A. INTRODUCTION

Great River Hydro, LLC (the Applicant), has applied for a license from the Federal Energy Regulatory Commission (FERC) to continue the operation and maintenance of the Wilder Hydroelectric Project (Project) located on the Connecticut River, in the city of Lebanon, Grafton County, New Hampshire and the town of Hartford, Windsor County, Vermont. The Project has a total installed power generating capacity of 35.6 megawatts (MW). The Project generates electricity, and the Applicant sells the electricity to the power grid. A more complete description of the Project is provided in Section C of this certification.

In accordance with 33 U.S. Code §1341 (§401 of the federal Clean Water Act [CWA]), federal regulations promulgated under the CWA at Title 40 Code of Federal Regulations (CFR) Part 121, and New Hampshire law under Revised Statutes Annotated (RSA) 485-A:12, III, the Applicant submitted an Application for Water Quality Certification (WQC) to the New Hampshire Department of Environmental Services - Watershed Management Bureau (NHDES) on April 19, 2024. The WQC application (the Application)[2] included a certification request, completed application form, and the links to public documents included in the FERC Amended Final License Application (AFLA).

The purpose of the certification is to provide an assurance that discharges into surface waters of the state and waters of the United States, hereinafter collectively referred to as "surface waters", from the Project will comply with applicable water quality requirements, including New Hampshire surface water quality standards specified under RSA 485-A:8 and New Hampshire Code of Administrative Rules Env-Wq 1700 (Surface Water Quality Standards); 33 U.S. Code §1313 (CWA §303); effluent limitations and other limitations, under 33 U.S.C. §1311 or 33 U.S.C. §1312 (CWA §301 or §302, respectively); standards of performance per 33 U.S.C. §1316 (CWA §306), or prohibition, effluent standard, or pretreatment standard under 33 U.S.C. §1317 (CWA §307); and with any other appropriate requirement of state law (Provisions of the CWA), of which CWA §303 is the most applicable provision for the Project.

B. DECISION

Based on a review of the Application, and subject to conditions included herein, NHDES has determined that discharges from operation of the proposed Project will comply with applicable water quality requirements, including New Hampshire Surface Water Quality Standards and Provisions of the CWA. NHDES hereby grants this certification in accordance with RSA 485-A:12, III, subject to the conditions in Section E of this certification.

C. PROJECT DESCRIPTION

C-1. On May 1, 2017,[3] the Applicant filed the Final License Application (FLA) to FERC for licensing of the Project. On December 07, 2020,[4] the Applicant filed the AFLA, and on June 7, 2023,[5] the Applicant filed a revised composite Exhibit E for the three Applicant-owned

[2] FERC Accession Number 20240423-5125
[3] FERC Accession Number 20170501-5425
[4] FERC Accession Number 20201207-5219
[5] FERC Accession Number 20230608-5103

Hydroelectric Projects concurrently undergoing relicensing on the Connecticut River.[6] On November 21, 2023, FERC accepted the Applicant's AFLA and issued a Ready for Environmental Analysis (REA)[7] for the Wilder Project, et. al.

C-2. In Table 2.1-1 of Exhibit E of the AFLA, the Applicant provided the following summary of the Project:

General Information	
Owner	Great River Hydro, LLC
FERC Project Number	P-1892
Current license term	December 10, 1979 - April 30, 2019
Authorized Generating Capacity	35.6 MW
Location of Dam	Connecticut River at [river mile] 173.7
Nearest Towns/Counties	Lebanon, Grafton County, NH Hartford, Windsor County, VT
Drainage area	3,375 square miles
Major tributaries	NH - Ammonoosuc River VT - Wait and Ompompanoosuc rivers
Operating range elevation[8]	380.0 ft - 385.0 ft
Current range elevation[9]	382.0 ft - 384.5 ft
Normal tailwater elevation	332.0 ft
Impoundment length	45 miles (Haverhill, NH / Newbury, VT)
Gross storage	34,350 acre-ft
Useable storage	13,350 acre-ft (at 5-ft drawdown)
Surface area at full pond	3,100 acres
Average annual inflow at the Project	Approximately 6,400 cfs
Required minimum flow	675 cfs or inflow, whichever is less
Generated minimum flow	700 cfs
Major Structures and Equipment	
Dam	Rolled earth embankment, reinforced concrete gravity non-overflow section, powerhouse, concrete spillway, earth dike, 1,541 feet long with a maximum height of 59 feet and net head of 51 feet.
Spillway gates	6 tainter gates, 2 skimmer gates, 4 stanchion bays
Powerhouse	Steel frame and brick masonry construction with reinforced concrete substructure.
Turbine generating units	3
Turbine type	Units 1‑2: Kaplan adjustable blade Unit 3: vertical Francis

[6] Wilder Hydroelectric Project (P-1892), Bellows Falls Hydroelectric Project (P-1855) and Vernon Hydroelectric Project (P-1904).
[7] FERC Accession Number 20240222-3012
[8] Elevation data are presented using the National Geodetic Vertical Datum of 1929 (NGVD29)
[9] Reflects typical non-spill, non-emergency operation.

Turbine capacities	Units 1‑2: 19 MW, 6,000cfs at 49 ft head Unit 3: 3 MW, 700 cfs at 58 ft head
Generator capacities	Units 1‑2: 16,200 kW Unit 3: 3,200 kW
Total discharge capacity, including spill	157,600 cfs
Fish ladder	Reinforced concrete, overflow weir fish ladder approximately 450 ft long with 58 pools and 54 ft of vertical rise, collection facility, and viewing windows.

C-3. In Section A1 of Exhibit A of the AFLA, the Applicant provided the following overall description of the Project:

"The Wilder Project's dam and powerhouse are located on the Connecticut River at river mile (RM) 217.4, approximately 1.5 miles upstream of the White River confluence and 7 miles downstream of the Ompompanoosuc River in the town of Hartford, Windsor County, Vermont, and in the city of Lebanon, Grafton County, New Hampshire… The Project is located in the towns of Hartford, Norwich, Thetford, Fairlee, Bradford, and Newbury, Vermont; and Lebanon, Hanover, Lyme, Orford, Piermont, and Haverhill, New Hampshire…"

"The primary Project facilities… include the dam and spillway, the powerhouse, garage/service building, and buildings used for offices. The Project also includes fish passage facilities… and recreation areas and facilities including a boat launch, portage, picnic areas, hiking trail, fish ladder viewing area, and fishing access…"

"Great River Hydro holds fee ownership of 123 acres of land for the Wilder Project. Of this acreage, 43 acres are associated with the dam and generation, 59 acres are currently dedicated to public outdoor recreation use, 10 acres have been licensed to Dartmouth College for recreation use, and 11 acres of other lands along the shoreline just upstream and downstream of the dam on the New Hampshire side and downstream of the dam on the Vermont side."

C-4. In Section A1.1 of Exhibit A of the AFLA, the Applicant provided the following description of the Project's Impoundment:

"The Project impoundment extends upstream about 45 miles to a point about 4.0 miles below the Wells River-Woodsville Bridge. The Project has limited storage capacity because of the relatively flat terrain from the upper extent of the Project impoundment to the dam. The impoundment has a surface area of 3,100 acres and about 105 miles of shoreline and a total volume of 34,600 acre-feet (acre-ft) at elevation (El.) 385.0 ft (National Geodetic Vertical Datum of 1929 [NGVD29]) above mean sea level (m.s.l.) at the top of the stanchion boards. The usable storage amounts to about 13,350 acre-ft in 5 ft of drawdown to El. 380 ft; however, the typical impoundment operating range under non-spill conditions is about 2.5 ft, between El. 382.0 and El. 384.5 ft providing about 7,350 cfs of storage."

C-5. In Section A1.2 of Exhibit A of the AFLA, the Applicant provided the following description of the Project's Dam and Spillway:

"The dam is a concrete gravity structure extending across the Connecticut River from Hartford, Vermont, to Lebanon, New Hampshire. The dam structures include an earthen embankment that is about 400 ft long, a non-overflow gravity concrete bulkhead wall that is 232 ft long, a concrete forebay

intake that is 208 ft long, a gravity concrete spillway that is about 526 ft long and 59 ft in maximum height, and another earthen embankment that is about 180 ft long. The south embankment is 13 ft in maximum height and the north embankment is primarily a natural bank to which protection has been added. The spillway portion of the dam is divided into four sections: skimmer gate, six tainter gates, four stanchion flashboards, and another skimmer gate. The various bays are separated by concrete piers supporting a steel and concrete bridge. The non-overflow section crest is at El. 393 ft..."

C-6. In Section A1.5.1 of Exhibit A of the AFLA, the Applicant provided the following description of the Project's Upstream Fish Passage Facilities:

"The Wilder fish ladder is a reinforced concrete structure with accessory electrical, mechanical, and pneumatic equipment that is designed to provide passage past the dam for migrating Atlantic Salmon... Upstream migrating fish are guided to the ladder entrance by attraction water supplied from the discharge of the Unit No. 3 generator and collection channel weirs. When Unit No. 3 is not available, a Unit No. 3 bypass supplies the attraction water. Upstream migrating fish enter the tailrace area where fish are attracted to the main entrance weir at the northwest end of the powerhouse. A spillway entrance weir and a turbine entrance weir are incorporated into the southeast and southwest walls of the attraction water channel for use under varying tailwater conditions. The spillway entrance weir is a gated entrance slot used for fish attraction from the spillway area, where fish may congregate during high-water spill conditions. The tailrace entrance weir is a gated entrance slot that is used for fish attraction during minimum flow operation of the "continuous-flow" turbine (Unit No. 3). The attraction water weirs, when used, open fully; they are not adjustable."

