Connecticut River Conservancy

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June 13, 2022

Secretary Bethany Card
Executive Office of Energy and Environmental Affairs
100 Cambridge St, Suite 900
Commonwealth of Massachusetts
Boston, MA 02114 **via electronic mail**

Re: Turners Falls Hydroelectric Project (FERC No. 1889) and Northfield Mountain Pumped Storage Project (FERC No. 2485) FERC Relicensing and Massachusetts Clean Water Act § 401 Certification

Dear Secretary Card,

As the settlement process of the Federal Energy Regulatory Commission (FERC) relicensing of Turners Falls Dam and the Northfield Mountain Pumped Storage Project on the Connecticut River moves closer toward completion, Connecticut River Conservancy (CRC) is compelled to raise several concerns that require the Massachusetts Department of Environmental Protection's (DEP) immediate attention. If DEP continues to wait for FirstLight's Clean Water Act (CWA) § 401 water quality certification application to fully engage in the FERC settlement process, it risks, among other things: (1) that FERC already will be presented with a settlement involving minimum flows below Turners Falls Dam that will not protect and restore designated uses for that river segment, and thus will not comply with Massachusetts surface water quality standards; (2) that the time and effort put in by the parties to reach a flawed settlement will be such that their positions will have solidified, making it more difficult to reach consensus during the CWA § 401 certification process; and (3) that the result of DEP's non-engagement earlier in the process will be protracted litigation over the § 401 certification. CRC would prefer to avoid the latter scenario because of the time and cost involved for everyone, which also delays implementation of those new license conditions that will result in improvements for the Connecticut River.

These are real and foreseeable risks. But they are not inevitable outcomes. CRC believes that if DEP fully engages in the process now, it can avoid or mitigate these risks. But time is of the essence.

Below we outline the four primary deficiencies in how the FERC process is unfolding as it relates to compliance with state surface water quality standards. This is by no means an exhaustive list—for example, it does not include significant concerns CRC has about erosion in the Turners Falls impoundment or the timing of fish passage installation at the dam. But the issues below are fundamental and must be addressed if DEP plans to issue a CWA § 401 certification for Turners Falls Dam and the Northfield Mountain Pumped Storage Project.

The starting point for DEP's § 401 certification analysis is the Clean Water Act. The objective of the CWA is "to *restore* and maintain the chemical, physical, and biological integrity of the Nation's waters."[1] Turners Falls Dam and the Northfield Mountain Pumped Storage Project cause, and without significant operational changes (that are currently not being contemplated), will continue to cause impairments to

[1] 33 U.S.C. § 1251(a) (emphasis added); *see also* 314 CMR § 4.01(3).

the Connecticut River that prevent the affected and legally impaired river segments from attaining and protecting existing and designated uses.

I. The Proposed Minimum Flows Below Turners Falls Dam Are Insufficient to Meet Water Quality Standards

On March 17, 2022, FirstLight submitted the Flows and Fish Passage Agreement in Principle ("AIP") to FERC.[2] The AIP set forth the proposed minimum flow schedule for releases at Turners Falls Dam. The months of concern for CRC are July through March, which prescribed proposed minimum flows as follows:

- July 1–November 15: 250 cfs, with a chance of increased minimum flows up to 400 cfs pending further analysis on state-listed plant species
- November 16–March 31: as close to 400 cfs as possible.

Under the Massachusetts Surface Water Quality Standards, 314 CMR 4.06, the Connecticut River from Turners Falls Dam to the Holyoke Dam is designated as Class B waters. 314 CMR 4.05 (b) states that Class B "waters are designated as a habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation. . . . These waters shall have consistently good aesthetic value." The existing and designated uses that must be legally protected are aquatic life use (ALU), boating, and fishing.

In the Massachusetts Year 2018-2020 Integrated List of Waters (finalized in February 2022), Segment 34-03 is the 3.7-mile segment between the Turners Falls Dam and the confluence with the Deerfield River. This segment is listed as impaired for *dewatering, flow regime modification*, E. coli bacteria, PCBs in fish tissue, and total suspended solids. Thus, the existing and designated uses in the river segment below the Turners Falls Dam described above are considered impaired under the current license conditions.

314 CMR 4.03(3)(b) states, "In waters where flows are regulated by dams or similar structures, the lowest flow condition at which aquatic life criteria must be applied is the flow equaled or exceeded 99% of the time on a yearly basis, or another equivalent flow agreed upon by the Department and the federal, state, or private entity controlling the flow…. When the Department issues a 401 Water Quality Certification of an activity subject to licensing by the Federal Energy Regulatory Commission, *flows shall be maintained or restored to protect existing and designated uses*." (emphasis added).

Evidence currently available to DEP indicates that the flows proposed in the AIP for July through March will neither maintain nor restore existing and designated uses, specifically the ALUs and boating. A particularly startling implication is that proposed summertime flows will protect less than 6% of the wetted usable area for benthic macroinvertebrates in the area below the Turners Falls dam. CRC details that evidence in the attached Technical Memorandum for both ALUs and boating uses. *See* **Exhibit 2**. Based on that evidence, CRC recommends the following flow levels:

- <u>July 1 to November 15</u>: 1,000 cfs to provide habitat for fallfish, longnose dace, tessellated darter, and macroinvertebrates. This flow also will be a navigable flow for recreation.
- <u>November 16-March 31</u>: At least 500 cfs to maintain some of the wetted usable area for ALUs.

[2] *See* Docket No. P-2485, Accession No. 20220318-5004 (March 18, 2022), attached as **Exhibit 1**.

Any § 401 certification that includes minimum flows currently proposed in the AIP will be vulnerable to legal challenge. Thus, it is in DEP's interest, in order to have the best chance at avoiding protracted litigation, to conduct and provide its analysis of the proposed flow regime below Turners Falls Dam as soon as possible. CRC is confident that any such use attainability analysis will conclude that the flows proposed in the AIP are not sufficient to protect and restore existing and designated uses in the bypass reach below Turners Falls Dam, but that protection and restoration of ALUs and boating uses *are attainable* with the higher flow levels recommended by CRC.[3]

II. The Purported Protection of Two Plant Species Does Not Justify Low Flows That Do Not Protect Aquatic Life Uses

The current proposed minimum flows below Turners Falls Dam during the summer, fall, and winter are based primarily on a single biological factor—the presence of two rare plant species in the river segment below the dam[4]—and at the expense of impaired aquatic habitat protected by the CWA. When considered in light of the suite of designated ALUs and recreation uses that the proposed minimum flows will *not* protect or restore, the establishment of minimum flows based on two plants species is arbitrary and wilts under legal scrutiny for several reasons.[5]

First, the plants would not even be growing in their present locations in the bypass reach but for the artificial dewatering caused by the hydropower facilities. In other words, these plants only exist as a result of the ongoing impairment to the river. Using the plants to justify low flows so the plants are not harmed creates a logical fallacy: the listed impairment for that river segment (dewatering) created the condition that allowed the plants to establish there, which in turn prevents the impairment from being addressed. This factor weighs heavily against elevating protection of the plant species above all other ALUs in setting minimum flows below the dam.

Second, it is not clear that the plants at issue are even an ALU. Both species are listed in the U.S. Army Corps of Engineers National Plant List as facultative wetland species, meaning that they usually occur in wetlands. They are, however, occasionally found in nonwetlands and are thus not riverine species.[6] If they are not an ALU, then they are not a designated use protected under the CWA, and the protection of actual ALUs would definitively trump the protection of these plants. Moreover, CRC has asked for—but has not yet received—the most up-to-date data and analysis regarding the locations and elevations of the plant communities in the bypass reach. While CRC understands and respects the need to keep locational information confidential, that information is being used to justify flows in the Connecticut River below Turners Falls Dam for the next 40–50 years, to the detriment of other aquatic life. Given the long-term ramifications of the FERC relicensings, the most current plant data and analysis must be

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[3] *See* 314 CMR § 4.03(4)(a)(4) (only allowing a removal of a use if there is a determination that it is not feasible to operate the dam "in a way that would result in the attainment of the use").

[4] The two species, Tussock Hairgrass (TH) (*Deschampsia caespitosa ssp. glauca*) and Tradescant's Aster (TA) (*Symphotrichum tradescanii*), have established themselves along portions of the bypass reach that were historically underwater.

[5] To be clear, CRC is not advocating against protecting rare plants generally, but context matters. Here, if the rare plants *and* the ALUs cannot both be protected—a premise for which the data, evidence, and analysis are currently lacking—the plants must give way to the more sensitive use that requires more water, not less.

[6] The fact that the plants are known to exist in nonwetlands suggests that there is a possibility of relocating them to an area that would not be impacted by the higher flows necessary to protect ALUs in that stretch of the river. Until an examination of this possibility is fully exhausted, the plants should not be part of any balancing analysis, even assuming they are aquatic fauna.

available for public scrutiny.[7]

Third, assuming for argument's sake that the plants are aquatic fauna and therefore a designated use under Massachusetts surface water quality standards, DEP's obligation when certifying a project as complying with state water quality standards is to identify the most sensitive existing or designated use and to ensure that use is enhanced, maintained, and protected. That obligation is different than the mission of the Massachusetts Division of Fish and Wildlife's Natural Heritage and Endangered Species Program (NHESP), which is to protect species listed as endangered or threatened under the Massachusetts Endangered Species list, irrespective of whether those species comprise designated uses under state water quality standards. Thus, DEP must undertake its own independent analysis to determine the most sensitive ALUs needing protection in the bypass reach below the dam.

Fourth, even if the plants are an ALU, the plain language of the CWA evinces a preference for "fish, shellfish, and wildlife," versus plants. *See* 33 U.S.C. § 1251(a)(2) ("[I]t is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983."). Thus, if there are competing ALUs, the CWA's explicit hierarchy weighs against favoring aquatic flora over "fish, shellfish, and wildlife."[8]

Fifth, the use of the plants to set flow levels ignores the needs of other Massachusetts fish species of special concern known to exist in the area below the dam. CRC expects that flows sufficient to support ALUs also would provide additional habitat to support two fish species that NHESP has listed as species of special concern, the burbot (*Lota lota*) and longnose sucker (*Catostomas catostomas*). Hartel et al. (2002) describes a 12-inch burbot caught in a pool below the Turners Falls dam in December 2000 by an angler who had noted that other specimens have also been caught there (see page 191). Young burbot feed on aquatic insects and crustaceans, while large adults feed on fish. Hartel et al. (2002) states that records from 1940–60 show that longnose sucker historically occurred in the Connecticut River and Westfield Rivers and at the mouth of the Chicopee River. Pollution and habitat alteration along the mainstems have limited surviving populations. The water quality in the Connecticut River has improved greatly in recent decades, and the relicensings provide a once-in-a-generation opportunity to reduce the negative effects of habitat alteration. Hartel et al. (2002) states that longnose suckers vacuum a wide variety of aquatic invertebrates and algae off the bottom of rivers, highlighting the need to protect flows suitable for benthic macroinvertebrates.

The available scientific evidence demonstrates that accommodating the minimum flows purportedly required for the plants will continue the degradation of water quality necessary to maintain and restore other ALUs and prevent the attainment of the boating recreation use. The applicable law does not permit this outcome. Further, to CRC's knowledge, there has been no demonstration that any anticipated harm to the rare plants due to higher flows cannot be mitigated by relocation of those plant communities. For all of these reasons, the protection of the state-listed plants found in the stretch of river below Turners Falls Dam due to the ongoing impairments to the river should not and cannot be

[7] CRC believes this data and analysis should be available to the public, but at a minimum, CRC requests all available documents from state agencies related to the data and analysis of the locations of the rare plants in the bypass reach so it can conduct its own analysis of the threat to those species, if any, posed by higher flows. CRC would be willing to consider a protective order covering the information provided.

[8] The CWA also explicitly mentions providing for recreation in and on the water as a national goal. 33 U.S.C. § 1251(a)(2).

used as justification to set future flow levels. We attach as **Exhibit 2** a memorandum recommending flows that will meet water quality standards.

III. Increases in storage capacity at Northfield Mountain Will Exacerbate Existing CWA Impairments and Impact Recreation

Massachusetts lists all three sections of the Connecticut River that make up the Turners Falls Impoundment (TFI) above Turners Falls Dam as "impaired" Class B waters under CWA § 303(d), in part due to flow regime modification.[9] As is the case for the river sections below the dam, the existing and designated uses that must be legally protected are ALUs, boating, and fishing. Appendix 15 to the 2018–20 Massachusetts Integrated List states that these segments are "not supporting" the Fish, other Aquatic Life and Wildlife Use because of the ongoing impairments of flow modification and streambank alteration and, in the case of Barton Cove, several species of non-native invasive aquatic plants. To legally issue a CWA § 401 certification for the FERC relicensings of Turners Falls Dam and the Northfield Mountain Pumped Storage Project, DEP must ensure the protection and restoration of the designated uses the river segments are currently "not supporting."

FirstLight is seeking to expand the elevation ranges (and therefore the amount of water it uses) from the upper reservoir.[10] Full and unrestricted use of the extra volume in the upper reservoir will make impairments worse, rather than bring the TFI into attainment of designated uses. FirstLight's Amended Final License Application (AFLA) proposes significant operational changes, including expansion of the upper reservoir, will continue to accelerate erosion and impact the legally protected recreation use. This has been amply demonstrated by the conditions created on June 12–13, 2021, when FirstLight operations brought the impoundment down to a water level of 177.5 msl, which was within the current and proposed allowed minimum elevation of 176 msl, as measured at the dam. This event stranded boats, exposed aquatic habitat, and was in response to the increasingly likely instances of low or negative cost energy prices created during times of high solar energy generation. Because there is little to no attention being given to addressing these issues, DEP will need to conduct a Use Attainability Analysis, which then must be approved by EPA, to determine if it is feasible to operate the facilities "in a way that would result in the attainment of the use." 314 CMR 4.03(4)(a)(4). Such analysis requires FirstLight to submit to DEP the information necessary for its completion, and DEP must provide public notice and opportunity for a public hearing "prior to removal of a use or the designation of a partial." *Id*. at 4.03(4)(b). There may be operational changes FirstLight can make to operate the facilities so as to attain the designated uses of the TFI, but those are not currently being contemplated in FirstLight's AFLA.

IV. Requiring a Decommissioning Plan and Sufficient Funding Is Necessary to Avoid Future Water Quality Standard Violations When the Facilities Are Shuttered

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[9] MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION, FINAL MASSACHUSETTS INTEGRATED LIST OF WATERS FOR THE CLEAN WATER ACT 2018/2020 REPORTING CYCLE (Nov. 2021) at 168. Segment 34-01 is the 3.5-mile segment between the Vermont/New Hampshire/Massachusetts state line and the Route 10 bridge and is listed as impaired for alteration in stream-side or littoral vegetative covers, *flow regime modification*, and PCBs in fish tissue. Segment 34-02 is the 11.4-mile segment between the Route 10 bridge and the Turners Falls Dam, excluding Barton Cove and is listed as impaired for alteration in stream-side or littoral vegetative covers, *flow regime modification*, water chestnut, and PCBs in fish tissue. Barton Cove is MA34122 and is listed as impaired for curly-leaf pondweed, Eurasian water milfoil (*Myriophyllum spicatum*), fanwort, water chestnut, E. coli, and PCBs in fish tissue. *Id*.; 33 U.S.C. § 1313(d).

