

**Revised Draft Biological Assessment
for Shortnose Sturgeon
Federal Relicensing of the
Northfield Mountain Pumped Storage Project (No. 2485)
and the
Turners Falls Hydroelectric Project (No. 1889)**

Prepared for:



Prepared by:



Kleinschmidt

Submitted to:



MARCH 2024

TABLE OF CONTENTS

Executive Summary	1
1 Introduction.....	3
1.1 Background.....	3
1.2 Federally Listed Species Considered in this Biological Assessment.....	4
1.3 NMFS Consultation Record	4
1.4 Purpose of this Document.....	5
2 Project Layout and Current Operations	6
2.1 Existing Facilities	6
2.1.1 Turners Falls Project	6
2.1.2 Northfield Mountain Project	7
2.2 Current Operations.....	11
2.2.1 Turners Falls Project	11
2.2.2 Northfield Mountain Project	11
3 Proposed Actions.....	12
3.1 Proposed Project Facilities	12
3.1.1 Proposed Generation Facilities.....	12
3.1.2 Proposed Non-Generation Facilities- Fish Passage.....	12
3.1.3 Proposed Non-Generation Facilities- Recreation	14
3.2 Proposed Project Boundary	15
3.3 Proposed Project Safety	16
3.4 Proposed Project Operations.....	16
3.5 Proposed Environmental Measures	17
4 Action Area.....	28
4.1 Geographic Area of Project Effects	28
4.1.1 Construction	28
4.1.2 Maintenance	28
4.1.3 Operations	28
4.2 Affected Environment	30
5 Status of Affected Species.....	32
5.1 Rangewide Threats to Shortnose Sturgeon Recovery.....	32
5.2 Population Status and Trends of Shortnose Sturgeon.....	32
5.2.1 Rangewide.....	32
5.2.2 Connecticut River.....	32
5.2.3 Action Area	34
5.3 Shortnose Sturgeon Life History	34

5.3.1	Growth, Maturity, Fecundity, and Mortality Rates	34
5.3.2	Use of Riverine and Estuarine Environments	34
5.3.3	Use of Coastal Environments	36
5.4	Shortnose Sturgeon Movements, Habitat Use and Current Project Effects in the Action Area ..	37
5.4.1	Upstream Extent of Migration and Habitat Use	39
5.4.2	Spawning Migrations and Habitats	40
5.4.3	Egg/Larvae Maturation and Habitats.....	43
5.4.4	Dispersal of Fry	43
5.4.5	Adult and Juvenile Foraging	43
5.4.6	Juvenile Migrations	44
5.4.7	Overwintering.....	44
6	Environmental Baseline.....	45
6.1	Effects of Federal Actions that have Undergone Formal or Early Section 7 Consultation	45
6.2	Non-Federally Regulated Actions	45
6.3	Other Factors	46
6.3.1	Shortnose Sturgeon Life History	46
6.3.2	Dams.....	47
6.3.3	Natural Stochastic Events.....	51
6.3.4	Scientific Studies.....	52
6.3.5	Contaminants and Water Quality	52
6.3.6	Interactions with Native and Non-native Species.....	53
6.3.7	Climate Change	54
6.3.8	Conservation and Recovery Actions Reducing Threats to Listed Species.....	56
7	Effects of the Proposed Actions	57
7.1	Protection, Mitigation, and Enhancement Measures	57
7.1.1	Fish Passage Measures – Construction and Operation.....	57
7.1.2	Construction, Operation, and Maintenance of Eel Passage Measures.....	58
7.1.3	Construction and Maintenance of Recreation Areas	58
7.2	Project Operations	62
7.2.1	Measures Developed for Shortnose Sturgeon	63
7.2.2	Overall Flow Proposal.....	93
7.2.3	Other Operations	102
7.2.4	Temporary Modifications to Operations	103
7.3	Summary of Effects	104
8	Conclusion	105
9	Literature Cited	106

LIST OF APPENDICES

Appendix A: Flows and Fish Passage Settlement Agreement, March 2023
Appendix B: Recreation Settlement Agreement, June 2023
Appendix C: Consultation Record
Appendix D: Proposed Project Boundary
Appendix E: SNS Handling Plan

LIST OF TABLES

Table 4.1.3-1: River Miles of Major Project Features	28
Table 7.2.1.1-1: Percent of Maximum Potential Modeled Habitat Provided by Proposed April/May Bypass Flows to Spawning SNS.....	66
Table 7.2.1.1-2: Range of Suitable Habitat Area for SNS Spawning Proposed and Baseline Conditions in Reach 3 given Low and High Deerfield River Flows	67
Table 7.2.1.2-1: Range of Suitable Habitat Area for SNS Rearing under Proposed and Baseline Conditions in Reach 3 given Low and High Deerfield River Flows	79

LIST OF FIGURES

Figure 2.1-1: Project Boundaries	8
Figure 2.1.1-1 Turners Falls Project Features.....	9
Figure 2.1.2-1 Northfield Mountain Project Features.....	10
Figure 4.1-1: Geographic Area of Project Effects Map	29
Figure 4.2-1: Affected Environment.....	31
Figure 5.4-1: Known Habitat Use by SNS in the Action Area	38
Figure 5.4.2-1: Documented Shortnose Sturgeon Spawning Locations in the Action Area.....	42
Figure 7.1.3-1: Wadability under Baseline Conditions.....	60
Figure 7.1.3-2: Wadability under Proposed Conditions.....	61
Figure 7.2.1.1-1: Distribution of Flows Modeled in Reach 1 for Baseline and Proposed Conditions during the SNS Spawning Period.....	68
Figure 7.2.1.1-2: Habitat vs. Flow Relationship for SNS Spawning in Reach 1	69
Figure 7.2.1.1-3: Map of Baseline and Proposed Minimum Flow Conditions for SNS Spawning in Reach 1	70
Figure 7.2.1.1-4: Distribution of Bypass Flows Modeled in Reaches 2 and 3 for Baseline and Proposed Conditions during the SNS Spawning Period.....	71
Figure 7.2.1.1-5: Habitat vs. Flow Relationship for SNS Spawning in Reach 2	72
Figure 7.2.1.1-6: Map of Baseline and Proposed Minimum Flow Conditions for SNS Spawning in Reach 2	73
Figure 7.2.1.1-7: Habitat vs. Flow Relationship for SNS Spawning in Reach 3 with Deerfield River Flow at 200 cfs.....	74
Figure 7.2.1.1-8: Habitat vs. Flow Relationship for SNS Spawning in Reach 3 with Deerfield River Flow at 1,445 cfs.....	75

Figure 7.2.1.1-9: Map of Baseline and Proposed Minimum Flow Conditions for SNS Spawning in Reach 3	76
Figure 7.2.1.2-1: Habitat vs. Flow Relationship for SNS Eggs and Larvae in Reach 1	80
Figure 7.2.1.2-2: Minimum Modeled Flow Provided during the June 1-15 Portion of the SNS Rearing Season in Reach 1	81
Figure 7.2.1.2-3: Map of Baseline and Proposed Minimum Flow Conditions for SNS Rearing in Reach 1	82
Figure 7.2.1.2-4: Habitat vs. Flow Relationship for SNS Eggs and Larvae in Reach 2	83
Figure 7.2.1.2-5: Minimum Modeled Flow Provided during the June 1-15 Portion of the SNS Rearing Season in Reach 2	84
Figure 7.2.1.2-6: Map of Baseline and Proposed Minimum Flow Conditions for SNS Rearing in Reach 2	85
Figure 7.2.1.2-7: Habitat vs. Flow Relationship for SNS Egg and Larvae in Reach 3 with Deerfield River Flow at 200 cfs.....	86
Figure 7.2.1.2-8: Habitat vs. Flow Relationship for SNS Egg and Larvae in Reach 3 with Deerfield River Flow at 1445 cfs.....	87
Figure 7.2.1.2-9: Map of Baseline and Proposed Minimum Flow Conditions for SNS Rearing in Reach 3	88
Figure 7.2.1.2-10: Habitat vs. Flow Relationship for SNS Fry in Reach 4.....	89
Figure 7.2.1.3-1: Percent Change in Flow over Rolling 24-hour Periods for Baseline and Proposed Conditions, April 15 – June 15	91
Figure 7.2.1.3-2: Percent Change in Flow over Rolling 24-hour Periods for Baseline and Proposed Conditions, June 16-30	92
Figure 7.2.2.2-1: Habitat vs. Flow Relationship for SNS Adult in Reach 1	95
Figure 7.2.2.2-2: Habitat vs. Flow Relationship for SNS Adult in Reach 2	96
Figure 7.2.2.2-3: Habitat vs. Flow Relationship for SNS Adult in Reach 3	97
Figure 7.2.2.2-4: Habitat vs. Flow Relationship for SNS Adults and Juveniles in Reach 4	98
Figure 7.2.2.2-5: Distribution of Flows Modeled Entering Reach 4 for Baseline and Proposed Conditions during the SNS Foraging Period	99
Figure 7.2.2.3-1: Distribution of Flows Modeled Entering Reach 4 for Baseline and Proposed Conditions during the SNS Overwintering Period	101

LIST OF ABBREVIATIONS

AFLA	Amended Final License Application
AMC	Appalachian Mountain Club
AW	American Whitewater
BA	Biological Assessment
BO	Biological Opinion
°C	degree Celsius
CAW	Crab Apple Whitewater, Inc.
CFR	Code of Federal Regulations
cfs	cubic feet per second
CI	confidence interval
CSO	combined sewer overflows
CT	Connecticut
CTDEEP	Connecticut Department of Energy and Environmental Protection
d	days
DO	dissolved oxygen
DPS	Distinct Population Segments
Draft BA	Draft Biological Assessment
ESA	Endangered Species Act
FERC or Commission	Federal Energy Regulatory Commission
F/F Agreement	Flows and Fish Passage Settlement Agreement
FirstLight	FirstLight Hydro MA LLC and Northfield Mountain LLC
FLA	Final License Application
FRCOG	Franklin Regional Council of Governments
ft	feet
GHG	World Greenhouse Gases
h	hour
ha	hectare
HEC-RAS	Hydrologic Engineering Center's River Analysis System
HEC-ResSim	Hydrologic Engineering Center's Reservoir System Simulation
HG&E	Holyoke Gas and Electric
ILP	Integrated Licensing Process
ISO-NE	ISO-New England
ITS	Incidental Take Statement
km	kilometer
L	liter
MA	Massachusetts
MDCR	Massachusetts Department of Conservation and Recreation
MDEP	Massachusetts Department of Environmental Protection
MDFW	Massachusetts Division of Fisheries and Wildlife

Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)
SHORTNOSE STURGEON DRAFT BIOLOGICAL ASSESSMENT

NHESP	Massachusetts Natural Heritage and Endangered Species Program
mg	milligram
m	meter
mm	millimeter
mtDNA	mitochondrial deoxyribonucleic acid
MW	megawatt
NADW	North Atlantic Deepwater
NE FLOW	New England Flow
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NGVD29	National Geodetic Vertical Datum of 1929
Northfield Mountain Project	Northfield Mountain Pumped Storage Project (FERC No. 2485)
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRF	Naturally Routed Flow
PAD	Pre-Application Document
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
PM&E	Protection, Mitigation, and Enhancement
PSP	Proposed Study Plan
Project(s)	Collectively the Turners Falls Hydroelectric Project (FERC No. 1889) and the Northfield Mountain Pumped Storage Project (FERC No. 2485)
Recreation Agreement	Recreation Settlement Agreement
s	second
SD1	Scoping Document 1
SD2	Scoping Document 2
SNS	Shortnose Sturgeon
SPDL	Study Plan Determination Letter
RPA	reasonable and prudent alternative
TFI	Turners Falls Impoundment
TL	total length
Turners Falls Project	Turners Falls Hydroelectric Project (FERC No. 1889)
USACE	United States Army Corps of Engineers
USFWS	United States Fish Wildlife Service
USGS	United States Geological Survey
VY	Vermont Yankee
WUA	Weighted Usable Area
YOY	young of year
ZO	Zoar Outdoor

EXECUTIVE SUMMARY

FirstLight MA Hydro LLC is the owner of the Turners Falls Hydroelectric Project (Turners Falls Project, FERC No. 1889). Northfield Mountain LLC is the owner of the Northfield Mountain Pumped Storage Project (Northfield Mountain Project, FERC No. 2485). Collectively referred to as FirstLight, the owners are seeking to relicense the hydroelectric projects with the Federal Energy Regulatory Commission (FERC).

The Turners Falls Project and Northfield Mountain Project are collectively referred to as the Project(s). As part of relicensing, FirstLight filed Amended Final License Applications (AFLA) in December 2020, which included proposals for continued operation of the Projects. FirstLight also included Draft Biological Assessment with the AFLA. Since the AFLA filings, settlement discussions occurred resulting in a Flows and Fish Passage Settlement Agreement (F/F Agreement) that was filed with FERC on March 31, 2023.¹ The F/F Agreement resolved issues pertaining to Project operations (minimum flows, ramping rates, stabilized flows, recreational boating flows, water levels, etc.) and fish passage. The F/F Agreement was signed by FirstLight, United States Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), Massachusetts Division of Fisheries and Wildlife (MDFW), The Nature Conservancy (TNC), American Whitewater (AW), Appalachian Mountain Club (AMC), New England Flow (NE FLOW), Crab Apple Whitewater, Inc. (CAW), and Zoar Outdoor (ZO). The F/F Agreement included draft license articles for FERC's consideration.

Also, since filing the AFLA, a Recreation Settlement Agreement (Recreation Agreement) was filed with FERC on June 12, 2023.² The Recreation Agreement resolved issues pertaining to recreation, including establishing conservation easements, creating new public access sites to the Connecticut River, campsites, parks, portages, trails and other measures. The Recreation Agreement was signed by FirstLight, National Park Service (NPS), Massachusetts Department of Conservation and Recreation (MDCR), Franklin Regional Council of Governments (FRCOG), the Towns of Erving, Gill, Montague and Northfield Massachusetts, Access Fund, AW, AMC, CAW, NE FLOW, Western Massachusetts Climbing Coalition and ZO. The Recreation Agreement included draft license articles and a Recreation Management Plan for FERC's consideration.

This Draft Biological Assessment (BA) was prepared to support FERC's submission of a request for Endangered Species Act (ESA) Section 7 consultation with the NMFS to consider the effects of two Proposed Actions – the relicensing of the Turners Falls Project and the relicensing of the Northfield Mountain Project. Since F/F and Recreation Agreements were reached on both Projects, the effects of the measures included in these agreements are evaluated in this Draft BA.

Shortnose Sturgeon (SNS) is the only federally listed fish species that could be affected by the Projects that is under the jurisdiction of NMFS. Other federally listed species under the jurisdiction of the United States Fish and Wildlife Service (USFWS) are addressed in a separate Draft BA. SNS are listed as endangered throughout their range. No critical habitat has been designated for SNS under the ESA.

The population of SNS in the Connecticut River historically ranged upstream to Great Falls, which is the current location of the Turners Falls Dam. The upstream portion of the population has been primarily isolated from the downstream portion since the historic construction of dams below Turners Falls, and remains divided by the Holyoke Dam, though recent fish passage improvement efforts have substantially increased the number of adult SNS moving from the lower portions of the Connecticut River to areas upstream of Holyoke Dam.

Studies performed at the Projects during relicensing informed FirstLight's development of several measures to enhance conditions for SNS in relation to the baseline condition (i.e., conditions that include Project

¹ FERC Accession No. 20230331-5600.

² FERC Accession No. 20230612-5219.

operations consistent with the existing license). These measures are expected to provide considerably more habitat for SNS spawning and rearing, which are the critical life stages for this species that are affected by Project operations and have been included in FirstLight's comprehensive proposal for relicensing. Based on the best available information on the status of endangered and threatened species under NMFS jurisdiction, the environmental baseline for the action area, the effects of the Proposed Actions, and the cumulative effects, it is concluded that the Projects are likely to adversely affect SNS because proposed construction is in close proximity to SNS habitat, and because proposed flows from the Projects affect habitat suitability for various life stages of SNS. However, the adverse effects of the Projects will be minimized, and conditions enhanced and improved for the Connecticut River population of SNS. As such, the Proposed Actions are not likely to jeopardize the continued existence of SNS.

1 INTRODUCTION

1.1 Background

FirstLight MA Hydro LLC owns and operates the Turners Falls Hydroelectric Project (Turners Falls Project, FERC No. 1889) located on the Connecticut River near Montague, MA. Northfield Mountain LLC owns and operates the Northfield Mountain Pumped Storage Project (Northfield Mountain Project, FERC No. 2485) located in Northfield, MA. The Turners Falls Project and Northfield Mountain Project are collectively referred to as the Project(s). The Northfield Mountain Project uses water from the Turners Falls Impoundment (TFI), which is created by the Turners Falls Dam, as part of its pumped-storage operations. Hereinafter the two owners are collectively referred to as FirstLight.

FirstLight, in accordance with Sections (§§) 5.17 and 5.18 of Title 18 of the Code of Federal Regulations (CFR), is filing with the Federal Energy Regulatory Commission (FERC, the Commission) separate license applications for the two Projects, although a combined Exhibit E – Environmental Analysis was developed. The current license for the Turners Falls Project was issued on May 5, 1980, and expired on April 30, 2018. The license for the Northfield Mountain Project was issued on May 14, 1968 and also expired on April 30, 2018. Both Projects currently operate under annual licenses. FirstLight filed Amended Final License Applications (AFLAs) on each Project with FERC on December 6, 2020, which included a Draft Biological Assessment (BA) on Shortnose Sturgeon (SNS). Since the AFLA filings, settlement discussions occurred resulting in a Flows and Fish Passage Settlement Agreement (F/F Agreement) that was filed with FERC on March 31, 2023 ([Appendix A](#)).³ The F/F Agreement resolved issues pertaining to Project operations (minimum flows, ramping rates, stabilized flows, recreational boating flows, water levels, etc.) and fish passage. The F/F Agreement was signed by FirstLight, United States Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), Massachusetts Division of Fisheries and Wildlife (MDFW), The Nature Conservancy (TNC), American Whitewater (AW), Appalachian Mountain Club (AMC), New England Flow (NE FLOW), Crab Apple Whitewater, Inc. (CAW), and Zoar Outdoor (ZO). The F/F Agreement included draft license articles for FERC’s consideration.

Also, since filing the AFLAs, a Recreation Settlement Agreement (Recreation Agreement) was filed with FERC on June 12, 2023 ([Appendix B](#)).⁴ The Recreation Agreement resolved issues pertaining to recreation, including establishing conservation easements, creating new public access sites to the Connecticut River, campsites, parks, portages, trails and other measures. The Recreation Agreement was signed by FirstLight, National Park Service (NPS), Massachusetts Department of Conservation and Recreation (MDCR), Franklin Regional Council of Governments (FRCOG), the Towns of Erving, Gill, Montague and Northfield Massachusetts, Access Fund, AW, AMC, CAW, NE FLOW, Western Massachusetts Climbing Coalition and ZO. The Recreation Agreement included draft license articles and a Recreation Management Plan for FERC’s consideration.

It should also be noted that there are three Projects owned by Great River Hydro (GRH) that are located upstream of the Project, which can affect inflows to the Turners Falls and Northfield Mountain Projects. Those upstream Projects, in downstream to upstream order, are the Vernon Hydroelectric Project (FERC No. 1904), Bellows Falls Hydroelectric Project (FERC No. 1855) and Wilder Hydroelectric Project (FERC No. 1892). These three GRH Projects previously had the same license expiration date as the FirstLight Turners Falls Project and Northfield Mountain Project (April 30, 2018). However, on January 16, 2015, TransCanada (now GRH) requested a 1-year license extension, which was granted by FERC on July 22, 2015 making the new license expiration date April 30, 2019. On May 9, 2019, the FERC authorized continued operation of the three GRH Projects and thus they are now operating under annual licenses. An agreement was reached between GRH and various resource agencies and stakeholders on December 1, 2020

³ FERC Accession No. 20230331-5600.

⁴ FERC Accession No. 20230612-5219.

regarding operation of those Projects.⁵ Changes to flow regimes from those Projects, as proposed, along with the Proposed Actions included herein, are anticipated to collectively result in more limited daily changes in flow in this segment of the Connecticut River than have occurred under the existing operational regimes. Changes to the inflows to the Turners Falls and Northfield Mountain Projects associated with relicensing of the upstream Projects have been incorporated into the analyses in this Draft BA.

1.2 Federally Listed Species Considered in this Biological Assessment

The Shortnose Sturgeon (SNS, *Acipenser brevirostrum*) is a federally endangered species listed under the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531-1543), throughout their range. SNS are known to occur below the Turners Falls Dam. SNS is the only federally listed fish species in areas affected by the Projects and the relicensing proposals that is under National Marine Fisheries Service (NMFS) jurisdiction. No critical habitat has been designated for SNS.

1.3 NMFS Consultation Record

FirstLight is relicensing the Projects using the Integrated Licensing Process (ILP), throughout which there have been intensive and documented consultation efforts between FirstLight and resource agencies, including NMFS. On October 31, 2012, FirstLight filed its Pre-Application Document (PAD) and Notice of Intent with the FERC. The PAD included FirstLight's preliminary list of proposed studies. FERC conducted a public scoping process during which various resource issues were identified. On December 21, 2012, FERC issued Scoping Document 1 (SD1) and preliminarily identified resource issues and concerns. On January 30 and 31, 2013, FERC held scoping meetings for the two Projects. FERC issued Scoping Document 2 (SD2) on April 15, 2013.

FirstLight filed its Proposed Study Plan (PSP) on April 15, 2013, and, per the Commission regulations, held a PSP meeting at the Northfield Visitors Center on May 14, 2013. Thereafter, FirstLight held ten resource-specific study plan meetings to allow for more detailed discussions on the studies. On June 28, 2013, FirstLight filed with the Commission an Updated PSP to reflect further changes to the PSP based on comments received at the meetings. On or before July 15, 2013, stakeholders filed written comments on the Updated PSP. FirstLight filed a Revised Study Plan (RSP) on August 14, 2013, with FERC addressing stakeholder comments.

On August 27, 2013, Entergy Corp. announced that the Vermont Yankee Nuclear Power Plant (VY), located on the downstream end of the Vernon Impoundment on the Connecticut River and upstream of the two Projects, would be closing no later than December 29, 2014. With the closure of VY, certain environmental baseline conditions were anticipated to change during the relicensing study period. On September 13, 2013, FERC issued its first Study Plan Determination Letter (SPDL) in which many of the studies were approved or approved with FERC modification. However, due to the impending closure of VY, FERC did not act on 19 proposed or requested studies pertaining to aquatic resources. The SPDL for these 19 studies was deferred until after FERC held a technical meeting with stakeholders on November 25, 2013, regarding any necessary adjustments to the proposed and requested study designs and/or schedules due to the impending VY closure. FERC issued its second SPDL on the remaining 19 studies on February 21, 2014, approving the RSP with certain modifications. Studies were completed over several subsequent years. The Draft License Application was filed with FERC on December 2, 2015, the Final License Application was filed with FERC on April 29, 2016, and an AFLA was filed on December 6, 2020.

FirstLight consulted with NMFS on March 29, 2018, (meeting) and on October 17, 2019 (conference call). At the March 29, 2018, meeting NMFS identified various concerns regarding SNS including the impact of

⁵ Memorandum of Understanding: Wilder, Bellows Falls, and Vernon Hydroelectric Projects FERC Relicensing, December 1, 2020. Filed on December 7, 2020 as part of GRH's Amended Final License Application. FERC Accession No. 20201207-5219.

Turners Falls Project operations on known SNS spawning and rearing habitat near the Cabot tailrace (see descriptions of Project components in Section 2). At the meeting, NMFS stated it is charged with recovering the SNS population, and that maximizing spawning habitat gives SNS the best opportunity for recovery. NMFS noted that the success of early life stages is also critical to SNS restoration. NMFS stated it was seeking to increase spawning and rearing habitat not only in the documented locations, but in other areas of the bypass.

On the October 17, 2019, conference call, NMFS identified the following potential adverse effects of the Turners Falls Project on the SNS action area:

- The magnitude of flow in the bypass reach during the spawning and rearing period.
- Cabot peaking operations (sudden changes in flow) during the spawning and rearing periods.
- The frequency of Cabot emergency spill releases and bypass flume (log sluice) discharges on spawning and rearing habitat

NMFS noted that it is seeking higher flows in the bypass reach during the spawning and rearing period, reduced flow fluctuations from Cabot Station and reduced use of the Cabot emergency spill gates.

On April 17, 2020, FirstLight sent NMFS a preliminary Draft Biological Assessment (BA) of SNS for review and comment. On May 8, 2020, and June 8, 2020, FirstLight and NMFS had conference calls to discuss the preliminary Draft BA. On June 24, 2020, NMFS returned a marked-up copy of the preliminary Draft BA to FirstLight. On December 6, 2020, the Draft BA was filed with FERC. As noted above, since the AFLA filings, FirstLight filed the F/F Agreement relative to Project operations and fish passage, which included significant changes to the Proposed Actions relative to what was evaluated in the preliminary Draft BA. FirstLight developed this Draft BA to reflect the operations in the F/F Agreement and provided it to NMFS on September 28, 2023 for review and comment. Comments were received on December 19, 2023, and a call was held with NMFS on February 26, 2024, to review the addressed comments and to finalize the Draft BA. Minor revisions based on the discussion with NMFS were made to the Draft BA that resolved the remainder of comments provided by NMFS. The consultation record is included in [Appendix C](#).

1.4 Purpose of this Document

This document describes the effects of FirstLight's proposed relicensing actions on SNS. The effects of the Proposed Actions on all other federally listed species in Project-affected areas, all of which are under USFWS jurisdiction, are evaluated in a separate Draft BA. The analysis in this Draft BA considers FirstLight's relicensing proposal (the Proposed Actions) added to the environmental baseline and compares the effects of the Proposed Actions to the effects of the baseline condition (i.e., effects to SNS from operations consistent with the existing license). Environmental baseline refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the Proposed Actions. The environmental baseline includes the past and present impacts of all state, federal or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early Section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02). The environmental baseline for this Draft BA includes the effects of several activities that may affect the survival and recovery of the endangered species in the action area.

2 PROJECT LAYOUT AND CURRENT OPERATIONS

2.1 Existing Facilities

The Northfield Mountain Project boundary includes the perimeter of the TFI down to the Turners Falls Dam and the area around the Northfield Mountain Project. The Turners Falls Project boundary also includes the perimeter of the TFI (overlapping with the Northfield Mountain Project boundary) and an area below the Turners Falls Dam down to Cabot Station. [Figure 2.1-1](#) shows the overlapping Project boundary, and the separate Turners Falls and Northfield Mountain Project boundaries. The combined existing Project Boundaries for the Turners Falls Project and Northfield Mountain Project contain 7,246 acres of land and 2,238 acres of flowed land.

2.1.1 Turners Falls Project

The Turners Falls Project includes the Turners Falls Dam, which creates the TFI on the Connecticut River ([Figure 2.1.1-1](#)). The Turners Falls Dam consists of two individual concrete gravity dams, referred to as the Gill Dam and Montague Dam, which are connected by a natural rock island known as Great Island. The 630-foot-long Montague Dam connects Great Island to the west bank of the Connecticut River and includes four bascule type gates, each 120-foot-wide by 13.25-foot-high and a fixed crest section which is normally not overflowed. The Gill Dam is approximately 55-foot-high and 493-foot-long extending from the Gill shoreline (east bank) to Great Island and includes three Tainter spillway gates, each 40-foot-wide by 39-foot-high.

Adjacent to the Montague Dam is the 214-foot-long gatehouse equipped with 15 operating gates controlling flow from the TFI to the power canal. Six (6) of the gates are 10'-8" high by 9' wide wooden gates and nine (9) of the gates are 12'-7" high by 9'-6" wide wooden gates. The Gatehouse fishway, described below, passes through the gatehouse at the east bank.

The power canal is approximately 2.1 miles long and has a design capacity of approximately 18,000 cubic feet per second (cfs). There are several water withdrawals from the power canal. The major ones are FirstLight's Station No. 1 and Cabot Station—these two hydroelectric projects are part of the Turners Falls Project. Station No. 1 is located closer to the upstream end of the power canal and Cabot Station is located at the downstream terminus of the power canal. The generation and hydraulic capacity of Station No. 1 are 5,683 kW and 2,210 cfs, respectively. The generation and hydraulic capacity of Cabot Station are 62.016 MW and 13,728 cfs, respectively. With the two generating stations combined, the total hydraulic capacity of the Turners Falls Project is 15,938 cfs.

In addition to Station No. 1 and Cabot Station, there are two other hydropower facilities on the canal that discharge into the bypass reach, when operating, including the Turners Falls Hydro, LLC project and Milton Hilton, LLC project. The Turners Falls Hydro project (FERC No. 2622) is owned and operated by Eagle Creek Renewable Energy and received a new FERC license on February 25, 2021. It discharges into the bypass reach approximately 0.3 miles downstream of the Turners Falls Dam, which is upstream of the Station No. 1 tailrace. The Milton Hilton, LLC project is an unlicensed project owned and operated by a private developer. It discharges into the bypass reach approximately 0.5 miles downstream of the Turners Falls Hydro project tailrace, which is also upstream of the Station No. 1 tailrace.

The Turners Falls Project is equipped with three upstream fish passage facilities, including (in order from downstream to upstream): the Cabot fishway, the Spillway fishway, and the Gatehouse fishway. The Cabot fishway, located near the Cabot tailrace, moves migrating fish from the Connecticut River into the power canal. The Spillway fishway, located at the Turners Falls Dam, moves migrating fish from the Connecticut River into a gallery leading to the Gatehouse fishway; however, some fish do drop out into the power canal. The Gatehouse fishway, located at the Gatehouse, moves fish from the power canal to above the Turners Falls Dam. A downstream fish passage facility is located at Cabot Station, at the downstream terminus of

the power canal. Assuming no spill is occurring at Turners Falls Dam, fish moving downstream pass through the gatehouse (which has no racks) and into the power canal. SNS have not used the Project fishways, which have been primarily utilized by American Shad (*Alosa sapidissima*), Sea Lamprey (*Petromyzon marinus*), and a variety of resident fish species which are not listed under the ESA.

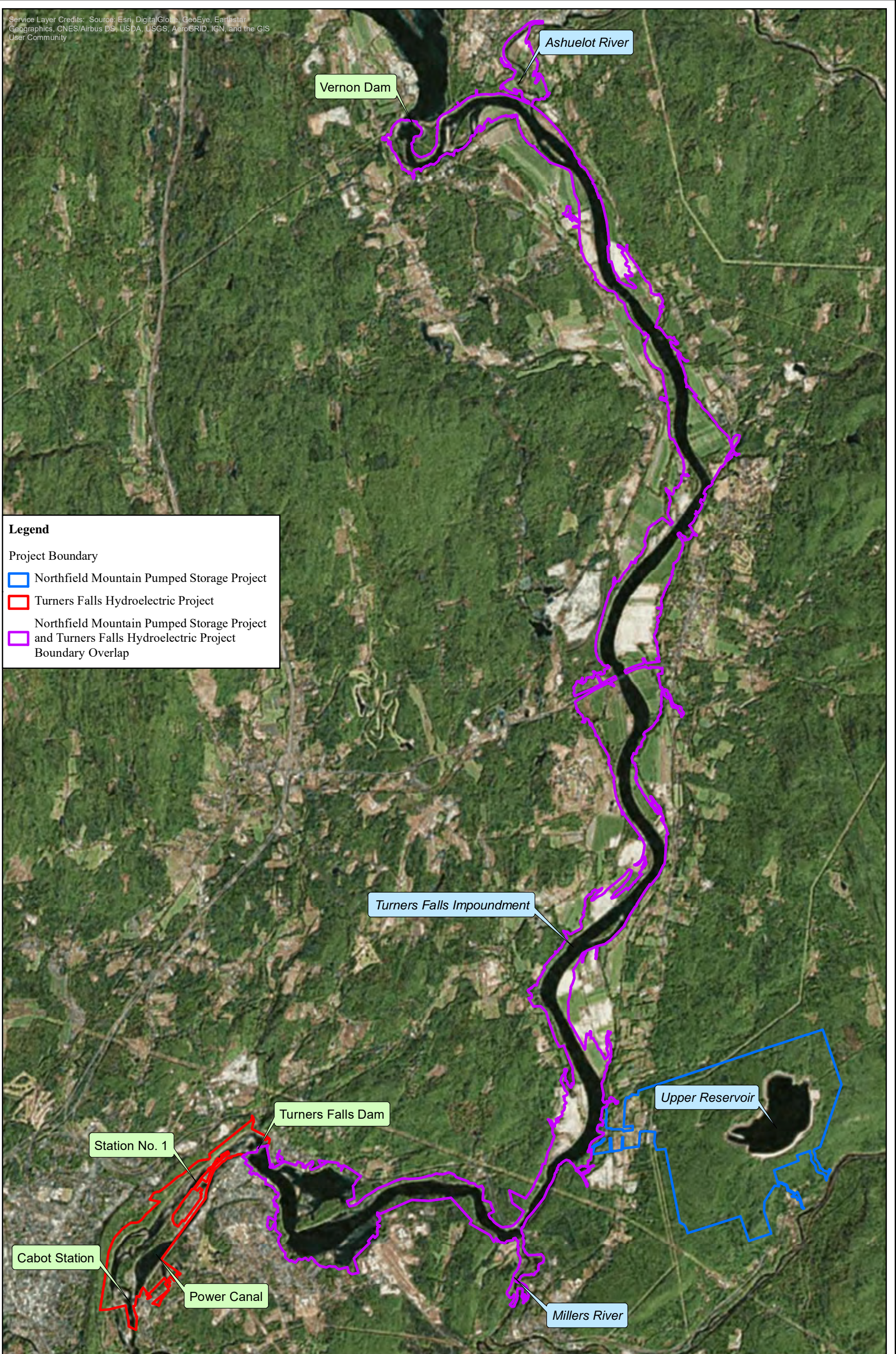
The TFI extends approximately 20 miles upstream to just below the Vernon Hydroelectric Project (FERC No. 1904), which is owned and operated by Great River Hydro. To provide storage capacity for the Northfield Mountain Project, the TFI elevation may vary, per the FERC license, from a minimum elevation of 176.0 feet⁶ (National Geodetic Vertical Datum of 1929 (NGVD29)) to a maximum elevation of 185.0 feet constituting a 9-foot fluctuation as measured at the Turners Falls Dam. The usable storage capacity in this 9-foot fluctuation, as measured at the Turners Falls Dam, is approximately 16,150 acre-feet.

2.1.2 Northfield Mountain Project

The Northfield Mountain Project consists of an Upper Reservoir and dam/dikes, an intake, pressure shaft, underground powerhouse and tailrace ([Figure 2.1.2-1](#)). The crest elevation of the Upper Reservoir's Main Dam is at elevation 1010 feet. In addition to the Main Dam there are several dam/dikes that form the Upper Reservoir. The Upper Reservoir elevation may vary, per the FERC license, from a minimum elevation of 938 feet to a maximum elevation of 1000.5 feet constituting a 62.5-foot drawdown. FERC has allowed temporary variances to increase the maximum and minimum elevation to 1004.5 feet and 920 feet, respectively, during certain periods to meet electric grid system needs.

The intake channel directs water from the Upper Reservoir into the pressure conduit intake and eventually to the underground powerhouse. The electrical capacity of the four (4) reversible pump-turbines is 291.7 MW for a total station nameplate capacity of 1,166.80 MW. When operating at maximum pumping mode, the approximate hydraulic capacity is 15,200 cfs. Alternatively, when operating at maximum generation mode, the approximate hydraulic capacity is 20,000 cfs.

⁶ The Project datum is the National Geodetic Vertical Datum of 1929 (NGVD29). All elevations in the license application for the Turners Falls Project and Northfield Mountain Project are based on the NGVD29 datum unless otherwise noted.



Legend

Project Boundary

- Northfield Mountain Pumped Storage Project
- Turners Falls Hydroelectric Project
- Northfield Mountain Pumped Storage Project and Turners Falls Hydroelectric Project Boundary Overlap

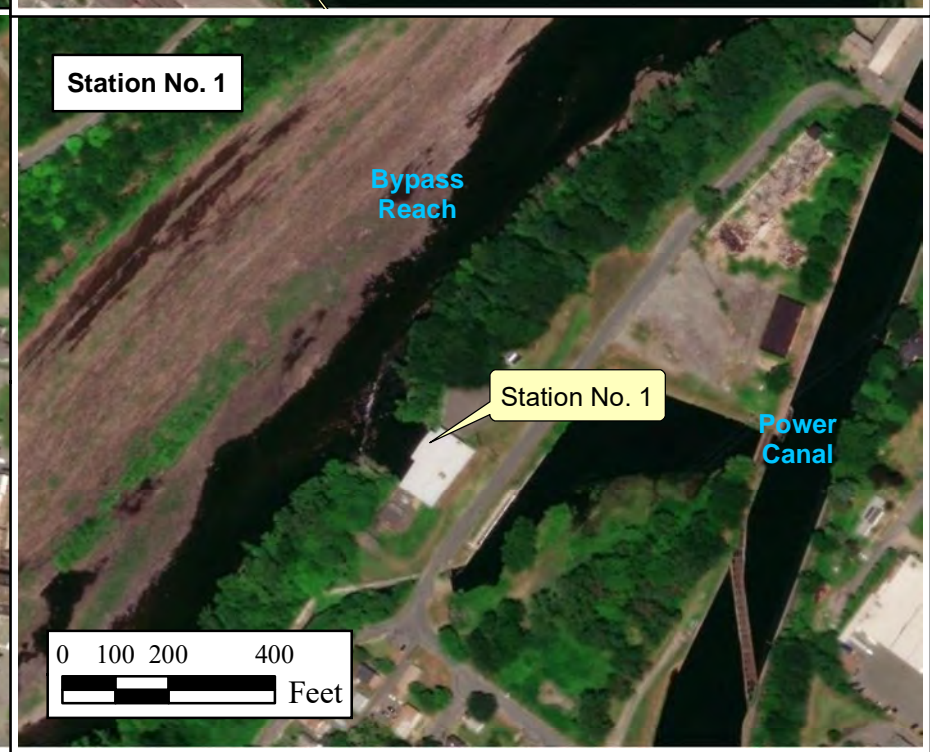
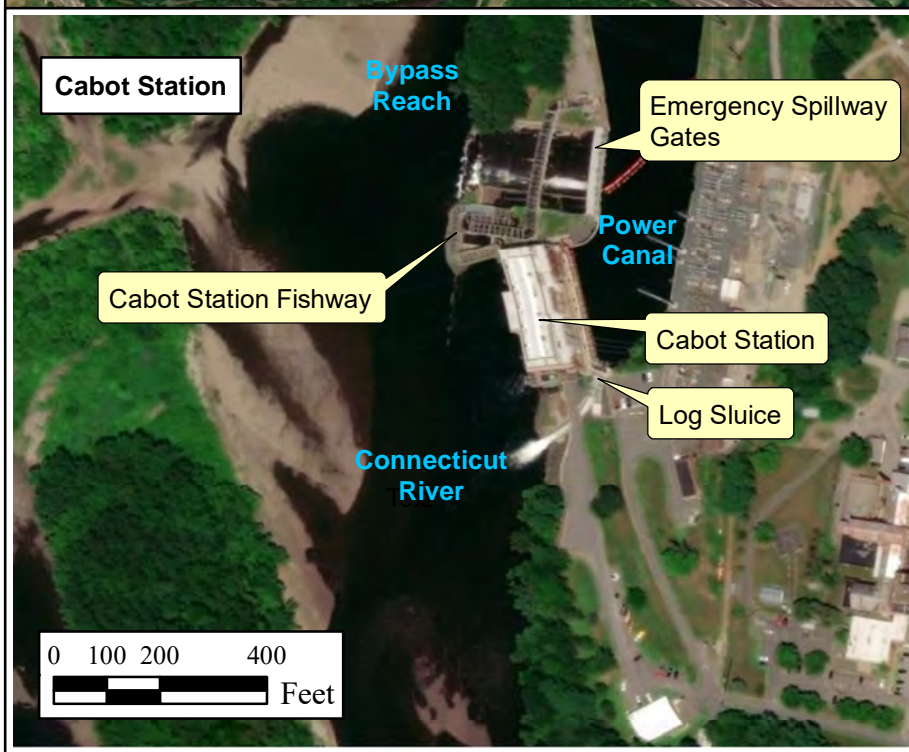
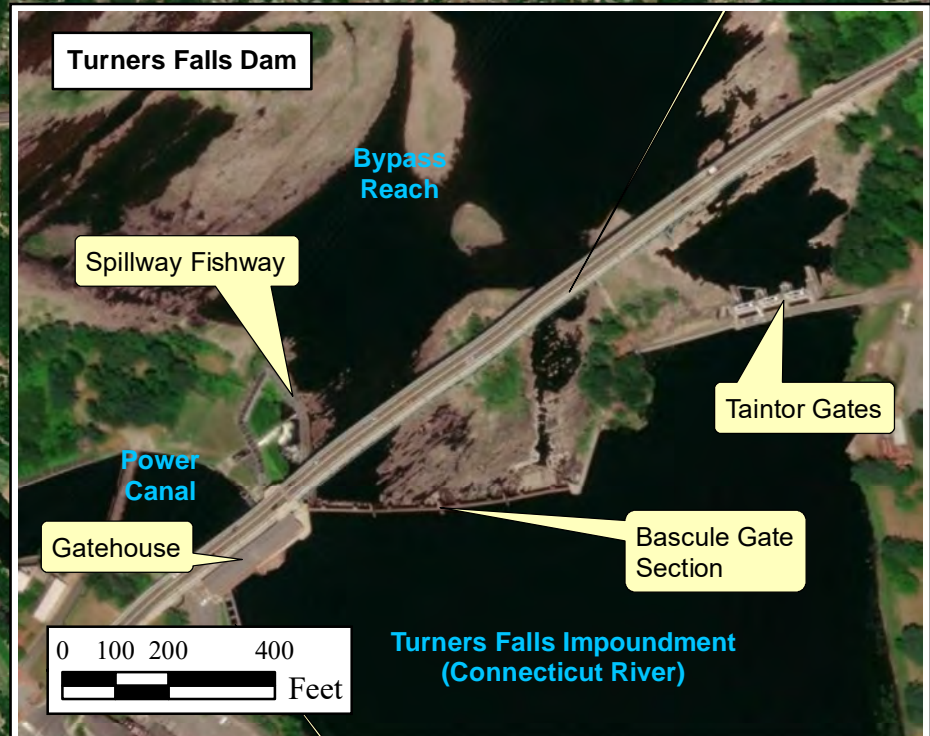
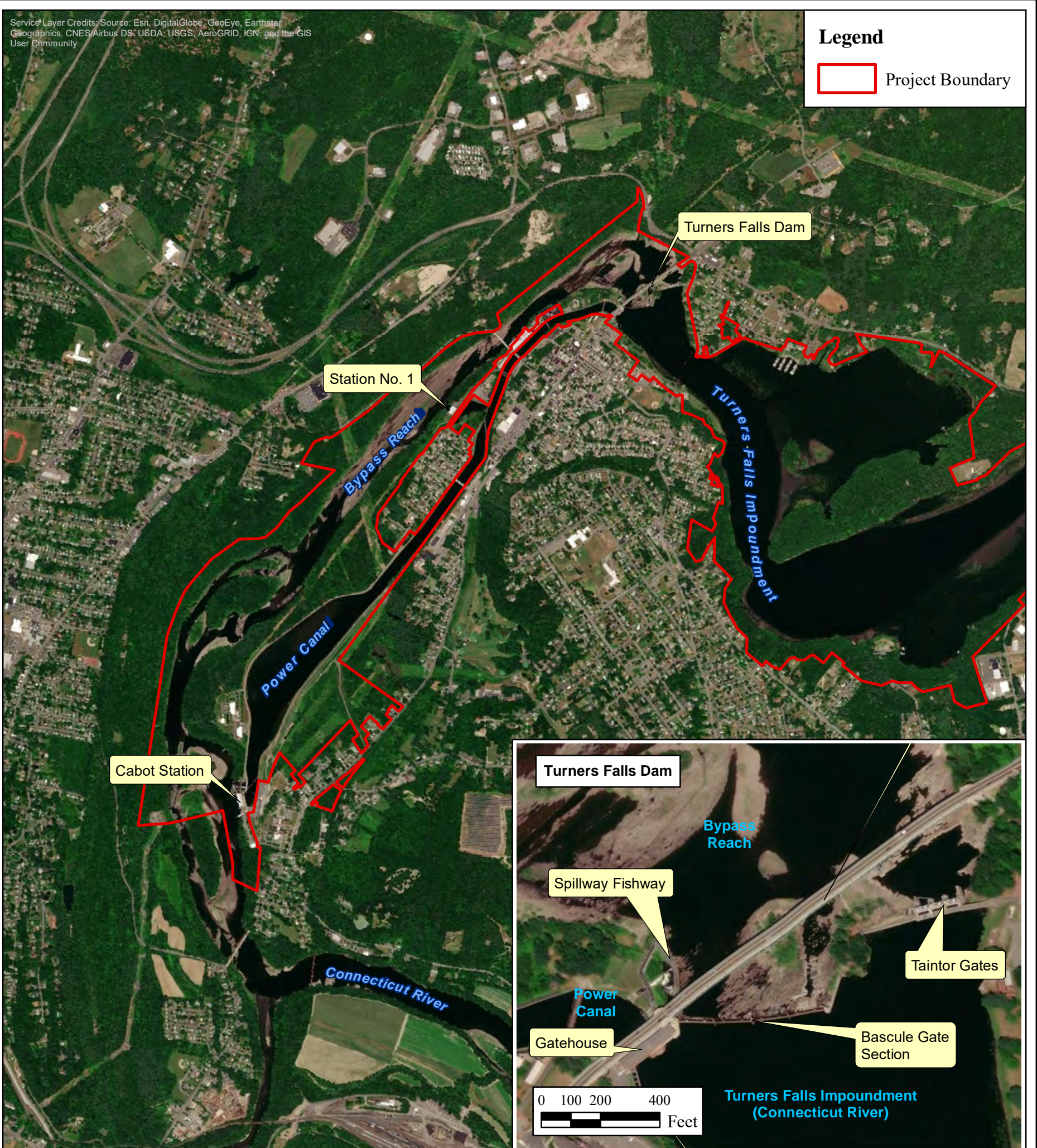
Northfield Mountain Pumped Storage Project (No. 2485)
and
Turners Falls Hydroelectric Project (No. 1889)

**Figure 2.1-1
Project Boundary Map**



Legend

 Project Boundary



Northfield Mountain Pumped Storage Project (No. 2485)

and

Turners Falls Hydroelectric Project (No. 1889)

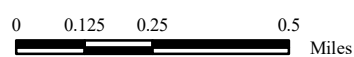
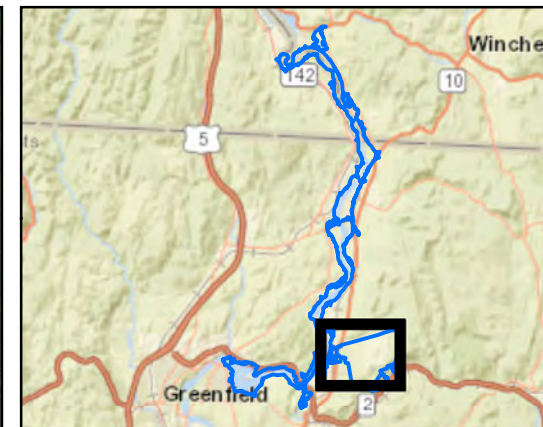
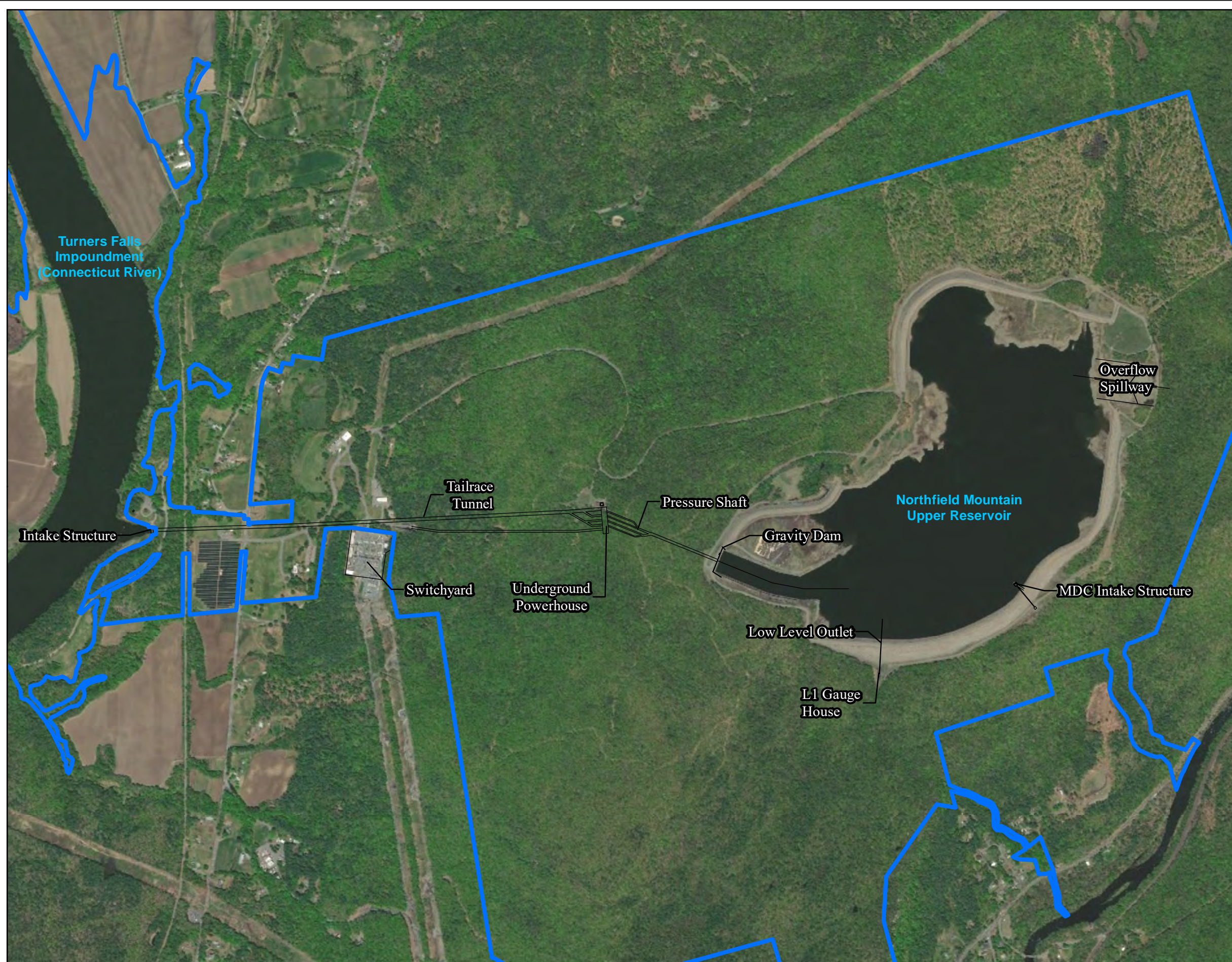


Figure 2.1.1-1
Turners Falls Project Features



Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889)

Figure 2.1.2-1 Northfield Mountain Project Features

Legend

Project Boundary

N
↑

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

0 600 1,200 2,400 Feet

1 inch = 1,200 feet



2.2 Current Operations

2.2.1 Turners Falls Project

As noted above, the Turners Falls Project consists of two hydroelectric facilities- Cabot Station and Station No. 1. During periods when inflow is within the hydraulic range of Cabot Station, it is operated as a peaking plant; during periods of high inflow, in excess of 13,728 cfs (its approximate maximum hydraulic capacity), it operates as a base load plant. Station No. 1 is a base load plant with a hydraulic capacity of 2,210 cfs and typically operates when inflows to the TFI are less than the hydraulic capacity of a single Cabot Unit (~2,288 cfs) or when inflows exceed the hydraulic capacity of Cabot Station. Station No. 1 is manually operated, while Cabot is remotely operated. The current license requirements relative to Turners Falls Project operations are described below.

As noted above, the Turners Falls Hydro project and Milton Hilton, LLC project are also located on the canal. Milton Hilton, LLC⁷ and Turners Falls Hydro⁸ have indentured water rights. FirstLight currently has an agreement with each of these entities which provides that the entity will come online when the naturally routed flow (NRF)⁹ in the Connecticut River increases to 15,000 cfs (close to the combined capacity of Cabot and Station No. 1).

Under the current FERC license for the Turners Falls Project, FirstLight is required to release a continuous minimum flow of 1,433 cfs¹⁰ or inflow, whichever is less below the Project. FirstLight typically maintains the minimum flow requirement through discharges at Cabot and/or Station No. 1.

Per the FERC license, a continuous minimum flow of 200 cfs is maintained in the bypass reach starting on May 1, increasing to 400 cfs when fish passage starts by releasing flow through a bascule gate at the Turners Falls Dam. The 400 cfs continuous minimum flow is provided through July 15, unless the upstream fish passage season has concluded early in which case the 400 cfs flow is reduced to 120 cfs to allow SNS egress through the bypass reach. The 120 cfs continuous minimum flow is maintained in the bypass reach from the date the fishways are closed (or by July 16) until the river temperature drops below 7°C, which typically occurs around November 15.

The TFI elevation is currently licensed to fluctuate between 176.0 feet and 185.0 feet, as measured at the Turners Falls Dam. Though TFI water levels are managed at the Turners Falls Dam, generation and pumping from Northfield Mountain, and varying inflows all affect the TFI water levels.

2.2.2 Northfield Mountain Project

The Northfield Mountain Project is a pumped storage hydroelectric facility. Water is pumped from the TFI to the Upper Reservoir which has 12,318 acre-feet of useable storage available for pumped storage operations. Typically, pumping occurs during periods when energy prices are low, while generation occurs during periods when energy prices are high. Under the current FERC license, the Northfield Mountain Upper Reservoir elevation may fluctuate between 1,000.5 feet and 938 feet.

⁷ A water use agreement between then Esleek Manufacturing Company (a predecessor to Milton Hilton, LLC) and then Turners Falls Power and Electric Company (a predecessor to FirstLight) was signed in August 1928.

⁸ A water exchange agreement between then Keith Paper Company (a predecessor to Eagle Creek Renewable Energy) and then Western Massachusetts Electric Company (a predecessor to FirstLight) was signed in September 1951.

⁹ The naturally routed flow equals the sum of Vernon discharges plus flows recorded at USGS Gages on the Ashuelot and Millers Rivers.

¹⁰ This equates to 0.20 cfs per square mile of drainage area at the Turners Falls Dam.

3 PROPOSED ACTIONS

The Proposed Actions include the relicensing of the Turners Falls Project and the Northfield Mountain Pumped Storage Project consistent with the terms of the F/F Agreement. The F/F Agreement includes several protection, mitigation and enhancement measures (PM&E) designed to benefit various environmental and recreational resources. These include modifications relative to Project operations to benefit SNS. For the purposes of this BA, these are considered part of the Proposed Actions. Where applicable in the sections below we have included the Draft License Articles from the F/F Agreement (verbatim) relative to Project operations or construction of fish passage facilities that are relevant to the Action Area and SNS.

Note that the F/F Agreement Draft License Articles were written as standalone articles, thus any footnotes have been added to the end of the license article; not to the bottom of the page. In addition, only those Draft License Articles pertaining to the construction of fish passage are included below. Many other fish passage related Draft License Articles are included in the F/F Agreement. License articles starting with an A or B pertain to the Turners Falls Project and Northfield Mountain Project, respectively.

Also included below are proposed recreation improvements, as outlined in the Recreation Agreement. Specifically, Appendix A of the Recreation Agreement includes the Recreation Management Plan listing the various recreation features. Any new or updated recreation features relevant to SNS and/or their habitat are described herein.

3.1 Proposed Project Facilities

3.1.1 Proposed Generation Facilities

FirstLight is not proposing any changes to existing developmental (i.e., generation) facilities at the Northfield Mountain Project.

Station No. 1 Upgrades

Article A100. Station No. 1 Upgrades

Within 3 years of license issuance, the Licensee shall automate Station No. 1 such that it is capable of being operated remotely and over a range of flows. The Licensee shall submit design plans to the Commission for automating Station No. 1. Upon Commission approval, the Licensee shall automate Station No. 1, including any changes required by the Commission.

3.1.2 Proposed Non-Generation Facilities- Fish Passage

Turners Falls Project

Article A300. Fish Passage Facilities and Consultation¹¹

The Licensee shall implement the following fish passage measures on the schedule specified. When due dates cited in this and other articles are in “years after license issuance,” this shall mean on the appropriate date in the specified calendar year after license issuance, regardless of the quarter in which the license is issued. For example, “Year 1 after license issuance” begins on the first January 1 following license issuance.

¹¹ The consultation part of the License Article is not included herein.

Upstream Fish Passage

- (a) construct a Spillway Lift at the Turners Falls Dam to be operational no later than April 1 of Year 9 after license issuance.
- (b) rehabilitate the Gatehouse Trapping facility (sampling facility) to be operational no later than April 1 of Year 9 after license issuance.
- (c) retire, either by removal or retaining in place, the Cabot Ladder and the power canal portions of the Gatehouse Ladder within 2 years after the Spillway Lift becomes operational.
- (d) install and operate interim upstream eel passage in the vicinity of the existing Spillway Ladder within 1 year of license issuance and continue operating it until permanent upstream eel passage facilities are operational. The Licensee shall consult MDFW, NMFS, and USFWS on the location and design of the interim eelway(s).
- (e) conduct up to 2 years of eelway siting studies after the Spillway Lift becomes operational, using a similar methodology to relicensing Study 3.3.4 for both years. Based on the 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 Licensee shall consult MDFW, NMFS, and USFWS on the location of the two permanent upstream eel passage facilities. The final eelway siting will take into account the ability to maintain the eelway(s) in light of spillage conditions at the Turners Falls Project. The Licensee will not be required to place any eelways at the foot of any active spillway structures.

Downstream Fish Passage

- (f) Within 4 years¹ of license issuance, replace the existing Cabot Station trashrack structure with a new full depth trashrack with 1-inch clear spacing. The new trashracks will have multiple openings for fish passage, including openings on the top and bottom of the water column. The Licensee will attempt to maximize the hydraulic capacity of these openings within the constraints of the conveyance mechanisms. The Licensee will base detailed design alternatives on the following conceptual design; however, the Parties will remain flexible on design alternatives as necessary to meet fish passage goals.

The new trashrack will have multiple surface entrances including a.) between Cabot Units 2 and 3; b.) between Cabot Units 4 and 5; and c.) at the right wall of the intake (looking downstream) at Cabot Unit 6. The 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 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 5% (685 cfs) of maximum hydraulic station capacity (13,728 cfs). The conveyance at each bypass entrance will be determined during the design phase.

- (g) Within 4 years¹ of license issuance, construct a ¾-inch clear-spaced bar rack at the entrance to the Station No. 1 branch canal.

¹Relative 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. If the License is issued in quarter 1 (Q1, Jan 1-Mar 31) then these two facilities will be operational no later than April 1 of Year 4 after license issuance; if it is issued in Q2 then these two facilities will be operational no later than August 1 of Year 4 after license issuance; and if it is issued after Q2 then these two facilities will be operational no later than April 1 of Year 5 after license issuance.

- (h) Construct a plunge pool downstream of the Turners Falls Dam 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.

Northfield Mountain Project

Article B200. Fish Intake Protection and Consultation¹²

Intake Protection

The Licensee shall install a barrier net in front of the Northfield Mountain tailrace/intake, having 3/8-inch mesh on the top and 3/4-inch mesh on the bottom. The barrier net design shall be based on the conceptual design in the Amended Final License Application filed with the Commission in December 2020, as modified through consultation with MDFW, NMFS, and USFWS, from June 1 to November 15 to protect out-migrating American Shad and adult American Eel, to be operational no later than June 1 of Year 7 after license issuance.

3.1.3 Proposed Non-Generation Facilities- Recreation

Any new recreation features or upgrades to existing recreation features that are proposed for areas downstream of Turners Falls Dam and could require in-water construction are described below.

Turners Falls Project

Construct River Access and Two Put-Ins Just Below Turners Falls Dam: The new access will start via the existing bridge (aka the “IP Bridge”) spanning the power canal just below the Gatehouse. Once over the power canal, a 12-foot-wide path will lead recreationists to an elevated bench and opening above the river channel. From this elevated bench there will be two routes to access the river. One route will continue with a 12-foot wide path leading further upstream to a put-in closer to the dam and upstream of Peskeomskut Island. This route will be designed to accommodate whitewater rafters. The second route will lead further downstream to a put-in below Peskeomskut Island. The second route currently consists of an uneven path with jagged rocks creating unstable footing. The proposed second route will require clearing and grubbing to create an approximate 12-foot-wide level path with better footing before turning right to the put-in. This route will be designed to accommodate pass-through boaters (canoes and kayaks) that want to avoid Peskeomskut Island.

Construct River Access Trail at Station No. 1: Although there is currently informal access to the Station No. 1 tailrace, FirstLight will provide formal access for fishing and non-motorized boats. It will include an approximately 10-footwide path leading from Power Street to a put-in just upstream of the Station No. 1

Construct Portage Trail Around Rock Dam: The “Rock Dam” is a natural rock feature with a sizeable vertical drop located in the bypass reach of the Connecticut River near the Cabot Woods Fishing Area. With boating opportunities expected to increase under the new flow regime, some boaters may opt to avoid Rock Dam and portage around it for safety reasons. Alternatively, some boaters may view the vertical drop at

¹² The consultation part of the License Article is not included herein.

Rock Dam as a “play” area and may want to “run” the drop more than once. For these reasons, FirstLight will construct a portage trail around Rock Dam.

Improve Poplar Street River Access: There is existing cartop access at Poplar Street; however, it is extremely steep. Due to steep topography and land ownership restrictions, FirstLight will use the existing gravel parking lot, leading to 20-foot-wide timber stairs with a boat slide railing leading to a 5-foot-long, 20-foot-wide concrete landing/abutment. A 32-foot-long gangway will be anchored to the concrete abutment and lead to a floating dock in the Connecticut River to accommodate fluctuations in the river elevation.

3.2 Proposed Project Boundary

FirstLight is proposing changes to each Project Boundary as summarized below. None of the lands FirstLight proposes to exclude from the Project boundaries contains historic properties eligible or potentially eligible for the National Register of Historic Places.

Turners Falls Project and Northfield Mountain Project Overlapping Project Boundary Changes

The removal of a 0.2-acre parcel of land at 39 Riverview Drive in Gill, MA. These lands are owned by FirstLight but are not needed for Project operations or any other Project purpose. Northfield Mountain Project Boundary Changes

- The removal of an 8.1-acre parcel of land referred to as Fuller Farm located near 169 Millers Falls Road in Northfield, MA. These lands are not needed for Project operations or any other Project purpose.
- The addition of 135.5 acres¹³ of land south of the Northfield Switching Station located in the Towns of Northfield and Erving in Massachusetts. Some of these lands are currently owned by Eversource and are necessary to include recreation trails associated with the Northfield Mountain Trail and Tour Center that are not currently enclosed in the Project Boundary.
- The removal of 52.3 acres of land on the south side of Northfield Mountain located in the Town of Erving, MA. These lands are not needed for Project operations and are being taken out to establish a conservation easement on Farley Ledges as part of an off-license agreement.

Turners Falls Project Boundary Changes

- The removal of a 20.1-acre parcel of land currently occupied by the United States Geological Survey’s (USGS) Silvio Conte Anadromous Fish Laboratory located at One Migratory Way, P.O. Box 796, in Turners Falls, MA 01376. The Conte Lab lands are located just north of Cabot Station. These lands are not needed for Project operations or any other Project purpose.
- The addition of an 0.8-acre parcel of land owned by FirstLight at 21 Poplar Street (end of the street) in Montague, MA. These lands are needed for recreational purposes (take-out or put-in).

The proposed Project Boundaries at the Turners Falls and Northfield Mountain Projects are shown in [Appendix D](#).

¹³ Of the 135.5 acres, 12.5 acres is owned by FirstLight, while the remaining 122 acres is owned by Eversource.

3.3 Proposed Project Safety

FirstLight anticipates that, as part of the relicensing process, FERC staff will evaluate the continued safety of the proposed Project facilities under the new license. FirstLight anticipates FERC will continue to inspect the Project during the new license term to assure continued adherence to FERC-approved plans and specifications, any special license articles pertaining to construction, operation and maintenance, and accepted engineering practices and procedures.

3.4 Proposed Project Operations

FirstLight proposes several operational changes as summarized in Section 3.5.

3.5 Proposed Environmental Measures

FirstLight proposes the following Draft License Articles relative to operations. Note that the Draft License Articles were written as standalone articles, thus any footnotes have been added to the end of the license article; not to the bottom of the page.

Turners Falls Project

Article A110. Minimum Flows below Turners Falls Dam

Upon license issuance, the Licensee shall discharge from the Turners Falls Dam or from the gate located on the power canal (“canal gate”) just below the Turners Falls Dam the following seasonal minimum flows.

Date	Minimum Flows below Turners Falls Dam
01/01-03/31 ¹	<ul style="list-style-type: none"> • If the Naturally Routed Flow (NRF- definition provided later in this article) is \leq 400 cubic feet per second (cfs), the Minimum Flow below Turners Falls Dam shall be 400 cfs or the NRF, whichever is less. • If the NRF is $>$ 400 cfs, the Minimum Flow below Turners Falls Dam shall be 400 cfs.
04/01-05/31	<ul style="list-style-type: none"> • If the NRF is \leq 6,500 cfs, the Minimum Flow below Turners Falls Dam shall be 67% of the NRF. • If the NRF is $>$ 6,500, the Minimum Flow below Turners Falls Dam shall be 4,290 cfs.
06/01-06/15 ^{2,3}	<ul style="list-style-type: none"> • If the NRF is \leq 4,500 cfs, the Minimum Flow below Turners Falls Dam shall be 67% of the NRF. • If the NRF is $>$ 4,500 cfs, the Minimum Flow below Turners Falls Dam shall be 2,990 cfs.
06/16-06/30 ³	<ul style="list-style-type: none"> • If the NRF is \leq 3,500 cfs, the Minimum Flow below Turners Falls Dam shall be 67% of the NRF. • If the NRF is $>$ 3,500 cfs, the Minimum Flow below Turners Falls Dam shall be 2,280 cfs.
07/01-11/15 ¹	<ul style="list-style-type: none"> • If the NRF is \leq 500 cfs, the Minimum Flow below Turners Falls Dam shall be 500 cfs or the NRF, whichever is less. • If the NRF is $>$ 500 cfs, the Minimum Flow below Turners Falls Dam shall be 500 cfs.
11/16-12/31 ¹	<ul style="list-style-type: none"> • If the NRF is \leq 400 cfs, the Minimum Flow below Turners Falls Dam shall be 400 cfs or the NRF, whichever is less. • If the NRF is $>$ 400 cfs, the Minimum Flow below Turners Falls Dam shall be 400 cfs.

¹From November 16 through March 31, the 400 cfs minimum flow below Turners Falls Dam will be provided from the canal gate, having a design maximum capacity of 400 cfs. The Licensee shall open the canal gate to its maximum opening and implement ice mitigation measures, if necessary, to maintain the maximum opening. The Licensee shall monitor canal 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.

²One of the upstream fish passage adaptive management measures (AMMs) described in Article A330 calls for increasing the Total Minimum Bypass Flow below Station No. 1 (see Article A120) from June 1 to June 15 from 4,500 cfs to 6,500 cfs. If this AMM is enacted, and if the NRF is \leq 6,500 cfs, the Minimum Flow

below the Turners Falls Dam shall be 67% of the NRF, subject to the conditions in Article A330. If this AMM is enacted, and if the NRF is > 6,500 cfs, the Minimum Flow below the Turners Falls Dam shall be 4,290 cfs, subject to the conditions in Article A330.

³The magnitude of the Minimum Flow below Turners Falls Dam from June 1 to June 30 may be modified in the future pending fish passage effectiveness studies (see Article A330). If the Licensee conducts fish passage effectiveness studies, in consultation with the MDFW, NMFS, and USFWS and determines that migratory fish are not delayed by passing a greater percentage of the Total Minimum Bypass below Station No. 1 (see Article A120) via Station No. 1 discharges, the Licensee may file for a license amendment to increase the Station No. 1 discharge upon written concurrence of MDFW, NMFS, and USFWS. Prior to filing for a license amendment with the Commission, the Licensee shall consult the Massachusetts Department of Environmental Protection (MDEP) and address any of its comments in the license amendment filing.

Definition of Naturally Routed Flow

From December 1 through June 30, the NRF is defined as the hourly sum of the discharges from 12 hours previous as reported by the: Vernon Hydroelectric Project (FERC No. 1904), Ashuelot River (USGS, Gauge No. 01161000), and Millers River USGS gauge (USGS Gauge No. 01166500).

From July 1 through November 30, the NRF is defined as the hourly sum of the discharges averaged from 1 to 12 hours previous as reported by the: Vernon Hydroelectric Project, Ashuelot River USGS gauge, and Millers River USGS gauge. Upon license issuance until 3 years thereafter, the Licensee shall operate the Turners Falls Project based on the NRF computational method from July 1 through November 30 to determine if the Turners Falls Project can be operated in this manner. If the Turners Falls Project cannot be operated in this manner, the Licensee shall consult MDFW, NMFS, and USFWS on alternative means of computing the NRF that are feasible for Turners Falls Project operation and sufficiently dampen upstream hydroelectric project flexible operations.

The Minimum Flow below Turners Falls Dam may be temporarily modified if required by equipment malfunction or operating emergencies reasonably beyond the control of the Licensee.¹⁴ If the Minimum Flow below Turners Falls Dam is so modified, the Licensee shall notify the Commission, MDEP, MDFW, NMFS, and USFWS as soon as possible, but no later than 10 days after such incident. The Minimum Flow below Turners Falls Dam may also be temporarily modified for short periods upon mutual agreement with the Licensee for the Northfield Mountain Pumped Storage Project (FERC No. 2485), MDEP, MDFW, NMFS and USFWS, and upon 5 days' notice to the Commission.

Article A120. Total Minimum Bypass Flows below Station No. 1

Upon license issuance, the Licensee shall maintain the Total Minimum Bypass Flows below Station No. 1 as follows:

Date	Total Minimum Bypass Flows below Station No. 1 ¹
01/01-03/31	<ul style="list-style-type: none"> • If the NRF is \leq 400 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be 400 cfs, or the NRF, whichever is less. • If the NRF is > 400 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be 1,500 cfs, or the NRF, whichever is less.
04/01-05/31	<ul style="list-style-type: none"> • If the NRF is \leq 6,500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be the NRF.

¹⁴ Temporary modifications are discussed in further detail in Section 7.2.4

Date	Total Minimum Bypass Flows below Station No. 1 ¹
	<ul style="list-style-type: none"> • If the NRF is > 6,500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be 6,500 cfs.
06/01-06/15 ^{2,4}	<ul style="list-style-type: none"> • If the NRF is ≤ 4,500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be the NRF. • If the NRF is > 4,500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be 4,500 cfs.
06/16-06/30 ⁴	<ul style="list-style-type: none"> • If the NRF is ≤ 3,500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be the NRF. • If the NRF is > 3,500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be 3,500 cfs.
07/01-08/31 ³	<ul style="list-style-type: none"> • If the NRF is ≤ 500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be 500 cfs, or the NRF, whichever is less. • If the NRF is > 500 cfs and ≤ 1,800 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be the NRF or 90% of the NRF. • If the NRF is > 1,800 cfs, the Total Minimum Bypass below Station No. 1 shall be 1,800 cfs, or 90% of the NRF, whichever is less.
09/01-11/15 ³	<ul style="list-style-type: none"> • If the NRF is ≤ 500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be 500 cfs, or the NRF, whichever is less. • If the NRF is > 500 cfs and ≤ 1,500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be the NRF, or 90% of the NRF. • If the NRF is > 1,500 cfs, the Total Minimum Bypass below Station No. 1 shall be 1,500 cfs, or 90% of the NRF, whichever is less.
11/16-12/31 ³	<ul style="list-style-type: none"> • If the NRF is < 400 cfs, then the Total Minimum Bypass Flow below Station No. 1 shall be 400 cfs, or the NRF, whichever is less. • If the NRF is > 400 cfs and ≤ 1,500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be the NRF or 90% of the NRF. • If the NRF is > 1,500 cfs, the Total Minimum Bypass below Station No. 1 shall be 1,500 cfs, or 90% of the NRF, whichever is less.

¹From license issuance until 3 years thereafter, Station No. 1 will not be automated. During those 3 years, if Station No. 1 is the only source, other than the Fall River, Turners Falls Hydro, LLC, or Milton Hilton, LLC to provide the additional flow needed to meet the Total Minimum Bypass Flow below Station No. 1, the Licensee shall maintain the Station No. 1 discharge such that the Turners Falls Dam Minimum Flow will be as shown in Article A110, or higher flows, in cases where the additional flow cannot be passed through Station No. 1.