"Fish travel through the 6-ft-wide entrance channel along the powerhouse to the attraction water floor diffuser in the southeast half of a spare turbine bay between the powerhouse and the concrete dam. From the attraction water diffuser, fish enter a 6-ft-wide fish ladder entrance channel and ascend to the forebay by swimming through a series of 58 pools created by a sequence of overflow weirs with each succeeding weir spaced 10 ft apart and 12 inches higher than the last. After passing 28 pools, the fish enter the counting/trapping area, are guided by flow and crowder screens, travel through a 3-ft-wide flume, and pass an underwater viewing window, where they may be observed and counted. At this location, they can be trapped and diverted to a holding pool by means of manually activated pneumatic trapping gates."

"From the counting/trapping area, fish continue to swim through an additional 30 overflow weirs and pools to the 5-ft-wide fish ladder exit channel in the spillway adjacent to the powerhouse. The exit channel (the last pool) includes a motor driven head gate, widely spaced trashracks (sufficient to pass adult salmon) with 12-inch spacing, and slots for wooden stop logs. The head gate is either open or closed. The last five weirs in the vertical slot section contain adjustable weir gates that can be lowered (opened) to provide a nearly constant flow when the forebay water surface elevation (WSE) drops through its normal operating range. As the impoundment WSE rises and falls, these gates are programmed to maintain a nearly constant water level of 12 inches over the first fixed weir downstream of the five adjustable weirs by means of a water level monitor and control system."

"An outdoor public viewing area with an observation deck and underwater window is located at the northwest end of the fish ladder on the Vermont shore adjacent to the powerhouse parking lot. The Connecticut River Atlantic Salmon Commission (CRASC) provides an annual *Fish Passage Notification Schedule*, which sets the dates for upstream passage for all dams on the Connecticut River. Typically, the upstream fish ladder operates from May 15 through July 15 and from September 15 through November

15 for Atlantic Salmon; however, in recent years, fish ladder operation has been suspended because of low salmon returns and abandonment of the program by the U.S. Department of the Interior, Fish and Wildlife Service (FWS) and the states."

C-7. In Section A1.5.2 of Exhibit A of the AFLA, the Applicant provided the following description of the Project's Downstream Fish Passage Facilities:

"As of February 11, 2016, CRASC no longer requires downstream passage operations at Wilder for Atlantic Salmon smolts... CRASC's annual Fish Passage Notification Schedule had set the dates for downstream passage for all dams on the Connecticut River. Downstream passage flows were provided for adult Atlantic Salmon from October 15 to December 31 if 50 or more adults were documented as having passed upstream. Downstream fish passage was provided by the skimmer gate (trash/ice sluice) located between Unit No. 3 and the fish ladder entrance gallery bay and spillway. A flow of 512 cfs was maintained continuously through the skimmer gate for downstream passage of Atlantic salmon. The gate is motorized and operated locally as needed to pass river debris and ice."

C-8. In Section B1.1 of Exhibit B of the AFLA, the Applicant provided the following description of the existing operations of the Project:

"Project operations are automated and controlled from a consolidated hydro operations control center located in Wilder, Vermont. Great River Hydro, LLC (Great River Hydro), typically operates the Project in a coordinated manner with other Great River Hydro generating facilities on the Connecticut River, taking into consideration variations in electricity demand as well as natural flow in order to maximize the efficient use of available water."

"When inflows are within the Project's generating capacity, Great River Hydro uses the limited impoundment storage at the Project to dispatch generation as required to meet the generation schedule managed by New England Independent System Operator (ISO-NE). During any day, generation can vary between the required minimum flow and full generating capacity, depending on inflow and impoundment storage. Over the day, the Project generally passes the average daily inflow."

"…Anticipated inflow calculations predict impoundment water surface elevations (WSEs) and determine whether spill gates must be operated to pass flow in excess of Project generating capacity. Estimated inflow is calculated using discharge from the Project plus/minus changes in WSE measured at the dam on an hourly basis, averaged over a rolling 6-hour period. Impoundment drawdown rates are typically less than 0.1 to 0.2 foot (ft) per hour and do not exceed 0.3 ft per hour and depend upon station turbine discharge capability and rate of inflow. Due to the length and [river] channel characteristics of the impoundment, changes in WSE and flow at the dam are not mirrored at upstream locations within the impoundment due to reduced influence and affect from operations at the dam and increased influence and contribution from inflow as distance from of the dam is increased. There is approximately 3,000 cubic feet per second (cfs) per hour per 0.1 ft of elevation, and 0.3 ft per hour represents a maximum station output with little to no inflow."

"The maximum station discharge with all three units operating is approximately 11,700 cfs, although 98 percent of the time flows are less than 10,700 cfs… The maximum hydraulic capacity (calculated as the sum of each individual unit's maximum discharge capacity) is 12,700 cfs."

"The Project itself has a maximum discharge (generation plus spill) capacity of 157,600 cfs, and the flood of record at this site, which occurred in March 1936, was 91,000 cfs. Since then, a U.S. Army Corps of

Engineers (USACE) flood control structure on the Ompompanoosuc River has been built, the Wilder Project redeveloped, and Moore dam, which has some flood control capacity, was constructed. All of these facilities have helped to decrease the peak flow at the Project during flood events. Since Moore dam began operating in the late 1950s, the highest flow recorded at Wilder has been less than 65,000 cfs."

"The licensed minimum flow requirement is 675 cfs (or inflow if less) and is provided primarily by generation from Unit No. 3 at an efficient operating flow of about 700 cfs. Additional non-generation flows are provided seasonally on a schedule provided annually by the Connecticut River Atlantic Salmon Commission (CRASC) based on fish counts at downstream projects. If required, fish passage flows are provided in spring (May 15–July 15) and in fall (September 15–November 15) for upstream fish passage (25-cfs fishway flow plus Unit No. 3 generation flow for attraction water) and for downstream fish passage (512 cfs) from October 15–December 31. As of 2016, CRASC no longer requires downstream passage operations at Wilder for Atlantic Salmon smolts in spring, and only requires fall downstream passage operations if 50 or more adult salmon are documented passing upstream... During the summer recreation season, beginning the Friday before Memorial Day and continuing through the last weekend in September, Great River Hydro maintains a self-imposed minimum impoundment WSE as measured at the dam of elevation (El.) 382.5 ft from Friday at 4:00 p.m. through Sunday at midnight and on holidays during this period, unless the Project is experiencing high flows above generating capacity."

C-9. In Section B1.3 of Exhibit B of the AFLA, the Applicant provided the following description of the proposed operations of the Project, with the proposed operations exhaustively described in "Attachments A – Great River Hydro's Proposed Alternative Operation for the Projects", and "B - Evidence of Support for Proposed Alternative Operation - Memorandum of Understanding [MOU] Wilder, Bellows Falls and Vernon Hydroelectric Projects FERC Relicensing" (dated December 1, 2020), of Exhibit B of the AFLA. [Attachments A and B of Exhibit B are attached to this Certification as **Attachment 1**.]:

"Great River Hydro, with support from relevant state and federal resource agencies, and regional and national non-governmental organizations that have actively participated in scoping and study phases of relicensing, proposes a modified project operation that significantly reduces both the frequency, amplitude and rate of change in project-related discharge and impoundment water surface fluctuation in comparison to Existing Project Operation…"

"The proposed operation focuses on creating more stable reservoir water surface elevations, reducing the magnitude of changes and the frequency of sub-daily changes in discharge from the project, increasing the amount of time that the project is operated as inflow equals outflow and at full reservoir. At the same time, the proposed operation maintains Great River Hydro's capability to be flexible and responsive to current wholesale energy, forward capacity, reserve and other ancillary services markets managed by the New England Independent System Operator (ISO-NE). The proposed operation will also remain responsive to ISO-NE system emergencies when ISO-NE requires operation for reserves, security, system stability (e.g., VAR support), system over-supply conditions (ISO-NE minimum generation emergency or negative prices), and critical events or emergencies involving dam and public safety. The proposed operation ensures the Project's ability to address future regional energy demands and system needs as those evolve over time."

"The Proposed Project Operation will predominantly maintain a specified WSE (Target WSE) at the dam and as a result, maintain flow below the Project equal to the approximate inflow as measured or

calculated at the dam (inflow equals outflow or IEO). Specifically, a Target WSE of 384.5 ft m.s.l. (NVGD 29) will be maintained at the Wilder dam by passing inflow within a Target WSE Bandwidth between 385.0 ft and 384.0 ft to account for potential differences between anticipated inflow and actual instantaneous inflow. In addition to IEO Operation, the Project will have restricted discretionary Flexible Operation capability to respond to elevated energy prices as well as unrestricted capability to respond to emergencies and ISO-NE transmission and power system requirements..."

C-10. In Section 5.1 of Exhibit E of the AFLA, the Applicant described the effects of the proposed environmental measures related to aquatic resources for the Project:

"Under the Great River Hydro proposal, the proposed operation will reduce the frequency of impoundment WSE fluctuations by 58-100 percent…, with the greatest reduction occurring during critical spawning periods. The magnitude of WSE change is expected to be less than 0.4 ft in most month and year scenarios (average 0.23 ft)."

"Station discharge will match inflow 67-100 percent of the time in spring, summer, and fall months, and 39-60 percent of the time during winter. Increases in base flow levels and the reduction in frequency, occurrence, and amount of change in flow, particularly during critical seasonal periods under the proposed operation, will reduce the frequency and magnitude of gravel and cobble-bar wetting and dewatering and provide a more stable environment for riverine species. The proposed flow regime is expected to increase success of spawners using shallow shoal habitats, including Smallmouth Bass, Fallfish, and Sea Lamprey."

"The higher base flow and Transition Operation of up-ramping and down-ramping preceding and following Flexible Operation will also provide more consistency for mussel recruitment and less likelihood of stranding for mussels and other less mobile species, including fry. Similarly, reduction in frequency, occurrence and amount of change in flow, particularly during critical seasonal periods will reduce nest scour or abandonment due to high velocities, reduce displacement of newly emerged fry of many species, and should provide extended periods of more stable flow for nest construction by Fallfish and Sea Lamprey."