[10] *See* TFI Technical Memorandum, attached as **Exhibit 3**, at 2–3.

At some point in the future—potentially before the end of the next license terms—either Turners Falls Dam, the Northfield Mountain Pumped Storage Project, or both will reach the end of their useful lives, as is happening to many other hydropower facilities around the country. On January, 11, 2022, CRC provided a memorandum to the Massachusetts Executive Office of Environmental Affairs (EEA) outlining the legal authority for DEP to require financial assurances from FirstLight as conditions of a CWA § 401 certification issued for these facilities ("Financial Assurances Memo"). The Financial Assurances Memo is attached here as **Exhibit 4**.

In that January 11th transmission and in follow-up, CRC requested a meeting to discuss the decommissioning funding issue but such a meeting has not yet been scheduled. As we stated in our Financial Assurances Memo:

> Conditioning CWA § 401 certifications on such financial assurances will ensure that federal and state requirements are met and that the physical, chemical, and biological integrity of rivers, including unobstructed flows, are *restored* to protect existing and designated uses. Requiring such financial assurances also will ensure that the Massachusetts tax and ratepayers and host communities are not burdened with the bill for such restoration, which is good public policy already being practiced in the context of many other energy generating contexts throughout the state.

Through this letter, CRC again requests a meeting on the requirement for decommissioning and removal financial assurances and urges EEA and DEP to speed up the process of internally investigating that issue. Although we are completely confident in DEP's authority to include financial assurances as a condition of its § 401 certification, such a condition may represent an issue of first impression for hydropower facilities in Massachusetts. As such, it will require appropriate vetting by state agencies, which will inevitably take time. Moreover, it may be necessary to develop a decommissioning plan in order to properly assess the amount of financial assurances necessary. This is yet one more reason for DEP to fully engage in this process *well in advance of* receiving FirstLight's CWA § 401 certification application.

CONCLUSION

The stretches of the Connecticut River both downstream and upstream of the Turners Falls Dam have suffered impairments for decades caused by the operations of the dam and the Northfield Mountain Pumped Storage Project that have impeded restoration of those river stretches and prevented them from attaining state surface water quality standards. As one of the parties requesting a delay in the issuance of FERC's ready for environmental analysis and the re-starting of long-stalled settlement discussions, CRC recognizes that there has been significant and positive progress in those talks. However, for the reasons outlined above, continued settlement talks without the engagement of DEP are creating more harm than good.

CRC requests DEP engage FERC and request issuance of the ready for environmental analysis and so begin the state § 401 water quality certification process. In the meantime, we request a meeting to review the issues outlined above and to discuss the public process supporting the formal § 401 water quality certificate.

CRC appreciates DEP's consideration of these issues and the significant attention all of the state

agencies have been giving this complex and long-running licensing process.

Sincerely,

Andrew Fisk, Ph.D.
Executive Director

EXHIBIT 1: Fish and Flow Agreement in Principle (AIP) filed with FERC
EXHIBIT 2: Technical memo on flows below the Turners Falls Dam
EXHIBIT 3: Technical memo on TFI impairments and recommendations
EXHIBIT 4: Decommissioning memo

cc: Settlement service list; MassDEP Commissioner; EPA Region 1; FERC; FirstLight Power; MA legislative delegation; Kevin Cassidy; Ron Shems

Document Accession #: 20220318-5004 Filed Date: 03/18/2022 Exhibit 1

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Alan Douglass
Regulatory Compliance Manager

March 17, 2022

Via Electronic Filing

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

Re: Turners Falls Hydroelectric Project (FERC No. 1889), FirstLight MA Hydro LLC, Northfield Mountain Pumped Storage Project (FERC No. 2485), Northfield Mountain LLC, Status Update

Dear Secretary Bose:

As the Federal Energy Regulatory Commission (FERC) is aware from recent filings, over the course of the past several months, the licensees for the above-referenced projects (collectively, FirstLight) have been engaged with federal and state resource agencies, local communities, environmental organizations, Native American tribes, and other stakeholders in renewed discussions on a broad range of issues pertaining to fish passage, stream flows, recreation, and cultural resources related to relicensing of the projects.

On February 28, 2022, FirstLight filed with FERC Agreements-in-Principle (AIP) on Whitewater Boating Releases and Recreation Improvements. In that same letter, FirstLight indicated it had reached conceptual agreement on a Flows[1] and Fish Passage AIP. Please find attached the AIP for Flows and Fish Passage, including the signature pages.

FirstLight and the stakeholders are now negotiating a comprehensive, binding Settlement Agreement that aims to fully resolve all relicensing issues. FirstLight is targeting the summer 2022, for filing the Settlement Agreement and again requests FERC to reserve issuing its Ready for Environmental Analysis Notice until after the Settlement Agreement is filed. FirstLight and the stakeholders needed to adjust the previous Settlement Agreement schedule due to the delay in finalizing the Flows and Fish Passage AIP.

Thank you for your consideration.

Respectfully,

Alan J. Douglass

Alan Douglass
Regulatory Compliance Manager

Attachments: AIP for Flows and Fish Passage

[1] Flows refers to Project operations including bypass flows, base flows, ramping, and water level management.

TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485

AGREEMENT IN PRINCIPLE TO DEVELOP A RELICENSING SETTLEMENT AGREEMENT

March 17, 2022

WHEREAS, FirstLight MA Hydro LLC and Northfield Mountain LLC (collectively, FirstLight) are the Federal Energy Regulatory Commission (FERC) licensees for the Turners Falls Hydroelectric Project, FERC Project No. 1889 (Turners Falls Project) and Northfield Mountain Pumped Storage Project, FERC Project No. 2485 (Northfield Mountain Project), respectively. Both the license for the Turners Falls Project and the license for the Northfield Mountain Project expired April 30, 2018. The Projects have been operating on annual licenses pursuant to Section 15 of the Federal Power Act (FPA) since that time.

WHEREAS, in accordance with the requirements of the FPA and FERC's regulations, FirstLight filed a Final Application for New License (FLA) for the Turners Falls and Northfield Mountain Projects with FERC on April 29, 2016. Because certain environmental studies had not yet been completed as of the statutory deadline for filing of the FLA, FirstLight filed a separate Amended Final License Application for each Project on December 4, 2020 (AFLA), including FirstLight's proposed protection, mitigation and enhancement (PM&E) measures to be included in the new licenses and the scientific and evidentiary basis for those measures.

WHEREAS, since filing of the AFLAs, FirstLight has been engaged with federal and state resource agencies, local communities, environmental organizations, Native American Tribes, and other stakeholders to consider agency and stakeholder proposals for additional PM&E measures on a broad range of issues pertaining to fish passage, streamflows, recreation, and cultural resources, with the goal of developing a comprehensive settlement agreement.

WHEREAS, FirstLight has been engaged specifically with the Parties to this Agreement in Principle (AIP), including the Massachusetts Division of Fisheries and Wildlife (MDFW), Massachusetts Natural Heritage and Endangered Species Program (NHESP), National Marine Fisheries Service (NMFS), The Nature Conservancy (TNC), and the United States Fish and Wildlife Service (USFWS). The Parties have now achieved conceptual agreement on minimum bypass flows to benefit fisheries resources and their habitats, operational restrictions to benefit downstream fish and wildlife habitat, and project modifications to improve upstream and downstream fish passage, designed to function as part of a framework for FERC's proposed action to be analyzed in the ESA section 7 context, Federal Power Act Section 18 prescriptions and for development of a Final Settlement Agreement facilitating the resolution of all issues relating to the relicensing of the Projects. The Parties are still negotiating certain critical elements such as a protocol for dampening Great River Hydro (GRH) peaking flows, the Cobblestone tiger beetle mitigation plan, and fish passage performance metrics and adaptive management provisions.

NOW, THEREFORE, the Parties agree in principle as follows:

PART I: OVERVIEW AND INTENT

A. The Parties agree to negotiate toward a Final Settlement Agreement based on the terms of this AIP, with the intention reaching a Final Settlement Agreement, if one can be reached, no later than June 30, 2022.

B. All Parties enter into this AIP without any admission of law or fact. The Parties acknowledge that the Final Settlement Agreement must include other material terms that have not yet been agreed upon (for example impoundment bank erosion) and is subject to agreement on language embracing all of the terms agreed to in principle as set forth in Part II herein.

C. The Parties recognize that the Final Settlement Agreement and any other related agreements negotiated pursuant to this AIP are subject to formal and final review and approval of the Parties' management, executives, boards of directors, and other leadership, as necessary and appropriate to comply with corporate, municipal and agency requirements. The signatories to this AIP are the principal negotiators for each Party, who represent by their signatures only that:

- They have informed their respective management or leadership of the terms of this AIP.
- They have been authorized to negotiate toward a Final Settlement Agreement based in substance on the terms of this AIP.

D. All Parties recognize and acknowledge that this AIP is not legally binding and does not give rise to any enforceable rights in contract.

E. Unless and until a Final Settlement Agreement is executed by the Parties, any Party may take any action before FERC or any other agency as that Party unilaterally determines necessary to protect its interests.

F. In the event that this AIP does not culminate in a Final Settlement Agreement, it shall be null and void. No Party shall use this AIP as evidence of any other Party's position on any issue addressed in this AIP or as evidence that any term should or should not be incorporated into the New Licenses for the Turners Falls and Northfield Mountain Projects.

G. Nothing in this Agreement shall be construed as a waiver of any state or federal agency authority to carry out its statutory and regulatory mandates, including the requirement for FERC to engage in consultation under Section 7 of the Endangered Species Act. All parties understand that the terms conceptually agreed upon in this document do not circumscribe the authority of the agencies or their analyses under Section 7 of the Endangered Species Act.

PART II: PROTECTION, MITIGATION AND ENHANCEMENT MEASURES- OPERATIONS

1 OPERATIONS

1.1 Project Operations

1.1.1 Turners Falls Project Operations

(a) FirstLight shall operate the Turners Falls Hydroelectric Project in accordance with the following operational flow regime until the third (3rd) anniversary of the date of license issuance.

FirstLight has included two timing elements to address the new operational paradigm. From license issuance until the third (3rd) anniversary of the date of license issuance, FirstLight shall institute the minimum flows in the bypass and below Cabot Station and Cabot Station up/down ramping in paragraph (a) and (b), as a license condition, and also put processes in place with GRH and ISO-NE to assure success in meeting its obligations for Flow Stabilization restrictions described in paragraph (c). In addition, Station No. 1 upgrades (described later) will be completed during this period. FirstLight also will submit to FERC for approval no later than 1 year after license issuance a project operation, monitoring and reporting plan after consultation with the agencies. On the third (3rd) anniversary of the date of license issuance and upon FERC's approval of the project operation, monitoring and reporting plan, FirstLight shall institute the full suite of flow enhancements shown in paragraphs (a), (b) and (c) (i.e., minimum flows in bypass and below Cabot Station, Cabot Station up/down ramping and flow stabilization restrictions). Table 1.1.1-1 summarizes the operations from license issuance through the third (3rd) anniversary of the date of license issuance.

Table 1.1.1-1: Operating Conditions from License Issuance through the third (3rd) anniversary of the date of license issuance: Turners Falls Dam Minimum Flow, Station No. 1 Minimum Flow, below Cabot Station Minimum Flows, Cabot Station Ramping, and Flexible Operations

1. Date	2. Total Bypass Flow[2]	3. Turners Falls Dam	4. Station No. 1[4,5]	5. Below Cabot Station Minimum Flow	6. Cabot Station Ramping to Protect Shortnose Sturgeon and Odonates	7. Allowable Deviations from Ramping
01/01-03/31	1,500 cfs or the Naturally Routed Flow (NRF), whichever is less	400 cfs[3]	1,100 cfs	3,800 cfs or NRF, whichever is less (1,500 cfs + 2,300 cfs)	N/A	0 hours of Flexible Operations
04/01-05/15	6,500 cfs or the NRF, whichever is less	4,290 cfs	2,210 cfs	8,800 cfs between midnight and 7 pm or NRF, whichever is less (6,500 cfs + 2,300 cfs)	Up/Down to 2,300 cfs/hour	0 hours of Flexible Operations
05/16-05/31	6,500 cfs or the NRF, whichever is less	4,290 cfs	2,210 cfs	8,800 cfs between midnight and 7 pm or NRF, whichever is less (6,500 cfs + 2,300 cfs)	Up/Down to 2,300 cfs/hour	0 hours of Flexible Operations
06/01-06/15[1]	4,500 cfs or the NRF, whichever is less	2,990 cfs	1,510 cfs	6,800 cfs or NRF, whichever is less (4,500 cfs + 2,300 cfs)	Up/Down to 2,300 cfs/hour	0 hours of Flexible Operations
06/16-06/30[1]	3,500 cfs of the NRF, whichever is less	2,280 cfs	1,220 cfs	5,800 cfs or NRF, whichever is less (3,500 cfs + 2,300 cfs)	Up/Down to 2,300 cfs/hour	0 hours of Flexible Operations
07/01-07/15	1,800 cfs or 90 % of the NRF, whichever is less	250 cfs[6]	1,550 cfs	1,800 cfs or 90 % of the NRF, whichever is less	Up to 2,300 cfs/hour (8 am to 2 pm)	N/A
07/16-07/31	1,800 cfs or 90 % of the NRF, whichever is less	250 cfs[6]	1,550 cfs	1,800 cfs or 90 % of the NRF, whichever is less	Up to 2,300 cfs/hour (8 am to 2 pm)	
08/01-08/15	1,800 cfs or 90 % of the NRF, whichever is less	250 cfs[6]	1,550 cfs	1,800 cfs or 90 % of the NRF, whichever is less	Up to 2,300 cfs/hour (8 am to 2 pm)	N/A
08/16-08/31	1,800 cfs or 90 % of the NRF, whichever is less	250 cfs[6]	1,550 cfs	1,800 cfs or 90 % of the NRF, whichever is less	N/A	
09/01-09/15	1,500 cfs or 90 % of the NRF, whichever is less	250 cfs[6]	1,250 cfs	1,500 cfs or 90 % of the NRF, whichever is less	N/A	N/A
09/16-09/30	1,500 cfs or 90 % of the NRF, whichever is less	250 cfs[6]	1,250 cfs	1,500 cfs or 90 % of the NRF, whichever is less	N/A	
10/01-10/15	1,500 cfs or 90 % of the NRF, whichever is less	250 cfs[6]	1,250 cfs	1,500 cfs or 90 % of the NRF, whichever is less	N/A	N/A
10/16-10/31	1,500 cfs or 90 % of the NRF, whichever is less	250 cfs[6]	1,250 cfs	1,500 cfs or 90 % of the NRF, whichever is less	N/A	
11/01-11/15	1,500 cfs or 90 % of the NRF, whichever is less	250 cfs[6]	1,250 cfs	1,500 cfs or 90 % of the NRF, whichever is less	N/A	N/A
11/16-11/30	1,500 cfs or 90% of the NRF, whichever is less	400 cfs[3]	1,100 cfs	1,500 cfs or 90 % of the NRF, whichever is less	N/A	
12/01-12/31	1,500 cfs or the NRF, whichever is less	400 cfs[3]	1,100 cfs	3,800 cfs or NRF, whichever is less (1,500 cfs + 2,300 cfs)	N/A	N/A

[1]The flow split during these periods is approximately 67% from the Turners Falls Dam and 33% from Station No. 1. If FirstLight conducts further testing, in consultation with the National Marine Fisheries Service (NMFS), United States Fish and Wildlife Service (USFWS) and Massachusetts Division of Fish and Wildlife (MDFW) and determines that migratory fish are not delayed by passing a greater percentage of the bypass flow via Station No. 1, it may increase the percentage through Station No. 1 upon written concurrence of those agencies. If further testing shows that the flow split could potentially be modified, FirstLight shall consult with American Whitewater (AW), Appalachian Mountain Club (AMC), Zoar Outdoors, Crab Apple Whitewater, Inc and New England FLOW relative to any changes in the flow split and address those entities comments in any filing before FERC or the Massachusetts Department of Environmental Protection (MDEP).