²One of the upstream fish passage adaptive management measures (AMMs) described in Article A330 calls for increasing the Total Minimum Bypass Flow below Station No. 1 from June 1 to June 15 from 4,500 cfs to 6,500 cfs. If this AMM is enacted, and if the NRF is ≤ 6,500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be the NRF, subject to the conditions in Article A330. If this AMM is enacted, and the NRF > 6,500 cfs, the Total Minimum Bypass Flow below Station No. 1 is 6,500 cfs, subject to the conditions in Article A330.

³From July 1 to August 31, when the NRF is greater than 1,800 cfs, the Total Minimum Bypass Flow below Station No.1 shall be 1,800 or 90% of the NRF, whichever is less. From September 1 to December 31, when the NRF is greater than 1,500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be 1,500 cfs or 90% of the NRF, whichever is less. From July 1 to December 31, if the Total Minimum Bypass

Flow below Station No. 1 shall be reduced by 10%, it will not be taken from the Turners Falls Dam Minimum Flow (Article 110).

⁴The amount of flow needed from Station No. 1 from June 1 to June 30 may be modified in the future pending fish passage effectiveness studies. If the Licensee conducts fish passage effectiveness studies, in consultation with the MDFW, NMFS, and USFWS and determines that migratory fish are not delayed by passing a greater percentage of the Total Minimum Bypass Flow below Station No. 1 via Station No. 1 discharge, the Licensee may file for a license amendment to increase the magnitude of Station No. 1 discharge upon written concurrence of MDFW, NMFS, and USFWS. Prior to filing for a license amendment with the Commission, the Licensee shall consult AW, AMC, CAW, MDEP, NEF and ZO and address any comments of those entities in the license amendment filing.

If the Station No. 1 units are used to maintain the Total Minimum Bypass Flow below Station No. 1, and if some or all of the Station No. 1 units become inoperable, the balance of the flow needed to maintain the Total Bypass flow below Station No. 1 will be provided from either the Turners Falls Dam Minimum Flow (dam or canal gate), Fall River, Turners Falls Hydro, LLC or Milton Hilton, LLC.

The Total Minimum Bypass Flow below Station No. 1 may be temporarily modified if required by equipment malfunction or operating emergencies reasonably beyond the control of the Licensee.¹⁵ If the Total Minimum Bypass Flow below Station No. 1 is so modified, the Licensee shall notify the Commission, MDEP, MDFW, NMFS, and USFWS as soon as possible, but no later than 10 days after such incident. The total bypass flow below Station No. 1 may also be temporarily modified for short periods upon mutual agreement with the Licensee for the Northfield Mountain Pumped Storage Project (FERC No. 2485), MDEP, MDFW, NMFS, and USFWS, and upon 5 days' notice to the Commission.

Article A130. Minimum Flows below Cabot Station

Upon license issuance, the Licensee shall maintain Minimum Flows below Cabot Station, or the NRF, whichever is less, as follows.

Date	Minimum Flow below Cabot Station
01/01-03/31	3,800 cfs or the NRF, whichever is less
04/01-05/31	8,800 cfs from midnight to 7:00 pm or the NRF, whichever is less and 6,500 cfs from 7:00 pm to midnight or the NRF, whichever is less.
06/01-06/15	6,800 cfs or the NRF, whichever is less
06/16-06/30	5,800 cfs or the NRF, whichever is less
07/01-08/31 ¹	1,800 cfs or 90% of the NRF, whichever is less
09/01-11/15 ¹	1,500 cfs or 90% of the NRF, whichever is less
11/16-11/30 ¹	1,500 cfs or 90% of the NRF, whichever is less
12/01-12/31	3,800 cfs or NRF, whichever is less

¹From July 1 to November 30, the Minimum Flow below Cabot Station is 1,800 (07/01-08/31) and 1,500 cfs (09/01-11/30) or 90% of the NRF, whichever is less. If the Minimum Flow below Cabot Station is reduced by 10% during these periods, it will not be taken from the Turners Falls Dam Minimum Flow (Article A110).

¹⁵ Temporary modifications are discussed in further detail in Section 7.2.4

The Minimum Flow below Cabot Station may be temporarily modified if required by equipment malfunction or operating emergencies reasonably beyond the control of the Licensee.¹⁶ If the Minimum Flow below Cabot Station is so modified, the Licensee shall notify the Commission, MDEP, MDFW, NMFS, and USFWS as soon as possible, but no later than 10 days after such incident. The Minimum Flow below Cabot Station may also be temporarily modified for short periods upon mutual agreement with the Licensee for the Northfield Mountain Pumped Storage Project (FERC No. 2485), MDEP, MDFW, NMFS and USFWS, and upon 5 days’ notice to the Commission.

Article A140. Cabot Station Ramping Rates

Upon license issuance until 3 years after license issuance, the Licensee shall ramp Cabot Station as follows.

Date	Cabot Station Ramping Rates ¹
04/01-06/30	Up and Down Ramping at a rate of 2,300 cfs/hour
07/01-08/15	Up Ramping at a rate of 2,300 cfs/hour from 8:00 am to 2:00 pm

Three years after license issuance, the Licensee shall ramp Cabot Station as follows.

Date	Cabot Station Ramping Rate ¹
04/01-06/30	Up and Down Ramping at a rate of 2,300 cfs/hour

¹If the NRF is greater than the sum of the hydraulic capacity of Cabot Station and Station No. 1 and the Minimum Flow below Turners Falls Dam in effect at the time, the Cabot Station up-ramping rates will not apply.

The Cabot Station Ramping Rates above will take precedence over the Flow Stabilization below Cabot Station (Article A160).

The Cabot Station Ramping Rates may be temporarily modified if required by equipment malfunction or operating emergencies reasonably beyond the control of the Licensee.¹⁷ If the Cabot Station Ramping Rates are so modified, the Licensee shall notify the Commission, MDEP, MDFW, NMFS, and USFWS as soon as possible, but no later than 10 days after such incident. The Cabot Station Ramping Rate may also be temporarily modified for short periods upon mutual agreement with the Licensee for the Northfield Mountain Pumped Storage Project (FERC No. 2485), MDEP, MDFW, NMFS, and USFWS, and upon 5 days’ notice to the Commission.

Article A150. Variable Releases from Turners Falls Dam and Variable Flow below Station No. 1

For recreation and ecological conservation purposes, upon license issuance, the Licensee shall provide variable releases from the Turners Falls Dam and a variable flow below Station No. 1 as shown below.

Variable Releases from Turners Falls Dam

Magnitude of Variable Release from Turners Falls Dam	¹ 4,000 cfs, or the NRF, whichever is less
Dates when Variable Releases may occur	² July 1 through October 31

¹⁶ Temporary modifications are discussed in further detail in Section 7.2.4

¹⁷ Temporary modifications are discussed in further detail in Section 7.2.4

³ Total No. of 2-day events	5 events for a total of 10 Variable Releases, but could potentially be 11 Variable Releases subject to footnote 3
Days of Variable Release for 2 day-events	Saturday and Sunday- must be two consecutive days
Hours of Variable Release	10:00 am to 2:00 pm, 4 hrs/day, Saturday and Sunday
Magnitude of Variable Release from Turners Falls Dam from Saturday at 2:00 pm to Sunday at 10:00 am.	See footnote 4
⁵ Up-Ramping Rates at Start of Variable Release	See footnote 5
⁶ Down-Ramping Rates at End of Variable Release	See footnote 6

¹If the NRF < 2,500 cfs during the scheduled variable release (see footnote 2 below relative to scheduling variable releases), there will be no variable release and it will not be rescheduled.

²The Licensee shall consult American Whitewater (AW), Appalachian Mountain Club (AMC), commercial outfitters, MDEP, MDFW, National Park Service (NPS), New England FLOW (NE FLOW), and USFWS no later than March 1 annually over the license term to develop a mutually agreeable schedule for the variable releases. When developing the schedule, there will be at least one weekend per month, between July 1 and October 31, when no variable releases are provided.

³The Licensee conducts annual canal drawdowns for maintenance purposes resulting in the NRF being passed at the Turners Falls Dam. If the canal drawdown occurs between July 1 and October 31 and the NRF is being passed either on Saturday from 10:00 am- 2:00 pm or Sunday from 10:00 am-2:00 pm, the total number of releases at the Turners Falls Dam shall remain at 10 releases. However, if the canal drawdown does not occur between July 1 and October 31 on Saturday from 10:00 am-2:00 pm or Sunday from 10:00 am-2:00 pm, the Licensee shall provide an additional consecutive day of variable release such that one of the 2-day events is a 3-day consecutive event resulting in a total of 11 releases. The additional day shall either be Friday from 10:00 am-2:00 pm before the scheduled weekend variable release or Monday from 10:00 am-2:00 pm after the scheduled weekend variable release. If there ends up being one 3-day event, the magnitude of release from Friday at 2:00 pm to Saturday at 10:00 am (or Sunday at 2:00 pm to Monday at 10:00 am), shall be computed as noted in footnote 4.

⁴This flow will be calculated as: [(Variable Flow Release- Minimum Flow below Turners Falls Dam as defined in Article A110)/2]. If there is a 3-day event as noted in footnote 3, the variable flow release from Friday at 2:00 pm to Saturday at 10:00 am (or from Sunday at 2:00 pm to Monday at 10:00 am) will be based on the same calculation.

⁵At the beginning of the variable release, if the NRF is > 4,000 cfs, the Licensee shall up-ramp from the Minimum Flow below Turners Falls Dam as defined in Article A110 to 4,000 cfs in two hours, not to exceed 2,000 cfs/hr.

At the beginning of the variable release, if the NRF is between 2,500 and 4,000 cfs, the Licensee shall up ramp at 50% of the NRF per hour.

⁶At the end of the variable release, if Turners Falls Dam variable release is between 2,500 and 4,000 cfs, the Licensee shall down ramp at 50% of the variable release per hour.

Variable Flow below Station No. 1

Magnitude of Variable Flow below Station No. 1	¹ 2,500 cfs, or the NRF, whichever is less
Dates when Variable Flow may occur	² July 1 through October 31
Total No. of 2-day events	7 events for a total of 14 Variable Flows
Days of Variable Flow	Saturday and Sunday- must be two consecutive days
Hours of Variable Flow	10:00 am to 2:00 pm, 4 hrs/day
Magnitude of Variable Flow below Station No. 1 from Saturday at 2:00 pm to Sunday at 10:00 am.	See Footnote 3

¹If the NRF < 2,500 cfs, during the scheduled flow (see footnote 2 below relative to scheduling the flow), there will be no 2,500 cfs flow and it will not be rescheduled.

²The Licensee shall consult AW, AMC, commercial outfitters, MDEP, MDFW, NPS, NE FLOW, and USFWS no later than March 1 annually over the license term to develop a mutually agreeable schedule for the variable flow. When developing the schedule there will be at least one weekend per month, between July 1 and October 31, when no variable flow is provided.

³From July 1 to August 31, the Total Minimum Bypass Flow below Station No. 1 is defined in Article A120. If the NRF is > 1,800 cfs, the Total Minimum Bypass below Station No. 1 shall be 1,800 cfs, or 90% of the NRF, whichever is less. The magnitude of flow below Station No. 1 from Saturday at 2:00 pm to Sunday at 10:00 am from July 1 to August 31 will be computed as follows:

$$(2,500 \text{ cfs} + \text{Total Minimum Flow below Station No. 1 as defined in Article A120})/2.$$

From September 1 to November 15, the Total Minimum Bypass Flow below Station No. 1 is defined in Article A120. If the NRF is > 1,500 cfs, the Total Minimum Bypass below Station No. 1 shall be 1,500 cfs, or 90% of the NRF, whichever is less. The magnitude of flow below Station No. 1 from Saturday at 2:00 pm to Sunday at 10:00 am from September 1 to November 15 will be computed as follows:

$$(2,500 \text{ cfs} + \text{Total Minimum Flow below Station No. 1 as defined in Article A120})/2.$$

When implementing the variable releases from the Turners Falls Dam or the 2,500 cfs flow below Station No. 1, the Licensee is still required to maintain the operational requirements in License Articles A110, A120, A130, A140, A160 and A190.

The above variable release from the Turners Falls Dam and variable flow below Station No. 1 may be temporarily modified if required by equipment malfunction or operating emergencies reasonably beyond the control of the Licensee.¹⁸ If the Turners Falls Dam variable release or variable flow below Station No. 1 are so modified, the Licensee shall notify AW, AMC, commercial outfitters, MDEP, MDFW, NMFS, NPS, NE FLOW, and USFWS as soon as possible. The Turners Falls Dam variable release or variable flow below Station No. 1 may also be temporarily modified for short periods upon mutual agreement with the Licensee for the Northfield Mountain Pumped Storage Project (FERC No. 2485), AW, AMC, commercial outfitters, MDEP, MDFW, NMFS, NPS, NE FLOW and USFWS.

¹⁸ Temporary modifications are discussed in further detail in Section 7.2.4

Article A160. Flow Stabilization below Cabot Station and Allowable Deviations for Flexible Operations

Three years after license issuance, the Licensee shall maintain $\pm 10\%$ of the NRF below Cabot Station as follows.

Date	Flow Stabilization below Cabot Station ¹
04/01-05/15 ²	Provide $\pm 10\%$ of the NRF below Cabot Station from 7:00 pm to midnight, with allowable deviations up to $\pm 20\%$ of the NRF for up to 22 hours total from 04/01-05/15 (the 22 hours will be used from 7:00 pm to midnight).
05/16-05/31 ²	Provide $\pm 10\%$ of the NRF below Cabot Station from 7:00 pm to midnight, with allowable deviations up to $\pm 20\%$ of the NRF for up to 18 hours total from 05/16-05/31 (the 18 hours will be used from 7:00 pm to midnight).
06/01-06/15 ²	Provide $\pm 10\%$ of the NRF below Cabot Station with allowable deviations up to $\pm 20\%$ of the NRF for up to 7 hours total from 06/01-06/15.
06/16-06/30 ²	Provide $\pm 10\%$ of the NRF below Cabot Station with allowable deviations up to $\pm 20\%$ of the NRF for up to 7 hours total from 06/16-06/30.
07/01-08/15 ³	Provide $\pm 10\%$ of the NRF below Cabot Station with allowable deviations up to $\pm 20\%$ of the NRF for up to 55 hours total from 07/01-08/15.
08/16-08/31 ³	Provide $\pm 10\%$ of the NRF below Cabot Station with allowable deviations up to $\pm 20\%$ of the NRF for up to 27 hours total from 08/16-08/31.
09/01-10/31 ³	Provide $\pm 10\%$ of the NRF below Cabot Station with allowable deviations up to $\pm 20\%$ of the NRF for up to 44 hours total from 09/01-10/31.
11/01-11/30 ³	Provide $\pm 10\%$ of the NRF below Cabot Station with allowable deviations up to $\pm 20\%$ of the NRF for up to 11 hours total from 11/01-11/30.

¹If the NRF is greater than the sum of the hydraulic capacity of Cabot Station and Station No. 1 and the Minimum Flow below Turners Falls Dam in effect at the time, the Flow Stabilization below Cabot Station will not apply.

²From April 1 to June 30, the NRF flow may be reduced by 10% or up to 20% for select hours. If the NRF is reduced during this period, the flow will be taken from Cabot Station generation.

³From July 1 to November 30, the NRF flow may be reduced by 10% or up to 20% for select hours. If the NRF is reduced during this period, the flow will not be taken from the Turners Falls Dam Minimum Flow.

Beginning three years after license issuance, the Licensee may deviate from the Flow Stabilization below Cabot Station and Cabot Station Ramping Rates (Article A140) for a certain number of hours in July, August, September, October and November, hereinafter referred to as flexible operations.

The Licensee has restricted discretionary flexible operating capability to respond to elevated energy prices, as defined in paragraph (a) below, from July 1 to November 30, as well as unrestricted capability to respond to emergencies, Independent System Operator-New England (ISO-NE, or its successors) transmission and power system requirements, and other regulatory requirements as defined in paragraph (b) below.

- (a) The Licensee may deviate from the Flow Stabilization below Cabot Station and Cabot Station Ramping Rates (Article A140). The number of hours of flexible operations, which may be used at the discretion of the Licensee, are as follows.

Date	Allowable Deviations from Cabot Station Ramping Rates (Article A140) and Flow Stabilization below Cabot Station
07/01-07/31	20 hours of flexible operations with no more than 7 flexible events per month
08/01-08/31	26 hours of flexible operations with no more than 7 flexible events per month
09/01-09/30	23 hours of flexible operations with no more than 7 flexible events per month
10/01-10/31	20 hours of flexible operations with no more than 7 flexible events per month
11/01-11/30	28 hours of flexible operations with no more than 7 flexible events per month

(b) If compliance with the Flow Stabilization below Cabot and Cabot Station Ramping Rates (Article A140) would cause the Licensee to violate or breach any law, any applicable license, permit, approval, consent, exemption or authorization from a federal, state, or local governmental authority, any applicable agreement with a governmental entity, the Licensee may deviate from the Flow Stabilization below Cabot and Cabot Station Ramping Rates (Article A140) to the least degree necessary to avoid such violation or breach. The Licensee may also deviate from the Flow Stabilization below Cabot and Cabot Station Ramping Rates for the following reasons:

- (1) To implement Flood Flow Operations as defined in Article A170.
- (2) To perform demonstrations of the resources' operating capabilities under ISO-NE, or its successors, rules and procedures such as, maintaining the Licensee's capacity accreditation (or its successor) or its fast start reserve eligibility. The Licensee shall seek to perform these demonstrations at times that will not cause it to deviate from the conditions in Articles A110-A160, with recognition that April 1 to June 30 should be avoided, to the maximum extent possible.
- (3) To manage the Turners Falls Impoundment to stay within its licensed operating limits in Article A190, with recognition that deviations from April 1 to June 30 should be avoided to the maximum extent possible.
- (4) If compliance with Articles A110-A160 would cause a public safety hazard or prevent timely rescue.

*ISO-NE, or its successors, (or another recognized entity with responsibilities for regional energy and capacity supply) requirements are circumstances when ISO-NE requires the Licensee to be fully available and, if necessary, responsive.

The Flow Stabilization below Cabot Station may be temporarily modified if required by equipment malfunction or operating emergencies reasonably beyond the control of the Licensee.¹⁹ If the Flow Stabilization below Cabot Station is so modified, the Licensee shall notify the Commission, MDEP, MDFW, NMFS, and USFWS as soon as possible, but no later than 10 days after such incident. The Flow Stabilization below Cabot Station may also be temporarily modified for short periods upon mutual agreement with the Licensee for the Northfield Mountain Pumped Storage Project (FERC No. 2485), MDEP, MDFW, NMFS, and USFWS, and upon 5 days' notice to the Commission.

Article A170. Flood Flow Operations

Upon license issuance, the Licensee shall operate the Project in accordance with its existing agreement with the United States Army Corps of Engineers (USACE). 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 will operate during flood conditions and coordinate its operations with the Licensee of the Northfield Mountain Pumped Storage Project (FERC No. 2485).

¹⁹ Temporary modifications are discussed in further detail in Section 7.2.4

Article A180. Cabot Station Emergency Gate Use

Upon license issuance, the Licensee will use the Cabot Station Emergency Gates under the following conditions: a) a Cabot load rejection which could cause overtopping of the canal, b) dam safety issues such as potential canal overtopping or partial breach, and c) to discharge up to approximately 500 cfs from April 1 to June 15 for debris management. The Licensee shall avoid discharging flows higher than 500 cfs through the gates from April 1 to June 15 if practicable; however, if necessary to discharge higher flows, the Licensee shall coordinate with NMFS to minimize potential impacts to Shortnose Sturgeon in the area below Cabot Station.

Article A190. Turners Falls Impoundment Water Level Management

Upon license issuance, the Licensee shall operate the Turners Falls Impoundment, as measured at the Turners Falls Dam, as follows:

- (a) Maintain water levels between elevation 176.0 feet and 185.0 feet National Geodetic Vertical Datum of 1929 (NGVD29).
- (b) Limit the rate of rise of the Turners Falls Impoundment water level to be less than 0.9 feet/hour from May 15 to August 15 from 8:00 am to 2:00 pm. However, if the NRF is greater than the sum of the hydraulic capacity of Cabot Station and Station No. 1 and the Minimum Flow below Turners Falls Dam in effect at the time, the Turners Falls Impoundment rate of rise requirement will not apply.
- (c) The rate of rise of the Turners Falls Impoundment may be temporarily modified if required by equipment malfunction or operating emergencies reasonably beyond the control of the Licensee.²⁰ If the rate of rise of the Turners Falls Impoundment is so modified, the Licensee shall notify the Commission, MDEP, MDFW, NMFS, and USFWS as soon as possible, but no later than 10 days after such incident. The rate of rise of the Turners Falls Impoundment may also be temporarily modified for short periods upon mutual agreement with the Licensee for the Northfield Mountain Pumped Storage Project (FERC No. 2485), MDEP, MDFW, NMFS, and USFWS, and upon 5 days' notice to the Commission.

The Licensee may increase the allowable NRF deviation from $\pm 10\%$ to $\pm 20\%$ to better manage Turners Falls Impoundment water levels. The increased flow deviation is limited by the number of hours shown in the first table of Article A160. This allowance for an increased flow deviation is in addition to the exceptions outlined in paragraphs (a) and (b) of Article A160. As such, the increased flow allowable deviations outlined in this paragraph will not count against any time allotment for exceptions outlined in paragraphs (a) and (b) of Article A160. Similarly, operations meeting the exception criteria outlined in paragraphs (a) and (b) of Article A160 will not count against any time allotment for allowable deviations outlined in this paragraph. Allowable flow deviations in excess of $\pm 10\%$ of NRF resulting from conflicting operational requirements will not count against any time allotment for allowable deviations outlined in this paragraph.

²⁰ Temporary modifications are discussed in further detail in Section 7.2.4

Northfield Mountain Project

Article B100. Project Operations

Upon license issuance, the Licensee shall:

- (a) Operate the Northfield Mountain Pumped Storage Project in accordance with its existing agreement with the United States Army Corps of Engineers (USACE). This agreement, memorialized in the Reservoir and River Flow Management Procedures (1976), as it may be amended from time to time, governs how the Project will operate during flood conditions and coordinate its operations with the Licensee of the Turners Falls Hydroelectric Project (FERC No. 1889).
- (b) Operate the Northfield Mountain Pumped Storage Project upper reservoir between elevation 1004.5 and 920.0 feet National Geodetic Vertical Datum of 1929 (NGVD29).

4 ACTION AREA

For purposes of ESA section 7 consultation, action area means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).

4.1 Geographic Area of Project Effects

Project elements of the Proposed Actions include construction, maintenance, and operations. Each is defined below, and their geographic area of effect is identified based on features in [Figure 4.1-1](#).

4.1.1 Construction

Construction will be limited to the PM&E measures proposed at the Projects. All proposed construction will be confined to specific areas within the Project boundaries ([Figure 4.1-1](#)).

4.1.2 Maintenance

Maintenance of Project facilities and lands will be limited to areas within the Project boundaries ([Figure 4.1-1](#)).

4.1.3 Operations

Project hydropower operations affect the Connecticut River corridor for approximately 57 river miles from Vernon Dam to Holyoke Dam ([Figure 4.1-1](#); [Table 4.1.3-1](#)). The TFI water levels are affected by pumping and generation at the Northfield Mountain Project, along with operations at the Turners Falls Project. River flows from upstream, along with pumping and generation from the Northfield Mountain Project, can determine the amount of flow passed through the Turners Falls Project. Outflows through the Turners Falls Project affect flows and water levels in the Connecticut River from Turners Falls Dam to Holyoke Dam, but only when the river flows are below the combined hydraulic capacity of the Turners Falls Project and its minimum spill flow. Flows higher than 15,938 cfs, plus the minimum bypass flow at the time, results in additional spill over the dam, along with full generation at the Project.

Table 4.1.3-1: River Miles of Major Project Features

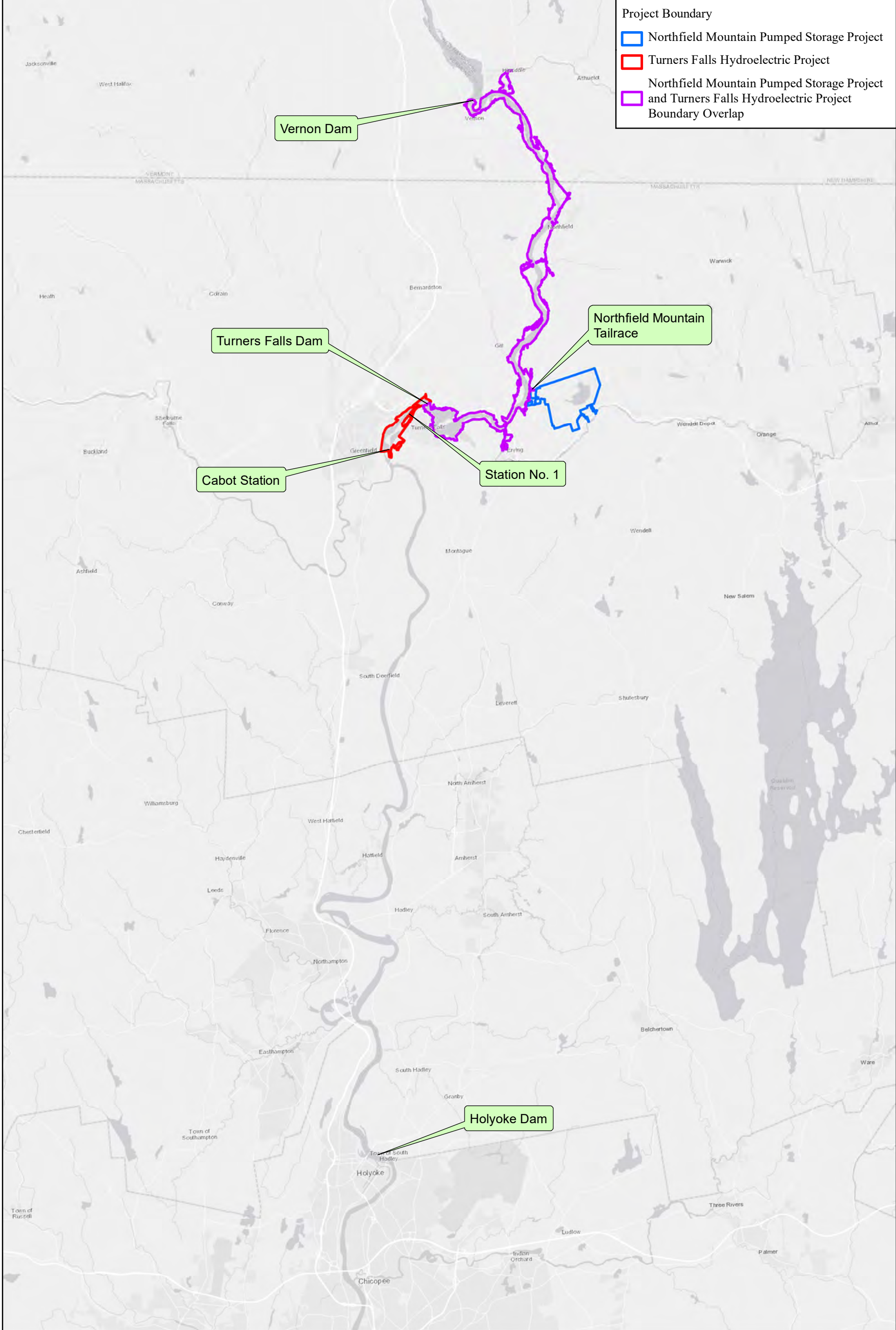
Location	River Mile
Vernon Dam*	142.1
Northfield Mountain Tailrace	127.3
Turners Falls Dam	122.2
Station No. 1	121.1
Cabot Station	119.3
Lower End of Turners Falls Project Boundary	119.0
Holyoke Dam*	85.5

*Vernon Dam and Holyoke Dam are not Project features but are included because they are considered the upstream and downstream extents, respectively, of the operational project element for the Northfield Mountain and Turners Falls Projects.

Legend

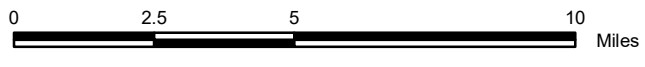
Project Boundary

- Northfield Mountain Pumped Storage Project
- Turners Falls Hydroelectric Project
- Northfield Mountain Pumped Storage Project and Turners Falls Hydroelectric Project Boundary Overlap



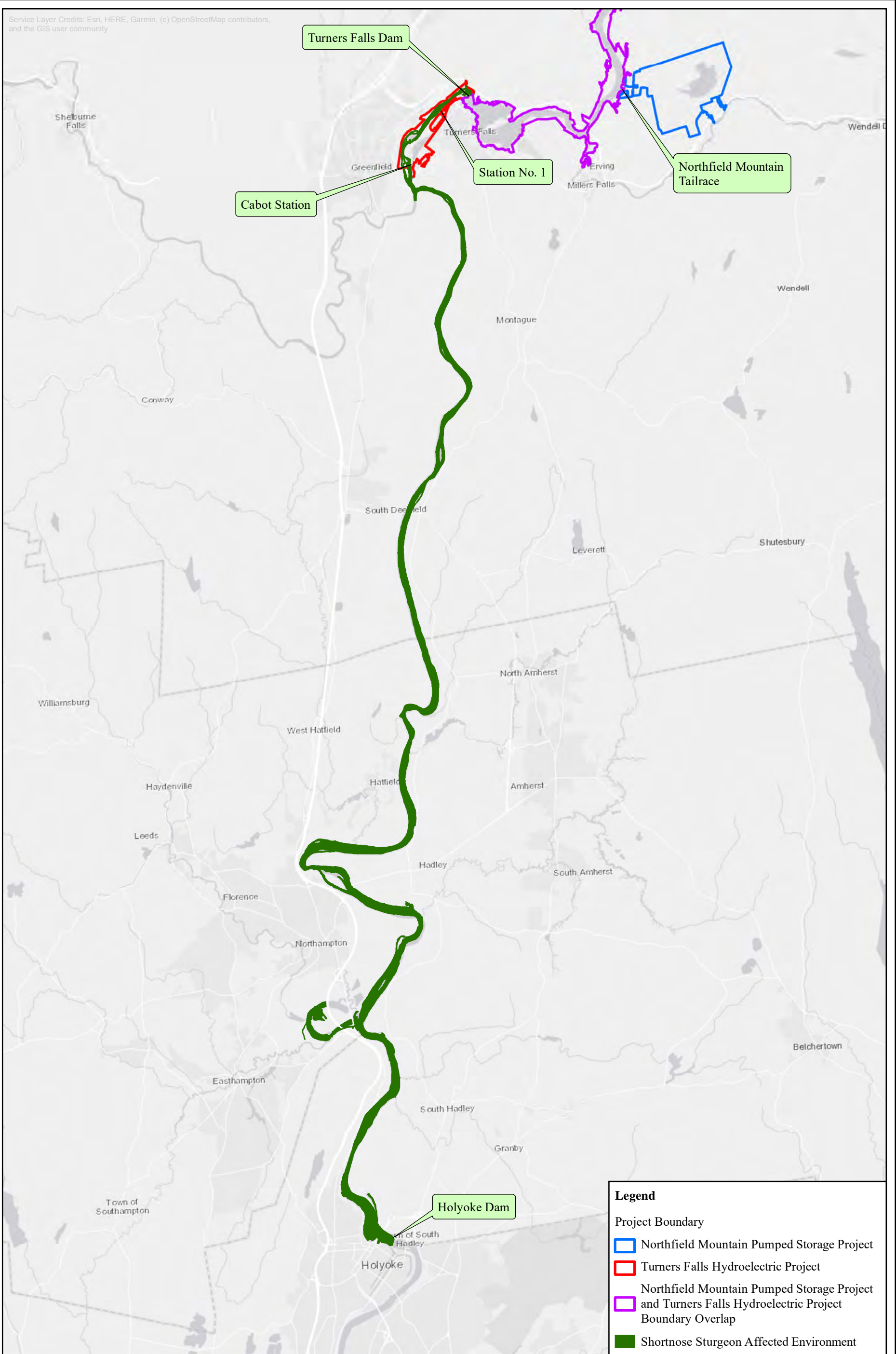
Northfield Mountain Pumped Storage Project (No. 2485)
and
Turners Falls Hydroelectric Project (No. 1889)

Figure 4.1-1
Geographic Area of Project Effects Map



4.2 Affected Environment

The affected environment includes the portion of the Action Area with the potential for effects on the listed species. The historical limit of SNS in the Connecticut River is at Turners Falls (river mile 122.2) ([NMFS, 1998](#)). They are known to seasonally inhabit all areas in the Connecticut River from Turners Falls Dam to the river mouth but flows within the hydraulic capacity of the Turners Falls Project are modified by operations at Holyoke Dam. Therefore, the affected environment, as it pertains to the effects of the Turners Falls Project and Northfield Mountain Project on SNS, includes areas of the Connecticut River below the Turners Falls Project from the Turners Falls Dam to the Holyoke Dam ([Figure 4.2-1](#)). Within the affected environment are areas that various life stages of SNS use during different times of the year for all necessary life history activities (see [Section 5.4](#)).



Northfield Mountain Pumped Storage Project (No. 2485)
and
Turners Falls Hydroelectric Project (No. 1889)

Figure 4.2-1
Affected Environment



5 STATUS OF AFFECTED SPECIES

SNS were listed as endangered in 1967 (32 FR 4001), and the species remained on the endangered species list with the enactment of the ESA in 1973. SNS are thought to have been abundant in nearly every large river along the East Coast prior to the 1880s. Pollution and overfishing, including bycatch in the shad fishery, were listed as principal reasons for the species' decline. The species remains listed as endangered throughout its range. While the 1998 Recovery Plan refers to Distinct Population Segments (DPS), the process to designate DPSs for this species has not been undertaken; therefore, the species remains listed as a single entity throughout its range. No critical habitat has been designated for SNS.

5.1 Rangewide Threats to Shortnose Sturgeon Recovery

SNS occupy a variety of habitats at various points in their life including rivers, estuaries, bays, and occasionally, coastal marine waters. Habitat alterations potentially affecting SNS include loss of access to historical habitat, loss of and alteration of spawning habitat, poor water quality and changes to water flow, substrate alteration, siltation and contamination. Some important aspects of habitat quality, especially water quality, have improved in many portions of their range during the last 30 years.

SNS throughout their range are exposed to a variety of habitat stressors from anthropogenic activities including obstructed or restricted access to riverine habitat; perturbations of habitat from dredging and construction and degraded habitat and water quality which may result in water quality standards that are below fish health standards and tissue contamination ([SSSRT, 2010; NMFS, 1998](#)). There are also potential emerging threats from new technologies (such as tidal turbines) and the consequences of climate change ([NMFS, 2017, SSSRT, 2010, NMFS, 1998](#)).

5.2 Population Status and Trends of Shortnose Sturgeon

5.2.1 Rangewide

There is no current rangewide population estimate for SNS. In general, populations in the Northeast are larger and more stable than those in the Southeast ([SSSRT, 2010](#)). There are 19 documented populations of SNS ranging from the St. Johns River, Florida to the Saint John River in New Brunswick, Canada. Recent developments in genetic research as well as differences in life history support the grouping of SNS into five genetically distinct groups, all of which have unique geographic adaptations ([SSSRT, 2010](#)). These groups are: 1) Gulf of Maine; 2) Connecticut and Housatonic Rivers; 3) Hudson River; 4) Delaware River and Chesapeake Bay; and 5) Southeast. The Gulf of Maine, Delaware/Chesapeake Bay and Southeast groups function as metapopulations. The other two groups (Connecticut/Housatonic and the Hudson River) function as independent populations.

While there is some migration within each metapopulation (i.e., between rivers in the Gulf of Maine and between rivers in the Southeast) and occasional migration between populations (e.g. Connecticut and Hudson), interbreeding between river populations is limited to very few individuals per generation; this results in morphological and genetic variation between most river populations (see [Walsh et al. 2001; Grunwald et al. 2002; Waldman et al. 2002; Wirgin et al. 2005](#)). Indirect gene flow estimates from mitochondrial deoxyribonucleic acid (mtDNA) indicate an effective migration rate of less than two individuals per generation. This means that while individual SNS may move between rivers, very few SNS are spawning outside their natal river. In the northern portion of their range in the United States, SNS are known to spawn in the Kennebec, Androscoggin, Merrimack, Connecticut, Hudson and Delaware Rivers.

5.2.2 Connecticut River

According to Kynard et al., ([2016](#)), 28,000 adult SNS would be predicted to reside in the Connecticut River based on a range-wide analysis of relatively recent populations. This number was derived from a significant

relationship documented among rivers, where SNS abundance was positively correlated with the upstream spawning distance from the river mouth. The number of adults estimated almost two decades ago is on the order of approximately 2,000 individuals (Savoy, 2004; Kynard *et al.*, 2016). Holyoke Gas and Electric (HG&E) is currently working cooperatively with NMFS and other researchers to develop a new SNS population estimate for the Connecticut River.

The current abundance and distribution of SNS in the Connecticut River are largely artifacts of the long-term presence of Holyoke Dam (Kynard *et al.*, 2012). Prior to construction of dams in the lower portions of the Connecticut River, SNS migrated upstream from the lower river to spawn in areas near Great Falls, the current location of the Turners Falls Dam. Construction of the Holyoke Dam divided the population, isolating a portion of the population upstream of the dam, within the action area. The individual SNS residing within the action area spawn near Montague, within the Project boundary of the Turners Falls Project. Recent fish passage efforts at Holyoke Dam have resulted in greater passage of SNS to areas upstream of Holyoke Dam as well as improved downstream passage. Pre-spawn SNS remaining downstream of Holyoke Dam do not complete their migration to the historical spawning areas near Montague (Kynard *et al.*, 2016). However, evidence of spawning has also been documented downstream of Holyoke Dam. During ichthyoplankton sampling in the Connecticut River during 2005 and 2006, three SNS larvae were captured downstream of Holyoke Dam (1 in 2005 and 2 in 2006; Kleinschmidt, 2006, 2007; SSSRT, 2010). Several studies have documented downstream dispersal of SNS in the Connecticut River (i.e., Kynard and Horgan, 2002; Taubert, 1980), and results of these studies would suggest that larvae spawned at Montague would not likely be in the migratory phase long enough to pass downstream of Holyoke Dam, and therefore larvae downstream of Holyoke Dam likely originated there. More recently, several eggs (n=70) were captured on egg mats placed downstream of Holyoke Dam in 2021 by Connecticut Department of Energy and Environmental Protection (CT DEEP) (CRASC 2021; HG&E 2023). Eggs were also captured during similar surveys performed in 2022, with 36 eggs and two hatched larvae found on the mats (HG&E 2023). Divers have also observed juvenile sturgeon in 2021 and 2022 while searching for mussels in the Springfield, CT area (HG&E 2023). The State of Connecticut is currently undertaking a number of studies of SNS below the Holyoke Dam including investigations of potential spawning locations.

Of the total Connecticut River population, approximately 328 adult SNS were residing upstream of Holyoke Dam based on captures and tagging from 1990-2005 (B. Kynard, USGS, unpubl. Data in SSSRT, 2010). Abundance of pre-spawning adult SNS in this area was estimated at 142.5 individuals each spring between 1994 and 2001 (Kynard *et al.*, 2012). SNS passed upstream at Holyoke in recent years (n = 242 from 2017-2022²¹) may contribute to the spawning population.

The most recent population estimate for SNS adults below Holyoke Dam found that the population was between 1,054 and 2,671 fish depending on the mark-recapture population statistic used (Savoy, 2004). Further, this portion of the population was showing an increasing trend from 1989 through 2002, and Savoy (2004) stated that this could have resulted from significant improvements in water quality and decreases in commercial fishing effort in the Connecticut River. The fish handled during the studies of the downstream population were relatively robust, and this portion of the population does not appear to be food-limited (Savoy, 2004). By comparison, male SNS upstream of Holyoke Dam grow slower than those downstream (Kynard *et al.*, 2012), possibly due to some type of foraging or nutrient/mineral limitation. However, female SNS upstream of Holyoke Dam do not appear to exhibit the same growth limitation, possibly due to different foraging strategies between females and males that have not yet been identified (Kynard *et al.*, 2012).

²¹ There was a total of 245 SNS captured and passed at Holyoke Dam between 2017 and 2022, but three mortalities were documented in 2018. Therefore, 242 were documented as being passed alive.

There was no information found on the portion of the population that would include juvenile SNS in the Connecticut River.

5.2.3 Action Area

The portion of the Connecticut River SNS population between Holyoke Dam and Turners Falls Dam is considered to be within the action area. Information on SNS in the action area is presented in Section 5.4 below.

5.3 Shortnose Sturgeon Life History

SNS are an anadromous species, but their degree of anadromy varies by latitude. SNS in the northern (i.e., Bay of Fundy and Gulf of Maine) and southern rivers use habitats in saltwater, and near the saltwater/freshwater interface more extensively than populations of rivers in between ([Kynard et al., 2016](#)). This has been termed “amphidromous”, whereby SNS move between fresh and saltwater at some point during their life, but not only for spawning. This is slightly different from classical anadromy, for which there are more clear distinctions on fresh and saltwater habitat uses.

5.3.1 Growth, Maturity, Fecundity, and Mortality Rates

SNS have similar lengths at maturity (45-55 cm fork length) throughout their range, but, because SNS in southern rivers grow faster than those in northern rivers, SNS mature at younger ages in southern rivers ([Dadswell et al. 1984](#)). SNS are long-lived (30-40 years) and, with the oldest known female reaching 67 years of age and the oldest known male reaching 32 years. In the northern portion of their range, which includes the Connecticut River population, males reach maturity at five (5) to 10 years, while females mature between seven (7) and 13 years. Based on limited data, females spawn every three (3) to five (5) years while males spawn approximately every two (2) years. Fecundity estimates have been made and range from 27,000 to 208,000 eggs/female ([Dadswell et al., 1984](#)).

Several published reports have presented the problems facing long-lived species that delay sexual maturity ([Crouse et al., 1987](#); [Crowder et al., 1994](#); [Crouse, 1999](#)). In general, these reports concluded that animals that delay sexual maturity and reproduction must have high annual survival as juveniles through adults to ensure that enough juveniles survive to reproductive maturity and then reproduce enough times to maintain stable population sizes.

Total instantaneous mortality rates (Z) are available for the Saint John River (0.12 – 0.15; ages 14-55; [Dadswell, 1979](#)), Upper Connecticut River (Holyoke Dam to Turners Falls Dam) (0.12; [Taubert, 1980](#)), and Pee Dee-Winyah River (0.08-0.12; [Dadswell et al., 1984](#)). Total instantaneous natural mortality (M) for SNS in the Lower Connecticut River (river mouth to Holyoke Dam) was estimated to be 0.13 (T. Savoy, Connecticut Department of Environmental Protection, *personal communication*). There is no recruitment information available for SNS because there are no commercial fisheries for the species. Estimates of annual egg production are difficult to calculate because females do not spawn every year ([Dadswell et al., 1984](#)). Further, females may abort spawning attempts, possibly due to interrupted migrations or unsuitable environmental conditions ([NMFS, 1998](#)). Thus, annual egg production is likely to vary greatly in this species.

5.3.2 Use of Riverine and Estuarine Environments

Much of the information for SNS is from riverine and estuarine environments, where they have been studied throughout their range. Though they are known to make coastal migrations between rivers, much of the life of SNS is spent in riverine and estuarine habitats.

5.3.2.1 Spawning and Early Life Stages

SNS throughout their range typically spawn at water temperatures of 9–15°C ([Dadswell, 1979](#), [Kynard, 1997](#)). The spawning period is estimated to last from a few days up to 30 days ([SSSRT, 2010](#)). Within a given river, SNS have been documented spawning at discrete sites within different rivers, returning to the same areas over multiple spawning events ([Kieffer and Kynard, 1993](#); [Kynard et al., 2012](#); [Squiers et al., 1982](#)). Spawning occurs in freshwater over channel habitats containing gravel, rubble, or rock-cobble substrates ([Dadswell et al., 1984](#); [NMFS, 1998](#)). During spawning, individual females deposit eggs in batches over the course of 20 or more hours, moving relatively short distances during this time ([Kynard et al., 2012](#)). The spawning period is estimated to last from a few days to several weeks. Spawning begins from late winter/early spring (southern rivers) to mid-to-late spring (northern rivers) when the freshwater temperatures increase to 8-9°C. Eggs are 3-3.5mm in diameter, are negatively buoyant, and become adhesive once they are immersed in water ([Dadswell, 1979](#); [Dadswell et al., 1984](#); [Kynard, 1997](#)). They do not tend to drift far from the spawning locations and enlarge after adhesion to the substrate ([Kynard, 1997](#); [Kynard et al., 2012](#)). Development of fertilized eggs is correlated with water temperature. In one study, SNS hatched after just 8 days in water temperatures of 17°C ([Buckley and Kynard, 1981](#)).

Upon hatching, SNS are blackish-colored and 7-11 mm long ([Buckley and Kynard, 1981](#)). Yolk-sac larvae are capable of only “swim-up and drift” swimming behavior and are ill-equipped to survive as free-swimming individuals in the open river ([SSSRT, 2010](#)). Yolk-sac larvae are known to form aggregations with other larvae in concealment ([SSSRT, 2010](#)). Sheltering in dark substrate (i.e. in the interstitial spaces between rocks/cobble at the spawning site) may enhance survival during this life stage by avoiding predators ([SSSRT, 2010](#)). Eggs and yolk-sac larvae may be concentrated near the spawning area for up to four (4) weeks post-spawning. In 9-12 days, the yolk sac is absorbed and the SNS develop into larvae which are about 15 mm long ([Buckley and Kynard, 1981](#)).

SNS larvae are believed to begin downstream migrations at about 20 mm total length (TL). Laboratory studies suggest that young SNS move downstream in a 2-step migration: a 2 to 3-day downstream migration by larvae followed by a residency period by young of the year (YOY), then a resumption of migration by yearlings in the second summer of life ([Kynard, 1997](#)). Little is known about YOY behavior and movements in the wild but SNS at this age are believed to remain in channel areas within freshwater habitats upstream of the salt wedge for about one year ([Dadswell et al., 1984](#), [Kynard, 1997](#)). Foraging of YOY and yearling SNS appears to be somewhat adaptive, with consumed food items changing with the abundance of available prey that are both drifting and residing in the benthos ([Carlson and Simpson, 1987](#)). The most important food items documented on the Hudson River were midges and amphipods, and based on diet, young SNS likely prefer to forage over substrates exhibiting high production of benthic invertebrates such as sandy mud ([Carlson and Simpson, 1987](#)).

5.3.2.2 Juvenile and Adult Habitat Uses and Movements

SNS have been documented using a wide range of depths. A minimum depth of 0.6 m (1.9 feet) is necessary for the unimpeded swimming by adults ([SSSRT, 2010](#)). SNS are known to occur at depths of up to 30 m (98 feet) but are generally found in waters less than 20 m (66 feet) ([Dadswell et al., 1984](#)). SNS have also demonstrated tolerance to a wide range of salinities ([SSSRT, 2010](#)).

In most rivers, juvenile SNS that are over one year old join adults and show similar patterns of habitat use ([Kynard, 1997](#)). Above Holyoke Dam on the Connecticut River, where some juveniles and adults continuously reside in freshwater, there was no habitat segregation by age as both adults and juveniles used the same river reaches ([Savoy 1991](#), [Seibel, 1991](#)). In the southeast, juveniles age one and older make seasonal migrations like adults, moving upriver during warmer months where they shelter in deep holes, before returning to the fresh/saltwater interface when temperatures cool ([SSSRT, 2010](#)). Conversely, juveniles of this age in the Saint John River, Canada, preferred different habitat than adults. Dadswell

(1979) reported juveniles prefer freshwater habitats until they reach about 45 cm (17.7 inches) total length or age eight.

In the northern extent of their range, SNS exhibit three distinct movement patterns. These migratory movements are associated with spawning, feeding, and overwintering activities. In spring, as water temperatures rise above 8°C, pre-spawning SNS move from overwintering grounds to spawning areas. Spawning occurs from mid/late March to mid/late May depending upon location and water temperature. SNS spawn in upper, freshwater areas and feed and overwinter in both fresh and saline habitats.

Adult SNS typically leave the spawning grounds soon after spawning to forage. Kynard et al., (2012) documented that spent females in the Connecticut River had lost between 20–40% of pre-spawning weight from egg deposition; males lost between 5–7% of pre-spawning weight. Dadswell (1979) documented both males and females actively feed immediately after spawning. Because substrate type strongly affects composition of benthic prey, both juvenile and adult SNS primarily forage over sandy-mud bottoms, which support benthic invertebrates (Kynard, 1997). They feed on a variety of benthic and epibenthic invertebrates including mollusks, crustaceans (amphipods, chironomids, isopods), and oligochaete worms (Vladykov and Greeley, 1963; Dadswell, 1979). Foraging in the colder rivers in the northern part of their range appears to cease during winter months when SNS become inactive.

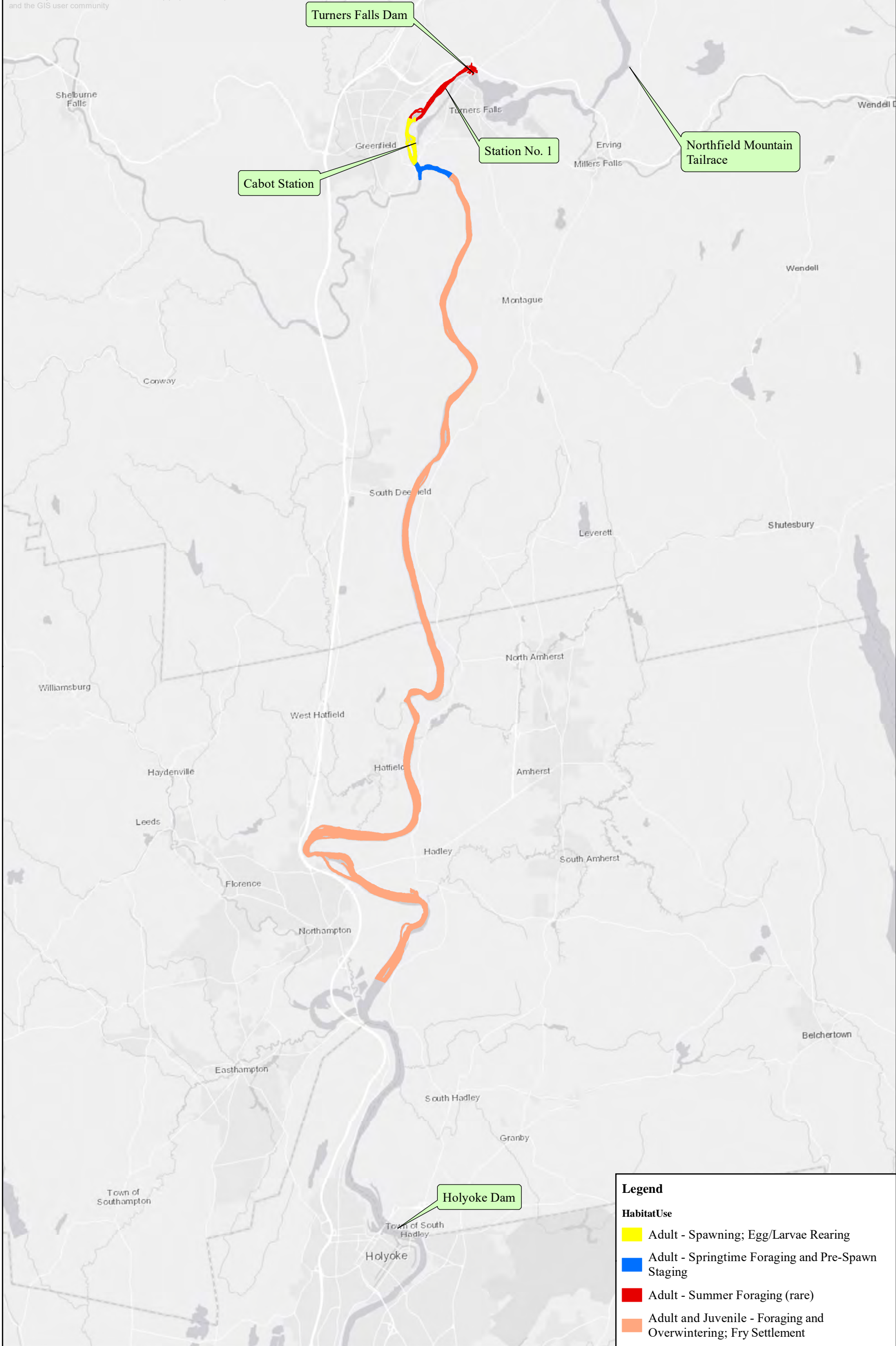
During the winter, both juveniles and adults form dense aggregations in relatively deep river segments (3–10m) in northern populations (Kynard et al., 2012). Kynard et al., (2012) examined habitat data and discovered that the quality of wintering areas differs. Wintering sites appear to be entirely in freshwater in the Merrimack River (Kieffer and Kynard, 1993), Connecticut River (Buckley and Kynard, 1985a, T. Savoy CTDEEP, pers. Comm., Kynard et al., 2012), and Hudson River (Dovel et al., 1992). The number of wintering sites in any river was unrelated to population size and may be indicative of life history adaptations to each river system (Kynard et al., 2012).

5.3.3 Use of Coastal Environments

Movement among river systems has been documented across the entire species range, with most coastal migrants occurring in the northern portion of the range, where populations are large (Dadswell et al., 1984; Kynard, 1997; Kynard et al., 2016). They have been documented migrating in the nearshore zone along the coast and moving in complex patterns using non-natal river, coastal, and estuarine habitats (Kynard et al., 2016). Presumably, these movements could pertain to foraging, and migrations from larger rivers with higher abundances of SNS to smaller, surrounding coastal and non-natal river areas could be related to density-dependent factors (Kynard et al., 2016). For example, if abundance of SNS is high and suitable forage becomes scarcer, some individuals may migrate to more distant foraging areas outside of that river system. Additionally, some migrants are known to forage and overwinter in some rivers, but migrate to different rivers to spawn, presumably their natal river (Altenritter et al., 2018).

5.4 Shortnose Sturgeon Movements, Habitat Use and Current Project Effects in the Action Area

The Connecticut River SNS population, like every other SNS population, uses freshwater for spawning and rearing. However, this population primarily uses habitats within freshwater for foraging and wintering, in comparison to the northern and southern riverine populations that would utilize saltwater habitats more often ([Kynard *et al.*, 2016](#)). The life history and population of SNS in the action area has been studied extensively by researchers at the Silvio O. Conte Anadromous Fish Research Laboratory (see [Kynard *et al.*, 2012](#)). Though the SNS that move downstream of Holyoke Dam are known to use estuarine habitats further downriver for foraging, those that remain in the action area only have access to freshwater habitats. It appears that some SNS in the Connecticut River use the full range of accessible habitat, from the lower estuary to Turners Falls Dam, while others appear to complete their life cycle above the Holyoke Dam. SNS in the action area are likely to be a combination of both types of individuals. SNS are known to exhibit specific life history movements and habitat use within the action area. This includes movements and activities, such as pre-spawn and spawning migrations, egg and larval development, fry dispersal, foraging, and overwintering ([Figure 5.4-1](#)). Further details on each of these activities and current Project-related effects are provided in the subsections below.



Legend

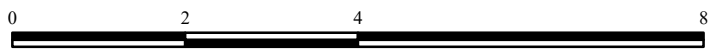
Habitat Use

- Adult - Spawning; Egg/Larvae Rearing
- Adult - Springtime Foraging and Pre-Spawn Staging
- Adult - Summer Foraging (rare)
- Adult and Juvenile - Foraging and Overwintering; Fry Settlement

Northfield Mountain Pumped Storage Project (No. 2485)
and
Turners Falls Hydroelectric Project (No. 1889)

Figure 5.4-1
Known Habitat Use by Shortnose Sturgeon
in Action Area

Note: Locations are general and were derived from Kynard et al. (2012)



5.4.1 *Upstream Extent of Migration and Habitat Use*

5.4.1.1 Historical Extent and Passage at Holyoke Dam

The Turners Falls Dam is the natural upstream limit of the Connecticut River SNS population ([NMFS, 1998](#)). The Holyoke Dam, which is currently the furthest-downstream dam on the river, divides the Connecticut River SNS population, and historically was a complete barrier to upstream migration until fish passage facilities were installed there. Upstream passage of SNS at Holyoke Dam from 1975 to 1999 only averaged four (4) fish per year, and SNS were not allowed to pass upstream of the dam from 1999 to 2017 until a downstream fish passage facility was built to pass downstream migrating SNS as well as other diadromous and resident species. From 2017 through 2023, a total of 306 SNS have been passed upstream alive at Holyoke Dam. SNS in the action area belong to the portion of the population that appears to stay within the areas upstream of Holyoke Dam as well as that portion of the population that migrates downstream past the Holyoke Dam and returns upstream via the fishway at the Holyoke Dam.

5.4.1.2 Documented Presence/Absence in the Turners Falls Impoundment

Occasional, anecdotal reports of SNS in the Connecticut River upstream of Turners Falls Dam have been reported; however, to date, there have been no documented reports of any individuals made to NMFS that could be verified and no SNS of any life stage have been reported in any scientific study carried out upstream of Turners Falls. In August 2017, an angler reported catching and releasing an adult-sized SNS below the Vernon Dam (the upper end of the TFI). This was the first documented report of a SNS being collected upstream of the Turners Falls Dam. NMFS has confirmed that although this report appears to be legitimate, they are not aware of any other documented incidents of SNS upstream of the Turners Falls Dam. Since the existence of a population of ESA listed SNS in the TFI could have implications for license conditions, FirstLight worked to proactively address this reported capture. To answer the question of whether the single capture of a SNS indicated the presence of a population in the TFI, FirstLight investigated scientific methods which could determine the existence of such a population. Since SNS are federally endangered and collection requires an ESA Section 10 research permit, netting for SNS was not an option that could be pursued in a timely manner. However, environmental DNA (eDNA) is a sampling method for detecting aquatic species which can provide a measure of species presence, density, and distribution without having to collect the fish. Fish release DNA into their surrounding environment via slime, scales, epidermal cells, or feces.

FirstLight collected a total of 170 water samples which were filtered during the two surveys on July 18 and 19 and August 14, 2018. There was no SNS DNA detected in the water samples collected in the TFI; however, SNS DNA was detected downstream in an area that SNS are known to occupy in the summer (these locations were used to confirm the validity of the sampling technique and subsequent detection analysis). The samples taken below Vernon Dam and within the TFI did not detect the presence of SNS and thus, based on this information combined with the lack of additional documented captures of SNS in the TFI, FirstLight considers the likelihood of a population, as opposed to a single SNS in the TFI, to be very low. A report entitled *Environmental DNA Sampling for Shortnose Sturgeon* summarizing the eDNA findings was filed with FERC on November 8, 2018.

During an October 17, 2019 conference call, NMFS noted that it had provided funds to support efforts led by the USGS Conte Lab to gill net upstream of the Turners Falls Dam to attempt to determine if SNS were present. Though the details of the gillnetting surveys were not provided to FirstLight, NMFS reported that no SNS were found in any of the gill net sets. No SNS were captured or observed in the TFI during extensive boat electrofishing and gillnetting surveys that were performed as part of Relicensing Study 3.3.11 – *Fish Assemblage Assessment* in June/July and September 2015. In addition, no SNS were collected in boat electrofishing and gillnetting surveys conducted as part of Great River Hydro relicensing studies which sampled the reach immediately downstream of Vernon Dam during June, August, and October 2015 ([Normandeau 2016A,B](#)). Further, boat electrofishing was conducted to assess the ecological effects of the

Vermont Yankee Nuclear Power Station from 1968 through 2011. Standardized methodology was used from 1991 through 2014 to sample the reach from Vernon Dam to approximately five miles downstream. With some exceptions due to extreme flow conditions, sampling was conducted monthly from July through October at 4 to 5 sites for general species collections and twice monthly from July through October at six sites for targeted anadromous species collections. Despite decades of electrofishing surveys that documented at least 35 species, no SNS were ever collected in those studies ([Aquatec 1993, 1995, Normandeau, 1997-2016](#)).

5.4.1.3 Current Upstream Extent

Given the historical extent, along with the extensive data collection and study findings described above the current upstream extent of the SNS population in the Connecticut River is considered to be the Turners Falls Dam.

5.4.2 *Spawning Migrations and Habitats*

Pre-spawn adult SNS have been documented departing wintering areas downstream of the Turners Falls Dam as early as April 12, and as late as May 3, at a variety of flows and water temperatures but within a narrow day-length window ([Kynard et al., 2012](#)). Spawning in the action area has also been documented to occur within a specific day-length window of 13.9–14.9-hours, which corresponds to April 27 through May 22. Documented spawning has occurred only when daily mean water temperatures of 6.5–15.9°C and mean daily river flows of 4,273 to 31,819 cfs occurred within the April 27 through May 22 window ([Kynard et al., 2012](#)). Therefore, the presence of pre-spawn and spawning fish in the action area, regardless of inter- and intra-annual variability is constrained conservatively to April and May.

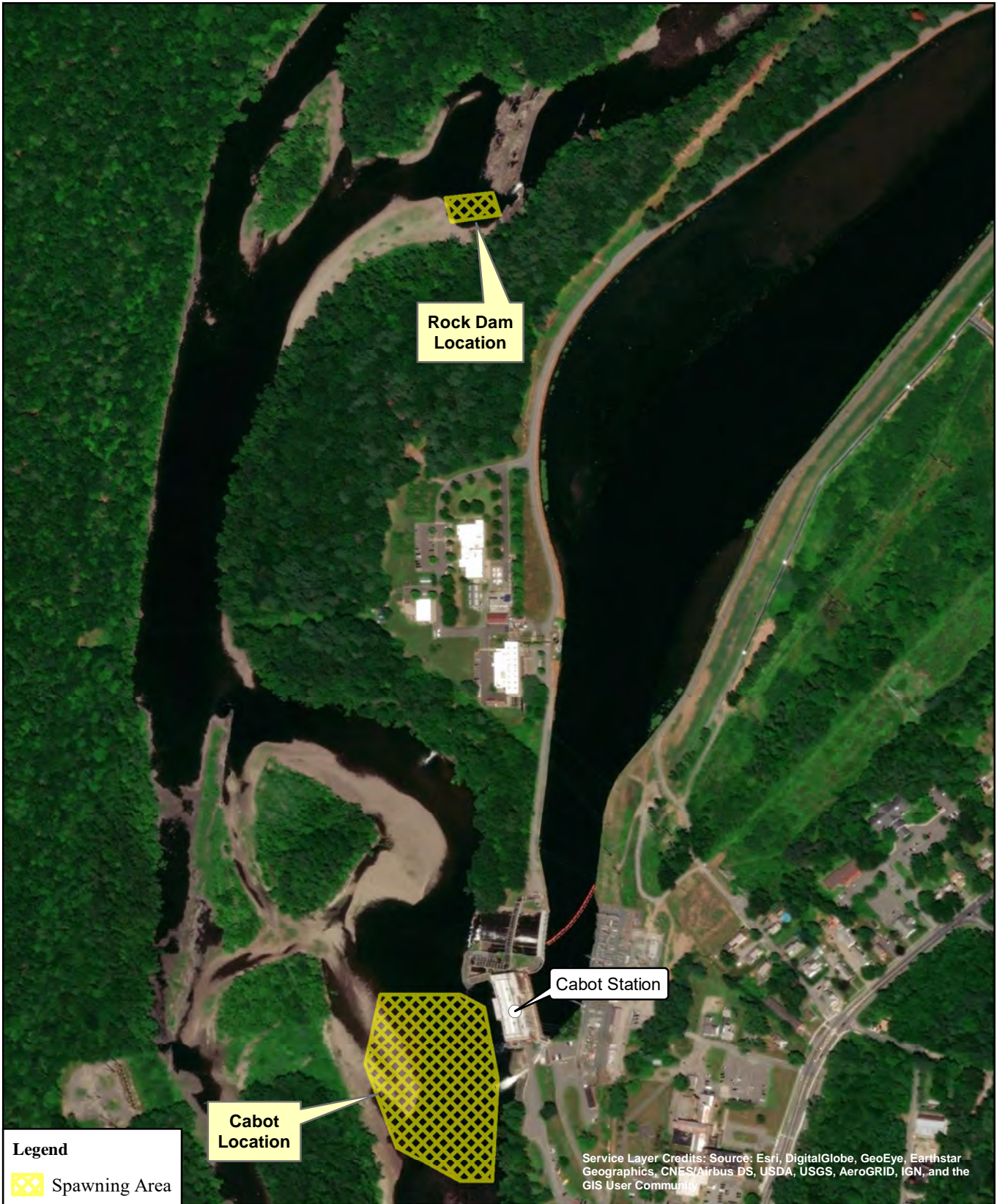
Movements of tagged fish suggest that pre-spawn fish arrive in the general Montague area, and then exhibit searching behavior to choose specific sites for spawning. [Kynard et al., \(2012\)](#) have documented SNS choosing the same two sites for spawning within the action area each year, both of which are located within a 2-km (1.2 mi) reach near Montague, MA ([Figure 5.4.2-1](#)). The primary spawning location within the action area chosen by SNS is in the tailrace of Cabot Station at the Turners Falls Project. This spawning site is approximately 2.7 hectares (ha) or 6.7 acres in area. The secondary, smaller site (0.4 ha or 0.99 acres in area) chosen by SNS is located downstream of a natural rock formation locally known as Rock Dam, which is within the Turners Falls Project bypass reach. The spatial extent of these sites was determined from the tracked locations of spawning SNS over several years ([Kynard et al., 2012](#)).

In general, spawning has been more commonly successful at the location near Cabot Station than it has been near Rock Dam. Discharges or discharge spikes of approximately 35,000 cfs were correlated with spawning failure at the location near Cabot Station. Spawning failed or did not occur at the Rock Dam site at discharges in the bypass reach above approximately 21,000 cfs, but also if flows in the bypass reach were reduced below approximately 2,500 cfs.

Operational flows at the Turners Falls Project have also been cited as potentially impacting SNS spawning in the action area. [Kynard et al., \(2012\)](#) noted that Cabot Station peaking operations did not result in abandonment of spawning by SNS, but that changes in flow could result in rapid changes of velocities. SNS are known to release eggs continuously in small batches, and once they start releasing eggs, they do not stop until they are finished, even if conditions become unsuitable. Therefore, changes in velocities near Cabot Station could be resulting in egg mortality if SNS are spawning in areas with unsuitable velocities ([Kynard et al., 2012](#)). At the Rock Dam site, flow changes in the bypass reach, as resulting from flow regulation from the Turners Falls Project, have been shown to change the flow between suitable and unsuitable spawning conditions relatively rapidly ([Kynard et al., 2012](#)). Disruption of spawning, and sediment mobilization that could harm eggs, was also noted as a potential effect caused by the episodic operation of the emergency spillway gates at Cabot Station ([Kynard et al., 2012](#)); however, this issue was

studied by FirstLight during the relicensing process, and it was determined that operation of the emergency spillway gates would not likely effect SNS to the degree that common springtime flow events could.

After spawning, SNS need to recover lost energy, and begin to actively forage. SNS in the action area have been documented moving downstream to the Deerfield River confluence, and subsequently further downstream, to forage (see [Section 5.4.5](#)). Some post-spawn fish leave the action area, passing downstream to areas below Holyoke Dam.



Northfield Mountain Pumped Storage Project (No. 2485)
and
Turners Falls Hydroelectric Project (No. 1889)

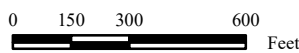


Figure 5.4.2-1: Documented Shortnose Sturgeon Spawning Locations in the Action Area

Notes: Locations drawn based on Fig. 2 from Chapter 3 of Kynard et al. (2012).

5.4.3 Egg/Larvae Maturation and Habitats

Eggs and larvae are present at rearing areas within the action area from the time they are spawned until they mature into fry. The widest predicted time period that eggs and larvae would be present in the action area, based on studies by Kynard *et al.*, (2012) would be from late April through mid-June. SNS eggs and larvae have been captured in drift and kick nets and/or observed during SCUBA surveys in close proximity to spawning SNS, and within or immediately downstream of the primary spawning areas (Kynard *et al.*, 2012). Kynard *et al.*, (2012) noted that SNS eggs would not drift long distances, such as from the Rock Dam spawning area to the Cabot Station spawning area. However, Kynard *et al.*, (2012) noted that shoals downstream of the Cabot and Rock Dam locations could become exposed due to a combination of Project operations and low natural river discharges. They identified these shoals as potential nursery locations, and visually surveyed for eggs and larvae during multiple years when the shoals below Cabot Station became exposed. Though other species of eggs and larvae were observed on the shoals during the surveys, no SNS eggs or larvae were found stranded on dewatered shoals (Kynard *et al.*, 2012; Kieffer and Kynard, 2007). Additionally, based on data gathered during Relicensing Study 3.3.1 – *Instream Flow Habitat Assessments in the Bypass Reach and Below Cabot Station*, habitat frequently becomes unsuitable at these shoals given the variety of flows that could occur during the SNS rearing period. This is due to their flat, shallow nature which promotes dewatering at low flow and high velocities at higher flows. By contrast, suitable habitat tends to remain available to the egg/larval stages, despite flow changes that occur, within and in close proximity to the SNS spawning habitat area at Cabot Station. As such, successful egg and larval development is most likely occurring within and near the spawning area identified by Kynard *et al.*, (2012) rather than at the downstream shoals.

5.4.4 Dispersal of Fry

Research by Kynard *et al.*, (2012) has found that dispersal of fry typically occurs in the late May and early June period. Fry are only present near the rearing areas for a day or two, and then disperse downstream to settle within the reach of the Connecticut River between Fourth Island and Mitch's Island (Kynard *et al.*, 2012). There have been no direct studies of Project effects on fry in the action area, though flows can influence the amount of suitable habitat available. FirstLight has included SNS fry in its analyses from Relicensing Study 3.3.1 and they are also considered in the effects section of this BA.

5.4.5 Adult and Juvenile Foraging

According to Kynard *et al.*, (2012), SNS have also been documented using specific areas for seasonal foraging in the action area, including:

- Spring
 - Connecticut River between the mouth of the Deerfield River and Fourth Island, along with areas of the lower Deerfield River. This may include staging (pre-spawn) adults, post-spawn adults, and non-spawning adults. Fish that forage here stay until summertime, after which they migrate downstream to summer foraging areas.
 - Juvenile SNS foraging in the Connecticut River between Fourth Island and Mitch's Island.
- Summer into Fall
 - Adult and juvenile SNS foraging in the Connecticut River between Fourth Island and Mitch's Island.
 - Rare occurrences of adult SNS migration to the Turners Falls Dam, presumably for foraging.

After foraging in the summer and early fall, adult and older (2+ year) juvenile SNS migrate to overwintering habitats in November. The seasonal habitat use and movements of younger juveniles have not been studied, but they are presumed to forage in the reach between Fourth Island and Mitch's Island ([Kynard et al., 2012](#)).

There have been no direct studies of Project effects on SNS foraging in the action area, though flows can influence the amount of suitable habitat available. FirstLight has included SNS foraging in its analyses from Relicensing Study 3.3.1 and potential effects of foraging are also considered in the effects section of this BA.

5.4.6 Juvenile Migrations

Though little is known about juvenile SNS, laboratory studies suggest that juveniles (1-3 years old) employ two primary strategies. One strategy would be migrating in a general downstream direction, resulting in passage to areas below Holyoke Dam, and the other would be to remain upstream of Holyoke Dam, staying within the action area ([Kynard et al., 2012](#); [SSSRT, 2010](#)).

5.4.7 Overwintering

Between Turners Falls Dam and Holyoke Dam, adult and 1+ year old juvenile SNS have been observed overwintering in groups, primarily at five locations between Whitmore Pool and Elwell Island. Whitmore Pool is approximately 6.9 miles downstream of Cabot Station, and Elwell Island is approximately 22.3 miles downstream of Cabot Station. The greatest numbers of overwintering SNS have been observed at Whitmore Pool. Some fish have also been observed overwintering alone, but still within the river reach between Whitmore Pool and Elwell Island. Areas with deep water, low water velocities, and sandy substrate are common micro-habitat variables between the overwintering sites ([Kynard et al., 2012](#)). Wintering adults selected sand substrate, bottom velocity between 0.2 to 3.1 ft/sec, and deep (depths 13-29 feet), and juveniles have been observed in between the adults ([Kynard et al., 2012](#)). Most overwintering SNS in northern rivers such as the CT, are relatively sedentary, are often oriented parallel and very close (touching or nearly touching) to each other, and typically only move short distances within their chosen overwintering sites. They have been observed moving further, and toward the shorelines, during high flow events ([Kynard et al., 2012](#)). Discharge spikes that have resulted in this type of behavior during overwintering were greater than approximately 35,000 cfs.

The location and wintering strategy for SNS less than 2-year-old is unknown, but they are presumed to use slow-velocity areas with available forage during the winter ([Kynard et al., 2012](#)).

6 ENVIRONMENTAL BASELINE

The environmental baseline includes the past and present impacts of all state, federal or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early Section 7 consultation, and the impact of state or private actions that are contemporaneous with the consultation in process (50 CFR 402.02). The environmental baseline for this BA includes the effects of several activities that may affect the survival and recovery of the endangered species in the action area. Because the Turners Falls Project and Northfield Mountain Project are existing, FERC-licensed facilities, past and present effects of the Projects on listed species are part of the environmental baseline; future effects of these projects would be considered effects of the Proposed Actions.