C-11. In Section 2.2.2 of Exhibit E of the AFLA, the Applicant described the proposed non-operational protection, mitigation, and enhancement measures for the Project, including:

"Continuing to manage, maintain, and enhance as demand and use requires the various recreation areas and facilities associated with the three projects."

"Continuing to manage undeveloped land through cooperative agreements with farmers to maintain prime agricultural lands productive but also managed for critical wildlife habitat such as grassland bird nesting."

"Continue to maintain and operate fish passage facilities. and operate as requested in Schedule of Operations letters issued annually by the Connecticut River Salmon Restoration Commission (CRASC)."

"Operate fish ladders at [the Project] from April 1 thru July 15 to support upstream passage for resident early spring spawners such as White Sucker and Walleye and diadromous species as adult Sea Lamprey and juvenile American Eel."

"Design, install and implement tools, equipment, and resources as needed, within the Project boundary, portions of the river affected by project operations and in the hydro operations control center to assist

in inflow monitoring, inflow forecasting and manage the impoundment to Target WSE in order to successfully operate the Projects under the proposed operation."

C-12. In Section 2.1.1.5 of Exhibit E of the AFLA, the Applicant provided the following summary of the existing recreational facilities for the Project:

"The Project includes the following formal recreation areas and facilities: (1) the Hartford (Wilder) picnic area at Kilowatt Park (North); (2) Wilder dam (Olcott Falls) boat launch at Kilowatt Park (South); (3) Wilder dam fish ladder and angler parking; (4) Lebanon (Wilder dam) picnic area, vista, and hiking trails; (5) Wilder dam portage and downstream natural areas; and (6) Gilman Island including primitive campsites and Titcomb Cabin…"

C-13. In Section 5.1 of Exhibit E of the AFLA, the Applicant described the effects of the proposed environmental measures related to recreation and land use for the Project:

"Under the Great River Hydro proposal, Great River Hydro will also continue to operate and maintain the existing Project recreation facilities throughout the term of the new licenses and continue to permit state and local entities to operate recreational facilities that provide access to Project lands and waters for recreational boating, fishing, picnicking, and environmental education. Great River Hydro proposes to incorporate into its respective Projects three canoe campsites, currently non-Project recreation areas on Great River Hydro fee-owned land."

"The Great River Hydro proposal will continue to offer a variety of boatable flows at the popular Sumner Falls site as desired by boating interests. Flexible Operation at Wilder and responsive to ISO-NE schedule will continue to support a variety of boating conditions and opportunities at Sumner Falls. Under proposed IEO Operations, changes in boating opportunities will occur as a function of the inflow hydrograph eliminating the cycling between low and high flows. Boater group comments on the PLP showed they were interested in higher base flows to improve navigation of the riverine reaches and impoundments. Higher instantaneous base flows, within impoundments and downstream are anticipated under the proposed operation. Overall, this will provide higher base flows at Sumner Falls and the entire riverine reach and longer duration boating opportunities. Under IEO, hundreds of more hours of flows between 3,800 and 5,000 cfs (within the preferred boating flow for 'main wave') are modeled to occur in June and August. IEO Operations will occur over 80 percent of the time in June and August, increasing the duration of boatable flows."

C-14. In Sections 3.4.1.3 and 3.4.2.1 of Exhibit E of the AFLA, the Applicant described the bank composition and observed erosion at the Project:

"The height, composition, and stability of the banks vary considerably throughout the Wilder impoundment. The upper impoundment flows across wide floodplain areas, so bank heights are generally limited to less than 15 feet north of Bradford, Vermont, and Piermont, New Hampshire. Bank heights exceed 50 feet in portions of the lower impoundment where the river more frequently encounters glacial surfaces. Very low banks of less than 5 feet make up 15 percent of the Wilder impoundment and are typically found at tributary confluences and where old abandoned oxbows intersect the river."

"Banks of the upper Wilder impoundment are composed (almost exclusively) of sand…, but gravel is present at the base of the banks in some locations. While loam and sand banks are also prevalent in the

The Applicant's Proposed Alternative Operations include a Dwarf Wedgemussel (DWM) Management Goal, which is to: "Increase habitat stability by stabilizing/reducing impoundment fluctuations and providing multiple consecutive-day periods (≥3) at IEO each month during the period April 1 through October 15."

The rationale for this management goal is as follows: "Existing operations impact the State and Federally listed Dwarf Wedgemussel. The identified goal is intended to facilitate DWM growth, breeding, and juvenile settlement in the riverine section below the Wilder Project and in the [Wilder impoundment]. Time spent moving in response to relatively rapid changes in water level that could occur due to Flexible Operation is time not spent feeding, which can lead to increased energy expenditure and predation risk, resulting in reduced growth and/or increased susceptibility to mortality. Periods of IEO are also intended to facilitate successful breeding (male gamete release/fertilization in females), believed to occur in the months of August and September, by maximizing the chance male gametes will reach females and not be mobilized to points downstream. Similarly, extended periods of IEO will increase the potential for metamorphosed glochidia released from host fish to successfully settle on a DWM bed versus being mobilized and settling off-bed. Based on analysis of Flexible Operation simulations provided by GRH, the expectation is that the limited number of Flexible Operation hours allowed during the active season for these species will meet this species-specific goal."

C-21. In accordance with RSA 488:3, and the New Hampshire Code of Administrative Rules Env-Wq 2102 - Water Use Registration and Reporting, the Applicant is required by law to measure all withdrawals and discharges of the Project and report them to the NHDES Water Use Registration and Reporting Program.

D. DISCHARGES

Potential and proposed discharges to surface waters from the Project include discharges of various water quantities to the Project's impoundment, and to the Connecticut River downstream of the Project's dam, which affect flow of the Connecticut River and water surface elevation levels of the Project's impoundment.

E. CERTIFICATION CONDITIONS

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

E-1. **Compliance with Surface Water Quality Standards:** The Applicant shall ensure that the discharges from the Project will maintain and protect Surface Water Quality Standards of surface waters that are affected by the Project, including the chemical, physical, and biological integrity of those surface waters, to achieve the purposes of the legislative classification of those surface waters.

This condition is necessary to ensure that the discharges from the Project will comply with the Surface Water Quality Standards because those standards apply to all surface waters of the state and any person who undertakes any activity that affects the beneficial uses or the water quality of surface waters. Those standards require, among other things, that all surface waters 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; provide for the protection of

private corporation, individual, partnership, or other entity), the Applicant shall provide the contact information of the new person, including the name, mailing address, phone number, and email address of the person, in writing to NHDES and FERC prior to the transfer.

This condition is necessary to ensure that the discharges from the proposed Project will comply with the Surface Water Quality Standards because NHDES and other persons must be able to know who is responsible for the Project, and so NHDES may appropriately target inspection and enforcement of certification conditions, as necessary, to ensure compliance with and enforcement of conditions of this certification.

Citations that authorize this condition: CWA §401; RSA 485-A:12, III; and RSA 485-A:18.

E-6. **Flow / Impoundment Management:** The Applicant shall operate the Project in accordance with **Attachment 1**: AFLA Exhibit B, "Attachments A - Great River Hydro's Proposed Alternative Operation for the Projects", and "B - Evidence of Support for Proposed Alternative Operation - Memorandum of Understanding [MOU] Wilder, Bellows Falls and Vernon Hydroelectric Projects FERC Relicensing" (dated December 1, 2020), as summarized in Conditions E-6a through E-6f below.

These procedures may be temporarily modified if required by operating emergencies beyond the control of the Applicant, such as flooding or drought, and as specified in an Operations Compliance Monitoring Plan (OCMP) required in Condition E-8 of this certification. These requirements may be temporarily modified upon mutual agreement between NHDES, NHFGD, USFWS, Vermont Agency of Natural Resources (VANR), Vermont Department of Fish and Wildlife (VDF&W), and the Applicant, and approval by FERC and any other federal agency that has the authority to specify flow or impoundment levels of the Project. The Applicant shall determine surface water flows and elevation levels based on measurement data that is collected no less frequently than hourly.

This certification does not require the Applicant to comply with the following requirements during an "emergency condition." Defined under Env-Wr 101.15, "Emergency Condition" means a situation exists at a dam which jeopardizes its ability to control or impound water or contents.

E-6a. **Inflow Equals Outflow (IEO) Operations:** At all times, except for those times allowed under the Flexible Operations described in Condition E-6f, the Applicant shall operate the Project such that inflow to the Project approximates the total outflow from the Project, and water levels above the dam are not drawn down for the purpose of generating power.

E-6b. **Downstream Minimum Flows:** At all times, the Applicant shall discharge a continuous minimum flow, or inflow to the Project if less, as described in E-6b(i) through E-6b(iii), below, to the Project's downstream reach.

E-6b(i). From October 1 to March 31: 1,500 cfs

E-6b(ii). From April 1 to May 31: 2,000 cfs

E-6b(iii). From June 1 to September 30: 1,100 cfs

E-6c. **Impoundment Water Surface Elevation (WSE):** At all times, except for those times allowed under the Flexible Operations described in E-6f and for seasonal impoundment lowering to protect Dwarf Wedgemussel (DWM), as described in Condition E-6c(i), the Target WSE of the impoundment under normal operating conditions shall be 384.5 feet as measured at the dam of the Project using the NGVD 29 reference datum. The Applicant shall maintain the impoundment level within a Target WSE Bandwidth of 384.0 feet - 385.0 feet (within +/- 0.5 feet of the Target WSE). The Target WSE shall be monitored no less frequently than hourly, and station discharge shall be adjusted as frequently as is necessary to maintain proximity to the Target WSE.