[2]If the NRF is less than 6,500 cfs (04/01-05/31), 4,500 cfs (06/01-06/15) or 3,500 cfs (06/16-06/30) the flow split will still be set at approximately 67% of the NRF from the Turners Falls Dam and 33% of the NRF from Station No. 1 subject to footnote 1. If 90% of the NRF is less than 1,800 cfs (7/1-8/31) or 1,500 cfs (9/1-11/15), FirstLight shall maintain the Turners Falls Dam discharge at 250 cfs or a maximum of 400 cfs, subject to footnote 6. If the NRF is less than 1,500 cfs (11/16-3/31), FirstLight shall maintain the Turners Falls Discharge at 400 cfs subject to footnote 3.

[3]The design maximum capacity of the canal gate is 400 cfs. FirstLight commits to opening the attraction flow gate to its maximum opening and will implement ice mitigation measures to maintain the maximum opening, if necessary, and monitor gate operations to determine if supplemental measures, such as cable heating the gate, are needed to maintain flows at or as close to 400 cfs as possible.

[4]To maintain the flow split, Station No. 1 must be automated, which will not occur until Year 3 of the license. FirstLight proposes to maintain the flow split such that the Turners Falls Dam discharge will be as shown above, or higher flows will be spilled, in cases where the additional flow cannot be passed through Station No. 1.

[5]The Turners Falls Hydro (TFH) project (FERC No. 2622) and Milton Hilton, LLC project (unlicensed) are located on the power canal and discharge into the bypass reach upstream of Station No. 1. The hydraulic capacities of the TFH project and Milton Hilton, LLC project are 289 and 113 cfs, respectively. If the TFH project is operating, FirstLight may reduce its Station No. 1 discharge by 289 cfs. If the Milton Hilton, LLC project is operating, FirstLight may reduce its Station No. 1 discharge by 113 cfs.

[6] The 250 cfs is subject to an inspection of rare plant species in the bypass under Turners Falls Dam spillage flows ranging from 250-400 cfs in the first 4 years after license issuance. The entity conducting the inspection of rare plants will be resolved by the Parties as part of the Comprehensive Settlement Agreement. Pending the results of the study, NHESP may authorize that the Turners Falls Dam discharge be increased up to a maximum of 400 cfs with the portion of the bypass flow coming from Station No. 1 reduced by the corresponding amount. The Parties agree to discuss this issue further as part of Comprehensive Settlement discussions due to competing interests from multi-day through paddlers and flatwater paddlers.

The bypass flows and minimum flow below Cabot Station may be modified temporarily: (1) during and to the extent required by operating emergencies beyond the control of FirstLight; and (2) upon mutual agreement among FirstLight for Projects Nos. 1889 and 2485 and the USFWS, NMFS, MDEP, and MDFW.

(b) The NRF represents the inflow to the Turners Falls Dam. The NRF is defined as the sum of the Vernon Hydroelectric Project total discharge from 12 hours previous, Ashuelot River United States Geological Survey (USGS) gage flow from 12 hours previous, and Millers River USGS gage flow from 12 hours previous.

(c) FirstLight shall operate the Turners Falls Project in accordance with the conditions in paragraph (a) and the following operational flow regime beginning on the third (3rd) anniversary of the date of license issuance (see Table 1.1.1-2).

Table 1.1.1-2: Operating Conditions starting on the third (3rd) anniversary of the date of license issuance: Turners Falls Dam Minimum Flow, Station No. 1 Minimum Flow, below Cabot Station Minimum Flows, Flow Stabilization, Cabot Station Ramping and Flexible Operations

1. Date	2. Total Bypass Flow[2]	3. Turners Falls Dam	4. Station No. 1[4,5]	5. Below Cabot Station Minimum Flow	6. Flow Stabilization to Protect Shad Spawning (4/1-5/15),Puritan and Cobblestone Tiger Beetles, and state listed mussel and plant species (5/16-11/30)	7. Cabot Station Ramping to Protect Shortnose Sturgeon and Odonates	8. Allowable Deviations from Flow Stabilization
01/01-03/31	1,500 cfs or the Naturally Routed Flow (NRF), whichever is less	400 cfs[3]	1,100 cfs	3,800 cfs or NRF, whichever is less (1,500 cfs + 2,300 cfs)	N/A	N/A	0 hours of Flexible Operations
04/01-05/15	6,500 cfs or the NRF, whichever is less	4,290 cfs	2,210 cfs	8,800 cfs between midnight and 7 pm or NRF, whichever is less (6,500 cfs + 2,300 cfs)	Provide NRF ±10% below Cabot Station from 7 PM to Midnight, with deviations up to +/-20% allowed for up to 22 hours.	Up/Down to 2,300 cfs/hour (ramping will take precedence over flow stabilization)	0 hours of Flexible Operations
05/16-05/31	6,500 cfs or the NRF, whichever is less	4,290 cfs	2,210 cfs	8,800 cfs between midnight and 7 pm or NRF, whichever is less (6,500 cfs + 2,300 cfs)	Provide NRF ±10% below Cabot Station from 7 pm to Midnight, with deviations up to +/-20% for up to 18 hours.	Up/Down to 2,300 cfs/hour (ramping will take precedence over flow stabilization)	0 hours of Flexible Operations
06/01-06/15[1]	4,500 cfs or the NRF, whichever is less	2,990 cfs	1,510 cfs	6,800 cfs or NRF, whichever is less (4,500 cfs + 2,300 cfs)	Provide NRF ±10% below Cabot Station, with deviations up to +/-20% for up to 7 hours	Up/Down to 2,300 cfs/hour (ramping will take precedence over flow stabilization)	0 hours of Flexible Operations
06/16-06/30[1]	3,500 cfs of the NRF, whichever is less	2,280 cfs	1,220 cfs	5,800 cfs or NRF, whichever is less (3,500 cfs + 2,300 cfs)	Provide NRF ±10% below Cabot Station, with deviations up to +/-20% for up to 7 hours	Up/Down to 2,300 cfs/hour (ramping will take precedence over flow stabilization)	0 hours of Flexible Operations
07/01-07/15	1,800 cfs or 90 % of the NRF, whichever is less	250 cfs[6]	1,550 cfs	1,800 cfs or 90 % of the NRF, whichever is less	Provide NRF ±10% below Cabot Station, with deviations up to +/-20% for up to 55 hours	N/A	20 hours of Flexible Operations with no more than 7 flex events per month (Jul).
07/16-07/31	1,800 cfs or 90 % of the NRF, whichever is less	250 cfs[6]	1,550 cfs	1,800 cfs or 90 % of the NRF, whichever is less			
08/01-08/15	1,800 cfs or 90 % of the NRF, whichever is less	250 cfs[6]	1,550 cfs	1,800 cfs or 90 % of the NRF, whichever is less			26 hours of Flexible Operations with no more than 7 flex events per month (Aug).
08/16-08/31	1,800 cfs or 90 % of the NRF, whichever is less	250 cfs[6]	1,550 cfs	1,800 cfs or 90 % of the NRF, whichever is less	Provide NRF ±10% below Cabot Station, with deviations up to +/-20% for up to 27 hours	N/A	
09/01-09/15	1,500 cfs or 90 % of the NRF, whichever is less	250 cfs[6]	1,250 cfs	1,500 cfs or 90 % of the NRF, whichever is less	Provide NRF ±10% below Cabot Station, with deviations up to +/-20% for up to 44 hours	N/A	23 hours of Flexible Operations with no more than 7 flex events per month (Sep).
09/16-09/30	1,500 cfs or 90 % of the NRF, whichever is less	250 cfs[6]	1,250 cfs	1,500 cfs or 90 % of the NRF, whichever is less		N/A	
10/01-10/15	1,500 cfs or 90 % of the NRF, whichever is less	250 cfs[6]	1,250 cfs	1,500 cfs or 90 % of the NRF, whichever is less		N/A	20 hours of Flexible Operations with no more than 7 flex events per month (Oct).
10/16-10/31	1,500 cfs or 90 % of the NRF, whichever is less	250 cfs[6]	1,250 cfs	1,500 cfs or 90 % of the NRF, whichever is less		N/A	
11/01-11/15	1,500 cfs or 90 % of the NRF, whichever is less	250 cfs[6]	1,250 cfs	1,500 cfs or 90 % of the NRF, whichever is less	Provide NRF ±10% below Cabot Station, with deviations up to +/-20% for up to 11 hours	N/A	28 hours of Flexible Operations with no more than 7 flex events per month (Nov).
11/16-11/30	1,500 cfs or 90 % of the NRF, whichever is less	400 cfs[3]	1,100 cfs	1,500 cfs or 90 % of the NRF, whichever is less		N/A	
12/01-12/31	1,500 cfs or the NRF, whichever is less	400 cfs[3]	1,100 cfs	3,800 cfs or NRF, whichever is less (1,500 cfs + 2,300 cfs)	N/A	N/A	N/A

1. Date	2. Total Bypass Flow[2]	3. Turners Falls Dam	4. Station No. 1[4,5]	5. Below Cabot Station Minimum Flow	6. Flow Stabilization to Protect Shad Spawning (4/1-5/15) and Puritan Tiger Beetles (5/16-11/15)	7. Cabot Station Ramping to Protect Shortnose Sturgeon and Odonates	8. Allowable Deviations from Ramping and Flow Stabilization

[1]The flow split during these periods is approximately 67% from the Turners Falls Dam and 33% from Station No. 1. If FirstLight conducts further testing, in consultation with the NMFS, USFWS and MDFW and determines that migratory fish are not delayed by passing a greater percentage of the bypass flow via Station No. 1, it may increase the percentage through Station No. 1 upon written concurrence of those agencies. If further testing shows that the flow split could potentially be modified, FirstLight shall consult with American Whitewater (AW), Appalachian Mountain Club (AMC), Zoar Outdoors, Crab Apple Whitewater, Inc and New England FLOW relative to any changes in the flow split and address those entities comments in any filing before FERC or the Massachusetts Department of Environmental Protection (MDEP).

[2]If the NRF is less than 6,500 cfs (04/01-05/31), 4,500 cfs (06/01-06/15) or 3,500 cfs (06/16-06/30) the flow split will still be set at approximately 67% of the NRF from the Turners Falls Dam and 33% of the NRF from Station No. 1, subject to footnote 1. If 90% of the NRF is less than 1,800 cfs (7/1-8/31) or 1,500 cfs (9/1-11/15), FirstLight shall maintain the Turners Falls Dam discharge at 250 cfs or a maximum of 400 cfs, subject to footnote 6. If the NRF is less than 1,500 cfs (11/16-3/31), FirstLight shall maintain the Turners Falls Discharge at 400 cfs subject to footnote 3.

[3]The design maximum capacity of the canal gate is 400 cfs. FirstLight commits to opening the attraction flow gate to its maximum opening and will implement ice mitigation measures to maintain the maximum opening, if necessary, and monitor gate operations to determine if supplemental measures, such as cable heating the gate, are needed to maintain flows at or as close to 400 cfs as possible.

[4]To maintain the flow split, Station No. 1 must be automated, which will not occur until Year 3 of the license. FirstLight proposes to maintain the flow split such that the Turners Falls Dam discharge will be as shown above, or higher flows will be spilled, in cases where the additional flow cannot be passed through Station No. 1.

[5]The Turners Falls Hydro (TFH) project (FERC No. 2622) and Milton Hilton, LLC project (unlicensed) are located on the power canal and discharge into the bypass reach upstream of Station No. 1. The hydraulic capacities of the TFH project and Milton Hilton, LLC project are 289 and 113 cfs, respectively. If the TFH project is operating, FirstLight may reduce its Station No. 1 discharge by 289 cfs. If the Milton Hilton, LLC project is operating, FirstLight may reduce its Station No. 1 discharge by 113 cfs.

[6] The 250 cfs is subject to an inspection of rare plant species in the bypass under Turners Falls Dam spillage flows ranging from 250-400 cfs in the first 4 years after license issuance. The entity conducting the inspection of rare plants will be resolved by the Parties as part of the Comprehensive Settlement Agreement. Pending the results of the study, NHESP may authorize that the Turners Falls Dam discharge be increased up to a maximum of 400 cfs with the portion of the bypass flow coming from Station No. 1 reduced by the corresponding amount. The Parties agree to discuss this issue further as part of Comprehensive Settlement discussions due to competing interests from multi-day through paddlers and flatwater paddlers.

FirstLight agrees that as part of an off-license agreement, it will plan for and begin implementation of the proposed flow stabilization measures in Table 1.2.1-2 upon license issuance, recognizing that it will not be required to demonstrate to FERC or the Parties that it is meeting the flow stabilization requirements in Column 6 of Table 1.2.1-2 until the third (3rd) anniversary of the date of license issuance. FirstLight agrees to provide reports to the Parties to demonstrate substantive progress towards implementing the flow stabilization requirements. The Parties agree to determine the frequency of reporting as part of the Comprehensive Settlement Agreement.

In addition, FirstLight will have restricted discretionary flexible operating capability to respond to elevated energy prices (as defined in paragraph (d) below) between July 1 and November 30, as well as unrestricted capability to respond to emergencies, ISO-NE transmission and power system requirements, and other regulatory requirements (as defined in paragraph (e) below).

(d) Flexible operations allow for deviation from the prescribed operating limits (defined as Flow Stabilization and Cabot Station Ramping which are shown in Columns 6 and 7 of Table 1.2.1-2 in paragraph (c)). Such flexible operations are limited to the July 1 to November 30 period and will occur at the discretion of FirstLight and will be limited by a maximum number of hours and events per period as shown in Column 8 of Table 1.2.1-2 in paragraph (c).

(e) If compliance with the prescribed operating limits (defined as Flow Stabilization and Cabot Station Ramping which are shown in Columns 6 and 7 of Table 1.2.1-2 in paragraph (c)) would cause FirstLight to violate or breach any law, any applicable license, permit, approval, consent, exemption or authorization from a federal, state, or local governmental authority, any agreement with a governmental entity, or any tariff, capacity rating requirement, ramping criterion, or other requirement of the ISO-NE or its successors (ISO-NE)[1], FirstLight may deviate from the prescribed operating limitations to the least degree necessary in order to avoid such violation or breach. In addition, FirstLight may deviate from the operating limits for the following reasons:

- To implement Flood Flow Operations as defined in paragraph (g) below.
- To perform demonstrations of the resources' operating capabilities under ISO-NE rules and procedures. FirstLight will use best efforts to be allowed by ISO-NE to perform these demonstrations at times that will not cause it to deviate from the operating limits, with recognition that the April 1 to June 30 period will be avoided to the maximum extent possible.
- To manage the Turners Falls Impoundment (TFI) to stay within license limits, with recognition that the April 1 to June 30 period will be avoided to the maximum extent possible.
- If compliance with the prescribed operating limitations would cause a public safety hazard or prevent timely rescue.