6.1 Effects of Federal Actions that have Undergone Formal or Early Section 7 Consultation

The NMFS has undertaken ESA Section 7 consultations to address the effects of federal actions on threatened and endangered species in the action area. In addition to numerous informal consultations for activities such as bridge crossings, shoreline construction, docks, etc. where NMFS has concurred with an action agency's determination that the proposed action was "not likely to adversely affect" SNS, NMFS has carried out a number of formal consultations, described briefly here.

In June 1992, NMFS issued a Biological Opinion to the New England District Army Corps of Engineers (ACOE) for maintenance dredging of the Connecticut River Federal Navigation Project. In this Opinion, NMFS concluded that the proposed long-term maintenance dredging project was likely to jeopardize the continued existence of SNS in the Connecticut River due to the high number of SNS expected to be killed or otherwise affected by hopper dredging operations. In cooperation with the ACOE, NOAA Fisheries developed a reasonable and prudent alternative (RPA) which would avoid jeopardy to SNS in the Connecticut River. The RPA included a time of year restriction and a change in disposal location. The accompanying Incidental Take Statement (ITS) indicated that NOAA Fisheries believed up to 10 SNS were likely to be taken from dredging operations on an annual basis but due to difficulty in monitoring take, the ITS exempted the take of five observed mortalities in the dredge hopper annually. This action has been ongoing since the 1960s and continues today. Dredging occurs early every year and no mortalities have been observed in recent years.

On January 27, 2005, NOAA Fisheries issued a BO on the effects of the FERC proposal to issue a new License Order for the Holyoke Hydroelectric Project on the Connecticut River in Massachusetts, consistent with a proposed Settlement Agreement. In this Opinion, NMFS concluded that the continued operation of the Holyoke Project, consistent with the new License Order and Settlement Agreement, was not likely to jeopardize the continued existence of SNS. This Opinion replaced an Opinion issued in 1999 which concluded that the Holyoke Project was likely to jeopardize the continued existence of SNS. The Holyoke Dam has impeded or obstructed natural upstream and downstream migration of the Connecticut River population of SNS for 150 years. Without passage at the dam, SNS above the dam have access to spawning habitat but not to downstream foraging habitat and SNS below Holyoke Dam have access to foraging habitat but have great difficulty accessing upstream spawning habitat. This consultation has been reinitiated a number of times with the most recent Biological Opinion issued in December 2019. The Opinion includes an Incidental Take Statement exempting the take of a number of SNS annually over the life of the project's FERC license.

6.2 Non-Federally Regulated Actions

Unauthorized take of SNS is prohibited by section 9 of the ESA. However, SNS are taken incidentally in anadromous fisheries along the East Coast and may be targeted by poachers ([NMFS, 1998](#)). Poaching has been documented in some locations on the Connecticut River. SNS could be easily targeted if their

aggregation areas are known by poachers, though poaching appears to be limited, likely due to severe federal punishments ([Kynard et al., 2016](#)).

The Connecticut River is an important corridor for migratory movements of various diadromous species including Alewife (*Alosa pseudoharengus*), American Eel (*Anguilla rostrata*), Blueback Herring (*Alosa aestivalis*), American Shad, Striped Bass (*Morone saxatilis*), and Sea Lamprey. Capture of SNS in commercial gillnet fisheries can result in lethal or non-lethal effects. The current drift gillnet fishery for American Shad on the Connecticut River runs from April 1 through June 15 each year, from the river mouth to Glastonbury, CT (and is therefore outside the action area), and could intercept SNS moving in the tidal estuary. This fishery is estimated to capture less than 10 fish annually, though this estimate was not scientifically verified ([Kynard et al., 2012](#)); additionally, this fishery appears to be declining in effort over time ([CTDEEP, 2017](#)). There are no commercial fisheries in the action area.

SNS are occasionally captured incidentally in rivers by recreational anglers, though the frequency of this has not been studied ([Kynard et al., 2016](#)). Though they are not legal to harvest, there could be some injury or mortality effects of incidental catch. In the action area, the only fisheries are recreational, primarily targeting resident species and American Shad. It is possible that anglers could hook SNS unintentionally when fishing for other species, particularly during the months of April and May when spawning American Shad and Walleye could also be present at SNS spawning areas during the SNS spawning window. Incidental disturbance or capture by anglers in the action area has not been reported and could be considered a rare occurrence that would affect few SNS individuals. Similarly, the effects of recreationalists walking on wading shoals are likely to be minimal. Access to rearing shoals is also difficult, and unsafe, during much of the spawning/rearing period. Once flows recede to the point that rearing shoals are both accessible and safely wadable/walkable, the shoals would be subjected to the effects of dewatering. By this time in a typical year, SNS eggs would have hatched and fry would have drifted downstream.

Boating in the action area is most common during the summer in the lower portions of the Holyoke Impoundment. Given their benthic nature, boat strikes could occur if SNS are residing in relatively shallow water or if they are jumping/breaching at the same time a boat is passing. Boat strikes in this area have not been reported, though they are possible and could affect a small number of SNS individuals. Boating is considerably less common during the spawning/rearing periods, particularly in the areas close to the Turners Falls Project where boating conditions can be difficult. As such, disturbance of SNS, or boat strikes during the spawning/rearing period would be an infrequent occurrence.

6.3 Other Factors

Several factors have affected SNS populations in the past, many of which could have lasting effects to the present day and could continue affecting SNS populations into the future, in addition to the Proposed Actions.

6.3.1 Shortnose Sturgeon Life History

The life-history patterns of SNS have enabled populations to survive, despite many of the impacts outlined below in this document. However, recovery of the Connecticut River population, or the portion of the population within the action area, could be affected by life-history patterns that affect the rate at which the SNS population could change in relation to benefits provided by the Proposed Actions.

6.3.1.1 Consistent Homing to Discrete Sites

SNS in the Connecticut River have been documented homing to the same relatively small sites each year, not only in the Connecticut River, but throughout their range ([Kynard et al., 2012](#); [Kynard et al., 2016](#)). Providing benefits to the population via increasing the amount of suitable spawning habitat is dependent upon use of newly suitable habitats by SNS, and there being a current limitation on spawning habitat. There are some potentially suitable spawning areas under the baseline condition that SNS have not been observed

using, such as the right channel (looking downstream) of Rawson Island and areas near the Montague Bridge (see [Section 7.2.1.1](#), [Figure 7.2.1.1-9](#)). Though providing more consistently suitable spawning habitat throughout the area may allow SNS to select new spawning habitats, it is not clear how quickly SNS would start utilizing the newly suitable or available habitats after initiation of the Proposed Actions. Studies of restored habitat use from other river basins suggest that SNS will utilize new habitats as they become available. In less than a decade, approximately one-third of SNS spawning events documented on the Kennebec River by Wippelhauser *et al.*, (2015) were within historic habitat that had been inaccessible to SNS for 162 years. In this case, the Kennebec River SNS population includes migrants that are known to reside in other river systems, is relatively large at around 9,436 adults (1998-2000 estimate, [Wippelhauser and Squiers, 2015](#)), and appeared to be expanding their use of spawning habitats by using previously-accessible and newly-accessible habitats (Wippelhauser *et al.*, (2015). By comparison, the entire Connecticut River population is smaller and does not appear to host very many migrants from other river systems ([Savoy, 2004](#); [Kynard *et al.*, 2016](#)).

6.3.1.2 Growth and Maturation

SNS are long-lived, but grow slowly, and females take 7-13 years to reach sexual maturity. Therefore, it would take several years before SNS that are spawned and hatched soon after initiation of the Proposed Actions are recruited to the population as spawning adults. Assessments of population size in the Connecticut River have been based on adult abundance, and changes to adult abundance may not be noticeable for several years after initiation of the Proposed Actions.

6.3.1.3 Emigration/Immigration

Because SNS are known to migrate along the coast between rivers, there is the potential for emigration from the Connecticut River population to other rivers, or for immigration into the Connecticut River from other rivers. Though this would not affect the total population number rangewide, the degrees of immigration and emigration could affect the population of SNS within a river at a given time. Immigration into the Connecticut River from the Hudson River has been documented in relatively low numbers, along with emigration from the Connecticut River to the Housatonic River ([Savoy, 2004](#); [SSSRT, 2010](#)). SNS that emigrate along the coast and throughout estuaries could be susceptible to several threats in the ocean that they are not exposed to in a riverine environment, such as predation by seals, ship strikes, incidental capture by commercial fishing vessels, and interactions with turbines used for tidal power ([SSSRT, 2010](#); [Kynard *et al.*, 2016](#)).

For the portion of the SNS population in the Connecticut River residing in the action area, immigration (passage upstream at Holyoke) or emigration (passage downstream at Holyoke) can affect the number of SNS within the action area at a given time. Though this does not immediately affect the total population size, it could result in changes to the number of spawning adults within the reach in future years, which could then affect the total population size through spawning and recruitment. In particular, older female SNS above Holyoke Dam appear to be driven to forage in the estuary, and eventually pass downstream of Holyoke Dam to do so ([Kynard *et al.*, 2012](#)); this strategy may be less common upstream of Holyoke Dam than historically due to the presence of Holyoke Dam, but these movements could become more prevalent as passage is improved and more SNS from below Holyoke Dam contribute to the population in the action area.

6.3.2 Dams

The position of the Projects relative to other dams in the Connecticut River watershed is important in the context of the environmental baseline, and for FirstLight's proposal. The Turners Falls and Northfield Mountain Projects are located on the Connecticut River at river mile 122 and 127, respectively. They are located between Great River Hydro's (GRH) Vernon Project upstream and HG&E's Holyoke Project

downstream. There are also several other dams in the watershed that could directly or indirectly affect SNS in the action area.

6.3.2.1 Restrictions on Access to Habitats

The historical construction of dams in the lower portions of main-stem rivers restricted access by SNS to historic spawning and rearing habitats and has been identified as one cause of SNS population declines in several rivers ([SSSRT, 2010](#)). The continued presence of these dams would be limiting to the populations of SNS that use those rivers. Alternatively, dam removal projects have been shown to improve or restore access by SNS to historic habitats (e.g., [Wippelhauser et al., 2015](#)), which has the potential to allow for population increases. On the Connecticut River, the historical upstream extent of SNS was at Great Falls, the location of the current Turners Falls Dam. The Holyoke Dam was constructed in 1849 at Hadley Falls, a steep rapid on the river that SNS could traverse ([Kynard et al., 2012](#)). This dam divided the population of SNS into two subpopulations, likely affecting the downstream portion of the population by restricting access to spawning habitats, and the upstream portion to rich tidal feeding grounds ([Kynard, 1997](#)). The current dam at Holyoke is the third structure to be built at this location and provides water for hydropower and the Holyoke Canal System. There have been several recent improvements to upstream and downstream fish passage at Holyoke Dam, but it was an upstream barrier to SNS for an estimated seven generations of SNS, leaving the population upstream of the dam isolated ([Kynard et al., 2012](#)). Though the Enfield Dam is no longer an impediment, and fish passage has improved at Holyoke Dam, the historical effects of damming and segmentation on the population of SNS still persist today ([Kynard et al., 2016](#)).

6.3.2.2 Watershed-wide River Flow Regulation

Upstream of the Project, and several other hydropower facilities, is the Fifteen Mile Falls Project including the Moore, Comerford and McIndoes Developments which are also owned by GRH and were licensed in April 2002. These developments have significant storage capacity and their operations influence flows to the Wilder Project and eventually to the Turners Falls and Northfield Mountain Projects. These dams are used to control floods—storing high inflows in the spring and reducing dam discharges—and subsequently discharging the stored water when flows recede. This extends the cool, high discharge period beyond natural conditions. The extension of this discharge for even a week could be sufficient to close the discharge window and cause spawning failure ([Kynard et al., 2012](#)). Reproductive success for SNS depends on suitable river conditions during their spawning window.

6.3.2.3 Hydropower Facilities and Operations

The installation and configuration of hydropower facilities can result in changes to habitat availability and suitability for SNS. On the Connecticut River, previous operations of the Holyoke Hydroelectric Project at Holyoke Dam impacted SNS. Quick reductions in spillage at Holyoke Dam from the 1950's through the early 2000's resulted in stranding of adult SNS in apron pools below the dam ([Kynard et al., 2012](#)). Downstream passage was also an issue, with adults exhibiting high mortality rates when passing downstream through the Project turbines ([Kynard et al., 2012](#)). Both of these issues at Holyoke Dam negatively impacted the population of SNS, and several measures have been taken at the facility to alleviate those issues.

Further upstream at the Turners Falls Project, no stranding has ever been observed and SNS are not intentionally passed upstream. However, this Project has affected habitat by altering the frequency, duration, magnitude, and timing of flows passed through the original river channel between the Turners Falls Dam and Cabot Station by passing up to nearly 16,000 cfs into the power canal and passing it back into the river at Station No. 1 and Cabot Station. Historically, it is possible that SNS spawned in various areas within this river reach, though they have only been documented spawning in one small area within the reach under the current baseline condition. Additionally, when inflows are less than the hydraulic capacity of the Turners Falls Project, Cabot Station is operated as a peaking facility whereby discharges are

high during high power demand periods and lower during lower power demand periods. These operations could also impact SNS spawning areas and rearing habitats (as described further in [Section 7.2](#)).

Upstream hydroelectric projects are also important aspects of the environmental baseline, and FirstLight's proposal. The Vernon Project is one of three GRH projects also undergoing relicensing in parallel to the Turners Falls and Northfield Mountain Projects. The other two projects are the Bellows Falls and Wilder Projects which are located immediately upstream of the Vernon Project. All three GRH facilities have been used to meet peak demand and, thus, have modified the inflows to the Turners Falls and Northfield Mountain Projects. An agreement was reached between GRH and various resource agencies and stakeholders on December 1, 2020 regarding operation of those Projects.²² Changes to flow regimes from those Projects, as proposed, along with the Proposed Actions included herein, are anticipated to collectively result in more limited daily changes in flow in this segment of the Connecticut River than have occurred under the existing operational regimes.

6.3.2.4 Fish Passage

Kynard *et al.*, (2012) states that their long-term study supports the idea that re-establishing natural upstream and downstream passage migrations for Connecticut River SNS is the only way to restore natural population abundance and structure. For most of the period that Holyoke Dam was in place, SNS could pass downstream beyond Holyoke Dam, but could not return back upstream. SNS killed during downstream migration at Holyoke Dam were lost from the population, and those that passed to reaches below Holyoke Dam were not able to return upstream to spawn again. As such, upstream and downstream passage rates for SNS at the Holyoke Dam have likely been a major driver in the overall population size. Improvements to upstream and downstream passage at Holyoke Dam have the potential to increase the size of the Connecticut River population of SNS by allowing more spawning fish to the reach near Turners Falls Dam, and more to survive downstream passage to return and spawn in future years.

Improvement in passage of SNS at Holyoke Dam in both directions also has the potential to allow for a more natural pattern of migration, which historically may have meant more use of lower-river and estuarine areas by SNS that spawn at Montague. This could have benefits to the overall population by increasing growth rates of SNS and enhancing reproductive capabilities of individual fish. Improved passage would also allow larger female sturgeon, which currently leave the action area to forage in the estuary, to return and spawn, each of which develop large quantities of eggs compared to younger, smaller females that are currently spawning at Montague. Because passage improvements at Holyoke were implemented relatively recently, these effects could occur over the course of the Proposed Actions' license period.

The combination of increased passage at Holyoke Dam and increases to the amount of spawning habitat available near Montague has potential for increasing the population size of SNS in the Connecticut River. Alternatively, if Holyoke Dam does not pass many SNS, it is possible that the benefits from increasing the amount of habitat available to spawning SNS through the Proposed Actions would become limited by the number of spawning females in the action area.

In 2017, a rogue SNS was caught by an angler near Vernon Dam. It is unclear how this rogue individual got into the TFI. FirstLight conducted eDNA testing throughout the TFI and no population of SNS were detected. FirstLight has developed a SNS handling plan in case any SNS are caught in the proposed Spillway Lift.

²² Memorandum of Understanding: Wilder, Bellows Falls, and Vernon Hydroelectric Projects FERC Relicensing, December 1, 2020. Filed on December 7, 2020 as part of GRH's Amended Final License Application. FERC Accession No. 20201207-5219.

6.3.2.5 Turners Falls Project – Emergency Spillway and Log Sluice Gate Events

As part of relicensing, FirstLight was required to evaluate the frequency and impact of water releases from the Cabot emergency spill gates and downstream fish passage bypass flume (or Log Sluice) on SNS spawning and rearing habitat in the Cabot tailrace and downstream of Cabot Station (see Study No. 3.3.12 *Evaluate Frequency and Impact of Emergency Water Control Gate Discharge Events and Bypass Flume Events on Shortnose Sturgeon Spawning and Rearing Habitat*). The emergency spill gates are needed in case water levels in the power canal, which are continually monitored, start to rise or if there is a load rejection at Cabot Station. During these events the emergency gates automatically open to prevent overtopping of the canal. The log sluice is used to pass downstream migrants past Cabot Station. These structures are in close proximity to the known SNS spawning area near Cabot Station, and associated rearing areas ([Figures 2.1.1-1](#) and [5.4.2-1](#)).

The log sluice gate is approximately 16 feet wide, but there is an 8-foot-wide weir that is inserted in the sluice opening during downstream fish passage periods. The weir has an elliptical floor and was developed specifically to enhance fish passage. Operation of the sluice gate with the weir installed during the downstream fish passage season results in a flow of ~220 cfs. Even with a constant gate opening, the actual flow through the sluice gate can vary slightly due to changes in forebay water level. The weir can be lifted out of the water at the sluice gate, allowing flow to be increased for the purposes of:

- Raking debris from the trashracks at Cabot Station and passing the debris through the sluice;
- Passing logs that accumulate at the weir;
- Preventing logs from becoming caught in the weir during high river flows; and
- Passing ice that accumulates at the Cabot trashrack.

Passing debris and logs would typically result in a relatively short-term flow increase on the order of minutes to hours at the sluice gate, except during high flow events when the incoming debris load is high. When river flow is greater than around 30,000 cfs, FirstLight closes the sluice gate to prevent the formation of an eddy downstream of the sluice when it is open under these higher flows. The eddy can cause undermining at the end of the sluice; the bank in this location has been stabilized with rip-rap to prevent erosion. Under lower river flows and tailwater elevation, the relatively low flow input from the sluice and the coarse nature of the substrate in the area likely precludes mobilization of fine sediment that would affect SNS rearing.

The emergency spillway gates, adjacent to and upstream of Cabot Station, comprise 10 vertical, downward-opening slide gates that are 12 feet wide by 12 feet high, with individually driven rack and pinion operators. Eight of the gates are used to discharge canal flows and two of the gates supply attraction water to the Cabot fish ladder. In this report, these eight gates are referred to as the “spill gates.” The discharge capacity of these eight spill gates is approximately 12,000 cubic feet per second (cfs) at the normal canal level of 173.5 feet (NGVD29). The maximum Cabot fish ladder attraction water provided through the other two gates is approximately 335 cfs.

The canal level at Cabot Station is constantly monitored. For safety reasons, the spill gates automatically open and the gates at the Turners Falls Gatehouse automatically close in the event an abnormal high or low canal level is detected, or when there is a load rejection at Cabot Station. An abnormally low canal level could indicate a dike breach which could cause inundation of houses along Montague City Road. A load rejection at Cabot Station could cause the canal level to rise and overflow, inundating surrounding areas. During events when the gates are operated automatically, the canal level will drop rapidly and excess water would flow through the spill gates for a short period, just minutes.

The spill gates have also been used for operational reasons in the past. During periods of high river flows, at least one spillway gate is opened to allow river debris entering the canal and caught on the trash boom to

be discharged back to the river to prevent obstructions at the Cabot Station intake racks. Likewise, in the winter and spring, when there is excess ice in the canal, gates would be opened to route ice down the emergency spillway. Operators would also routinely open one or more gates when necessary to help remove debris from the trash boom. The gates discharge water to the river just upstream of Cabot Station, in close proximity to known SNS spawning and rearing habitats. In general, the evaluation of the emergency spillway gate operation found that:

- Given the size of the spawning area and the relatively narrow areas affected by increased velocity and suspended sediment resulting from emergency spill events, SNS could move relatively short distances to a more suitable area if a spill event occurred during spawning.
- Emergency spillway operations have the potential to mobilize sediment at a comparable magnitude to sediment mobilization predicted during high bypass flow (i.e., 20,000 cfs) and full capacity generation at Cabot Station in the absence of spill. These potential impacts could be most severe when the spill flow is high, bypass flows are moderate, and Cabot Station continues generation during the spill event. Such an event results in water from the emergency spillway rushing across the channel, toward Smead Island, where it encounters greater amounts of sand, which could then become mobilized and transported downstream.
- Water velocities at the rearing area did not change considerably due to emergency spillway operation, and were relatively swift under most conditions, likely preventing deposition. As such, there is no indication that SNS eggs will become smothered by sand mobilized near Cabot Station during discharges from the emergency spillway. Additionally, predicted sediment mobilization did not appear to be considerably different than what could be encountered naturally during high (flow > 20,000 cfs) bypass reach flow. Flows of this magnitude, and sometimes much greater, occur naturally nearly every spring and can occur prior to and/or during the SNS spawning period. It is also possible that high flow in the bypass reach would mobilize sediment and move it out of the area prior to discharge events from the emergency spillway, resulting in less sediment that could become mobile due to emergency spill.

During recent years, FirstLight has modified operation of the emergency spillway gates, such that spill events of the greatest magnitude only result from emergencies (i.e., load rejection). In these cases, high amounts of spill would be necessary to ensure station viability and/or public safety. Small amounts of water (i.e., 300 cfs) have been passed through one of the gates continuously for trash/debris and ice management, consistent with FirstLight's proposed operation of the gate.

6.3.3 Natural Stochastic Events

The Proposed Actions include provisions for flow rates in the bypass reach and downstream areas that would be beneficial to spawning and rearing SNS (see [Sections 7.2.1.1](#) and [7.2.1.2](#)). High and low flow events occur naturally, and Connecticut River SNS populations have survived through many such events; however, they do have effects on the population. High river flows that are above the hydraulic capacity of the Turners Falls Project are not within either Project's structural or operational capabilities to control. Flooding that occurs during the spawning and/or rearing season could result in a lack of successful spawning and/or egg survival ([Kynard et al., 2016](#)). Alternatively, if flows are too low during the spawning and/or rearing period, SNS may have difficulty traversing shallow areas to reach spawning habitats, may encounter velocities that are too low to be suitable at spawning habitats, and/or rearing locations could become dewatered ([Kynard et al., 2016](#); [Kieffer and Kynard, 2007](#)). Neither Project can protect SNS against periods of low inflow.

The effects of stochastic events also go beyond the spawning and rearing period. River conditions in the summer and fall affect foraging efficiency of Connecticut River SNS, which could determine their condition going into winter ([Kynard et al., 2016](#)). If they are not in good condition going into winter, pre-spawn SNS

may not have the energy to make an upstream migration to spawning areas in the spring ([Kynard *et al.*, 2016](#)). High river flows during the summer foraging period, and overwintering period, have been identified by Kynard *et al.*, ([2016](#)) as potentially causing energetic crises for pre-spawning Connecticut River SNS that could result in spawning migration failure the following spring.

6.3.4 Scientific Studies

Previous research projects conducted in the Connecticut River since 1976 may have influenced the survival, reproduction and/or migration of individual SNS. Research projects conducted in the action area include capture, measuring, weighing, tagging (internal and external) and obtaining eggs from SNS. Currently two ongoing research projects are permitted by NOAA Fisheries. Micah Kieffer (USGS) and Jacque Benway (Connecticut Department of Energy and Environmental Protection) possess ESA Section 10(a) (1) (A) Permits to conduct scientific research on SNS in the Connecticut River. In addition, as a requirement of their Incidental Take Statement issued to FERC as part of the ESA consultation, HG&E is conducting a post construction monitoring study to determine the effectiveness of passing SNS upstream and downstream through the Holyoke Project ([HG&E 2023](#)).

6.3.5 Contaminants and Water Quality

Heavy usage of the Connecticut River and development along the waterfront have likely affected SNS throughout the action area. Construction sites often result in excessive water turbidity, which could influence SNS spawning and/or foraging ability. Industries along the Connecticut River include or have included in the past, hydroelectric and other energy generating facilities, an armory, firearms factory, industrial mills and various other industrial pursuits. The effect of general pollution on SNS in the Connecticut River is unknown.

Pulp mill, silvicultural, agricultural, and sewer discharges, as well as a combination of non-point source discharges containing elevated temperatures or high biological demand, can reduce DO concentrations. SNS are known to be adversely affected by DO concentration below 5 mg/L. SNS may be less tolerant of low DO concentrations in high ambient water temperatures and show signs of stress in water temperatures higher than 28°C ([Flournoy *et al.*, 1992](#)). At these temperatures, concomitant low levels of DO may be lethal. Point source discharge (i.e., municipal wastewater, paper mill effluent, industrial or power plant cooling water or wastewater) and compounds associated with discharges (i.e., metals, dioxins, dissolved solids, phenols, and hydrocarbons) contribute to poor water quality and may also impact the health of SNS populations. The compounds associated with discharges can alter the pH of receiving waters, which may lead to mortality, changes in fish behavior, deformations, and reduced egg production and survival.

The New England Interstate Water Pollution Control Commission issued a report in early 1998 on water quality threats. This report indicated that the Connecticut River had several major water quality issues. These included: toxins, such as polychlorinated biphenyls (PCBs); combined sewer overflows (CSOs) which can cause poor water quality conditions in urban areas after storm events; and non-point source pollution. All four of the states with Connecticut River waters have public health advisories regarding the consumption of fish caught in the river (MA: PCBs, CT: mercury and PCBs).

Coal tar deposits released in the Connecticut River have likely affected spawning success, egg survival and/or larval development. Coal tar contains toxic Polycyclic Aromatic Hydrocarbons (PAHs) that are known to be carcinogenic. Other pollutants in the Connecticut River, such as PCBs, could affect SNS reproduction as well. In the Connecticut River, coal tar leachate was suspected of impairing SNS reproductive success. Kocan *et al.*, ([1993](#)) conducted a laboratory study to investigate the survival of SNS eggs and larvae exposed to PAHs, a by-product of coal distillation. Only approximately 5% of SNS embryos and larvae survived after 18 days of exposure to Connecticut River coal-tar (i.e., PAH) demonstrating that contaminated sediment is toxic to SNS embryos and larvae under laboratory exposure conditions ([NMFS, 1998](#)).

Major National Pollutant Discharge Elimination System (NPDES) permit holders in the Project areas include the Montague Wastewater Treatment Facility, the Erving Wastewater Treatment Plant #1, and the Hinsdale Wastewater Treatment Plant. The Erving and Hinsdale facilities discharge into the river upstream of Turners Falls Dam, whereas the Montague Wastewater Treatment Plant discharge is a short distance downstream of Cabot Station, which is within the action area.

Overall patterns of improving water quality in New England Rivers in recent decades have likely benefitted SNS and will continue to benefit SNS if good water quality is maintained. FirstLight performed a temperature and dissolved oxygen (DO) study in 2015 as part of relicensing. In general, all applicable water quality standards were met throughout the duration of the sampling period. DO results from within the TFI, the bypass reach, the power canal, and downstream of Cabot Station (i.e., Site 1 through Site 11) remained above the MA water quality standard of 5.0 mg/L minimum for Class B warm water fisheries. The minimum observed DO concentration was 5.8 mg/L (and 71.1% saturation) at Site 11 downstream of Cabot Station.

The water temperatures observed at each location remained below the MA water quality standard of 28.3°C for Class B warm water fisheries. The maximum instantaneous temperatures observed across all sites ranged from 26.4°C to 28.1°C. Monthly average water temperatures were very similar among all locations. August was the warmest month for all locations with an average water temperature of approximately 25°C.

Water temperature and DO levels in the Turners Falls power canal tracked similarly to conditions at the boat barrier in the TFI. Similarly, water quality conditions just downstream of Cabot Station (Site 11) tracked closely to conditions in the power canal while Cabot Station was generating. When Cabot Station was off-line, downstream conditions were dictated by flow and water quality conditions in the bypass reach.

Water temperature patterns were similar from site to site in the Connecticut River downstream of Cabot Station (Site 11-18) regardless of Cabot Station operations during periods of low flow. Monthly average water temperatures from Sites 11-18 were within a range of +/- 1.0°C. Daily water temperature fluctuations and hourly temperature rates of change were greater at locations further downstream of Cabot Station (Sites 12-18) in comparison to just downstream of Cabot Station (Site 11). The maximum rate of change for temperature was 1.5°C/hr. Average rates of change below Cabot Station were typically up to 0.2°C/hr. The study results demonstrated that the Turners Falls Project was not adversely affecting DO or water temperature.

6.3.6 Interactions with Native and Non-native Species

In general, predation on adult sturgeon appears to be relatively limited, likely due to their large size and protective scutes, though some predatory fish may attempt to consume juvenile sturgeon (e.g., [Gadomski and Parsley, 2005](#)). There are numerous non-native predatory species that have been introduced to the Connecticut River, including Channel Catfish (*Ictalurus punctatus*), Northern Pike (*Esox lucius*), Walleye (*Sander vitreus*), Smallmouth Bass (*Micropterus dolomieu*), and Largemouth Bass (*Micropterus salmoides*). Striped Bass are a native, anadromous fish that enter the lower Connecticut River, and populations of this predatory species have fluctuated in recent decades. Though Flathead Catfish (*Pylodictis olivaris*) are not currently known to be in the Connecticut River, their potential range expansion to the Connecticut River could threaten future populations of SNS given that this species has been observed consuming juvenile Atlantic Sturgeon ([USFWS 2019; Flowers et al., 2011](#)). Northern Snakehead (*Channa argus*) is an example of another predatory species that has not yet been introduced to the Connecticut River but could have future effects on SNS populations if this species becomes established in the river (e.g., [Lecky, 2010](#)).

Several native and non-native fish and other aquatic species have the potential to prey on early life stages of SNS or compete with adult and juvenile SNS for food and space. Though interactions with other native species would have occurred historically, the aquatic species assemblage is much different than it was historically for several reasons, including the introduction of non-native species. This could result in different interactions between native species than would have occurred naturally, along with additional

interactions with non-native species. Common Carp (*Cyprinus carpio*), which were introduced to the Connecticut River in the late 1800s and are common in the river, also feed in benthic areas and are known to drastically change aquatic food webs and habitats (Nico *et al.*, 2020). Common Carp could compete with adult and juvenile SNS for food, and they have also been documented consuming the eggs of other species of sturgeon (Miller and Beckman, 1996; Caroffino *et al.*, 2010).

Crayfish tend to reside in the interstitial spaces often synonymous with substrate that would be considered suitable for SNS spawning and rearing; crayfish were identified by Caroffino *et al.*, (2010) to be a major consumer of sturgeon eggs. Rusty Crayfish (*Orconectes rusticus*) is a non-native crayfish that is widely distributed in the Connecticut River. Though Kynard and Horgan (2002) found predation rates on SNS eggs and larvae were low, native Fallfish (*Semotilus corporalis*) were documented consuming SNS eggs.

6.3.7 Climate Change

This section presents background information on global climate change and information on past and predicted future effects of global climate change throughout the range of SNS. Additionally, available information on the predicted effects of climate change in the action area, and how listed SNS may be affected by those predicted environmental changes over the life of the Proposed Actions, are included herein.

The global mean temperature has risen 0.76°C (1.36°F) over the last 150 years, and the linear trend over the last 50 years is nearly twice that for the last 100 years (IPCC, 2007). Based on substantial evidence, there is a high confidence, that observed changes in marine systems are associated with rising water temperatures, as well as related changes in ice cover, salinity, oxygen levels, and circulation. Ocean acidification resulting from massive amounts of carbon dioxide and other pollutants released into the air can have major adverse impacts on the calcium balance in the oceans. Changes to the marine ecosystem due to climate change include shifts in ranges and changes in algal, plankton, and fish abundance (IPCC, 2007); these trends have been most apparent over the past few decades.

Climate model projections exhibit a wide range of plausible scenarios for both temperature and precipitation over the next century. The Canadian model scenario shows the southeast U.S. experiencing a high degree of warming, which translates into lower soil moisture as higher temperatures increase evaporation (NAST 2000). The Hadley model scenario projects less warming and a significant increase in precipitation (about 20%) (NAST, 2000). The scenarios examined, which assume no major interventions to reduce continued growth of world greenhouse gases (GHG), indicate that temperatures in the U.S. will rise by about 3°-5°C (5°-9°F) on average in the next 100 years which is more than the projected global increase. A warming of about 0.2°C (0.4°F) per decade is projected for the next two decades over a range of emission scenarios (IPCC, 2007). This temperature increase will very likely be associated with more extreme precipitation and faster evaporation of water, leading to greater frequency of both very wet and very dry conditions.

Climate warming has resulted in increased precipitation, river discharge, and glacial and sea-ice melting (Greene *et al.*, 2008). The past three decades have witnessed major changes in ocean circulation patterns in the Arctic, and these were accompanied by climate associated changes as well (Greene *et al.*, 2008). Data from the 1960s through 2006 show that the North Atlantic Oscillation NAO index has increased from minimum values in the 1960s to strongly positive index values in the 1990s and somewhat declined since (IPCC, 2007). This warming extends over 0.62 miles deep and is deeper than anywhere in the world oceans and is particularly evident under the Gulf Stream/ North Atlantic Current system (IPCC, 2007). On a global scale, large discharges of freshwater into the North Atlantic subarctic seas can lead to intense stratification of the upper water column and a disruption of North Atlantic Deepwater (NADW) formation (Greene *et al.* 2008). There is evidence that the NADW has already freshened significantly (IPCC, 2007). This in turn can lead to a slowing down of the global ocean thermohaline (large-scale circulation in the ocean that transforms low density upper ocean waters to higher density intermediate and deep waters and returns those waters

back to the upper ocean), which can have climatic ramifications for the whole Earth system ([Greene et al., 2008](#)).

While predictions are available regarding potential effects of climate change globally, it is more difficult to assess the potential effects of climate change over the next few decades on coastal and marine resources on smaller geographic scales, such as the Connecticut River, especially as climate variability is a dominant factor in shaping coastal and marine systems. The effects of future change will vary greatly in diverse coastal regions for the U.S. Warming is likely to continue in the U.S. over the next 25 to 50 years, regardless of reduction in GHGs, due to emissions that have already occurred. It is very likely that the magnitude and frequency of ecosystem changes will continue to increase in the next 25 to 50 years, and it is possible that rate of change will accelerate. Climate change can cause or exacerbate direct stress on ecosystems through high temperatures, a reduction in water availability, and altered frequency of extreme events and severe storms. Water temperatures in streams and rivers are likely to increase as the climate warms and are very likely to have both direct and indirect effects on aquatic ecosystems. Changes in temperature will be most evident during low flow periods when they are of greatest concern ([NAST, 2000](#)). In some marine and freshwater systems, shifts in geographic ranges and changes in algal, plankton, and fish abundance are associated with high confidence with rising water temperatures, as well as related changes in ice cover, salinity, oxygen levels and circulation ([IPCC, 2007](#)).

Increases in water temperature and changes in seasonal patterns of runoff will very likely disturb fish habitat and affect recreational uses of lakes, streams, and wetlands. Researchers anticipate: 1) the frequency and intensity of droughts and floods will change across the nation; 2) a warming of about 0.2°C (0.4°F) per decade; and 3) a rise in sea level ([NAST, 2000](#)). Sea level is expected to continue rising during the 20th century global sea level has increased 15 to 20 cm (6-8 inches).

6.3.7.1 Predicted Impacts of Climate Change Related to Shortnose Sturgeon

Climate change may affect SNS in the future. Rising sea level may result in the salt wedge moving upstream in affected rivers. SNS spawning occurs in fresh water reaches of rivers because early life stages have little to no tolerance for salinity. Similarly, juvenile SNS have limited tolerance to salinity and remain in waters with little to no salinity. If the salt wedge moves further upstream, the location of SNS spawning and rearing habitat could be affected. While there is an indication that an increase in sea level rise would result in a shift in the location of the salt wedge, for most spawning rivers there are no predictions on the timing or extent of any shifts that may occur; thus, it is not possible to predict any future loss in spawning or rearing habitat. In most river systems, spawning occurs miles upstream of the salt wedge. It is unlikely that shifts in the location of the salt wedge would eliminate freshwater spawning or rearing habitat.

The increased rainfall predicted by some models in some areas may increase runoff and scour spawning areas and flooding events could cause temporary water quality issues. Siltation from heavy rains upstream in the watershed could result in fine sediment deposition, which could affect SNS spawning success and potentially the habitat composition in areas where SNS forage. Rising temperatures predicted for all of the U.S. could exacerbate existing water quality problems with dissolved oxygen (DO) and temperature. While this occurs primarily in rivers in the southeast U.S. and the Chesapeake Bay, it may start to occur more commonly in the northern rivers like the Connecticut River, including the action area. SNS are tolerant to water temperatures up to approximately 28°C (82.4°F); these temperatures are experienced naturally in some areas of rivers during the summer months. If river temperatures rise and temperatures above 28°C are experienced in larger areas, SNS may be excluded from some habitats. Increasing temperatures can result in the increased frequency and duration of algal blooms, which can have effects on DO.

Increased droughts (and water withdrawal for human use) predicted by some models in some areas may cause loss of habitat including loss of access to spawning habitat. Drought conditions in the spring may also expose eggs and larvae in rearing habitats. If a river becomes too shallow or flows become intermittent, all SNS life stages, including adults, may become susceptible to stranding. Low flow and drought conditions

are also expected to cause additional water quality issues. Any of the conditions associated with climate change are likely to disrupt river ecology causing shifts in community structure and the type and abundance of prey.

Cues for spawning migration and spawning could occur earlier in the season causing a mismatch in prey that are currently available to developing SNS in rearing habitat; however, this would be mitigated if prey species also had a shift in distribution or if developing sturgeon were able to shift their diets to other species. In the action area, SNS are known to spawn within a narrow day-length window that must also overlap with other suitable conditions such as water temperatures and flow rates. If water temperatures warm and hydrology changes, the amount of overlap of the SNS spawning day length window with the other conditions could be reduced.

6.3.8 Conservation and Recovery Actions Reducing Threats to Listed Species

In 1998, NMFS issued the Final Recovery Plan for SNS ([NMFS, 1998](#)). The long-term recovery objective for SNS is to recover all discrete population segments to levels of abundance at which they no longer require protection under the ESA. To achieve and preserve minimum population sizes for each population segment, the final recovery plan recommends identifying and preserving essential habitats and monitoring and minimizing mortality. Other key recovery tasks are to define essential habitat characteristics, assess mortality factors, and protect SNS through applicable federal and state regulations.

7 EFFECTS OF THE PROPOSED ACTIONS

Effects of the Action are all consequences to listed species or designated critical habitat that are caused by the Proposed Actions, including the consequences of other activities that are caused by the Proposed Actions. A consequence is caused by the Proposed Actions if it would not occur “but for” the proposed actions and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the actions (50 CFR § 402.02).

Because there has been no population of SNS documented in the TFI despite extensive efforts to find them there, any activities performed in the TFI would result in either no or discountable effects on SNS. Therefore, the effects of the Proposed Actions are evaluated for the action area between the Turners Falls Dam and Holyoke Dam. The continued existence of Turners Falls Dam will not affect the distribution of SNS given its location at a natural falls which was the likely upstream extent of historic SNS distribution in the main stem Connecticut River.

7.1 Protection, Mitigation, and Enhancement Measures

7.1.1 Fish Passage Measures – Construction and Operation

FirstLight’s proposal includes provisions for providing improved fish passage measures, primarily pertaining to American Shad, at the Turners Falls Dam spillway, and discontinuing operation of fish passage at the Cabot Station ladder. Development of most downstream passage measures would not be anticipated to affect SNS because there is no population of SNS upstream of the Project, though construction of a plunge pool below the Turners Falls Dam spillway is in an area accessible to but rarely occupied by SNS.

7.1.1.1 Spillway Fish Lift and Turners Falls Plunge Pool Construction

Designs for construction of a lift at the Turners Falls Dam spillway, at the location of the current fish ladder, along with the plunge pool proposed to improve downstream fish passage, are in the conceptual phases. Therefore, the exact details and extent of the construction activities are unknown. However, these items will likely require in-stream access of heavy equipment, drilling into bedrock, and localized dewatering of areas to aid in safe and effective construction activities. Potential effects on SNS from this type of construction could include noise disturbance, disruption of substrate, stranding during dewatering efforts, and encounters of individual fish with heavy equipment and activities being performed by the heavy equipment (e.g., construction of cofferdams). FirstLight anticipates that construction will be performed outside of the SNS spawning and rearing season, even though SNS are not known to be present in this area at that time. FirstLight will also consult with NMFS during the design and permitting phases for this construction, to ensure that the potential effects of any construction activities on SNS would be minimized. It is anticipated that permits will also need to be obtained from the USACE. Additional consultation to consider the effects of construction activities on SNS may be necessary at such time that any permits are proposed. However, it is anticipated that through time-of-year restrictions and construction best management practices that would be developed in consultation with NMFS, that the effects on SNS would be insignificant.

7.1.1.2 Spillway Fish Lift Operation and Maintenance

Though SNS are not known to inhabit the area directly below Turners Falls Dam during the fish passage season, and they have never been observed passing the spillway fish ladder, rare occurrences of SNS entering fish ladders have been documented ([Kynard, 2008](#)). On the Connecticut River, SNS enter and pass at the Holyoke Dam via a fish lift. Therefore, if SNS encounter a fish lift at the Turners Falls Dam spillway, some individuals may be drawn to and enter the lift. It is also possible that the frequency of SNS inhabiting areas directly below the Turners Falls Dam could increase based on the proposed operational changes and associated increases in habitat suitability outlined in Section 7.2, increasing their likelihood of encountering a lift at the dam. Therefore, SNS could be captured in the fish lift, or be impacted by fish lift

maintenance activities. During the design phases for the lift, consideration will be given to structures that are anticipated to prevent entry of SNS into the lift. FirstLight has also developed a SNS Handling Plan ([Appendix E](#)), which includes measures for fish lift operators to follow, should SNS be encountered in the proposed fish lift during routine operations and maintenance activities, which is unexpected. Designs of the lift are to be developed in consultation with resource agencies, including NMFS, and would be anticipated to include measures to avoid injury and mortality of SNS, and measures to capture SNS prior to reaching the TFI. For individual SNS that are captured in the lift, there could be effects from capture, handling, and transport (i.e., injury, mortality). However, the measures in the SNS Handling Plan are designed to minimize those effects, such that SNS are returned to the Connecticut River safely and without additional stressors. Given these measures, potential effects on SNS associated with fish lift operations would be insignificant.

7.1.2 Construction, Operation, and Maintenance of Eel Passage Measures

Designs for construction of interim and permanent eel passage systems at the Turners Falls Dam spillway area have not been developed. Therefore, the exact details and extent of the construction activities are unknown. However, these measures are typically much smaller than conventional fish passage facilities and do not typically require heavy equipment, extensive construction, or operations that would be anticipated to affect SNS. However, FirstLight will consult with NMFS during the design and permitting phases for this construction, to ensure that the effects of any construction activities on SNS would be minimized. Given the anticipated work associated with construction of eel passage measures, effects to SNS, if any, are expected to be so small that they cannot be meaningfully measured, evaluated, or detected and are therefore insignificant.

7.1.3 Construction and Maintenance of Recreation Areas

Proposed recreational enhancements below Turners Falls Dam include:

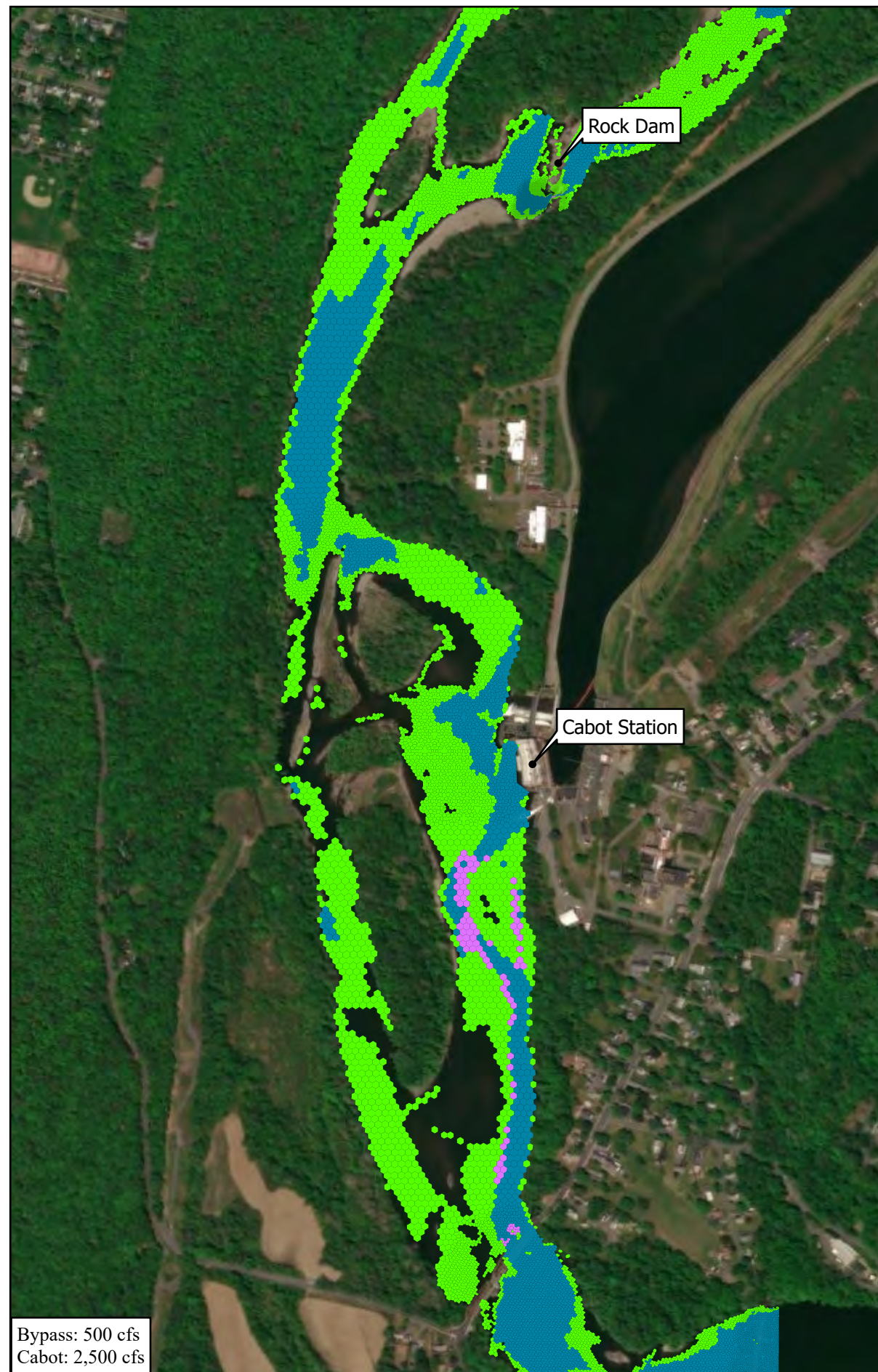
- Construct Two Put-Ins Just Below Turners Falls Dam
- Construct River Access Trail at Station No. 1
- Construct Portage Trail Around Rock Dam
- Improve Poplar Street River Access

Several of these proposed recreational enhancements are improvements on existing trails and river access points as discussed in the Recreation Management Plan, which is part the Recreation Agreement ([Appendix B](#)). Most construction would be minor, such as vegetation clearing and would be primarily within onshore areas. The designs for recreational enhancements are currently conceptual, and the exact details and extent of construction activities are not known (conceptual drawings of the recreation improvements are included in the Recreation Management Plan). Therefore, any construction activities involving recreational sites below Turners Falls Dam that are on or near the water may temporarily affect SNS (e.g., noise disturbance, localized dewatering, disturbance of near-shore substrates). Construction downstream of Turners Falls Dam involving recreation sites will be performed in accordance with applicable permits, which would include any required monitoring and mitigation measures for SNS, including time of year restrictions, as necessary. FirstLight will also consult with NMFS during the design and permitting phases for this construction, to ensure that the effects of any construction activities on SNS would be minimized. It is also anticipated that permits will need to be obtained from the USACE and others. Additional consultation to consider the effects of construction activities on SNS may be necessary at such time that any permits are proposed. However, it is anticipated that through time-of-year restrictions and construction best management practices that would be developed in consultation with NMFS, that the effects on SNS would be insignificant.

Most maintenance of recreation areas is not likely to result in any impacts to SNS unless there would need to be repairs of in or near-water structures requiring the use of heavy equipment. If this type of maintenance is encountered, it will be considered construction, and will be performed in accordance with applicable permits, which would include any required monitoring and mitigation measures for SNS, as necessary.

It is possible that new recreation areas and improvements to existing areas will increase recreational use of the river in areas where SNS currently spawn, or may spawn and forage in the future under the proposed flow regime. Proposed increases to minimum flows in the Turners Falls bypass reach would likely preclude potential effects due to wading (e.g., trampling of eggs) due to swift velocities and depths that would preclude safe wading in potential SNS spawning and rearing areas. Based on the USGS safety procedures, a condition where the multiple of depth (in feet) and velocity (in feet per second) is 10 or greater is unsafe to wade. Additionally, wading in depths of four feet or more would not be anticipated. FirstLight's two-dimensional hydraulic model that extends from near Rock Dam to below the bridge in Montague was used to develop a wading suitability map for this area, which covers known spawning sites of SNS. During the baseline minimum flow conditions during the SNS spawning period, several areas where SNS have been known to deposit eggs (e.g., riffles below Rock Dam, riffle upstream of Cabot Station, and areas around the spawning shoal below Cabot Station) are wadable, particularly when Cabot Station generation is low ([Figure 7.1.3-1](#)). By contrast, the higher minimum flow provided by the proposed conditions will result in more areas that are unwadable by recreationalists, including those areas associated with spawning and rearing ([Figure 7.1.3-2](#)).

Increasing usage by boaters could result in disturbance of spawning or foraging SNS, though injury or mortality would be unlikely given that most boating in the reach is expected to consist of non-motorized vessels (e.g., canoes, kayaks). Some motorized vessels are known to access areas of the river upstream of Rock Dam, but these occurrences are infrequent and are not likely to change given that none of FirstLight's proposed recreation areas includes provisions for trailered boat access.



Bypass: 500 cfs
Cabot: 2,500 cfs

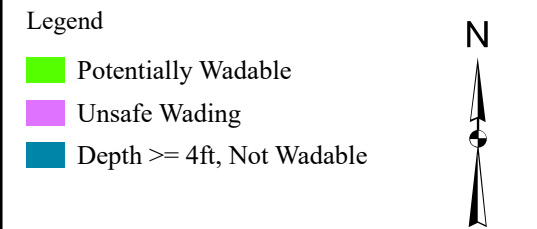
Bypass: 500 cfs
Cabot: 14,000 cfs



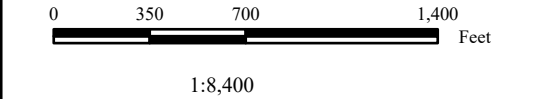
FIRSTLIGHT
Northfield Mountain Pumped Storage Project No. 2485
Turners Falls Hydroelectric Project No. 1889

Revised Draft Biological Assessment
for Shortnose Sturgeon

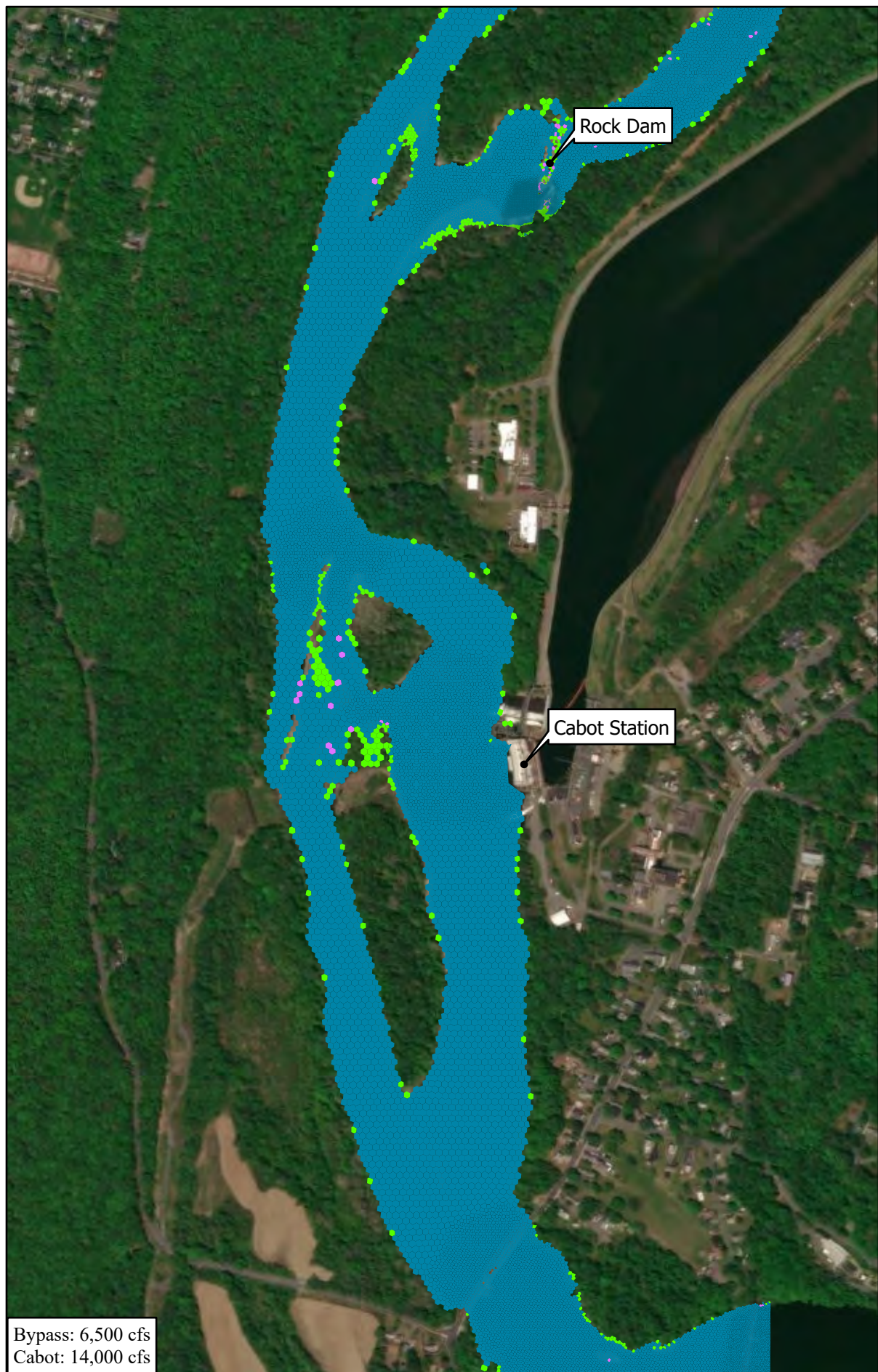
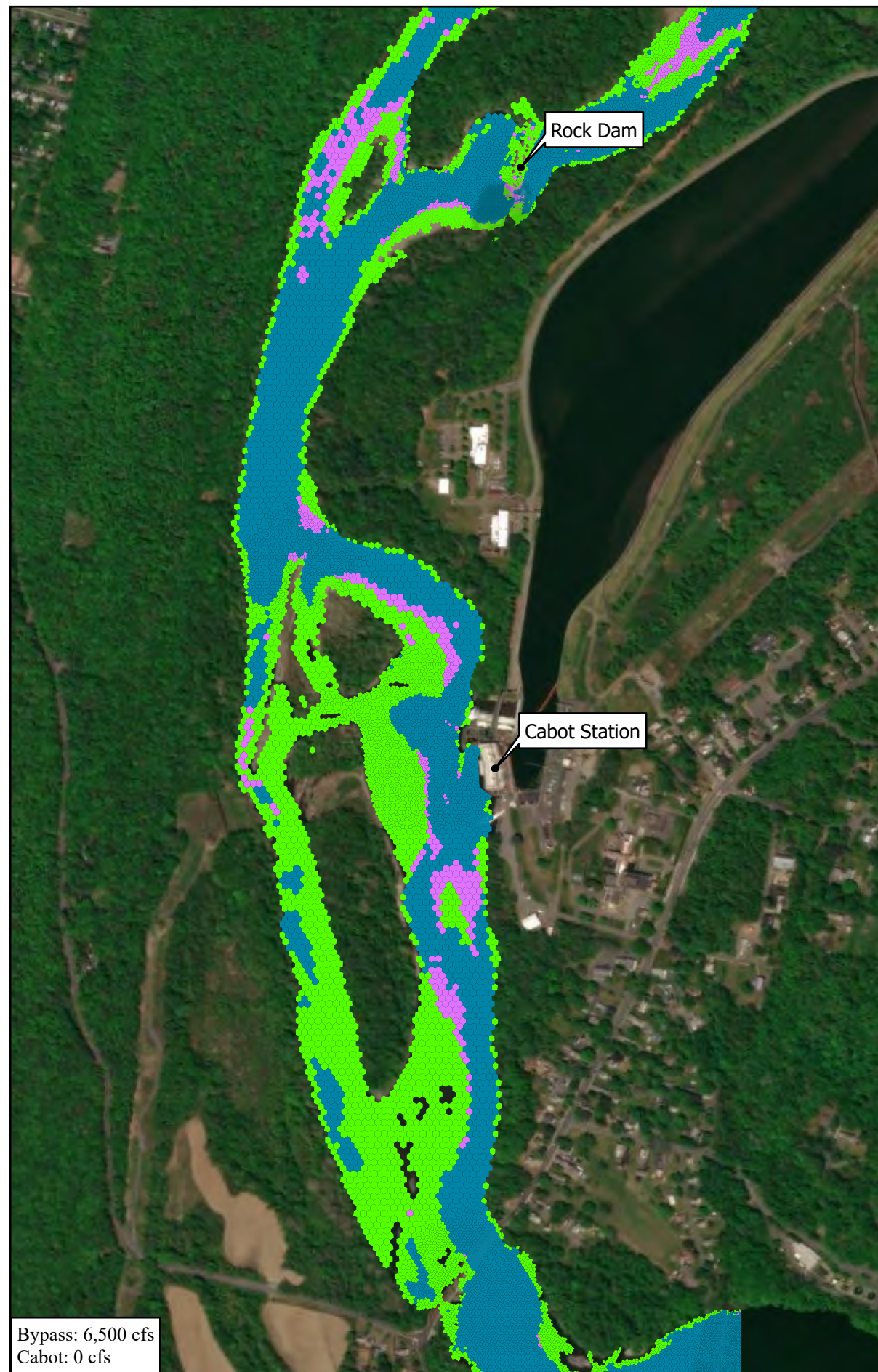
Figure 7.1.3-1:
Wadability under Baseline Conditions



Service Layer Credits: National Geographic World Map: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.
World Imagery: Maxar



Copyright © 2024 FirstLight All rights reserved.



FIRSTLIGHT
 Northfield Mountain Pumped Storage Project No. 2485
 Turners Falls Hydroelectric Project No. 1889

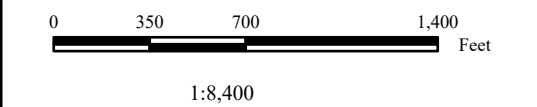
Revised Draft Biological Assessment
 for Shortnose Sturgeon

Figure 7.1.3-2:
 Wadability under Proposed Conditions

Legend

- Potentially Wadable
- Unsafe Wading
- Depth \geq 4ft, Not Wadable

Service Layer Credits: National Geographic World Map: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.
 World Imagery: Maxar



Copyright © 2024 FirstLight All rights reserved.

Bypass: 6,500 cfs
 Cabot: 0 cfs

Bypass: 6,500 cfs
 Cabot: 14,000 cfs

7.2 Project Operations

Though many of FirstLight’s proposed operational measures take into consideration several resources, there was consideration given to the habitat needs of SNS as outlined in the F/F Agreement. To assist FirstLight in considering the needs of SNS, extensive data collection and modeling were completed by FirstLight through development of an operations model using HEC-ResSim²³, along with data collection, modeling, and analyses from other relicensing studies^{24,25}. Results of the studies, and tools developed during the studies, are useful for evaluating the impacts of proposed operational effects on SNS relative to the baseline condition.

The analyses below focus on comparing the amounts of suitable habitat present between modeled baseline (i.e., current) and those operating conditions reflected in the Draft License Articles in the F/F Agreement “or proposed conditions”. The baseline operational condition includes Project operations consistent with the existing license. FirstLight has developed hourly flow timeseries data for baseline and proposed conditions using a combination of the HEC-ResSim operations model and a HEC-RAS hydraulic model. Baseline conditions were modeled with the FirstLight Projects and the upstream Great River Projects (Vernon, Bellow Falls, and Wilder) operating under presently licensed conditions.

Under proposed conditions, the FirstLight Projects were modeled per the operating conditions in the F/F Agreement as described in the Draft License Articles in [Section 3.4](#).

Great River Hydro’s Wilder, Bellows Falls and Vernon Projects, which are currently undergoing licensing, filed its AFLA with FERC on December 7, 2020. Per the AFLA, Great River Hydro, with support from relevant state and federal resources agencies, and regional and national non-governmental organizations, proposed modified project operations at all three facilities aimed at reducing the frequency, amplitude and rate of change in project-related discharge and water surface fluctuations. The proposed operation focuses on creating more stable discharges from all three projects year-round, except for a select number of hours where the Licensee is permitted to operate in “flex mode”, which allows the Licensee to be responsive to current wholesale energy, forward capacity, reserve, and other ancillary services markets managed by the New England Independent System Operator (ISO-NE). In fact, when the Vernon Project operates in a “flex mode”, FirstLight will be dampening peaking releases through its calculation of the NRF (see Draft License Article A110. Definition of Naturally Routed Flow).

From the timeseries data under proposed FirstLight and GRH operations, FirstLight evaluated flow frequencies and magnitudes that would be relevant to SNS given their seasonal needs based on their life-history and presence in various areas relevant to Project effects.

Additionally, FirstLight evaluated the effects of its proposed operations on habitat by comparing the flows provided from the timeseries datasets to the habitat-flow relationships developed for various life stages of SNS. The habitat-flow relationships were developed as part of Study No. 3.3.1 during relicensing, with the amount of suitable habitat represented by Weighted Usable Area (WUA). For this study the bypass reach and the reach below Cabot Station was delineated into five (5) reaches. The five reaches were delineated primarily based on hydraulics as described below.

- Reach 1 – Extends from the Turners Falls Dam to the just upstream of the Station No. 1 tailrace. The only known current use of Reach 1 by SNS is foraging by adults in the summer, and this was identified by Kynard *et al.*, (2012) as a rare occurrence.

²³ Relicensing Study 3.8.1 – *Evaluate the Impact of Current and Proposed Future Modes of Operation on Flow, Water Elevation, and Hydropower Generation*

²⁴ Relicensing Study 3.2.2 – *Hydraulic Modeling of Turners Falls Impoundment, Bypass Reach, and below Cabot Station*

²⁵ Relicensing Study 3.3.1 – *Instream Flow Habitat Assessments in the Bypass Reach and Below Cabot Station*

- Reach 2 – Extends from just upstream of the Station No. 1 tailrace downstream to Rock Dam and the upstream end of Rawson Island. There are no known current uses of Reach 2 by SNS, despite extensive study by Kynard *et al.*, (2012). However, in the rare case that adults forage further upstream in Reach 1 during the summer, these individuals would have passed through Reach 2.
- Reach 3 – Extends from Rock Dam/Upstream end of Rawson Island downstream to the USGS Gage on the Connecticut River at Montague. Reach 3 hydraulics are complex, given that they are influenced by the magnitude of bypass flow, magnitude of Cabot Station generation flow and the magnitude of flow discharging into Reach 3 from the Deerfield River. This reach contains the only known spawning and rearing habitats that are being utilized by SNS in the action area.
- Reach 4 – Extends from the Montague USGS Gage downstream to the Route 116 Bridge in Sunderland, MA, a distance of approximately nine (9) miles. These areas contain large amounts of foraging habitat for adults, juveniles, and fry, along with overwintering locations, for SNS.
- Reach 5 – Extends from the Route 116 Bridge in Sunderland, MA to the Dinosaur Footprints near Northampton, MA. This reach is heavily influenced by the Holyoke Dam impoundment levels and is characteristic of a riverine impoundment. The upper portions of Reach 5 are known to be used by SNS for foraging and overwintering, and the lower portions of Reach 5 are primarily an impounded riverine corridor that SNS migrate through during upstream and downstream migrations (Kynard *et al.*, 2012). Given flow attenuation and the increasing effects of the Holyoke Impoundment with distance downstream, the effects of the Projects would be greater in Reach 4 than Reach 5. In Reach 5, changes in water levels and velocities resulting from Project operations occur but are very limited in magnitude and would not be expected to affect SNS. Evaluations in Reach 4 are therefore more conservative to the resource. As such, the extent of SNS analyses for this BA focuses on Reaches 1 through 4.

The effects of proposed Project operations for measures developed and proposed specifically for SNS, along with a more general overview of the effects of the entire flow proposal on SNS, are examined in this Draft BA.

7.2.1 Measures Developed for Shortnose Sturgeon

Based on data collected, available literature, and discussions with NMFS staff, the spawning and rearing conditions provided by the baseline condition at the Turners Falls Project are potentially limiting the SNS population. This limitation could result from flow variability at the known spawning areas, which limits the viability of habitats in those areas, but potentially also throughout the entire reach above Cabot Station, which may be unused by SNS due to a lack of suitability consistently provided by the baseline flow condition. The primary baseline operational conditions that could be most limiting to the SNS population include:

- Bypass reach minimum flows during the spawning and rearing periods
- Rapid changes in flow from Cabot Station
- Dewatering of rearing shoals

FirstLight's proposed operational measures will benefit the SNS population by improving the conditions available to SNS during the spawning and rearing periods. These measures include:

- Considerably higher bypass reach flows relative to the baseline condition during the spawning and rearing periods (see Draft License Article A110. Minimum Flows below Turners Falls Dam and Draft License Article A120. Total Minimum Bypass Flows below Station No. 1).

- Considerably higher minimum flows below Cabot Station during the spawning and rearing period (see Draft License Article A130. Minimum Flows below Cabot Station).
- Ramping restrictions and flow stabilization below Cabot Station during the spawning and rearing period (see Draft License Article A140. Cabot Station Ramping Rates and Draft License Article A160. Flow Stabilization below Cabot Station and Allowable Deviations for Flexible Operations).²⁶

Analyses pertaining to these measures are provided below.

7.2.1.1 Bypass Flows throughout Sturgeon Spawning Period (April-May)

Though SNS are currently only known to spawn in Reach 3, the proposed minimum flows in the Turners Falls Project bypass reach could facilitate their movements throughout the bypass reach and would also support a high percentage of total potential habitat available for spawning SNS in Reaches 1, 2, and 3 during the spawning season ([Table 7.2.1.1-1](#)). Given that the spawning habitat vs. flow relationship levels off, and may begin to decline, at the highest flows modeled in Reaches 1 and 2, the proposed minimum flows would provide the highest amount that would have been provided historically, without the presence of the Project. When river flows are within the Project's capacity to control, passing water through Cabot Station appears to provide more suitable and more persistent habitat than would be present if the Project were not present or operational. This occurs because habitat would begin to decline at high flows in Reaches 1 and 2, and also because generation from Cabot Station results in a higher amount of habitat in Reach 3 than would be available under any potential bypass flow rate.

SNS have been identified as spawning within a relatively narrow day length window between April 27 and May 22 ([Kynard et al., 2012](#)), bypass flows specifically identified for SNS will be provided from April 1 through May 31 to allow for early arrival of pre-spawn fish, or a delayed spawning season. Start dates earlier than the known spawning period could also provide a benefit if SNS begin spawning earlier in the year due to effects on temperature and other conditions due to climate change.

In Reach 1, the baseline operational condition during the SNS spawning period allows flows in the bypass reach to drop to approximately 400 cfs from the Turners Falls Dam when inflows are relatively low and within the Turners Falls Project's hydraulic capacity. Based on modeled historical baseline conditions, this occurs at some point during the spawning season every year, and in some years, 400 cfs in Reach 1 would be the median flow during the spawning period ([Figure 7.2.1.1-1](#)). Alternatively, FirstLight's proposed bypass reach flow would be expected to provide considerably greater base flow relative to the baseline condition ([Figure 7.2.1.1-1](#)). Increasing the minimum base flow in Reach 1 would result in a four-fold increase in the amount of habitat provided by the minimum flow in Reach 1 from around 200,000 ft² during the baseline condition, to over 800,000 ft² during the proposed condition ([Figure 7.2.1.1-2](#)). Spatially, the proposed minimum flow would provide more contiguous areas of suitable spawning habitat in Reach 1 than is available under the minimum flow for the baseline condition ([Figure 7.2.1.1-3](#)).

In Reach 2, the baseline operational condition during the SNS spawning period allows flows in the bypass reach to drop to approximately 400 cfs from the Turners Falls Dam when inflows are relatively low and within the Turners Falls Project's hydraulic capacity. Based on modeled historical baseline conditions, this occurs at some point during the spawning season every year ([Figure 7.2.1.1-4](#)). Alternatively, FirstLight's proposed bypass reach flow would be expected to provide a minimum of 6,500 cfs to Reach 2 (assuming the NRF > 6,500 cfs, but if the NRF < 6,500 cfs, the minimum flow below Station No. 1 will be the NRF) during the entire spawning period most years ([Figure 7.2.1.1-4](#)). Years with flows in Reach 2 that are lower than 6,500 cfs would be indicative of periods of very low inflow, during which all inflow would be flowing through Reach 2 and Cabot Station would not be operating; as such, during low flow years, the flow through

²⁶ Note that the operations model did not simulate temporary deviations and flexible operations as described in Draft License Article A160 because it is unknown when deviations or flexible operations would be sought.

Reach 2 would be consistent with natural low-flow conditions. The proposed bypass minimum flow would substantially increase the amount of suitable spawning habitat in Reach 2, from around 156,000 ft² under the baseline condition, to over 1,400,000 ft² under the proposed condition ([Figure 7.2.1.1-5](#)). Spatially, the proposed minimum flow would provide considerably more contiguous areas of suitable spawning habitat than is available under the minimum flow for the baseline condition ([Figure 7.2.1.1-6](#)).

The bypass reach flows entering Reach 3 are the same as those flowing through Reach 2. Therefore, under the proposed condition the flow would be 6,500 cfs (if the NRF > 6,500 cfs) or the NRF (if the NRF < 6,500 cfs) during the entirety of the spawning season each year, in comparison to lower flows provided by the baseline condition ([Figure 7.2.1.1-4](#)). Evaluating habitat in Reach 3 is more complex than in Reaches 1 and 2, due to incoming flow from the bypass reach, varying flows from Cabot Station, and inflows from the Deerfield River, leading to complex hydraulic interactions. Instead of several habitat suitability curves, habitat suitability in Reach 3 can be represented by matrices with bypass reach flow on one axis, and Cabot Station flow on the other axis. The higher proposed bypass reach flow would result in approximately 2 – 2.5 times more suitable habitat area at the full range of Cabot Station flow conditions given low and high Deerfield River inflows ([Figure 7.2.1.1-7](#) and [7.2.1.1-8](#); [Table 7.2.1.1-2](#)). Additionally, at a bypass reach flow of 6,500 cfs, the proposed condition would eliminate the effect of Deerfield River peaking conditions that are observed as a slight effect in the baseline condition ([Table 7.2.1.1-2](#)). As such, the amount of habitat area provided to spawning SNS in Reach 3 would be more resilient to changes in flow from the Deerfield River under the proposed condition than it currently is under the baseline condition. Persistent habitat mapping in the reach confirms the increased resilience of habitat for the proposed condition as well, with large amounts of contiguous habitat that would remain suitable under the full range of Cabot Station generation flows ([Figure 7.2.1.1-9](#)). This is in comparison to the baseline condition, for which there are relatively few contiguous areas of persistent suitable habitat over the range of Cabot Station flows ([Figure 7.2.1.1-9](#)).

Table 7.2.1.1-1: Percent of Maximum Potential Modeled Habitat Provided by Proposed April/May Bypass Flows to Spawning SNS

Reach	Proposed Flow (cfs) from Source			% of Maximum Habitat Provided ²⁷
	Minimum Flow below Turners Falls Dam (Draft License Article A110)	Total Minimum Bypass Flow below Station No. 1 (Draft License Article A120)	Cabot Station Discharges	
1	If the NRF is ≤ 6,500 cfs, the Minimum Flow below Turners Falls Dam shall be 67% of the NRF. If the NRF is > 6,500, the Minimum Flow below Turners Falls Dam shall be 4,290 cfs.	-	-	96.0 ²⁸
2	Same as above	If the NRF is ≤ 6,500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be the NRF. If the NRF is > 6,500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be 6,500 cfs.	-	92.6 ²⁹
3	Same as above	Same as above	2,300 ³⁰ (~1 Cabot Unit)	82.9
	Same as above	Same as above	4,500 (~2 Cabot Units)	87.6
	Same as above	Same as above	7,000 (~3 Cabot Units)	93.0
	Same as above	Same as above	14,000 (~6 Cabot units)	97.7

²⁷ 100% of habitat would be the maximum amount of habitat provided at any modeled flow rate. Flow from Deerfield River (200 cfs vs. 1,445 cfs) did not affect the habitat calculations for these flow rates. Though spawning has never been documented in Reaches 1 and 2, the information is provided here in the event of habitat use expansion by SNS. Flow from Cabot Station only affect spawning habitats in Reach 3.