E-6c(i). Seasonal Impoundment Lowering for DWM: The impoundment shall be temporarily lowered to an elevation at, or above, the low limit of the Flexible Operations impoundment range described in Condition E-6f(i), for an estimated 10 to 21 days, when water temperatures consistently drop from 15°C to 10°C. Once water temperatures are consistently below 10°C, the impoundment will be adjusted upward back to the Target WSE. Throughout the subsequent period when water temperatures are at or below 10°C, and no earlier than March 1, the WSE shall remain at, or above, the elevation to which the impoundment was lowered for DWM habitat winter protection.

For the purpose of this condition, “consistent temperatures” shall be calculated using the mean average temperature of the previous seven days, as recommended to NHDES by the USFWS.

E-6d. **Impoundment Drawdown Procedure for Scheduled Maintenance or Repairs:** If impoundment drawdown is necessary to complete scheduled maintenance or repairs, the Applicant shall lower the impoundment water level no more than six inches per 24-hour period. If scheduled maintenance or repairs do not require impoundment drawdown, this drawdown rate does not apply.

E-6e. **Impoundment Refill Procedure:** When refilling the impoundment of the Project after drawdown for maintenance or emergencies, the Applicant shall maintain downstream reach flows specified in Condition E-6b, release 70 percent of the inflow to the Project downstream to the River, and utilize the remaining 30 percent of inflow to refill the impoundment. (This 70 percent/30 percent of inflow ratio, is the same refill rate as proposed for the Flexible Operations, in E-7d(iii)3., below.)

E-6f. **Flexible Operations:** At the discretion of the Applicant, Project operations may deviate from IEO operations to a mode using storage to generate power, known as Flexible Operations, as described in **Attachment 1**. There are no limitations on the number of Flexible Operations events per day or the duration of the event, other than those indirect limitations due to inflow, minimum discharges as described in E-6b, and the Transition Operations described in E-6f(iv).

E-6f(i). During Flexible Operations, the WSE of the impoundment shall be maintained between 384.5 and 383.0 feet (a 1.5-foot range).

E-6f(ii). Maximum number of hours of Flexible Operations per month:

E-6f(ii)1. December - March: 65 hours per month

E-6f(ii)2. April - June: 10 Hours per month

E-6f(ii)3. July: 20 hours (with no more than 10 hours from July 1 through July 15)

E-6f(ii)4. August - October: 20 hours per month

E-6f(ii)5. November: 42 hours (with no more than 10 hours from November 1 through November 15)

E-6f(iii). Maximum discharge during Flexible Operations: The maximum discharge during Flexible Operations shall be based on the calculated inflow at the hour in which the Flexible Operations begin, while maintaining the impoundment WSE between 384.5 and 383.0 feet.

E-6f(iii)1. When the calculated flow is 1,800 cfs or less, the maximum discharge is 4,500 cfs.

E-6f(iii)2. When the calculated inflow is greater than 1,800 cfs, the maximum discharge shall be no greater than 2.5 times the calculated inflow at the hour which the Flexible Operations begin.

E-6f(iv). Transition Operations: Transition operations shall be required to transition to or from an IEO to a Flexible Operation event.

E-8. **Operations Compliance Monitoring Plan (OCMP):** Specifics regarding how compliance with the proposed operation (described in Condition E-6 and **Attachment 1**), will be determined, and the information that will be provided by GRH for this purpose will be included in an operation compliance and monitoring plan (OCMP). Should review of information submitted to the relevant resource agencies pursuant to the OCMP indicate that operation of any Project is not complying with this Certification, GRH will consult with the State and Federal resource agencies to discuss their concerns and, if necessary, will identify and implement appropriate corrective actions.

The Applicant shall prepare the OCMP in consultation with NHDES, USFWS, NHFGD, VANR, and VDF&W, and filed with FERC, and submit it to said agencies within 180 days of license issuance or other time period mutually agreeable to the Applicant and NHDES. The final OCMP shall be submitted for NHDES approval, prior to implementation.

The OCMP, including any proposed future revisions, shall be developed in consultation with NHDES, NHFGD, USFWS, NHFGD, VANR, and VDF&W, and filed with FERC, and submitted to NHDES for approval. The OCMP shall be kept up to date by the Applicant so that it reflects current operation of the Project. When revisions are made, the Applicant shall submit, for approval, the updated OCMP to NHDES within 10 days, or other time period mutually agreeable to the Applicant and NHDES, of making the revisions. If NHDES requests the OCMP to be updated, the Applicant shall submit, for approval, the updated OCMP within 30 days, or other time period mutually agreeable to the Applicant and NHDES, of receiving a written request from NHDES to update the OCMP. Notwithstanding any required approvals from FERC or other regulatory agencies, the Applicant shall implement the approved OCMP.

The OCMP is expected to include the below items, specified in E-8a through E-8d, below.

E-8a. A description of the type of manual and automatic operation of the Project, including on-site and remote operation;

E-8b. 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, Flexible Operations (per Condition E-6f and **Attachment 1**), maintenance, and emergency conditions) to maintain compliance with the flow and impoundment level management requirements in Condition E-6, including the actions and measures the Applicant will use to maintain the required minimum flow and target impoundment levels;

E-8c. A description that includes calculations of how the downstream minimum flows will be maintained during scheduled drawdowns and the minimum impoundment level that will pass the downstream minimum flows to the Project's tailrace;

E-8d. 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, including how the Applicant will measure and monitor increased discharges downstream of the Project dam or decreased regulated inflow to the Project impoundment as necessary to comply with conditions of this certification, including but not limited to:

and incorporated in the USFWS's recommendations and prescriptions, downstream fish passage shall be operated from August 1 to December 1 and American eel passage shall be provided from May 1 to November 15.

This condition is necessary to ensure that the discharges from the proposed Project will comply with the Surface Water Quality Standards because the implementation of the recommendations would help protect, mitigate, and enhance fish and wildlife resources that are impacted by the Project and provide for adequate fish passage.

Citations that authorize this condition: CWA §401; RSA 485-A:8; RSA 485-A:12, III; Env-Wq 1703.01; Env-Wq 1703.19; and Env-Wq 1708.03(a).

E-10. **Invasive Plant Species Management Plan (IPSMP):** The Applicant shall prepare an IPSMP in consultation with NHDES, USFWS, NHFGD, VANR, and VDF&W, and filed with FERC, and submit it to said agencies within 180 days of license issuance or other time period mutually agreeable to the Applicant and NHDES. The final IPSMP shall be submitted for NHDES approval, prior to implementation.

The IPSMP shall include the below items, at a minimum:

E-10a. Monitoring Measures for Invasive Aquatic Plants, including: an updated baseline invasive aquatic plant survey (area to be determined during consultation with above resource agencies); early detection and rapid response protocol (EDRR); and cyclical monitoring of existing invasive aquatic plants;

E-10b. Control measures for existing invasive infestations; and

E-10c. Activities to prevent the spread of invasive plants, including activities associated with daily operations (including during flexible operations) and routine maintenance; and future construction (pre-construction, during construction and post-construction) or major maintenance.

This condition is necessary to ensure that the discharges from the proposed Project will comply with the Surface Water Quality Standards because 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) and result in a dominance of nuisance species (which is a violation of Env-Wq 1703(c)(1)(d), General Water Quality Criteria).

Citations that authorize this condition: CWA §401(a); RSA 485-A:8; RSA 485-A:12, III; Chapter Env-Wq 1700.

E-11. **Water Quality Improvement Plan (WQIP)**: With this Certification and conditions, NHDES certifies that the proposed operations of the Project will comply with New Hampshire Surface Water Quality Standards. However, as an adaptive management measure, a WQIP will be required, **if in the future**, NHDES determines that the Project is causing or contributing to a violation of Surface Water Quality Standards at a magnitude, duration, and frequency that contributes to an impaired designated use, or is not protecting or maintaining an existing use. NHDES shall notify the Applicant in writing. The Applicant shall coordinate a meeting with NHDES and other interested resource agencies to discuss, then

ATTACHMENT 1

"Evidence of Support for Proposed Alternative Operation - Memorandum of Understanding [MOU] Wilder, Bellows Falls and Vernon Hydroelectric Projects FERC Relicensing"
(dated December 1, 2020); and

"Great River Hydro's Proposed Alternative Operation for the Projects"

MEMORANDUM OF UNDERSTANDING
WILDER, BELLOWS FALLS AND VERNON
HYDROELECTRIC PROJECTS FERC RELICENSING

The parties to this Memorandum of Understanding, dated as of December 1, 2020, are **Great River Hydro, LLC** ("Great River Hydro"), together with the following: **the United States Fish and Wildlife Service**, **the New Hampshire Department of Environmental Services**, **the New Hampshire Fish and Game Department**, **the Vermont Department of Environmental Conservation**, **the Vermont Department of Fish and Wildlife** (collectively, the "Resource Agencies"), **The Nature Conservancy**, and **the Connecticut River Conservancy** (such two parties, together with the Resource Agencies, the "Stakeholders").

Recitals

Great River Hydro is the owner and licensee of the Wilder Hydroelectric project (FERC No. 1892) ("Wilder Project"), the Bellows Falls Hydroelectric Project (FERC No. 1855) ("Bellows Falls Project"), and the Vernon Hydroelectric Project (FERC No. 1904) ("Vernon Project"), collectively, the "Projects".

The licenses for each of the Projects expire on April 30, 2021. If issuance of a new license (or other disposition) does not take place on or before April 30, 2021, pursuant to 18 C.F.R. 16.18(c), annual licenses under section 15(a)(1) of the FPA are renewed automatically. In accordance with the Federal Energy Regulatory Commission's ("FERC") Integrated Licensing Process regulations set forth in 18 C.F.R. Part 5, Great River Hydro submitted applications for new licenses for each of the Projects on May 1, 2017.

Great River Hydro and the Stakeholders have been engaged in discussions focused on reaching agreement on proposed operations of the Projects under new FERC licenses. The parties to this memorandum concur with the Proposed Alternative Operation for the Projects, attached as **Exhibit A**.