From license issuance until the third (3rd) anniversary of the date of license issuance, FirstLight shall document on an hourly basis for each day any deviations from the Cabot Station Ramping restrictions and the same in the third (3rd) anniversary of the date of license issuance to license expiration from the Cabot Station restrictions and Flow Stabilization restrictions. Each day, between April 1 and November 30 any deviations would be recorded in a spreadsheet showing the daily deviations, the reason for the deviation, the number of hours and scope. The Parties agree to determine the frequency of reporting as part of the

[1]ISO-NE requirements are conditions when ISO-NE requires FirstLight to be fully available and, if necessary, responsive. Some 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).

Comprehensive Settlement Agreement. In addition, FirstLight shall provide the total number of deviations and supply it to the USFWS, NMFS, MDFW and MDEP on an annual basis no later than March 1 of each year. Deviations will be tracked as follows:

- Identify Deviations: At the top of each hour, FirstLight will record the maximum and minimum total Project discharge and Cabot Station discharge which occurred over the past hour. The NRF (as detailed in paragraph (b) of the "Operational Regime" section) will be compared with the recorded range of Project discharge in a given hour to identify if a Flow Stabilization deviation occurred over the past hour. The recorded range of Cabot Station discharge will be reviewed each hour to see if a Cabot Station Ramping violation occurred. Any deviation within the hour will be counted in one-hour increments.

- Categorize Deviations: When a deviation is identified it will be categorized as either Regulatory (as detailed in paragraph (e) of the "Turners Falls Project Operations" in Section 1.2.1 of this Proposal), NRF Allowance (as detailed in paragraph (d) of the "Turners Falls Impoundment Water Level Management" in Section 1.2.2 of this Proposal), or Discretionary (as detailed in paragraph (d) of the "Operational Regime" section of this Proposal).

(f) Cabot Emergency Gate Use. FirstLight shall use the Cabot Emergency Gates under the following conditions: a) in case of a Cabot load rejection[2], b) in the case of dam safety issues such as potential canal overtopping or partial breach, and c) to discharge approximately 500 cfs between April 1 and June 15 for debris management. FirstLight shall avoid discharging higher flows through the gates from April 1 to June 15 whenever possible; however, if necessary, FirstLight shall coordinate with NMFS to minimize potential impacts to Shortnose Sturgeon in the area below Cabot Station.

(g) Flood Flow Operations. FirstLight shall operate the Turners Falls Project in accordance with its existing agreement with the United States Army Corp of Engineers (USACOE). This agreement, memorialized in the *Reservoir and River Flow Management Procedures* (1976), as it may be amended from time to time, governs how the Turners Falls Project shall operate during flood conditions[3] and coordinate its operations with the Licensee of the Northfield Mountain Project (FERC No. 2485).

(h) The Parties agree that as part of the Final Settlement Agreement they will work to develop a mutually-agreeable protocol to dampen the magnitude of Great River Hydro's (GRH) Vernon Hydroelectric Project (FERC No. 1904) flexible operations discharges (i.e., peaking releases) below FirstLight's Turners Falls Project from July 1 through November 30 .

1.1.2 Turners Falls Impoundment Water Level Management

(a) FirstLight shall operate the TFI, as measured at the Turners Falls Dam, between elevation 176.0 feet and 185.0 feet NGVD29.

(b) FirstLight shall limit the rate of rise of the TFI water level, as measured at the Turners Falls Dam, to be less than 0.9 feet/hour from May 15 to August 15 between the hours of 8:00 am and 2:00 pm for the protection of odonates.

[2] A load rejection is when the Cabot Station units are suddenly shut off. If this were to occur, the canal could potentially be overtopped. To prevent overtopping, the Cabot Emergency Gates open so that incoming flow down the power canal can be discharged via the Cabot Emergency Gates. Load rejections could occur at any time.

[3] These procedures define a flood as the NRF in excess of 65,000 cfs. However, these procedures implement measures for flood control when the NRF reaches 30,000 cfs.

(c) The rate of rise of the TFI may be modified temporarily: (1) during and to the extent required by operating emergencies beyond the control of FirstLight; and (2) upon mutual agreement among the Licensees for Projects Nos. 1889 and 2485 and the USFWS, NMFS and MDFW.

(d) FirstLight is entitled to increase the allowable NRF deviation from ±10% to ±20% in order to better manage TFI water levels. The increased flow deviation would be limited by the number of hours shown in Column 6 of Table 1.2.1-2 in paragraph (c) of "Turners Falls Project" in Section 1.2.1 of this Proposal. The allowance for an increased flow deviation outlined in this paragraph is different from the exceptions outlined in paragraphs (d) and (e) of "Turners Falls Project" in Section 1.2.1 of this Proposal. As such, the increased flow deviations outlined in this paragraph shall not count against any time allotment for exceptions outlined in paragraphs (d) and (e) of "Turners Falls Project" in Section 1.2.1 of this Proposal, and similarly operations meeting the exception criteria outlined in paragraphs (d) and (e) of "Turners Falls Project" in Section 1.2.1 of this Proposal shall not count against any time allotment for deviations outlined in this paragraph. Additionally, flow deviations in excess of ±10% of NRF resulting from conflicting operational requirements shall not count against any time allotment for deviations outlined in this paragraph.

1.1.3 Northfield Mountain Pumped Storage Project Operations

(a) Flood Flow Operations. FirstLight shall operate the Northfield Mountain Project in accordance with its existing agreement with the USACOE. This agreement, memorialized in the Reservoir and River Flow Management Procedures (1976), as it may be amended from time to time, governs how the Northfield Mountain Project shall operate during flood conditions and coordinate its operations with the Licensee of the Turners Falls Project (FERC No. 1889).

(b) Upper Reservoir Water Level Management: FirstLight shall operate the Northfield Mountain Project Upper Reservoir between elevation 1004.5 and 920.0 feet NGVD29.

1.1.4 Cobblestone Tiger Beetles

As part of Final Settlement FirstLight agrees to work with the Settlement Parties to develop a Cobblestone Tiger Beetle Mitigation Plan. This plan will not include any requirements that limit the capacity of Cabot Station.

PART II: PROTECTION, MITIGATION AND ENHANCEMENT MEASURES- FISH PASSAGE

2 FISH PASSAGE

2.1 Provisions to Provide Bypass Flows

2.1.1 Station No. 1- Improve Operating Range of Turbines

FirstLight will automate the Station No. 1 turbines to throttle the station over a range of flows within 3 years of license issuance.

2.2 Fish Passage Design and Consultation, Fish Passage Efficiency Metrics and Adaptive Management Plans

The Parties agree to the following:

- For any new fish passage facility described in this AIP, FirstLight will consult and obtain approval from the MDFW, NMFS and USFWS on the facility design and on operation and maintenance procedures. For any new fish passage facility, the Parties will attempt to meet agency design guidelines to the extent practicable.
- As part of the Final Settlement Agreement, the Parties will negotiate upstream and downstream fish passage efficiency and timing metrics for the Projects and include the metrics, if agreed upon, as part of the Final Settlement Agreement. The Parties will also negotiate adaptive management measures to be followed if the agreed upon fish passage metrics are not achieved.

2.3 Downstream Fish Passage

2.3.1 Intake Protection at the Northfield Mountain Pumped Storage Project Intake/Tailrace

FirstLight will install a barrier net as conceptually proposed in the Amended Final License Application for the period August 1 to November 15 to protect out-migrating juvenile shad and silver eel, to be operational no later than August 1 of Year 7 after license issuance. The barrier net will be 3/8-inch on the top and 3/4-inch on the bottom. The Parties agree to FirstLight's proposed operational period so long as there is a mechanism for expanding the operational period if daytime pumping operations at the Northfield Mountain Project during the adult alosine fish passage season increase substantially and there is demonstrated additional entrainment. FirstLight will be required to provide the agencies with annual logs of daily operation data with respect to the timing of pumping and generating. FirstLight will also be required to include the Northfield Mountain Project in the study design for effectiveness studies of upstream and downstream fish passage measures at the Turners Falls Project (e.g., deploy receivers at the Northfield Mountain Project lower reservoir intake and sites upstream and downstream of the intake, as well as in the Northfield Mountain Upper Reservoir).

The Parties agree to discuss the possibility of a fund to be used for habitat improvement projects and/or alosine management activities to offset the potential loss of ichthyoplankton through entrainment as part of final settlement discussions.

2.3.2 Cabot Intake Protection and Downstream Passage Conveyance

Within 4 years[4] of license issuance, FirstLight will replace the existing trashrack structure with a new full depth trashrack with 1-inch clear spacing. In terms of general design concepts, the Parties agree that the new trashracks will have multiple openings for fish passage and that those openings will include both the top and bottom of the water column. The Parties further agree that they will attempt to maximize the hydraulic capacity of these openings within the constraints of the conveyance mechanisms. The Parties have analyzed a number of alternatives and believe the following conceptual design has merit for future exploration of detailed design alternatives:

The new trashrack will have multiple surface entrances including a.) between Units 2 and 3; b.) between Units 4 and 5; and c.) at the right wall of the intake (looking downstream) at Unit 6. These openings will be 3-feet-wide by 2-feet-tall and will connect to the existing trash trough located behind the racks. Each opening at the top of the trashrack will have an approximate hydraulic capacity of 24 cfs, and the existing trash trough will convey a total hydraulic capacity of approximately 72 cfs from these openings. The new trashrack will have an additional entrance near the bottom at the left wall of the intake (looking downstream) at Unit 1. This entrance will be approximately 3-feet-wide by 3-feet-tall and will and will connect to a vertical pipe to safely convey fish to the existing trash trough or log sluice. This entrance will be sized to provide a velocity that attracts fish to the bypass relative to the turbine intakes (approximately 5 feet-per-second).

In addition to the entrances integral to the new trashrack structure, fish will be conveyed via a new uniform acceleration weir (UAW) and log sluice. The log sluice will be resurfaced to limit turbulence and injury to migrants. A steel panel (or equivalent) will be provided below the UAW to exclude migrants from being delayed in the space below the UAW. Total flow from all downstream passage components at Cabot Station will be at least 5% (685 cfs) of maximum hydraulic station capacity (13,728 cfs). The conveyance at each bypass entrance will be determined during the design phase.

FL will consult and obtain approval from the Agencies during the design process as described in Section 2.2.

2.3.3 Station No. 1 Bar Rack

FirstLight will construct a ¾-inch clear-spaced bar rack at the entrance to the Station No. 1 branch canal the same year (see footnote 6) the Cabot Intake Protection and Downstream Passage Conveyance is built, so as to minimize canal outage time.

2.3.4 Plunge Pool below Bascule Gate No. 1

FirstLight will construct a plunge pool downstream of the Bascule Gate No. 1 as part of the construction of the Spillway Lift, to be operational no later than April 1 of Year 9 after license issuance.

[4] Relative to the Cabot Intake Protection and Downstream Passage Conveyance and the Station No. 1 Bar Rack, the times cited are from license issuance based on the time needed to complete construction. The actual first year of operation of these two facilities will depend on when the license is issued.

2.4 Upstream Fish Passage

2.4.1 Anadromous Passage

2.4.1.1 Spillway Lift

FirstLight will construct a new Spillway Lift at the Turners Falls Dam to be operational no later than April 1 of Year 9 after license issuance irrespective of what quarter the license is issued.

2.4.1.2 Rehabilitate Gatehouse Trapping Facility

FirstLight will rehabilitate the Gatehouse Trapping facility (sampling facility) to be operational no later than April 1 of Year 9 after license issuance.

2.4.1.3 Retire Cabot Ladder and Portions of Gatehouse Ladder

FirstLight will retire the Cabot ladder and the canal portions of the Gatehouse ladder once the new Spillway Lift is operational.

2.4.2 Eel Passage

2.4.2.1 Eel Passage Measures

FirstLight will conduct the following measures:

- Install and operate interim upstream eel passage in the vicinity of the Spillway Ladder within 1 year of license issuance and continue operating until permanent upstream eel passage becomes operational. The location and design of interim eelway(s) will be determined in consultation with the agencies.
- Conduct up to 2 years of eel ramp siting studies, using a similar methodology to relicensing Study 3.3.4 (both years). Siting surveys will be initiated the year the new Spillway Lift becomes operational.
- Based on siting survey results, design, construct, operate, and maintain up to two permanent upstream eel passage facilities at the Turners Falls Project no later than 3 years after completing the final siting survey. The Parties agree that final eel ramp siting will take into account the ability to maintain the facilities in light of spillage conditions at the Project. In particular, the Parties agree not to site any ramps immediately at the foot of any active spillway structures.

PART III SIGNATURES

Organization: FirstLight MA Hydro LLC and Northfield Mountain LLC (collectively, FirstLight)

By: Justin Trudell

Title: Justin Trudell

Signature: Chief Operating Officer

Date: 3/17/2021

Organization: Massachusetts Division of Fisheries and Wildlife

By: Caleb Slater

Title: Chief of Hatcheries

Signature:

Date: 3/17/2022

Organization: Massachusetts Natural Heritage and Endangered Species Program

By: Jesse Leddick

Title: Chief of Regulatory Review

Signature: 

Date: March 17, 2022

Organization: National Marine Fisheries Service

By: Christopher Boelke

Title: New England Branch Supervisor, Habitat and Ecosystem Services

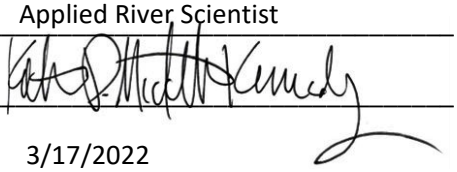
Signature: 

Date: 3/17/22

Organization: The Nature Conservancy

By: Katie Kennedy

Title: Applied River Scientist

Signature: 

Date: 3/17/2022

Organization: United States Department of the Interior, United States Fish and Wildlife Service

By: Audrey Mayer, Ph.D.

Title: Field Supervisor, New England Field Office

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EXHIBIT 2
TECHNICAL MEMORANDUM

Basis for minimum flows directly downstream of the Turners Falls Dam between July 1 and December 31 to meet Clean Water Act and Massachusetts Surface Water Quality Standards

1. Background and regulatory basis

This memorandum presents a technical basis for minimum flow recommendations that will meet water quality standards below the Turners Falls Dam for July 1 to March 31 under the new license. As part of the 401 Water Quality Certificate, Massachusetts DEP will need to determine a flow that will protect existing and designated uses of the Connecticut River. If uses are not protected, DEP will need to perform a use attainability analysis to justify their decision.