²⁸ At a flow of 4,290 cfs from Turners Falls Dam, which would be the most common minimum flow condition each spawning season (see [Figure 7.2.1.1-1](#))

²⁹ At a flow of 6,500 cfs in Reach 2, which would be the most common minimum flow condition each spawning season (see [Figure 7.2.1.1-4](#))

³⁰ Draft License Article A130 requires a minimum flow below Cabot Station of 8,800 cfs (2,300 cfs from Cabot Station, in addition to the minimum flow of 6,500 cfs from the bypass reach) from midnight to 7:00 pm or the NRF, whichever is less and 6,500 cfs from 7:00 pm to midnight or the NRF, whichever is less. .

Table 7.2.1.1-2: Range of Suitable Habitat Area for SNS Spawning Proposed and Baseline Conditions in Reach 3 given Low and High Deerfield River Flows

Deerfield River Flow	Suitable Habitat Area (ft²)			
	Baseline Condition		Proposed Condition	
	Minimum	Maximum	Minimum	Maximum
Low (200 cfs)	602,575	962,181	1,548,065	1,975,287
High (1,445 cfs)	644,565	1,028,240	1,548,065	1,975,287

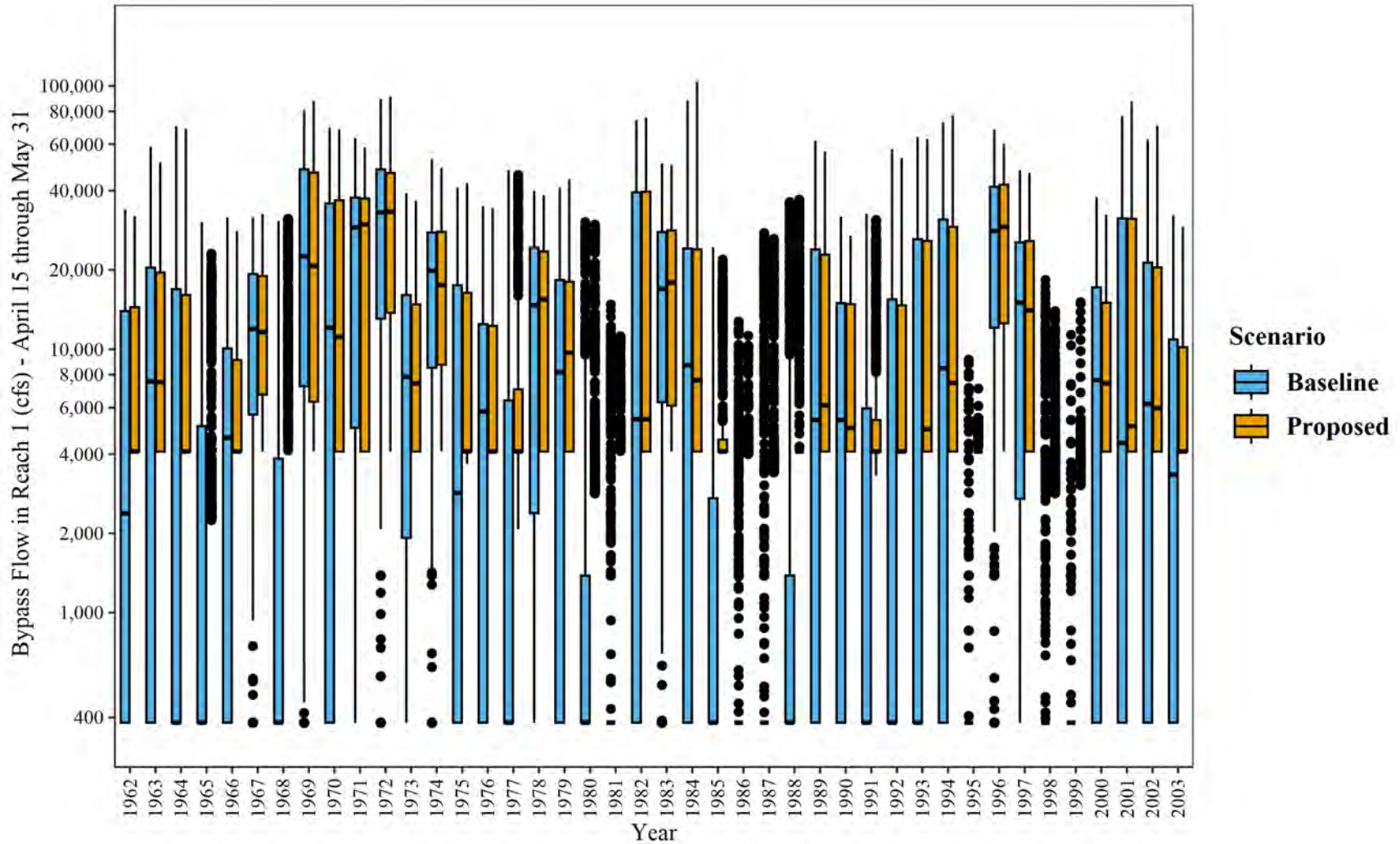


Figure 7.2.1.1-1: Distribution of Flows Modeled in Reach 1 for Baseline and Proposed Conditions during the SNS Spawning Period

Note: The boxplots can be interpreted as follows: Bold line = Median; Top and bottom of box are 75% and 25% percentile flows, respectively; Whiskers represent reasonable extreme flows that are uncommon; Points are outlier flows.

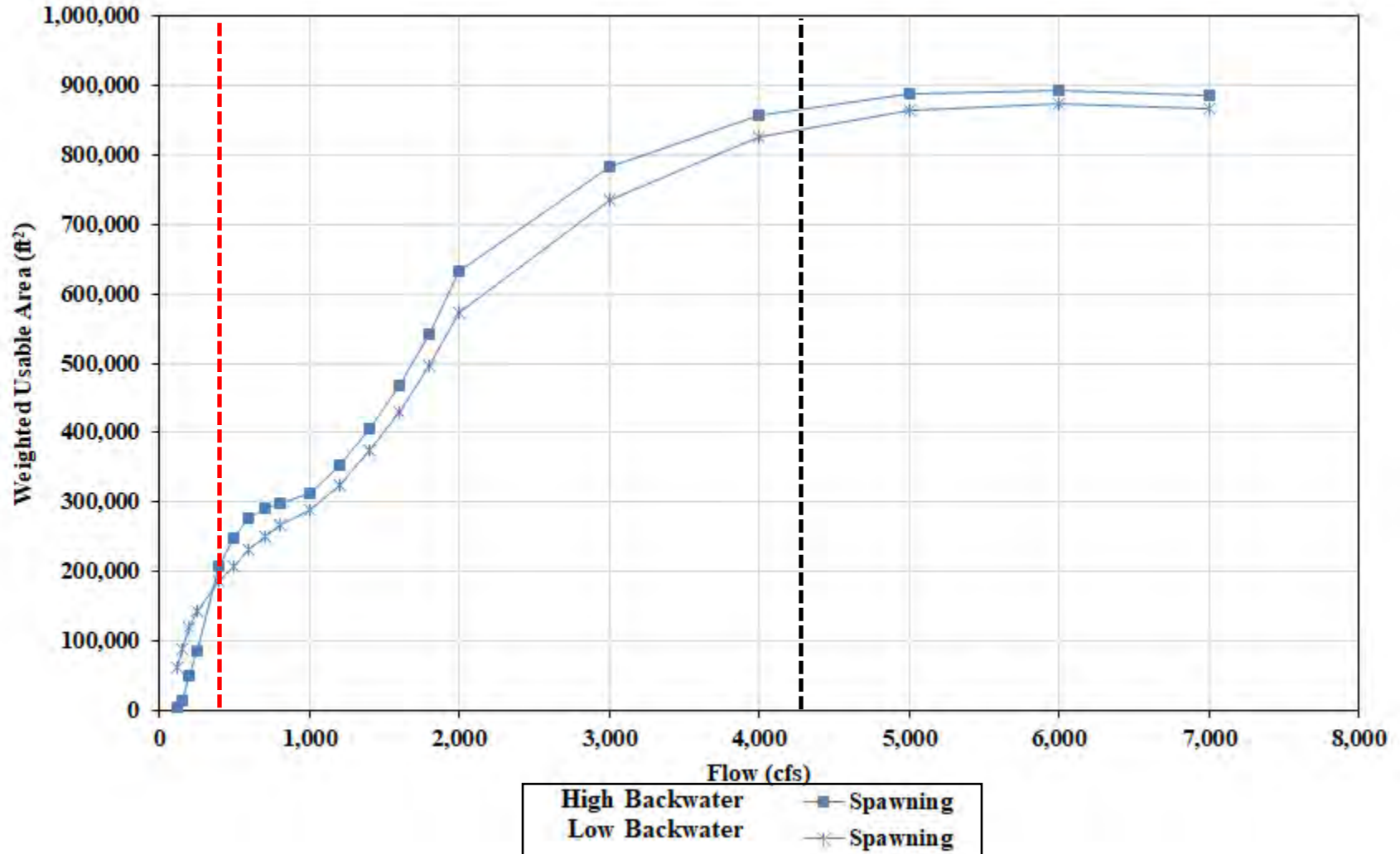


Figure 7.2.1.1-2: Habitat vs. Flow Relationship for SNS Spawning in Reach 1

Note: The vertical black dashed line indicates the proposed minimum flow (4,290 cfs, when the NRF > 6,500 cfs), whereas the red vertical dashed line indicates the baseline minimum flow. If the NRF ≤ 6,500 cfs, the minimum flow in Reach 1 below Turners Falls Dam is 67% of the NRF, though these flows would occur rarely under the proposed condition ([Figure 7.2.1.1-1](#)).



FIRSTLIGHT HYDRO GENERATING COMPANY
 Northfield Mountain Pumped Storage Project No. 2485
 Turners Falls Hydroelectric Project No. 1889
BIOLOGICAL ASSESSMENT
 Figure 7.2.1.1-3:
 Map of Baseline and Proposed
 Minimum Flow Conditions for
 SNS Spawning in Reach 1

Legend

Reach Extent

Combined Suitability Index

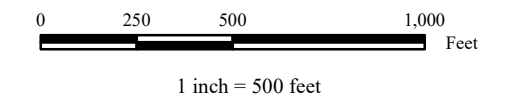
- 0.75 - 1
- 0.50 - 0.75
- 0.25 - 0.50
- 0 - 0.25
- 0



NOTES:

Flows shown were chosen from available models developed for Relicensing Study 3.3.1, and may not be exact relative to Baseline and Proposed Conditions, but are considered to be representative. Modeled flows used to create this map are:

1. Baseline scenario depicted using Turners Falls Dam Flow of 400 cfs, Station 1 flow of 96 cfs.
2. Proposed scenario depicted using Turners Falls Dam Flow of 4,350 cfs, Station 1 flow of 2,210 cfs.



Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
 National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

Copyright © 2024 FirstLight MA Hydro LLC. All rights reserved.

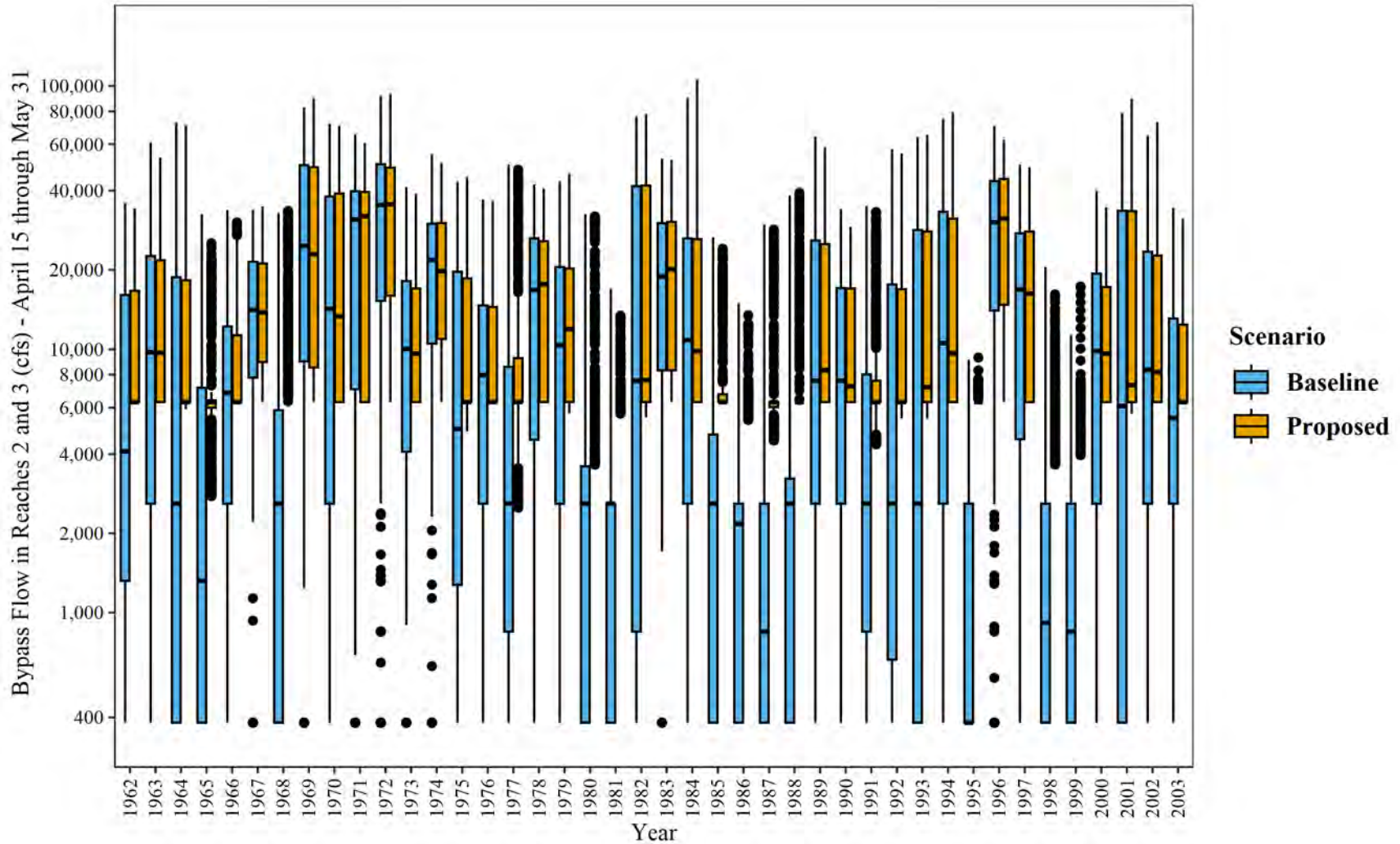


Figure 7.2.1.1-4: Distribution of Bypass Flows Modeled in Reaches 2 and 3 for Baseline and Proposed Conditions during the SNS Spawning Period

Note: The boxplots can be interpreted as follows: Bold line = Median; Top and bottom of box are 75% and 25% percentile flows, respectively; Whiskers represent reasonable extreme flows that are uncommon; Points are outlier flows.

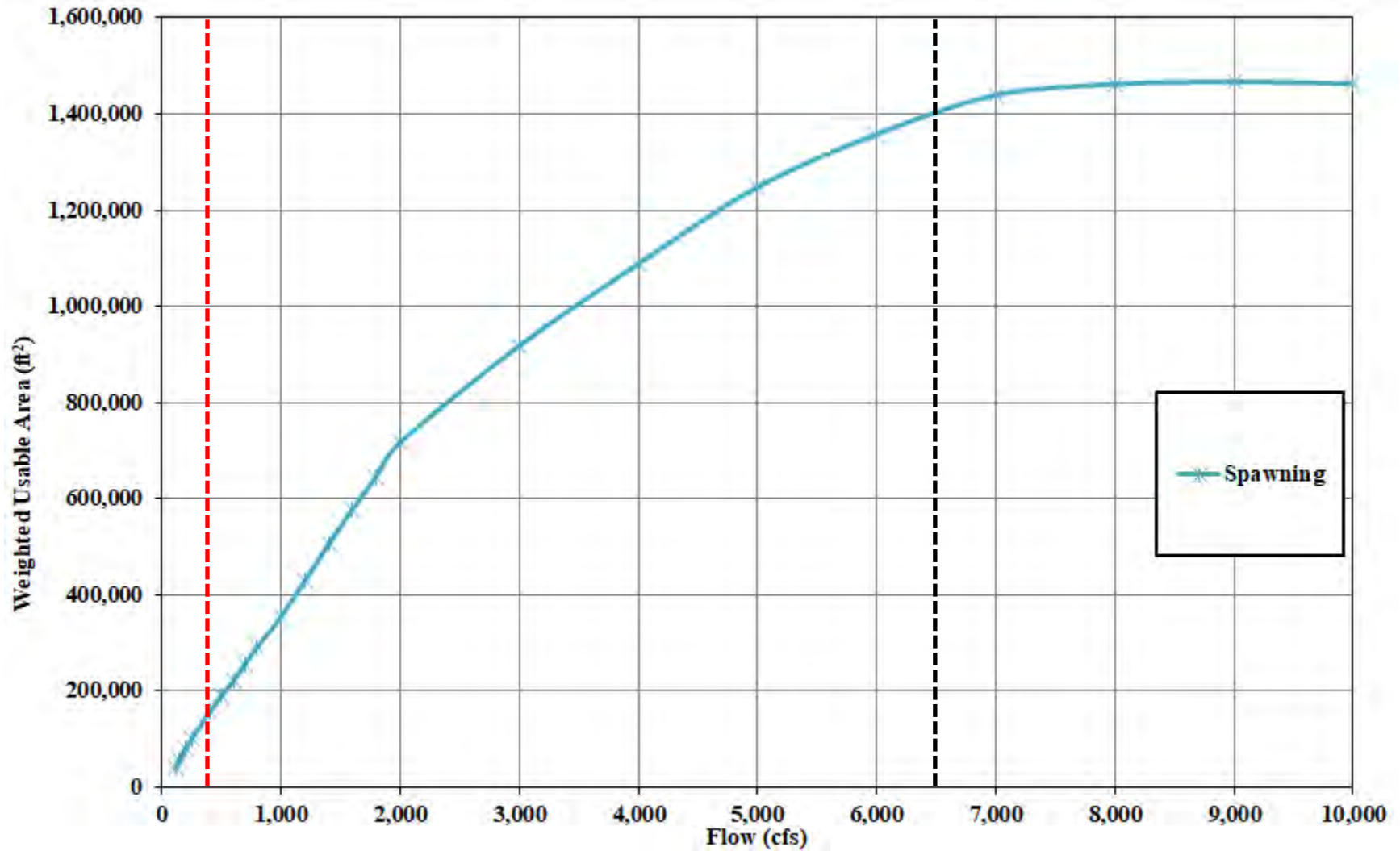
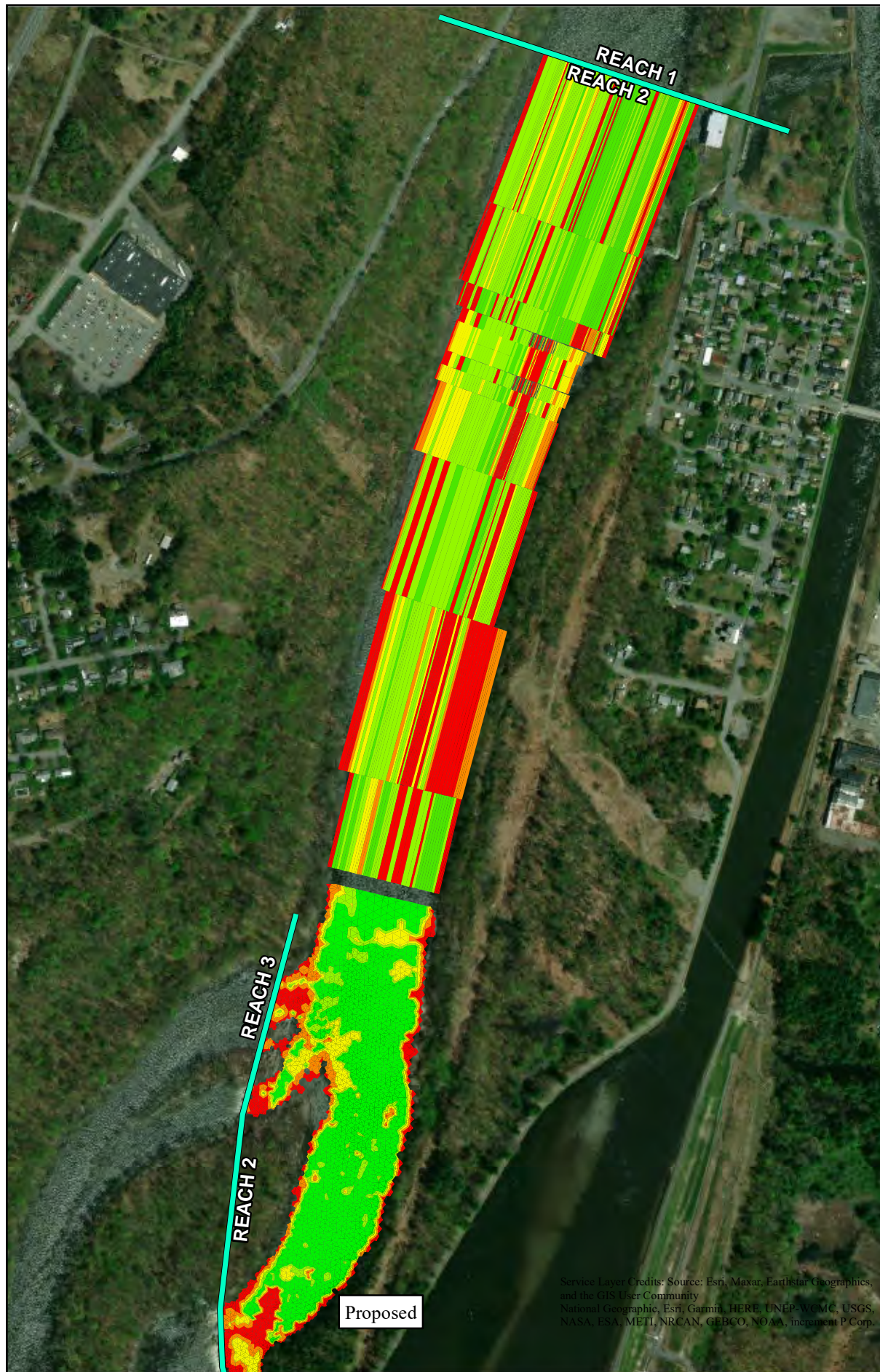


Figure 7.2.1.1-5: Habitat vs. Flow Relationship for SNS Spawning in Reach 2

Note: The vertical black dashed line indicates the proposed minimum flow (6,500 cfs, when the NRF > 6,500 cfs), whereas the red vertical dashed line indicates the baseline minimum flow. If the NRF ≤ 6,500 cfs, the minimum flow in Reach 2 is the NRF, though these flows would occur rarely under the proposed condition ([Figure 7.2.1.1-4](#)).



FIRSTLIGHT HYDRO GENERATING COMPANY
 Northfield Mountain Pumped Storage Project No. 2485
 Turners Falls Hydroelectric Project No. 1889
Biological Assessment
 Figure 7.2.1.1-6:
 Map of Baseline and Proposed
 Minimum Flow Conditions for
 SNS Spawning in Reach 2

Legend

— Reach Extent

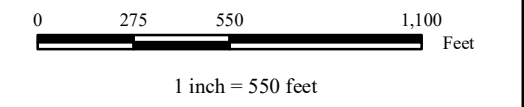
Combined Suitability Index

- 0.75 - 1
- 0.50 - 0.75
- 0.25 - 0.50
- 0 - 0.25
- 0

NOTES:
 Flows shown were chosen from available models developed for Relicensing Study 3.3.1, and may not be exact relative to Baseline and Proposed Conditions, but are considered to be representative. Modeled flows used to create this map are:

Baseline Modeled Flows
 Bypass: 500 cfs

Proposed Modeled Flows
 Bypass: 6,500 cfs



Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
 National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.



Copyright © 2024 FirstLight MA Hydro LLC. All rights reserved.

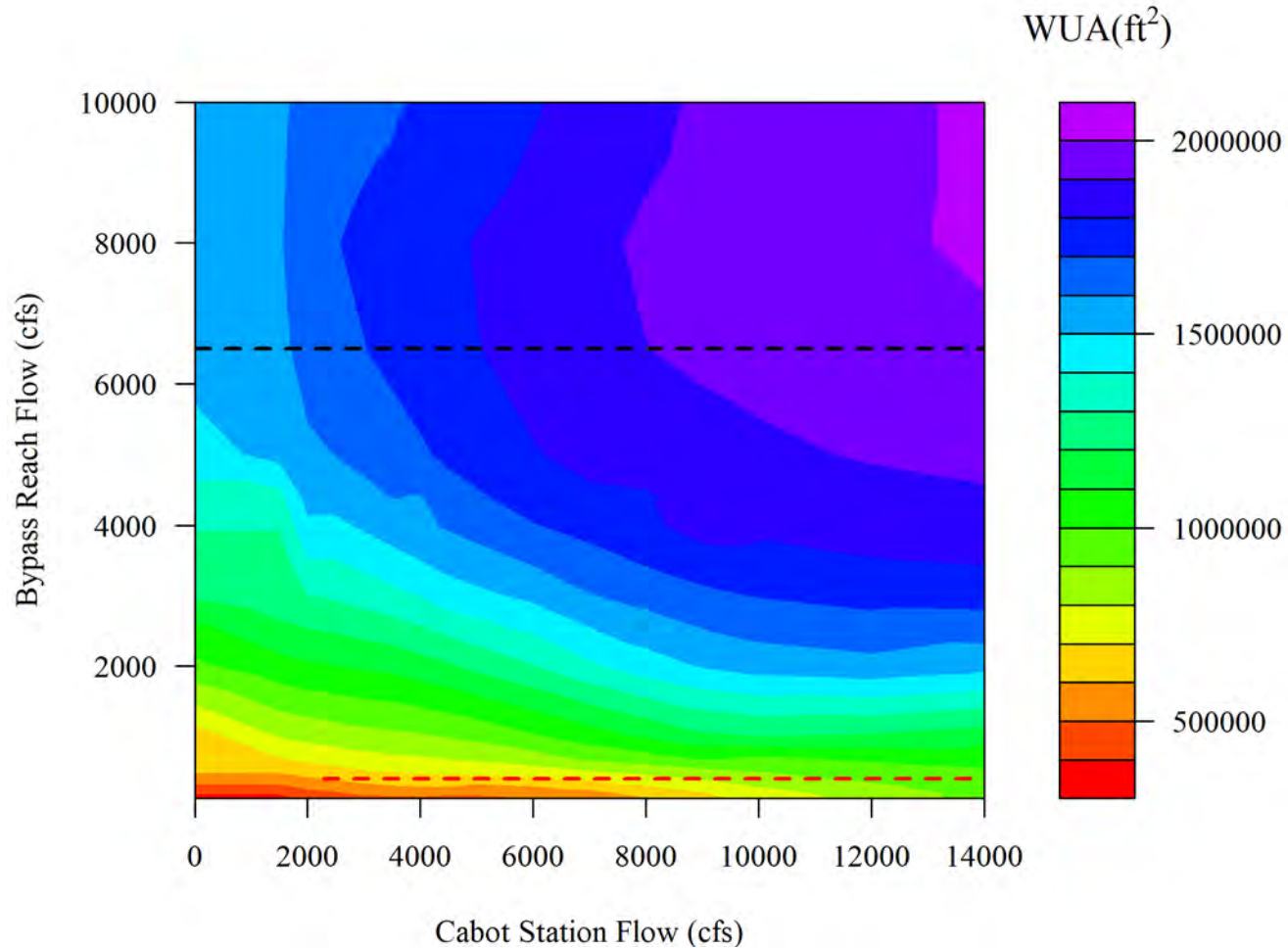


Figure 7.2.1.1-7: Habitat vs. Flow Relationship for SNS Spawning in Reach 3 with Deerfield River Flow at 200 cfs

Note: The horizontal black dashed line indicates the potential range of flows that could occur for various Cabot Station flow operations combined with a 6,500 cfs minimum bypass flow, whereas the red horizontal dashed line indicates the baseline minimum flow at various Cabot Station flows.

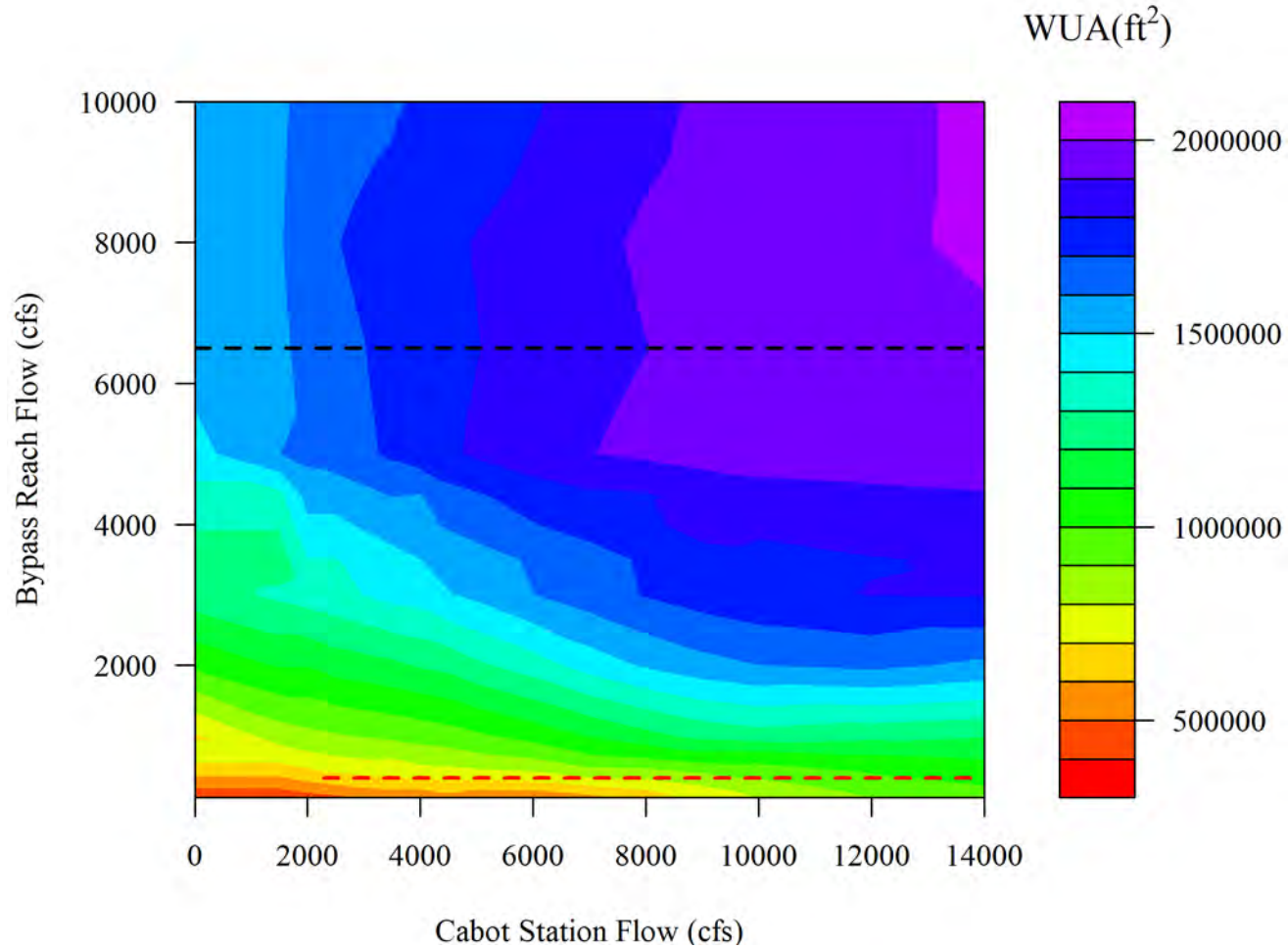
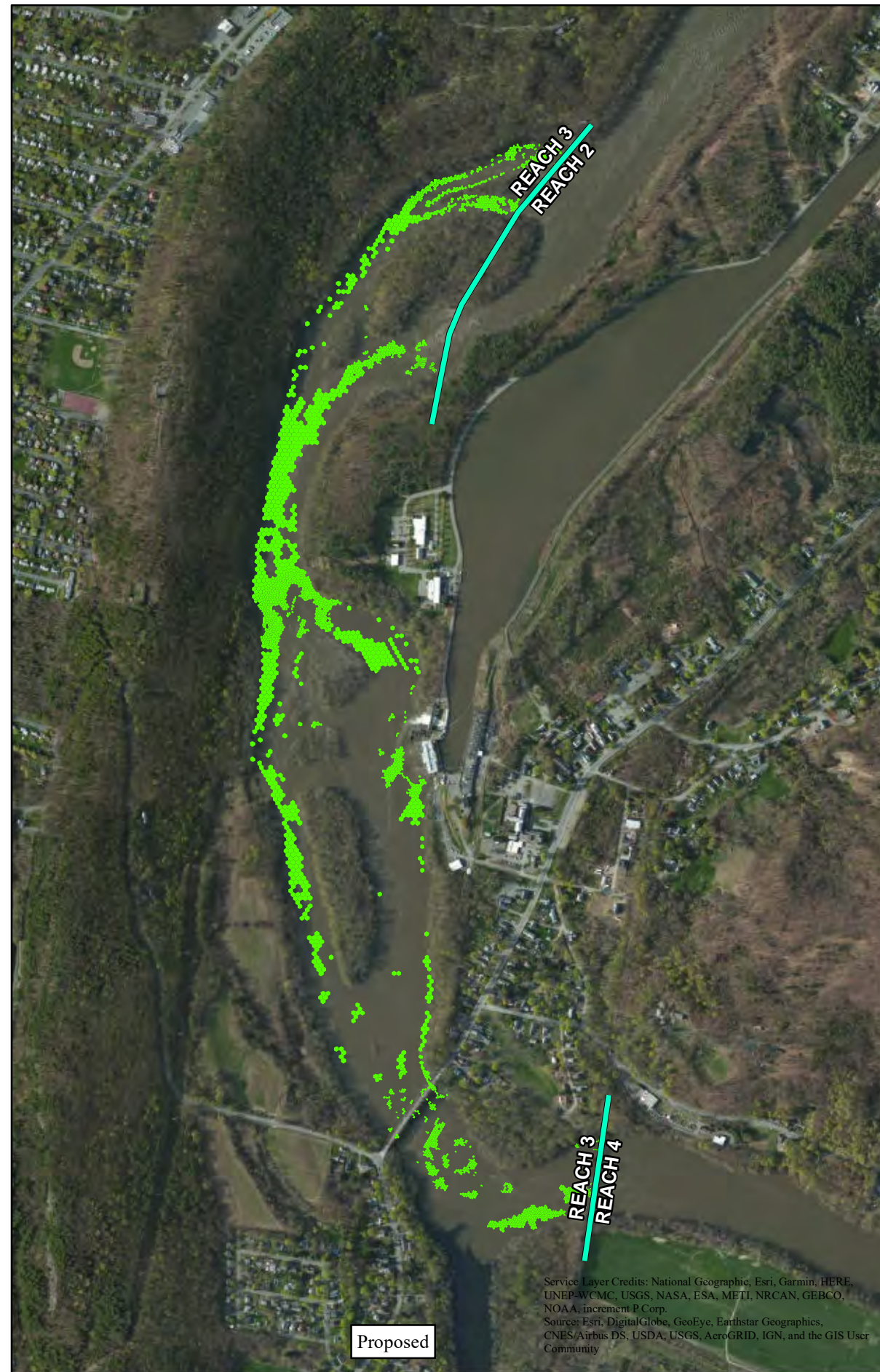
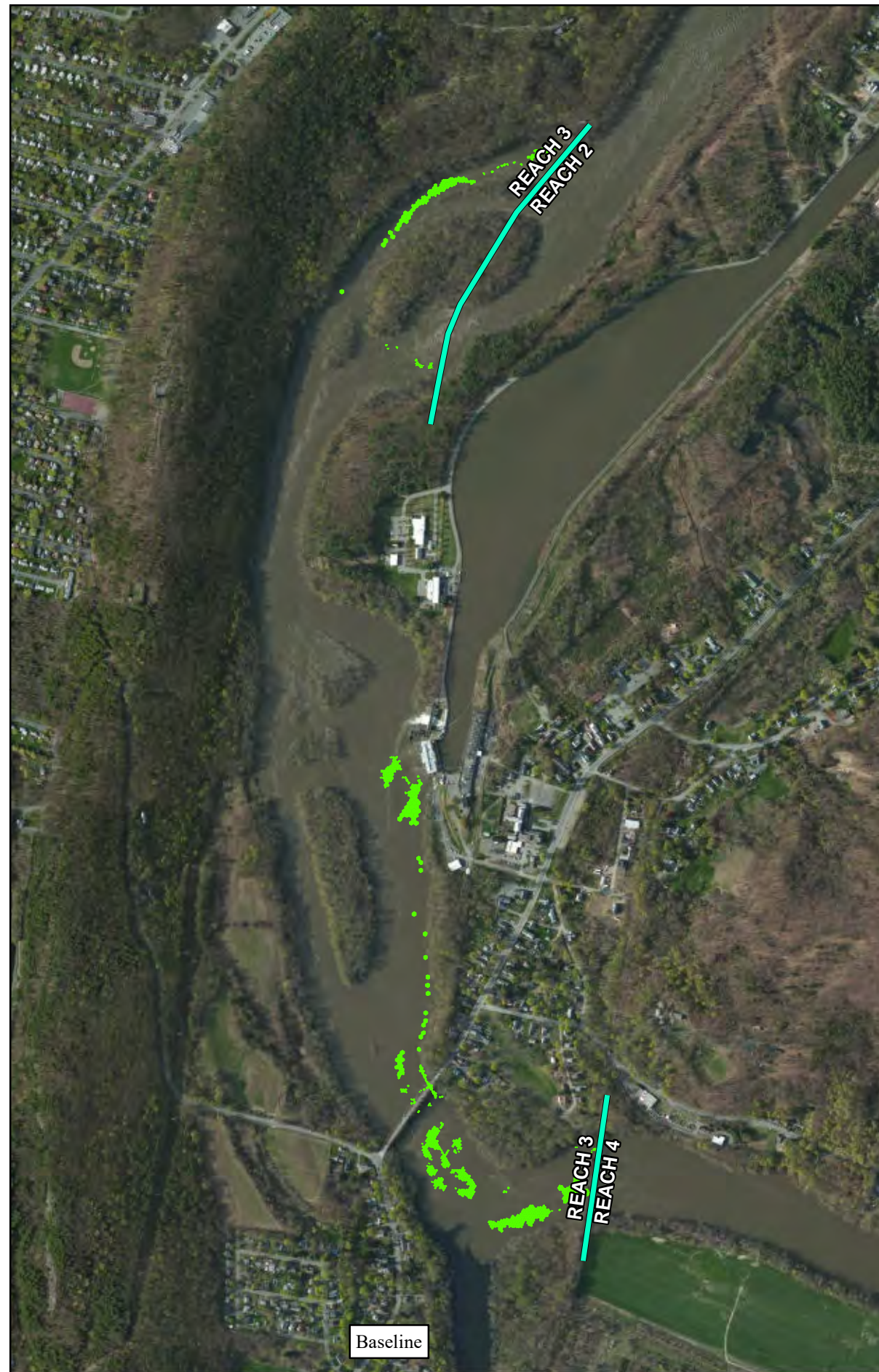


Figure 7.2.1.1-8: Habitat vs. Flow Relationship for SNS Spawning in Reach 3 with Deerfield River Flow at 1,445 cfs

Note: The horizontal black dashed line indicates the potential range of flows that could occur for various Cabot Station flow operations combined with a 6,500 cfs minimum bypass flow, whereas the red horizontal dashed line indicates the baseline minimum flow at various Cabot Station flows.



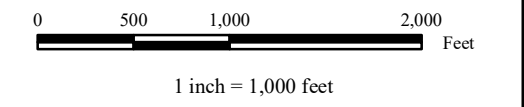
FIRSTLIGHT HYDRO GENERATING COMPANY
 Northfield Mountain Pumped Storage Project No. 2485
 Turners Falls Hydroelectric Project No. 1889
Biological Assessment
 Figure 7.2.1.1-9:
 Map of Baseline and Proposed
 Minimum Flow Conditions for
 SNS Spawning in Reach 3

Legend

- Reach Extent
- Persistent Habitat - Cabot
Flow 1 Thru 2

NOTES:
 Flows shown were chosen from available models developed for Relicensing Study 3.3.1, and may not be exact relative to Baseline and Proposed Conditions, but are considered to be representative. Modeled flows used to create this map are:

- Baseline Modeled Flows**
 Bypass: 500 cfs
 Cabot 1: 2,500 cfs
 Cabot 2: 14,000 cfs
- Proposed Apr 1 - May 31 Modeled Flows**
 (Persistent Between Minimum Flow Ranges)
 Bypass: 6,500 cfs Bypass: 6,500 cfs
 Cabot 1: 0 cfs Cabot 1: 2,500 cfs
 Cabot 2: 14,000 cfs Cabot 2: 14,000 cfs



Service Layer Credits: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Copyright © 2024 FirstLight MA Hydro LLC. All rights reserved.

7.2.1.2 Minimum Bypass and Downstream Flows during Sturgeon Rearing Period

SNS eggs and larvae can be present during spawning, and for a short time afterward because they take time to hatch and mature before becoming fry. They could therefore be present at and around spawning areas in April and May, into early June, after which they disperse downstream as fry ([Kynard et al., 2012](#)). After the April/May spawning period, bypass flows are proposed to be reduced slightly in June (from 6,500 cfs to 4,500 cfs), but special consideration was given to SNS eggs and larvae with regard to the amount of suitable habitat that would be present. Continuously operating (base loading) one unit at Cabot Station was identified as an additional step to further limit flow changes and drastic flow reductions. Note that baseloading one Cabot Station unit is in addition to maintaining up- and down ramping rates in June (Draft License Article A140) and maintaining stabilized flows below Cabot Station in June (Draft License Article A160). The effects of base loading on rearing habitat only pertains to Reach 3, whereas changes in bypass flows could affect rearing in Reaches 1, 2, and 3.

In Reach 1, the baseline operational condition during the SNS rearing period, when eggs and larvae could be present, allows flows in the bypass reach to drop to approximately 400 cfs from the Turners Falls Dam, when inflows are relatively low and within the Turners Falls Project's hydraulic capacity. Based on modeled historical baseline conditions, this occurs at some point during the spawning season every year, and in some years, 400 cfs in Reach 1 is the median flow during the April/May portion of the rearing period (see Section 7.2.1.1, [Figure 7.2.1.1-1](#)). Alternatively, FirstLight's proposed bypass reach flow would be expected to provide 4,290 cfs from Turners Falls Dam to Reach 1 during April/May, and the frequency of higher flows would be similar to the baseline condition (see Section 7.2.1.1, [Figure 7.2.1.1-1](#)). Proposed increases to the minimum base flow in Reach 1 would result in a four-fold increase in the amount of habitat provided by the minimum flow in Reach 1 from less than 600,000 ft² during the baseline condition, to more than 1,200,000 ft² ([Figure 7.2.1.2-1](#)). The effects of backwatering from Station No. 1 are also eliminated at this spill flow ([Figure 7.2.1.2-1](#)). Even though flows would be provided on an "or-inflow" basis, when bypass flows are reduced to a proposed minimum of 2,990 cfs from Turners Falls Dam on June 1, historical timeseries data suggests that flows in Reach 1 would have fallen no lower than 1,500 cfs during the June 1-15 period in dry seasons ([Figure 7.2.1.2-2](#)). Flows of 1,500 cfs and greater offer a high percentage of habitat for eggs/larvae of SNS in Reach 1. Alternatively, the baseline condition provided flows as low as 400 cfs during the latter portion of the egg/larvae period every year, providing only 600,000 ft² of suitable habitat ([Figure 7.2.1.2-2](#)). Therefore, based on the habitat vs. flow relationship and anticipated inflows, the proposed conditions would offer considerably more habitat to SNS eggs and larvae, consistently each year throughout the spawning season and the remainder of the egg/larval period. Spatially, the increase in the amount of habitat provided by the proposed condition in Reach 1, relative to the baseline condition, is substantial ([Figure 7.2.1.2-3](#)).

In Reach 2, the baseline operational condition during the SNS rearing period, when eggs and larvae could be present, allows flows in the bypass reach to drop to approximately 400 cfs from the Turners Falls Dam when inflows are relatively low and within the Turners Falls Project's hydraulic capacity. Based on modeled historical baseline conditions, this occurs at some point during the April/May period every year (see Section 7.2.1.1, [Figure 7.2.1.1-4](#)). Alternatively, FirstLight's proposed bypass reach flow would be expected to provide a minimum of 6,500 cfs to Reach 2 during the April/May period most years (see Section 7.2.1.1, [Figure 7.2.1.1-4](#)). Years when April/May flows in Reach 2 that are lower than 6,500 cfs would be indicative of periods of very low inflow, during which all inflow would be flowing through Reach 2 and Cabot Station would not be operating; as such, during low flow years, the flow through Reach 2 would be consistent with natural low-flow conditions. The proposed bypass minimum flow would substantially increase the amount of suitable rearing habitat in Reach 2, from around 791,000 ft² during the baseline condition, to approximately 2,000,000 ft² during the proposed condition ([Figure 7.2.1.2-4](#)). Even though flows would be provided on an "or-inflow" basis, and total bypass flows would be reduced to a proposed minimum of 4,500 cfs on June 1, historical timeseries data suggests that flows in Reach 2 would fall no lower than 1,600 cfs during the June 1-15 period in dry seasons, with several years when the minimum flow

did not fall below 4,500 (Figure 7.2.1.2-5). Flows of this magnitude and greater offer a high percentage of habitat for eggs/larvae of SNS in Reach 2 and 4,500 cfs offers nearly the maximum amount of available potential habitat in Reach 2 (approximately 2,000,000 ft²). Alternatively, the baseline condition provides flows as low as 400 cfs during the latter portion of the egg/larvae period every year, providing only approximately 791,000 ft² of suitable habitat (Figure 7.2.1.2-4). Therefore, based on the habitat vs. flow relationship and anticipated inflows, the proposed conditions would offer considerably more habitat to SNS eggs and larvae, consistently each year throughout the spawning season and the remainder of the egg/larval period. Spatially, the increase in the amount of habitat provided by the proposed condition in Reach 2, relative to the baseline condition, is substantial (Figure 7.2.1.2-6).

The bypass reach flows entering Reach 3 are the same as those flowing through Reach 2. Therefore, even on an or-inflow basis, the proposed condition would still provide considerably more water than would be provided by the baseline condition during the spawning season (see Section 7.2.1.1, Figure 7.2.1.1-4) and through the remainder of the rearing period (Figure 7.2.1.2-5). Evaluating habitat in Reach 3 is more complex than in Reaches 1 and 2, due to incoming flow from the bypass reach, varying flows from Cabot Station, and inflows from the Deerfield River, leading to complex hydraulic interactions. Instead of several habitat suitability curves, habitat suitability in Reach 3 can be represented by matrices with bypass reach flow on one axis, and Cabot Station flow on the other axis. The higher proposed minimum bypass reach flows, and one unit base loaded at Cabot Station in June, would result in more suitable habitat area at the full range of Cabot Station flow conditions given low and high Deerfield River inflows (Figure 7.2.1.2-7 and 7.2.1.2-8; Table 7.2.1.2-1). Specifically, the baseline minimum flow conditions could provide as little as 1,568,286 ft² of habitat for eggs and larvae, and the maximum amount of habitat provided by the baseline condition (2,322,338 ft²) is less than the minimum amount of habitat provided by the proposed conditions (2,456,255 ft²). As such, the amount of habitat area provided to spawning SNS in Reach 3 would be more resilient under the proposed condition than it currently is under the baseline condition. Persistent habitat mapping in the reach confirms the increased resilience of habitat for the proposed condition as well, with large amounts of contiguous habitat that would remain suitable under the range of Cabot Station generation flows proposed (Figure 7.2.1.2-9). This is particularly evident in the right (west) channel around the Smead Island Complex, across from Cabot Station (Figure 7.2.1.2-9).

After mid-June, eggs and larvae would have matured to the fry stage and would be dispersing downstream. At this point, total bypass flows are proposed to be reduced to 3,500 cfs. Continuing base loading (the hydraulic equivalent of a single Cabot unit) through the end of June would promote continued dispersal of fry downstream and maintain more habitat for post-drift fry in Reach 4 when compared to the baseline condition (Figure 7.2.1.2-10). Though peaking during this period could limit habitat suitability for fry in Reach 4, the frequency and magnitude of peaking are likely to be reduced relative to the baseline condition due to higher proposed bypass and downstream flows, along with restrictions on ramping rates and flow deviations from the NRF (see Section 7.2.1.3). This would provide benefits to fry in Reach 4 compared to the baseline condition during periods when inflows are lower than the hydraulic capacity of the Turners Falls Project.

Table 7.2.1.2-1: Range of Suitable Habitat Area for SNS Rearing under Proposed and Baseline Conditions in Reach 3 given Low and High Deerfield River Flows

Deerfield River Flow	Suitable Habitat Area (ft ²)					
	Baseline Condition		Proposed Condition (April-May)		Proposed Condition (June 1-15)	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
Low (200 cfs)	1,568,286	2,246,625	2,456,255	2,668,282	2,525,535	2,658,099
High (1,445 cfs)	1,623,492	2,322,338	2,456,255	2,668,282	2,536,206	2,671,332

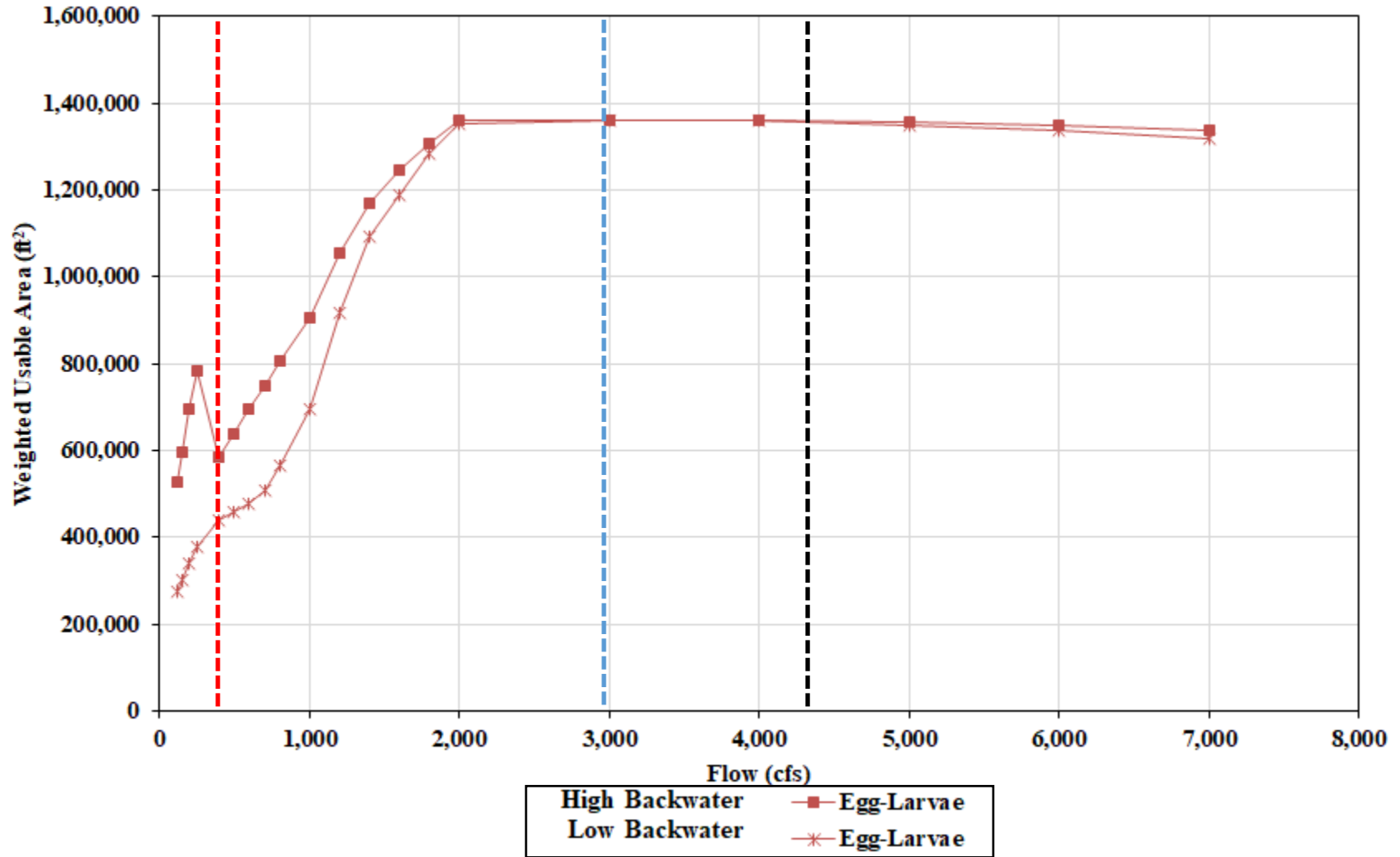


Figure 7.2.1.2-1: Habitat vs. Flow Relationship for SNS Eggs and Larvae in Reach 1

Note: The vertical black dashed line indicates the proposed minimum flow from April-May (4,290 cfs when the NRF > 6,500 cfs) and the blue vertical dashed line indicates the proposed minimum flow from June 1-15 (2,990 cfs when the NRF is > 4,500 cfs), whereas the red vertical dashed line indicates the baseline minimum flow. The proposed minimum flow in Reach 1 below Turners Falls Dam when the NRF is ≤ 4,500 cfs is 67% of the NRF; these flows would occur during abnormally dry periods (Figure 7.1.1.2-2).

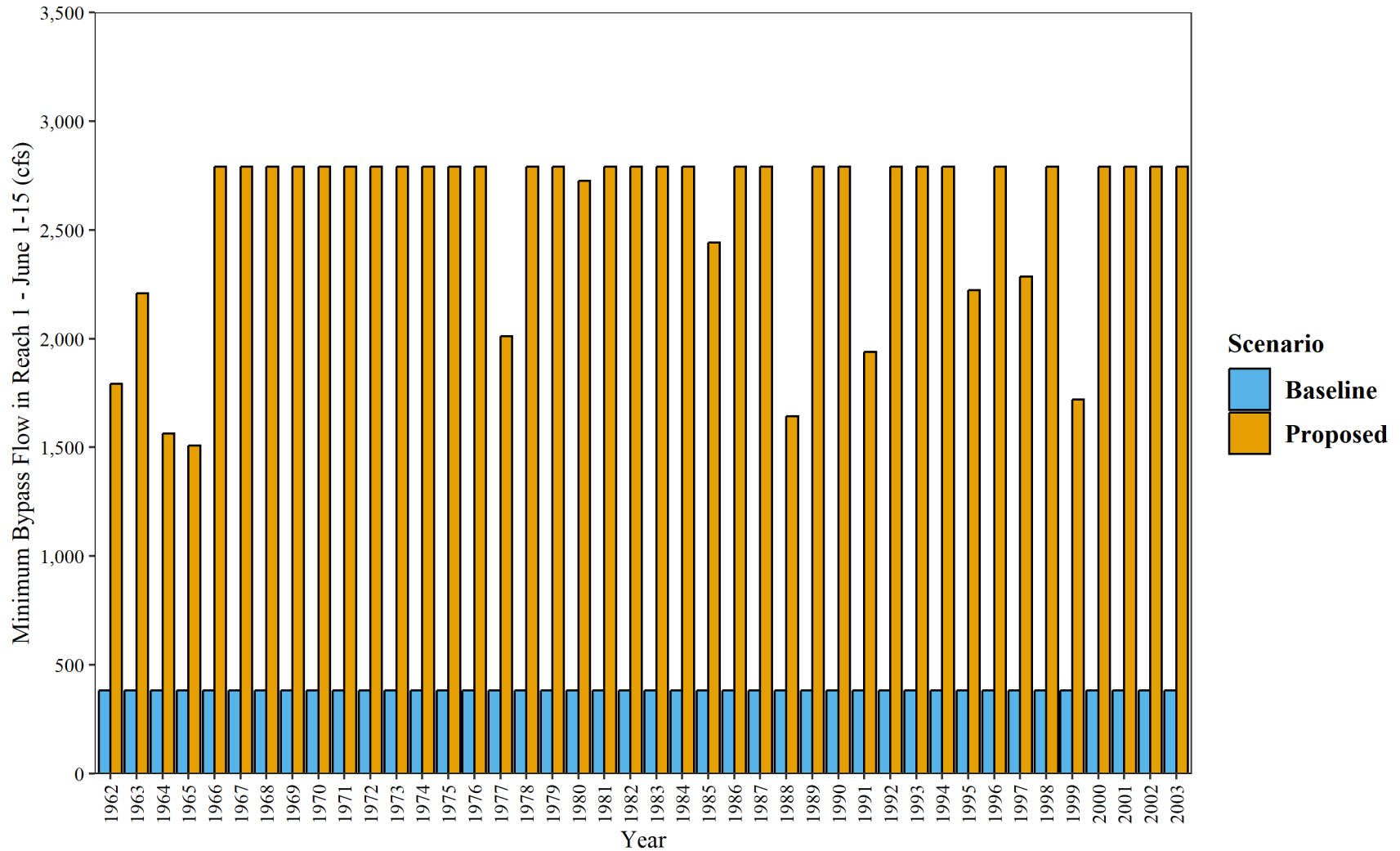


Figure 7.2.1.2-2: Minimum Modeled Flow Provided during the June 1-15 Portion of the SNS Rearing Season in Reach 1



FIRSTLIGHT HYDRO GENERATING COMPANY
 Northfield Mountain Pumped Storage Project No. 2485
 Turners Falls Hydroelectric Project No. 1889
BIOLOGICAL ASSESSMENT
 Figure 7.2.1.2-3:
 Map of Baseline and Proposed
 Minimum Flow Conditions for
 SNS Rearing in Reach 1

Legend

— Reach Extent

Combined Suitability

0.75 - 1

0.50 - 0.75

0.25 - 0.50

0 - 0.25

0



NOTES:

Flows shown were chosen from available models developed for Relicensing Study 3.3.1, and may not be exact relative to Baseline and Proposed Conditions, but are considered to be representative. Modeled flows used to create this map are:

1. Baseline scenario depicted using Turners Falls Dam Flow of 400 cfs, Station 1 flow of 96 cfs.
2. Proposed April 1 - May 31 scenario depicted using Turners Falls Dam Flow of 4,350 cfs, Station 1 flow of 2,210 cfs.
3. Proposed June 1 - 15 scenario depicted using Turners Falls Dam Flow of 3,000 cfs, Station 1 flow of 2,210 cfs.



1 inch = 500 feet



Copyright © 2024 FirstLight MA Hydro LLC. All rights reserved.

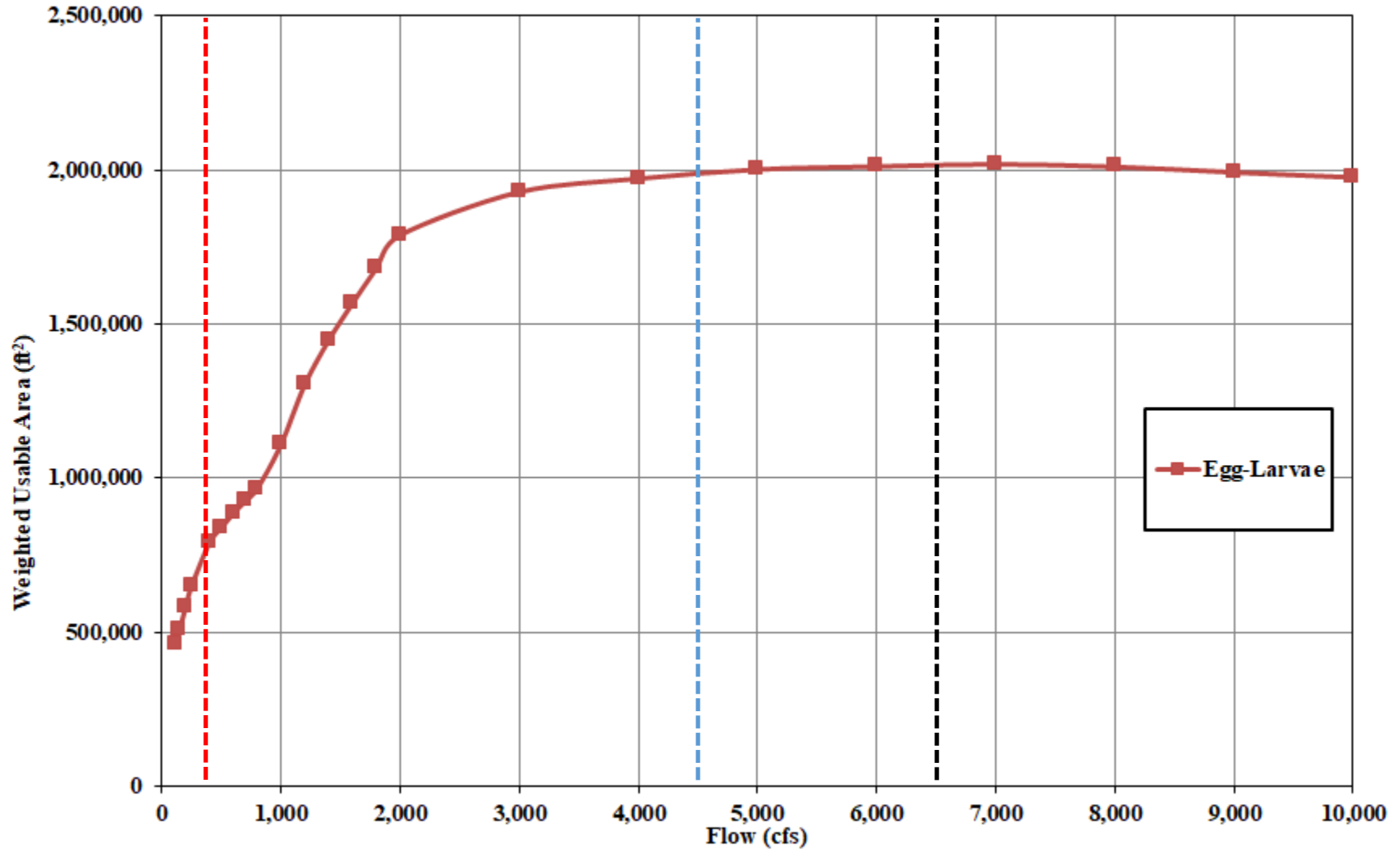


Figure 7.2.1.2-4: Habitat vs. Flow Relationship for SNS Eggs and Larvae in Reach 2

Note: The vertical black dashed line indicates the proposed minimum flow from April-May (6,500 cfs when the NRF > 6,500 cfs) and the blue vertical dashed line indicates the proposed minimum flow from June 1-15 (4,500 cfs when the NRF is > 4,500 cfs), whereas the red vertical dashed line indicates the baseline minimum flow. The proposed minimum flow in Reach 2 when the NRF is ≤ 4,500 cfs is the NRF; these flows would occur during abnormally dry periods ([Figure 7.1.1.2-5](#)).

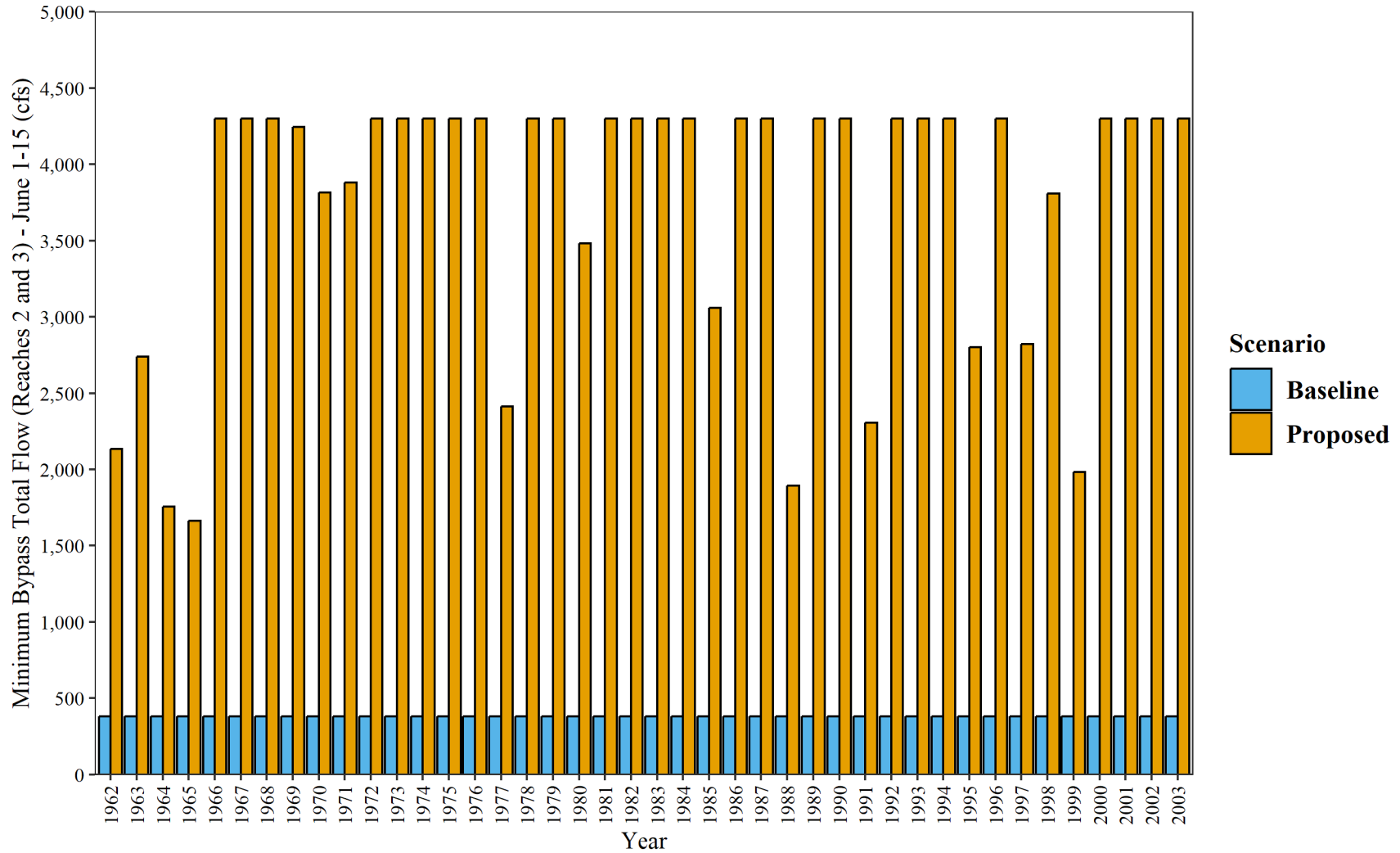


Figure 7.2.1.2-5: Minimum Modeled Flow Provided during the June 1-15 Portion of the SNS Rearing Season in Reach 2

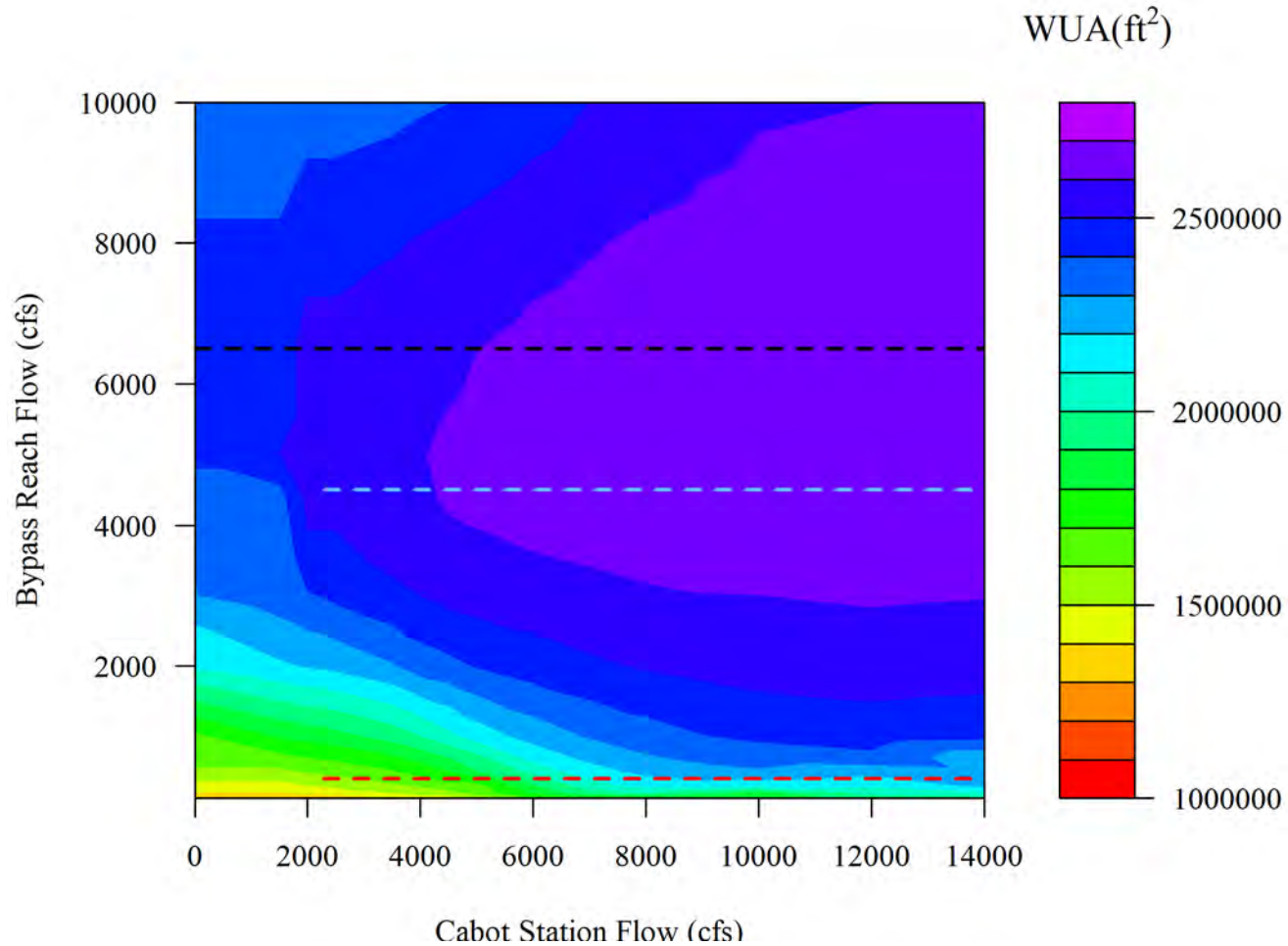


Figure 7.2.1.2-7: Habitat vs. Flow Relationship for SNS Egg and Larvae in Reach 3 with Deerfield River Flow at 200 cfs

Note: The horizontal black dashed line indicates the potential range of flows that could occur for various Cabot Station flow operations combined with a 6,500 cfs minimum bypass flow (April/May), the horizontal light blue dashed line indicates the potential range of flows that could occur for various Cabot Station flow operations combined with a 4,500 cfs minimum bypass flow (June 1-15), whereas the red horizontal dashed line indicates the baseline minimum flow at various Cabot Station flows.