Understanding Between the Parties

The parties hereby recite as follows:

A. FERC License Application and WQC Proceedings. The Proposed Alternative Operation will be presented in the amended license applications as Great River Hydro's proposed operation of each Project (the "FERC License Application") and, pending any new information that would suggest otherwise, as its proposed operation of each Project in Great River Hydro's applications for water quality certifications from the New Hampshire Department of Environmental Services and the Vermont Department of Environmental Conservation in accordance with Section 401 (a)(1) of the Clean Water Act (the "WQC Proceedings").

B. Stakeholder Representations. Subject to the Resource Agency Reservations below, the Stakeholders represent the following:

The Stakeholders support the Proposed Alternative Operation as representing an agreed upon operation of the Projects, addressing many flow, impoundment and operational related resource concerns that are a result of, or are perceived to be a result of, operations of the Projects.

The Proposed Alternative Operation will be acceptable and supported by the Stakeholders in the FERC License Application process and, pending any new information that would suggest otherwise, included in the draft WQC issued for public comment. No further data or information related to the Proposed Alternative Operation is anticipated to be required to support the inclusion of the Proposed Alternative Operation in the draft WQC. However, if additional data or information is necessary to support the inclusion of the Proposed Alternative Operation in the draft WQC, the Stakeholders will confer with Great River Hydro.

The Stakeholders represent they will not propose additional or alternative operation proposals or license conditions that are inconsistent with the Proposed Alternative Operation, or would require a modification to the Proposed Alternative Operation.

Nothing in this Memorandum shall preclude the state and federal resource agencies from complying with their obligations under the National Environmental Policy Act, the Clean Water Act, the Endangered Species Act, the Federal Power Act, the Fish and Wildlife Coordination Act or any other applicable state or federal laws or regulations. However, by entering into this Memorandum the Resource Agencies represent, based on the information available to them as of the date of this Memorandum and subject to the Resource Agency Reservations below, that they believe their statutory obligations are, or can be, met consistent with the Proposed Alternative Operation.

Nothing in this Memorandum shall be interpreted to limit the right of The Nature Conservancy and the Connecticut River Conservancy from providing information or giving testimony in any regulatory, administrative or judicial proceeding, or to fully pursue any issue that, in its opinion, is not adequately addressed by Exhibit A.

C. Resource Agency Reservations. Nothing in this Memorandum shall preclude the state resource agencies responsible for issuing water quality certifications:

- from modifying the format or language of Exhibit A to better match typical water quality certification format or language provided it is consistent with the Proposed Alternative Operation;
- from including, if necessary, conditions in the WQCs related to potential resource issues not specifically addressed by the Proposed Alternative Operation, including, but not limited to, fish passage, whitewater rafting, recreation and monitoring;

- from including other conditions in the water quality certification provided they are not inconsistent with the Proposed Alternative Operation;
- from making revisions to the Proposed Alternative Operation in the draft Water Quality Certification prior to issuance for public comment based on any new information that would suggest revisions are necessary to support the inclusion of the Proposed Alternative Operation (as revised), in the draft WQC; and
- from issuing a final Water Quality Certification with revisions to the Proposed Alternative Operation based on comments received on the draft Water Quality Certification.

Prior to issuing the final Water Quality Certification, the States shall confer with Great River Hydro and the other Stakeholders in an effort to reach agreement on any substantive amendments to the draft Water Quality Certification made as a result of public comment or new information.

Nothing in this Memorandum shall be interpreted to preclude or otherwise limit EPA from complying with its obligations under the Clean Water Act, Clean Air Act, and National Environmental Policy Act, or other federal statutes. Nothing herein shall preclude EPA or the States of New Hampshire and Vermont from fully and objectively considering all public comments received in any regulatory process related to the Project, from conducting an independent review of the Projects under applicable statutes, or from providing comments to FERC.

Nothing in this Memorandum shall be interpreted to preclude or otherwise limit the U.S. Fish and Wildlife Service from completing consultation with FERC under Section 7 of the Endangered Species act, or as predetermining the outcome of such consultation.

D. Great River Hydro Representations. Great River Hydro supports the Proposed Alternative Operation as representing a reasonable balance between power and non-power resources by significantly increasing a broad range of resource protection while maintaining the Projects' capabilities to be flexible and responsive to current wholesale energy, forward capacity, reserve and other ancillary services markets managed by the New England Independent System Operator (ISO-NE). Under the Proposed Alternative Operation, the Projects can remain responsive to ISO-NE system emergencies and critical events, other emergencies involving dam and public safety and ensures their ability to address future regional energy demands and system needs as those evolve over time.

E. Confidentiality. Other than information regarding how Great River Hydro currently participates and intends to participate in ISO-NE wholesale energy, capacity, reserve and ancillary markets, any data or technical supporting information shared as a part of the Mitigation Discussions that supports the conclusion of this Memorandum that the Proposed Alternative Operation meets the regulatory obligations of a Resource Agency shall be

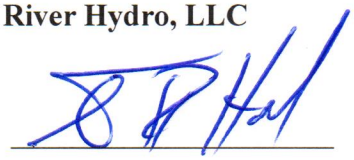
considered public and may be used by the Stakeholders to support its decision, provided that the terms of the Confidentiality Agreement for Mitigation Discussions shall continue to govern the use of proposals, counterproposals, meeting notes and informal discussions.

F. Representations and Warranties. The Parties represent and warrant to each other that: (1) this Memorandum has been duly authorized, signed and delivered by each party; (2) this Memorandum shall not, in any manner, limit any regulatory function of a Resource Agency; (3) this Memorandum shall not grant any person the right to initiate a suit to enforce its terms against a Resource Agency; (4) this Memorandum shall not be construed as a waiver of sovereign immunity or any other defense any Resource Agency may raise to any claim in a suit related to the subject matter of this agreement; and (5) this Memorandum shall not be construed to limit the right of The Nature Conservancy and the Connecticut River Conservancy to provide information or give testimony in any regulatory, administrative or judicial proceeding, or to fully pursue any issue that, in its opinion, is not adequately addressed by Exhibit A.

G. Counterpart Signatures and PDF Signatures. This Memorandum may be executed by the parties in separate counterparts, each of which when so executed and delivered shall be an original, but all such counterparts shall together constitute one and the same instrument. Signatures to this Memorandum transmitted by fax, by electronic mail in "portable document format" (.pdf), or by any other electronic means intended to preserve the original graphic and pictorial appearance of the Memorandum, shall have the same effect as physical delivery of the paper document bearing the original signature. The parties agree that any such reproduction shall, to the extent permitted by law, be as admissible in evidence as the original itself in any judicial or administrative proceeding (whether or not the original is in existence and whether or not the reproduction was made in the regular course of business) and that any enlargement, facsimile or further reproduction shall likewise be admissible in evidence.

[*signatures on following page*]

Great River Hydro, LLC

By: 

Name: Scott D. Hall

Title: President and CEO

United States Fish and Wildlife Service

By: _____

Name: _____

Title: _____

New Hampshire Department of Environmental Services

By: _____

Name: _____

Title: _____

New Hampshire Fish and Game Department

By: _____

Name: _____

Title: _____

Vermont Department of Environmental Conservation

By: _____

Name: _____

Title: _____

Vermont Department of Fish and Wildlife

By: _____

Name: _____

Title: _____

The Nature Conservancy

By: _____

Name: _____

Title: _____

Connecticut River Conservancy

By: _____

Name: _____

Title: _____

Great River Hydro, LLC

By: _____

Name: _____

Title: _____

United States Fish and Wildlife Service

By: _____

Name: _____

Title: _____

New Hampshire Department of Environmental Services

By: _____

Name: _____

Title: _____

New Hampshire Fish and Game Department

By: _____

Name: _____

Title: _____

Vermont Department of Environmental Conservation

By: _____

Name: _____

Title: _____

Vermont Department of Fish and Wildlife

By: _____

Name: _____

Title: _____

The Nature Conservancy

By: _____

Name: _____

Title: _____

Connecticut River Conservancy

By: _____

Name: ___Andrew Fisk_____

Title: ____Executive Directo___

EXHIBIT A

Proposed Alternative Operation

Exhibit A

Great River Hydro's Proposed Alternative Operation for the Projects

INTRODUCTION

Great River Hydro, LLC (Great River Hydro or GRH) proposes to operate each of the Wilder, Bellows Falls and Vernon Projects (Projects or Facilities) in a similar manner under the terms of a new License, as the preferred (or proposed) alternative over the No-Action Alternative. The proposed alternative (also referred to herein as the Proposal) focuses on

- creating more stable impoundment water surface elevations,
- reducing the magnitude and frequency of sub-daily changes in discharge from the stations,
- increasing the amount of time that the project is operated as inflow equals outflow (IEO) and at full impoundment,
- reducing the magnitude and rate of change in flows downstream of the dams, and
- reducing the average frequency, average duration and average range of impoundment fluctuation under conditions when inflow to the Project at the dam is within the range of the Project powerhouse hydraulic capacity.

At the same time, the proposed alternative maintains Great River Hydro's capability to be flexible and responsive to current wholesale energy, forward capacity, reserve and other ancillary services markets managed by the New England Independent System Operator (ISO-NE). Great River Hydro also proposes to remain responsive to ISO-NE system emergencies and critical events and other emergencies involving dam and public safety. The proposal ensures the Project's ability to address future regional energy demands and system needs as those evolve over time. Additional non-operational elements of the proposal are also specified.

This Proposal is largely based on model simulations (simulations) provided by GRH that compared historic to proposed operation at each Project for the months of February, June, August and November in 2009, 2015, 2016 and 2017. GRH believes the simulations present an overly opportunistic representation with respect to the utilization of flow and managing to operational limits, which may result in overstatement of the actual impact of proposed Flexible Operations on the natural resources. This is because the simulations were created with perfect foresight with regards to pricing and inflow. Such perfect foresight will not be available during implementation of the proposal which will likely result in the Projects being operated more conservatively than indicated in the simulations in order to ensure compliance with the operational requirements specified herein.