In the Flows and Fish Passage Agreement in Principle (AIP) dated March 17, 2022, signed by FirstLight and agencies, and filed with FERC, it laid out the proposed minimum flow schedule for releases at the Turners Falls Dam, at Station No. 1, and below Cabot Station. The volume of releases at the dam during fish passage season is split into three different time frames to protect different species. CRC is of the opinion that these flows, and supplemented further downstream with Station No. 1 flows (not listed here) will meet water quality standards. The following flows are the Turners Dam minimum spill amounts in the AIP:

April 1 -May 31: 4,290 cfs
June 1 - June 15: 2,990 cfs
June 16-June 30: 2,280 cfs

The AIP proposes the following minimum flows for the remainder of the year:

- July 1-November 15: 250 cfs. There is a footnote saying, "*The 250 cfs is subject to an inspection of rare plant species in the bypass under Turners Falls Dam spillage flows ranging from 250-400 cfs in the first 4 years after license issuance. The entity conducting the inspection of rare plants will be resolved by the Parties as part of the Comprehensive Settlement Agreement. Pending the results of the study, NHESP may authorize that the Turners Falls Dam discharge be increased up to a maximum of 400 cfs with the portion of the bypass flow coming from Station No. 1 reduced by the corresponding amount. The Parties agree to discuss this issue further as part of Comprehensive Settlement discussions due to competing interests from multi-day through paddlers and flatwater paddlers.*"
- November 16-March 31: 400 cfs. There is a footnote saying, "*The design maximum capacity of the canal gate is 400 cfs. FirstLight commits to opening the attraction flow gate to its maximum opening and will implement ice mitigation measures to maintain the maximum opening, if necessary, and monitor gate operations to determine if supplemental measures, such as cable heating the gate, are needed to maintain flows at or as close to 400 cfs as possible*."

CRC believes that the flows, particularly between July 1 to November 15, are far lower than those that are necessary to meet water quality standards. For comparison, in their Amended Final License Application, the upstream licensee, Great River Hydro, is proposing seasonal base flows at Vernon of 1,400 cfs during the summer and these increase to 1,600 cfs in October. The Ashuelot River and the Millers River provide additional flow between Vernon the Turners Falls Dam. According to EPA Fact Sheets for NPDES permits for Hinsdale NH and Erving MA, the 7Q10 for the Ashuelot River is 40.2 cfs and the 7Q10 for the Millers River is 43.7 cfs. Therefore, FirstLight has sufficient flow volume from upstream and tributary sources available to discharge flows above 250 cfs in the summer and fall.

The river segment below the dam is listed as impaired

Under the Massachusetts Surface Water Quality Standards, 314 CMR 4.06, the Connecticut River from Turners Falls Dam to the Holyoke Dam is designated as a Class B warm water river with the CSO qualifier. 314 CMR 4.05 (b) states that Class B "…waters are designated as a habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation… These waters shall have consistently good aesthetic value."

In the Massachusetts Year 2018-2020 Integrated List of Waters (finalized in February 2022), Segment 34-03 is the 3.7-mile segment between the Turners Falls Dam and the confluence with the Deerfield River. This segment is listed as impaired for *dewatering, flow regime modification*, E. coli bacteria, PCBs in fish tissue, and total suspended solids. It is not currently attaining these statutory standards, and is not meeting the aquatic life use.

2. Relevant Guidance and Technical Information

A. Massachusetts Surface Water Quality Standards

314 CMR 4.03(3)(b) states, "In waters where flows are regulated by dams or similar structures, the **lowest flow** condition at which aquatic life criteria must be applied is the flow equaled or exceeded 99% of the time on a yearly basis, or another **equivalent** flow agreed upon by the Department and the federal, state, or private entity controlling the flow. … When the Department issues a 401 Water Quality Certification of an activity subject to licensing by the Federal Energy Regulatory Commission, **flows shall be maintained or restored to protect existing[1] and designated uses**."

The designated uses that must be legally protected are aquatic life use, boating, and fishing. As noted above, these uses in the river segment below the Turners Falls Dam are officially listed as impaired under the current license conditions.

Section 314 CMR 4.03(3)(b) refers to the Q99, which is the flow equaled or exceeded 99% of the time on an annual basis. In 2018, CRC computed the Q99 at the Turners Falls Dam by using data from the most recent 30 years, 1988 to 2017, at the Montague City USGS station and subtracting a minimum flow of 206 cfs for the Deerfield River (this is the required minimum flow of the most downstream hydropower

[1] Note: existing uses are those attained on or after November 28, 1975. Northfield Mountain started commercial operation on November 30, 1972.

station on the Deerfield River). The Q99 we computed is 1,814 cfs.

A 2015 study[2] conducted in New England by the Midwest Biodiversity Institute compiled data from large rivers in New England. According to the author, the upper section of the reach below the Turners Falls Dam at River Mile 67.9 had the lowest (i.e., poorest) Index of Biological Integrity (IBI) score out of nearly 500 sites sampled in New England 2002-9 (see Table 27 on page 134).

i. Attainment of aquatic life use

Relicensing Study 3.3.1, the Instream Flow Habitat Assessments in the Bypass Reach and Below Cabot Station (referred here as the IFIM Study), analyzed transects within the bypass reach. The section directly downstream of the Dam is a complex area, and as a result four separate analyses were done, which were different than those done for the rest of the bypass reach.

- Left channel: A single transect looking at the cross-sectional water height at different dam release flows for zone of passage.
- Center channel: This channel is a fast chute, and only a hydraulic analysis was done.
- Right channel: This channel was the area where fish habitat was analyzed by wetted usable area for different river species.
- Plunge pool (not shown on map): A wetted area and wetted volume curve was calculated for the pool areas directly below the dam.

[2] Yoder, C.O., E.T. Rankin, and Lon E. Hersha. 2015. Development of Methods and Designs for the Assessment of the Fish Assemblages of Non-Wadeable Rivers in New England. MBI Technical Report MBI/2015-3-3. U.S. EPA Assistance Agreement RM-83379101. U.S. EPA, Office of Research and Development, Atlantic Ecology Division, Narragansett, RI and U.S. EPA, Region I, Boston, MA. 152 pp. http://www.midwestbiodiversityinst.org/.

Exhibit 2: CRC minimum flow recommendations below Turners Falls Dam

Further downstream, Transects T-10 and T-11 are the only transects upstream of Station 1. The analyses looked at high and low backwater scenarios for when Station 1 is operating or not. Under the proposed operations, river conditions should mostly be a high backwater situation because Station 1 will be operating most of the time.

Analyses

The Massachusetts Consolidated Assessment and Listing Methodology 2018 Guidance Manual (CALM) explains that MassDEP uses a weight-of-evidence approach, considering results from biological and habitat, toxicological, physico-chemical, sediment, and body burden investigations, to assess the attainment of Aquatic Life Use as defined at 314 CMR 4.02.

The 2018 CALM states that ALU is supported when the fish community includes fluvial specialist/dependent species or at least one fluvial species in moderate abundance. Fluvial specialist (FS) species require flowing water for all of their life-history requirements. According to Appendix B in the CALM, longnose dace, fallfish, and tessellated darter are all fluvial specialist species and these species were used as target species in the IFIM study for Turners Falls.

Appendix A of the IFIM shows the habitat suitability curves for target species in the study. We note that adult fallfish and tessellated darter (juvenile and adult) find wide ranges of substrate as suitable habitat, including bedrock, which is dominant in this upper reach. For Longnose dace, cobble and boulder are the most suitable.

Tables 7.1.1.1-1 (revised in an errata filing dated November 2016) and 7.1.1.2-2 show the percentage of maximum weighted usable area (WUA) for flows within the right channel in Reach 1 and at Transects 10 and 11 under high backwater conditions, respectively.

In the right channel of Reach 1, maximum WUA flow for adult fallfish was 1,583 cfs; for adult longnose dace was 591 cfs, tessellated darter was 562 cfs, and macroinvertebrates was 1,719 cfs.

Table 7.1.1.1-1 corrected showing the percentage of weighted usable area for the Right Channel of Reach 1.

Species	Life stage	Months Present	Maximum WUA Total Release from Dam (cfs)	Maximum WUA Flowing in the Right Channel (cfs)	Maximum WUA (ft^2)	Total Release from Dam											
						500 (cfs)	562 (cfs)	591 (cfs)	670 (cfs)	802 (cfs)	1,281 (cfs)	1,583 (cfs)	1,719 (cfs)	2,106 (cfs)	2,551 (cfs)	3,062 (cfs)	4,105 (cfs)
						0.07 (cfsm)	0.08 (cfsm)	0.08 (cfsm)	0.09 (cfsm)	0.11 (cfsm)	0.18 (cfsm)	0.22 (cfsm)	0.24 (cfsm)	0.29 (cfsm)	0.36 (cfsm)	0.43 (cfsm)	0.57 (cfsm)
Fallfish	Spawning/Incu	May-June	802	250	86,628	80%	90%	95%	97%	100%	88%	68%	56%	34%	26%	20%	13%
Fallfish	Fry	May-June	591	140	66,936	97%	99%	100%	92%	79%	65%	43%	39%	32%	17%	12%	8%
Fallfish	Juvenile	Year Round	802	250	83,561	80%	83%	89%	93%	100%	83%	77%	68%	46%	35%	32%	24%
Fallfish	Adult	Year Round	1583	662	33,506	42%	49%	52%	60%	72%	96%	100%	98%	88%	76%	66%	39%
Longnose Dace	Juvenile	Year Round	802	250	83,561	70%	83%	89%	93%	100%	83%	77%	68%	46%	35%	32%	24%
Longnose Dace	Adult	Year Round	591	140	74,344	94%	98%	100%	99%	97%	63%	43%	37%	29%	23%	21%	13%
White Sucker	Spawning/Incu	May-June	591	140	41,330	94%	98%	100%	95%	87%	70%	48%	37%	26%	28%	21%	8%
White Sucker	Fry	Apr-May	591	140	66,936	97%	99%	100%	92%	79%	65%	43%	39%	32%	17%	12%	8%
White Sucker	Adult/Juvenile	Year Round	0	0	-	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Walleye	Spawning/Incu	April-May	3062	1,500	86,372	5%	8%	10%	14%	21%	45%	60%	72%	92%	98%	100%	99%
Walleye	Fry	April-May	562	125	13,105	100%	100%	92%	75%	42%	16%	5%	9%	16%	1%	3%	2%
Walleye	Juvenile	Year Round	591	140	58,234	94%	98%	100%	90%	75%	47%	30%	25%	18%	24%	13%	5%
Walleye	Adult	Year Round	0	0	-	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Tessellated Darter	Adult/Juvenile	Year Round	562	125	38,259	100%	100%	98%	81%	54%	28%	16%	12%	17%	17%	5%	5%
Sea Lamprey (Agency)	Spawning/Incu	May-June	2106	1000	121,903	40%	46%	50%	55%	66%	94%	100%	100%	100%	83%	72%	47%
Macroinvertebrates	Larva	Year Round	1719	750	74,190	35%	41%	45%	53%	68%	95%	99%	100%	96%	93%	87%	79%
Shallow Slow	Shallow Slow	Year Round	562	125	45,830	100%	100%	91%	75%	44%	23%	3%	7%	23%	1%	2%	4%
Shallow Fast	Shallow Fast	Year Round	562	125	56,586	100%	100%	97%	88%	69%	32%	23%	20%	22%	16%	8%	5%
Deep Slow	Deep Slow	Year Round	1281	500	14,944	0%	7%	17%	35%	66%	100%	36%	16%	0%	0%	0%	0%
Deep Fast	Deep Fast	Year Round	1719	750	98,741	0%	0%	3%	12%	24%	70%	89%	96%	100%	89%	80%	63%

Table 7.1.1.2-2 showing the percentage of weighted usable area for T-10 and T-11 in Reach 1 under high backwater conditions is below. Please see the IFIM study for larger version of this table.

Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)
INSTREAM FLOW HABITAT ASSESSMENTS IN THE BYPASS REACH AND BELOW CABOT STATION STUDY REPORT

Table 7.1.1.2-2: Percentage of the Maximum Weighted Usable Area (WUA) for Various Flows within Reach 1 (Transects 10 & 11) for High Backwater Condition