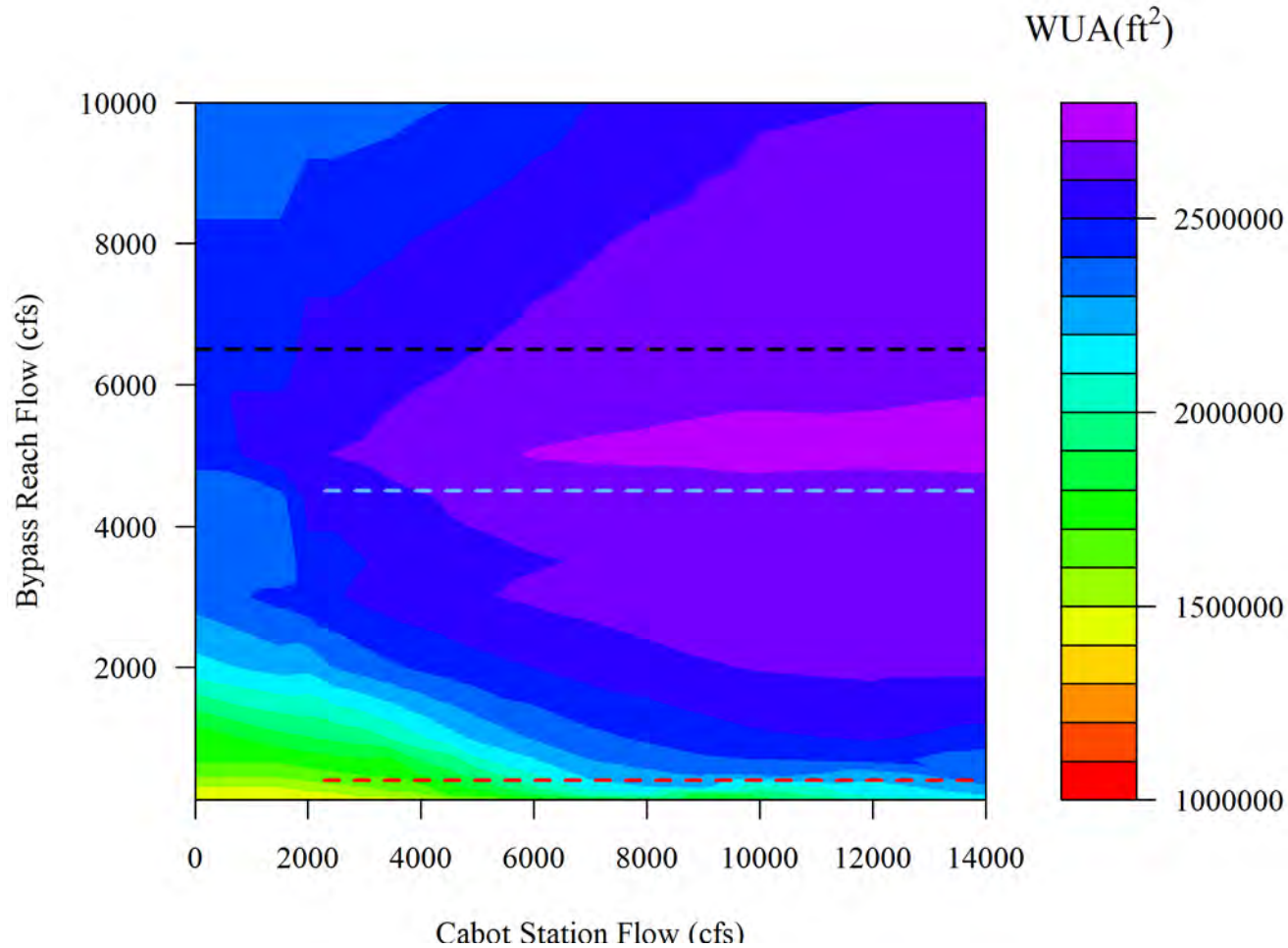




Figure 7.2.1.2-8: Habitat vs. Flow Relationship for SNS Egg and Larvae in Reach 3 with Deerfield River Flow at 1445 cfs

Note: The horizontal black dashed line indicates the potential range of flows that could occur for various Cabot Station flow operations combined with a 6,500 cfs minimum bypass flow (April/May), the horizontal light blue dashed line indicates the potential range of flows that could occur for various Cabot Station flow operations combined with a 4,500 cfs minimum bypass flow (June 1-15), whereas the red horizontal dashed line indicates the baseline minimum flow at various Cabot Station flows.



FIRSTLIGHT HYDRO GENERATING COMPANY
Northfield Mountain Pumped Storage Project No. 2485
Turners Falls Hydroelectric Project No. 1889
Biological Assessment
Figure 7.2.1.2-9:
Map of Baseline and Proposed
Minimum Flow Conditions for
SNS Rearing in Reach 3

Legend

-  Reach Extent
-  Persistent Habitat - Cabot
Flow 1 Thru 2



NOTES:

Flows shown were chosen from available models developed for Relicensing Study 3.3.1, and may not be exact relative to Baseline and Proposed Conditions, but are considered to be representative. Modeled flows used to create this map are:

Baseline Modeled Flows

Bypass: 500 cfs
Cabot 1: 2,500 cfs
Cabot 2: 14,000 cfs

Proposed Apr 1 - May 31 Modeled Flows
(Persistent Between Minimum Flow Ranges)

Bypass: 6,500 cfs	Bypass: 6,500 cfs
Cabot 1: 0 cfs	Cabot 1: 2,500 cfs
Cabot 2: 14,000 cfs	Cabot 2: 14,000 cfs

Proposed June 1 - 15 Modeled Flows

Bypass: 4,400 cfs
Cabot 1: 2,500 cfs
Cabot 2: 14,000 cfs



1 inch = 1,000 feet



Copyright © 2024 FirstLight MA Hydro LLC. All rights reserved.

Service Layer Credits: National Geographic, Garmin, HERE, UNEP, USACE, USGS, NASA, ESA, METI, PGCAN, GEBCO, NOAA, increment P Corp., Sweco, Esri, DeLorme, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

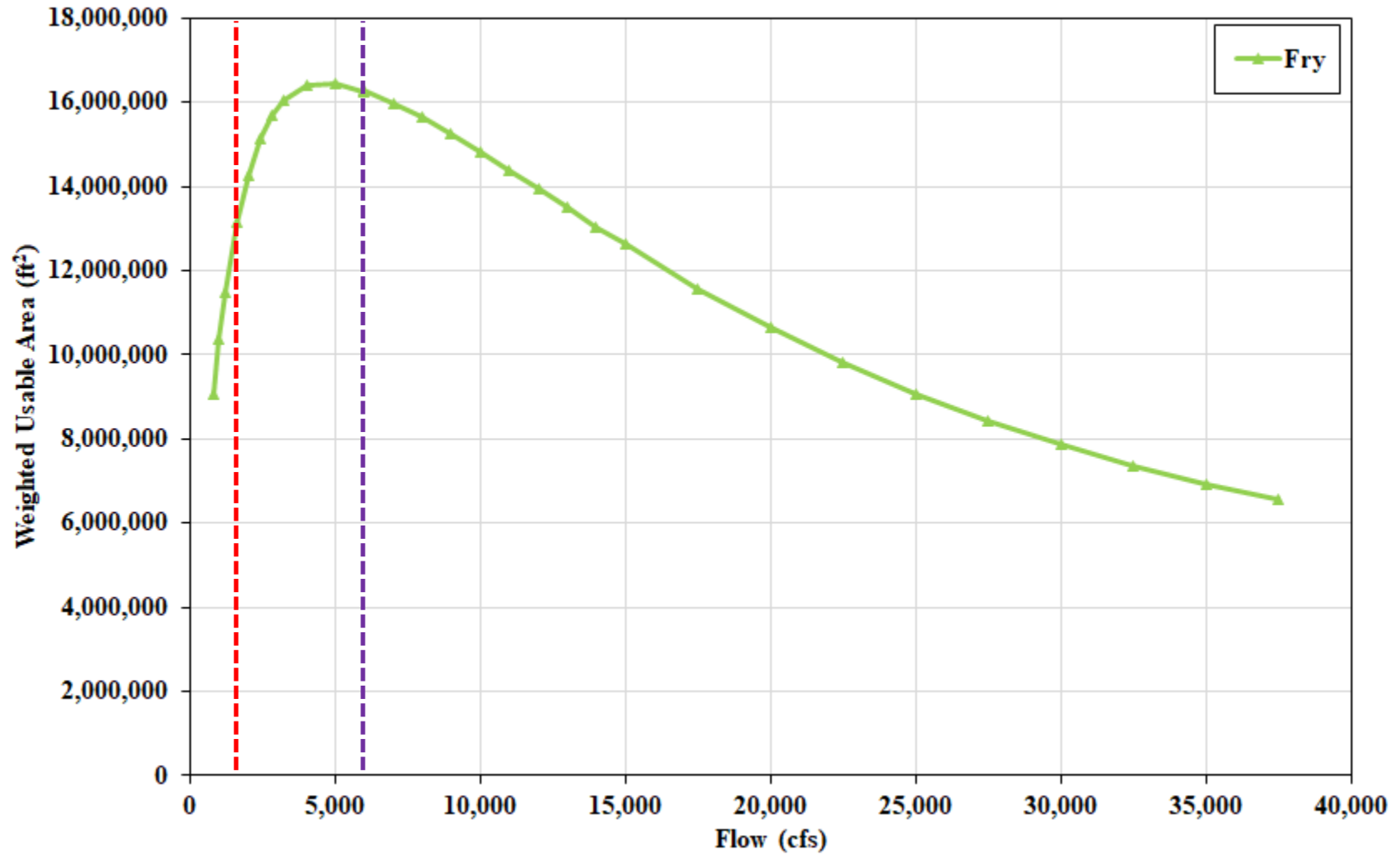


Figure 7.2.1.2-10: Habitat vs. Flow Relationship for SNS Fry in Reach 4

Note: The vertical lines indicate minimum downstream flows for the June 16-30 period. The purple vertical dashed line indicates the proposed minimum flow of approximately 6,000 cfs (approximates 5,800 below Cabot Station unit plus 200 cfs from Deerfield River), whereas the red vertical dashed line indicates the baseline minimum flow (approximates 1,433 cfs + 200 cfs from Deerfield River).

7.2.1.3 Ramping Restrictions and Flow Stabilization throughout Spawning and Rearing Period

As noted on the October 17, 2019, conference call, NMFS indicated that, based on consideration of information presented in Kynard et al. (2012) (Chapter 3), turning Cabot Station generating units rapidly on and off may cause spawning to cease and the SNS egg and larval rearing area to become dewatered or inundated with high velocity flow. To address NMFS' concern, Draft License Article A140. Cabot Station Ramping Rates requires up and down ramping at a rate of 2,300 cfs/hour from April 1 to June 30. In addition, Draft License Article A160. Flow Stabilization below Cabot Station and Allowable Deviations for Flexible Operation, requires FirstLight to maintain flows within $\pm 10\%$ of the NRF below Cabot Station from 7:00 pm to midnight for the entire April/May spawning period, and at all times of the day during the remainder of the rearing period (June 1-15), with allowable deviations up to $\pm 20\%$ of the NRF allowed for up to 22 hours total from April 1 to May 15, for up to 18 hours total from May 16 to May 31, and for up to 7 hours total from June 1-15.

Though flow stabilization is not a requirement from midnight to 7:00 pm, the combination of increased bypass flows, ramping rates, and the need to provide flow stabilization between 7:00 pm and midnight during the spawning and rearing period for SNS would ultimately provide slower flow changes and greater stabilization overall than the baseline condition. Overall, the % change in flow magnitude observed over the course of any 24-hour period in the modeled timeseries was substantially reduced by the proposed operational regime relative to the baseline condition during the spawning and rearing period (April 15 – June 15) ([Figure 7.2.1.3-1](#)). Flow stabilization would be expected to become more pronounced in late June when flows are lower and fry may be drifting downstream ([Figure 7.2.1.3-2](#)). This change, in combination with required minimum flows, could benefit SNS by limiting the frequency of rapid and high-magnitude changes that could affect SNS spawning and rearing. Regardless, these changes would not be anticipated to negatively affect SNS. It should be noted that, in the operations model, flow stabilization downstream of Cabot Station was modeled as $\pm 10\%$ of the NRF, which is proposed to occur most of the time between April 1 and November 30. However, the limited number of hours within each period where $\pm 20\%$ of the NRF would be allowed was not modeled because the timing of those hours was not able to be predicted. Given the relatively small portion of time that flow stabilization is required in April and May (5 hours, 7pm to midnight each day), and because very few hours allow for a 20% deviation from the NRF on June 1-15 (7 hours total) and June 16-30 (7 hours total), omitting the allowable deviations of 20% from the modeling would not be expected to substantially change the overall results shown for the proposed operations.

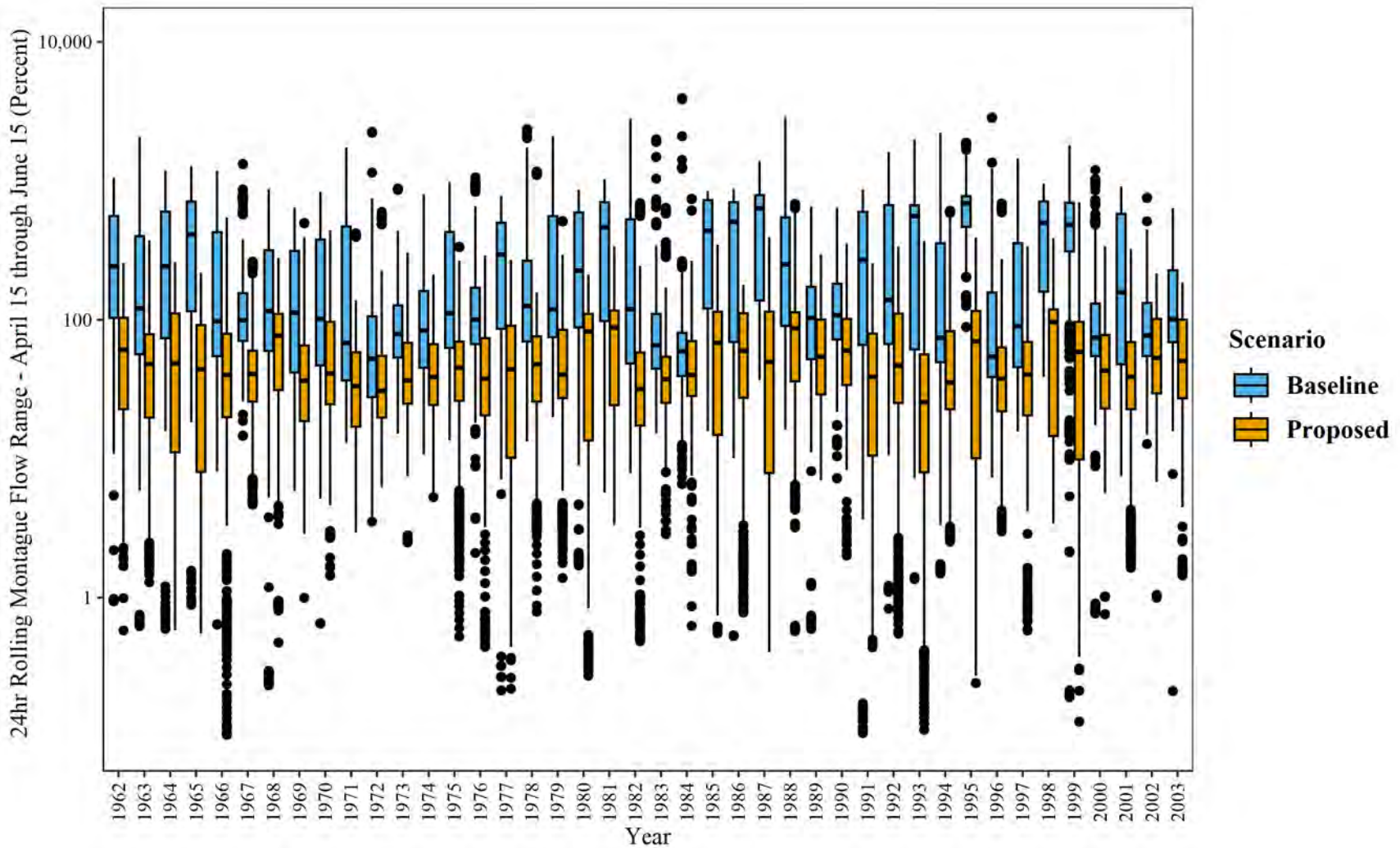


Figure 7.2.1.3-1: Percent Change in Flow over Rolling 24-hour Periods for Baseline and Proposed Conditions, April 15 – June 15

Note: The percent range was calculated by determining the minimum and maximum flows observed over rolling 24-hour periods, and dividing the range of flows by the minimum flow within each rolling 24-hour period. The boxplots can be interpreted as follows: Bold line = Median; Top and bottom of box are 75% and 25% percentile flows, respectively; Whiskers represent reasonable extreme flows that are uncommon; Points are outlier flows.

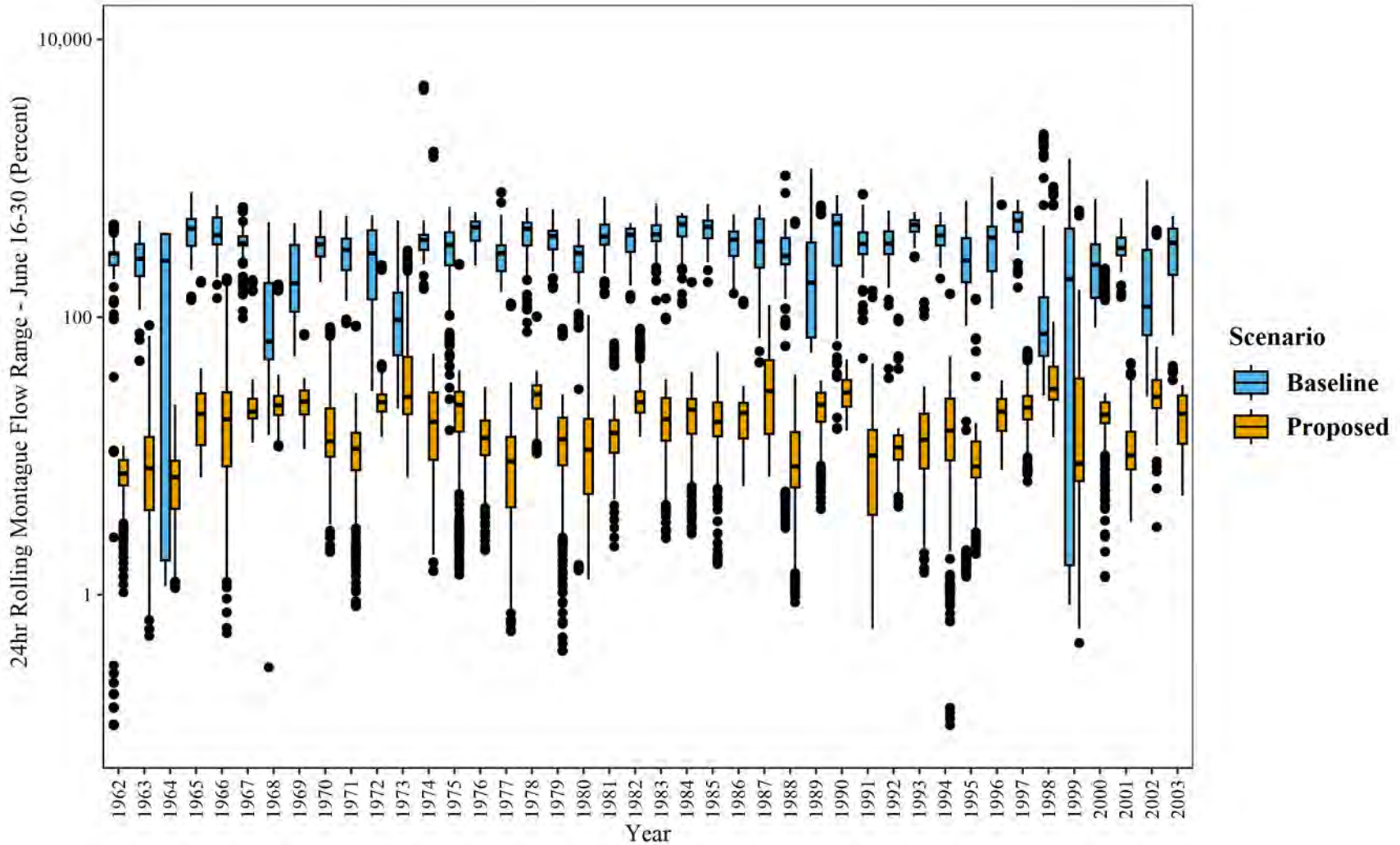


Figure 7.2.1.3-2: Percent Change in Flow over Rolling 24-hour Periods for Baseline and Proposed Conditions, June 16-30

Note: The percent range was calculated by determining the minimum and maximum flows observed over rolling 24-hour periods, and dividing the range of flows by the minimum flow within each rolling 24-hour period. The boxplots can be interpreted as follows: Bold line = Median; Top and bottom of box are 75% and 25% percentile flows, respectively; Whiskers represent reasonable extreme flows that are uncommon; Points are outlier flows.

7.2.2 Overall Flow Proposal

The analyses in the subsections below focus on SNS physical habitat as affected by flows. Given that studies have demonstrated that the Projects do not adversely affect temperature and DO parameters, and that temperature and DO downstream of Turners Falls Dam are consistent with State water quality standards, no effects on water quality are anticipated that could affect SNS (see [Section 6.3.5](#)).

7.2.2.1 Spawning and Rearing

The combined flow proposal during the SNS spawning and rearing period includes a combination of bypass flows, ramping restrictions, and flow stabilization below Cabot Station, all of which were developed with detailed consideration given to SNS. As discussed in [Section 7.2.1](#), these portions of the flow proposal were designed to benefit SNS spawning and rearing, and/or to mitigate specific effects pertaining to Cabot Station peaking. These actions combined are anticipated to provide conditions that are beneficial for SNS by providing large amounts of suitable spawning and rearing habitat in Reaches 1, 2, and 3 that were unused by SNS during the baseline condition. The proposed condition would provide SNS with the opportunity to expand their spawning to additional suitable areas, primarily in the Turners Falls bypass reach, should they choose to do so. Further, any eggs spawned in new areas would be more likely to survive to the fry stage due to the large amounts of suitable habitat provided through the rearing season by the proposed flows when compared to baseline flows.

To avoid potential effects of flow fluctuations, FirstLight is proposing no allowable deviations (flexible operations/events) from the ramping rate and flow stabilization requirements, and no whitewater releases in the bypass reach, during the spawning and rearing periods.

7.2.2.2 Foraging

The only known foraging of SNS in the action area occurs on occasions when adults enter the Turners Falls Project bypass reach during the summer; under baseline conditions these occurrences have been rare. The proposed minimum flows have been designed to provide consistently higher flows in the bypass reach than the baseline condition, under which the flow is reduced to 120 cfs after the fish passage season (or July 15) until river temperatures fall below 7°C in the fall. Further, during dry periods when the NRF is not high enough to pass the minimum flow thresholds, providing flows at or near the NRF would emulate flow conditions in this reach that are consistent with available inflows. The higher proposed bypass reach flows could encourage adult SNS to forage more frequently in the bypass reach and other areas near the Turners Falls Project during the summer and early fall period. The proposed summer bypass flows would increase the amount of adult SNS habitat available by providing more backwatering from Station No. 1 in Reach 1 ([Figure 7.2.2.2-1](#))³¹, and would increase habitat to a greater degree in Reaches 2 and 3 ([Figures 7.2.2.2-2](#) and [7.2.2.2-3](#)). In Reach 3, greater amounts of habitat would be available at a variety of Cabot Station flow rates in comparison to the baseline condition ([Figure 7.2.2.2-3](#)).

Most SNS, including both adults and juveniles, are known to forage within the relatively long reach of the Connecticut River between Fourth Island and Mitch's Island during the summer and fall, prior to migrating to overwintering areas within the reach in November. The areas closest to the Turners Falls Project were evaluated in a 9-mile reach, identified as Reach 4 during Relicensing Study 3.3.1. Reach 4 extends from Montague to the Route 116 Bridge in Sunderland. Of any reach between Turners Falls Dam and the Sunderland Bridge, Reach 4 contains the greatest amounts of SNS adult and juvenile foraging habitat, with more than 15,000,000 ft² of suitable foraging habitat available between the Project's baseline minimum flow and the maximum hydraulic capacity ([Figure 7.2.2.2-4](#)).

The current minimum flow at the Turners Falls Project is 1,433 cfs or inflow, whichever is less. The proposed minimum summer bypass flow is 1,800 cfs or 90% of the NRF, whichever is less. These flows

would be passed downstream in the Connecticut River to Reach 4. Additionally, the Deerfield River also provides flow to Reach 4. The proposed minimum flow would provide an estimated increase of 933,000 ft² and 956,000 ft² for adult and juveniles SNS in Reach 4, respectively ([Figure 7.2.2.2-4](#)). This represents an increase in the amount of suitable foraging habitat of 5.2 and 5.5% in Reach 4 for adult and juvenile SNS, respectively.

Proposed changes to summertime operations also include seasonal peaking restrictions to decrease water level fluctuations during the adult Puritan Tiger Beetle activity period at Rainbow Beach, located within the downstream portion of the SNS summer foraging area, along with TFI hourly water level change restrictions and downstream up-ramping restrictions to protect emerging odonates. These measures will change the timing of peaking and/or spill events and could limit the magnitude of peaking flows. Overall, the effects on SNS foraging would likely be positive but relatively limited given the large amounts of habitat available at the range of flows within the Turners Falls Project capacity. In general, the proposed operations would provide higher minimum flows and a slightly narrower flow range on an annual basis, though overall flow patterns in Reach 4 are heavily influenced by annual and inter-annual flow variability in the Connecticut River ([Figure 7.2.2.2-5](#)).

Variable flow release events are proposed to occur occasionally during the summer and fall as outlined in Draft License Article A150. Variable Releases from Turners Falls Dam and Variable Flow below Station No. 1. In cases of the releases from the Turners Falls Dam they are equivalent to 4,000 cfs (or the NRF, whichever is less) for 4 hours/day on 5 weekends (2 days) between July 1 and October 31 (total of 10 releases). In addition, there are up and down ramping requirements. In addition, there are 2,500 cfs (or the NRF, whichever is less) releases below Station No. 1 for 4 hours/day on 7 weekends (2 days) between July 1 and October 31 (total of 14 releases). These releases also include up and down ramping requirements.

These releases may affect the behavior of any adult SNS foraging in or near the bypass reach by changing water level and velocity conditions. The amount of habitat provided by the variable flow releases would be increased relative to what is provided by the proposed minimum flows, therefore no negative effects on habitat would be anticipated ([Figure 7.2.2.2-1](#) and [Figure 7.2.2.2-3](#)). Because generation at Cabot Station would likely need to be reduced to provide the variable flow releases, there would be limited to no effect on flows and habitats downstream of the Turners Falls Project when compared to the time leading up to the variable flow releases.

Though few SNS have been known to forage in the bypass reach, increased frequency of foraging in these areas could occur if the population of SNS increases or if the SNS increase foraging forays due to increased habitat suitability for foraging in these areas. Further, proposed enhancements to recreation access and proposed variable flow releases could result in a greater number of people recreating in these areas. Thus, the Proposed Actions could result in a greater frequency of encounters between SNS and recreational boaters. The activities of recreational boaters could affect the behavior of foraging adult SNS by altering or inhibiting their foraging behavior but would not be expected to injure SNS.

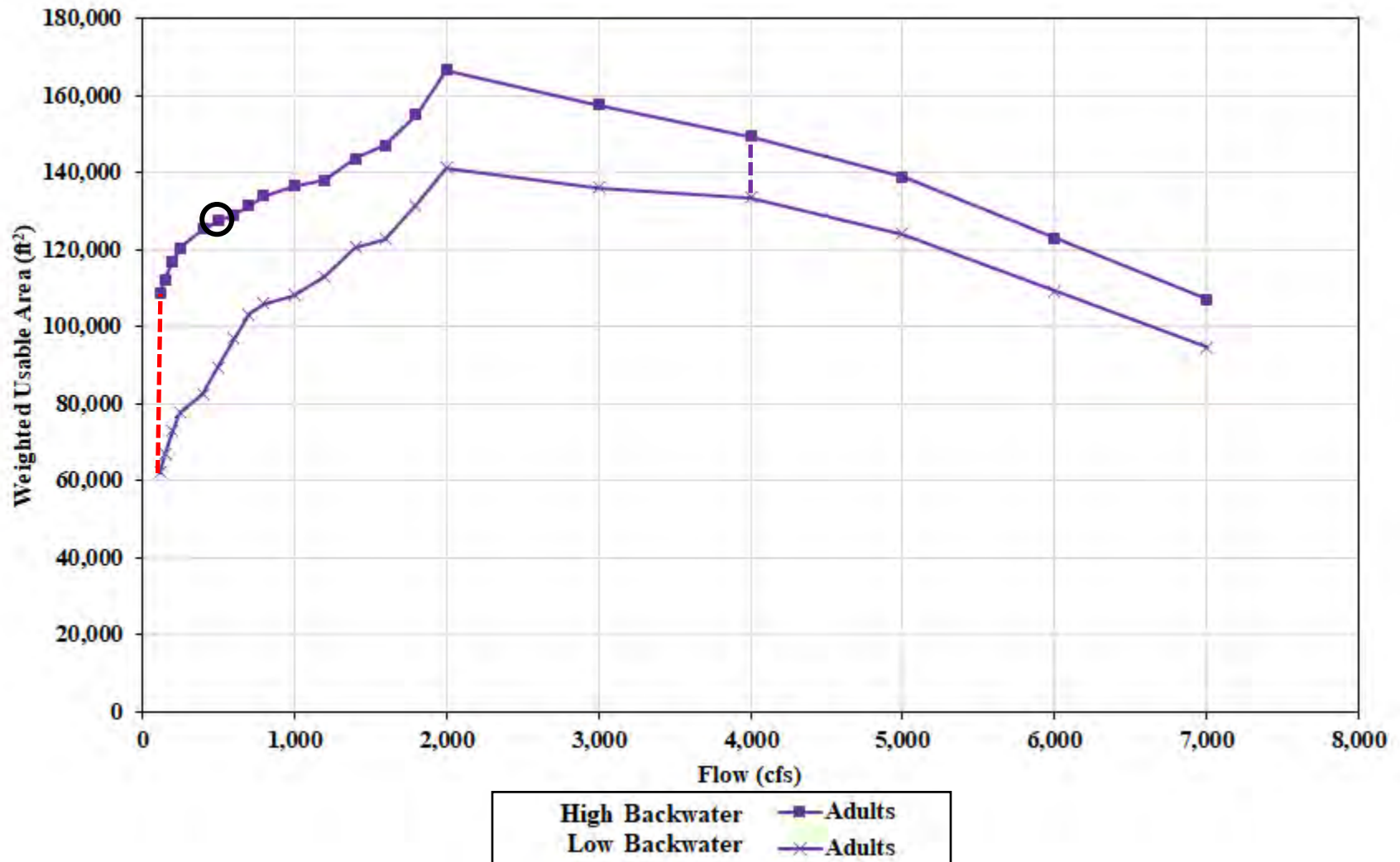


Figure 7.2.2.2-1: Habitat vs. Flow Relationship for SNS Adult in Reach 1

Note: The circle with the black outline indicates the proposed minimum flows from July 1 through November 15 (500 cfs, plus backwatering from Station No. 1), whereas the red vertical dashed line indicates the range of baseline summer minimum flows (120 cfs at a range of backwatering from Station No. 1). The purple dashed line indicates potential flows provided by whitewater releases (4,000 cfs from Turners Falls Dam, with varying backwater from Station No. 1). Actual flows could be lower if inflows are not sufficient.

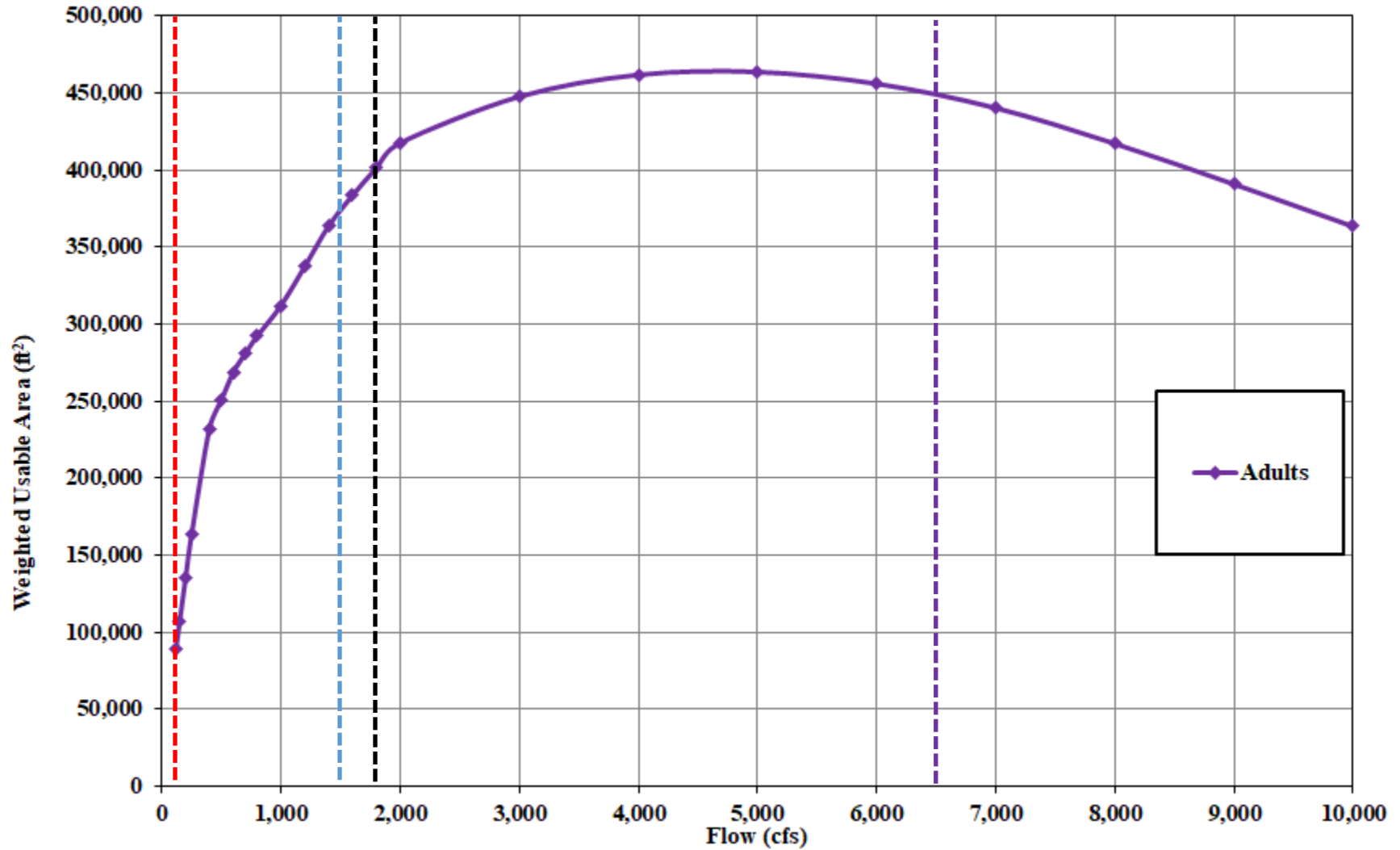


Figure 7.2.2.2-2: Habitat vs. Flow Relationship for SNS Adult in Reach 2

Note: The vertical black dashed line indicates the proposed summer minimum flow from July 1 through August 31 (1,800 cfs when the NRF is > 1,800 cfs) and the light blue vertical dashed line indicates the proposed summer minimum flow starting September 1 (1,500 cfs when the NRF is > 1,500 cfs), whereas the red vertical dashed line indicates the baseline summer minimum flow (120 cfs). The purple dashed lines indicates the maximum potential whitewater flows (6,500 cfs). Actual flows could be lower if inflows are not sufficient.

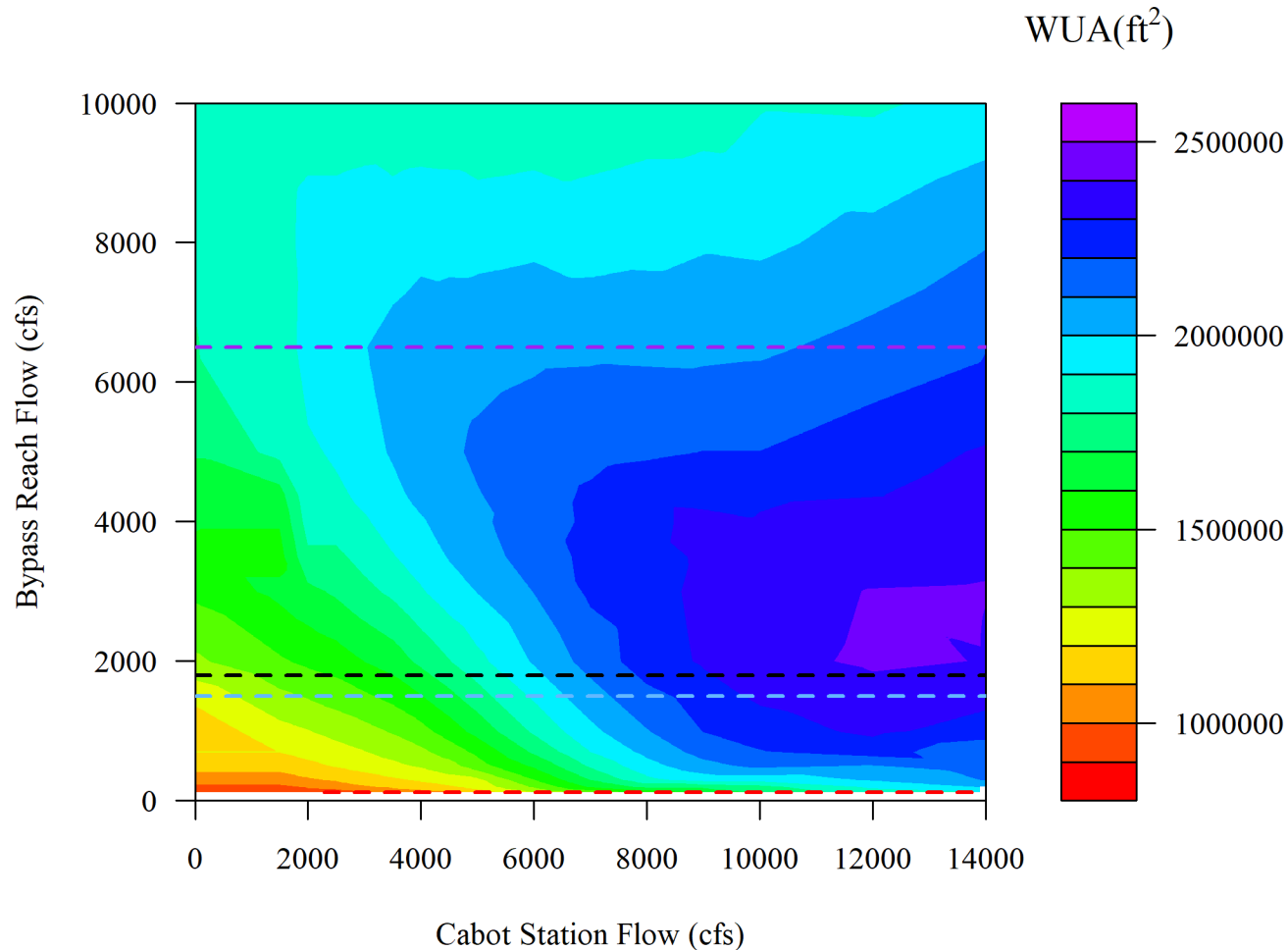


Figure 7.2.2.2-3: Habitat vs. Flow Relationship for SNS Adult in Reach 3

Note: Modeled Deerfield River Flow = 200 cfs. The horizontal black dashed line indicates the proposed bypass reach and downstream summer minimum flow from July 1 through August 31 (1,800 cfs) and the horizontal light blue dashed line indicates the proposed bypass reach and downstream summer minimum flow starting on September 1 (1,500 cfs), whereas the red horizontal dashed line indicates the baseline bypass reach summer minimum flow (120 cfs). The purple dashed line indicates potential whitewater flows from the bypass reach (6,500 cfs) when combined with various Cabot Station flows.

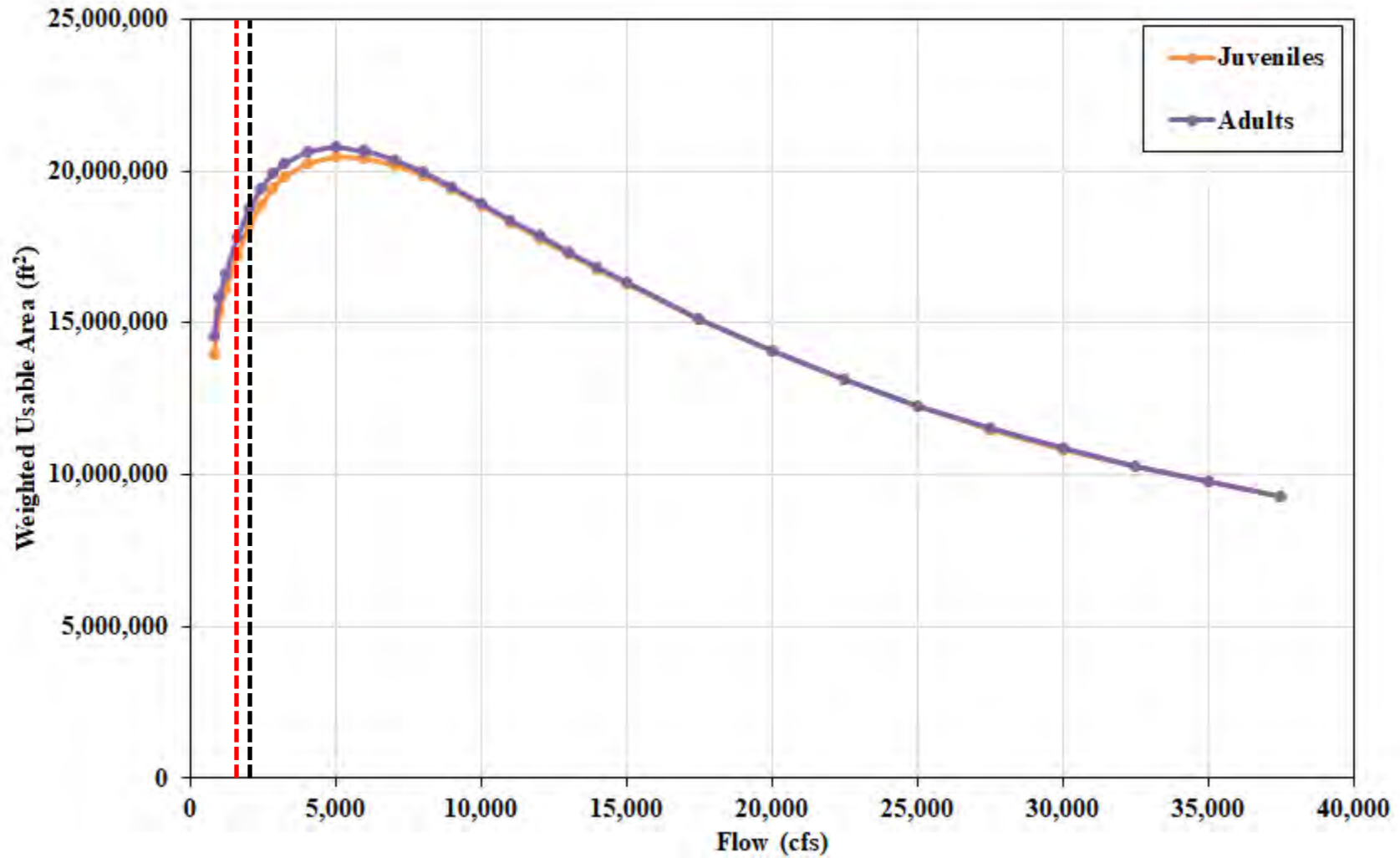


Figure 7.2.2.2-4: Habitat vs. Flow Relationship for SNS Adults and Juveniles in Reach 4

Note: The vertical black dashed line indicates conditions for the proposed downstream reach summer minimum flow from July 1 through August 31 (approximates 1,800 cfs plus 200 cfs from the Deerfield River), whereas the red vertical dashed line indicates the baseline downstream reach summer minimum flow (approximates 1,433 cfs plus 200 cfs from Deerfield River). The 1,500 cfs summer minimum flow starting on September 1 is not shown, but would be similar to the baseline minimum flow.

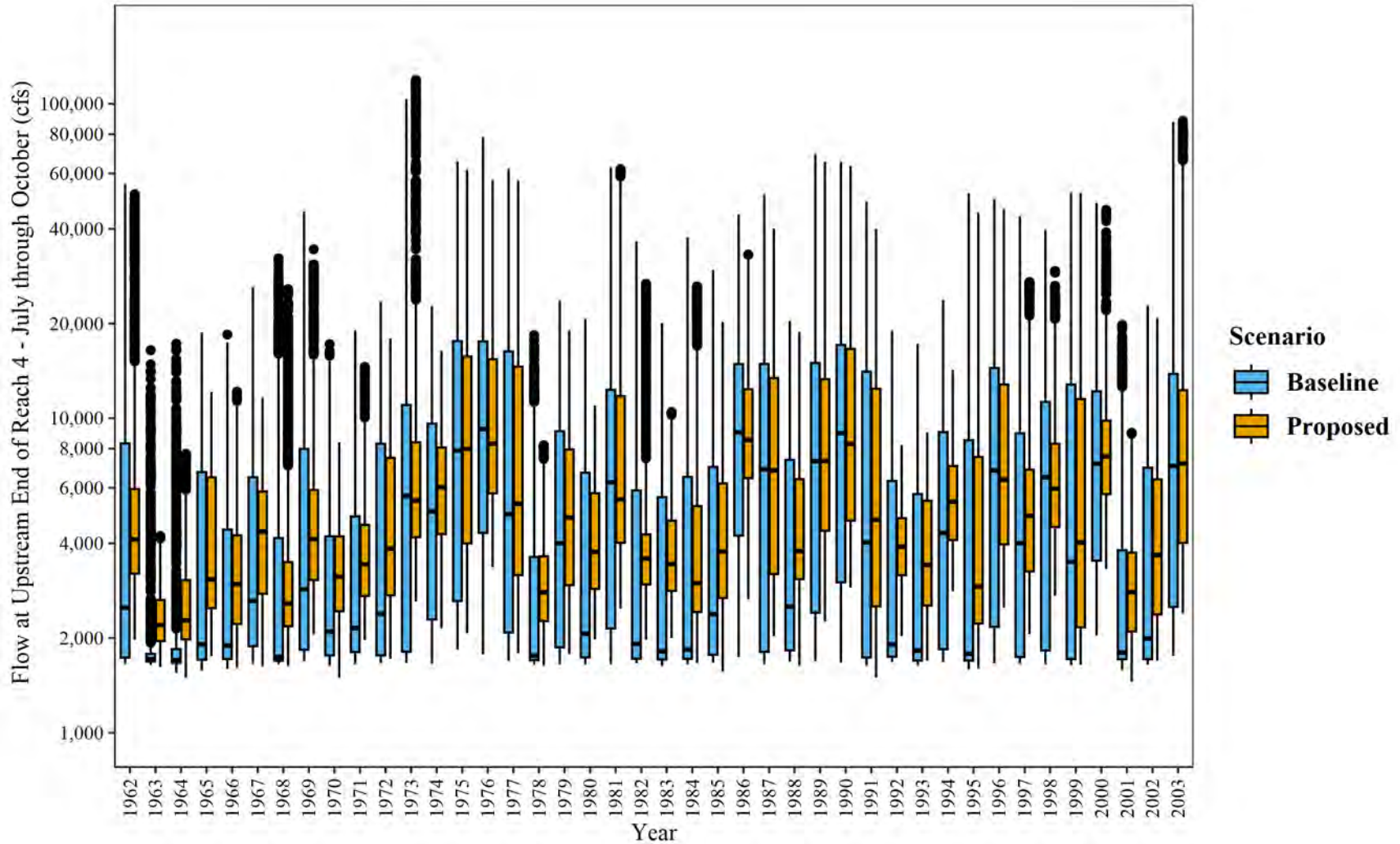


Figure 7.2.2-5: Distribution of Flows Modeled Entering Reach 4 for Baseline and Proposed Conditions during the SNS Foraging Period

Note: The modeled flows assumed a low operating level at Holyoke Dam. The boxplots can be interpreted as follows: Bold line = Median; Top and bottom of box are 75% and 25% percentile flows, respectively; Whiskers represent reasonable extreme flows that are uncommon; Points are outlier flows.

7.2.2.3 Overwintering

SNS residing below the Turners Falls Project and above Holyoke Dam overwinter at the bottom of deep, slow pools that are located several miles downstream of the Turners Falls Project. Whitmore Pool is the closest known overwintering area, at approximately 6.9 miles below Cabot Station (within Reach 4), and would be the overwintering area most likely to be affected by changes in flow from the Projects.

FirstLight has proposed a winter downstream minimum flow of 3,800 cfs, or naturally routed flow, whichever is less. Additionally, minimum bypass flows will be required. The baseline downstream minimum flow is 1,433 cfs or inflow, with no bypass reach minimum flow requirement. The proposed operations would result in greater bypass flow during the winter months, along with a narrower peaking range due to the increased flow provided to the bypass reach that would not be available for Cabot Station, along with the higher minimum flow below Cabot Station.

The proposed flows are anticipated to provide higher base flows but a similar range of common flows relative to the baseline conditions at Whitmore Pool during the winter months ([Figure 7.2.2.3-1](#)). Further, the depths and velocities of these deep pool areas would be relatively resistant to change due to changes in flow from upstream; Kynard *et al.*, ([2012](#)) observed changes in behavior at flows considerably higher than the Turners Falls Project capacity.

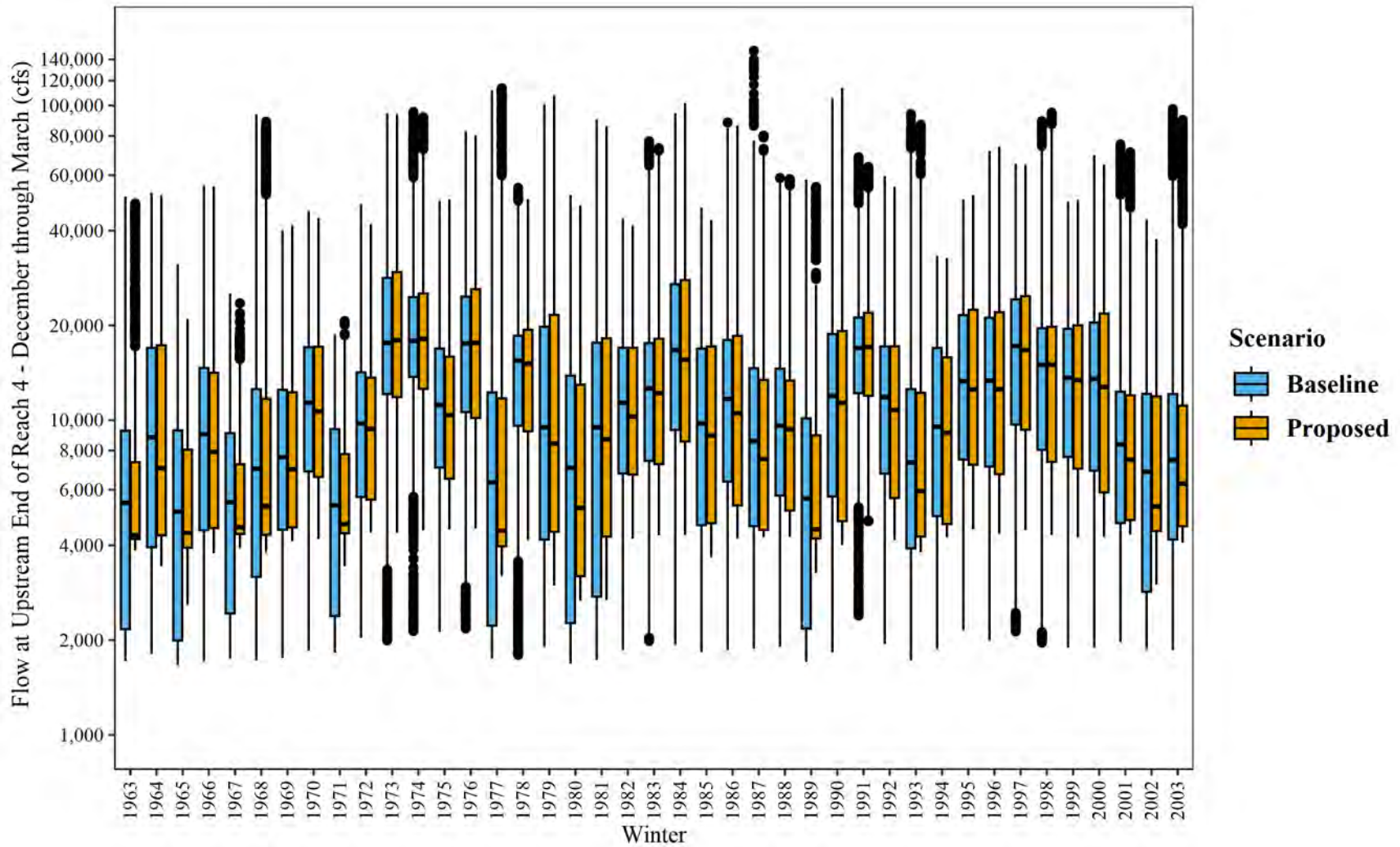


Figure 7.2.2.3-1: Distribution of Flows Modeled Entering Reach 4 for Baseline and Proposed Conditions during the SNS Overwintering Period

Note: The modeled flows also assumed a low operating level at Holyoke Dam. Note: The boxplots can be interpreted as follows: Bold line = Median; Top and bottom of box are 75% and 25% percentile flows, respectively; Whiskers represent reasonable extreme flows that are uncommon; Points are outlier flows.

7.2.2.4 Year-Round

Along with many other operational conditions, the proposed timeseries included expanded Northfield Mountain Project operations, whereas the baseline timeseries did not. Other than the specific proposed flow changes (e.g., increased minimum flows, restrictions on flow fluctuations) that affected flow in the timeseries data and associated plots, the distribution of flows below Turners Falls Dam within a given seasonal period are similar between the proposed and baseline conditions. No effects on flow frequencies or magnitude from Northfield Mountain expanded operations are evident within the modeled flow datasets, and therefore, this proposed operational change would not have any effects on SNS.

7.2.3 *Other Operations*

7.2.3.1 Increased Flows through Log Sluice

Implementation of upgraded downstream passage systems at Cabot Station will require approximately 685 cfs passing through the log sluice, which is higher than the existing ~220 cfs typically passed during the downstream passage season. Given the higher minimum bypass and downstream flows proposed for the SNS spawning and rearing periods, along with ramping rate and flow stabilization restrictions, it is anticipated that the amount of flow being passed by the downstream passage facility at Cabot Station will be a relatively small proportion of the flow passing through the Project at any given time. Therefore, no effects on SNS are anticipated by this modification.

7.2.3.2 Cabot Station Emergency Gate Use

Operation of the emergency gate will be limited to a flow of no more than 500 cfs during the spawning and rearing period, except for measures needed to ensure dam safety (e.g., to prevent canal overtopping or partial breach) or in coordination with NMFS. The proposed limitation to operations would prevent negative effects to SNS that could result from non-emergency high-discharge releases that convey debris and could scour habitats downstream of the structure and mobilize sediments. Therefore, effects on SNS from Cabot Station emergency gate use would be discountable.

7.2.3.3 Allowable Deviations from Cabot Station Ramping Rates and Flow Stabilization

There are no allowable deviations from Cabot Station ramping rates and requirements for flow stabilization during the spawning and rearing periods. The allowable deviations range from 20-28 hours per month, with no more than 7 flexible events per month, between July and November. These flexible operations would therefore be allowed during the foraging period for SNS, when most individuals would be well downstream of the Project. In downstream areas, such as in Reach 4, flows begin to attenuate with distance downstream. Further, there are large amounts of available foraging habitat in Reach 4 during all flows within the range of Project operations, even though the overall amount of habitat decreases with increasing flow rates above 5,000 cfs. Potential temporary reductions in overall habitat amounts during few hours and infrequent periods each month would have insignificant effects on SNS.

7.2.3.4 Flood Flows

The effects of the Northfield Mountain Project on overall flows downstream has been, and would continue to be limited by the current agreement (pursuant to Article 43 of the current Northfield Mountain Project license) with the USCOE for providing coordinated operation of the Turners Falls Project and Northfield Mountain Project during flood conditions on the Connecticut River in accordance with rules and regulations prescribed by the USCOE. In general, the agreement allows FirstLight to operate the Northfield Mountain Project within its FERC license requirements without causing river flows downstream of Turners Falls Dam to significantly exceed those that would have occurred absent the Northfield Mountain Project. It is expected that this agreement would be maintained as part of FirstLight's proposed operations in the new license. The continuation of the agreement with the USCOE would prevent unnatural flow patterns during flood conditions caused by the Northfield Mountain Project if no agreement was in place. Effects of Northfield Mountain Project flows on downstream SNS habitats during flood events would be discountable.

7.2.4 *Temporary Modifications to Operations*

Specific circumstances could result in temporary modifications to proposed operations at the Turners Falls Project. The exact nature of these types of circumstances is unknown at this time but could occur in the case of equipment malfunction or operating emergencies reasonably beyond the control of the Licensee, or upon mutual agreement with the Licensee for the Northfield Mountain Pumped Storage Project (FERC No. 2485), MDEP, MDFW, NMFS and USFWS. These include temporary modifications to:

- Rates of rise of the Turners Falls Impoundment
- Minimum flows below Turners Falls Dam, Station No. 1, or Cabot Station
- Variable flows from the Turners Falls Dam or below Station No. 1
- Ramping rates below Cabot Station
- Flow stabilization below Cabot Station

An example of an emergency that would result in temporary modifications to operations is a search and rescue operation associated with a potential drowning within the Turners Falls Impoundment, bypass reach, or downstream areas. Because such emergencies would be infrequent and short duration occurrences, it is anticipated that effects to SNS would be insignificant.

Examples of scenarios where mutual agreements are developed that result in temporary modifications include scientific studies by a Federal or State agency that necessitate changes to operational flows or water levels. Potential effects to SNS would be included in discussions, as appropriate, given that the agreement would need to include the NMFS. It is therefore anticipated that these types of modifications would only occur if effects on SNS were avoided or were discountable.

7.3 Summary of Effects

Kynard *et al.*, (2012) suggests that the abundance of SNS between Holyoke and Turners Falls Dams was stable, likely due to density dependent mechanisms related to the size of the area, food abundance, or both. More recently (2017-2023), 306 SNS have been passed alive upstream of Holyoke Dam, which would represent a substantial addition to the SNS population present in the action area. Based on FirstLight's habitat assessment, and information presented by Kynard *et al.*, (2012), spawning and rearing habitats are relatively limited in the action area in comparison to the more abundant juvenile and adult foraging habitats. Therefore, one limiting factor for this SNS population could be the amount of suitable spawning and rearing habitat.

The Proposed Actions are consistent with measures identified by NMFS as being beneficial to SNS and would substantially and consistently increase the amount of spawning and rearing habitat available for SNS. More spawning and rearing habitat that is consistently available at a variety of river flows and operational conditions would result in greater spawning success for mature adult SNS, and better survival for early life stage individuals. If SNS choose to spawn in more or larger areas near the Turners Falls Project as a result of the Proposed Actions, then their eggs would be distributed over a wider area. Because the abundance of fry is negatively correlated with the density of spawned eggs (Kynard *et al.*, 2016), reducing the overall density of spawned eggs by providing more habitat could facilitate population growth by increasing the survival of early life stage individuals. This population growth could also be aided by some increases to the amount of foraging habitats. Individual SNS that take advantage of improved foraging habitats could exhibit higher growth rates, survival, and fecundity, resulting in further increases to the population. Though no stranding has ever been observed at the Project, the minimum proposed flows in the bypass reach would prevent stranding of SNS by providing considerably more depth and wetted area than current minimum flow conditions. As shown in the habitat analyses, this provides many areas of interconnected habitats that allow for movements into and out of the areas of the bypass reach that have been rarely used by SNS under the baseline condition.

Most other measures in the Proposed Actions would have discountable or no effects on SNS due to similar conditions relative to the baseline condition or specific mitigation actions (i.e., SNS Handling Plan, permitting for recreation enhancements).

8 CONCLUSION

Based on the best available information on the status of endangered and threatened species under NMFS jurisdiction, the environmental baseline for the action area, the effects of the Proposed Actions, and the cumulative effects, it is the conclusion reached in this Draft BA that the Projects are likely to adversely affect SNS because proposed construction is in close proximity to SNS habitat, and because proposed flows from the Projects affect habitat suitability for various life stages of SNS. However, the adverse effects of the Projects will be minimized, and conditions enhanced and improved for the Connecticut River population of SNS because the Proposed Actions include the following PM&E measures:

- 1) Proposed flow conditions offer considerable increases in the amount of suitable spawning and rearing habitat for SNS to use near the Turners Falls Project, which would be beneficial to the SNS population.
- 2) Proposed flow conditions offer increases in the amount of foraging habitat in the Turners Falls Project bypass reach and habitats downstream of the Project.
- 3) Effects of the proposed flow conditions on wintering habitat are not anticipated to change relative to the baseline condition and are considered discountable.
- 4) Appropriate permits will be obtained for any proposed construction activities that would occur in or along the river below the Turners Falls Dam, and measures will be taken during construction to minimize any potential effects on SNS, such that few, if any individual SNS would be exposed to the impacts of construction. Therefore, potential effects of proposed construction on SNS would be considered discountable.
- 5) A SNS Handling Plan, developed by FirstLight for approval by NMFS, addresses potential impacts of capturing SNS in a proposed fish lift.
- 6) Because no critical habitat is designated in the action area, none will be affected by the Proposed Actions.

As such, the Proposed Actions are not likely to jeopardize the continued existence of SNS.

9 LITERATURE CITED

- Altenritter, M.E., Zydlewski, G.B., Kinnison, M.T., Zydlewski, J.D., and G.S. Wippelhauser. 2018. Understanding the basis of Shortnose Sturgeon (*Acipenser brevirostrum*) partial migration in the Gulf of Maine. *Canadian Journal of Fisheries and Aquatic Sciences* 75(3): 464-473.
- Aquatec. 1993. Ecological studies of the Connecticut River, Vernon, Vermont. Report 22, January-December 1992. Report prepared for Vermont Yankee Nuclear Power Corp., Brattleboro, VT.
- Aquatec. 1995. Ecological studies of the Connecticut River, Vernon, Vermont. Report 24, January-December 1994. Report prepared for Vermont Yankee Nuclear Power Corp., Brattleboro, VT.
- Brown, J.J., Perillo, J., Kwak, T.J., and R.J. Horwitz. 2005. Implications of *Pylodictis olivaris* (Flathead Catfish) introduction into the Delaware and Susquehanna drainages. *Northeastern Naturalist* 12(4): 473-484.
- Buckley, J. and B. Kynard. 1981. Spawning and rearing of Shortnose Sturgeon from the Connecticut River. *Prog. Fish-Culture* 43(2):74-76.
- Carlson, D.M. and K.W. Simpson. 1987. Cut contents of juvenile Shortnose Sturgeon in the upper Hudson estuary. *Copeia* 1987: 796-802.
- Caroffino, D.C., Sutton, T.M., Elliott, R.F., and M.C. Donofrio. 2010. Predation on early life stages of Lake Sturgeon in the Peshtigo River, Wisconsin. *Transactions of the American Fisheries Society* 139: 1846-1856.
- Crouse, D.T. 1999. The consequences of delayed maturity in a human-dominated world. *American Fisheries Society Symposium* 23 :19 5 -202.
- Crouse, D.T., L.B. Crowder, and H. Caswell. 1987. A stage-based population model for loggerhead sea turtles and implications for conservation. *Ecol.* 68:1412-1423.
- Crowder, L.S., D.T. Crouse, S.S. Heppell, and T.H. Martin. 1994. Predicting the impact of turtle excluder devices on loggerhead sea turtle populations. *Ecol. Applic.* 4:437-445.
- Connecticut Department of Energy and Environmental Protection (CTDEEP). 2017. Connecticut River American Shad Sustainable Fishing Plan Update. CTDEEP – Fisheries Division. Submitted to the Atlantic States Marine Fisheries Commission, August 2017.
- Connecticut River Atlantic Salmon Commission (CRASC). 2021. Connecticut River Basin Anadromous Fish Restoration: Coordination and Technical Assistance. Annual Progress Report, October 1, 2020 – September 30, 2021. F-100-R-38.
- Dadswell, M.J. 1979. Biology and population characteristics of the Shortnose Sturgeon, *Acipenser brevirostrum* Lesueur 1818 (Osteichthyes: Acipenseridae), in the Saint John River estuary, New Brunswick, Canada. *Can. J. Zool.* 57:2186-2210.
- Dadswell, M.J., B.D. Taubert, T.S. Squires, D. Marchette and J. Buckley. 1984. Synopsis of biological data on Shortnose Sturgeon, *Acipenser brevirostrum* LeSueur 1818. *FAO Fish. Synop.* 140:1-45.
- Flournoy, P.H., S.G. Rogers, and P.S. Crawford. 1992. Restoration of Shortnose Sturgeon in the Altamaha River, Georgia. Final Report to the U.S. Fish and Wildlife Service, Atlanta, Georgia.
- Flowers, H.J., Bonvechio, T.F., and D.L. Peterson. 2011. Observations of Atlantic Sturgeon predation by a Flathead Catfish. *Transactions of the American Fisheries Society* 140(2), 250-252.
- Gadomski, D.M. and M.J. Parsley. 2005. Laboratory studies on the vulnerability of young White Sturgeon to predation. *North American Journal of Fisheries Management* 25(2): 667-674.

- Greene, C.H., A.J. Pershing, T.M. Cronin and N.Ceci (2008). Arctic Climate Change and Its Impacts on the Ecology of the North Atlantic. *Ecology*, 89(11) Supplement, 2008, pp. S24–S38.
- Grunwald, C., J. Stabile, J.R. Waldman, R. Gross, and I.I. Virgin. 2002. Population genetics of Shortnose Sturgeon, *Acipenser brevirostrum*, based on sequencing of the mitochondrial DNA control region. *Molecular Ecology II :1885-1898* Hall, V./J., T.I.J. Smith, and S.D. 31
- Higgs, D. M, D. T. T. Plachta, A. K. Rollo, M. Singheiser, M. C. Hasting and A. N. Popper. 2004. Development of ultrasound detection in American Shad (*Alosa sapidissima*). *The Journal of Experimental Biology* 207, 155-163.
- Holyoke Gas and Electric (HG&E). 2023. 2023 Post Construction Shortnose Sturgeon Monitoring (FERC Project No. 2004) – Study Plan. March 2023. FERC eLibrary Accession Number 20230303-5199.
- IPCC, 2007: Summary for Policymakers. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- Kieffer, M.C. and B. Kynard. 2007. Effects of water manipulation by the Turners Falls Dam Hydroelectric Complex on Rearing Conditions for Connecticut River Shortnose Sturgeon Early Life Stages. S.O. Conte Anadromous Fish Research Center, Turners Falls, MA.
- Kieffer, M.C. and B. Kynard. 1993. Annual movements of shortnose and Atlantic sturgeons in the Merrimack River, Massachusetts. *Trans. Amer. Fish. Soc.* 122:1088-1103.
- Kleinschmidt. 2006. Entrainment Report prepared for Connecticut Resources Recovery Authority Mid-Connecticut Resource Recovery Facility, Hartford, CT, Permit No. CT0003875. November 2006. 26 pp and appendices.
- Kleinschmidt. 2007. Annual Progress Report prepared for Consolidated Edison Energy of Massachusetts, Inc. West Springfield Station, NPDES Permit No. MA0004707. February 2007. 23 pp and appendices.
- Kocan, R.M., M.B. Matta, and S. Salazar. 1993. A laboratory evaluation of Connecticut River coal tar toxicity to Shortnose Sturgeon (*Acipenser brevirostrum*) embryos and larvae. Final Report to the National Oceanic and Atmospheric Administration, Seattle, Washington.
- Kynard, B. 1997. Life history, latitudinal patterns, and status of the Shortnose Sturgeon, *Acipenser brevirostrum*. *Enviro. Biol. Fish.* 48:319-334.
- Kynard, B. 2008. Passage of sturgeons and other large fishes in fish lifts: Basic considerations. In *Passage for Fish. World Sturgeon Conservation Publication #2.*
- Kynard, B., P. Bronzi, H. Rosenthal. 2012. Life History and Behavior of Connecticut River Shortnose and other Sturgeons. *World Sturgeon Conservation Society: Special Publication 4(2012).*
- Kynard, B., Bolden, S., Kieffer, M., Collins, M., Brundage, H., Hilton, E.J., Litvak, M., Kinnison, M.T., King, T., and D. Peterson. 2016. Life history and status of Shortnose Sturgeon (*Acipenser brevirostrum* LeSueur 1818). *J. Appl. Ichthyol.* 32 (Suppl. 1) (2016), 208-248.
- Kynard, B. and M. Horgan. 2002. Ontogenetic behavior and migration of Atlantic Sturgeon, *Acipenser oxyrinchus oxyrinchus*, and Shortnose Sturgeon, *A. brevirostrum*, with notes on social behavior. *Environmental Biology of Fishes* 63: 137-150.
- Lecky, J.H. 2010. Environmental assessment on the effects of the issuance of a scientific research permit file no. 14176 to conduct research on Shortnose Sturgeon in the Potomac River, Maryland and Virginia.

- Miller, A.I. and L.G. Beckman. 1996. First record of predation on White Sturgeon eggs by sympatric fishes. *Transactions of the American Fisheries Society* 125:338-340.
- National Assessment Synthesis Team (NAST). 2000. Climate change impacts on the United States: the potential consequences of climate variability and change. US Global Change Research Program, Washington, DC. Available at <http://www.usgcrp.gov/usgcrp/Library/nationalassessment/overview.htm>
- National Marine Fisheries Service (NMFS). 2017. Endangered Species Act Section 7 Consultation Biological Opinion. Continued operation of the Holyoke Hydroelectric Project (FERC No. 2004) per the terms of an amended license (reinitiation to incorporate Shortnose Sturgeon downstream monitoring plan). PCTS: NER-2017-14221. July 4, 2017.
- National Marine Fisheries Service (NMFS). 1998. Recovery Plan for the Shortnose Sturgeon (*Acipenser brevirostrum*). Prepared by the Shortnose Sturgeon Recovery Team for the NMFS, Silver Spring, Maryland. 104 pages.
- Nico, L., E. Maynard, P.J. Schofield, M. Cannister, J. Larson, A. Fusaro, and M. Neilson, 2020, *Cyprinus carpio* Linnaeus, 1758: U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, <https://nas.er.usgs.gov/queries/factsheet.aspx?speciesID=4>, Revision Date: 9/12/2019, Peer Review Date: 4/1/2016, Access Date: 2/5/2020
- Normandeau Associates, Inc. 1997-2016. Ecological studies of the Connecticut River Vernon, Vermont. Reports 26-45]. Prepared for Entergy Nuclear Vermont Yankee, LLC, Brattleboro, VT.
- Normandeau Associates, Inc. 2016A. TransCanada Hydro Northeast, Inc. ILP Study 11, American Eel Survey. Final Study Report in support of Federal Energy Regulatory Commission relicensing of: Wilder Hydroelectric Project (FERC Project No. 1892-026), Bellows Falls Hydroelectric Project (FERC Project No. 1855-045), and Vernon Hydroelectric Project (FERC Project No. 1904-073). Prepared for TransCanada Hydro Northeast Inc.
- Normandeau Associates, Inc. 2016B. TransCanada ILP Study 10, Fish Assemblage Study. Final Study Report in support of Federal Energy Regulatory Commission relicensing of: Wilder Hydroelectric Project (FERC Project No. 1892-026), Bellows Falls Hydroelectric Project (FERC Project No. 1855-045), and Vernon Hydroelectric Project (FERC Project No. 1904-073). Prepared for TransCanada Hydro Northeast Inc.
- Popper, A.N. 2005. A Review of Hearing by Sturgeon and Lamprey. Submitted to the U.S. Army Corps of Engineers, Portland District. August 12, 2005.
- Savoy, T. 1991. Sturgeon status in Connecticut waters. Final Report to the NMFS, Gloucester, Massachusetts.
- Savoy, T. 2004. Population estimate, and utilization of the lower Connecticut River by Shortnose Sturgeon. Pgs345-352 in P.M. Jacobson, D.A. Dixon, W.C. Leggett, B. C. Marcy, Jr. and R.R. Massengill, editors. *The Connecticut River Ecological Study (1965-1973) revisited: ecology of the lower Connecticut River 1973-2003*. American Fisheries Society, Monograph 9, Bethesda, Maryland.
- Seibel, D. 1991. Habitat selection, movements, and response to illumination of Shortnose Sturgeons in the Connecticut River. Unpublished Master of Science thesis prepared for the University of Massachusetts, Amherst, Massachusetts. 57 pages.
- SSSRT (Shortnose Sturgeon Status Review Team). 2010. A Biological Assessment of Shortnose Sturgeon (*Acipenser brevirostrum*). Report to National Marine Fisheries Service, Northeast Regional Office. November 1, 2010. 417 pp

- Squiers, T., L. Flagg, and M. Smith. 1982. American shad enhancement and status of sturgeon stocks in selected Maine waters. Completion report, Project AFC-20
- Taubert, B.D. 1980. Biology of Shortnose Sturgeon (*Acipenser brevirostrum*) in the Holyoke Pool, Connecticut River, Massachusetts. Unpublished dissertation report prepared for the University of Massachusetts, Amherst, Massachusetts.
- U.S. Fish and Wildlife Service (USFWS). 2019. Flathead Catfish (*Pylodictis olivaris*): Ecological Risk Screening Summary. USFWS, September 2014, revised May 2019, Web Version 7/1/2019.
- Vladykov, V.D. and J.R. Greeley. 1963. Order Acipenseroidei. Pages 24-60: Fishes of the western North Atlantic. Part III Memoirs of the Sears Foundation for Marine Research 1.
- Waldman, J.R., C. Grunwald, J. Stabile, and I. Wirgin. 2002. Impacts of life history and biogeography on the genetic stock structure of Atlantic sturgeon *Acipenser oxyrinchus*, Gulf sturgeon *A. oxyrinchus desotoi*, and Shortnose Sturgeon *A. brevirostrum*. J. Appl. Ichthyol. 18:509-518,
- Walsh, M.J., M. Bain, T. Squires, J. Waldman, and I. Wirgin. 2001. Morphological and Genetic Variation among Shortnose Sturgeon *Acipenser brevirostrum* from Adjacent and Distant Rivers. Estuaries 24: 41-48.
- Wippelhauser, G.S., Zydlewski, G.B., Kieffer, M., Sulikowski, J., and M.T. Kinnison. 2015. Shortnose Sturgeon in the Gulf of Maine: Use of spawning habitat in the Kennebec system and response to dam removal. Transactions of the American Fisheries Society 144: 742-752.
- Wippelhauser, G.S. and T.S. Squiers, Jr. 2015. Shortnose Sturgeon and Atlantic Sturgeon on the Kennebec River System, Maine: a 1977 – 2001 retrospective of abundance and important habitat. Transactions of the American Fisheries Society 144(3).
- Wirgin, I., C. Grunwald, E. Carlson, J. Stabile, and J. Waldman. 2005 Range-wide population structure of Shortnose Sturgeon (*Acipenser brevirostrum*) using mitochondrial DNA control region sequence analysis. Fisheries Bulletin.34.