The term agencies, resource agencies, or relevant resource agencies, used herein includes, but may not be limited to, the United States Fish and Wildlife Service, the New Hampshire Department of Environmental Services, the New Hampshire Fish and Game Department, the Vermont Department of Environmental Conservation, and the Vermont Department of Fish and Wildlife.

DEFINITIONS

1. **Cobblestone Tiger Beetle (CTB) Management Goal**: Maintain multiple consecutive-day periods (≥3) in which Flexible Operations (item 6) do not exceed flow thresholds that maintain ≥75% uninundated habitat at most sites for each month during the CTB active period (June through September), excluding periods when inflows are above these thresholds.

   Rationale: Existing Project operations impact the State listed Cobblestone Tiger Beetle (CTB). The thresholds stated in the goal are intended to increase the duration and area of available CTB habitat to facilitate CTB reproduction and survival from June 1 through September 30. This time period is considered the primary active period for CTB adults and larvae. Lack of persistent habitat can reduce the available time for feeding and/or prey availability. Limited habitat availability resulting from prolonged or repeated inundation also can cause delays in pupae and larvae development, decrease survival of larvae and affect the mating behavior of adults. Based on analysis of IEO/ Flexible Operation simulations provided by GRH, the expectation is that the limited number of Flexible Operation hours allowed during the active season for these species will meet this species-specific goal.

2. **Dwarf Wedgemussel (DWM) Management Goal**: Increase habitat stability by stabilizing/reducing impoundment fluctuations and providing multiple consecutive-day periods (≥3) at IEO each month during the period April 1 through October 15.

   Rationale: Existing operations impact the State and Federally listed Dwarf Wedgemussel. The identified goal is intended to facilitate DWM growth, breeding, and juvenile settlement in the riverine section below the Wilder Project and in the Wilder and Bellows Falls impoundments. Time spent moving in response to relatively rapid changes in water level that could occur due to Flexible Operation is time not spent feeding, which can lead to increased energy expenditure and predation risk, resulting in reduced growth and/or increased susceptibility to mortality. Periods of IEO are also intended to facilitate successful breeding (male gamete release/fertilization in females), believed to occur in the months of August and September, by maximizing the chance male gametes will reach females and not be mobilized to points downstream. Similarly, extended periods of IEO will increase the potential for metamorphosed glochidia released from host fish to successfully settle on a DWM bed versus being mobilized and settling off-bed. Based on analysis of Flexible Operation simulations provided by GRH, the expectation is that the limited number of Flexible Operation hours allowed during the active season for these species will meet this species-specific goal.

3. **Dwarf Wedgemussel Pre-Winter Habitat Operation**: Dwarf Wedgemussel pre-winter habitat protection operation is intended to create overwintering habitat that is protected from potential water drawdown that could expose mussel beds to freezing air temperatures. Mussels reduce their mobility and settle into the substrate for the winter as water temperatures drop below 15° Celsius (° C). By lowering the water surface elevation (WSE), the habitat they occupy will remain submerged over the winter, protecting largely immobile mussels from exposure and freezing air temperatures. To accomplish this, GRH will lower the WSE at the Wilder and Bellows Falls dams to an elevation at or above the low limit of each of the respective Flexible Operating Impoundment Ranges (specified below in item 9) and maintain that WSE for the limited period of time during which water temperatures consistently drop from 15° C to 10° C.

This period is typically 10-21 days in length, occurring in the late-October to early-November timeframe. Once water temperatures are consistently below 10° C within identified DWM habitats within the Wilder and Bellows Falls Project impoundments, the WSE can be adjusted upward to the Target WSE (item 17) and utilize the elevation range above the low limit described above for Flexible Operations. The WSE at each the Wilder and Bellows Falls dams will remain at or above this DWM habitat winter protection WSE throughout the subsequent period when water temperatures are at or below 10° C and no earlier than March 1 unless inflow exceeds respective station capacity and inflow levels require flood profile operation WSE at the dams (item 11).

4. **Emergency and System Operation Requirements** are when a Project must respond to:

   a. Emergencies outside the control of GRH when dam safety, public safety or flood control require action or response.

   b. Emergency System Operations, Conditions and Emergencies when the ISO-NE requires GRH to be fully available and if necessary responsive. Examples include ISO-NE Reserve Deficiencies (a.k.a. Reserve Constraint Penalty Factors) when reserves are depleted on the power grid, for fuel security emergencies or scarcity events, for ISO-NE system (or system) stability (e.g., VAR support), and system over supply (negative prices). GRH is not informed as to how the Projects are called upon or held in reserve to respond to specific system conditions or emergencies. However, based on ISO-NE Reserve Constraint Penalty Factors (RCPF) reports, which indicate when the region's power grid is short of operating reserves, there were 109 activations between 2011 and July 2013 within the entire ISO-NE System that may or may not have required actions at the Wilder, Bellows Falls or Vernon Projects. A summary of information gleaned from these reports for the period 2014 through 2018 is provided in the table below which shows that, in general, these events occurred relatively infrequently and are often short in duration. This information only provides a sense of the limited scale, frequency and number of these events; it does not mean any action actually took place with regard to the GRH projects. GRH facilities are often held in reserve even in a portion of the events referred to below. With regards to ISO-NE declared "Minimum Generation Emergencies" or "MIN GEN Emergencies" which may initiate and produce negative pricing, GRH consulted ISO-NE staff who stated that, to the best of their knowledge, the last MIN GEN Emergency occurred in March 2016.

YEAR	# of System Events	System Event Duration Range	# of Local * Events	Local Event Duration Range
2014	20	5-110 minutes	Cannot determine	
2015	3	10-65 minutes	6	5-20 minutes
2016	3	5-115 minutes	1	5 minutes
2017	2	15-20 minutes	8	5-305 (5-19-17) minutes
2018	2	10-160	0 listed	

*Local event but precisely where is not identified in the RCPF report

5. **ISO-NE required audits, demonstrations and tests** are requirements necessary for participation in and to qualify resources for systems support and markets. Present audits include Claimed Capacity Audits and Reactive Power Demonstrations (see below).

a. Claim Capacity Audit (CCA) is an ISO-NE audit currently required at the Wilder Project and may be (unanticipated presently) required in the future at the Bellows Falls and Vernon Projects. A CCA demonstrates maximum capacity for the Project through a two-hour generation run and is used by the ISO-NE for calculating capacity related market participation. Wilder Project requires a CAA to be performed annually to address summer capacity capability and every three years to demonstrate winter capacity capability. CCAs are performed under conditions specified by the ISO-NE and are performed under the best conditions related to head and inflow in order to maximize the generation within the two-hour audit as specified in the table below. While the ISO-NE does not require CCAs at Vernon and Bellows Falls, Great River Hydro may need to perform a similar test on occasion in order to demonstrate claimed capacity to the ISO-NE should a disparity arise between ISO-NE and GRH capacity numbers.

Project	Maximum Impoundment Elevation at start of CCA (NGVD29)	Maximum Impoundment Drawdown during 2-hour CCA and prior to Refill (feet)	Impoundment Refill
Wilder	385.00	0.60	See item 19.c
Bellows Falls	291.63		
Vernon	220.13		

b. Reactive Capacity Demonstration (RCD) is a 2-step ISO-NE audit currently required at the Wilder, Bellows Falls and Vernon Projects every five years, to verify capability to provide voltage reactive power or VAR to the regional power grid. Hydro generators are excellent sources of VAR support to the power grid, through which voltage can be increased or decreased depending upon the need to boost or reduce voltage of the grid. This audit requires GRH to demonstrate capability in both a minimum [station] generation and a maximum generation condition. Minimum station generation would typically be less than the required minimum base flow specified in item 16. Maximum station generation (item 15) would typically be higher than the calculated inflow. A 5-business day advance notice must be given to the ISO-NE, which determines if system conditions are suitable for a test before authorizing GRH to conduct the audit on a specified date/time. The duration of each portion (minimum generation and maximum generation condition) of the audit generally last an hour if things perform as planned; otherwise the audit could require an additional hour(s). The minimum generation audit will pass inflow either through generation, spill or a combination of both. The maximum generation audit will require a maximum pond elevation (Top of Boards) as specified in item 10 (Full Operating Impoundment Range) below.

c. Other future requisites are requirements specified by the ISO-NE, which are unknown and unanticipated at this time, to demonstrate and meet performance capability requirements, in accordance with ISO-NE market rules that may be changed from time to time. Great River Hydro will notify and consult with the relevant resource agencies a minimum of 60 days in advance of ISO-NE's implementation if GRH determines there is a significant modification to ISO-NE CCAs or RCDs as described above, or present additional requisites or requirements which require GRH to deviate from present demonstration capabilities and which cannot be reasonably accomplished through IEO/Flexible Operation as proposed and implemented under a new License.

6. **Flexible Operation** is when the Projects are operated at the Licensee's discretion and deviate from operation at IEO and stable pond (item 13) in accordance with this Proposal.

7. **Flexible Operation Hours** are the hours of Flexible Operation (item 6) that will count towards the maximum number of hours of Flexible Operation allowed each month as specified in item 23. Determination of the number of Flexible Operation hours that have been used each month for comparison to the maximum number of Flexible Operation hours allowed, will be as follows:

a. The minimum duration of a Flexible Operation event is one hour. Should an event be less than an hour for any reason, the event will be counted as one hour. ISO-NE is responsible for the dispatch of a unit or station and as such GRH is not able to precisely determine or dictate when a unit starts or stops. ISO-NE typically dispatches units at or near the top of the hour (e.g., 1:00, 2:00, etc.) under non-emergency situations. Should an event last more than 15 minutes past the top of the hour that event will be considered to have lasted and counted as if it were for that entire hour (e.g., if an event ends and Down-ramping Transition Operation is initiated within 15 minutes past the top of the hour, it will not be considered an additional hour; if after 15 minutes past the top of the hour, it will count as an additional Flexible Operation hour.) Examples are provided below.