Species	Life stage	Months Present	Maximum WUA Flow (cfs)	Maximum WUA (ft^2)	120 (cfs)	150 (cfs)	200 (cfs)	250 (cfs)	400 (cfs)	500 (cfs)	600 (cfs)	700 (cfs)	800 (cfs)	1000 (cfs)	1200 (cfs)	1400 (cfs)	1600 (cfs)	1800 (cfs)	2000 (cfs)	3000 (cfs)	4000 (cfs)	5000 (cfs)
					0.02 (cfsm)	0.02 (cfsm)	0.03 (cfsm)	0.03 (cfsm)	0.06 (cfsm)	0.07 (cfsm)	0.08 (cfsm)	0.1 (cfsm)	0.11 (cfsm)	0.14 (cfsm)	017 (cfsm)	0.2 (cfsm)	0.22 (cfsm)	0.25 (cfsm)	0.28 (cfsm)	.42 (cfsm)	0.56 (cfsm)	0.7 (cfsm)
American Shad	Spawning/Incu	May-June	7,500	898,488	17.6%	18.7%	20.6%	22.5%	27.2%	29.1%	30.6%	32.2%	33.7%	36.6%	40.9%	45.5%	49.8%	54.5%	59.8%	72.4%	81.9%	89.0%
American Shad	Juvenile	June-Oct	2,000	668,444	43.9%	47.7%	53.5%	58.6%	52.9%	55.3%	57.5%	59.2%	61.2%	64.6%	74.4%	83.0%	88.7%	94.4%	100.0%	95.5%	88.1%	80.6%
American Shad	Adult	May-June	7,500	695,459	23.1%	24.0%	25.7%	27.2%	29.1%	30.1%	31.1%	32.2%	33.3%	35.2%	37.7%	40.7%	43.1%	46.3%	50.3%	66.2%	80.2%	90.7%
Shortnose Sturgeon	Spawning	April-May	6,000	893,383	0.5%	1.6%	5.6%	9.7%	23.1%	27.9%	31.0%	32.6%	33.5%	35.0%	39.6%	45.4%	52.3%	60.8%	70.8%	87.7%	96.0%	99.5%
Shortnose Sturgeon	Egg-Larvae	May	3,000	1,360,780	38.9%	43.8%	51.1%	57.5%	42.9%	46.9%	51.0%	55.0%	59.3%	66.6%	77.6%	85.8%	91.5%	95.9%	99.9%	100.0%	100.0%	99.7%
Shortnose Sturgeon	Fry	May	500	64,776	44.5%	54.9%	71.4%	85.1%	99.3%	100.0%	99.9%	99.8%	99.9%	98.3%	94.8%	93.8%	91.8%	91.3%	92.4%	73.1%	56.9%	43.5%
Fallfish	Spawning/Incu	May-June	120	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fallfish	Fry	May-June	150	25,172	96.3%	100.0%	99.7%	98.5%	87.3%	82.4%	75.3%	61.6%	50.7%	39.0%	32.6%	28.2%	24.3%	20.9%	17.8%	6.1%	1.8%	1.0%
Fallfish	Juvenile	Year Round	1,800	260,011	57.8%	63.6%	71.2%	77.0%	73.3%	74.3%	76.2%	77.6%	79.5%	82.8%	89.5%	93.4%	98.0%	100.0%	99.5%	80.4%	61.6%	44.0%
Fallfish	Adult	Year Round	2,000	549,907	67.5%	70.9%	76.2%	80.6%	75.7%	75.7%	71.2%	67.1%	63.5%	59.8%	70.4%	80.6%	86.7%	93.4%	100.0%	89.6%	74.3%	60.5%
Longnose Dace	Juvenile	Year Round	1,800	155,504	13.0%	16.4%	22.0%	27.6%	23.1%	27.7%	31.3%	34.2%	37.4%	44.0%	64.0%	81.7%	95.7%	100.0%	94.9%	39.8%	12.7%	3.6%
Longnose Dace	Adult	Year Round	2,000	413,608	9.3%	11.7%	15.8%	19.8%	16.1%	18.5%	20.4%	22.8%	25.4%	31.5%	51.4%	69.4%	84.2%	94.0%	100.0%	54.4%	17.0%	4.2%
White Sucker	Spawning/Incu	Apr-May	120	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
White Sucker	Fry	May-June	120	1,000,248	100.0%	99.6%	97.6%	95.7%	84.7%	79.3%	75.2%	74.9%	76.4%	79.7%	75.7%	66.4%	51.8%	36.6%	20.8%	4.3%	1.0%	0.8%
White Sucker	Adult/Juvenile	Year Round	250	362,803	75.0%	85.5%	95.4%	100.0%	82.0%	71.1%	60.5%	50.9%	43.7%	45.5%	63.6%	77.0%	78.1%	73.4%	63.4%	29.9%	8.2%	2.6%
Walleye	Spawning	April-May	3,000	139,817	14.5%	14.9%	15.5%	16.2%	19.3%	21.4%	25.8%	29.8%	35.2%	45.0%	51.0%	55.9%	59.7%	64.4%	62.8%	100.0%	96.3%	85.7%
Walleye	Fry	April-May	120	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Walleye	Juvenile	Year Round	120	870	100.0%	82.4%	52.9%	32.4%	26.5%	23.5%	17.6%	14.7%	11.8%	8.8%	4.7%	3.5%	3.5%	2.4%	2.9%	0.0%	0.0%	0.0%
Walleye	Adult	Year Round	120	36,453	100.0%	80.4%	48.8%	24.5%	19.4%	15.8%	13.0%	12.9%	12.9%	13.1%	13.5%	14.1%	14.6%	14.9%	15.6%	20.0%	14.3%	4.4%
Tessellated Darter	Adult/Juvenile	Year Round	1,800	133,736	12.2%	15.4%	20.9%	26.5%	18.0%	22.0%	26.7%	31.9%	36.7%	45.3%	66.1%	84.5%	98.2%	100.0%	96.7%	28.7%	0.9%	0.0%
Sea Lamprey	Spawning/Incu	May-June	1,800	3,870	0.0%	0.0%	0.0%	0.3%	41.4%	56.6%	69.4%	62.8%	59.0%	69.8%	56.4%	74.0%	91.3%	100.0%	94.8%	34.9%	12.3%	2.3%
Macroinvertebrates	Larva	Year Round	4,000	918,412	0.0%	0.1%	0.4%	0.9%	6.0%	10.0%	14.0%	17.7%	21.3%	26.9%	30.4%	36.1%	44.7%	55.2%	67.1%	91.6%	100.0%	97.6%
Shallow Slow	Shallow Slow	Year Round	700	818,354	93.6%	94.1%	95.4%	97.1%	96.6%	97.5%	98.3%	100.0%	100.0%	93.0%	80.8%	78.2%	75.5%	71.7%	68.0%	21.5%	0.0%	0.0%
Shallow Fast	Shallow Fast	Year Round	1,600	535,297	24.8%	30.7%	40.4%	49.7%	26.1%	31.1%	36.2%	41.7%	49.0%	63.3%	83.5%	96.4%	100.0%	97.1%	88.9%	32.3%	9.1%	2.9%
Deep Slow	Deep Slow	Year Round	500	615,160	90.7%	91.4%	93.3%	95.7%	96.1%	100.0%	88.5%	65.6%	59.0%	67.0%	73.3%	78.9%	80.3%	64.2%	54.8%	22.2%	3.6%	1.2%
Deep Fast	Deep Fast	Year Round	3,000	124,411	2.4%	6.7%	15.0%	23.1%	37.8%	53.4%	69.1%	79.4%	82.8%	89.5%	88.3%	89.1%	91.6%	94.4%	99.6%	100.0%	89.8%	52.9%

In Transects 10 and 11, peak WUA for adult fallfish, tessellated darter, and white sucker were all around at flows between 1,600 and 2,000 cfs. The maximum WUA flow for macroinvertebrates was 4,000 cfs. Flows of 600-1,000 cfs would offer at least 20% WUA for fluvial specialists. A flow of 1,200 cfs would offer 30% WUA for macroinvertebrates. The Agreement in Principle (AIP) for fish passage and flows sets the summer minimum flow of 250 cfs with an opportunity to increase to 400 cfs, which represents only

0.9% to 6% WUA for macroinvertebrates. Both the 250 and 400 flows are far less than necessary to "maintain or restore" the designated Aquatic Life Use.

If flows were provided sufficient to support ALU, CRC expects that additional habitat would be created that would support two fish species that NHESP has listed as species of special concern, the burbot (*Lota lota*) and longnose sucker (*Catostomas catostomas*). Hartel et al. (2002)[3] describes a 12-inch burbot caught in a pool below the Turners Falls dam in December 2000 by an angler who had noted that other specimens have been caught there (see page 191). Burbot are stated to be nocturnal and they spawn under ice. Young burbot feed on aquatic insects and crustaceans, while large adults feed on fishes. Hartel et al. (2002) states that records from 1940-1960 show that longnose sucker historically occurred in the Connecticut River and Westfield Rivers and at the mouth of the Chicopee River. Pollution and habitat alteration along the mainstems have limited surviving populations. The water quality in the CT River has improved greatly in recent decades, and the relicensing provides a once in a generation opportunity to restore habitat for these at risk species. Hartel et al. states that longnose suckers are benthic feeders taking a wide variety of aquatic invertebrates and algae from the bottom of rivers, highlighting the need to protect flows suitable for macroinvertebrates.

ii. Attainment of boating use

At the request of stakeholders including CRC FirstLight conducted a Boating Navigability Study completed in December 2021. This study targeted an evaluation of releases at the dam of 500, 670, 1100, and 900 cfs. Due to previously unknown calibration issues to determine flows from the Turners Falls dam, the study was only able to achieve an evaluation of dam releases of 214, 276, 545, and 376 CFS. The failure of FirstLight to be able to accurately gauge flows from the dam demonstrates clearly the immediate need for calibration of released flows. The flow of 545 cfs was determined to be a minimum navigable flow for paddling in a canoe or kayak. Flows higher than 545 cfs would also be navigable.

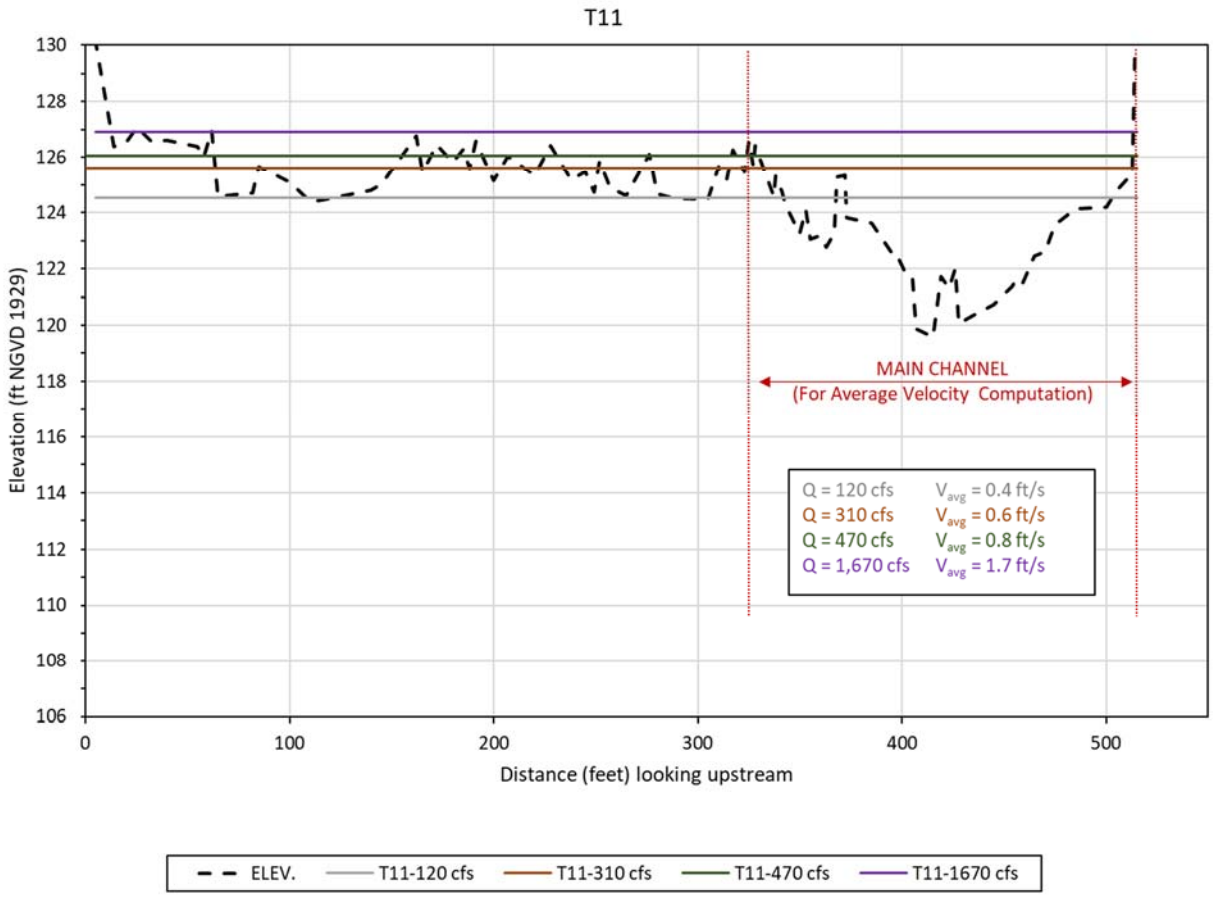
B. Wetted perimeter Method

The Wetted-Perimeter method is based on the assumption that there is a direct relation between the wetted perimeter in a riffle and fish habitat in streams (Annear and Conder, 1984; Lohr, 1993). The wetted perimeter of a stream, defined as the width of the streambed and stream banks in contact with water for an individual cross section, is used as a measure of the availability of aquatic habitat over a range of discharges (Annear and Conder, 1984; Nelson, 1984). EPA has approved the use by states of this simplified method that requires anywhere between 50% and 75% of wetted width of a river or stream. This percentage is statistically validated based on data sets of benthic macroinvertebrate assemblages at various conditions. It is statistically rigorous and provides for a simplified determination of attainment of the most sensitive aquatic life use.

While the geology of the river segment below the dam is complex, this method can be applied in the straighter section below the island and upstream of Station 1. For the IFIM Study, there were two transects in that section, T-10 and T-11. A slide prepared by FirstLight using data from the IFIM is shown below. Looking at the figure below, it seems that flows of at least 470 cfs upstream would be necessary

[3] Karsten E. Hartel, David B. Halliwell, and Alan E. Launer. Inland Fishes of Massachusetts. Published by the Massachusetts Audubon Society, 2002.

to achieve 50% wetted width, possibly higher.



3. Flow recommendation

The IFIM results and recreation navigable flow study both show that much higher minimum flows are needed to meet Water Quality Standards below the dam. Taking into account aquatic life use and boating navigability, CRC finds that the following minimum flows at the Turners Falls Dam are needed to meet Surface Water Quality Standards.

July 1 to October 31: 1,000 cfs to provide habitat for fallfish, longnose dace, tessellated darter, and macroinvertebrates. This flow will also be a navigable recreational flow in the river for through-paddlers.

November 1-March 31: at least 500 cfs to maintain some of the wetted area provided during the summer period. Small fish shelter in place in the winter. Adequate spill will reduce forced movements by smaller fishes to restricted pool habitats. Predator fishes more effectively predate upon small bodied native fluvial species forced from shallow water habitat. Ideally, the spill at the dam during the winter would be at least 1,000 cfs during the winter, yet CRC acknowledges the economic value of power generation during the winter period.

Connecticut River Conservancy

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EXHIBIT 3
TECHNICAL MEMORANDUM

Recommendation for conditions upstream of Turners Falls Dam to meet Clean Water Act and Massachusetts Surface Water Quality Standards

1. Background and regulatory basis

This memorandum presents a technical basis for recommendations that will attempt to meet water quality standards above the Turners Falls Dam. As part of the 401 Water Quality Certificate, Massachusetts DEP will need to determine the conditions that will protect existing and designated uses of the Connecticut River. If uses are not protected, DEP will need to perform a use attainability analysis to justify their decision.

<u>The river segments above the dam are impaired</u>

Under the Massachusetts Surface Water Quality Standards, 314 CMR 4.06, the Connecticut River from the Vermont, New Hampshire, and Massachusetts state line to the Turners Falls Dam is designated as a Class B warm water river. 314 CMR 4.05 (b) states that Class B "…waters are designated as a habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation… These waters shall have consistently good aesthetic value."

In the Massachusetts Year 2018-2020 Integrated List of Waters (finalized in February 2022), there are three different segments that make up the Turners Falls impoundment (TFI). All three are listed as impaired, as follows:

- Segment 34-01 is the 3.5-mile segment between the Vermont/New Hampshire/Massachusetts state line and the Route 10 bridge. This segment is listed as impaired for *alteration in stream-side or littoral vegetative covers, flow regime modification*, and PCBs in fish tissue.
- Segment 34-02 is the 11.4-mile segment between the Route 10 bridge and the Turners Falls Dam, excluding Barton Cove. This segment is listed as impaired for *alteration in stream-side or littoral vegetative covers, flow regime modification, water chestnut*, and PCBs in fish tissue.
- Barton Cove is MA34122 and is listed as impaired for curly-leaf pondweed, Eurasian water milfoil (*Myriophyllum spicatum*), fanwort, water chestnut, E. coli, and PCBs in fish tissue.

Appendix 15 to the 2018-2020 Massachusetts Integrated List states that these segments are "not supporting" the Fish, other Aquatic Life and Wildlife Use because of the impairments described above, although the impairments other than the invasive plants were worded as "stream bank alteration," "flow modification." These impairments, except for PCBs, are all related to the existence of the impoundment and/or project operations.

314 CMR 4.03(3)(b) states, "In waters where flows are regulated by dams or similar structures, the

lowest flow condition at which aquatic life criteria must be applied is the flow equaled or exceeded 99% of the time on a yearly basis, or another equivalent flow agreed upon by the Department and the federal, state, or private entity controlling the flow. … When the Department issues a 401 Water Quality Certification of an activity subject to licensing by the Federal Energy Regulatory Commission, flows shall be maintained or restored to protect existing and designated uses." [1] Waters behind a dam are not specifically addressed in this regulation; impoundments become lake-like and would need to be managed to maintain river functions.

The designated uses that must be legally protected are aquatic life use, boating, and fishing.