**APPENDIX A: FLOWS AND FISH PASSAGE
SETTLEMENT AGREEMENT, MARCH 2023**

FLOWS AND FISH PASSAGE SETTLEMENT
AGREEMENT

**FOR THE RELICENSING OF THE TURNERS FALLS
HYDROELECTRIC PROJECT, FERC PROJECT NO. 1889, AND
NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT,
FERC PROJECT NO. 2485**

MARCH 2023



**FLOWS AND FISH PASSAGE SETTLEMENT AGREEMENT FOR THE
RELICENSING OF THE TURNERS FALLS HYDROELECTRIC PROJECT, FERC
PROJECT NO. 1889, AND NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT,
FERC PROJECT NO. 2485**

TABLE OF CONTENTS

APPENDICES.....	v
RECITALS.....	1
TERMS OF AGREEMENT.....	3
1 General Provisions.....	3
1.1 Effective Date of Settlement Agreement.....	3
1.1.1 FirstLight’s Affirmative Acceptance of License	3
1.1.2 Effective Date of Parties’ Obligations	3
1.2 Term of Settlement Agreement	3
1.3 Definitions.....	3
1.4 Acronyms	6
2 Purpose of Settlement Agreement.....	6
2.1 Purpose.....	6
2.2 No Precedent for Other Proceedings	7
3 Compliance with Legal Responsibilities and Reservations of Rights.....	7
3.1 Regulatory Parties.....	7
3.2 No Effect on Parties’ Other Legal Duties.....	8
3.3 Future Relicensings.....	8
4 Settlement Agreement Commitments and Implementation.....	8
4.1 Parties Bound by Settlement Agreement.....	8
4.2 Fishway Prescriptions and Section 10(a) and 10(j) Recommendations.....	8
4.2.1 Protection, Mitigation and Enhancement Measures to Be Included in Section 18 Fishway Prescriptions and Section 10(a) and 10(j) Recommendations	8

4.2.2	Fishway Prescriptions Inconsistent with Settlement Agreement	9
4.3	ESA Consultation.....	10
4.3.1	Biological Opinions.....	10
4.3.2	Biological Opinion and Incidental Take Statement Inconsistent with This Settlement Agreement.....	11
4.4	CWA Section 401 Certification.....	11
4.4.1	Protection, Mitigation and Enhancement Measures Recommended to Be Included in CWA Section 401 Certifications	11
4.4.2	Section 401 Certifications Inconsistent with This Settlement Agreement	12
4.5	New Project Licenses.....	13
4.5.1	Support for Issuance of New Project Licenses	13
4.5.2	Term of New Project Licenses	13
4.5.3	Comments on the NEPA Document	13
4.5.4	PM&E Measures Recommended to Be Included in New Project Licenses	13
4.5.5	New Project Licenses Inconsistent with This Settlement Agreement	13
4.6	Cooperation Among Parties.....	15
4.7	Support for Implementation.....	15
4.8	Defense Against PM&E Measures Inconsistent with This Settlement Agreement.....	15
4.9	Responsibility for Compliance with New Project Licenses.....	15
4.10	Availability of Funds	16
4.11	Implementation	16
4.11.1	Implementation Schedule.....	16
4.11.2	Permits	16

4.12	Reopener or Amendment of New Project Licenses	17
	4.12.1 Limitation on Reopeners and Modifications.....	17
	4.12.2 Amendment of New Project Licenses.....	17
4.13	Compliance with FERC Project Safety and Other Directives.....	19
4.14	Amendment of Settlement Agreement	19
5	Dispute Resolution.....	19
	5.1 General Applicability.....	19
	5.2 Process.....	20
	5.2.1 Dispute Initiation Notice	20
	5.2.2 Informal Meetings	20
	5.2.3 Mediation.....	20
	5.2.4 Dispute Resolution Notice	21
	5.3 Enforcement of Settlement Agreement After Dispute Resolution.....	21
	5.3.1 Enforcement Regarding New Project Licenses	21
	5.3.2 Enforcement Regarding Contractual Obligations.....	21
6	Withdrawal from Settlement Agreement.....	22
	6.1 Withdrawal of Party from Settlement.....	22
	6.2 Withdrawal of FirstLight from Settlement Agreement Prior to Acceptance of the New Project Licenses	22
	6.3 Effective Date of Withdrawal.....	22
	6.4 Continuity After Withdrawal	22
	6.5 Termination of Settlement Agreement	23
7	General Provisions.....	23
	7.1 Non-Severable Terms of Settlement Agreement.....	23
	7.2 No Third-Party Beneficiaries.....	24
	7.3 Successors and Assigns	24

7.3.1	Assignment.....	24
7.3.2	Succession	24
7.3.3	Continuation of Certain Obligations	24
7.3.4	Notice	25
7.4	Extension of Time; Inability to Perform.....	25
7.4.1	Obligations under New Project Licenses.....	25
7.4.2	Contractual Obligations.....	25
7.4.3	Notice of Delay or Inability to Perform	26
7.5	Governing Law	26
7.6	Elected Officials Not to Benefit	26
7.7	No Partnership.....	26
7.8	Reference to Regulations	26
7.9	Notice	26
7.10	Section Titles for Convenience Only.....	27
8	Execution of Settlement Agreement.....	27
8.1	Signatory Authority	27
8.2	Signing in Counterparts	27

APPENDICES

- Appendix A - Protection, Mitigation, and Enhancement Measures Recommended to be Included in the New Turners Falls Hydroelectric Project License
- Appendix B - Protection, Mitigation, and Enhancement Measures Recommended to be Included in the New Northfield Mountain Pumped Storage Project License
- Appendix C - Measures Agreed to Among the Parties But Not to Be Included in New Project Licenses
- Appendix D - Authorized Representatives of the Parties

This Relicensing Settlement Agreement for the Turners Falls Hydroelectric Project and Northfield Mountain Pumped Storage Project (“Settlement Agreement”) is made and entered into pursuant to Federal Energy Regulatory Commission (“Commission” or “FERC”) Rule 602, 18 C.F.R. § 385.602, by and among:

FirstLight MA Hydro LLC
Northfield Mountain LLC
National Marine Fisheries Service
U.S. Fish and Wildlife Service
Massachusetts Division of Fisheries and Wildlife
The Nature Conservancy
American Whitewater
Appalachian Mountain Club
Crab Apple Whitewater, Inc.
New England FLOW
Zoar Outdoor

each referred to individually as a “Party” and collectively as “Parties.”

RECITALS

WHEREAS,

- A. FirstLight MA Hydro LLC and Northfield Mountain LLC (collectively, “FirstLight”) are the 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 (collectively, “Projects”) expired on April 30, 2018. The Projects have been operating on annual licenses pursuant to Section 15 of the Federal Power Act (“FPA”) since that time.
- B. In accordance with the requirements of the FPA and FERC’s regulations, FirstLight filed a Notice of Intent to file an application for new license for each of the Projects on October 31, 2012. Pursuant to FERC’s Integrated Licensing Process, FirstLight then engaged with relicensing participants, FERC, and the public in scoping environmental issues related to the Projects and in developing and implementing a rigorous study plan to assess the Projects’ environmental impacts.
- C. As required by the FPA and FERC’s regulations, FirstLight filed a Final Application for New License (“FLA”) for the Projects with FERC on April 29, 2016. Because certain environmental studies required by FERC 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 (“AFLAs”) on December 4, 2020, 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.

- D. In 2017, FirstLight began formal settlement discussions with relicensing participants, in particular, discussions with state and federal fish and wildlife agencies on fish passage and flow issues. Those discussions did not result in agreement on all fish passage and flow issues, but nevertheless informed FirstLight’s PM&E proposals in the AFLAs. FirstLight’s PM&E proposals in the AFLAs also were informed by further non-FERC required environmental studies undertaken in consultation with the state and federal fish and wildlife agencies, which FirstLight filed into the FERC record.
- E. Following submittal of the AFLAs, FirstLight, the state and federal fish and wildlife agencies, and certain conservation organizations resumed discussions on fish passage and flows, which resulted in an Agreement in Principle which FirstLight filed with FERC on March 18, 2022. The same Parties reached an Amended Agreement in Principle on fish passage and flows to address fish passage adaptive management and certain other matters, which FirstLight filed with FERC on October 31, 2022. FirstLight separately engaged with whitewater boating interests and entered into an Agreement in Principle which FirstLight filed with FERC on February 28, 2022. Because of certain inconsistencies between the fish passage and flow agreement and the whitewater boating agreement, the parties to both agreements engaged in mutual discussions to bridge the gaps. Those discussions resulted in updates that have been incorporated into this Settlement Agreement.
- F. While FERC and the Massachusetts Department of Environmental Protection (“MADEP”) have not been directly involved in settlement negotiations, FirstLight and other Parties have kept FERC and MADEP generally apprised with periodic reports of their progress. Additionally, FirstLight and other Parties have at critical junctures requested FERC to continue to defer its Ready for Environmental Analysis (“REA”) notice requesting comments, protests and interventions on FirstLight’s applications for new license in order to give the Parties time to negotiate a final settlement agreement and resolve remaining outstanding issues. MADEP has been supportive of continued settlement discussions in filings with FERC. The Parties appreciate FERC’s agreement to defer its REA notice during this time to allow the Parties to focus on finalizing the Settlement Agreement.
- G. This Settlement Agreement is the end product of the Parties’ work on: (1) fish passage, (2) flows for fishery, ecological conservation and recreation purposes, and (3) protected, threatened and endangered species, and as to the Parties, addresses all outstanding issues for the relicensing of the Projects on those topics (“Topics within the Scope of this Agreement”).
- H. In the course of settlement negotiations, FirstLight developed additional technical materials in support of those discussions. The additional materials will be filed with FERC as relevant and appropriate to the Settlement Agreement.
- I. FERC has stated its intent to do a comprehensive environmental review that includes FirstLight’s Projects as well as the upstream Project Nos. 1855, 1892, and 1904. This Settlement Agreement has been negotiated with the understanding that FirstLight’s

operation of the Projects is in part governed by and dependent upon operations of the upstream projects.

TERMS OF AGREEMENT

NOW THEREFORE, in consideration of the mutual covenants set forth herein, the receipt and sufficiency of which is hereby acknowledged, the Parties agree as follows:

1 General Provisions

1.1 Effective Date of Settlement Agreement

Except as provided in Section 1.1.1, this Settlement Agreement shall become effective upon the execution by all Parties of this Settlement Agreement (“Effective Date”).

1.1.1 FirstLight’s Affirmative Acceptance of License

FirstLight’s contractual obligation to the Parties to implement the measures set forth in Appendix C of this Settlement Agreement shall become effective only upon FirstLight’s acceptance, in its sole discretion, of the Final New Project Licenses. Within 45 days of the New Project Licenses becoming Final, FirstLight shall provide Notice to all Parties whether it affirmatively accepts the New Project Licenses and its concomitant obligations under this Settlement Agreement. If FirstLight does not timely provide such Notice, it shall be deemed to have affirmatively accepted the New Project Licenses. If FirstLight rejects the New Project Licenses this Settlement Agreement will terminate pursuant to Section 6.5, and will not be binding on FirstLight or any other Party in any subsequent proceeding at FERC or otherwise.

1.1.2 Effective Date of Parties’ Obligations

The Parties’ obligations under Sections 2 through 8, including the obligation to support this Settlement Agreement in the relicensing and related regulatory proceedings, take effect on the Effective Date.

1.2 Term of Settlement Agreement

The term of this Settlement Agreement shall commence on the Effective Date and shall continue (unless terminated as otherwise provided herein) for the term of the New Project Licenses plus the term(s) of any annual license(s) that may be issued after the foregoing New Project Licenses have expired.

1.3 Definitions

1.3.1 Commission or FERC shall mean the Federal Energy Regulatory Commission.

1.3.2 Consultation shall mean the process under this Settlement Agreement by which FirstLight seeks views through providing drafts of proposals, plans and reports, and seeking and considering comments on such proposals, plans, and reports as appropriate from relevant Parties. Consultation under this Settlement Agreement shall not be construed to satisfy “consultation” under Section 7 of the Endangered Species Act (“ESA”) or other federal laws specifically requiring consultation, unless specifically noted.

1.3.3 Disputing Party or Disputing Parties shall mean the Party providing Notice of the dispute, the Party alleged to have failed to perform an obligation, and any other Party that provides Notice of its intent to participate in the dispute resolution.

1.3.4 Final, with respect to the New Project Licenses under this Settlement Agreement, shall mean such licenses after exhaustion of administrative and judicial remedies for any challenge which any Party or other person brings against the New Project Licenses or against any other regulatory approval integral to issuance of the New Project Licenses.

1.3.5 Fishway Prescription shall mean a prescription issued by the National Marine Fisheries Service (“NMFS”) or the U.S. Fish and Wildlife Service (“USFWS”) under Section 18 of the FPA, whether designated as preliminary, modified or final.

1.3.6 Inconsistent with this Settlement Agreement shall mean: (1) any material modification to, deletion of, or addition to the Proposed License Articles in the New Project Licenses; (2) any material modification to, deletion of, or addition to the Proposed License Articles in any Fishway Prescription, ESA Section 7 Biological Opinion, or Clean Water Act (“CWA”) Section 401 Certification issued in connection with the New Project Licenses; (3) changes to the Projects proposed by FirstLight that are materially inconsistent with the assumptions underlying the Settlement Agreement; or (4) New Project Licenses issued for terms of less than 50 years. The term “material” for purposes of this section means a deviation from the Proposed License Articles that, either individually or collectively with other such deviations, substantially affects a Party’s bargained-for benefits under this Settlement Agreement.

1.3.7 Inconsistent with this Settlement Agreement shall not mean: (1) the inclusion of standard articles from the appropriate L-Form (as defined by 18 C.F.R. § 2.9) in the New Project Licenses; (2) FERC’s reservation of its authority to require changes to implementation schedules, plans, or other requirements of the New Project Licenses; (3) the inclusion in any Fishway Prescription of the issuing agency’s reservation of authority to reopen its prescription, provided that the reservation of authority is consistent with this Settlement Agreement, and provided further that each Party reserves its right to contest the exercise of such reserved authority at such time as the agency may exercise the reserved authority; (4) the inclusion in any ESA Section 7 Biological Opinion of the issuing agency’s

criteria for re-initiation of Section 7 consultation pursuant to 50 C.F.R. § 402.16; or (5) the inclusion in the New Project Licenses, any Fishway Prescription, any ESA Section 7 Biological Opinion, or any CWA Section 401 Certification, of such reasonable minimization and reporting requirements as FERC or the issuing agency determines are necessary to ensure FirstLight's compliance.

1.3.8 Material New Information shall mean significant and relevant new information which was neither in the administrative record for the relicensing nor otherwise known as of the Effective Date to the Party who seeks to use the Material New Information. Each Party agrees in good faith to share any such information with the other Parties in a timely manner.

1.3.9 New Project Licenses shall mean the new licenses, not to include any annual license extending the current licenses, issued by the Commission to FirstLight pursuant to Section 15 of the FPA for the continued operation of Project Nos. 1889 and 2485.

1.3.10 Notice shall mean a written communication which meets the requirements of Section 7.9 and any other requirements for notice specifically provided in any other applicable section of this Settlement Agreement.

1.3.11 Party or Parties shall mean the signatories to this Settlement Agreement.

1.3.12 Projects shall mean the Turners Falls Hydroelectric Project, currently licensed to FirstLight MA Hydro LLC as FERC Project No. 1889, and the Northfield Mountain Pumped Storage Project, currently licensed to Northfield Mountain LLC as FERC Project No. 2485.

1.3.13 Proposed License Articles shall mean the terms and conditions set forth in Appendices A and B of this Settlement Agreement that the Parties request that the Commission include in the New Project Licenses for the continued operation of the Projects.

1.3.14 Regulatory Party (collectively, "Regulatory Parties") shall mean USFWS, NMFS, and the Massachusetts Division of Fisheries and Wildlife ("MDFW").

1.3.15 Settlement Agreement shall mean the entirety of this Settlement Agreement, including the Appendices.

1.4 Acronyms

- 1.4.1** AFLAs – Amended Final License Applications
- 1.4.2** CWA – Clean Water Act
- 1.4.3** ESA – Endangered Species Act
- 1.4.4** FERC – Federal Energy Regulatory Commission
- 1.4.5** FLA – Final License Application
- 1.4.6** FPA – Federal Power Act
- 1.4.7** MADEP – Massachusetts Department of Environmental Protection
- 1.4.8** MDFW – Massachusetts Division of Fisheries and Wildlife
- 1.4.9** NMFS – National Marine Fisheries Service
- 1.4.10** NEPA – National Environmental Policy Act
- 1.4.11** PM&E – protection, mitigation and enhancement measure
- 1.4.12** REA – Ready for Environmental Analysis
- 1.4.13** USFWS – U.S. Fish and Wildlife Service

2 Purpose of Settlement Agreement

2.1 Purpose

The Parties have entered into this Settlement Agreement for the purpose of resolving all issues that have or could have been raised by the Parties in connection with FERC’s orders issuing New Project Licenses relating to Topics within the Scope of this Agreement. While recognizing that several regulatory and statutory processes are not yet completed, it is the Parties’ intention that this Settlement Agreement considers all significant issues related to the authority of Regulatory Parties concerning Topics within the Scope of this Agreement that may arise in the issuance of all regulatory approvals integral to FERC’s issuance of the New Project Licenses, including but not limited to ESA Section 7 Biological Opinions to be issued by USFWS and NMFS, the CWA Section 401 Certifications to be issued by MADEP, and any Environmental Impact Statement or Environmental Assessment issued pursuant to the National Environmental Policy Act (“NEPA”). The Parties recognize that MADEP is the agency responsible for Section 401 Certification and is not a Party to this Settlement Agreement. Pursuant to the Parties’ various rights, authorities, and responsibilities under Sections 10(a), 10(j), and 18 of the FPA, as well as other statutory and regulatory authorities and implied powers, this Settlement Agreement is intended to establish FirstLight’s obligations concerning Topics within the Scope of this Agreement for the protection, mitigation and enhancement of resources affected by the Projects under the New Project Licenses. It also specifies procedures to be used among the Parties to ensure that implementation of the New Project Licenses is not Inconsistent with this Settlement Agreement, and with other legal and regulatory mandates. Except as specifically provided below, each of the Regulatory Parties agrees that FirstLight’s performance of its obligations under this Settlement Agreement will be consistent with and is intended to fulfill FirstLight’s existing statutory and regulatory obligations as to each Regulatory Party relating to the relicensing of the Projects with respect to Topics within the Scope of this Agreement.

2.2 No Precedent for Other Proceedings

This Settlement Agreement is made with the understanding that it constitutes a negotiated resolution of issues relating to Topics within the Scope of this Agreement for the New Project Licenses. Accordingly, this Settlement Agreement shall not be offered against a Party as argument, admission or precedent in any mediation, arbitration, litigation, or other administrative or legal proceeding that does not involve or relate to the New Project Licenses or the operation of the Projects. Further, no Party shall be deemed to have approved, admitted, accepted, or otherwise consented to any operation, management, valuation, or other principle underlying any of the matters covered by this Settlement Agreement, except as expressly provided herein. With respect to any mediation, arbitration, litigation, or other administrative or legal proceeding involving or relating to the New Project Licenses, the Parties' rights and responsibilities shall be as set forth in this Settlement Agreement. This Section shall survive any termination of this Settlement Agreement.

3 Compliance with Legal Responsibilities and Reservations of Rights

3.1 Regulatory Parties

3.1.1 Except as otherwise provided in this Settlement Agreement, by entering into this Settlement Agreement, each Regulatory Party represents that it believes and expects, based on the information known to it at time of signature, that: (1) the Proposed License Articles set forth in Appendices A and B are likely to satisfy the statutory, regulatory, or other legal requirements for the protection, mitigation, and enhancement of natural resources with respect to Topics within the Scope of this Agreement under the New Project Licenses; and (2) the Regulatory Party's statutory, regulatory, or other legal responsibilities with respect to Topics within the Scope of this Agreement are, or can be, met through approval without material modification of this Settlement Agreement and subsequent implementation of the New Project Licenses. This representation applies only to those requirements that the Regulatory Party administers.

3.1.2 Nothing in this Settlement Agreement is intended or shall be construed to be an irrevocable commitment of resources or a pre-decisional determination by a Regulatory Party. After the Effective Date of this Settlement Agreement but prior to the issuance of the New Project Licenses, each Regulatory Party will participate in the relicensing proceeding, including environmental review and consideration of public comments, as required by applicable law. Further, NMFS and USFWS shall consult with FERC under the ESA. Each Regulatory Party shall consider any new information arising in the relicensing proceeding or ESA consultation, as required by applicable law.

3.1.3 The Regulatory Parties agree that, throughout the duration of the term of this Settlement Agreement, they will not exercise any statutory or regulatory authority under currently applicable federal or state law in a manner that is

Inconsistent with this Settlement Agreement, absent Material New Information and except as provided in Section 4.12. Any reservation of authority of USFWS or NMFS pursuant to Section 18 of the FPA and any exercise of such reserved authority shall be consistent with the provisions of this Settlement Agreement, including Section 4.12.

3.2 No Effect on Parties' Other Legal Duties

Nothing in this Settlement Agreement is intended to, or shall be construed to, affect or limit the authority or obligation of any Party to fulfill its constitutional, statutory, and regulatory responsibilities or to comply with any judicial decision or order.

3.3 Future Relicensings

Nothing in this Settlement Agreement is intended or shall be construed to affect or restrict any Party's participation in or comments about the provisions of any future relicensing of the Projects subsequent to the current relicensing.

4 Settlement Agreement Commitments and Implementation

4.1 Parties Bound by Settlement Agreement

Each Party shall be bound by this Settlement Agreement for the term stated in Section 1.2, provided the Final New Project Licenses are not Inconsistent with this Settlement Agreement and the Party has not withdrawn from the Settlement Agreement under Section 6 of this Settlement Agreement.

4.2 Fishway Prescriptions and Section 10(a) and 10(j) Recommendations

4.2.1 Protection, Mitigation and Enhancement Measures to Be Included in Section 18 Fishway Prescriptions and Section 10(a) and 10(j) Recommendations

(1) Preliminary Fishway Prescriptions and any flow or fish passage recommendations under FPA Sections 10(a) and 10(j) of the Parties shall not be Inconsistent with this Settlement Agreement;

(2) Any information, comments, or responses to comments regarding flows and/or fish passage by the Parties in the context of relicensing of the Projects shall not be Inconsistent with this Settlement Agreement;

(3) The Parties shall use reasonable efforts to obtain FERC orders approving this Settlement Agreement and issuing New Project Licenses not Inconsistent with this Settlement Agreement in a timely manner;

(4) The Parties shall support, in all relevant regulatory proceedings in which they

participate, regulatory actions regarding flows and/or fish passage not Inconsistent with this Settlement Agreement; and

(5) A Party may only use Material New Information to submit comments or recommendations under Sections 10(a) or 10(j) Inconsistent with this Settlement Agreement if it believes in good faith that such information significantly undermines the Settlement Agreement, taken as a whole for the affected Party, and significantly affects the adequacy of the Proposed License Articles under Sections 10(a) or 10(j).

4.2.2 Fishway Prescriptions Inconsistent with Settlement Agreement

4.2.2.1 NMFS and USFWS intend that any Fishway Prescriptions submitted to FERC in connection with the issuance of the New Project Licenses will not be Inconsistent with this Settlement Agreement, in particular, Proposed License Articles A300, A310, A320, and A330 for the Turners Falls Project and Articles B200, B210, and B220 for the Northfield Mountain Project.

4.2.2.2 If any Fishway Prescription is Inconsistent with this Settlement Agreement, the Settlement Agreement shall be deemed modified to conform to the inconsistency unless a Party provides Notice to the other Parties that it objects to the inconsistency and initiates dispute resolution within 30 days after the date the inconsistent Fishway Prescription is filed with FERC.

4.2.2.3 The Disputing Party may exercise any right it may have to request an agency trial-type hearing on issues of material fact under Section 18 of the FPA, and propose alternatives under Section 33 of the FPA, with respect to any Fishway Prescriptions that include an inconsistency with this Settlement Agreement, even if other provisions in the Fishway Prescriptions are not Inconsistent with the Settlement Agreement. The Disputing Party may also seek administrative review at FERC and any other administrative and/or judicial remedies provided by law. The Parties shall follow the dispute resolution process to the extent reasonably practicable while any such appeal of an inconsistent action is pursued.

4.2.2.4 Except as provided in Section 4.5.5.4 for omissions based on jurisdiction or if the Settlement Agreement is terminated pursuant to Section 6.5, if any Fishway Prescriptions are Inconsistent with this Settlement Agreement after a final and non-appealable administrative or judicial decision, this Settlement Agreement shall be deemed modified to conform to that decision.

4.2.2.5 If the Fishway Prescriptions are not Inconsistent with this Settlement Agreement, each Party waives any right it may have to request

an agency trial-type hearing on issues of material fact under Section 18 of the FPA, and to propose alternatives under Section 33 of the FPA. The Parties shall not support any trial-type hearing request by any non-party and will make reasonable efforts to support USFWS and NMFS, as appropriate, if a trial-type hearing is requested by any non-party. If a non-party requests a trial-type hearing, the Parties may intervene in the hearing to support this Settlement Agreement.

4.3 ESA Consultation

4.3.1 Biological Opinions

FERC has designated FirstLight as FERC's non-federal representative for carrying out informal consultation with NMFS and USFWS under Section 7 of the ESA. As part of this informal consultation, FirstLight submitted as part of its AFLAs draft Biological Assessments to assist FERC's preparation of Biological Assessments for purposes of Section 7 consultation with NMFS and USFWS. Within 180 days of the Effective Date, FirstLight will file with FERC revised draft Biological Assessments reflecting the relevant PM&E measures agreed to as part of this Settlement Agreement and asking FERC to consider and adopt them as part of the proposed actions for the Section 7 consultations between FERC and NMFS, and FERC and USFWS. Any Biological Opinions relating to the New Project Licenses shall address and evaluate the provisions that FERC incorporates into its proposed actions. As of the Effective Date, NMFS and USFWS represent that they enter into this Settlement Agreement believing that the information in the record supports the PM&E measures provided herein. However, NMFS and USFWS are not making a pre-decisional determination of the outcome of any Section 7 consultation and expressly reserve the right to issue any Reasonable and Prudent Measures and Terms and Conditions in any Biological Opinions and Incidental Take Statements as necessary to meet their obligations under the ESA.

Further, the Parties acknowledge the ESA consultation will be based on FERC's proposed actions, the species listed under the ESA at the time of the consultation, and the best information available at the time of the consultation. Per the implementing regulations for Section 7 of the ESA, a consultation shall be reinitiated if any of the criteria at 50 C.F.R. § 402.16 are met. The outcome of future consultations on the Projects, during or after the term of the New Project Licenses, will not be limited by the content of this Settlement Agreement. Per 50 C.F.R. § 402.14(i)(2), formal consultations that result in non-jeopardy Biological Opinions must adhere to the "minor change rule."

4.3.2 Biological Opinion and Incidental Take Statement Inconsistent with This Settlement Agreement

4.3.2.1 Consistent with Section 4.3.1, NMFS and USFWS anticipate that the measures contained in this Settlement Agreement will minimize any incidental take occurring as a result of implementation of this Settlement Agreement for species listed as threatened or endangered as of the Effective Date, and that any Reasonable and Prudent Measures and/or Terms and Conditions contained in any Biological Opinions and Incidental Take Statements will not be Inconsistent with this Settlement Agreement.

4.3.2.2 If any Biological Opinion or Incidental Take Statement issued pursuant to Section 7 of the ESA is Inconsistent with this Settlement Agreement, this Settlement Agreement shall be deemed modified to conform to the provisions of the Biological Opinion and Incidental Take Statement, unless a Party provides Notice to the other Parties that it objects to the inconsistency and initiates dispute resolution within 30 days after the Biological Opinion and Incidental Take Statement are filed with FERC.

4.3.2.3 The Disputing Party may, to the extent provided by applicable law, seek administrative and/or judicial review of any Biological Opinion or Incidental Take Statement that is Inconsistent with this Settlement Agreement. The Parties shall follow the dispute resolution process to the extent reasonably practicable while such administrative or judicial review is pursued.

4.3.2.4 Except as provided in Section 4.5.5.4 for omissions based on jurisdiction or if the Settlement Agreement is terminated pursuant to Section 6.5, if any Biological Opinion or Incidental Take Statement is Inconsistent with this Settlement Agreement after a final and non-appealable decision on the administrative or judicial action, this Settlement Agreement shall be deemed modified to conform to the final decision.

4.4 CWA Section 401 Certification

4.4.1 Protection, Mitigation and Enhancement Measures Recommended to Be Included in CWA Section 401 Certifications

Any Party participating in the Section 401 Certification process shall request that MADEP accept and incorporate, without material modifications, as conditions to the Section 401 Certifications, all the PM&E measures stated in Appendices A and B of the Settlement Agreement that are within the MADEP's jurisdiction pursuant to Section 401 of the CWA. The Parties shall further request that

MADEP not include as conditions to the Section 401 Certifications additional conditions that are Inconsistent with this Settlement Agreement.

4.4.2 Section 401 Certifications Inconsistent with This Settlement Agreement

4.4.2.1 If the MADEP denies FirstLight's application for Section 401 Certification for either of the Projects, the Parties agree such denial shall be considered Inconsistent with this Settlement Agreement, unless (1) the denial is without prejudice, and (2) the denial is not based on a determination that the PM&E measures in Appendices A and B of this Settlement Agreement are insufficient for MADEP to issue Section 401 Certifications based on those PM&E measures. If the MADEP issues the Section 401 Certifications and any condition of a Section 401 Certification is Inconsistent with this Settlement Agreement, the Settlement Agreement shall be deemed modified to conform to the Section 401 Certification, unless a Party provides Notice to the other Parties that it objects to the inconsistency and initiates dispute resolution within 30 days after the issuance of the Section 401 Certification.

4.4.2.2 The Disputing Party may, to the extent provided by applicable law, seek administrative and/or judicial review of any Section 401 Certification or denial of Section 401 Certification that is Inconsistent with this Settlement Agreement. The Parties shall follow the dispute resolution process to the extent reasonably practicable while such administrative and/or judicial review is pursued.

4.4.2.3 If any Party or non-party seeks administrative and/or judicial review of a Section 401 Certification, FirstLight or any Party may request that FERC hold the New Project Licenses in abeyance pending a final adjudication of the Section 401 Certification. Any Party objecting to such a request may oppose it, after complying with the dispute resolution procedures of this Settlement Agreement.

4.4.2.4 Except as provided in Section 4.5.5.4 for omission based on jurisdiction or if the Settlement Agreement is terminated pursuant to Section 6.5, if any condition of a Section 401 Certification is Inconsistent with this Settlement Agreement after a final and non-appealable decision on the administrative or judicial action, this Settlement Agreement shall be deemed modified to conform to the final decision.

4.5 New Project Licenses

4.5.1 Support for Issuance of New Project Licenses

The Parties shall support and advocate through appropriate written communications to FERC, USFWS, NMFS, and MADEP on behalf of this Settlement Agreement and the PM&E measures stated in Appendices A and B hereto. The Parties agree not to propose, support, or advocate proposed PM&E measures Inconsistent with this Settlement Agreement, except as specifically permitted herein.

4.5.2 Term of New Project Licenses

The Parties agree that the investment of funds and other commitments associated with the terms of this Settlement Agreement justify the issuance of 50-year licenses and support FirstLight's request for 50-year licenses to FERC.

4.5.3 Comments on the NEPA Document

The Parties shall comment on any PM&E measure recommended by FERC in its draft or final NEPA document which, if approved in the New Project Licenses, would be Inconsistent with this Settlement Agreement. Such comment(s) would aim to urge FERC to adopt the full settlement terms before the issuance of the New Project Licenses.

4.5.4 PM&E Measures Recommended to Be Included in New Project Licenses

The Parties shall request that FERC accept and incorporate, without material modification, as license articles, all the PM&E measures stated in Appendices A and B of this Settlement Agreement. The Parties shall further request that FERC not include in the New Project Licenses PM&E measures that are Inconsistent with this Settlement Agreement.

The Parties shall request that measures and actions agreed to among the Parties as set forth in Appendix C not be incorporated in the New Project Licenses.

4.5.5 New Project Licenses Inconsistent with This Settlement Agreement

4.5.5.1 Consistency of Licenses with Settlement Agreement

If the New Project Licenses issued by FERC are Inconsistent with this Settlement Agreement, the Settlement Agreement shall be deemed modified to conform to the inconsistency, unless a Party provides Notice to the other Parties that it objects to the inconsistency and initiates dispute resolution within 30 days after the date of the FERC order issuing license.

4.5.5.2 Disputing Inconsistencies

The Disputing Party may, in addition, if it is a party to the FERC relicensing proceeding, petition FERC for rehearing and seek judicial review of the New Project Licenses. If any Party, including FirstLight, or non-party seeks rehearing or judicial review of the New Project Licenses, FirstLight may seek a stay or an extension of time of any or all requirements of the New Project Licenses. Any Party objecting to such a request may oppose it, after complying with the dispute resolution procedures of this Settlement Agreement.

4.5.5.3 Modification of Agreement if Inconsistency

Except as provided in Section 4.5.5.4 for omission based on jurisdiction and Section 4.5.5.5 for inclusion based on jurisdiction, or if the Settlement Agreement is terminated pursuant to Section 6.5, if a provision in the Final New Project Licenses is Inconsistent with this Settlement Agreement, this Settlement Agreement shall be deemed modified to conform to the final decision.

4.5.5.4 Omission Based on Jurisdiction

If the New Project Licenses do not contain all the PM&E measures stated in Appendices A and B because FERC expressly determines that it does not have jurisdiction to adopt or enforce the omitted PM&E measures, this Settlement Agreement shall not be deemed modified to conform to such omission, and such omission shall not be used as the basis for dispute among the Parties; provided that any PM&E measure that FERC excludes from Appendices A or B based on a lack of jurisdiction shall be automatically included in Appendix C without material modification (including all funds needed to carry out or implement any such PM&E measure).

4.5.5.5 Inclusion Based on Jurisdiction or Section 401 Certification

If the New Project Licenses include PM&E measures stated in Appendix C of this Settlement Agreement because FERC determines that such measures are required to be included under the FPA and are within FERC's jurisdiction to enforce, or MADEP includes such measures as conditions of a Section 401 Certification, such action shall not be considered Inconsistent with this Settlement Agreement provided there is no material change to the PM&E measure other than its inclusion in the New Project Licenses. However, Parties may not assert in any regulatory forum including FERC that any PM&E measures in Appendix C of this Settlement Agreement should be included in the New Project Licenses.

4.6 Cooperation Among Parties

The Parties shall cooperate in good faith in the implementation of this Settlement Agreement and the New Project Licenses.

4.7 Support for Implementation

Upon notification by FirstLight of the need therefore, the other Parties shall provide written communications (or orally, in the event written communication is impossible to obtain due to reasons outside a Party's control) of support in any administrative approval process that may be required for implementation of this Settlement Agreement or related articles of the New Project Licenses, subject to available Party resources and Regulatory Party authority and policy.

4.8 Defense Against PM&E Measures Inconsistent with This Settlement Agreement

If a Party files a pleading or other document before FERC or another regulatory agency advocating a PM&E measure Inconsistent with this Settlement Agreement which is not based on Material New Information, whether prior to or following issuance of the New Project Licenses, any other Party may defend by: (1) stating its opposition to the PM&E measure Inconsistent with this Settlement Agreement; (2) requesting that FERC or other regulatory agency disapprove the PM&E measure Inconsistent with this Settlement Agreement; and (3) explaining what offsetting PM&E measures should be included in and/or excluded from the New Project Licenses if the PM&E measure Inconsistent with this Settlement Agreement is approved.

4.9 Responsibility for Compliance with New Project Licenses

Upon acceptance of the New Project Licenses, FirstLight is ultimately responsible for compliance with them. By entering into this Settlement Agreement, except as expressly provided herein, none of the other Parties is accepting any new or additional legal liability or responsibility for compliance with the obligations under the New Project Licenses. FirstLight shall not be excused from its duty to comply with the New Project Licenses due to a failure by any other Party, entity, or person to provide funding or carry out a duty, obligation, or responsibility it may have with respect to the Projects pursuant to other laws or agreements. Notwithstanding the foregoing, this Settlement Agreement does not alter or abrogate any duty, obligation, or responsibility that any other Party or person may have to provide such funding pursuant to other laws or agreements, nor does this Settlement Agreement prevent FirstLight or any other Party from seeking to enforce such duty, obligation, or responsibility. Further, FirstLight shall have no obligation to reimburse or otherwise pay any other Party for its assistance, participation, or cooperation in any activities pursuant to this Settlement Agreement of the New Project Licenses unless expressly agreed to by FirstLight or as required by law. In the event of administrative rehearing or judicial review, Parties shall bear their own costs and attorneys' fees.

4.10 Availability of Funds

Implementation of this Settlement Agreement by any Party other than FirstLight is subject to the availability of funds. In addition, implementation of this Settlement Agreement by any federal agency is subject to the requirements of the Anti-Deficiency Act, 31 U.S.C. Section 1341 *et seq.*

4.11 Implementation

4.11.1 Implementation Schedule

FirstLight shall ensure that implementation of the PM&E measures stated in Appendices A and B shall be consistent with any schedule specified in Appendices A and B (as it may be modified by the New Project Licenses). FirstLight and other responsible Parties shall implement the measures stated in Appendix C consistent with the applicable schedules.

4.11.2 Permits

Upon acceptance of the New Project Licenses and FERC approval of the applicable plans, FirstLight shall apply for and use reasonable efforts to obtain in a timely manner and in final form all necessary federal, state, regional, and local permits, licenses, authorizations, certifications, determinations, and other governmental approvals for purposes of implementing this Settlement Agreement and the New Project Licenses (“Permits”). The applications for such Permits shall be consistent with the terms of this Settlement Agreement. Each Party, upon FirstLight’s request, shall use reasonable efforts to support FirstLight’s applications for Permits, and shall not file comments or recommend Permit conditions that are Inconsistent with this Settlement Agreement. However, this agreement to support FirstLight’s applications for Permits, shall not apply to a Regulatory Party issuing the permit, consulting on the issuance of a permit under its legal authority, or not participating in the Permit application proceeding. FirstLight shall pay all fees required by law related to such Permits. The Parties shall work together and cooperate as appropriate during the permitting, environmental review, and implementation of this Settlement Agreement. FirstLight shall not be required by the Settlement Agreement to implement an action required under this Settlement Agreement or the New Project Licenses if a Permit has been denied or contains conditions that are Inconsistent with this Settlement Agreement, or until all applicable Permits required for that action are obtained. If a proceeding challenging any Permit required for the action has been commenced, FirstLight shall be under no obligation under this Settlement Agreement to implement the action or any related action until any such proceeding is terminated. In the event any Permit has been denied, FirstLight determines that the Permit contains conditions that are Inconsistent with this Settlement Agreement, or any Permit is not obtained in a timely manner, the Parties shall confer to evaluate the effect of such event on implementation of this

Settlement Agreement and seek to develop actions to respond to that event. If the Parties do not agree on actions to respond to that event and nonperformance or prolonged delay in performance of one or more PM&E measures due to the event materially reduces the benefit of this Settlement Agreement, a Party may initiate dispute resolution, except that dispute resolution regarding denial of a Permit shall be restricted to the issue of actions to respond to that event. In addition, if the event results in nonperformance or prevents performance of one or more PM&E measures for a prolonged period, the Parties recognize that re-initiation of consultation under the ESA may be required. Nothing contained in this section shall be construed to limit FirstLight's right to apply for a Permit before issuance of the New Project Licenses, provided that any such applications shall not be Inconsistent with this Settlement Agreement.

4.12 Reopener or Amendment of New Project Licenses

4.12.1 Limitation on Reopeners and Modifications

No Party to this Settlement Agreement may seek to modify or otherwise reopen the PM&E measures included in the New Project Licenses in a manner that is Inconsistent with this Settlement Agreement unless that Party, relying on Material New Information, reasonably demonstrates that such proposed modification or reopener fulfills a statutory, regulatory, or court ordered responsibility, or reasonably demonstrates that the New Project Licenses no longer comply with applicable law, or that there is a similarly compelling reason to modify the PM&E measures.

4.12.1.1 Notice of Proposed Reopener

Prior to seeking modification or reopener, a Party shall provide all Parties at least 90-day Notice to consider the Material New Information and that Party's position. A Party shall not be required to comply with this 90-day Notice provision if it reasonably believes an emergency situation exists. If a Party proposes a modification or reopener that another Party believes would be Inconsistent with this Settlement Agreement and objects, then the dispute resolution provisions of Section 5 apply, and the objecting Party must invoke dispute resolution during the 90-day Notice period or waive its objection.

4.12.2 Amendment of New Project Licenses

Nothing in this Settlement Agreement is intended, or shall be construed, to affect or limit the right of FirstLight to seek amendments of the New Project Licenses that are not Inconsistent with this Settlement Agreement.

4.12.2.1 Notice of Proposed License Amendment

Prior to filing any proposed license amendment that relates to a subject covered by this Settlement Agreement, including a temporary amendment, FirstLight shall provide the other Parties at least 90-day Notice of its intention to do so. At the request of any Party, FirstLight shall consult with any/all interested Parties regarding the need for and the purpose of the amendment. If a Party believes the proposed amendment is Inconsistent with this Settlement Agreement and objects, then the dispute resolution provisions in Section 5 apply, and the objecting Party must invoke dispute resolution within this 90-day Notice period or waive its objection. FirstLight shall not be required to comply with this 90-day Notice provision if it reasonably believes an emergency situation exists or if required to meet its responsibilities under applicable law or an order of an agency with jurisdiction over it. In such an emergency or regulatory compliance situation, FirstLight shall give Notice to the Regulatory Parties within 10 business days of recognition of the need for such amendment.

4.12.2.2 Consultation on Amendments

Except as provided in the New Project Licenses or in the case of an emergency, FirstLight shall allow a minimum of 60 days for any Party to comment and to make recommendations before filing any application for a Project license amendment that relates to a subject covered by this Settlement Agreement and where consultation with Regulatory Parties or other Parties is required. If FirstLight does not adopt a recommendation or comment of a Party, it shall include in any filing with FERC copies of the comments/recommendations and an explanation as to why the comment/recommendation was not adopted.

4.12.2.3 Exception for FERC Compliance Directives

The notice and consultation requirements of this Section shall not apply to license amendments in connection with compliance matters under Section 4.13 below.

4.12.2.4 Parties' Option to Intervene in Amendment Proceeding

FirstLight shall not oppose, based on the issue of standing, an intervention request by any Party in a proceeding for a Project license amendment that the Party has concluded would be Inconsistent with this Settlement Agreement. The Parties acknowledge that intervention in the relicensing proceeding docket at FERC does not make the Party an intervenor in any post-licensing proceeding.

4.13 Compliance with FERC Project Safety and Other Directives

FirstLight expressly reserves the right to fully and timely comply with any FERC directive or compliance order, including but not limited to any requirement related to Project safety or security. In no instance will any action by FirstLight that is reasonably necessary or appropriate to comply with any such order or direction from FERC trigger the dispute resolution protocols of this Settlement Agreement or be construed as a breach of the Settlement Agreement or an action Inconsistent with this Settlement Agreement. FirstLight agrees to consult with relevant Parties to the extent practicable prior to taking action. All Parties reserve their rights to defend their interests at FERC.

4.14 Amendment of Settlement Agreement

This Settlement Agreement may be amended at any time through the term of the New Project Licenses plus the term(s) of any annual license(s) that may be issued after the New Project Licenses have expired, with the unanimous agreement of all Parties still in existence, including any successor thereto. The Party seeking amendment shall give each other Party at least 60-day prior written Notice. Such Notice shall state that failure of any Party, with the exception of Regulatory Parties and FirstLight, to respond in writing or by electronic mail to the Notice within the applicable 60-day period shall be deemed to be an approval of such amendment. Any amendment of this Settlement Agreement shall be in writing and executed by the responding Parties. The Parties recognize that any amendment to Appendices A and B of the Settlement Agreement may also require an amendment to the New Project Licenses, the CWA 401 Certifications, and the Biological Opinions.

5 Dispute Resolution

5.1 General Applicability

5.1.1 All disputes among the Parties regarding any Party's performance or compliance with this Settlement Agreement, including resolution of any disputes related to the New Project Licenses, Fishway Prescriptions, Biological Opinions, Section 401 Certifications, or Permits related to the New Project Licenses, shall be subject to the dispute resolution process provided in this Section 5, unless otherwise specifically provided in this Settlement Agreement or required by applicable law. The Parties agree that disputes shall be brought in a prompt and timely manner.

5.1.2 The Disputing Parties shall devote such resources as are needed and as can be reasonably provided to resolve the dispute expeditiously.

5.1.3 The Disputing Parties shall cooperate in good faith to promptly schedule, attend, and participate in the dispute resolution.

5.1.4 Unless otherwise agreed among the Disputing Parties, each Disputing Party shall bear its own costs for its participation in this or any administrative dispute resolution process related to the Settlement Agreement.

5.1.5 Each Disputing Party shall promptly implement any resolution of the dispute.

5.1.6 The dispute resolution process in this Section does not preclude any Party from timely filing and pursuing an action for administrative or judicial relief of any FERC order, compliance matter, or other regulatory action related to the New Project Licenses, provided that any such Party shall pursue dispute resolution pursuant to this process as soon as practicable thereafter or concurrently therewith.

5.1.7 The Party initiating a dispute under this Section may notify FERC when dispute resolution proceedings are initiated relevant to the New Project Licenses. The Parties acknowledge that the initiation of dispute resolution proceedings shall have no effect on filing deadlines or applicable statutes of limitation before FERC.

5.2 Process

5.2.1 Dispute Initiation Notice

A Party claiming a dispute shall give Notice of the dispute. If the dispute includes a claim that a New Project License, or related regulatory approval, is Inconsistent with this Settlement Agreement, the Notice shall be issued within the applicable time periods specified in Section 4. Such Notice shall describe: (A) the matter(s) in dispute, (B) the identity of any other Party alleged to have not performed an obligation provided by the Settlement Agreement, and (C) the specific relief sought. The Parties agree that disputes shall be brought in a prompt and timely manner.

5.2.2 Informal Meetings

The Disputing Parties shall hold at least two informal meetings to resolve the dispute, commencing within 30 days after the Dispute Initiation Notice.

5.2.3 Mediation

If the dispute is not resolved in the informal meetings, the Disputing Parties shall decide whether to use a neutral mediator, such as FERC's Office of Dispute Resolution Services. The decision whether to pursue mediation shall be made within 20 days after conclusion of the informal meetings in Section 5.2.2. The Disputing Parties shall agree on an appropriate allocation of any costs of the mediator employed under this section. Mediation shall not occur if the Disputing

Parties cannot agree on the allocation of costs. The Disputing Parties shall select a mediator within 30 days of the decision to pursue mediation, including the agreement of allocation of costs. The mediation process shall be concluded not later than 60 days after the mediator is selected. The above time periods may be shortened or lengthened upon mutual agreement of the Disputing Parties.

5.2.4 Dispute Resolution Notice

The Disputing Parties shall provide Notice of any resolution of the dispute achieved under Sections 5.2.2 and 5.2.3. The Notice shall: (A) restate the disputed matter, as initially described in the Dispute Initiation Notice; (B) describe the alternatives which the Disputing Parties considered for resolution; and (C) state whether resolution was achieved, in whole or part, and state the specific relief agreed-to as part of the resolution.

5.3 Enforcement of Settlement Agreement After Dispute Resolution

5.3.1 Enforcement Regarding New Project Licenses

A Disputing Party may seek administrative or judicial relief for an unresolved dispute regarding FirstLight's performance of its obligations under the New Project Licenses only after exhaustion of the dispute resolution process under Section 5, unless applicable processes require a filing for relief before dispute resolution can conclude. Any such relief shall be sought and obtained from FERC or other appropriate regulatory or judicial forum. No Party to the Settlement Agreement may seek damages for breach of the Proposed License Articles stated in Appendices A and B, whether before or after acceptance of the New Project Licenses.

5.3.2 Enforcement Regarding Contractual Obligations

A Disputing Party may seek administrative or judicial relief for breach of a contractual obligation established by this Settlement Agreement only after exhaustion of the dispute resolution process in Section 5. Venue for such action shall lie in a court with jurisdiction located in the Commonwealth of Massachusetts. In such action, a Disputing Party may only seek specific performance of the contractual obligation or other equitable relief. No Party shall be liable for damages for such breach of contractual obligations. By executing this Settlement Agreement, no Party waives any equitable or legal defenses that may be available. Nothing in this agreement waives the sovereign immunity of the United States, or the Commonwealth of Massachusetts, or constitutes consent to suit by either sovereign in any manner not otherwise provided for by law.

6 Withdrawal from Settlement Agreement

6.1 Withdrawal of Party from Settlement

A Party may withdraw from this Settlement Agreement only if (1) it objects to a Fishway Prescription, Biological Opinion, CWA 401 Certification, or FERC order issuing a New Project License that is Inconsistent with this Settlement, (2) it has complied with the required dispute resolution procedures stated in Section 5 to attempt to resolve the objection, and (3) the objection is to a CWA 401 Certification or FERC order issuing a New Project License, that Party does not file for appeal of the inconsistency. If the Party files an appeal to resolve the inconsistency, that Party may not withdraw until its appeal is concluded and the inconsistency remains uncured. In addition, FirstLight may withdraw as provided in Section 6.2. A Party that withdraws will provide Notice of withdrawal, including its basis for withdrawal.

6.2 Withdrawal of FirstLight from Settlement Agreement Prior to Acceptance of the New Project Licenses

In addition to the provisions of Section 6.1, prior to the acceptance of the New Project Licenses, FirstLight may withdraw from this Settlement Agreement without first complying with the dispute resolution process stated in Section 5 if a Party withdraws from this Settlement Agreement and FirstLight determines in its sole discretion, after providing the remaining Parties a reasonable opportunity to meet and discuss the matter with FirstLight, that the withdrawal: (1) may adversely affect the likelihood of NMFS or USFWS issuing a Fishway Prescription or Biological Opinion that is consistent with this Settlement Agreement, (2) may adversely affect the likelihood of MADEP issuing a CWA 401 Certification that is consistent with this Settlement Agreement, (3) may adversely affect the likelihood of FERC issuing a license that is consistent with this Settlement Agreement, or (4) substantially diminishes the value of this Settlement Agreement for FirstLight. FirstLight shall give Notice identifying the reason for withdrawal within 30 days of its knowledge of the event creating the right to withdraw.

6.3 Effective Date of Withdrawal

Withdrawal by a Party shall become effective 10 calendar days after Notice is given by the withdrawing Party.

6.4 Continuity After Withdrawal

The withdrawal of a Party, other than FirstLight, does not automatically terminate this Settlement Agreement for the remaining Parties. If a Party withdraws from this Settlement Agreement, the withdrawing Party shall not be bound by any term contained in this Settlement Agreement, except as provided in this section and in Section 2.2. The withdrawing Party shall not use any documents and communications related to the development, execution, and submittal of this Settlement Agreement to FERC as evidence, admission, or argument in any forum or proceeding for any purpose to the

fullest extent allowed by applicable law, including 18 C.F.R. § 385.606. This provision does not apply to any information that was in the public domain prior to the development of this Settlement Agreement or that became part of the public domain at some later time through no unauthorized act or omission by any Party. This provision does not apply to: (1) any information held by a federal agency that is not protected from disclosure pursuant to the Freedom of Information Act or other applicable law; or (2) any information held by a state or local agency that is not protected from disclosure pursuant to M.G.L. ch. 66 §§ 10-10B or other applicable state or federal law. The withdrawing Party shall continue to maintain the confidentiality of all settlement communications to the extent permitted by applicable law.

6.5 Termination of Settlement Agreement

This Settlement Agreement shall terminate as to all Parties and have no further force or effect upon expiration of the New Project Licenses and any annual licenses issued after expiration thereof, upon withdrawal from this Settlement Agreement by FirstLight or upon FirstLight's decision not to affirmatively accept the New Project Licenses, or upon FERC issuing an order approving FirstLight's surrender of one or both of the New Project Licenses. Upon termination, all documents and communications related to the development, execution, and submittal of this Settlement Agreement to FERC shall not be used as evidence, admission, or argument in any forum or proceeding for any purpose to the fullest extent allowed by applicable law, including 18 C.F.R. § 385.606. This provision does not apply to any information that was in the public domain prior to the development of this Settlement Agreement or that became part of the public domain at some later time through no unauthorized act or omission by any Party. This provision does not apply to: (1) any information held by a federal agency that is not protected from disclosure pursuant to the Freedom of Information Act or other applicable law; or (2) any information held by a state or local agency that is not protected from disclosure pursuant to M.G.L. ch. 66 §§ 10-10B or other applicable state or federal law. Notwithstanding the termination of this Settlement Agreement, all Parties shall continue to maintain the confidentiality of all settlement communications to the extent permitted by applicable law, and all Parties remain subject to Section 2.2 of this Settlement Agreement.

7 General Provisions

7.1 Non-Severable Terms of Settlement Agreement

The terms of this Settlement Agreement are not severable one from the other. This Settlement Agreement is made on the understanding that each term is in consideration and support of every other term, and each term is a necessary part of the entire Settlement Agreement. If a court of competent jurisdiction rules that any provision in Sections 1 through 8.2 of this Settlement Agreement is invalid, this Settlement Agreement is deemed modified to conform to such ruling, unless a Party objects. If a Party objects, the other Parties agree to meet and confer regarding the continued viability of this Settlement Agreement.

7.2 No Third-Party Beneficiaries

This Settlement Agreement shall not create any right or interest in the public, or any member thereof, as a third-party beneficiary hereof, and shall not authorize any non-Party to maintain a suit at law or equity pursuant to this Settlement Agreement. The duties, obligations, and responsibilities of the Parties with respect to third parties shall remain as imposed under applicable law.

7.3 Successors and Assigns

This Settlement Agreement shall be binding on and inure to the benefit of the Parties and their successors and approved assigns, unless otherwise specified in this Settlement.

7.3.1 Assignment

Any voluntary assignment by a Party shall not be effective unless approved by FirstLight, which approval shall not be unreasonably withheld. A partial assignment is not permitted. After FirstLight's approval of the assignment, the assignee shall sign the Settlement Agreement and become a Party.

7.3.2 Succession

In the event of succession between public agencies, whether by statute, executive order, or operation of law, the successor agency shall become a Party to and be bound by the terms of this Settlement Agreement, to the extent permitted by law.

7.3.3 Continuation of Certain Obligations

7.3.3.1 Upon completion of a succession or assignment, the initial Party shall no longer be a Party. It shall continue to be bound by Sections 2.2, 6.4, 6.5, 7.2, and 7.3. The initial Party shall not take any action adverse to the Settlement Agreement, or the New Project Licenses to the extent they incorporate the Settlement Agreement.

7.3.3.2 No change in ownership of the Project or transfer of the existing or New Project Licenses by FirstLight shall in any way modify or otherwise affect any other Party's rights or obligations under this Settlement Agreement. Unless prohibited by applicable law, FirstLight shall require in any transaction for a change in ownership of the Projects or transfer of the existing or New Project Licenses, that such new owner shall be bound by, and shall assume all of the rights and obligations of FirstLight under this Settlement Agreement upon completion of the change of ownership and approval by FERC of the license transfer.

7.3.4 Notice

FirstLight transferring pursuant to Section 7.3.3.2 or an assigning Party shall provide Notice to the other Parties at least 30 days prior to the proposed effective date of such transfer or assignment.

7.4 Extension of Time; Inability to Perform

7.4.1 Obligations under New Project Licenses

7.4.1.1 Extension of Time

If FirstLight has good cause, consistent with FERC's standard in 18 C.F.R. § 385.2008, to seek an extension of time to fulfill an obligation under the New Project Licenses, it may file with FERC such a request after consulting with the relevant Parties. The Parties acknowledge that FERC's standard for any such request shall apply. If any Party provides Notice that it disputes the good cause for extension, FirstLight and the Disputing Party shall follow the dispute resolution process in Section 5 of this Settlement Agreement. If the dispute cannot be timely resolved by such process, FirstLight may proceed with its request, if it has not done so already, and any Disputing Party may oppose the request.

7.4.1.2 Inability of FirstLight to Perform

If FirstLight is unable to perform an obligation under the New Project Licenses due to an event or circumstances beyond its reasonable control, FirstLight may file with FERC an appropriate request for relief. The Parties acknowledge that FERC's standard for any such request shall apply. If any Party provides Notice that it disputes the non-performance, FirstLight and the Disputing Party shall follow the dispute resolution process in Section 5 of this Settlement Agreement. If the dispute cannot be timely resolved by such process, FirstLight may proceed with its request to FERC, if it has not done so already, and any Disputing Party may oppose its request.

7.4.2 Contractual Obligations

No Party shall be in breach of a contractual obligation under this Settlement Agreement, as established by Sections 1 through 8.2 and Appendix C of this Settlement Agreement, if it is unable to perform or delays performance due to any Uncontrollable Force reasonably beyond its control, unless otherwise provided by this Settlement Agreement. For this purpose, "Uncontrollable Force" may include, but is not limited to, natural events, labor or civil disruption, action or non-action of a governmental agency, or unforeseen breakdown or failure of the Project works for the period of time necessary to cure.

7.4.3 Notice of Delay or Inability to Perform

The Party whose performance of an obligation under this Settlement Agreement is affected by any delay or inability to perform under Section 7.4 shall provide Notice as soon as reasonably practicable. This Notice shall include: (1) a description of the event causing the delay or anticipated delay; (2) an estimate of the anticipated length of the delay; (3) a description of the measures taken or to be taken to avoid or minimize the delay; and (4) a proposed timetable for the implementation of the measures or performance of the obligation. The affected Party shall make all reasonable efforts to promptly resume performance of the obligation. It shall provide Notice when it resumes performance of the obligation.

7.5 Governing Law

The New Project Licenses and any other terms of this Settlement Agreement over which a federal agency has statutory or regulatory jurisdiction shall be governed, construed, and enforced in accordance with such authorities. This Settlement Agreement shall otherwise be governed and construed under the laws of the Commonwealth of Massachusetts. By executing this Settlement Agreement, no federal agency is consenting to the jurisdiction of a state court unless such jurisdiction otherwise exists. All activities undertaken pursuant to this Settlement Agreement shall be in compliance with all applicable law.

7.6 Elected Officials Not to Benefit

No elected officials shall be entitled to any share or part of this Settlement Agreement or to any benefit that may arise from it.

7.7 No Partnership

Except as otherwise expressly set forth herein, this Settlement Agreement does not and shall not be deemed to make any Party the agent for, partner of, or joint venturer with any other Party.

7.8 Reference to Regulations

Any reference in this Settlement Agreement to any federal or state regulation shall be deemed to be a reference to such regulation, or successor regulation, in existence as of the date of the action at the time in question.

7.9 Notice

Except as otherwise provided in this Section, any Notice required by this Settlement Agreement shall be written. Notice shall be sent to all Parties still in existence and, as applicable, filed with FERC. For the purpose of this Settlement Agreement and unless otherwise specified, a Notice shall be effective upon receipt, but if provided by U.S. Mail, seven (7) business days after the date on which it is mailed. The Parties agree that

if practicable, electronic mail or fax are the preferred methods of providing Notice under this Settlement Agreement. When this Settlement Agreement requires Notice in fewer than seven (7) business days, Notice shall be provided by telephone, fax, or electronic mail and shall be effective when provided. For the purpose of Notice, the list of authorized representatives of the Parties as of the Effective Date is attached as Appendix D. FirstLight shall keep the names and contact information for the Parties to this Settlement Agreement. The Parties shall provide Notice of any change in the authorized representatives designated in Appendix D, and FirstLight shall maintain the current distribution list of such representatives. The Parties agree it is their responsibility to keep FirstLight informed of their current address, telephone, fax, and electronic mail information, and that failure to provide FirstLight with current contact information will result in a waiver of that Party's right to Notice under this Settlement Agreement.

7.10 Section Titles for Convenience Only

The titles for the Sections of this Settlement Agreement are used only for convenience of reference and organization and shall not be used to modify, explain, or interpret any of the provisions of this Settlement Agreement or the intentions of the Parties. This Settlement Agreement has been jointly drafted by the Parties and therefore shall be construed according to its plain meaning and not for or against any Party.

8 Execution of Settlement Agreement

8.1 Signatory Authority

Each signatory to this Settlement Agreement certifies that he or she is authorized to execute this Settlement Agreement and to legally bind the Party he or she represents, and that such Party shall be fully bound by the terms hereof upon such signature without any further act, approval, or authorization by such Party.

8.2 Signing in Counterparts

This Settlement Agreement may be executed in any number of counterparts, and each executed counterpart shall have the same force and effect as an original instrument as if all the signatory Parties to all of the counterparts had signed the same instrument. Any signature page of this Settlement Agreement may be detached from any counterpart of this Settlement Agreement without impairing the legal effect of any signatures thereon, and may be attached to another counterpart of this Settlement Agreement identical in form hereto but having attached to it one or more signature pages.

IN WITNESS THEREOF,

the Parties, through their duly authorized representatives, have cause this Settlement Agreement to be executed as of the date set forth in this Settlement Agreement.

FirstLight MA Hydro LLC and Northfield Mountain LLC,



Date: 3/24/2023

By: Justin Trudell

U.S. Fish and Wildlife Service,


AUDREY MAYER Digitally signed by AUDREY
MAYER

Date: 2023.03.24 11:40:21 -04'00' Date: _____

By:

National Marine Fisheries Service,

**Michael
Pentony**

 Digitally signed by Michael
Pentony
Date: 2023.03.24 14:47:06
-04'00'

Date: _____

By:

Massachusetts Division of Fisheries and Wildlife,

Mark S. Tisa

Date: 3/24/2023

By: Director Mark S. Tisa, Ph.D., M.B.A.

American Whitewater,

Robert H. Aschley

Date: 3/27/23

By:

Appalachian Mountain Club,

Nicole Zussman

Date: March 28, 2023

By: Nicole Zussman, President & CEO of Appalachian Mountain Club

Crab Apple Whitewater, Inc.,

July 1, 2023

Date: 3-27-23

By: Frank J. Moore IV

New England FLOW,

New England FLOW

Date: 3/24/23

By: *Thomas J. Christopher,*
Secretary/Director

Zoar Outdoor,

Janet Cowie

By: JANET Cowie, GM

Date: 3/27/23

**Appendix A. Protection, Mitigation, and Enhancement Measures Recommended
to be Included in the New Turners Falls Hydroelectric Project License**

Appendix A: Draft License Articles- Turners Falls Hydroelectric Project

Article A100. Station No. 1 Upgrades

Within 3 years of license issuance, the Licensee shall automate Station No. 1 such that it is capable of being operated remotely and over a range of flows. The Licensee shall submit design plans to the Commission for automating Station No. 1. Upon Commission approval, the Licensee shall automate Station No. 1, including any changes required by the Commission.

Article A110. Minimum Flows below Turners Falls Dam

Upon license issuance, the Licensee shall discharge from the Turners Falls Dam or from the gate located on the power canal (“canal gate”) just below the Turners Falls Dam the following seasonal minimum flows.

Date	Minimum Flows below Turners Falls Dam
01/01-03/31 ¹	<ul style="list-style-type: none"> • If the Naturally Routed Flow (NRF- definition provided later in this article) is ≤ 400 cubic feet per second (cfs), the Minimum Flow below Turners Falls Dam shall be 400 cfs or the NRF, whichever is less. • If the NRF is > 400 cfs, the Minimum Flow below Turners Falls Dam shall be 400 cfs.
04/01-05/31	<ul style="list-style-type: none"> • If the NRF is ≤ 6,500 cfs, the Minimum Flow below Turners Falls Dam shall be 67% of the NRF. • If the NRF is > 6,500, the Minimum Flow below Turners Falls Dam shall be 4,290 cfs.
06/01-06/15 ^{2,3}	<ul style="list-style-type: none"> • If the NRF is ≤ 4,500 cfs, the Minimum Flow below Turners Falls Dam shall be 67% of the NRF. • If the NRF is > 4,500 cfs, the Minimum Flow below Turners Falls Dam shall be 2,990 cfs.
06/16-06/30 ³	<ul style="list-style-type: none"> • If the NRF is ≤ 3,500 cfs, the Minimum Flow below Turners Falls Dam shall be 67% of the NRF. • If the NRF is > 3,500 cfs, the Minimum Flow below Turners Falls Dam shall be 2,280 cfs.
07/01-11/15 ¹	<ul style="list-style-type: none"> • If the NRF is ≤ 500 cfs, the Minimum Flow below Turners Falls Dam shall be 500 cfs or the NRF, whichever is less. • If the NRF is > 500 cfs, the Minimum Flow below Turners Falls Dam shall be 500 cfs.
11/16-12/31 ¹	<ul style="list-style-type: none"> • If the NRF is ≤ 400 cfs, the Minimum Flow below Turners Falls Dam shall be 400 cfs or the NRF, whichever is less. • If the NRF is > 400 cfs, the Minimum Flow below Turners Falls Dam shall be 400 cfs.

¹From November 16 through March 31, the 400 cfs minimum flow below Turners Falls Dam will be provided from the canal gate, having a design maximum capacity of 400 cfs. The Licensee shall open the canal gate to its maximum opening and implement ice mitigation measures, if necessary, to maintain the maximum opening. The Licensee shall monitor canal 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.

²One of the upstream fish passage adaptive management measures (AMMs) described in Article A330 calls for increasing the Total Minimum Bypass Flow below Station No. 1 (see Article A120) from June 1 to June 15 from 4,500 cfs to 6,500 cfs. If this AMM is enacted, and if the NRF is \leq 6,500 cfs, the Minimum Flow below the Turners Falls Dam shall be 67% of the NRF, subject to the conditions in Article A330. If this AMM is enacted, and if the NRF is $>$ 6,500 cfs, the Minimum Flow below the Turners Falls Dam shall be 4,290 cfs, subject to the conditions in Article A330.

³The magnitude of the Minimum Flow below Turners Falls Dam from June 1 to June 30 may be modified in the future pending fish passage effectiveness studies (see Article A330). If the Licensee conducts fish passage effectiveness studies, in consultation with the Massachusetts Division of Fisheries and Wildlife (MDFW), National Marine Fisheries Service (NMFS), and United States Fish and Wildlife Service (USFWS) and determines that migratory fish are not delayed by passing a greater percentage of the Total Minimum Bypass below Station No. 1 (see Article A120) via Station No. 1 discharges, the Licensee may file for a license amendment to increase the Station No. 1 discharge upon written concurrence of MDFW, NMFS, and USFWS. Prior to filing for a license amendment with the Commission, the Licensee shall consult the Massachusetts Department of Environmental Protection (MDEP) and address any of its comments in the license amendment filing.

Definition of Naturally Routed Flow

From December 1 through June 30, the NRF is defined as the hourly sum of the discharges from 12 hours previous as reported by the: Vernon Hydroelectric Project (FERC No. 1904), Ashuelot River United States Geological Survey gauge (USGS, Gauge No. 01161000), and Millers River USGS gauge (Gauge No. 01166500).

From July 1 through November 30, the NRF is defined as the hourly sum of the discharges averaged from 1 to 12 hours previous as reported by the: Vernon Hydroelectric Project, Ashuelot River USGS gauge, and Millers River USGS gauge. Upon license issuance until 3 years thereafter, the Licensee shall operate the Turners Falls Project based on the NRF computational method from July 1 through November 30 to determine if the Turners Falls Project can be operated in this manner. If the Turners Falls Project cannot be operated in this manner, the Licensee shall consult MDFW, NMFS, and USFWS on alternative means of computing the NRF that are feasible for Turners Falls Project operation and sufficiently dampen upstream hydroelectric project flexible operations.

The Minimum Flow below Turners Falls Dam may be temporarily modified if required by equipment malfunction or operating emergencies reasonably beyond the control of the Licensee. If the Minimum Flow below Turners Falls Dam is so modified, the Licensee shall notify the Commission, MDEP, MDFW, NMFS, and USFWS as soon as possible, but no later than 10 days after such incident. The Minimum Flow below Turners Falls Dam may also be temporarily modified for short periods upon mutual agreement with the Licensee for the Northfield Mountain Pumped Storage Project (FERC No. 2485), MDEP, MDFW, NMFS and USFWS, and upon 5 days' notice to the Commission.

Article A120. Total Minimum Bypass Flows below Station No. 1

Upon license issuance, the Licensee shall maintain the Total Minimum Bypass Flows below Station No. 1 as follows:

Date	Total Minimum Bypass Flows below Station No. 1 ¹
01/01-03/31	<ul style="list-style-type: none"> • If the NRF is ≤ 400 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be 400 cfs, or the NRF, whichever is less. • If the NRF is > 400 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be 1,500 cfs, or the NRF, whichever is less.
04/01-05/31	<ul style="list-style-type: none"> • If the NRF is ≤ 6,500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be the NRF. • If the NRF is > 6,500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be 6,500 cfs.
06/01-06/15 ^{2,4}	<ul style="list-style-type: none"> • If the NRF is ≤ 4,500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be the NRF. • If the NRF is > 4,500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be 4,500 cfs.
06/16-06/30 ⁴	<ul style="list-style-type: none"> • If the NRF is ≤ 3,500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be the NRF. • If the NRF is > 3,500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be 3,500 cfs.
07/01-08/31 ³	<ul style="list-style-type: none"> • If the NRF is ≤ 500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be 500 cfs, or the NRF, whichever is less. • If the NRF is > 500 cfs and ≤ 1,800 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be the NRF or 90% of the NRF. • If the NRF is > 1,800 cfs, the Total Minimum Bypass below Station No. 1 shall be 1,800 cfs, or 90% of the NRF, whichever is less.
09/01-11/15 ³	<ul style="list-style-type: none"> • If the NRF is ≤ 500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be 500 cfs, or the NRF, whichever is less. • If the NRF is > 500 cfs and ≤ 1,500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be the NRF, or 90% of the NRF. • If the NRF is > 1,500 cfs, the Total Minimum Bypass below Station No. 1 shall be 1,500 cfs, or 90% of the NRF, whichever is less.
11/16-12/31 ³	<ul style="list-style-type: none"> • If the NRF is < 400 cfs, then the Total Minimum Bypass Flow below Station No. 1 shall be 400 cfs, or the NRF, whichever is less. • If the NRF is > 400 cfs and ≤ 1,500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be the NRF or 90% of the NRF. • If the NRF is > 1,500 cfs, the Total Minimum Bypass below Station No. 1 shall be 1,500 cfs, or 90% of the NRF, whichever is less.

¹From license issuance until 3 years thereafter, Station No. 1 will not be automated. During those 3 years, if Station No. 1 is the only source, other than the Fall River, Turners Falls Hydro, LLC, or Milton Hilton, LLC to provide the additional flow needed to meet the Total Minimum Bypass Flow below Station No. 1, the Licensee shall maintain the Station No. 1 discharge such that the Turners Falls Dam Minimum Flow will be as shown in Article A110, or higher flows, in cases where the additional flow cannot be passed through Station No. 1.

²One of the upstream fish passage adaptive management measures (AMMs) described in Article A330 calls for increasing the Total Minimum Bypass Flow below Station No. 1 from June 1 to June 15 from 4,500 cfs to 6,500 cfs. If this AMM is enacted, and if the NRF is ≤ 6,500 cfs, the Total Minimum Bypass Flow

below Station No. 1 shall be the NRF, subject to the conditions in Article A330. If this AMM is enacted, and the NRF > 6,500 cfs, the Total Minimum Bypass Flow below Station No. 1 is 6,500 cfs, subject to the conditions in Article A330.

³From July 1 to August 31, when the NRF is greater than 1,800 cfs, the Total Minimum Bypass Flow below Station No.1 shall be 1,800 or 90% of the NRF, whichever is less. From September 1 to December 31, when the NRF is greater than 1,500 cfs, the Total Minimum Bypass Flow below Station No. 1 shall be 1,500 cfs or 90% of the NRF, whichever is less. From July 1 to December 31, if the Total Minimum Bypass Flow below Station No. 1 shall be reduced by 10%, it will not be taken from the Turners Falls Dam Minimum Flow (Article 110).