When Up-ramping is implemented in accordance with item 19.a, hours for Flexible Operation begin the hour immediately following the Up-ramp hour. If Up-ramping is not implemented in accordance with item 19.a, due to Real-Time pricing, hours for Flexible Operation begin as soon as Flexible Operation begins as specified above. In all cases, the time that Flexible Operation ends for the purpose of determining the number of allowed hours which have been used each month (item 23) is when Down-ramping begins.

Examples (assuming no Up-ramping)

Approximate Time Flexible Operation Event Begins*	Time Flexible Operation Event Ends and Down-ramping Begins	Number of Flexible Operation Hours
2:00 pm	2:57 pm	1
2:00 pm	3:15pm	1
2:00 pm	3:16 pm	2

* ISO-NE dispatches units near the top of the hour.

b. Should GRH need to conduct more than two CCA tests per year at a single Project (due to problems, changing conditions, or failure to reach expected levels), GRH will alert the relevant resource agencies that 1) it must conduct additional tests, 2) that each additional test will require maximum impoundment elevation (see table under item 5.a) and no ramping, and 3) that the number of Flexible Operation hours for each additional test will be determined in accordance with 7.a above and counted either in the current or in the next month's allocation (item 23) if none were available in the current month.

8. **Flexible Operation Maximum Discharge** (item 27) is the maximum discharge from the Project powerhouse during Flexible Operation and is a function of inflow (item 12) and the maximum station generating capacity (item 15).

9. **Flexible Operating Impoundment Range** is bounded by the following Water Surface Elevation (WSE) limits except during the Dwarf Wedgemussel (DWM) pre-winter habitat protection operation (item 3). These limits are no greater than the current typical range of operation under normal operating condition for Bellows Falls and Vernon, one foot less than current operation for Wilder [which is 382.0 to 384.5 ft (msl NGVD 29)], 0.5 feet less at Bellows Falls during the active DWM period, and will be no greater than 1.5 feet at any of the Projects.

Project	WSE Range (msl NGVD 29)	Maximum Fluctuation During Any Flexible Operation Event (feet)
Wilder	383.0 and 384.5	1.5
Bellows Falls	Oct 1 – May 31: 289.6 and 291.1 June 1-Sept 30: 290.1 and 291.1	Oct 1 – May 31: 1.5 June 1-Sept 30: 1.0
Vernon	218.3 and 219.63	1.33

It is anticipated that the typical impoundment operating range as a function of Flexible Operation will be on average less than the Proposed Flexible Operating Impoundment WSE Range measured at each dam and as specified in the table above. GRH may, at some future date and at its discretion, after gaining more operating experience with the proposed operation, request to meet with relevant resource agencies to discuss the potential for reducing the Target WSE Bandwidth (Item 18) and/or modifying the Flexible Operating Impoundment Range, by raising both the upper and lower limits of the range, but not increasing the difference between the upper and lower limits (i.e., the maximum fluctuation shown in the table above).

10. **Full Operating Impoundment Range** is the historic full operating range for each Project that generally corresponds with the maximum height (top) of the flashboards or gates down to the low limit. This range is utilized for managing high flows and not for power generation. Water surface elevations (WSE) must be lower if extreme high water or dam safety emergencies require stanchion flashboards and beams to be removed from the concrete dam crest. In order to rebuild the stanchion flashboards, the impoundment WSE must be lowered to the crest before rebuilding the structures can be accomplished.

Wilder Project: Top of Boards 385.0 ft; Low limit to manage flood flows 380.0 ft; Concrete Stanchion Flashboard Crest 368.0 ft (msl NGVD 29).

Bellows Falls Project: Top of Boards 291.63 ft; Low limit to manage flood flows 288.63 ft; Concrete Stanchion Flashboard Crest 278.63.0 ft (msl NGVD 29).

Vernon Project: Top of Boards 220.13 ft; Low range to manage flood flows between 218.6 - 212.13 ft; Concrete Stanchion Flashboard Crest 212.13 ft (msl NGVD 29).

11. **High Water Operation** is when inflow at the dam exceeds the maximum station generating capacity (item 15). In most cases this requires each project to follow its Flood Profile Operating procedures, that require specific elevations be maintained at the dam for specific ranges of flow. These elevations fall within the Full Operating Impoundment Range of each Project (item 10).

12. **Inflow** to each Project is estimated based on anticipated inflow arriving at the dam from upstream. In real-time it is calculated and monitored through actual change in WSE measured at the dam on an hourly basis and adjusted through actual discharge from the Project.

13. **Inflow Equals Outflow (IEO) Operation** is defined as follows:

    a. When the Project maintains discharge through the powerhouse equal to inflow at the dam by maintaining a stable target WSE together with any required non-generation flow (e.g., Bellows Falls bypass flow, fish passage related flow) or,

    b. When inflow exceeds the maximum station generating capacity (item 15) and all inflow is passed via a combination of spillage and discharge through the powerhouse or if the station were out of service, via spillage alone.

14. **Maintenance Requirements** are either scheduled periodic maintenance or unscheduled maintenance due to an unanticipated situation or condition. Maintenance requirements can, in some cases, be pre-planned and executed accordingly or unplanned and require various elements such as investigation and problem identification, engineering, planning and execution.

15. **Maximum Station Generating Capacity** (in cfs) is the maximum flow that can be passed through the powerhouse for each Project as shown in the last column of the table below:

Project	Number and Type of Turbines	Maximum Flow / Turbine (cfs)	Minimum Flow / Turbine (cfs)	Maximum Nameplate Rated Capacity * (cfs)	Maximum Station Generating Capacity** (cfs)
Wilder	2- Kaplan 1-Vertical Francis	6000 700	400 400	12,700	11,700
Bellows Falls	3- Vertical Francis	3670	700	11,010	11,400

Project	Number and Type of Turbines	Maximum Flow / Turbine (cfs)	Minimum Flow / Turbine (cfs)	Maximum Nameplate Rated Capacity * (cfs)	Maximum Station Generating Capacity** (cfs)
Vernon	4- Vertical Francis	1465	400	17,130	15,400
	4-Vertical Kaplan	1800	300		
	2-Vertical Francis	2035	500		

* The maximum nameplate hydraulic capacity is based on design specifications of the turbine (or nameplate rating) and is the sum of the hydraulic capacities of all units in the powerhouse. It is not a realistic representation of what the Station can actually pass through the turbines at the same time, which is largely determined by net head.

** The maximum station generating capacity represents the maximum Station discharge based on operating data and represents the maximum discharge that can actually be passed through the turbines.

16. **Minimum Base Flows** are minimum flows required to be maintained below each dam at all times. As described below, flows are expected to be equal to inflow and significantly higher than these base flows the vast majority of time. The proposed Minimum Base Flows are all greater than the minimum base flows required in the current FERC licenses and include a seasonal component.

During the following periods the requirement will be to provide, at a minimum, the approximate inflow as measured at the dam.

- While operating in the Inflow Equals Outflow (IEO) mode (item 13) – discharging inflow will require maintaining Target WSE within the bandwidths specified (item 18) and hourly (minimum required frequency) adjustments necessary to maintain proximity to Target WSE.
- While operating in Flexible Operation and Up-ramping and Down-ramping Transition Operation (item 19), flows will be maintained above or equal to inflow. Instantaneous inflow measurements will be calculated in accordance with item 12.
- The economic minimum dispatch flow (Eco-Min) specified to the ISO-NE will be the estimated hourly inflow. When prices go negative, station discharge will be set to the specified Eco-Min (i.e., the estimated inflow). When a System Minimum Generation Emergency is declared by the ISO-NE, a combined spill plus station discharge will equal the Eco-Min. Both of these situations will resemble IEO and any discrepancy between estimated Eco-Min and real-time inflow would be captured within the Target Elevation Bandwidth and adjusted once either the negative pricing situation or the System Minimum Generation Emergency has ended.

While operating in Transition Refill Operation (item 19.c) discharge will be approximately 70% of estimated inflow and adjusted as necessary through hourly real-time monitoring and calculation of estimated inflow. Discharge during refill will not fall below the seasonal Minimum Base Flow thresholds shown below.

For the purpose of establishing a base flow below the dams for IEO/Flexible Operational Planning purposes and deciding whether or not to implement Flexible Operation by utilizing allocated hours (item 23) in the Day-Ahead (DA) market or in responding to Real-Time (RT) price signals in the RT market, all flows associated with Transition Operation Up-ramping; Flexible Operation; Transition Operation Down-ramping and; Transition Operation Refill will be maintained above the following Project and seasonal Minimum Base Flow thresholds. The only time Project flows prior to or following these periods may be less than these thresholds is when the inflow calculated in accordance with item 12 is less. It is anticipated that flows will be higher than the base flows the vast majority of the time.

Wilder	**Bellows Falls***	**Vernon**
Oct 1 - March 31: 1,500 cfs April 1 - May 31: 2,000 cfs June 1 - Sept 30: 1,100 cfs	Oct 1 - March 31: 1,600 cfs April1 - May 31: 3,000 cfs June 1 - Sept 30: 1,400 cfs Bypass Reach below dam: 300 cfs year round	Oct 1 - March 31: 1,600 cfs April 1 - May 31: 3,000 cfs June 1 - Sept 30: 1,400 cfs

***** Minimum Base Flow is the combined flow below dam and station.

Emergencies, facility outages, station trips that result in unanticipated reductions in station discharge will be considered unavoidable flow reductions, and GRH will restore flows below the Project to at least the estimated inflow as quickly as possible. When spill, other than the continuous 300 cfs in the Bellows Falls bypassed reach, is required during non-business hours to respond to emergencies or System minimum generation emergencies noted above, to maintain IEO, transition flows or the base flows as described, GRH will require personnel to come to the affected station(s) and check for public safety risks below the gates and confirm none exist before opening a spill gate. As soon as that is accomplished a gate(s) will be opened to provide the proper flows. This entire process typically takes one hour or less.