2. Recommendations for addressing impairments

A. Management and Removal of Non-Native Invasive Aquatic Plants to Restore Habitat and Improve Water Quality

The presence of the dam contributes to the existence of invasive plant species that prefer lakes and coves, such as water chestnut. FirstLight should re-draft the Invasive Plant Management Plans that were submitted in the Amended Final License Application (AFLA) dated December 2020. These plans should be merged into a single plan for both projects, and should commit to efforts to monitor, remove and manage aquatic invasives plants that are in the Turners Falls impoundment and in the Turners Falls canal system. FirstLight should work with state and federal agencies, as well as continue to work with organizations like the Connecticut River Conservancy, in this endeavor.

B. Operational recommendations to address flow modification and stream bank alteration impairments

1. Manage Operations of the Upper Reservoir to protect Aquatic Life, Wildlife Habitat and Fisheries

In the AFLA, FirstLight is requesting to use additional space in the upper reservoir on a permanent basis. The fish and flow Agreement in Principle (AIP) allows this with no restrictions. In the past, FirstLight and its predecessor companies has applied for and received temporary license amendments to use this additional volume of water during certain winter periods and one summer period. A permanent license amendment request was denied because it would have required a full endangered species act analysis due to a confirmed find of a federally endangered shortnose sturgeon below the Vernon Dam.[2] The table below shows the amount of water in the upper and lower reservoirs under the current and proposed operations.

Use of the expanded reservoir will provide more opportunities for FirstLight to pump to river levels that continue and increase impairments. The extra space in the upper reservoir was built into the plans at Northfield Mountain as part of a scheme to divert water for drinking water supply for the Boston metropolitan area. This water would have been diverted to Quabbin Reservoir via a pipeline that has never been built. When the Massachusetts legislature approved this deal in 1970, they limited diversions only to days when the flows of the CT River in Montague were above 17,000 cfs. The river at the Montague gage exceeds 17,000 cfs approximately 25% of the year.

[1] Note: existing uses are those attained on or after November 28, 1975. Northfield Mountain started commercial operation on November 30, 1972.

[2] CRC is not aware if the agencies will require this as part of the new license.

This information is significant because the additional volume in the upper reservoir, though available, was never designed to be used on a regular basis throughout the year, especially during the lower flow months. The table below summarizes the volumes available.

	Current License (acre ft) – Existing Requirements	**New License – FirstLight Proposed Requirements (acre-ft)**	**Implications**
Upper reservoir	**12,318 acre-ft** 1000.5 -938 ft elevation range	**15,327 acre-ft** 1004.5-920 ft elevation range	Expanded volume is 3,009 more acre ft than under the current license.
Water available in TFI for lower reservoir	Total TFI to elevation 185 ft is 20,300 acre-ft. The storage amount between 176 and 185 is 16,150 acre-ft. The amount that was created for Northfield Mountain by raising the dam is **12,600 acre-ft, which is equal to the upper reservoir storage amount**.	12,600 acre-ft was originally for Northfield Mountain operations. Total between the requested elevations is 16,150 acre-ft (used for operations at Turners Falls and minimum flows).	No additional acre ft is being created in the impoundment. Extra volume used for the upper reservoir will need to be "borrowed" from water available in the Connecticut River.

Note: the information on the upper reservoir storage comes from Figure 2.3-1 in Exhibit B in the AFLA for Northfield Mountain. The information on the TFI storage comes from the previous license and Figure 2.3-1 in Exhibit B in the AFLA for Turners Falls Dam.

Section 2.3 of Exhibit B in the AFLA shows that FirstLight strives to maintain a near balanced condition or a positive balance where the combined useable storage is close to 12,318 acre-ft. If FirstLight is allowed to use the 15,327 acre-ft in the upper reservoir, Northfield could need to "borrow" water available in the Connecticut River. Model outputs FirstLight have shown indicates they will be keeping the TFI at an average elevation 0.5-1.0 ft higher than they have historically (for the months and years that were shown to stakeholders). We have previously observed the same pattern, TFI held 0.5 ft higher, during temporary amendment periods when FirstLight was required to release impoundment data to the public. CRC filed a Motion to Intervene for a temporary license amendment dated November 21, 2016, observing that FirstLight's 2015-2016 Amendment Report showed that the average lower reservoir elevation was half a foot higher, 181.7 ft during the 2015-2016 amendment period, compared to 181.2 ft during non-amendment years. This was also the case during the 2014-2015 amendment period. For additional information why that is a concern from an erosion standpoint, please see a response letter filed with FERC by CRC and the Franklin Regional Council of Governments dated November 9, 2017.

Full and unrestricted use of the extra volume in the upper reservoir will likely lead to larger TFI fluctuations and make impairments worse, and therefore CRC recommends that it only be allowed under very limited scenarios or emergency circumstances.

2. *Manage Recreation Impacts to Protect Boating and Fishing*

At the Turners Falls Dam

The current license allows FirstLight to vary the water elevation of the impoundment from 176 to 185 ft above mean sea level, as measured at the Turners Falls Dam. FirstLight is requesting the same range in the new license.

The existing license allows FirstLight to bring water levels down so low that Barton Cove cannot be adequately used for boat recreation and safety boat use. This was especially evident last June, when the impoundment levels dipped low enough that FERC received a complaint and issued a letter to FirstLight requesting information to make sure the license parameters were followed. FirstLight's response dated June 23, 2021 stated that the reservoir levels reached a low of 177.5 ft msl during June 12-13, 2021. These levels are within the license limits. Photos below were posted on Facebook.

Franklin County Boat Club at Barton Cove in Gill on June 12-13, 2021

Connecticut River shoreline during June 12-13, 2021, as posted on Facebook

After the low water level occurrence, the month of July in 2021 was unusually rainy, and water levels were kept so high that boaters also had trouble launching boats and using boat ramps. This indicates that the upper end of the allowable range is also problematic for boating.

Relicensing Study 3.6.6 Assessment of Effects of Project Operation on Recreation and Land Use Study Report evaluated water levels at recreation sites. Section 4.2.6 concludes that water level elevations need to be above 179 ft msl to adequately launch an emergency motorboat. Figure 4.2.6-4 shows that the boat ramp elevation is at 184 ft msl, so when the TFI is above this elevation, parts of Barton Cove on the Gill side are under water. Figure 4.2.6-5 is a HEC-RAS analysis showing that the impoundment levels are below 184 ft 100% of the time and are above 179 ft approximately 97% of the time during the summer months under current operations. These historical analyses of water levels do not predict how FirstLight will operate Northfield Mountain into the future. Indeed, the June 2021 event appears to be in response to FirstLight's price seeking of low (or even the potentially likely instances of negative) energy prices for the operation of Northfield. It is clear that summertime renewable energy generation

during the daytime will create instances of abundant electricity on the grid and so significant revenue opportunities for FirstLight.

CRC recommends that the impoundment be kept within the range of 179 -184 msl. Deviations below 179 would need to be an exceptional occurrence. Deviations above 184 would happen only during high water times of the year. Under current operations, these conditions are already met 97% of the time.

These water level recommendations will also be beneficial for fish protection. The fish and flow AIP provides for downstream fish passage protection at Northfield Mountain by installing a barrier net. Based on the fish barrier net study and Relicensing Study 3.3.9, velocities at the net during pumping are higher during the low impoundment scenarios. If river levels are kept above 179 ft at the dam and 181 ft at Pauchaug, that will result in less of a chance of fish entrainment.

Water levels at Pauchaug Boat Ramp

Relicensing study 3.6.6 also looked at water levels at Pauchaug Boat ramp, and concluded that water levels needed to be above 181 for the boat ramp to be usable for emergency motor boats. Figure 4.2.2-3 indicates water levels dip below this level about 20% of the time in the recreation season. CRC's analysis in the comment letter on this study dated December 15, 2016 analyzed water level logger data and demonstrated that during summer months, it is common that water levels at Pauchaug are below 181 during the morning hours. While the new minimum flows coming from Great River Hydro's Vernon Dam may help improve this situation, we believe the elevation dips are related more to Northfield Mountain's cycles of pumping and generating.

In addition to the water level constraints noted above CRC recommends that Northfield Mountain pump at a more gradual rate in order to maintain navigable water levels (>181 ft msl) during the recreation season.

Barton Cove siltation

Barton Cove is filling up with sediment due to the presence of Turners Falls Dam, raised in elevation in the early 1970's to build Northfield Mountain pumped storage. Sediments naturally precipitate to the bottom of impounded areas. More sediment has been added by erosion that has occurred in the impoundment since the installation and operation of Northfield Mountain, combined with events like the 2010 Northfield Mountain upper reservoir maintenance disaster and Tropical Storm Irene in 2011. It is increasingly difficult to navigate boats to the Gill side of Barton Cove during low water. During the course of the next license period, there should be a feasibility study and environmental assessment of some level of dredging in non-archaeologically sensitive portions of Barton Cove.

C. Addressing stream bank alteration impairments

1. Develop and Implement an Adaptive River Management Plan

Five hydropower facilities are being relicensed on the mainstem Connecticut River at the same time. As part of the 401 Water Quality Certificates for all the projects, there should be an Adaptive River Management Plan for the entire five-project area that treats the area as a system and provides a similar approach across project areas.

Rapid drawdown of the river level can impair bank stability, and can cause seepage, tension crack development, and ultimately slope failure along a rotational slip surface. Rapid rising of water levels along a riverbank can also cause bank stability problems.[3] Operational changes are proposed at all 5 projects, and these may impact erosion positively or negatively.

We envision a process during which stakeholders involved in the five projects and the two companies, together with consultants, develop an Adaptive River Management Plan for the Connecticut River to monitor and mitigate the impacts of the operation/management of the 5 hydro projects and restore, enhance, and protect riverine functions to provide habitat, protect riparian land and cultural/historic artifacts, and recreation areas. We envision a process outlined below.

I. Create stakeholder group with FirstLight, Great River Hydro, state agencies, towns, regional planning agencies, landowners, and nongovernment organizations (does not have to be those signing on to a settlement agreement)

II. Establish goals
   a. Identify the resource areas and ecosystem attributes that are important to restore, enhance, and protect
   b. Identify a systems or conceptual model to use as framework (e.g., Interdam Sequence Conceptual Model[4])
   c. Maintain as many riverine processes as possible given the presence of the dams/pumped storage
      - Bar and bend geomorphology
      - Sediment flushing
   d. Protect archaeological sites, agricultural land, and infrastructure that can't easily be moved.
   e. Identify jurisdictional boundaries for state and federal wetlands

III. Monitor and Study
   a. Establish baseline conditions using principles and science of fluvial geomorphology.
   b. Identify data gaps
   c. Geomorphic function
   d. Riparian habitat attributes
   e. Land use practices
   f. Seepage/groundwater movement
   g. Erosion and deposition on inside and outside bends
   h. Establish 3rd-party monitoring that has buy-in from project owners and stakeholders
   i. Monitor stabilized and treated banks
   j. Build success/fail criteria
   k. Document monitoring protocol in a Quality Assurance Project Plan

[3] See page 15 of "Run-of-river Hydroelectric Dam Bank Erosion and Cultural Resources in VT" by G. Robert Brakenridge of University of Colorado, December 2021.

[4] Katherine J. Skalaka, Adam J. Benthem, Edward R. Schenk, Cliff R. Huppa, Joel M. Galloway, Rochelle A. Nustad, Gregg J. Wiche. Large dams and alluvial rivers in the Anthropocene: The impacts of the Garrison and Oahe Dams on the Upper Missouri River. In Anthropocene Volume 2, Pages 1-102 (October 2013), Geomorphology of the Anthropocene: Understanding the Surficial Legacy of Past and Present Human Activities. Edited by Anne J. Jefferson and Karl W. Wegmann.
http://www.swc.nd.gov/pdfs/oct_2013_impacts_garrison_oahe_upper_missouri.pdf

IV. Restore/Adapt
   a. Protection of banks where there are archaeological resources that should not be losst
   b. If fail criteria triggered, establish remediation approach where needed
   c. Appropriate treatment techniques
   d. Schedule in review and updates to process

2. *Minimize Impacts to Shoreline Areas to Mitigate Erosion*

Studies show that the cyclic process of wetting and drying the banks lead to increased rates of bank erosion. We assume that in the 50 years that Northfield Mountain has been operating, that the river has begun some process of adjusting to the operational pattern. Changing an average elevation during the next license period would initiate a new period of destabilization (please see above B(1)).

CRC looked at the historic TFI levels provided by FirstLight for the months of August and November of the years 2009, 2015, 2016, and 2017, which were the years and months that Great River Hydro provided of their modeled proposed flex ops and for which FirstLight also ran their model (the model runs themselves are not public during settlement discussions).

We are calling the "daily delta" to be maximum elevation minus the minimum elevation in a calendar day. The average daily delta for a month has been in the range of 2.1 to 3.1 ft, as measured at the dam. The difference between the lowest low elevation and the highest high elevation for each month ranges between 3.7 (November 2016) and 5.9 ft (August 2009). This represents the wetted range for the months of August and November, which are not typically high flow months.

Looking upstream of Northfield Mountain, the average monthly river elevation at the Northfield USGS gage located near the Route 10 bridge ranges from 11.1 to 14.2 ft gage height. According to USGS, the Northfield USGS gage is at elevation 170 ft (NAVD1988; personal communication from Timothy Sargent dated 11/26/2018). This means the average monthly river elevation ranges from 181.1 ft to 184.2 ft. The lowest average monthly elevations can happen June through September.

At the Northfield USGS gage, the average daily delta for each month between June of 2019 and this year has ranged from 1.5 to 3 ft. The average daily delta tends to be highest in the summer months of June, July, and August, typically having been a little below or above 2.5 ft.

CRC recommends that there be stipulations put in place such that conditions not get worse. That means, the *average* river elevations should remain the same and the average daily and monthly deltas should not increase. In other words, **TFI should be kept at an average elevation over a month of 181 to 182.5 ft**. **The average daily delta for a month should not be above 3.5 ft, and the average min vs. max elevation over the course of a month should not be greater than 6 ft, except in high flow/flooding conditions.**

Summary of CRC recommendations

FirstLight AIP proposal	**FirstLight AIP or AFLA proposal**	**CRC recommendations**
Aquatic invasive species	Invasive species management plan as submitted in the AFLA, which did not address aquatic invasives	FirstLight update invasive species management plan in consultation with agencies and CRC to include commitment to work on removing aquatic invasive plants in the TFI and TF canal system.
TFI limit as measured at the dam	176-185 ft	179-184 ft, with deviations allowed during extreme situations of flow/energy needs
River levels at Pauchaug boat ramp	NA	Maintain water levels > 181 ft by pumping more gradually
Barton Cove siltation	NA	During the new license period, a feasibility study and environmental assessment of sediment dredging in a portion of Barton Cove (consultation with archeologists and indigenous groups needed)
Adaptive River Management Plan	NA	FL contribute to creating and implementing an Adaptive River Management Plan for all 5 CT River projects.
Maintain river at an established average monthly elevation	NA	TFI should be held at an *average* monthly elevation similar (within an acceptable difference) to the historic average for that month over the previous 20 years of operations.
Average daily delta (TFI elevation from each hour of each day averaged for each month)	NA	< 3.5 ft
Range of wetted bank: maximum elevation minus minimum elevation for each month	NA	< 6 ft

Exhibit 4

To: Massachusetts Executive Office of Energy and Environmental Affairs ("EEA")
From: Connecticut River Conservancy; Earthrise Law Center
RE: Financial Assurances as Conditions of a Clean Water Act § 401 Water Quality Certification
Date: December 23, 2021

QUESTION PRESENTED

Does Massachusetts, under authority granted to it by Clean Water Act ("CWA") Title 33 U.S.C. § 1431(d) ("CWA § 401"), have the authority to require from hydropower facilities seeking CWA § 401 water quality certification for a Federal Energy Regulatory Commission ("FERC") license the financial assurances sufficient to decommission and remove a non-operating hydropower project once that license expires or the project is otherwise abandoned?