⁴The amount of flow needed from Station No. 1 from June 1 to June 30 may be modified in the future pending fish passage effectiveness studies. If the Licensee conducts fish passage effectiveness studies, in consultation with the MDFW, NMFS, and USFWS and determines that migratory fish are not delayed by passing a greater percentage of the Total Minimum Bypass Flow below Station No. 1 via Station No. 1 discharge, the Licensee may file for a license amendment to increase the magnitude of Station No. 1 discharge upon written concurrence of MDFW, NMFS, and USFWS. Prior to filing for a license amendment with the Commission, the Licensee shall consult AW, AMC, CAW, MDEP, NEF and ZO and address any comments of those entities in the license amendment filing.

If the Station No. 1 units are used to maintain the Total Minimum Bypass Flow below Station No. 1, and if some or all of the Station No. 1 units become inoperable, the balance of the flow needed to maintain the Total Bypass flow below Station No. 1 will be provided from either the Turners Falls Dam Minimum Flow (dam or canal gate), Fall River, Turners Falls Hydro, LLC or Milton Hilton, LLC.

The Total Minimum Bypass Flow below Station No. 1 may be temporarily modified if required by equipment malfunction or operating emergencies reasonably beyond the control of the Licensee. If the Total Minimum Bypass Flow below Station No. 1 is so modified, the Licensee shall notify the Commission, MDEP, MDFW, NMFS, and USFWS as soon as possible, but no later than 10 days after such incident. The total bypass flow below Station No. 1 may also be temporarily modified for short periods upon mutual agreement with the Licensee for the Northfield Mountain Pumped Storage Project (FERC No. 2485), MDEP, MDFW, NMFS, and USFWS, and upon 5 days' notice to the Commission.

Article A130. Minimum Flows below Cabot Station

Upon license issuance, the Licensee shall maintain Minimum Flows below Cabot Station, or the NRF, whichever is less, as follows.

Date	Minimum Flow below Cabot Station
01/01-03/31	3,800 cfs or the NRF, whichever is less
04/01-05/31	8,800 cfs from midnight to 7:00 pm or the NRF, whichever is less and 6,500 cfs from 7:00 pm to midnight or the NRF, whichever is less.
06/01-06/15	6,800 cfs or the NRF, whichever is less
06/16-06/30	5,800 cfs or the NRF, whichever is less
07/01-08/31 ¹	1,800 cfs or 90% of the NRF, whichever is less
09/01-11/15 ¹	1,500 cfs or 90% of the NRF, whichever is less
11/16-11/30 ¹	1,500 cfs or 90% of the NRF, whichever is less
12/01-12/31	3,800 cfs or NRF, whichever is less

¹From July 1 to November 30, the Minimum Flow below Cabot Station is 1,800 (07/01-08/31) and 1,500 cfs (09/01-11/30) or 90% of the NRF, whichever is less. If the Minimum Flow below Cabot Station is reduced by 10% during these periods, it will not be taken from the Turners Falls Dam Minimum Flow (Article A110).

The Minimum Flow below Cabot Station may be temporarily modified if required by equipment malfunction or operating emergencies reasonably beyond the control of the Licensee. If the Minimum Flow below Cabot Station is so modified, the Licensee shall notify the Commission, MDEP, MDFW, NMFS, and USFWS as soon as possible, but no later than 10 days after such incident. The Minimum Flow below Cabot Station may also be temporarily modified for short periods upon mutual agreement with the Licensee for the Northfield Mountain Pumped Storage Project (FERC No. 2485), MDEP, MDFW, NMFS and USFWS, and upon 5 days' notice to the Commission.

Article A140. Cabot Station Ramping Rates

Upon license issuance until 3 years after license issuance, the Licensee shall ramp Cabot Station as follows.

Date	Cabot Station Ramping Rates ¹
04/01-06/30	Up and Down Ramping at a rate of 2,300 cfs/hour
07/01-08/15	Up Ramping at a rate of 2,300 cfs/hour from 8:00 am to 2:00 pm

Three years after license issuance, the Licensee shall ramp Cabot Station as follows.

Date	Cabot Station Ramping Rate ¹
04/01-06/30	Up and Down Ramping at a rate of 2,300 cfs/hour

¹If the NRF is greater than the sum of the hydraulic capacity of Cabot Station and Station No. 1 and the Minimum Flow below Turners Falls Dam in effect at the time, the Cabot Station up-ramping rates will not apply.

The Cabot Station Ramping Rates above will take precedence over the Flow Stabilization below Cabot Station (Article A160).

The Cabot Station Ramping Rates may be temporarily modified if required by equipment malfunction or operating emergencies reasonably beyond the control of the Licensee. If the Cabot Station Ramping Rates are so modified, the Licensee shall notify the Commission, MDEP, MDFW, NMFS, and USFWS as soon as possible, but no later than 10 days after such incident. The Cabot Station Ramping Rate may also be temporarily modified for short periods upon mutual agreement with the Licensee for the Northfield Mountain Pumped Storage Project (FERC No. 2485), MDEP, MDFW, NMFS, and USFWS, and upon 5 days' notice to the Commission.

Article A150. Variable Releases from Turners Falls Dam and Variable Flow below Station No. 1

For recreation and ecological conservation purposes, upon license issuance, the Licensee shall provide variable releases from the Turners Falls Dam and a variable flow below Station No. 1 as shown below.

Variable Releases from Turners Falls Dam

Magnitude of Variable Release from Turners Falls Dam	¹ 4,000 cfs, or the NRF, whichever is less
Dates when Variable Releases may occur	² July 1 through October 31
³ Total No. of 2-day events	5 events for a total of 10 Variable Releases, but could potentially be 11 Variable Releases subject to footnote 3
Days of Variable Release for 2 day-events	Saturday and Sunday- must be two consecutive days
Hours of Variable Release	10:00 am to 2:00 pm, 4 hrs/day, Saturday and Sunday
Magnitude of Variable Release from Turners Falls Dam from Saturday at 2:00 pm to Sunday at 10:00 am.	See footnote 4
⁵ Up-Ramping Rates at Start of Variable Release	See footnote 5
⁶ Down-Ramping Rates at End of Variable Release	See footnote 6

¹If the NRF < 2,500 cfs during the scheduled variable release (see footnote 2 below relative to scheduling variable releases), there will be no variable release and it will not be rescheduled.

²The Licensee shall consult American Whitewater (AW), Appalachian Mountain Club (AMC), commercial outfitters, MDEP, MDFW, National Park Service (NPS), New England FLOW (NE FLOW), and USFWS no later than March 1 annually over the license term to develop a mutually agreeable schedule for the variable releases. When developing the schedule, there will be at least one weekend per month, between July 1 and October 31, when no variable releases are provided.

³The Licensee conducts annual canal drawdowns for maintenance purposes resulting in the NRF being passed at the Turners Falls Dam. If the canal drawdown occurs between July 1 and October 31 and the NRF is being passed either on Saturday from 10:00 am- 2:00 pm or Sunday from 10:00 am-2:00 pm, the total number of releases at the Turners Falls Dam shall remain at 10 releases. However, if the canal drawdown does not occur between July 1 and October 31 on Saturday from 10:00 am-2:00 pm or Sunday from 10:00 am-2:00 pm, the Licensee shall provide an additional consecutive day of variable release such that one of the 2-day events is a 3-day consecutive event resulting in a total of 11 releases. The additional day shall either be Friday from 10:00 am-2:00 pm before the scheduled weekend variable release or Monday from 10:00 am-2:00 pm after the scheduled weekend variable release. If there ends up being one 3-day event, the magnitude of release from Friday at 2:00 pm to Saturday at 10:00 am (or Sunday at 2:00 pm to Monday at 10:00 am), shall be computed as noted in footnote 4.

⁴This flow will be calculated as: $[(\text{Variable Flow Release} - \text{Minimum Flow below Turners Falls Dam as defined in Article A110})/2]$. If there is a 3-day event as noted in footnote 3, the variable flow release from Friday at 2:00 pm to Saturday at 10:00 am (or from Sunday at 2:00 pm to Monday at 10:00 am) will be based on the same calculation.

⁵At the beginning of the variable release, if the NRF is > 4,000 cfs, the Licensee shall up-ramp from the Minimum Flow below Turners Falls Dam as defined in Article A110 to 4,000 cfs in two hours, not to exceed 2,000 cfs/hr.

At the beginning of the variable release, if the NRF is between 2,500 and 4,000 cfs, the Licensee shall up ramp at 50% of the NRF per hour.

⁶At the end of the variable release, if Turners Falls Dam variable release is between 2,500 and 4,000 cfs, the Licensee shall down ramp at 50% of the variable release per hour.

Variable Flow below Station No. 1

Magnitude of Variable Flow below Station No. 1	¹ 2,500 cfs, or the NRF, whichever is less
Dates when Variable Flow may occur	² July 1 through October 31
Total No. of 2-day events	7 events for a total of 14 Variable Flows
Days of Variable Flow	Saturday and Sunday- must be two consecutive days
Hours of Variable Flow	10:00 am to 2:00 pm, 4 hrs/day
Magnitude of Variable Flow below Station No. 1 from Saturday at 2:00 pm to Sunday at 10:00 am.	See Footnote 3

¹If the NRF < 2,500 cfs, during the scheduled flow (see footnote 2 below relative to scheduling the flow), there will be no 2,500 cfs flow and it will not be rescheduled.

²The Licensee shall consult AW, AMC, commercial outfitters, MDEP, MDFW, NPS, NE FLOW, and USFWS no later than March 1 annually over the license term to develop a mutually agreeable schedule for the variable flow. When developing the schedule there will be at least one weekend per month, between July 1 and October 31, when no variable flow is provided.

³From July 1 to August 31, the Total Minimum Bypass Flow below Station No. 1 is defined in Article A120. If the NRF is > 1,800 cfs, the Total Minimum Bypass below Station No. 1 shall be 1,800 cfs, or 90% of the NRF, whichever is less. The magnitude of flow below Station No. 1 from Saturday at 2:00 pm to Sunday at 10:00 am from July 1 to August 31 will be computed as follows:

$$(2,500 \text{ cfs} + \text{Total Minimum Flow below Station No. 1 as defined in Article A120})/2.$$

From September 1 to November 15, the Total Minimum Bypass Flow below Station No. 1 is defined in Article A120. If the NRF is > 1,500 cfs, the Total Minimum Bypass below Station No. 1 shall be 1,500 cfs, or 90% of the NRF, whichever is less. The magnitude of flow below Station No. 1 from Saturday at 2:00 pm to Sunday at 10:00 am from September 1 to November 15 will be computed as follows:

$$(2,500 \text{ cfs} + \text{Total Minimum Flow below Station No. 1 as defined in Article A120})/2.$$

When implementing the variable releases from the Turners Falls Dam or the 2,500 cfs flow below Station No. 1, the Licensee is still required to maintain the operational requirements in License Articles A110, A120, A130, A140, A160 and A190.

The above variable release from the Turners Falls Dam and variable flow below Station No. 1 may be temporarily modified if required by equipment malfunction or operating emergencies reasonably beyond the control of the Licensee. If the Turners Falls Dam variable release or variable flow below Station No. 1 are so modified, the Licensee shall notify AW, AMC, commercial outfitters, MDEP, MDFW, NMFS, NPS, NE

FLOW, and USFWS as soon as possible. The Turners Falls Dam variable release or variable flow below Station No. 1 may also be temporarily modified for short periods upon mutual agreement with the Licensee for the Northfield Mountain Pumped Storage Project (FERC No. 2485), AW, AMC, commercial outfitters, MDEP, MDFW, NMFS, NPS, NE FLOW and USFWS.

Article A160. Flow Stabilization below Cabot Station and Allowable Deviations for Flexible Operations

Three years after license issuance, the Licensee shall maintain $\pm 10\%$ of the NRF below Cabot Station as follows.

Date	Flow Stabilization below Cabot Station ¹
04/01-05/15 ²	Provide $\pm 10\%$ of the NRF below Cabot Station from 7:00 pm to midnight, with allowable deviations up to $\pm 20\%$ of the NRF for up to 22 hours total from 04/01-05/15 (the 22 hours will be used from 7:00 pm to midnight).
05/16-05/31 ²	Provide $\pm 10\%$ of the NRF below Cabot Station from 7:00 pm to midnight, with allowable deviations up to $\pm 20\%$ of the NRF for up to 18 hours total from 05/16-05/31 (the 18 hours will be used from 7:00 pm to midnight).
06/01-06/15 ²	Provide $\pm 10\%$ of the NRF below Cabot Station with allowable deviations up to $\pm 20\%$ of the NRF for up to 7 hours total from 06/01-06/15.
06/16-06/30 ²	Provide $\pm 10\%$ of the NRF below Cabot Station with allowable deviations up to $\pm 20\%$ of the NRF for up to 7 hours total from 06/16-06/30.
07/01-08/15 ³	Provide $\pm 10\%$ of the NRF below Cabot Station with allowable deviations up to $\pm 20\%$ of the NRF for up to 55 hours total from 07/01-08/15.
08/16-08/31 ³	Provide $\pm 10\%$ of the NRF below Cabot Station with allowable deviations up to $\pm 20\%$ of the NRF for up to 27 hours total from 08/16-08/31.
09/01-10/31 ³	Provide $\pm 10\%$ of the NRF below Cabot Station with allowable deviations up to $\pm 20\%$ of the NRF for up to 44 hours total from 09/01-10/31.
11/01-11/30 ³	Provide $\pm 10\%$ of the NRF below Cabot Station with allowable deviations up to $\pm 20\%$ of the NRF for up to 11 hours total from 11/01-11/30.

¹If the NRF is greater than the sum of the hydraulic capacity of Cabot Station and Station No. 1 and the Minimum Flow below Turners Falls Dam in effect at the time, the Flow Stabilization below Cabot Station will not apply.

²From April 1 to June 30, the NRF flow may be reduced by 10% or up to 20% for select hours. If the NRF is reduced during this period, the flow will be taken from Cabot Station generation.

³From July 1 to November 30, the NRF flow may be reduced by 10% or up to 20% for select hours. If the NRF is reduced during this period, the flow will not be taken from the Turners Falls Dam Minimum Flow.

Beginning three years after license issuance, the Licensee may deviate from the Flow Stabilization below Cabot Station and Cabot Station Ramping Rates (Article A140) for a certain number of hours in July, August, September, October and November, hereinafter referred to as flexible operations.

The Licensee has restricted discretionary flexible operating capability to respond to elevated energy prices, as defined in paragraph (a) below, from July 1 to November 30, as well as unrestricted capability to respond to emergencies, Independent System Operator-New England (ISO-NE, or its successors)

transmission and power system requirements, and other regulatory requirements as defined in paragraph (b) below.

- (a) The Licensee may deviate from the Flow Stabilization below Cabot Station and Cabot Station Ramping Rates (Article A140). The number of hours of flexible operations, which may be used at the discretion of the Licensee, are as follows.

Date	Allowable Deviations from Cabot Station Ramping Rates (Article A140) and Flow Stabilization below Cabot Station
07/01-07/31	20 hours of flexible operations with no more than 7 flexible events per month
08/01-08/31	26 hours of flexible operations with no more than 7 flexible events per month
09/01-09/30	23 hours of flexible operations with no more than 7 flexible events per month
10/01-10/31	20 hours of flexible operations with no more than 7 flexible events per month
11/01-11/30	28 hours of flexible operations with no more than 7 flexible events per month

- (b) If compliance with the Flow Stabilization below Cabot and Cabot Station Ramping Rates (Article A140) would cause the Licensee to violate or breach any law, any applicable license, permit, approval, consent, exemption or authorization from a federal, state, or local governmental authority, any applicable agreement with a governmental entity, the Licensee may deviate from the Flow Stabilization below Cabot and Cabot Station Ramping Rates (Article A140) to the least degree necessary to avoid such violation or breach. The Licensee may also deviate from the Flow Stabilization below Cabot and Cabot Station Ramping Rates for the following reasons:

- (1) To implement Flood Flow Operations as defined in Article A170.
- (2) To perform demonstrations of the resources' operating capabilities under ISO-NE, or its successors, rules and procedures such as, maintaining the Licensee's capacity accreditation (or its successor) or its fast start reserve eligibility. The Licensee shall seek to perform these demonstrations at times that will not cause it to deviate from the conditions in Articles A110-A160, with recognition that April 1 to June 30 should be avoided, to the maximum extent possible.
- (3) To manage the Turners Falls Impoundment to stay within its licensed operating limits in Article A190, with recognition that deviations from April 1 to June 30 should be avoided to the maximum extent possible.
- (4) If compliance with Articles A110-A160 would cause a public safety hazard or prevent timely rescue.

*ISO-NE, or its successors, (or another recognized entity with responsibilities for regional energy and capacity supply) requirements are circumstances when ISO-NE requires the Licensee to be fully available and, if necessary, responsive.

The Flow Stabilization below Cabot Station may be temporarily modified if required by equipment malfunction or operating emergencies reasonably beyond the control of the Licensee. If the Flow Stabilization below Cabot Station is so modified, the Licensee shall notify the Commission, MDEP, MDFW, NMFS, and USFWS as soon as possible, but no later than 10 days after such incident. The Flow Stabilization below Cabot Station may also be temporarily modified for short periods upon mutual agreement with the Licensee for the Northfield Mountain Pumped Storage Project (FERC No. 2485), MDEP, MDFW, NMFS, and USFWS, and upon 5 days' notice to the Commission.

Article A170. Flood Flow Operations

Upon license issuance, the Licensee shall operate the Project in accordance with its existing agreement with the United States Army Corps of Engineers (USACE). 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 will operate during flood conditions and coordinate its operations with the Licensee of the Northfield Mountain Pumped Storage Project (FERC No. 2485).

Article A180. Cabot Station Emergency Gate Use

Upon license issuance, the Licensee will use the Cabot Station Emergency Gates under the following conditions: a) a Cabot load rejection which could cause overtopping of the canal, b) dam safety issues such as potential canal overtopping or partial breach, and c) to discharge up to approximately 500 cfs from April 1 to June 15 for debris management. The Licensee shall avoid discharging flows higher than 500 cfs through the gates from April 1 to June 15 if practicable; however, if necessary to discharge higher flows, the Licensee shall coordinate with NMFS to minimize potential impacts to Shortnose Sturgeon in the area below Cabot Station.

Article A190. Turners Falls Impoundment Water Level Management

Upon license issuance, the Licensee shall operate the Turners Falls Impoundment, as measured at the Turners Falls Dam, as follows:

- (a) Maintain water levels between elevation 176.0 feet and 185.0 feet National Geodetic Vertical Datum of 1929 (NGVD29).
- (b) Limit the rate of rise of the Turners Falls Impoundment water level to be less than 0.9 feet/hour from May 15 to August 15 from 8:00 am to 2:00 pm. However, if the NRF is greater than the sum of the hydraulic capacity of Cabot Station and Station No. 1 and the Minimum Flow below Turners Falls Dam in effect at the time, the Turners Falls Impoundment rate of rise requirement will not apply.
- (c) The rate of rise of the Turners Falls Impoundment may be temporarily modified if required by equipment malfunction or operating emergencies reasonably beyond the control of the Licensee. If the rate of rise of the Turners Falls Impoundment is so modified, the Licensee shall notify the Commission, MDEP, MDFW, NMFS, and USFWS as soon as possible, but no later than 10 days after such incident. The rate of rise of the Turners Falls Impoundment may also be temporarily modified for short periods upon mutual agreement with the Licensee for the Northfield Mountain Pumped Storage Project (FERC No. 2485), MDEP, MDFW, NMFS, and USFWS, and upon 5 days' notice to the Commission.
- (d) The Licensee may increase the allowable NRF deviation from $\pm 10\%$ to $\pm 20\%$ to better manage Turners Falls Impoundment water levels. The increased flow deviation is limited by the number of hours shown in the first table of Article A160. This allowance for an increased flow deviation is in addition to the exceptions outlined in paragraphs (a) and (b) of Article A160. As such, the increased flow allowable deviations outlined in this paragraph will not count against any time allotment for exceptions outlined in paragraphs (a) and (b) of Article A160. Similarly, operations meeting the exception criteria outlined in paragraphs (a) and (b) of Article A160 will not count against any time allotment for allowable deviations outlined in this paragraph. Allowable flow deviations in excess of

±10% of NRF resulting from conflicting operational requirements will not count against any time allotment for allowable deviations outlined in this paragraph.

Article A200. Project Operation, Monitoring and Reporting Plan

Within 1 year of license issuance, the Licensee shall file with the Commission, for approval, a Project Operation, Monitoring and Reporting Plan describing how the Licensee will document compliance with the operating conditions. The Plan will include the following:

- (a) a description of how the Licensee will comply with Minimum Flows below Turners Falls Dam (Article A110), Total Minimum Bypass Flows below Station No. 1 (Article A120), Minimum Flows below Cabot Station (Article A130), Cabot Station Ramping Rates (Article A140), Variable Releases from Turners Falls Dam and Variable Flow below Station No. 1 (Article A150), Flow Stabilization below Cabot Station (Article A160, implementation starting 3 years after license issuance), and Turners Falls Impoundment Water Level Management (Article A190). These are collectively referred to hereinafter as the operating requirements.
- (b) a provision to file with the Commission, after consultation with the MDEP, MDFW, NFMS, and USFWS, a minimum flow and operation compliance report detailing implementation of the plan, including any allowable deviations that occurred during the reporting period. For the period January 1 to March 31 and July 1 to December 31, the compliance report, including any deviations, will be filed with the Commission by March 1 of the following year. For the months of April, May and June, the monthly compliance report, including any deviations, will be filed with the Commission on June 1, July 1 and August 1, respectively. Upon license issuance until 3 years thereafter, the Licensee shall document on an hourly basis for each day any allowable deviations from the Cabot Station Ramping Rates (Article A140) and demonstrate progress towards meeting the Flow Stabilization below Cabot Station (Article A160). Beginning three years after license issuance until license expiration, the Licensee shall document on an hourly basis for each day any allowable deviations from the Cabot Station Ramping Rates restrictions (Article A140) and Flow Stabilization below Cabot Station restrictions (Article A160). Each day, from April 1 to November 30, the Licensee shall record any allowable deviations in a spreadsheet showing the daily deviations, the reason for the deviation, the number of hours, and scope. The Licensee shall provide the total number of deviations to the MDEP, MDFW, NFMS, and USFWS per the reporting schedule above. Allowable deviations will be tracked as follows:
 - Identify Allowable Deviations: The Licensee shall record the NRF, Turners Falls Dam discharge, Station No. 1 discharge, Cabot Station discharge and total Turners Falls Project discharge (below the Cabot Station tailrace) at the top of each hour. Allowable deviations in both the Cabot Station Ramping Rate and Flow Stabilization below Cabot Station requirements will be recorded. At the top of each hour, the Licensee shall record the change in Cabot Station discharge from the previous hour to determine if any deviation has occurred from the agreed upon Cabot Station Ramping Rate. In addition, the NRF (as detailed in paragraph (b) of the "Operational Regime" section) will be compared with the recorded total Turners Falls Project discharge in a given hour to identify if a Flow Stabilization below Cabot Station deviation occurred over the past hour. Any deviation of either the Cabot Station Ramping Rate or total Turners Falls Project discharge within the hour will be counted in one-hour increments.

- Categorize Allowable Deviations: When an allowable deviation is identified it will be categorized as either Regulatory, as detailed in paragraph (b) of Article A160, NRF Allowance, as detailed in paragraph (d) of the Article A190 or Discretionary, as detailed in paragraph (a) of Article A160.

The Licensee shall develop the Plan after consultation with MDEP, MDFW, NMFS, and USFWS. The Licensee shall include with the Plan documentation of consultation after it has been prepared and provided to MDEP, MDFW, NMFS, and USFWS. The Licensee shall provide a minimum of 30 days for MDEP, MDFW, NMFS, and USFWS to comment and to make recommendations before filing the Plan with the Commission. If the Licensee does not adopt a recommendation, the filing will include the Licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the Plan. Implementation of the Plan will not begin until the Licensee is notified by the Commission that the Plan is approved. Upon Commission approval, the Licensee shall implement the Plan, including any changes required by the Commission.

Article A210. Flow Notification and Website

Within 1 year of license issuance, the Licensee shall provide the following information year-round on a publicly available website:

- On an hourly basis, the Turners Falls Impoundment water elevation, as measured at the Turners Falls Dam, the Turners Falls Dam total discharge, and the Station No. 1 discharge.
- On an hourly basis, the anticipated Turners Falls Dam total discharge and the anticipated Station No. 1 discharge for a 12-hour window into the future. Should the Licensee deviate from passing the 12-hour previous NRF from December 1 to May 31 or the 12-hour average NRF from June 1 to November 30, it will post the revised flows (in the 12-hour look ahead window) to a website as soon as practicable after they are known. Should the Licensee of the Vernon Hydroelectric Project provide the Licensee with flow data more than 12 hours in advance, the Licensee shall publish the information sooner.
- Within one month prior to its annual power canal drawdown, the Licensee shall post on its website the starting and ending time/date of the drawdown, which will last at least 4 days. Throughout the duration of the canal drawdown, the NRF, as defined in Article A110, will be maintained below the Turners Falls Dam.

Article A300. Fish Passage Facilities and Consultation

The Licensee shall implement the following fish passage measures on the schedule specified. When due dates cited in this and other articles are in "years after license issuance," this shall mean on the appropriate date in the specified calendar year after license issuance, regardless of the quarter in which the license is issued. For example, "Year 1 after license issuance" begins on the first January 1 following license issuance.

Upstream Fish Passage

- construct a Spillway Lift at the Turners Falls Dam to be operational no later than April 1 of Year 9 after license issuance.

- (b) rehabilitate the Gatehouse Trapping facility (sampling facility) to be operational no later than April 1 of Year 9 after license issuance.
- (c) retire, either by removal or retaining in place, the Cabot Ladder and the power canal portions of the Gatehouse Ladder within 2 years after the Spillway Lift becomes operational.
- (d) install and operate interim upstream eel passage in the vicinity of the existing Spillway Ladder within 1 year of license issuance and continue operating it until permanent upstream eel passage facilities are operational. The Licensee shall consult MDFW, NMFS, and USFWS on the location and design of the interim eelway(s).
- (e) conduct up to 2 years of eelway siting studies after the Spillway Lift becomes operational, using a similar methodology to relicensing Study 3.3.4 for both years. Based on the 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 Licensee shall consult MDFW, NMFS, and USFWS on the location of the two permanent upstream eel passage facilities. The final eelway siting will take into account the ability to maintain the eelway(s) in light of spillage conditions at the Turners Falls Project. The Licensee will not be required to place any eelways at the foot of any active spillway structures.

Downstream Fish Passage

- (f) Within 4 years¹ of license issuance, replace the existing Cabot Station trashrack structure with a new full depth trashrack with 1-inch clear spacing. The new trashracks will have multiple openings for fish passage, including openings on the top and bottom of the water column. The Licensee will attempt to maximize the hydraulic capacity of these openings within the constraints of the conveyance mechanisms. The Licensee will base detailed design alternatives on the following conceptual design; however, the Parties will remain flexible on design alternatives as necessary to meet fish passage goals.

The new trashrack will have multiple surface entrances including a.) between Cabot Units 2 and 3; b.) between Cabot Units 4 and 5; and c.) at the right wall of the intake (looking downstream) at Cabot Unit 6. The 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 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 5% (685 cfs) of maximum hydraulic station capacity (13,728 cfs). The conveyance at each bypass entrance will be determined during the design phase.

- (g) Within 4 years¹ of license issuance, construct a ¾-inch clear-spaced bar rack at the entrance to the Station No. 1 branch canal.

¹Relative 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. If the License is issued in quarter 1 (Q1, Jan 1-Mar 31) then these two facilities will be operational no later than April 1 of Year 4 after license issuance; if it is issued in Q2 then these two facilities will be operational no later than August 1 of Year 4 after license issuance; and if it is issued after Q2 then these two facilities will be operational no later than April 1 of Year 5 after license issuance.

- (h) Construct a plunge pool downstream of the Turners Falls Dam 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.

Consultation

For any new fish passage facility, the Licensee shall consult and obtain approval from MDFW, NMFS, and USFWS on the facility design and on operation and maintenance procedures. The Licensee shall consult MDFW, NMFS, and USFWS at the 30%, 60%, 90% and 100% design plan milestones. The Licensee shall file the 100% design plans with the Commission, along with documentation of consultation with MDFW, NMFS, and USFWS. If any fish passage adaptive management measures (AMMs) are implemented as discussed in Articles A320 and A330 and require facility design and operation and maintenance procedures, then the Licensee shall follow the same consultation process as the initial fish passage build-out.

The Commission reserves the right to require changes to the design plans. Implementation of the design plans will not begin until the Licensee is notified by the Commission that the design plans are approved. Upon Commission approval, the Licensee shall implement the design plans, including any changes required by the Commission.

Article A310. Schedule of Initial Effectiveness Testing, Consultation Process on Effectiveness Testing Study Plans, and Fish Passage Performance Goals

Schedule of Initial Effectiveness Testing

The Licensee shall complete construction of each fish passage facility, operate the fish passage facility for one season (shakedown year), and then conduct representative and quantitative fish passage effectiveness testing per the schedule below.

Facility	Operational/Shakedown Date	Initial Effectiveness Study Years and Locations to be Tested
Cabot Rack and Downstream Conveyance	Year 4 after license issuance ¹	Years 6-7, the Cabot Downstream Fish Passage Structure and Station No. 1 Rack will be tested.
Station No. 1 Bar Rack	Year 4 after license issuance ¹	
Turners Falls Dam Plunge Pool	Year 9 (by April 1 st) after license issuance	Years 10-11, the Turners Falls Plunge Pool and Spillway Lift will be tested.
Spillway Lift	Year 9 (by April 1 st) after license issuance	

Facility	Operational/Shakedown Date	Initial Effectiveness Study Years and Locations to be Tested
Rehabilitate Gatehouse Trapping Facility (Sampling Facility)	Year 9 (by April 1 st) after license issuance	Not Applicable
Retire Cabot Ladder and Portions of Gatehouse Ladder	No later than Year 11 after license issuance (tied to within 2 years after the Spillway Lift becomes operational).	Not Applicable
Permanent Eel Passage Structure(s)	Year 13 after license issuance	Year 14, the internal efficiency of the permanent eel passage structure(s) will be tested.

¹Relative 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. If the license is issued in quarter 1 (Q1, Jan 1-Mar 31) then these two facilities will be operational no later than April 1 of Year 4 after license issuance; if it is issued in Q2 then these two facilities will be operational no later than August 1 of Year 4 after license issuance; and if it is issued after Q2 then these two facilities will be operational no later than April 1 of Year 5 after license issuance.

Consultation Process on Effectiveness Study Plans

For any initial fish passage effectiveness studies and any subsequent fish passage effectiveness studies required after implementing any AMMs described in Article A320 and A330, the Licensee shall provide the effectiveness study plans to MDFW, NMFS, and USFWS and request comments on the study plans within 30 days. The Licensee shall consult MDFW, NMFS, and USFWS and obtain their approval on the study plans before conducting the effectiveness studies. The Licensee shall file the effectiveness study plans with the Commission, along with any consultation records.

Fish Passage Performance Goals

The Licensee shall compare the effectiveness study results to the following fish passage performance goals:

Downstream Passage

- 95% of juvenile American Shad arriving 500 meters upstream of the Turners Falls Dam survive migration past the Turners Falls Project within 24 hours.
- 95% of adult American Shad arriving 1 kilometer upstream of the Turners Falls Dam survive migration past the Turners Falls Project within 24 hours.
- 95% of American Eel arriving 1 kilometer upstream of the Turners Falls Dam survive migration past the Turners Falls Project within 48 hours of a flow event. The definition of what constitutes a flow event shall be determined by the Licensee in consultation with MDFW, NMFS and USFWS during effectiveness study plan development.

The downstream passage at the Turners Falls Project is project wide and will include all routes of passage (e.g., spill, fish bypass, and turbine passage).

Upstream Passage

- 75% of adult American Shad arriving 500 meters below Cabot Station successfully pass into the Turners Falls Impoundment within 48 hours. The 75% passage efficiency for American Shad will be based on the first 90% of the American Shad run. The effectiveness testing will be conducted over the entire adult American shad run, but the 75% passage efficiency goal will be based on the first 90% of the run as determined by the Licensee as *a posteriori* analysis of run counts. The Licensee will determine where and how run counts will occur in consultation with MDFW, NMFS and USFWS during effectiveness study plan development. The Licensee, MDFW, NMFS and USFWS will revisit whether the 75% passage efficiency goal is achievable or should be reduced, and whether the 48-hour time-to-pass goal is achievable or should be increased, after implementing the first (Tier 1) and second (Tier 2) round of AMMs as described in Article A330.
- An internal passage efficiency of 95% within the permanent passage structure(s) for American Eel. The 95% internal efficiency assumes it is possible for the Licensee to successfully tag up-migrating eels. The Licensee shall consult MDFW, NMFS, and USFWS on the appropriate size American eel, based on available technology, to test the internal efficiency.

Article A320. Downstream Fish Passage- Initial Effectiveness Studies, Adaptive Management Measures and Subsequent Effectiveness Studies

Initial Effectiveness Studies- Years 6 and 7

The Licensee shall conduct initial effectiveness testing in Years 6 and 7 (see Article 310) to evaluate the fish passage survival and time-to-pass of the newly constructed Station No. 1 bar rack and Cabot Rack and Conveyance Structure and compare the findings at individual components (e.g., Cabot Station and Station No. 1) to the performance goals in Article 310. The Licensee shall develop reports by February 1 of Years 7 and 8 for adult American Shad and by April 1 of Years 7 and 8 for juvenile American Shad and adult American Eel summarizing the survival study findings and provide it to MDFW, NMFS, and USFWS. The Licensee shall consult MDFW, NMFS, and USFWS on the effectiveness study results and determine what, if any, adaptive management measures (AMMs) may be implemented from the table below. The Licensee will target any AMMs to those locations where fish passage performance goals are not achieved. The Licensee shall file a report with the Commission to include the effectiveness testing report and documentation of any AMMs agreed to by the Licensee, MDFW, NMFS, and USFWS, along with any consultation records. If warranted, the Licensee shall consult MDFW, NMFS, and USFWS on when to implement the Round 1 AMMs at Station No. 1 and/or Cabot Station.

Effectiveness Testing of Round 1 AMMs at Station No. 1 and/or Cabot Station and Initial Effectiveness Testing at Turners Falls Dam Plunge Pool- Years 10 and 11

The Licensee shall conduct Round 1 AMM effectiveness testing at Station No. 1 and/or Cabot Station and initial effectiveness testing of the Turners Falls Dam plunge pool in Years 10 and 11. The Licensee shall:

- Compare the effectiveness study results to the performance goals in Article 310.
- Provide the effectiveness study report to MDFW, NMFS, and USFWS by February 1 of Years 11 and 12 for adult American Shad and by April 1 of Years 11 and 12 for juvenile American Shad and adult American Eel summarizing the survival study findings.
- Consult MDFW, NMFS, and USFWS to determine what, if any AMMs may be implemented from the table below and target AMMs to those locations where passage performance goals are not achieved.

- File the effectiveness study report and documentation of any AMMs with the Commission.

If warranted, the Licensee shall consult MDFW, NMFS and USFWS on when to implement any Round 2 AMMs at Station No. 1 and/or Cabot Station and Round 1 AMMs at the Turners Falls Dam plunge pool.

Effectiveness Testing of Round 2 AMMs at Station No. 1 and/or Cabot Station and Round 1 AMMs at Turners Falls Dam Plunge Pool- Years 14 and 15

The Licensee shall conduct Round 2 AMM effectiveness testing at Station No. 1 and/or Cabot Station and Round 1 AMMs at the Turners Falls Dam plunge pool in Years 14 and 15. The Licensee shall follow the same consultations steps bulleted above; however, the Licensee shall provide the effectiveness study report to MDFW, NMFS, and USFWS by February 1 of Years 15 and 16 for adult American Shad and by April 1 of Years 15 and 16 for juvenile American Shad and adult American Eel.

If warranted, the Licensee shall consult MDFW, NMFS and USFWS on when to implement any Round 3 AMMs at Station No. 1 and/or Cabot Station and Round 2 AMMs at the Turners Falls Dam plunge pool.

Effectiveness Testing of Round 3 AMMs at Station No. 1 and/or Cabot Station and Round 2 AMMs at Turners Falls Dam Plunge Pool- Years 18 and 19

The Licensee shall conduct Round 3 AMM effectiveness testing at Station No. 1 and/or Cabot Station and Round 2 AMMs at the Turners Falls Dam plunge pool in Years 18 and 19. The Licensee shall follow the same consultations steps bulleted above however, the Licensee shall provide the effectiveness study report to MDFW, NMFS, and USFWS by February 1 of Years 19 and 20 for adult American Shad and by April 1 of Years 19 and 20 for juvenile American Shad and adult American Eel.

MDFW, NMFS, and USFWS have agreed, consistent with the terms of the Flows and Fish Passage Settlement Agreement (March 2023), not to exercise any reserved or other regulatory authority regarding downstream passage to request or require any AMMs other than those listed in the table below for the first 25 years of the license. In addition, MDFW, NMFS, and USFWS have agreed, consistent with the terms of the settlement agreement, that they will not request or require Cabot Station shutdowns over the life of the license.

Downstream Adaptive Management Measures

Adaptive Management Measure (if needed)	Timing
<p><u>Turners Falls Dam</u></p> <ul style="list-style-type: none"> • Modify the bascule gate setting(s) and resultant spill (rate, location). <p><u>Station No. 1</u></p> <ul style="list-style-type: none"> • Install a behavioral barrier. <p><u>Cabot Station</u></p> <ul style="list-style-type: none"> • Modify the downstream passage conveyance design to reduce impact velocities and shear stresses (e.g., pump-back system; gradient reduction; piping, lining); 	<p>Initial Effectiveness Testing at Cabot Station and Station No. 1: Years 6-7.</p> <p>Initial Effectiveness Testing at Turners Falls Dam Plunge Pool and Round 1 Effectiveness Testing for any AMMs implemented at Cabot Station and/or Station No. 1 (if needed): Years 10-11.</p> <p>Round 2 AMM Effectiveness Testing at Cabot Station and/or Station No. 1 (if needed) and Round 1 Effectiveness</p>

Adaptive Management Measure (if needed)	Timing
<ul style="list-style-type: none"> • Modify the downstream passage conveyance design to increase water depth; • Modify the area of flow convergences of the trash trough, Uniform Acceleration Weir, eel pipe, and sluiceway; • Modify the area of flow convergence of the sluiceway and the receiving waters in the Connecticut River (e.g., adjustable lip, velocity control, and plunge pool depth) 	<p>Testing at Turners Falls Dam Plunge Pool (if needed): Years 14-15</p> <p>Round 3 AMM Effectiveness Testing at Cabot Station and/or Station No. 1 (if needed) and Round 2 Effectiveness Testing at Turners Falls Dam Plunge Pool (if needed): Years 18-19</p>

Article A330. Upstream Fish Passage Initial Effectiveness Studies, Adaptive Management Measures and Subsequent Effectiveness Testing

Initial Effectiveness Testing of Adult American Shad- Years 10 and 11

The Licensee shall conduct initial effectiveness testing in Years 10 and 11 (see Article 310) to evaluate upstream fish passage efficiency and time-to-pass at the Cabot Station tailrace, Rawson Island, Station No. 1 tailrace, and at the Spillway Lift through the Gatehouse Ladder exit and compare the findings to the performance goals in Article 310. The Licensee shall develop a report by February 1 of Years 11 and 12 for adult American Shad summarizing the effectiveness study findings and provide it to MDFW, NMFS, and USFWS. The Licensee shall consult MDFW, NMFS, and USFWS on the effectiveness study results and determine what, if any, Tier 1 adaptive management measures (AMMs) from the table below may be implemented.

The Licensee’s implementation of Tier 1 AMMs, if warranted, will be informed by the initial effectiveness testing results. While the overall passage efficiency goal is 75% in 48 hours, there are four locations (or nodes) of interest, where the Licensee can provide enhancements as part of the AMMs for upstream passage efficiency including Cabot Station, Rawson Island, Station No. 1 and the Spillway Lift. If the individual passage efficiency at all four locations is 90% or higher, or if the overall passage efficiency goals are met, no Tier 1 AMMs will be implemented. If the individual passage efficiency at any of the four locations is less than 90%, the Licensee shall target Tier 1 enhancements to achieve an individual location passage efficiency of 90% or higher. However, if the Licensee, MDFW, NFMS, and USFWS agree that improvements can be made at other nodes that would improve the overall passage efficiency a comparable amount as an enhancement to achieve an individual location/node to at least 90%, then that enhancement can be implemented.

If warranted, the Licensee shall consult MDFW, NMFS and USFWS on when to implement the Tier 1 AMMs.

Tier 1 Adaptive Management Measures Effectiveness Testing of Adult American Shad- Years 13 and 14

The Licensee shall conduct Tier 1 AMM effectiveness testing in Years 13 and 14 and conduct the following:

- The Licensee shall compare the effectiveness study results to the performance goals in Article 310.
- The Licensee shall provide the effectiveness study report to MDFW, NMFS and USFWS by February 1 of Years 14 and 15.

- At the election of the Licensee, the Licensee may provide the effectiveness study report to an Independent Peer Review Panel (IPRP) of experts to evaluate the study results. The IPRP will consist of one member selected by the Licensee, one member selected collectively by MDFW, NMFS, and USFWS, and one member selected jointly by the Licensee, MDFW, NMFS, and USFWS. After the IPRP's review of the effectiveness study findings, the IPRP will evaluate the ability to achieve the upstream fish passage performance goals in Article 310 and provide a summary report of its findings to the Licensee, MDFW, NMFS, and USFWS within 3 months of receiving the effectiveness study report.
- If the 75% passage efficiency/48-hour time-to-pass performance goal is not met, the Licensee shall consult MDFW, NMFS, and USFWS to determine whether the 75% passage efficiency goal is achievable or should be reduced, and/or the 48-hour time-to-pass goal is achievable or should be increased. Any modifications to the 75% passage efficiency/48-hour time-to-pass must be agreed to by the Licensee, MDFW, NMFS, and USFWS.
- The Licensee shall consult MDFW, NMFS, and USFWS to determine what, if any, AMMs will be implemented.
- The Licensee shall file the effectiveness study report and documentation of any AMMs with the Commission.

If warranted, the Licensee shall consult MDFW, NMFS and USFWS on when to implement either the remaining Tier 1 AMMs and/or Tier 2 AMMs.

Tier 1 and/or Tier 2 Adaptive Management Measures Effectiveness Testing of Adult American Shad- Years 18 and 19

The Licensee shall conduct any Tier 1 and/or Tier 2 AMM effectiveness testing in Years 18 and 19 and conduct the following:

- The Licensee shall compare the effectiveness study results to the performance goals in Article 310.
- The Licensee shall provide the effectiveness study report to MDFW, NMFS and USFWS by February 1 of Years 19 and 20.
- The Licensee shall file the effectiveness study report and documentation of any AMMs with the Commission.

If, after the Licensee implements additional Tier 1 AMMs and/or Tier 2 AMMs, the overall passage efficiency is greater than 65% or a lesser number as agreed to by the Licensee, MDFW, NMFS, and USFWS, and the overall time-to-pass is less than 60 hours or a higher number as agreed by the same group, then MDFW, NMFS, and USFWS will not exercise any reserved or other regulatory authority to require additional upstream fish passage measures or operational changes.

MDFW, NMFS, and USFWS have agreed, consistent with the terms of the Flows and Fish Passage Settlement Agreement (March 2023), not to exercise any reserved or other regulatory authority regarding upstream passage to request or require any AMMs other than those listed in the table below for the first 25 years of the license. In addition, MDFW, NMFS, and USFWS have agreed, consistent with the terms of the settlement agreement, that they will not request or require Cabot Station shutdowns or a lift at Cabot Station over the life of the license.

Effectiveness Testing of Juvenile American Eel- Year 14

The Licensee shall conduct effectiveness testing in Year 14 to evaluate the internal efficiency of the permanent eelway structure(s) and compare the findings to the performance goals in Article 310.

Upstream Adaptive Management Measures- Tier 1 and 2

Adaptive Management Measure (if needed)	Schedule
Tier 1	
<p><u>Cabot Tailrace and Rawson Island Nodes</u></p> <ul style="list-style-type: none"> Upon license issuance, the Total Minimum Bypass Flow below Station No. 1 from June 1 to June 15 is 4,500 cfs (see Article A120). This AMM includes increasing the Total Minimum Bypass Flow below Station No. 1 from June 1 to June 15 to 6,500 cfs until 90% of the American Shad run enter the Spillway Lift, upon which the Total Minimum Bypass Flow below Station No. 1 will revert to 4,500 cfs. <p>If this adaptative management measure is enacted and after two years of effectiveness testing, it improves the fish passage efficiency and time-to-pass goals, this change may be implemented throughout the remainder of the license, subject to other adaptive management measures. However, even after this change, the 6,500 cfs will revert to 4,500 cfs when 90% of the adult American Shad run enter the Spillway Lift before or within the June 1 to 15 period. The indicator as to when the 90% of the adult American Shad run passes will be determined using a predictive model to be developed by the Licensee in consultation with MDFW, NMFS, and USFWS. The Licensee shall file with the Commission the predictive model results within 6 months of license issuance and it will be updated and/or refined with data collected over intervening years.</p> <p>If this change is implemented, from June 1 to June 15, the Minimum Flow below the Turners Falls Dam (Article A110) must be 4,290 cfs or the NRF, whichever is less; and the Total Minimum Bypass Flow below Station No. 1 (Article A120) must be 6,500 cfs or the NRF, whichever is less.</p> <p><u>Station No. 1 Node</u></p> <ul style="list-style-type: none"> Shift the distribution of the Total Minimum Bypass Flow below Station No. 1 (Article A120) to increase the Total Minimum Flow below Turners Falls Dam (Article A110) from April 1 to June 30 until 90% of the adult American Shad run enter the Spillway Lift, upon which it will revert back to the flow requirements in Articles A110 and A120. The Total Minimum Bypass Flow below Station No. 1 remains the same from April 1 to June 30 as described in Article A120. <p><u>Spillway Lift</u></p> <ul style="list-style-type: none"> Adjust the new plunge pool release and/or bascule gate operation and/or, Adjust the new fish lift attraction water and entrance conditions and/or, Adjust the timing and frequency of lift operations and/or; Adjust the entrance gate. 	<p>Years of Initial Effectiveness Testing: Years 10-11</p> <p>Time Needed to Implement AMM(s): Year 0 since all Tier 1 AMMs are operational</p> <p>Years of Post AMM Effectiveness Testing: Years 13-14</p>

Adaptive Management Measure (if needed)	Schedule
Tier 2	
<p><u>Cabot Tailrace Node</u></p> <ul style="list-style-type: none"> Install a behavioral barrier near the Cabot Station tailrace to guide fish upstream for passage at the Turners Falls Dam. If this AMM is implemented, then the Total Minimum Bypass Flow below Station No. 1 (Article A120) will be reduced from 6,500 cfs to 4,500 cfs (Tier 1 AMM) from June 1 to June 15 for the period of testing the Tier 2 measures. At the end of Tier 2 testing (and provided that the 6,500 cfs extension is not needed to significantly improve passage efficiency or time-to-pass at Rawson Island) either the increased flow of 6,500 cfs (June 1 to June 15) will be implemented or the behavioral barrier but not both unless it is demonstrated that both are needed to make a substantial improvement in passage efficiency or time-to-pass. <p><u>Rawson Island Node</u></p> <ul style="list-style-type: none"> If it is determined that the river channel adjacent to Rawson Island is inhibiting upstream fish passage, then constructing a zone of passage is an AMM. Prior to conducting any work associated with this AMM, the Licensee shall consult MDFW, NMFS, USFWS, recreational boating and Tribal interests and the Massachusetts Natural Heritage and Endangered Species Program (NHESP) on the design of the zone of passage. If the zone of passage is constructed, then the Total Minimum Bypass Flow below Station No. 1 will be reduced from 6,500 cfs to 4,500 cfs (Tier 1 AMM) from June 1 to June 15 for the period of testing the Tier 2 measures. At the end of Tier 2 testing (and provided that the 6,500 cfs extension is not needed to significantly improve passage efficiency or time-to-pass at Rawson Island) the 6,500 cfs will be reduced back to 4,500 cfs. <p><u>Station No. 1 Node</u></p> <ul style="list-style-type: none"> Install a behavioral barrier near the Station No. 1 tailrace to guide fish upstream for passage at the Turners Falls Dam. If this AMM is implemented, then the Turners Falls Dam Spill/Sum of Fall River, Turners Falls Hydro, LLC, Milton Hilton, LLL and Station No. 1 flow split will be returned to the 67%/33%, respectively, from April 1 to June 30. At the end of Tier 2 testing, either the increased Turners Falls Dam Minimum Flow component of the flow split used in Tier 1 will be implemented or the behavioral barrier but not both unless it is demonstrated that both are needed to make a substantial improvement in passage efficiency or time to pass. <p><u>Turners Falls Dam/Fish Lift Node</u></p> <ul style="list-style-type: none"> Internal structural modifications to improve hydraulics for fish movement, as necessary. 	<p>Time Needed to Implement AMM(s): Year 15-16</p> <p>Shakedown: Year 17</p> <p>Years of Post AMM Effectiveness Testing: Years 18-19</p>

Article A340. Fishway Operating Periods¹

The Licensee shall operate the fishways during the following periods:

Upstream eel passage	May 1 to November 15
Upstream anadromous	April 4 to July 15
Downstream passage	April 4 to November 15

¹Future refinement of the timing on an annual or permanent basis may be made by the MDFW, NMFS, and USFWS based on new information and after consultation with the Licensee.

Article A350. Fish Passage Facilities Operation and Maintenance Plan

The Licensee shall develop and implement a Fish Passage Facilities Operations and Maintenance Plan (FOMP). The FOMP shall detail how and when the fishways will be operated and describe routine maintenance activities that will occur both during and outside of the fish passage season. The FOMP will include a provision to provide annual fishway Operation and Maintenance (O&M) reports that summarize the status of the fish passage facilities, identify needed repairs or equipment replacement, etc. The O&M report shall be submitted to the MDFW, NMFS, and USFWS by January 31 annually. The FOMP shall be developed in consultation with and require approval by the MDFW, NMFS, and USFWS prior to submitting the final FOMP to the FERC for approval.

The FOMP shall be completed no later than 6 months after license issuance for the interim upstream eel passage which will be placed into service within 1 year of license issuance per Article A300, and for existing fish passage facilities (i.e., Cabot downstream fish bypass; Cabot Ladder; Spillway Ladder; and Gatehouse Ladder). Thereafter, the same FOMP shall be amended by the Licensee within 6 months prior to the following:

- Any fish passage structures are placed into service, as outlined in the schedule in Article A300;
- Any AMM’s are placed into service, as outlined in the schedule in Articles A320 and A330; and,
- Any operational or facilities modifications resulting from new information obtained from operation of the fish passage facilities pursuant to the annual O&M reports.

FOMP provisions dealing with facilities that are decommissioned over the term of the license may be dropped from revisions of the FOMP after decommissioning.

Article A400. Bald Eagle Protection Plan

The Licensee shall implement the Bald Eagle Protection Plan dated January 2023.

Article A410. Bat Protection Measures

The Licensee shall implement the following measures to protect state or federally listed bat habitat: (1) avoid cutting trees equal to or greater than 3 inches in diameter at breast height within the Turners Falls Project boundary from April 1 through October 31, unless they pose an immediate threat to human life or property (hazard trees); and (2) where non-hazard trees need to be removed, only remove non-hazard trees between November 1 and March 31.

Turners Falls Hydroelectric Project (FERC Project Number 1889)

Bald Eagle Protection Plan



JANUARY 2023

BACKGROUND

The purpose of this plan is to guide the Licensee's management and maintenance of lands at the Turners Falls Hydroelectric Project (Project) over the new license term for the protection of bald eagles.

Although bald eagles have been removed from the endangered species list, bald and golden eagles are still protected under multiple federal laws and regulations including the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

Bald eagles winter along the Connecticut River in the Project area. Bald eagles are known to perch in riverbank trees and forage over the Connecticut River in Project vicinity. As part of licensing, several bald eagles, adults and juveniles, have been observed perching or foraging in the Turners Falls Impoundment (TFI) and Northfield Mountain in both 2014 and 2015, and three occupied bald eagle nests were located within the study area. These nests were found downstream on Third Island (below Cabot Station), near Smead Island, Barton Island in Barton Cove, and along the east bank of the TFI across from Stebbins Island in the upper reaches of the TFI. Since the study, the Licensees staff at the Northfield Mountain Visitor Center have provided anecdotal information on two additional eagle nests located within the TFI. One is located in the vicinity of Kidd's Island either on the Island or the eastern shore in the Town of Northfield and one in Turners Falls, on the hillside in the general vicinity of the Turners Falls Airport runway.

PROTECTION MEASURES

Given the nature and scope of Project operations, no adverse effects on bald eagles are anticipated. In the event that tree removal or construction activities are necessary at the Project, the Licensee shall implement the conservation measures described below to avoid effects to bald eagles.

Prior to any tree clearing within the Project boundary or areas immediately adjacent to the Project boundary by the Licensee or its contractors, the area to be cleared will be observed for bald eagle nests by the Licensee. If practicable, the Licensee should also survey for nests within 660 feet of the proposed clearing because nests adjacent to clearing may also be indirectly affected. If such nests are discovered, the Licensee shall consult the Massachusetts Division of Fisheries and Wildlife (MDFW) and the United States Fish and Wildlife Service (USFWS) prior to tree-clearing activities and the tree-clearing activities shall be performed in accordance with the applicable regulations and guidance (i.e., the National Bald Eagle Management Guidelines, USFWS 2007, or as amended).

During the nesting season (January 1 through September 30), no tree clearing will occur within 330 feet of, and no construction activities will occur within 660 feet of, any known bald eagle nests by the Licensee or its contractors. The National Bald Eagle Management Guidelines advise against conducting external construction and land clearing activities within 660 feet of bald eagle nests during the breeding season. Additionally, the Guidelines recommend maintaining a year-round buffer between nests and tree clearing of at least 330 feet and a year-round buffer between external construction and nests of either 330 or 660 feet, depending on the construction's size, visibility, and local precedence. For any project-related construction activities, work that requires blasting or other activities that produce extremely loud noises within 1/2 mile of active nests will be avoided. The Licensee shall consult with the MDFW and USFWS regarding tree clearing or construction activities that cannot meet these conditions.

Appendix B. Protection, Mitigation, and Enhancement Measures Recommended to be Included in the New Northfield Mountain Pumped Storage Project License

Appendix B: Draft License Articles- Northfield Mountain Pumped Storage Project

Article B100. Project Operations

Upon license issuance, the Licensee shall:

- (a) operate the Northfield Mountain Pumped Storage Project in accordance with its existing agreement with the United States Army Corps of Engineers (USACE). This agreement, memorialized in the Reservoir and River Flow Management Procedures (1976), as it may be amended from time to time, governs how the Project will operate during flood conditions and coordinate its operations with the Licensee of the Turners Falls Hydroelectric Project (FERC No. 1889).
- (b) operate the Northfield Mountain Pumped Storage Project upper reservoir between elevation 1004.5 and 920.0 feet National Geodetic Vertical Datum of 1929 (NGVD29).

Article B200. Fish Intake Protection and Consultation

Intake Protection

The Licensee shall install a barrier net in front of the Northfield Mountain tailrace/intake, having 3/8-inch mesh on the top and 3/4-inch mesh on the bottom. The barrier net design shall be based on the conceptual design in the Amended Final License Application filed with the Commission in December 2020, as modified through consultation with MDFW, NMFS, and USFWS, from June 1 to November 15 to protect out-migrating American Shad and adult American Eel, to be operational no later than June 1 of Year 7 after license issuance.

Consultation

The Licensee shall consult and obtain approval from MDFW, NMFS, and USFWS on the barrier net design and on operation and maintenance procedures. The Licensee shall consult MDFW, NMFS, and USFWS at the 30%, 60%, 90% and 100% design plan milestones. The Licensee shall file the 100% design plans with the Commission, along with documentation of consultation with MDFW, NMFS, and USFWS.

The Commission reserves the right to require changes to the design plans. Implementation of the design plans must not begin until the Licensee is notified by the Commission that the design plans are approved. Upon Commission approval, the Licensee shall implement the design plans, including any changes required by the Commission.

Article B210. Initial Intake Protection Effectiveness Testing and Fish Passage Performance Goals

Initial Effectiveness Testing

The Licensee shall complete construction of the Northfield Mountain barrier net, operate the barrier net for one season (shakedown year), and conduct representative and quantitative effectiveness testing in Years 10 and 11 to evaluate the downstream fish passage survival and time-to-pass compared to the performance goals below.

Consultation Process on Effectiveness Study Plans

For any initial fish passage effectiveness studies and any subsequent fish passage effectiveness studies required after implementing any AMMs described in Article B220, the Licensee shall provide the effectiveness study plans to MDFW, NMFS, and USFWS and request comments on the study plans within

30 days. The Licensee shall consult MDFW, NMFS, and USFWS and obtain their approval on the study plans before conducting the effectiveness study. The Licensee shall file the effectiveness study plans with the Commission, along with any consultation records.

Fish Passage Performance Goals

The Licensee shall compare the effectiveness study results to the following fish passage performance goals:

- 95% of juvenile American Shad arriving 500 meters upstream of the Northfield Mountain Pumped Storage Project tailrace survive migration past the Northfield Mountain Pumped Storage Project tailrace within 24 hours.
- 95% of adult American Shad arriving 1 kilometer upstream of the Northfield Mountain Pumped Storage Project tailrace survive migration past the Northfield Mountain Pumped Storage Project tailrace within 24 hours.
- 95% of American Eel arriving 1 kilometer upstream of the Northfield Mountain Pumped Storage Project tailrace survive migration past the Northfield Mountain Pumped Storage Project tailrace within 48 hours of a flow event. The definition of what constitutes a flow event shall be determined by the Licensee in consultation with MDFW, NMFS, and USFWS during effectiveness study plan development.

Article B220. Downstream Fish Passage- Initial Effectiveness Studies, Adaptive Management Measures and Subsequent Effectiveness Studies

Initial Effectiveness Studies- Years 10 and 11

The Licensee shall conduct initial effectiveness testing in Years 10 and 11 (Article B210) to evaluate the fish passage survival and time-to-pass of the newly constructed barrier net and compare the findings to the performance goals in Article B210. The Licensee shall develop a report by February 1 of Years 11 and 12 for adult American Shad and by April 1 of Years 11 and 12 for juvenile American Shad and adult American Eel summarizing the survival study findings and provide it to MDFW, NMFS, and USFWS. The Licensee shall consult MDFW, NMFS, and USFWS on the effectiveness study results and determine what, if any, adaptive managements measures (AMMs) may be implemented from the table below. The Licensee shall file a report with the Commission to include the effectiveness testing report and documentation of any AMMs agreed to by the Licensee, MDFW, NMFS, and USFWS, along with any consultation records. If warranted, the Licensee shall consult MDFW, NMFS and USFWS on when to implement any Round 1 AMMs.

Effectiveness Testing of Round 1 AMMs - Years 14 and 15

The Licensee shall conduct Round 1 AMM effectiveness testing in Years 14 and 15. The Licensee shall:

- Compare the effectiveness study results to the performance goals in Article B210.
- Provide the effectiveness study report to MDFW, NMFS, and USFWS by February 1 of Years 15 and 16 for adult American Shad and by April 1 of Years 15 and 16 for juvenile American Shad and adult American Eel.
- Consult MDFW, NMFS, and USFWS to determine what, if any AMMs may be implemented from the table below.
- File the effectiveness study report and documentation of any AMMs with the Commission.

If warranted, the Licensee shall consult MDFW, NMFS and USFWS on when to implement any Round 2 AMMs.

Effectiveness Testing of Round 2 AMMs - Years 17 and 18

The Licensee shall conduct Round 2 AMM effectiveness testing in Years 17 and 18. The Licensee shall follow the same consultations steps bulleted above; however, the Licensee shall provide the effectiveness study report to MDFW, NMFS, and USFWS by February 1 of Years 18 and 19 for adult American Shad and by April 1 of Years 18 and 19 for juvenile American Shad and adult American Eel.

MDFW, NMFS, and USFWS have agreed, consistent with the terms of the Flows and Fish Passage Settlement Agreement (March 2023), not to exercise any reserved or other regulatory authority regarding passage to request or require any AMMs other than those listed in the table below for the first 25 years of the license. In addition, they have agreed, consistent with the settlement agreement, not to request or require pumping restrictions at any time over the life of the license.

Downstream Adaptive Management Measures

Adaptive Management Measure (if needed)	Timing
<p><u>Northfield Mountain Intake/Tailrace</u></p> <ul style="list-style-type: none"> • Alter the arrangement and size of the net panels (e.g. extend depth of the smaller panels). • Improve maintenance measures for the net. 	<p>Initial Effectiveness Testing of Barrier Net: Years 10-11.</p> <p>Round 1 AMM Effectiveness Testing (if needed): Years 14-15</p> <p>Round 2 AMM Effectiveness Testing (if needed): Years 17-18</p>

Article B230. Fishway Operating Periods¹

The Licensee shall operate the barrier net for downstream passage from June 1 to November 15.

¹Future refinement of the timing may be made by the MDFW, NMFS, and USFWS based on new information and after consultation with the Licensee.

Article B240. Fish Passage Facility Operation and Maintenance Plan for Barrier Net

The Licensee shall develop and implement a Fish Passage Facilities Operations and Maintenance Plan (FOMP) for the barrier net. The FOMP shall detail how and when the barrier net will be operated and describe routine maintenance activities that will occur both during and outside of the downstream fish passage season. The FOMP will include a provision to provide annual fishway Operation and Maintenance (O&M) reports that summarize the status of the barrier net, identify needed repairs or equipment replacement, etc. The O&M report shall be submitted to the MDFW, NMFS, and USFWS by January 31 annually. The FOMP shall be developed in consultation with and require approval by the MDFW, NMFS, and USFWS prior to submitting the final FOMP to the FERC for approval.

The FOMP shall be completed no later than 6 months prior to the barrier net being placed into service, as outlined in the schedule in Article B200. Thereafter, the same FOMP shall be amended by the Licensee within 6 months prior to the following:

- Any AMM's are placed into service, as outlined in Articles B220; and,
- Any operational or facility modifications resulting from new information obtained from operation of the barrier net pursuant to the annual O&M reports.

Article B300. Bald Eagle Protection Plan

The Licensee shall implement the Bald Eagle Protection Plan dated January 2023.

Article B310. Bat Protection Measures

The Licensee shall implement the following measures to protect state or federally listed bat habitat: (1) avoid cutting trees equal to or greater than 3 inches in diameter at breast height within the Northfield Mountain Pumped Storage Project boundary from April 1 through October 31, unless they pose an immediate threat to human life or property (hazard trees); and (2) where non-hazard trees need to be removed, only remove non-hazard trees between November 1 and March 31.

Northfield Mountain Project (FERC Project Number 2485)

Bald Eagle Protection Plan



JANUARY 2023

BACKGROUND

The purpose of this plan is to guide the Licensee's management and maintenance of lands at the Northfield Mountain Pumped Storage Project (Project) over the new license term for the protection of bald eagles.

Although bald eagles have been removed from the endangered species list, bald and golden eagles are still protected under multiple federal laws and regulations including the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

Bald eagles winter along the Connecticut River in the Project area. Bald eagles are known to perch in riverbank trees and forage over the Connecticut River in Project vicinity. As part of licensing, several bald eagles, adults and juveniles, have been observed perching or foraging in the Turners Falls Impoundment (TFI) and Northfield Mountain in both 2014 and 2015, and two occupied bald eagle nests were located within the study area. These nests were found downstream on Third Island (below Cabot Station), near Smead Island, Barton Island in Barton Cove, and along the east bank of the TFI across from Stebbins Island in the upper reaches of the TFI. Since the study, the Licensees staff at the Northfield Mountain Visitor Center have provided anecdotal information on two additional eagle nests located within the TFI. One is located in the vicinity of Kidd's Island either on the Island or the eastern shore in the Town of Northfield and one in Turners Falls, on the hillside in the general vicinity of the Turners Falls Airport runway.

PROTECTION MEASURES

Given the nature and scope of Project operations, no adverse effects on bald eagles are anticipated. In the event that tree removal or construction activities are necessary at the Project, the Licensee shall implement the conservation measures described below to avoid effects to bald eagles.

Prior to any tree clearing within the Project boundary or areas immediately adjacent to the Project boundary by the Licensee or its contractors, the area to be cleared will be observed for bald eagle nests by the Licensee. If practicable, the Licensee should also survey for nests within 660 feet of the proposed clearing because nests adjacent to clearing may also be indirectly affected. If such nests are discovered, the Licensee shall consult the Massachusetts Division of Fisheries and Wildlife (MDFW) and the United States Fish and Wildlife Service (USFWS) prior to tree-clearing activities and the tree-clearing activities shall be performed in accordance with the applicable regulations and guidance (i.e., the National Bald Eagle Management Guidelines, USFWS 2007, or as amended).

During the nesting season (January 1 through September 30), no tree clearing will occur within 330 feet of, and no construction activities will occur within 660 feet of, any known bald eagle nests by the Licensee or its contractors. The National Bald Eagle Management Guidelines advise against conducting external construction and land clearing activities within 660 feet of bald eagle nests during the breeding season. Additionally, the Guidelines recommend maintaining a year-round buffer between nests and tree clearing of at least 330 feet and a year-round buffer between external construction and nests of either 330 or 660 feet, depending on the construction's size, visibility, and local precedence. For any project-related construction activities, work that requires blasting or other activities that produce extremely loud noises within 1/2 mile of active nests will be avoided. The Licensee shall consult with the MDFW and USFWS regarding tree clearing or construction activities that cannot meet these conditions.

**Appendix C. Measures Agreed to Among the Parties But Not to be Included in
New Project License**

ENVIRONMENTAL

Section C101. Ichthyoplankton Mitigation Fund (Northfield Mountain Project)

The Licensee of the Northfield Mountain Pumped Storage Project (FERC No. 2485) shall provide funding for habitat improvement projects and/or alosine management activities to offset the potential loss of ichthyoplankton through entrainment at the Northfield Mountain Pumped Storage Project. The Licensee shall make payments to the United States Fish and Wildlife Service or its designee per the schedule below by February 1 of each identified year.

Year after License Issuance	Amount
1	\$112,800
13	\$35,000
15	\$220,000
20	\$90,000
25	\$110,000
30	\$294,000
35	\$125,000
40	\$132,481
45	\$177,000
Total	\$1,296,281

Section C102. Cobblestone Tiger Beetle Fund (Turners Falls Project)

The Licensee of the Turners Falls Project (FERC No. 1889) shall provide funding for Cobblestone Tiger Beetle (CTB) conservation and management activities to provide a long-term net benefit to CTB in Massachusetts. The Licensee shall make payments to the Massachusetts Division of Fisheries and Wildlife or its designee per the schedule below by February 1 of each identified year.

Year after License Issuance	Amount
4	\$50,000
5	\$80,000
6	\$100,000
7	\$150,000
8	\$150,000
9	\$150,000
10	\$150,000
11	\$75,000
12	\$75,000
Total	\$980,000

OPERATIONS

Section C103. Agency Support for Flow Data from Licensee of Vernon Hydroelectric Project (Turners Falls and Northfield Mountain Projects)

The Massachusetts Division of Fisheries and Wildlife (MDFW) shall independently request from the Commission, at the same time the Settlement Agreement is filed, that the Licensee of the Vernon Hydroelectric Project (Vernon Project, FERC No. 1904) shall provide to the Licensees of the Turners Falls Hydroelectric Project (FERC No. 1889) and Northfield Mountain Pumped Storage Project (FERC No. 2485) the following upon license issuance:

- Electronically provide by 8:00 am of each day, the next day's 24 hour anticipated Vernon Project total discharge. The next day's 24-hour anticipated Vernon Project total discharge will be updated once the day ahead power bidding market closes and Independent System Operator-New England (ISO-NE) issues the day ahead schedule. If ISO-NE updates the day ahead hourly Vernon Project total discharge, then that revised schedule shall be provided to the Licensees within 2 hours of the Vernon Project Licensee receiving an update from ISO-NE.
- Electronically provide the instantaneous Vernon Hydroelectric Project total discharge and tailwater elevation.

Section C104. Licensee Reporting on Flow Stabilization below Cabot Station Measures for Years 1 -3 after License Issuance (Turners Falls Project)

Upon license issuance, the Licensee shall implement the proposed Flow Stabilization below Cabot Station as defined in Article A160. *Flow Stabilization below Cabot Station and Allowable Deviations for Flexible Operations*¹, recognizing that it will not be required to demonstrate to the Federal Energy Regulatory Commission (FERC), or the Parties, that it is meeting the Flow Stabilization below Cabot Station requirements until the third (3rd) anniversary of the date of license issuance. The Licensee shall provide the Parties an annual report (by March 1 of the following year) for Years 1 and 2 and quarterly reports for Year 3 to demonstrate substantive progress towards implementing the Flow Stabilization below Cabot Station. Quarterly reports for January 1 to March 31, April 1 to June 30, July 1 to September 30 and October 1 to December 31 shall be provided to the Parties by June 1, September 1, December 1 and March 1 (of the following year), respectively.

¹The Flow Stabilization below Cabot Station is based on providing a percentage of the naturally routed flow (NRF). The NRF is defined in Article A110. *Minimum Flows below Turners Falls Dam* as follows:

From December 1 through June 30, the NRF is defined as the hourly sum of the discharges from 12 hours previous as reported by the: Vernon Hydroelectric Project (FERC No. 1904), Ashuelot River United States Geological Survey gauge (USGS, Gauge No. 01161000), and Millers River USGS gauge (Gauge No. 01166500).

From July 1 through November 30, the NRF is defined as the hourly sum of the discharges averaged from 1 to 12 hours previous as reported by the: Vernon Hydroelectric Project, Ashuelot River USGS gauge, and Millers River USGS gauge. Upon license issuance until 3 years thereafter, the Licensee shall operate the Turners Falls Project based on the NRF computational method from July 1 through November 30 to determine if the Turners Falls Project can be operated in this manner. If the Turners Falls Project cannot

be operated in this manner, the Licensee shall consult Massachusetts Division of Fisheries and Wildlife, National Marine Fisheries Service and United States Fish and Wildlife Service on alternative means of computing the NRF that are feasible for Turners Falls Project operation and sufficiently dampen upstream hydroelectric project flexible operations.

Appendix D. Authorized Representatives of the Parties

FirstLight

Justin Trudell
Chief Operating Officer
FirstLight Power
111 Soth Bedford Street, Suite 103
Burlington, MA 01803
Phone: 781-653-4247
Email: justin.trudell@firstlightpower.com

American Whitewater

Bob Nasdor
Northeast Stewardship & Legal Director
American Whitewater
65 Blueberry Hill Lane
Sudbury, MA 01776
Phone: 617-584-4566
Email: bob@americanwhitewater.org

Appalachian Mountain Club

Mark Zakutansky
Director of Conservation Policy Engagement
Appalachian Mountain Club
45 Jordan Road, PO Box 527
Albrightsville, PA 18210
Phone: 610-868-6915
Email: mzakutansky@outdoors.org

Crab Apple Whitewater, Inc.

Frank Mooney
River Manager/Ownership Family
Crab Apple Whitewater, Inc.
PO Box 295
Charlemont, MA 01339
Phone: 413-824-1842
Email: frank@crabapplewhitewater.com

Massachusetts Division of Fisheries and Wildlife

Todd Richards
Assistant Director of Fisheries
Massachusetts Division of Fisheries and Wildlife
1 Rabbit Hill Road
Westborough, MA 01581
Phone: 508-389-6336
Email: todd.richards@mass.gov

Everose Schluter
Assistant Director of Natural Heritage & Endangered Species Program
Massachusetts Division of Fisheries and Wildlife
1 Rabbit Hill Road
Westborough, MA 01581
Phone: 508-389-6346
Email: eve.schluter@mass.gov

National Marine Fisheries Service

Christopher Boelke
Chief, New England Branch
Habitat and Ecosystem Services Division
NOAA Fisheries, Greater Atlantic Regional Fisheries Office
55 Great Republic Drive
Gloucester, MA 01930
Phone: 978-281-9131
Email: christopher.boelke@noaa.gov

New England Flow

Tom Christopher
New England FLOW
240 Fort Pond Road
Lancaster, MA 01523
Phone: 508-331-4889
Email: tom.christopher@comcast.net

The Nature Conservancy

Katie Kennedy
Applied River Scientist
North America Region
The Nature Conservancy
PO Box 32
Chesterfield, MA 01012
Phone: 413-588-1959
Email: kkennedy@tnc.org

United States Fish and Wildlife Service

Supervisor
New England Field Office
U.S. Fish and Wildlife Service
70 Commercial Street, Suite 300
Concord, NH 03301-5087
Phone: 603-223-2541
Email: newengland@fws.gov

Zoar Outdoor

Janet Cowie
Zoar Outdoor
PO Box 245
Charlemont, MA 01339
Phone: 413-339-4010
Email: janet@zoaroutdoor.com

**APPENDIX B: RECREATION SETTLEMENT
AGREEMENT, JUNE 2023**



FirstLight Power
111 South Bedford Street, Suite 103
Burlington, MA 01803
Ph.: (781) 653-4247
Email: justin.trudell@firstlightpower.com

Justin Trudell
Chief Operating Officer

June 12, 2023

Via Electronic Filing

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

Re: Turners Falls Hydroelectric Project (FERC No. 1889), FirstLight MA Hydro LLC, Northfield Mountain Pumped Storage Project (FERC No. 2485), Northfield Mountain LLC, Recreation Settlement Agreement and Explanatory Statement

Dear Secretary Bose:

Pursuant to Rule 602 of the Rules of Practice and Procedure of the Federal Energy Regulatory Commission (“FERC” or “Commission”),¹ FirstLight MA Hydro LLC, owner and operator of the Turners Falls Hydroelectric Project (“Turners Falls Project”) and Northfield Mountain LLC, owner and operator of the Northfield Mountain Pumped Storage Project (“Northfield Mountain Project”) (collectively, “FirstLight”), are pleased to submit the attached Recreation Settlement Agreement for the relicensing of the Turners Falls Project and Northfield Mountain Project (together, “Projects”). Also enclosed is FirstLight’s Explanatory Statement as required by Rule 602.

