the NHDES approved plan. Unless otherwise authorized or directed by NHDES, the plan shall specify that monitoring that year shall last for at least five weeks and include periods of relatively low flows and high temperatures as well as times when the Project is, and is not, generating power. Continuous (i.e., every 15 minutes) monitoring of temperature and dissolved oxygen (mg/L and percent saturation) shall be conducted in the riverine reach just upstream of the Project impoundment, at the deep spot of the Project impoundment, the Project tailrace and the Project bypass reach and vertical profiles for temperature and dissolved oxygen shall be conducted each week at the deep spot of the impoundment. Continuous (i.e., every 15 minutes) estimates of impoundment elevation, inflow, tailrace flow, bypass reach flow and generation shall also be provided.

By December 31st of each year that monitoring is conducted, the Applicant shall submit a report and supplemental information that clearly demonstrates via text, tables and plots, the spatial and temporal effect of Project operation (in terms of inflow and flow in the bypass reach and tailrace, impoundment elevation and power generation) on surface water quality and if New Hampshire surface water quality standards are met. Results of quality assurance/quality control checks (calibration, hand-held meter checks, duplicates, etc.) and identification of any deviations from the monitoring and reporting plan shall be clearly identified. In addition to the report, water quality (including uncorrected and any corrected data), continuous impoundment elevation, and continuous flow data (including calculations) should be provided in a working MS Excel workbook or other database acceptable to NHDES. The Applicant shall also enter all data into the NHDES Environmental Monitoring Database (EMD) within 120 days of when monitoring is completed in each year monitoring is conducted.

Should monitoring indicate that water quality standard excursions persist, the Applicant shall consult with NHDES and, if requested by NHDES in writing, submit a new or updated Water Quality Improvements Plan (WQIP) in accordance with Condition E-14.

(For an explanation and citations, see Fact C-2, and Findings D-11, D-14, D-38 and D-39)

E-16. **Invasive Species Control**: If NHDES notifies the Applicant in writing that invasive species control efforts are needed in the river segments impacted by Project operation, the Applicant shall assist by seeking funding for implementation of control efforts and by temporarily modifying Project operation as necessary to facilitate those control efforts.

(For an explanation and citations, see Fact C-2, and Findings D-11 and D-55.)

F. ENFORCEMENT

Certification conditions are subject to enforcement mechanisms available to the federal licensing or permitting agency and to the state of New Hampshire.

G. APPEAL PROCESS

Any person aggrieved by this decision may appeal to the N.H. Water Council ("Council") by filing an appeal that meets the requirements specified in RSA 21-O:14 and the rules adopted by the Council, Env-WC 100-200. The appeal must be filed directly with the Council within 30 days of the date of this decision and must set forth fully every ground upon which it is claimed that the decision complained of is unlawful or unreasonable. Only those grounds set forth in the notice of appeal can be considered by the Council. Information about the Council, including a link to the Council's rules, is available on the New Hampshire Environmental Council website (or more directly at the Water Council page). Copies of the rules also are available from the NHDES Public Information Center at (603) 271-2975.

If you have questions regarding this certification, please contact Gregg Comstock at (603) 271-2983 or william.g.comstock@des.nh.gov or James Tilley at (603) 271-0699 or james.tilley@des.nh.gov.

H. SIGNATURE AND DATE

Rene J. Pelletier, P.G., Director
NHDES Water Division

4/4/22
Date

cc via email:
FERC efile
Robert Belmore, City Manager, Somersworth, NH
John Greenan, Green Mountain Power Corporation
James Bellissimo, Town Manager, Berwick, ME
Cheri Patterson, NHFGD
Michael Dionne, NHFGD
Ken Hogan, USFWS
Bjorn Lake, NOAA-NMFS
Kathy Howatt, MEDEP
John Perry, MEDIFW
Chris Williams, NHDES