SHORT ANSWER

Yes. Multiple provisions of Massachusetts' water quality standards applicable to the Connecticut River, including those specific to waters influenced by hydropower facilities, provide support, independently and collectively, for requiring decommissioning and removal costs be included in a facility's CWA § 401 certification and thus incorporated into its FERC license.

STATUTORY BACKGROUND

The Clean Water Act implements a cooperative federalism model to "*restore* and maintain the chemical, physical, and biological integrity of the Nation's waters." 33 U.S.C. § 1251 (emphasis added). States are granted authority to impose conditions on federal permits to ensure that discharges not only meet water quality standards, but other requirements of state law. 33 U.S.C. 1342(a)(2). A CWA § 401 certification shall set forth "effluent limitations and other limitations" to ensure that the federal license or permit "compl[ies] with any applicable … limitations … and with any other appropriate requirement of State law." 33 U.S.C. § 1341(d). Conditions imposed by a State "shall become a condition on any Federal license or permit." *Id.*; *see also Am. Rivers, Inc. v. F.E.R.C.,* 129 F.3d 99 (2d Cir. 1997). Section 401 has been interpreted broadly to grant State agencies significant authority to impose conditions for the preservation of both state water quality standards, state-established designated uses, as well as other legislative goals.[1] *See PUD No. 1 of Jefferson Cty. v. Washington Dep't of Ecology*, 511

[1] The Trump administration promulgated a rule articulating a narrower interpretation of this CWA provision that has been successfully challenged in federal court. *See In Re Clean Water Act Rulemaking*, 2021 WL 4924844 (N.D. Cal. Oct. 21, 2021) (vacating the Trump EPA's CWA 401 Rule and remanding to EPA). On December 17, 2021, EPA released a document entitled *Clean Water Act Section 401 Water*

US 700 (1994); *see also, e.g., In re Morrisville Hydroelectric Project Water Quality,* 211 Vt. 233 (2019); *Trout Unlimited v. U.S. Dep't of Agric.,* 210 F. Supp.2d 1090 (D. Colo. 2004); *Friends of Merrymeeting Bay v. Olsen*, 839 F. Supp. 2d 366, (D. Me. 2012). Because of the broad statutory language and cooperative federalism scheme found in the CWA, there are multiple avenues of support for imposing decommissioning and removal costs in the CWA § 401 certification process broadly, as well as in the context of certain portions of the Connecticut River specifically.

PRECEDENT IN MASSACHUSETTS FOR REQUIRING FINANCIAL ASSURANCES

Requiring decommissioning funding for large infrastructure projects is not a novel concept. Industrial solar facilities, wind turbines, nuclear power plants, and landfills all pose environmental and public health risks to the communities where they are sited once their useful operational life is over. And they all require significant financial expenditures to decommission safely. Accordingly, the facility owners are typically required to provide financial assurance, either at the federal, state or local level—often in the form of a surety bond or proof of a decommissioning fund—in order to build and/or continue operating such facilities.[2] Requirements for such funds are good public policy to prevent host communities and/or taxpayers from bearing the financial burden if the owner/operator does not adequately plan for decommissioning.

Hydropower facilities, both large and small, are also expensive to decommission and pose similar environmental and public health risks and impacts when they are no longer operating (e.g., ongoing adverse impacts to habitat, obstruction of fish passage, dangers of breaching and flooding risks). Accordingly, Massachusetts must also require financial assurances for their decommissioning and removal, especially since (1) there is a clear trend toward removing old dams and restoring natural river flows; (2) unlike some of the other facilities discussed above,

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Quality Certification Questions and Answers on the 2020 Rule Vacatur, which confirmed that the 1971 regulations preceding the vacated Trump EPA's rule again govern the CWA § 401 certification process. *See* https://www.epa.gov/system/files/documents/2021-12/questions-and-answers-document-on-the-2020-cwa-section-401-certification-rule-vacatur-12-17-21-508.pdf.

[2] In our earlier memorandum transmitted to Beth Card and Stephanie Cooper on September 28, 2021 ("CRC Decom Memo 1"), we cited to examples of states, including Massachusetts, requiring financial assurances for other energy generating infrastructure. *See* CRC Decom Memo 1, at 4–5. For example, Massachusetts' model ordinance for wind energy facilities contains a financial surety provision at 3.12.3. *See* https://www.mass.gov/doc/wind-model-bylaw-mar-2012pdf/download.

hydropower facilities use and impact rivers, a public trust resource; (3) federal licenses for dams can last up to 50 years, meaning some of the dams being relicensed today will be nearly a century old (and some far older since they existed before their original FERC licenses) when their new license expires; and (4) it is good public policy as evidenced by the similar requirements imposed on other energy-generating facilities.

While FERC could condition its licenses with financial assurances for decommissioning and removal,[3] CRC is unaware of FERC ever exercising this authority. Thus, it is incumbent upon Massachusetts to exercise its authority under CWA § 401(d) and Massachusetts SWQS to require such assurances. Such a proactive approach to financing dam removal would be consistent with Massachusetts' efforts to remove derelict dams throughout the state.[4] It also would be consistent with the positions of several federal resource agencies. For example, the U.S. Fish and Wildlife Service recently told FERC it supported financial assurances for decommissioning funds, stating:

> The Service also recommends that financial assurances address decommissioning costs, including the removal of project infrastructure and the restoration of habitat when a licensee or exemptee surrenders its license or otherwise voluntarily abandons a project. This would ensure projects that are abandoned do not pose a risk to the environment and would reduce the risk that taxpayers and ratepayers would have to pay to remove project infrastructure and restore habitat if a project is abandoned.[5]

The U.S. Fish and Wildlife Service clearly articulates the risk of *not* conditioning CWA § 401 certification on financial assurances for decommissioning and removal: local communities, taxpayers and ratepayers will be stuck with an enormous bill for removing deadbeat dams and restoring river habitat.

MASSACHUSETTS SURFACE WATER QUALITY STANDARDS PROVIDE A BASIS FOR REQUIRING DECOMMISSIONING AND REMOVAL COSTS

There is ample support in Massachusetts' Surface Water Quality Standards ("SWQS"), 314 CMR 4.00, *et. seq.*, for the goal of restoring rivers to their original conditions, which necessarily

[3] 60 Fed. Reg. 339, 340 (Jan. 4, 1995), available at https://www.govinfo.gov/content/pkg/FR-1995-01-04/pdf/95- 63.pdf.
[4] *See, e.g.,* https://www.mass.gov/info-details/river-run-a-story-of-dam-removal-in-massachusetts.
[5] U.S. Fish and Wildlife Service Comments on the Federal Energy Regulatory Commission's Notice of Inquiry on Financial Assurance Measures for Hydropower Projects, Docket RM21-9-000, at pdf page 4 (March 26, 2021).

includes decommissioning and removing a hydropower facility at the end of its useful life. Given this clear and direct nexus to water quality, a condition in a state's CWA § 401 certification requiring hydropower facilities provide financial assurances sufficient to decommission and remove a non-operating hydropower project falls squarely within the scope of CWA § 401(d). We set forth the specific Massachusetts SWQS supporting such a condition below.

314 CMR 4.01: Massachusetts SWQS impose a "duty and responsibility" upon DEP to "protect the public health and enhance the quality and value of the water resources of the Commonwealth" and "direct[] the Department to take all action necessary or appropriate to secure the Commonwealth the benefits of the Clean Water Act." 314 CMR 4.01(4). In turn, the Purpose provision of the SWQS explicitly incorporates the seminal objective of the CWA, which is "the *restoration* and maintenance of the chemical, physical, and biological integrity of the Nation's waters." *Id*. (emphasis added). The plain meaning of "integrity" is the state of being whole and undivided."[6] Dams, whether operational or not, divide rivers and disrupt their chemical, physical and biological integrity. Decommissioning and removal financial assurances directly relate to the "restoration" prong, a value that is emphasized expressly in the state regulations, including those specific to dams as discussed further below. Thus, conditioning a CWA § 401 certification on a hydropower facility providing adequate financial assurances for decommissioning and removal falls squarely within the very purpose of Massachusetts SWQS.

314 CMR 4.03(3): The Hydrologic Conditions provision of Massachusetts' SWQS directly addresses state waters containing dams and other hydropower facilities, and sets forth a clear mandate: "When the Department issues a 401 Water Quality Certification of an activity subject to licensing by the Federal Energy Regulatory Commission, flows shall be maintained or *restored* to protect existing and designated uses." 314 CMR 4.03(3)(b) (emphasis added). This is perhaps the most applicable SWQS provision as it deals directly with FERC-licensed dams and CWA § 401 certifications, and specifically contemplates *restoration* of flows, which would occur if a dam or other hydropower facility were decommissioned and removed. Thus, requiring financial assurances that would achieve such restoration finds direct support in this provision.

314 CMR 4.03(4): Massachusetts SWQS must balance competing public interest goals when it comes to *operating* hydropower facilities. In cases where dams preclude the attainment of a

[6] https://www.merriam-webster.com/dictionary/integrity.

designated use, DEP may remove that use, after a Use Attainability Analysis, so long as "it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use." 314 CMR 4.03(4)(d). This provision provides support for requiring financial assurances in two ways. First, it explicitly contemplates restoring a river to "its original [undammed] condition," which is precisely what funding decommissioning and removal would accomplish. Second, it highlights a negative, and perhaps unintended, consequence of *not* requiring financial assurances. Once a dam is no longer operating and therefore no longer making money, it may make it easier for the facility owner/operator to argue that it is not "feasible" to restore the waterbody to its original condition, thus paving the way for the removal of whatever use cannot be obtained while the dam exists. On the other hand, if financial assurances for decommissioning and removal are required as part of the CWA § 401 certification, it negates a non-feasibility argument from the facility owner/operator.

314 CMR 4.05 (Designated Uses): Massachusetts SWQS designate the most sensitive uses "for which the various waters of the Commonwealth shall be enhanced, maintained and protected." 314 CMR 4.01(4). The stretch of the Connecticut River adjacent to the Turners Falls Dam and the Northfield Pump Station is listed as Class B waters, which are designated "as habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation." 314 CMR 4.05(3)(b). It is indisputable that the Turners Falls Dam and Northfield Pump Station have negative impacts—including flow impairment, temperature increases, impingement and entrainment, and habitat alteration and erosion, among others—on these designated uses.[7] In fact, it is far from clear to CRC how Massachusetts will be able to certify that the operations of those facilities, as currently proposed, will meet SWQS as part of their FERC relicensing process. However, once the facilities are no longer operational, their presence in the river will *per se* violate SWQS. Further, given that the FERC licenses last for decades, there is tremendous

[7] The Draft Massachusetts Integrated List of Waters for the Clean Water Act 2018/2020 Reporting Cycle lists the section of the Connecticut River between the Northfield Pump Station and the Turners Falls Dam as impaired due to Flow Regime Modification and Alteration in stream-side or littoral vegetative covers. *See* https://www.mass.gov/doc/draft-massachusetts-integrated-list-of-waters-for-the-clean-water-act-20182020-reporting-cycle/download, at 168. The river section below the Turners Falls Dam is listed as impaired due to Flow Regime Modification and Dewatering, among other impairments. *Id*.

uncertainty regarding what the existing and designated uses of that portion of the Connecticut River will be when the licenses expire. For example, will there be additional species listed as threatened or endangered under the Endangered Species Act in that portion of the river that are negatively impacted by the presence of the non-operational hydropower facilities? Requiring financial assurances sufficient to decommission and remove such facilities—especially given the uncertainty of river conditions when the licenses expire—has a direct nexus to and clearly supports DEP's mandatory duty set forth in the SWQS to protect and enhance designated uses.

314 CMR 4.05(5): In addition to the specific water quality criteria associated with Class B waters to protect and enhance those designated uses, all surface waters in Massachusetts shall be free from "from alterations that adversely affect the physical or chemical nature of the bottom, interfere with the propagation of fish or shellfish, or adversely affect populations of non-mobile or sessile benthic organisms." 314 CMR 4.05(5)(b). Non-operational dams constitute such alterations, and, as such, requiring financial assurances for their decommissioning and removal is supported by this SWQS as well.

THE PUBLIC TRUST DOCTRINE SUPPORTS REQUIRING FINANCIAL ASSURANCES FOR DECOMMISSIONING AND REMOVAL COSTS

The public trust doctrine, codified in both the Massachusetts Constitution, as well as the General Laws, provides another basis of support to require financial assurances for decommissioning and removal of hydropower facilities. *See* Mass. Const. art. XLIX, as amended by art. XCVII; *see also* G.L. 91 § 2 (2016). Using trust-like language, DEP is charged with the "effective planning and management of water use and conservation in the commonwealth" to "ensure an adequate volume and quality of water for all citizens of the commonwealth, both present and future." Mass. Gen Laws Ann ch. 21G, § 3. DEP, through its regulations, defines "trust lands" as "present and former waterways in which the fee simple, any easement, or other proprietary interest is held by the Commonwealth in trust for the benefit of the public." 310 CMR § 9.02. These statutes and regulations are evidence of the Commonwealth of Massachusetts adopting the public trust doctrine into State law, which brings it within the purview of CWA 33 U.S.C. § 1341(d).

The Connecticut River is one of the few geographic areas explicitly listed as "trust lands" in state regulations. *See* 310 CMR § 9.04(1)(b). Accordingly, Massachusetts can require financial assurances pursuant to its public trust obligations for the Connecticut River, which have been

codified in state law. Arguably, *not* requiring such financial assurance would constitute a breach of Massachusetts' duty to protect an identified trust resource. This is especially the case when a hydropower facility is no longer operational. At that point, there is no countervailing public benefit—electricity generation—to offset the ongoing impairment of the trust resource.

CONCLUSION

This memorandum is not intended to provide an exhaustive list of state laws that provide a basis for requiring financial assurances as a condition of CWA § 401 certification. There may be other state laws related to protection of aquatic species and habitat, or addressing climate change or flood control that also are applicable. But, at a minimum, the provisions of Massachusetts' SWQS discussed above and the public trust doctrine provide more than ample nexus and support for the state to require financial assurances from hydropower owners and operators sufficient to decommission and remove a non-operating hydropower facility, especially since some of those facilities will have been in operation for a century when their renewed licenses expire. Conditioning CWA § 401 certifications on such financial assurances will ensure that federal and state requirements are met and that the physical, chemical, and biological integrity of rivers, including unobstructed flows, are *restored* to protect existing and designated uses. Requiring such financial assurances also will ensure that the Massachusetts tax and ratepayers and host communities are not burdened with the bill for such restoration, which is good public policy already being practiced in the context of many other energy generating projects throughout the state.