17. **Target Water Surface Elevation (WSE)** is a specified elevation (item 21) at each Project dam to be maintained under IEO Operation by adjusting station discharge. The Target WSE would be monitored no less frequently than hourly, and station discharge would be adjusted as frequently as reasonably possible to ensure accurate WSE. Station discharge is calculated and adjusted based on unit discharge curves and formulas within the accuracy of the unit's control systems.

18. **Target WSE Bandwidth** is a range, 0.5 ft above and 0.5 ft below the Target WSE, available for use during IEO Operation, in order to absorb unanticipated changes in inflow at the dam or slight deviations or imbalances between hourly inflow and hourly discharge due to miscalculation of inflow or unit discharge. See item 21 for elevations associated with the bandwidth. GRH may, at some future date and at its discretion, after gaining more operating experience with the proposed operation, request to meet with relevant resource agencies to discuss the potential for reducing the Target WSE Bandwidth and/or modifying the Flexible Operating Impoundment Range (item 9) by raising both the upper and lower limits of the range, but not increasing the difference between the upper and lower limits (i.e., the maximum fluctuation shown in the table under item 9).

19. **Transition Operation** describes actions required to precede Flexible Operation in some cases and follow Flexible Operation in all cases. There are three elements associated with Transition Operation:

a. **Up-ramping**: A flow increase for the hourly period that would precede most (exceptions specified below) initial Flexible Operation hours at a specified flow depending upon the Project, so that the overall flow difference between the IEO flow and the scheduled Flexible Operation flow is gradual and not instantaneous. Up-ramping rates are specific to each Project and would only apply when Flexible Operation is scheduled in advance (i.e., in the Day-Ahead market) and not when Flexible Operation is initiated in Real-Time or for CCA and RCD audits. Up-ramp rates are specified at each Project as:

Wilder Project: the lesser of 1 of 2 large units (approximately 5000 cfs) or half-way between the IEO flow and the Flexible Operation flow;

Bellows Falls Project: the lesser of 1 cfs/square mile of drainage area (cfsm) (approximately 5,414 cfs) or the flow half-way between current IEO flow and the Flexible Operation flow;

Vernon Project: the lesser of 1 cfsm (approximately 6,266 cfs) or half-way between current IEO flow and the Flexible Operation flow.

b. **Down-ramping**: A flow decrease at a specified rate for the period following Flexible Operation until the flow is equal to inflow at the dam. Decreases will occur on an hourly basis, as a percentage of the previous hourly flow. The first hour after the Flexible Operation hour will be no greater than approximately 70% of the Flexible Operation flow and each successive hour will be approximately 70% of the previous hour.

c. **Refill**: A maximum 48-hour period subsequent to post-Flexible Operation Down-ramping when the impoundment WSE is restored to the stable Target WSE by passing a fraction of the inflow at the dam and retaining the remaining fraction as impounded water above the dam. The hourly flow rate below each Project dam during refill will be the greater of approximately 70% of inflow or the base flow specified in item 16.

The 48-hour maximum refill period begins immediately following Down-ramping after a Flexible Operation event and ends no more than 48 hours later unless the reservoir is within 0.1 foot of the Target WSE (item 21). The 48-hour period includes any temporary interruptions during refill (e.g., purposely pausing refill and passing all inflow, or decisions to implement another Flexible Operation event prior to the impoundment reaching a WSE equal to the Target WSE minus 0.1 feet.) GRH expects to only pause refill for extended periods as needed when participating in the Real-Time Market, as described in 19.a above. Based on analysis of Flexible Operation simulations provided by GRH, it is expected that the number and duration of pauses will be minimal especially during the critical spawning months spanning from April through July 15.

PROJECT OPERATION DESCRIPTIONS

20. All Projects will comply with IEO Operation (item 13), applying Target WSE (item 17) and associated Target WSE Bandwidths (item 18) as described below, unless:

    a. Flexible Operation (item 6) along with Transition Operation (item 19) are applied as specified herein, and implemented;

    b. IEO Operation is suspended due to either High Water Operation (item 11), or Emergency and System Operation, Requirements and Audits (items 4 and 5); or

    c. IEO Operation is suspended due to non-emergency Maintenance Requirements that mandate deviating from IEO Operation, but only after consultation with relevant State and Federal resource agencies prior to initiating a necessary deviation and developing a suitable refill plan and schedule.

21. Target WSEs and Target WSE Bandwidths for each Project are described in the following table (all elevations are mean sea level (msl), NGVD 29):

	Wilder Project	**Bellows Falls Project**	**Vernon Project**
Target WSE	384.5 ft *	291.1 ft *	219.63 ft
Target WSE Bandwidth	Between 385.0 and 384.0 ft, representing 0.5 ft above and below the Target WSE	Between 291.6 and 290.6 ft, representing 0.5 ft above and below the Target WSE	Between 220.13 and 219.13 ft, representing 0.5 ft above and below the Target WSE

*Except during DWM pre-winter habitat protection operation period, triggered and maintained as water temperatures drop from 15° Celsius (° C) to 10° C within identified DWM habitats within the projects (item 3).

22. Rates of change in station discharge to maintain a Target WSE (matching inflow with outflow) will be limited to reasonable changes necessary to continue or adjust the actual WSE to the Target WSE within the Target WSE Bandwidth, largely dependent upon rate of change in inflow, the degree of flow control using MW setpoints on the generator and the monitoring accuracy of WSE at the dam. Changes in station discharge necessary to match inflow should not occur more than once per hour (unless rate of change in inflow is rapidly accelerating or declining) and would not be greater than reasonably necessary to restore a balanced IEO condition at the Target WSE. Specifics regarding how to distinguish between flow adjustments for IEO and Flexible Operation for compliance purposes will be addressed in the operation compliance and monitoring plans (OCMPs) required by the §401 Water Quality Certifications and the FERC Licenses.

23. Flexible Operations are limited, in part, by maximum allowable hours specified below, which are allocated on a monthly basis in order to reflect the seasonal criticality of instream aquatic resources as well as the criticality and fuel security concerns associated with winter peaking loads in New England:

    December, January, February, March: no more than 65 hours in each month

    April, May, June: no more than 10 hours in each month

July: A total of 20 hours with no more than 10 hours from July 1 through July 15. Although a maximum of 10 hours is allowed from July 1 through July 15, in order to further enhance the potential for successful Sea Lamprey spawning, GRH will strive to minimize the hours of Flexible Operation at each Project during this period when conditions allow.

August, September, October: a total of no more than 20 hours in each month.

November: a total of 42 hours with no more than 10 hours from November 1 through 15.

24. Flexible Operations (item 6) will comply with the Flexible Operating Impoundment Range (item 9).

25. The duration (in hours) of each Flexible Operation event will be determined in accordance with item 7.

26. The minimum duration of a Flexible Operation event will be one hour in most cases.

27. Flexible Operation Maximum Discharge will be based upon the calculated inflow at the hour in which the Flexible Operation will occur as follows:

    a. When calculated inflow is approximately 1800 cfs or less, Flexible Operation Maximum Discharge is 4,500 cfs.

    b. When calculated inflow is greater than approximately 1800 cfs, the Flexible Operation Maximum Discharge is limited to 2.5 times the calculated inflow and will not exceed the maximum station generating capacity (item 15).

28. For the purpose of protecting Dwarf Wedgemussels (DWM) from freezing in the winter, the Wilder and Bellows Falls Project impoundments will be temporarily lowered in the Fall of each year as described in item 3.

29. There are no limitations on the number of Flexible Operation events per day or the duration of Flexible Operation events other than those indirect limitations due to inflow and Transition Operation requirements as specified herein.

30. Scheduled Flexible Operation will require one hour of Transition Operation Up-ramping (item 19.a). Unscheduled (in response to Real-Time price signals) Flexible Operation, and Emergency and System Operation, Requirements and Audits (Items 4 and 5) will not require Up-ramping.

31. All Flexible Operation events will require Transition Operation Down-ramping and Refill as specified in item 19.

32. The Transition Operation elements specified in item 19 will be applied at the Projects as follow:

	Up-Ramping	**Down-Ramping**	**Refill**
IEO Operations	Not Applied	Not Applied	Not Applied
Flexible Operations, Scheduled	Applied during the hour prior	Applied as Defined	Applied as Defined
Flexible Operations, Un-Scheduled	Not Applied	Applied as Defined	Applied as Defined

High Water Operations	Not Applied	Not Applied	Not Applied
CCA and RPD Audits	Not Applied	Applied as Defined	Applied as Defined
Emergencies and System Emergencies	Not Applied	Not Applied	Not Applied

33. **Compliance:** Specifics regarding how compliance with this Proposal will be determined and the information that will be provided by GRH for this purpose, will be included in the operation compliance and monitoring plans (OCMPs) required by the §401 Water Quality Certifications and the FERC licenses. Should review of information submitted to the relevant resource agencies pursuant to the OCMPs indicate that operation of any Project is not complying with this Proposal, GRH will consult with the State and Federal resource agencies to discuss their concerns and, if necessary, will identify and implement appropriate corrective actions.

34. **Consultation**: If after evaluating operation data pursuant to Item 33, the relevant resource agencies observe instances where operations do not appear to adequately represent a) the simulations discussed in the last paragraph of the Introduction, b) attain the five bulleted focus areas in the Introduction, or c) attain CTB and DWM management goals (items 1 and 2) at levels suggested by GRH simulations, GRH will, if requested, meet with the agencies to discuss their concerns and possible corrective actions.