The Recreation Settlement Agreement (“RSA”) was executed among FirstLight and the National Park Service, Massachusetts Department of Conservation and Recreation, Franklin Regional Council of Governments, Towns of Erving, Gill, Montague and Northfield, Massachusetts, American Whitewater, Appalachian Mountain Club, Crab Apple Whitewater, Inc., New England FLOW, Zoar Outdoor, Access Fund, and Western Massachusetts Climbers Coalition (“Recreation Settling Parties”). FirstLight wishes to express its great appreciation to each of these entities for their efforts in achieving this important milestone and the collaborative spirit in which they engaged to achieve this agreement.

The Recreation Settlement Agreement is a package that resolves all issues among the Recreation Settling Parties pertaining to recreation, except recreational flow releases, which are included in the Flows and Fish Passage Settlement Agreement filed with the Commission on March 31, 2023. While recognizing that regulatory processes related to the relicensing of the Projects are not yet completed, the Recreation Settlement Agreement reflects agreement as to FirstLight’s obligations with regard to recreation at the Projects. It further reflects agreement among the Recreation Settling Parties concerning recommendations, terms, conditions, and prescriptions to be submitted to the Commission pursuant to Sections 10(a) of the Federal Power Act.

¹ 18 C.F.R. § 385.602 (2022).

The Recreation Settlement Agreement includes a single proposed license article for each Project as set forth in Appendices A and B requiring FirstLight to implement the Recreation Management Plan (May 2023) (“RMP”), which is attached as Appendix E. The RMP supersedes the proposed recreation management plans FirstLight included with its December 2020 Amended Final License Applications as well as the Agreement in Principle on recreation FirstLight filed with the Commission on February 28, 2022. In addition to maintaining the extensive existing recreation facilities at the Projects, under the RMP FirstLight would construct numerous new recreation facilities and upgrades. These include, for example: establishing several new public recreation access points to the Connecticut River including campsites, parks and picnic areas, boater put-ins, portages, and trails; constructing improvements at the Boat Tour Dock; establishing conservation restrictions on FirstLight-owned lands within the Project boundaries totaling 761.4 acres; constructing several miles of new mountain biking trails; establishing Rose Ledges, a climbing area, as a Project recreation facility; making improvements to meet Americans with Disabilities Act requirements; and installing historical and cultural interpretive signage at several locations throughout the Projects. The total cost of these improvements will be almost \$6 million, representing a substantial investment by FirstLight in the local communities.

Appendix C of the RSA includes measures that the Recreation Settling Parties do not intend to be incorporated into the new licenses for the Projects but are included for the Commission’s information only. The measures in Appendix C include installation of a potential additional pocket park, a conservation restriction at Farley Ledges for rock climbing, establishment of a Recreation Advisory Group, and coordinating advertising of Project recreation facilities with the local communities. To facilitate the conservation restriction at Farley Ledges, FirstLight seeks Commission approval to revise the Northfield Mountain Project boundary to exclude a portion (52.3 acres) of Farley Ledges that is not needed for Project purposes and has attached to its Explanatory Statement a proposed revised Exhibit G map showing the proposed boundary change.

Appendix D of the Recreation Settlement Agreement lists the authorized representative for each Settling Party.

Collectively, the recreational improvements in the RMP reflect the preferences and priorities of federal and state agencies, local communities, and recreation users as articulated by the Recreation Settling Parties. As such, FirstLight asks that the Commission approve the RMP as proposed and without material modification in the public interest.

In accordance with Rule 602(d)(2), FirstLight hereby notifies all relicensing participants that unless otherwise provided by the Commission, comments on the RSA must be filed on or before July 3, 2023, and reply comments must be filed on or before July 12, 2023.

Please do not hesitate to contact the undersigned if you have questions or require additional information regarding the attached.

Respectfully,

A handwritten signature in black ink, appearing to read "J. Trudell". The signature is written in a cursive style with a large initial "J" and a long horizontal stroke.

Justin Trudell
Chief Operating Officer

Enclosures: Explanatory Statement, Recreation Settlement, Proposed Revised Northfield Mountain Exhibit G

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

**FirstLight Hydro MA LLC)
Northfield Mountain LLC)**

**Project Nos. 1889-____
2485-____**

**RECREATION SETTLEMENT AGREEMENT
EXPLANATORY STATEMENT**

JUNE 12, 2023

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

FirstLight Hydro MA LLC)	Project Nos. 1889-___
Northfield Mountain LLC)	2485-___

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	BACKGROUND	3
III.	OVERVIEW OF THE RECREATION SETTLEMENT MEASURES.....	7
	A. Proposed License Terms and Conditions.....	7
	1. Proposed License Articles for the Turners Falls and Northfield Mountain Projects.....	7
	2. RMP	7
	3. Fifty-Year License Terms	11
	B. Off-License Provisions	12
	1. Additional Pocket Park	12
	2. Farley Ledges Conservation Restriction.....	12
	3. Recreation Advisory Group	13
	4. Advertising.....	13
III.	CONCLUSION.....	13

Attachment A - Proposed Exhibit G Map

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

FirstLight Hydro MA LLC)	Project Nos. 1889-___
Northfield Mountain LLC)	2485-___

**RECREATION SETTLEMENT AGREEMENT
EXPLANATORY STATEMENT**

I. INTRODUCTION

Pursuant to Rule 602 of the Rules of Practice and Procedure of the Federal Energy Regulatory Commission (“FERC” or “Commission”),¹ FirstLight Hydro MA LLC, owner and operator of the Turners Falls Hydroelectric Project (“Turners Falls Project”) and Northfield Mountain LLC, owner and operator of the Northfield Mountain Pumped Storage Project (“Northfield Mountain Project”) (collectively, “FirstLight”), hereby submit this Explanatory Statement in support of the Recreation Settlement Agreement for the relicensing of the Turners Falls Project and Northfield Mountain Project (“Recreation Settlement Agreement”).

The Recreation Settlement Agreement was executed among FirstLight and the National Park Service (“NPS”), the Massachusetts Department of Conservation and Recreation (“MDCR”), Franklin Regional Council of Governments, the Towns of Erving, Gill, Montague and Northfield, Massachusetts, Access Fund, American Whitewater, Appalachian Mountain Club (“AMC”), Crab Apple Whitewater, Inc., New England FLOW, Western Massachusetts Climbing Coalition, and Zoar Outdoor (“Recreation Settling Parties”).²

¹ 18 C.F.R. § 385.602 (2022).

² The other Recreation Settling Parties have had an opportunity to review this Explanatory Statement in advance but FirstLight takes sole responsibility for its content.

The Recreation Settlement Agreement is a package that, by its terms, addresses all of the issues among the Recreation Settling Parties pertaining to recreation for relicensing of the Turners Falls Project and Northfield Mountain Project (“Projects”), with the exception of recreational boating flows which are addressed in a separate Flows and Fish Passage Settlement Agreement.³ While recognizing that regulatory processes related to the relicensing of the Projects are not yet completed, the Settling Parties expressly intend that the Recreation Settlement Agreement establish FirstLight’s obligations with regard to non-flow recreation measures at the Projects. The Recreation Settlement Agreement reflects agreement among the Recreation Settlement Parties concerning recommendations, terms, and conditions to be submitted to the Commission pursuant to Section 10(a) of the Federal Power Act (“FPA”) regarding this topic.⁴

To this end, the Recreation Settlement Agreement includes proposed license articles for the Projects as set forth in Appendices A (Turners Falls Project) and B (Northfield Mountain Project). The proposed license articles would require FirstLight to implement a Recreation Management Plan (May 2023) (“RMP”),⁵ which is Appendix E to the Recreation Settlement Agreement. Consistent with the Recreation Settlement Agreement, FirstLight requests that the Commission adopt the proposed license articles in the new licenses for the Projects and approve the RMP. FirstLight further requests that the Commission not include in the new licenses for the Projects or the RMP any requirement that constitutes a material modification of, or addition to, the

³ FirstLight filed the Flows and Fish Passage Settlement Agreement (March 2023) with FERC on March 31, 2023.

⁴ See Recreation Settlement Agreement, Sections 2.1, 4.2.1.

⁵ The RMP, if approved by the Commission, would supersede the recreation management plans FirstLight filed with its Amended Final License Applications (“AFLA”) on December 4, 2020.

proposed license articles or that is otherwise inconsistent with the RMP or this Recreation Settlement Agreement.⁶

As explained in this document and as supported by substantial evidence in the record of this proceeding, the RMP measures adequately protect and enhance public recreation at the Projects and thus are in the public interest. Approving the RMP as proposed by the Recreation Settling Parties, which include federal and state resource agencies, local communities, and a broad range of other stakeholders with interests in recreation, also would be consistent with the Commission's long-standing policy favoring licensing settlement agreements.⁷

The Recreation Settlement Agreement also includes measures, set forth in Appendix C, which the Recreation Settling Parties do not intend to be incorporated into the new licenses for the Projects. Appendix C is included for the Commission's information only. The measures in Appendix C include FirstLight's commitments to Recreation Settling Parties that relate to recreation activities outside the Project boundaries, are intended to promote community development, exceed regulatory requirements, or are otherwise inappropriate as license conditions. As such, they are not required to address FirstLight's obligations under the FPA and are not subject to FERC's jurisdiction.⁸

II. BACKGROUND

The Turners Falls Project is located on the Connecticut River in Massachusetts at river mile 122. The Turners Falls Dam creates the Turners Falls Impoundment ("TFI"), extending upstream approximately 20 miles to the Vernon Hydroelectric Project (FERC No. 1904). The

⁶ Sections 1.3.6 and 1.3.7 of the Recreation Settlement Agreement define the term "Inconsistent with this Settlement Agreement."

⁷ *Settlements in Hydropower Licensing Proceedings under Part I of the Federal Power Act*, 116 FERC ¶ 61,270 at P 2 (2006).

⁸ *See id.* at P 7.

Turners Falls Project also includes a gatehouse, a power canal, two hydroelectric plants located on the power canal named Station No. 1 and Cabot Station, and fish passage facilities. Cabot Station is the largest conventional hydroelectric station in Massachusetts at over 62 megawatts (“MW”). Between the Turners Falls Dam and Cabot Station tailrace there is an approximately 2.5-mile-long bypass reach; Station No. 1 discharges into the bypass approximately 0.9 miles below the Turners Falls Dam.

The TFI also serves as the lower impoundment for the Northfield Mountain Project, an approximately 1,168 MW pumped storage project in Northfield, Massachusetts that includes an off stream upper reservoir. The Northfield Mountain Project is the largest pumped storage project in New England.

The current licenses for the Turners Falls Project and Northfield Mountain Project were issued on May 5, 1980, and May 14, 1968, respectively. Both licenses expired on April 30, 2018, and the Projects have been operating under annual licenses issued by the Commission.

FirstLight commenced the relicensing process by filing a Notice of Intent and Pre-Application Document (“PAD”) on October 31, 2012. In the PAD, FirstLight indicated that it would use the Integrated Licensing Process (“ILP”) to relicense the Projects. Pursuant to the ILP, FirstLight then engaged with relicensing participants, FERC and the public in scoping environmental issues related to the Projects and in developing and implementing a rigorous study plan to assess the Projects’ environmental impacts and recreation needs. As required by the FPA, FirstLight filed a Final Application for New License for the Projects with FERC two years prior to expiration of the existing licenses, on April 29, 2016.

Because certain environmental studies required by FERC had not yet been completed in 2016, FirstLight filed AFLAs for each Project on December 4, 2020. The AFLAs included

FirstLight's proposed protection, mitigation, and enhancement measures to be included in the new licenses and the scientific and evidentiary basis for those measures. Included with the AFLAs was a proposed recreation management plan for each Project. FirstLight's recreation proposal was based on its relicensing studies which, in FirstLight's view, showed that its existing recreation facilities, combined with informal access and other public recreation sites, currently provide the public with a diversity of recreation opportunities and an abundance of options for accessing and utilizing Project lands and waters for recreation that is sufficient to meet forecasted demand. Nonetheless, FirstLight proposed several enhancements to existing Project recreation sites and new or modified recreation sites in the AFLAs.

In 2017, FirstLight began formal settlement discussions with relicensing participants. The initial focus of these discussions was with state and federal fish and wildlife agencies and certain conservation organizations on fish passage and stream flows for aquatic species protection. Following submittal of the AFLAs, FirstLight, the state and federal fish and wildlife agencies, and conservation organizations resumed discussions on fish passage and flows. The discussions ultimately expanded to include discussions with interested parties on flow releases for recreational boating. Those discussions resulted in the Flows and Fish Passage Settlement Agreement (March 2023), filed with the Commission on March 31, 2023.⁹

In parallel discussions, FirstLight engaged in extensive stakeholder outreach on non-flow recreation measures. These discussions led to an Agreement in Principle on recreation which FirstLight filed with the Commission on February 28, 2022. The Recreation Settling Parties temporarily deferred a final settlement on recreation while relicensing stakeholders explored the

⁹ The Flows and Fish Passage Settlement Agreement superseded an Agreement in Principle on whitewater boating flow releases filed with FERC on February 28, 2022.

possibility of a comprehensive settlement involving all relicensing issues. On January 12, 2023, FERC issued a letter instructing FirstLight to submit any settlement agreements for the Commission's consideration by March 31, 2023.¹⁰ The Recreation Settling Parties were not able to meet this deadline. However, the Recreation Settling Parties have now finalized the settlement and are submitting it for the Commission's consideration. The Recreation Settlement Agreement supersedes the Agreement in Principle on recreation previously filed with FERC.

In the Recreation Settlement Agreement, FirstLight has agreed to implement a number of recreation improvements in addition to those it proposed in the AFLAs. These better reflect the preferences and priorities of federal and state agencies, local communities, and recreation users as articulated during the extensive negotiations over the RMP. In addition, the Recreation Settling Parties anticipate a higher level of recreation use at the Project as a result of the increased flows in the bypass reach of the Connecticut River provided in the Flows and Fish Passage Settlement Agreement. The Recreation Settlement Agreement includes recreation facilities and amenities to account for such increased use as well as to attract additional recreation users to the Project area for the benefit of the local economy. The total cost of the recreation improvements in the Recreation Settlement Agreement RMP is almost \$6 million, representing a substantial investment by FirstLight in the local communities.

¹⁰ Letter from Vincent Yearick, FERC, to Alan Douglass, FirstLight, at 2, Project Nos. 1889-085 and 2485-071 (issued Jan. 12, 2023).

III. OVERVIEW OF THE RECREATION SETTLEMENT MEASURES

A. Proposed License Terms and Conditions

1. Proposed License Articles for the Turners Falls and Northfield Mountain Projects

Proposed License Article A100 for the Turners Falls Projects and B100 for the Northfield Mountain Project would require FirstLight to implement the RMP.

2. RMP

The RMP contains FirstLight's commitments to enhancing public recreation at the Projects for the next license term. For convenience and to avoid having to submit two separate and overlapping RMPs, recreational improvements for both Projects are contained in a single RMP. The RMP designates which recreational improvements pertain to which Project.

Section 5 of the RMP describes and lists the recreational facilities and amenities currently in place at the Projects. Section 6 describes the new recreation sites to be constructed as well as the proposed upgrades to existing sites. Table 6.3-1 of the RMP contains a comprehensive listing and summary of all existing and proposed recreational facilities and features under the RMP. Section 7 of the RMP provides an implementation schedule for the new facility construction and upgrades. FirstLight's commitments to manage and maintain the existing and new facilities are found in Section 8 of the RMP.

Section 4 of the RMP sets forth a number of programmatic or non-Project specific commitments of FirstLight. Highlights of these components are:

Ten-Year Comprehensive Review. The RMP Section 4.1.1 commits FirstLight to conduct a comprehensive review of recreation at the Projects every 10 years to evaluate recreation use and demand. FirstLight will review the information it collects from its recreation facilities, along with information which it will gather from the Recreation Settling Parties. Any updates to the RMP will

be based on consensus among the Recreation Settling Parties and FirstLight. FirstLight will file any updated RMP for FERC's approval. If no updates are proposed, FirstLight will file an explanation of why no changes are needed along with any written comments from consulted entities.

Americans with Disabilities Act. Under RMP Section 4.1.2, for any new construction or rehabilitation of existing Project recreation buildings and facilities, FirstLight will comply with applicable state and federal disability access standards. In addition, within two years of license issuance, FirstLight will conduct a comprehensive assessment of existing Project recreation facilities for consistency with Americans with Disabilities Act ("ADA") requirements. FirstLight will implement applicable ADA improvements within a reasonable period.

Conservation Restrictions. RMP Sections 4.2.1 and 4.3.1 provide that FirstLight will place certain lands it owns within the Project boundaries that are not used for specific Project activities into conservation restriction. These include lands along the river right immediately downstream of the Turners Falls Dam, as well as lands along the TFI. Details will be worked out in consultation with the relevant towns and with MDCR.

FirstLight also will permanently conserve its lands within the Bennett Meadow Wildlife Management Area managed by the Massachusetts Division of Fisheries and Wildlife ("MDFW") in consultation with MDFW. FirstLight will further consult with NPS, the Town of Erving, MDCR, and AMC to conserve, by way of a permanent trail easement, an approximately 1.3-mile long portion of the New England National Scenic Trail that lies inside the Northfield Mountain Project boundary on the eastern side of the Project's upper reservoir.

FirstLight recognizes the Commission may need to approve any conveyances of Project property rights to third parties.¹¹

Flow and Water Level Notification Website. Under Section 4.2.2, FirstLight will provide certain real-time and forecasted data on a website accessible to the public to facilitate recreational use of the Project area. FirstLight will provide hourly TFI water level information measured at the Turners Falls Dam, Turners Falls Dam spill rates, and Station No. 1 discharges. The real-time data will be posted year-round, 24 hours a day.

FirstLight also will include on the website the Naturally Routed Flow (“NRF”),¹² the anticipated Turners Falls Dam spill rate, and the anticipated Station No. 1 discharge for a 12-hour window into the future at any given time. Should FirstLight deviate from passing the 12-hour previous NRF, it will post the revised flows (in the 12-hour look ahead window) to the website as soon as practicable after those flows are known.

Cabot Camp. Cabot Camp consists of multiple structures that are in varying states of disrepair due to insect and animal damage. It is not suitable for use in its current condition. Cabot Camp is not currently designated as a Project recreational facility. Section 4.2.3 of the RMP provides that FirstLight, in consultation with the Town of Montague, will attempt to find a qualified organization to take responsibility for preserving the Cabot Camp historic buildings. FirstLight will conduct a topographic and property survey and a condition assessment of the Cabot Camp parcel and will conduct a market/redevelopment study in collaboration with the Town. If no acceptable means to otherwise preserve the historic structures of Cabot Camp is identified,

¹¹ See Form L-3, Terms and Conditions of License for Constructed Major Project Affecting Navigable Waters of the United States, Article 5, 54 F.P.C. 1817, 1818-19 (1975).

¹² For the definition of the NRF, see Appendix A to Flows and Fish Passage Settlement Agreement, Proposed License Article A110.

FirstLight will repurpose the property for other recreation or alternative use consistent with the FERC-approved Historic Properties Management Plan.

In addition to these programmatic components, FirstLight has agreed to a broad range of new recreational facility construction projects and upgrades to existing sites. These improvements are described in detail in Section 6 of the RMP. They include, for the Turners Falls Project:

- Construct a new pocket park (viewing location, picnic table) at the Pauchaug-Schell Bridge Greenway with signage for historical and cultural interpretation.
- Construct a new paddle access campsite at Mallory Brook or alternate location.
- Construct a new formal access trail and put-in at Cabot Camp with picnic area.
- Construct a new car-top access and put-in at the eastern end of Unity Park, with a means of storing and locking vessels, and reconfigure the Unity Park parking lot to improve vehicle and pedestrian safety.
- Construct a new river access and two put-ins below Turners Falls Dam, one for whitewater rafters closer to the dam and the other to accommodate pass-through boaters who want to avoid Peskeomskut Island.
- Construct a new viewing platform and picnic area below Turners Falls Dam.
- Construct a new river access trail for fishing and non-motorized boats to a put-in just upstream of the Station No. 1 tailrace.
- Install new stairs at the Cabot Woods fishing area just below Rock Dam.
- Construct a new portage trail around Rock Dam for boaters who may want to avoid the sizable vertical drop.
- Improve the existing Poplar Street river access by installing timber stairs with a boat slide railing leading to a concrete landing; anchor a gangway to the concrete abutment which will lead to a floating dock.
- Install interpretive cultural signage at key locations in consultation with area Tribes and the Town of Montague.

For the Northfield Mountain Project:

- Enhance existing trails at Bennett Meadow and add historical and cultural interpretive signage.

- Relocate the Boat Tour Dock further upstream to avoid the fish barrier net that will be installed under the Flows and Fish Passage Settlement Agreement.
- Construct a new, ADA-accessible dock layout in place of the current Boat Tour Dock that will support motorboats, canoes, kayaks, and the Tour Boat.
- Construct approximately five miles of new trails for mountain biking to be incorporated into the existing trail system.
- Provide paddle access camping at a new campsite in the Barton Cove area.
- Establish Rose Ledges as a Project recreation facility to ensure continued use of the area for rock climbing.
- Provide a means to lock canoes and kayaks during the day at the Barton Cove canoe and kayak rental facility in the picnic area.

In total, these improvements will significantly enhance the recreation experience for members of the local communities and others visiting the Projects. As detailed in the RMP, FirstLight will undertake these improvements working closely with the local towns, federal and state agencies, and interested organizations.

3. Fifty-Year License Terms

As stated in the Recreation Settlement Agreement, the Recreation Settling Parties agree that the investment of funds and other commitments associated with the terms of the Recreation Settlement Agreement and the Flows and Fish Passage Settlement Agreement support the issuance of 50-year licenses for the Projects.¹³ Where settling parties request a particular license term, it is the Commission’s policy to defer to the settling parties.¹⁴ Under the terms of the Recreation Settlement Agreement, a license term less than 50 years is defined as “Inconsistent with this Settlement Agreement,” permitting FirstLight to withdraw from the agreement.¹⁵

¹³ Recreation Settlement Agreement, Section 4.3.2.

¹⁴ *See Policy Statement on Establishing License Terms for Hydroelectric Projects*, 161 FERC ¶ 61,078 at P 15 (2017).

¹⁵ Recreation Settlement Agreement, Sections 1.3.6, 6.1.

B. Off-License Provisions

These are the measures, to which the Recreation Settling Parties have agreed, that should not be included in the new Project licenses.

1. Additional Pocket Park

FirstLight has agreed to construct a second pocket park within three years of license issuance at a location yet to be determined in the Town of Northfield. Alternatively, FirstLight will make an equivalent investment for a single river access point which may be within or outside of the Town. The park may include signage for historical and cultural interpretation. Details will be developed in consultation with the Recreation Settling Parties. Because the exact nature and location of this recreation improvement are yet to be determined and may be outside the FERC Project boundaries, the Recreation Settling Parties have agreed to pursue this improvement as an off-license measure.

2. Farley Ledges Conservation Restriction

Farley Ledges is a rock climbing area on the eastern side of Northfield Mountain, some of which lies inside the FERC Northfield Mountain Project boundary and is owned by FirstLight. FirstLight has agreed to grant a conservation restriction to permanently conserve, for public recreational purposes, a portion of Farley Ledges as shown in Exhibit A to the Recreation Settlement Agreement.

FirstLight also has agreed to request the Commission to amend the Northfield Mountain Project boundary to exclude this area from the FERC-licensed Project. This will facilitate the potential conveyance of the property to a third party which would administer the conservation restriction. Attached to this Explanatory Statement as Attachment A is an Exhibit G map to show the proposed boundary change. FirstLight is hereby requesting the Commission to approve the

boundary change as part of its order issuing the new Northfield Mountain Project license. The conservation restriction will ensure that the property continues to be used for rock climbing and other recreational purposes following the boundary change. Rose Ledges, another popular climbing area, would remain within the boundary because it is surrounded by the Project's recreational trail system. FirstLight has agreed to formally designate Rose Ledges as a Project recreational feature.¹⁶

3. Recreation Advisory Group

FirstLight will form and chair a Recreation Advisory Group ("RAG") consisting of any of the Recreation Settling Parties who wish to be members of the RAG. The RAG will meet at least annually to discuss recreation use at the Projects and any operation and maintenance needs. The purpose of the RAG is to address shorter term recreation needs at the Projects, as opposed to the longer term needs to be assessed in the ten-year periodic reviews under the RMP.

4. Advertising

FirstLight has agreed to promote use of its Project recreational facilities with local communities and organizations and improve its digital presence. FirstLight will work with the RAG to identify targeted audiences for this outreach including Environmental Justice communities, Indigenous communities, those with disabilities, visitors to the region, residents, and local communities and organizations. FirstLight will also work with the RAG to develop a schedule for pushing out promotional materials.

III. CONCLUSION

For all of the above reasons, the Commission should (1) adopt the proposed RMP in the new Project licenses without material modification, (2) revise the Northfield Mountain Project

¹⁶ See RMP, Section 6.2.5.

boundary to exclude the portion of Farley Ledges currently within the boundary as shown on Attachment A, and (3) issue FirstLight new Project licenses for terms of 50 years.

Respectfully submitted,

/s/ Michael A. Swiger

Michael A. Swiger

Van Ness Feldman, LLP

1050 Thomas Jefferson Street, NW

Seventh Floor

Washington, DC 20007

(202) 298-1800

mas@vnf.com

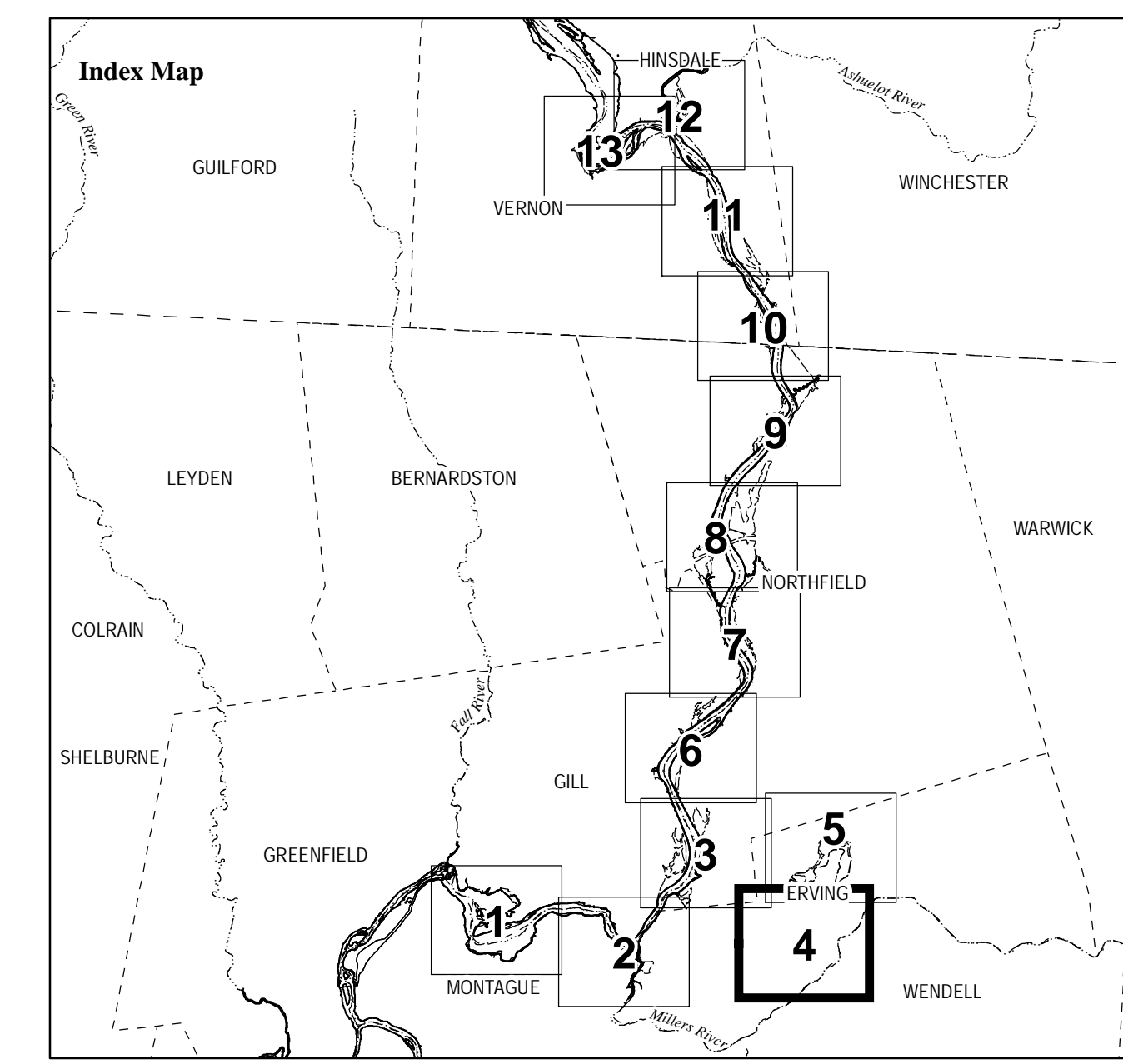
Counsel to FirstLight Hydro MA LLC
and Northfield Mountain LLC

DATED: June 12, 2023

Attachment

Attachment A

Exhibit G Map



Legend

	Project Boundary		Reference Point
	Point No. (see Project Boundary Data table for metes and bounds)		Maximum Water Surface Elevation (in feet)
	Project Recreation Site		Minimum Water Surface Elevation (in feet)
	Project Recreation Site Proposed to be Non-Project Recreation Site		Shoreline
	Town Boundary		Major Creek
	Area Added to Project Boundary		Project Trail
	Area Removed From Project Boundary		Railroad
	Licensee Land Rights		Transmission Lines
	Own in Fee		Roads
	Flowage Easement		
	License to Occupy		
	Right to be Acquired		

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
 Horizontal Datum:
 NAD 1983
 Vertical Datum:
 NGVD 1929

Declination changing by 0° 3' E/Year

I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT (FERC #2485) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +/-40 FEET. THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND/OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.

Northfield Mountain LLC
 NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
 FERC PROJECT NO. 2485

SHEET 4 of 13

EXHIBIT G-4 1 inch = 400 feet 1:4,800

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list compiled by the Federal Energy Regulatory Commission in these proceedings.

Dated at Washington, DC this 12th day of June, 2023.

/s/ Mealear Tauch

Mealear Tauch

Van Ness Feldman, LLP

1050 Thomas Jefferson Street, NW

Seventh Floor

Washington, DC 20007-3877

RECREATION SETTLEMENT AGREEMENT

**FOR THE RELICENSING OF THE TURNERS FALLS
HYDROELECTRIC PROJECT, FERC PROJECT NO. 1889, AND
NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT,
FERC PROJECT NO. 2485**

MAY 2023



**RECREATION SETTLEMENT AGREEMENT FOR
THE RELICENSING OF THE TURNERS FALLS HYDROELECTRIC PROJECT AND
NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT**

TABLE OF CONTENTS

1	General Provisions.....	2
1.1	Effective Date of Settlement Agreement	2
1.1.1	FirstLight’s Affirmative Acceptance of License.....	2
1.1.2	Effective Date of Parties’ Obligations.....	3
1.2	Term of Settlement Agreement.....	3
1.3	Definitions.....	3
1.4	Acronyms	5
2	Purpose of Settlement Agreement.....	5
2.1	Purpose.....	5
2.2	Relationship to Flows and Fish Passage Settlement Agreement	6
2.3	No Precedent for Other Proceedings.....	6
3	Reservations of Rights.....	6
3.1	No Effect on Parties’ Other Legal Duties or Rights	6
3.2	Reserved Rights	7
3.3	Future Relicensings.....	7
4	Settlement Agreement Commitments and Implementation.....	7
4.1	Parties Bound by Settlement Agreement	7
4.2	Recommendations of Parties to Regulatory Agencies.....	7
4.2.1	Recommendations To Be Consistent with Settlement Agreement	7
4.2.2	Biological Opinion and Incidental Take Statement Inconsistent with This Settlement Agreement.....	8

4.2.3	Section 401 Certifications Inconsistent with This Settlement Agreement	9
4.3	New Project Licenses.....	9
4.3.1	Support for Issuance of New Project Licenses.....	9
4.3.2	Term of New Project Licenses	10
4.3.3	Comments on the NEPA Document.....	10
4.3.4	Measures Not to Be Included in New Project Licenses	10
4.3.5	New Project Licenses Inconsistent with This Settlement Agreement	10
4.4	Cooperation Among Parties	11
4.5	Support for Implementation.....	11
4.6	Defense Against Measures Inconsistent with This Settlement Agreement.....	11
4.7	Responsibility for Compliance with New Project Licenses	12
4.8	Availability of Funds	12
4.9	Implementation	12
4.9.1	Implementation Schedule.....	12
4.9.2	Permits	12
4.10	Reopener or Amendment of New Project Licenses	13
4.10.1	Limitation on Reopeners and Modifications	13
4.10.2	Amendment of New Project Licenses	14
4.11	Compliance with FERC Project Safety and Other Directives	15
4.12	Amendment of Settlement Agreement.....	15
5	Dispute Resolution.....	15
5.1	General Applicability.....	15
5.2	Process	16

5.2.1	Dispute Initiation Notice	16
5.2.2	Informal Meetings	17
5.2.3	Mediation.....	17
5.2.4	Dispute Resolution Notice.....	17
5.3	Enforcement of Settlement Agreement After Dispute Resolution	17
5.3.1	Enforcement Regarding New Project Licenses.....	17
5.3.2	Enforcement Regarding Contractual Obligations	17
6	Withdrawal from Settlement Agreement.....	18
6.1	Withdrawal of Party from Settlement.....	18
6.2	Withdrawal of FirstLight from Settlement Agreement Prior to Acceptance of the New Project Licenses.....	18
6.3	Effective Date of Withdrawal	18
6.4	Continuity After Withdrawal	19
6.5	Termination of Settlement Agreement.....	19
7	General Provisions.....	20
7.1	Non-Severable Terms of Settlement Agreement	20
7.2	No Third-Party Beneficiaries	20
7.3	Successors and Assigns.....	20
7.3.1	Assignment.....	20
7.3.2	Succession	20
7.3.3	Continuation of Certain Obligations	20
7.3.4	Notice	21
7.4	Extension of Time; Inability to Perform.....	21
7.4.1	Obligations under New Project Licenses	21
7.4.2	Contractual Obligations.....	22
7.4.3	Notice of Delay or Inability to Perform	22

7.5	Governing Law	22
7.6	Elected Officials Not to Benefit.....	22
7.7	No Partnership	22
7.8	Reference to Regulations	23
7.9	Notice	23
7.10	Section Titles for Convenience Only	23
7.11	Entire Agreement	23
8	Execution of Settlement Agreement.....	23
8.1	Signatory Authority	23
8.2	Signing in Counterparts	24

APPENDICES

- Appendix A - Proposed License Article on Recreation to be Included in the New Turners Falls Hydroelectric Project License
- Appendix B - Proposed License Article on Recreation to be Included in the New Northfield Mountain Pumped Storage Project License
- Appendix C - Measures Agreed to Among the Parties But Not to be Included in New Project Licenses
- Appendix D - Authorized Representatives of the Parties
- Appendix E - Recreation Management Plan

This Recreation Settlement Agreement for the relicensing of the Turners Falls Hydroelectric Project and Northfield Mountain Pumped Storage Project (“Settlement Agreement”) is made and entered into pursuant to Federal Energy Regulatory Commission (“Commission” or “FERC”) Rule 602, 18 C.F.R. § 385.602, by and among:

FirstLight MA Hydro LLC
Northfield Mountain LLC
National Park Service
Massachusetts Department of Conservation and Recreation
Town of Erving, Massachusetts
Town of Gill, Massachusetts
Town of Montague, Massachusetts
Town of Northfield, Massachusetts
American Whitewater
Appalachian Mountain Club
Crab Apple Whitewater, Inc.
New England FLOW
Zoar Outdoor
Access Fund
Franklin Regional Council of Governments
Western Massachusetts Climbers Coalition

each referred to individually as a “Party” and collectively as “Parties.”

RECITALS

WHEREAS,

- A. FirstLight MA Hydro LLC and Northfield Mountain LLC (collectively, “FirstLight”) are the 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 (collectively, “Projects”) expired on April 30, 2018. The Projects have been operating on annual licenses pursuant to Section 15 of the Federal Power Act (“FPA”) since that time.
- B. In accordance with the requirements of the FPA and FERC’s regulations, FirstLight filed a Notice of Intent to file an application for new license for each of the Projects on October 31, 2012. Pursuant to FERC’s Integrated Licensing Process, FirstLight then engaged with relicensing participants, FERC, and the public in scoping environmental issues related to the Projects and in developing and implementing a rigorous study plan to assess the Projects’ environmental impacts.
- C. As required by the FPA and FERC’s regulations, FirstLight filed a Final Application for New License (“FLA”) for the Projects with FERC on April 29, 2016. Because certain environmental studies required by FERC 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 (“AFLAs”) on December 4, 2020, 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. FirstLight’s filing also included a proposed recreation management plan.

- D. In 2017, FirstLight began formal settlement discussions with relicensing participants. Those discussions initially were not focused on recreation and did not result in agreement on all issues, but nevertheless informed FirstLight’s PM&E proposals in the AFLAs. FirstLight’s PM&E proposals in the AFLAs also were informed by further non-FERC required environmental studies undertaken in consultation with the state and federal fish and wildlife agencies.
- E. Subsequently, FirstLight entered into settlement discussions with a broad group of state and federal agencies, local communities, and other recreation stakeholders which led to the filing with FERC of an Agreement in Principle on recreation on February 28, 2022. This Settlement Agreement is the end product of the Parties’ work on issues relating to recreation at the Projects and, as to the Parties, resolves all outstanding issues for the relicensing of the Projects on recreation.
- F. On March 31, 2023, FirstLight filed with FERC a fully executed Flows and Fish Passage Settlement Agreement among FirstLight, the U.S. Fish and Wildlife Service (“USFWS”), the National Marine Fisheries Service (“NMFS”), the Massachusetts Division of Fisheries and Wildlife, The Nature Conservancy, American Whitewater, Appalachian Mountain Club, Crab Apple Whitewater, Inc., New England FLOW and Zoar Outdoor addressing all issues among those parties pertaining to fish passage, flows (including flows for recreation boating), and protected, threatened and endangered species.

TERMS OF AGREEMENT

NOW THEREFORE, in consideration of the mutual covenants set forth herein, the receipt and sufficiency of which is hereby acknowledged, the Parties agree as follows:

1 General Provisions

1.1 Effective Date of Settlement Agreement

Except as provided in Section 1.1.1, this Settlement Agreement shall become effective upon the execution by all Parties of this Settlement Agreement (“Effective Date”).

1.1.1 FirstLight’s Affirmative Acceptance of License

FirstLight’s contractual obligation to the Parties to implement the measures set forth in Appendices A-C and E of this Settlement Agreement shall become effective only upon FirstLight’s acceptance, in its sole discretion, of the Final

New Project Licenses. Within 45 days of the New Project Licenses becoming Final, FirstLight shall provide Notice to all Parties whether it affirmatively accepts the New Project Licenses and its concomitant obligations under this Settlement Agreement. If FirstLight does not timely provide such Notice, it shall be deemed to have affirmatively accepted the New Project Licenses. If FirstLight rejects the New Project Licenses this Settlement Agreement will terminate pursuant to Section 6.5 and will not be binding on FirstLight or any other Party in any subsequent proceeding at FERC or otherwise.

1.1.2 Effective Date of Parties' Obligations

The Parties' obligations under Sections 2 through 8, including the obligation to support this Settlement Agreement in the relicensing and related regulatory proceedings, take effect on the Effective Date.

1.2 Term of Settlement Agreement

The term of this Settlement Agreement shall commence on the Effective Date and shall continue (unless terminated as otherwise provided herein) for the term of the New Project Licenses plus the term(s) of any annual license(s) that may be issued after the foregoing New Project Licenses have expired.

1.3 Definitions

1.3.1 Commission or FERC shall mean the Federal Energy Regulatory Commission.

1.3.2 Consultation shall mean the process under this Settlement Agreement by which FirstLight seeks views through providing drafts of proposals, plans and reports, and seeking and considering comments on such proposals, plans, and reports as appropriate from relevant Parties. Consultation under this Settlement Agreement shall not be construed to satisfy "consultation" under Section 7 of the Endangered Species Act ("ESA") or other federal laws specifically requiring consultation, unless specifically noted.

1.3.3 Disputing Party or Disputing Parties shall mean the Party providing Notice of the dispute, the Party alleged to have failed to perform an obligation, and any other Party that provides Notice of its intent to participate in the dispute resolution.

1.3.4 Final, with respect to the New Project Licenses under this Settlement Agreement, shall mean such licenses after exhaustion of administrative and judicial remedies for any challenge which any Party or other person brings against the New Project Licenses or against any other regulatory approval integral to issuance of the New Project Licenses.

1.3.5 Fishway Prescription shall mean a prescription issued by NMFS or USFWS under Section 18 of the FPA, whether designated as preliminary, modified or final.

1.3.6 Inconsistent with this Settlement Agreement shall mean: (1) any material modification to, deletion of, or addition to the Recreation Management Plan or Proposed License Articles in the New Project Licenses; (2) any material modification to, deletion of, or addition to the Recreation Management Plan or the Proposed License Articles in any ESA Section 7 Biological Opinion, or Clean Water Act (“CWA”) Section 401 Certification issued in connection with the New Project Licenses; (3) changes to the Projects proposed by FirstLight that are materially inconsistent with the assumptions underlying the Settlement Agreement; or (4) New Project Licenses issued for terms of less than 50 years. The term “material” for purposes of this section means a deviation from the Recreation Management Plan that, either individually or collectively with other such deviations, substantially affects a Party’s bargained-for benefits under this Settlement Agreement.

1.3.7 Inconsistent with this Settlement Agreement shall not mean: (1) the inclusion of standard articles from the appropriate L-Form (as defined by 18 C.F.R. § 2.9) in the New Project Licenses; (2) FERC’s reservation of its authority to require changes to implementation schedules, plans, or other requirements of the New Project Licenses; (3) the inclusion in any Fishway Prescription of the issuing agency’s reservation of authority to reopen its prescription, provided that the reservation of authority is consistent with this Settlement Agreement, and provided further that each Party reserves its right to contest the exercise of such reserved authority at such time as the agency may exercise the reserved authority; (4) the inclusion in any ESA Section 7 Biological Opinion of the issuing agency’s criteria for re-initiation of Section 7 consultation pursuant to 50 C.F.R. § 402.16; (5) the inclusion in the New Project Licenses, any Fishway Prescription, any ESA Section 7 Biological Opinion, or any CWA Section 401 Certification, of such reasonable minimization and reporting requirements as FERC or the issuing agency determines are necessary to ensure FirstLight’s compliance; or (6) the exercise of a reserved right under Section 3.2 of this Settlement Agreement or a condition in a CWA Section 401 Certification relating to erosion.

1.3.8 Material New Information shall mean significant and relevant new information which was neither in the administrative record for the relicensing nor otherwise known as of the Effective Date to the Party who seeks to use the Material New Information. Each Party agrees in good faith to share any such information with the other Parties in a timely manner.

1.3.9 New Project Licenses shall mean the new licenses, not to include any annual license extending the current licenses, issued by the Commission to FirstLight pursuant to Section 15 of the FPA for the continued operation of Project Nos. 1889 and 2485.

1.3.10 Notice shall mean a written communication to the Parties which meets the requirements of Section 7.9 and any other requirements for notice specifically provided in any other applicable section of this Settlement Agreement.

1.3.11 Projects shall mean the Turners Falls Hydroelectric Project, currently licensed to FirstLight MA Hydro LLC as FERC Project No. 1889, and the Northfield Mountain Pumped Storage Project, currently licensed to Northfield Mountain LLC as FERC Project No. 2485.

1.3.12 Proposed License Articles shall mean the terms and conditions set forth in Appendices A and B of this Settlement Agreement that the Parties request that the Commission include in the New Project Licenses for the continued operation of the Projects.

1.3.13 Recreation Management Plan shall mean the plan, attached as Appendix E to this Settlement Agreement, to which the Parties have agreed and which the Parties hereby propose for FERC's approval and inclusion as a requirement in the New Project Licenses.

1.3.14 Settlement Agreement shall mean the entirety of this Recreation Settlement Agreement, including the Appendices.

1.4 Acronyms

1.4.1 AFLAs – Amended Final License Applications

1.4.2 CWA – Clean Water Act

1.4.3 ESA – Endangered Species Act

1.4.4 FERC – Federal Energy Regulatory Commission

1.4.5 FLA – Final License Application

1.4.6 FPA – Federal Power Act

1.4.7 MADEP – Massachusetts Department of Environmental Protection

1.4.8 NMFS – National Marine Fisheries Service

1.4.9 NEPA – National Environmental Policy Act

1.4.10 REA – Ready for Environmental Analysis

1.4.11 USFWS – U.S. Fish and Wildlife Service

2 Purpose of Settlement Agreement

2.1 Purpose

The Parties have entered into this Settlement Agreement for the purpose of resolving all issues that have or could have been raised by the Parties in connection with FERC's orders issuing New Project Licenses relating to recreation. While recognizing that several regulatory and statutory processes are not yet completed, it is the Parties' intention that this Settlement Agreement considers all significant issues concerning recreation that may arise in the issuance of all regulatory approvals integral to FERC's issuance of the New Project Licenses, including but not limited to ESA Section 7 Biological Opinions to be

issued by USFWS and NMFS, the CWA Section 401 Certifications to be issued by the Massachusetts Department of Environmental Protection (“MADEP”), and any Environmental Impact Statement or Environmental Assessment issued pursuant to the National Environmental Policy Act (“NEPA”). The Parties recognize that MADEP is the agency responsible for Section 401 Certification and is not a Party to this Settlement Agreement. Pursuant to the Parties’ various rights, authorities, and responsibilities under the FPA, as well as other statutory and regulatory authorities and implied powers, this Settlement Agreement is intended to establish FirstLight’s obligations concerning recreation under the New Project Licenses. It also specifies procedures to be used among the Parties to ensure that implementation of the New Project Licenses is not Inconsistent with this Settlement Agreement, and with other legal and regulatory mandates. The Parties agree that FirstLight’s performance of its obligations under this Settlement Agreement will be consistent with and is intended to fulfill FirstLight’s existing statutory and regulatory obligations relating to the relicensing of the Projects with respect to recreation, with the exception of flows for recreational boating which are addressed in the Flows and Fish Passage Settlement Agreement (March 2023).

2.2 Relationship to Flows and Fish Passage Settlement Agreement

Subject to rights reserved under Section 3.2, the Parties to this Settlement Agreement who are not Parties to the Flows and Fish Passage Settlement Agreement agree that they will not oppose the Flows and Fish Passage Settlement Agreement.

2.3 No Precedent for Other Proceedings

This Settlement Agreement is made with the understanding that it constitutes a negotiated resolution of issues relating to recreation for the New Project Licenses. Accordingly, this Settlement Agreement shall not be offered against a Party as argument, admission or precedent in any mediation, arbitration, litigation, or other administrative or legal proceeding that does not involve or relate to the New Project Licenses or the operation of the Projects. Further, no Party shall be deemed to have approved, admitted, accepted, or otherwise consented to any operation, management, valuation, or other principle underlying any of the matters covered by this Settlement Agreement, except as expressly provided herein. With respect to any mediation, arbitration, litigation, or other administrative or legal proceeding involving or relating to the New Project Licenses, the Parties’ rights and responsibilities shall be as set forth in this Settlement Agreement. This Section shall survive any termination of this Settlement Agreement.

3 Reservations of Rights

3.1 No Effect on Parties’ Other Legal Duties or Rights

Nothing in this Settlement Agreement is intended to, or shall be construed to, affect or limit the authority or obligation of any Party to fulfill its constitutional, statutory, and regulatory responsibilities, to comply with any judicial decision or order, to exercise

reserved rights, or to pursue and advocate on issues defined as not Inconsistent with this Agreement.

3.2 Reserved Rights

Notwithstanding Sections 1.3.6, 2.2, 4.2.1, 4.3.1, and any other provision of this Settlement Agreement, the Parties to this Settlement Agreement who are not a party to the Flows and Fish Passage Settlement Agreement expressly reserve the right, without limitation or restriction, and regardless of whether exercise of this reserved right may affect Project operations or impoundment levels, to pursue and advocate for the inclusion of articles, conditions, or other requirements related to the prevention and mitigation of erosion in the Turners Falls impoundment.

3.3 Future Relicensings

Nothing in this Settlement Agreement is intended or shall be construed to affect or restrict any Party's participation in or comments about the provisions of any future relicensing of the Projects subsequent to the current relicensing.

4 Settlement Agreement Commitments and Implementation

4.1 Parties Bound by Settlement Agreement

The Parties shall be bound by this Settlement Agreement for the term stated in Section 1.2, provided the New Project Licenses are not Inconsistent with this Settlement Agreement.

4.2 Recommendations of Parties to Regulatory Agencies

4.2.1 Recommendations To Be Consistent with Settlement Agreement

(1) Each Party agrees to request that FERC approve and incorporate in the New Project Licenses, without material modification, the Proposed License Articles and the Recreation Management Plan. The Parties shall further request that FERC not include in the New Project Licenses additional measures that are Inconsistent with this Settlement Agreement.

(2) Any Party participating in the Section 401 Certification process shall request that MADEP not include as conditions to the Section 401 Certifications conditions that are Inconsistent with this Settlement Agreement.

(3) Any recommendations of the Parties to FERC or other state or federal agencies with regulatory authority over the New Project Licenses, including but not limited to USFWS, NMFS, the Massachusetts Division of Fisheries and Wildlife, and MADEP, shall not be Inconsistent with this Settlement Agreement;

(4) Any information, comments, or responses to comments by the Parties in the context of relicensing of the Projects shall not be Inconsistent with this Settlement Agreement;

(5) The Parties shall use reasonable efforts to support FERC orders approving this Settlement Agreement and issuing New Project Licenses not Inconsistent with this Settlement Agreement in a timely manner;

(6) The Parties shall support, in all relevant regulatory proceedings in which they participate, regulatory actions not Inconsistent with this Settlement Agreement; and

(7) A Party may only use Material New Information to submit comments or recommendations Inconsistent with this Settlement Agreement if it believes in good faith that such information significantly undermines the Settlement Agreement, taken as a whole for the affected Party, and significantly affects the adequacy of the Recreation Management Plan under the FPA or other applicable law.

4.2.2 Biological Opinion and Incidental Take Statement Inconsistent with This Settlement Agreement

4.2.2.1 If any Biological Opinion or Incidental Take Statement issued by NMFS or USFWS pursuant to Section 7 of the ESA is Inconsistent with this Settlement Agreement, this Settlement Agreement shall be deemed modified to conform to the provisions of the Biological Opinion and Incidental Take Statement, unless a Party provides Notice to the other Parties that it objects to the inconsistency and initiates dispute resolution within 30 days after the Biological Opinion and Incidental Take Statement are filed with FERC.

4.2.2.2 The Disputing Party may, to the extent provided by applicable law, seek administrative and/or judicial review of any Biological Opinion or Incidental Take Statement that is Inconsistent with this Settlement Agreement. The Parties shall follow the dispute resolution process to the extent reasonably practicable while such administrative or judicial review is pursued.

4.2.2.3 Except as provided in Section 4.3.5.4 for omissions based on jurisdiction or if the Settlement Agreement is terminated pursuant to Section 6.5, if any Biological Opinion or Incidental Take Statement is Inconsistent with this Settlement Agreement after a final and non-appealable decision on the administrative or judicial action, this Settlement Agreement shall be deemed modified to conform to the final decision.

4.2.3 Section 401 Certifications Inconsistent with This Settlement Agreement

4.2.3.1 If the MADEP denies FirstLight's application for Section 401 Certification for either of the Projects, the Parties agree such denial shall be considered Inconsistent with this Settlement Agreement, unless (1) the denial is without prejudice, and (2) the denial is not based on a determination that the Recreation Management Plan measures are insufficient for MADEP to issue Section 401 Certifications. If the MADEP issues the Section 401 Certifications and any condition of a Section 401 Certification is Inconsistent with this Settlement Agreement, the Settlement Agreement shall be deemed modified to conform to the Section 401 Certification, unless a Party provides Notice to the other Parties that it objects to the inconsistency and initiates dispute resolution within 30 days after the issuance of the Section 401 Certification.

4.2.3.2 The Disputing Party may, to the extent provided by applicable law, seek administrative and/or judicial review of any Section 401 Certification or denial of Section 401 Certification that is Inconsistent with this Settlement Agreement. The Parties shall follow the dispute resolution process to the extent reasonably practicable while such administrative and/or judicial review is pursued.

4.2.3.3 If any Party or non-party seeks administrative and/or judicial review of the Section 401 Certification, FirstLight or any Party may request that FERC hold the New Project Licenses in abeyance pending a final adjudication of the Section 401 Certification. Any Party objecting to such a request may oppose it, after complying with the dispute resolution procedures of this Settlement Agreement.

4.2.3.4 Except as provided in Section 4.3.5.4 for omission based on jurisdiction or if the Settlement Agreement is terminated pursuant to Section 6.5, if any condition of a Section 401 Certification is Inconsistent with this Settlement Agreement after a final and non-appealable decision on the administrative or judicial action, this Settlement Agreement shall be deemed modified to conform to the final decision.

4.3 New Project Licenses

4.3.1 Support for Issuance of New Project Licenses

The Parties shall support this Settlement Agreement in appropriate written communications to FERC, USFWS, NMFS, and MADEP. The Parties agree not to propose, support, or advocate proposed measures Inconsistent with this Settlement Agreement, except as specifically permitted herein.

4.3.2 Term of New Project Licenses

The Parties recognize the investment of funds associated with the terms of this Settlement Agreement and with the Flow and Fish Passage Settlement Agreement and support FirstLight's request for 50-year licenses to FERC.

4.3.3 Comments on the NEPA Document

The Parties shall comment on any measure recommended by FERC in its draft or final NEPA document which, if approved in the New Project Licenses, would be Inconsistent with this Settlement Agreement. Such comment(s) would aim to urge FERC to adopt the full settlement terms before the issuance of the New Project Licenses.

4.3.4 Measures Not to Be Included in New Project Licenses

The Parties shall request that measures and actions agreed to among the Parties as set forth in Appendix C (Off-License) not be incorporated in the New Project Licenses.

4.3.5 New Project Licenses Inconsistent with This Settlement Agreement

4.3.5.1 Consistency of Licenses with Settlement Agreement

If the New Project Licenses issued by FERC are Inconsistent with this Settlement Agreement, the Settlement Agreement shall be deemed modified to conform to the inconsistency, unless a Party provides Notice to the other Parties that it objects to the inconsistency and initiates dispute resolution within 30 days after the date of the FERC order issuing license.

4.3.5.2 Disputing Inconsistencies

The Disputing Party may, in addition, if it is a party to the FERC relicensing proceeding, petition FERC for rehearing and seek judicial review of the New Project Licenses. If any Party, including FirstLight, or non-party seeks rehearing or judicial review of the New Project Licenses, FirstLight may seek a stay or an extension of time of any or all requirements of the New Project Licenses. Any Party objecting to such a request may oppose it, after complying with the dispute resolution procedures of this Settlement Agreement.

4.3.5.3 Modification of Agreement if Inconsistency

Except as provided in Section 4.3.5.4 for omission based on jurisdiction and Section 4.3.5.5 for inclusion based on jurisdiction, or if the Settlement Agreement is terminated pursuant to Section 6.5, if a provision in the Final New Project Licenses is Inconsistent with this Settlement Agreement, this

Settlement Agreement shall be deemed modified to conform to the final decision.

4.3.5.4 Omission Based on Jurisdiction

If the New Project Licenses do not contain all the measures included in the Recreation Management Plan because FERC expressly determines that it does not have jurisdiction to adopt or enforce the omitted measures, this Settlement Agreement shall not be deemed modified to conform to such omission, and such omission shall not be used as the basis for dispute among the Parties; provided that any measure that FERC excludes from the New Project Licenses based on a lack of jurisdiction shall be automatically included in Appendix C without material modification (including all funds needed to carry out or implement any such measure).

4.3.5.5 Inclusion Based on Jurisdiction or Section 401 Certification

If the New Project Licenses include measures stated in Appendix C of this Settlement Agreement because FERC determines that such measures are required to be included under the FPA and are within FERC's jurisdiction to enforce, or MADEP includes such measures as conditions of a Section 401 Certification, such action shall not be considered Inconsistent with this Settlement Agreement provided there is no material change to the measure other than its inclusion in the New Project Licenses. However, Parties may not assert in any regulatory forum including FERC or MADEP that any measures in Appendix C of this Settlement Agreement should be included in the New Project Licenses.

4.4 Cooperation Among Parties

The Parties shall cooperate in good faith in the implementation of this Settlement Agreement and the New Project Licenses.

4.5 Support for Implementation

Upon notification by FirstLight of the need therefore, the other Parties shall provide written communications (or orally, in the event written communication is impossible to obtain due to reasons outside a Party's control) of support in any administrative approval process required for implementation of this Settlement Agreement, subject to available Party resources.

4.6 Defense Against Measures Inconsistent with This Settlement Agreement

If a Party files a pleading or other document before FERC or another regulatory agency advocating a measure Inconsistent with this Settlement Agreement, whether prior to or following issuance of the New Project Licenses, any other Party may defend by: (1)

stating its opposition to the measure Inconsistent with this Settlement Agreement; (2) requesting that FERC or other regulatory agency disapprove the measure Inconsistent with this Settlement Agreement; and (3) explaining what offsetting measures should be included in and/or excluded from the New Project Licenses if the measure Inconsistent with this Settlement Agreement is approved.

4.7 Responsibility for Compliance with New Project Licenses

Upon acceptance of the New Project Licenses, FirstLight is ultimately responsible for compliance with the New Project Licenses. By entering into this Settlement Agreement, except as expressly provided herein, none of the other Parties is accepting any new or additional legal liability or responsibility for compliance with the obligations under the New Project Licenses. FirstLight shall not be excused from its duty to comply with the New Project Licenses due to a failure by any other Party, entity, or person to provide funding or carry out a duty, obligation, or responsibility it may have with respect to the Projects pursuant to other laws or agreements. Notwithstanding the foregoing, this Settlement Agreement does not alter or abrogate any duty, obligation, or responsibility that any other Party or person may have to provide such funding pursuant to other laws or agreements, nor does this Settlement Agreement prevent FirstLight or any other Party from seeking to enforce such duty, obligation, or responsibility. Further, FirstLight shall have no obligation to reimburse or otherwise pay any other Party for its assistance, participation, or cooperation in any activities pursuant to this Settlement Agreement of the New Project Licenses unless expressly agreed to by FirstLight or as required by law. In the event of administrative rehearing or judicial review, Parties shall bear their own costs and attorneys' fees.

4.8 Availability of Funds

Implementation of this Settlement Agreement by any Party other than FirstLight is subject to the availability of funds. In addition, implementation of this Settlement Agreement by any federal agency is subject to the requirements of the Anti-Deficiency Act, 31 U.S.C. Section 1341 *et seq.*

4.9 Implementation

4.9.1 Implementation Schedule

FirstLight shall ensure that implementation of the Recreation Management Plan is consistent with any schedule specified therein (as it may be modified by the New Project Licenses). FirstLight and other responsible Parties shall implement the measures stated in Appendix C consistent with the applicable schedules.

4.9.2 Permits

Upon acceptance of the New Project Licenses and FERC approval of the Recreation Management Plan, FirstLight shall apply for and use reasonable efforts to obtain in a timely manner and in final form all necessary federal, state,

regional, and local permits, licenses, authorizations, certifications, determinations, and other governmental approvals for purposes of implementing this Settlement Agreement and the New Project Licenses (“Permits”). The applications for such Permits shall be consistent with the terms of this Settlement Agreement. Each Party, upon FirstLight’s request, shall, subject to a Party’s available resources, use reasonable efforts to support FirstLight’s applications for Permits, and shall not file comments or recommend Permit conditions that are Inconsistent with this Settlement Agreement. FirstLight shall pay all fees required by law related to such Permits. The Parties shall work together and cooperate as appropriate during the permitting, environmental review, and implementation of this Settlement Agreement. FirstLight shall not be required by the Settlement Agreement to implement an action required under this Settlement Agreement or the New Project Licenses if a Permit has been denied or contains conditions that are materially Inconsistent with this Settlement Agreement, or until all applicable Permits required for that action are obtained. If a proceeding challenging any Permit required for the action has been commenced, FirstLight shall be under no obligation under this Settlement Agreement to implement the action or any related action until any such proceeding is terminated. In the event any Permit has been denied, FirstLight determines that the Permit contains conditions that are Inconsistent with this Settlement Agreement, or any Permit is not obtained in a timely manner, the Parties shall confer to evaluate the effect of such event on implementation of this Settlement Agreement and seek to develop actions to respond to that event. If the Parties do not agree on actions to respond to that event and nonperformance or prolonged delay in performance of one or more measures due to the event materially reduces the benefit of this Settlement Agreement, a Party may initiate dispute resolution, except that dispute resolution regarding denial of a Permit shall be restricted to the issue of actions to respond to that event. Nothing contained in this section shall be construed to limit FirstLight’s right to apply for a Permit before issuance of the New Project Licenses, provided that any such applications shall not be Inconsistent with this Settlement Agreement.

4.10 Reopener or Amendment of New Project Licenses

4.10.1 Limitation on Reopeners and Modifications

No Party to this Settlement Agreement may seek to modify or otherwise reopen the measures included in the Recreation Management Plan in a manner that is Inconsistent with this Settlement Agreement unless that Party, relying on Material New Information, reasonably demonstrates that such proposed modification or reopener fulfills a statutory, regulatory, or court ordered responsibility, or reasonably demonstrates that the New Project Licenses no longer comply with applicable law.

4.10.1.1 Notice of Proposed Reopener

Prior to seeking modification or reopener, a Party shall provide all Parties at least 90-day Notice to consider the Material New Information and that Party's position. A Party shall not be required to comply with this 90-day Notice provision if it reasonably believes an emergency situation exists. If a Party proposes a modification or reopener that another Party believes would be Inconsistent with this Settlement Agreement and objects, then the dispute resolution provisions of Section 5 apply, and the objecting Party must invoke dispute resolution during the 90-day Notice period or waive its objection.

4.10.2 Amendment of New Project Licenses

Nothing in this Settlement Agreement is intended, or shall be construed, to affect or limit the right of FirstLight to seek amendments of the New Project Licenses that are not Inconsistent with this Settlement Agreement.

4.10.2.1 Notice of Proposed License Amendment

Prior to filing any proposed license amendment that relates to a subject covered by this Settlement Agreement, including a temporary amendment, FirstLight shall provide the other Parties at least 90-day Notice of its intention to do so. At the request of any Party, FirstLight shall consult with any/all interested Parties regarding the need for and the purpose of the amendment. If a Party believes the proposed amendment is Inconsistent with this Settlement Agreement and objects, then the dispute resolution provisions in Section 5 apply, and the objecting Party must invoke dispute resolution within this 90-day Notice period or waive its objection. FirstLight shall not be required to comply with this 90-day Notice provision if it reasonably believes an emergency situation exists or if required to meet its responsibilities under applicable law or an order of an agency with jurisdiction over it.

4.10.2.2 Consultation on Amendments

Except as provided in the New Project Licenses or in the case of an emergency, FirstLight shall allow a minimum of 60 days for any Party to comment and to make recommendations before filing any application for a Project license amendment that relates to a subject covered by this Settlement Agreement and where consultation with Parties is required. If FirstLight does not adopt a recommendation or comment of a Party, it shall include in any filing with FERC copies of the comments/recommendations and an explanation as to why the comment/recommendation was not adopted.

4.10.2.3 Exception for FERC Compliance Directives

The notice and consultation requirements of this Section shall not apply to license amendments in connection with compliance matters under Section 4.11 below.

4.10.2.4 Parties' Option to Intervene in Amendment Proceeding

FirstLight shall not oppose, based on the issue of standing, an intervention request by any Party in a proceeding for a Project license amendment that the Party has concluded would be Inconsistent with this Settlement Agreement. The Parties acknowledge that intervention in the relicensing proceeding docket at FERC does not make the Party an intervenor in any post-licensing proceeding.

4.11 Compliance with FERC Project Safety and Other Directives

FirstLight expressly reserves the right to fully and timely comply with any FERC directive or compliance order, including but not limited to any requirement related to Project safety or security. In no instance will any action by FirstLight that is reasonably necessary or appropriate to comply with any such order or direction from FERC trigger the dispute resolution protocols of this Settlement Agreement or be construed as a breach of the Settlement Agreement or an action Inconsistent with this Settlement Agreement. FirstLight agrees to consult with relevant Parties to the extent practicable prior to taking action. All Parties reserve their rights to defend their interests at FERC.

4.12 Amendment of Settlement Agreement

This Settlement Agreement may be amended at any time through the term of the New Project Licenses plus the term(s) of any annual license(s) that may be issued after the New Project Licenses have expired, with the unanimous agreement of all Parties still in existence, including any successor thereto. The Party seeking amendment shall give each other Party at least 60-day prior written Notice. Such Notice shall state that failure of any Party, with the exception of FirstLight, to respond in writing or by electronic mail to the Notice within the applicable 60-day period shall be deemed to be an approval of such amendment. Any amendment of this Settlement Agreement shall be in writing and executed by the responding Parties.

5 Dispute Resolution

5.1 General Applicability

5.1.1 All disputes among the Parties regarding any Party's performance or compliance with this Settlement Agreement, including resolution of any disputes related to the New Project Licenses, Fishway Prescriptions, Biological Opinions, Section 401 Certifications, or Permits related to the New Project Licenses, shall

be subject to the dispute resolution process provided in this Section 5, unless otherwise specifically provided in this Settlement Agreement or required by applicable law. The Parties agree that disputes shall be brought in a prompt and timely manner.

5.1.2 The Disputing Parties shall devote such resources as are needed and as can be reasonably provided to resolve the dispute expeditiously.

5.1.3 The Disputing Parties shall cooperate in good faith to promptly schedule, attend, and participate in the dispute resolution.

5.1.4 Unless otherwise agreed among the Disputing Parties, each Disputing Party shall bear its own costs for its participation in this or any administrative dispute resolution process related to the Settlement Agreement.

5.1.5 Each Disputing Party shall promptly implement any resolution of the dispute.

5.1.6 The dispute resolution process in this Section does not preclude any Party from timely filing and pursuing an action for administrative or judicial relief of any FERC order, compliance matter, or other regulatory action related to the New Project Licenses, provided that any such Party shall pursue dispute resolution pursuant to this process as soon as practicable thereafter or concurrently therewith.

5.1.7 The Party initiating a dispute under this Section may notify FERC when dispute resolution proceedings are initiated relevant to the New Project Licenses. The Parties acknowledge that the initiation of dispute resolution proceedings shall have no effect on filing deadlines or applicable statutes of limitation before FERC.

5.2 Process

5.2.1 Dispute Initiation Notice

A Party claiming a dispute shall give Notice of the dispute. If the dispute includes a claim that a New Project License, or related regulatory approval, is Inconsistent with this Settlement Agreement, the Notice shall be issued within the applicable time periods specified in Section 4. Such Notice shall describe: (A) the matter(s) in dispute; (B) the identity of any other Party alleged to have not performed an obligation provided by the Settlement Agreement; and (C) the specific relief sought. The Parties agree that disputes shall be brought in a prompt and timely manner.

5.2.2 Informal Meetings

The Disputing Parties shall hold at least two informal meetings to resolve the dispute, commencing within 30 days after the Dispute Initiation Notice.

5.2.3 Mediation

If the dispute is not resolved in the informal meetings, the Disputing Parties shall decide whether to use a neutral mediator, such as FERC's Office of Dispute Resolution Services. The decision whether to pursue mediation shall be made within 20 days after conclusion of the informal meetings in Section 5.2.2. The Disputing Parties shall agree on an appropriate allocation of any costs of the mediator employed under this section. Mediation shall not occur if the Disputing Parties cannot agree on the allocation of costs. The Disputing Parties shall select a mediator within 30 days of the decision to pursue mediation, including the agreement of allocation of costs. The mediation process shall be concluded not later than 60 days after the mediator is selected. The above time periods may be shortened or lengthened upon mutual agreement of the Disputing Parties.

5.2.4 Dispute Resolution Notice

The Disputing Parties shall provide Notice of any resolution of the dispute achieved under Sections 5.2.2 and 5.2.3. The Notice shall: (A) restate the disputed matter, as initially described in the Dispute Initiation Notice; (B) describe the alternatives which the Disputing Parties considered for resolution; and (C) state whether resolution was achieved, in whole or part, and state the specific relief agreed-to as part of the resolution.

5.3 Enforcement of Settlement Agreement After Dispute Resolution

5.3.1 Enforcement Regarding New Project Licenses

A Disputing Party may seek administrative or judicial relief for an unresolved dispute regarding FirstLight's performance of its obligations under the New Project Licenses only after exhaustion of the dispute resolution process under Section 5, unless applicable processes require a filing for relief before dispute resolution can conclude. Any such relief shall be sought and obtained from FERC or other appropriate regulatory or judicial forum. No Party to the Settlement Agreement may seek damages for breach of the Recreation Management Plan, whether before or after acceptance of the New Project Licenses.

5.3.2 Enforcement Regarding Contractual Obligations

A Disputing Party may seek administrative or judicial relief for breach of a contractual obligation established by this Settlement Agreement only after exhaustion of the dispute resolution process in Section 5. Venue for such action

shall lie in a court with jurisdiction located in the Commonwealth of Massachusetts. In such action, a Disputing Party may only seek specific performance of the contractual obligation or other equitable relief. No Party shall be liable for damages for such breach of contractual obligations. Nothing in this agreement waives the sovereign immunity of the United States, or the Commonwealth of Massachusetts, or any political subdivisions thereof, or constitutes a waiver of any statutory or common law immunity or consent to suit by either a sovereign or any Party in any manner not otherwise provided for by law.

6 Withdrawal from Settlement Agreement

6.1 Withdrawal of Party from Settlement

A Party may withdraw from this Settlement Agreement only if (1) it objects to a Biological Opinion, CWA 401 Certification, or FERC order issuing a New Project License that is Inconsistent with this Settlement, (2) it has complied with the required dispute resolution procedures stated in Section 5 to attempt to resolve the objection, and (3) the objection is to a CWA 401 Certification or FERC order issuing a New Project License, that Party does not file for appeal of the inconsistency. If the Party files an appeal to resolve the inconsistency, that Party may not withdraw until its appeal is concluded and the inconsistency remains uncured. In addition, FirstLight may withdraw as provided in Section 6.2. A Party that withdraws will provide Notice of withdrawal, including its basis for withdrawal.

6.2 Withdrawal of FirstLight from Settlement Agreement Prior to Acceptance of the New Project Licenses

In addition to the provisions of Section 6.1, prior to the acceptance of the New Project Licenses, FirstLight may withdraw from this Settlement Agreement if a Party withdraws from this Settlement Agreement and FirstLight determines, after providing the remaining Parties a reasonable opportunity to meet and discuss the matter with FirstLight, that the withdrawal: (1) may adversely affect the likelihood of NMFS or USFWS issuing a Fishway Prescription or Biological Opinion that is consistent with this Settlement Agreement, (2) may adversely affect the likelihood of MADEP issuing a CWA 401 Certification that is consistent with this Settlement Agreement, (3) may adversely affect the likelihood of FERC issuing a license that is consistent with this Settlement Agreement, or (4) substantially diminishes the value of this Settlement Agreement for FirstLight. FirstLight shall give Notice identifying the reason for withdrawal within 30 days of its knowledge of the event creating the right to withdraw.

6.3 Effective Date of Withdrawal

Withdrawal by a Party shall become effective 10 calendar days after Notice is given by the withdrawing Party.

6.4 Continuity After Withdrawal

The withdrawal of a Party, other than FirstLight, does not automatically terminate this Settlement Agreement for the remaining Parties. If a Party withdraws from this Settlement Agreement, the withdrawing Party shall not be bound by any term contained in this Settlement Agreement, except as provided in this section and in Section 2.3. The withdrawing Party shall not use any documents and communications related to the development, execution, and submittal of this Settlement Agreement to FERC as evidence, admission, or argument in any forum or proceeding for any purpose to the fullest extent allowed by applicable law, including 18 C.F.R. § 385.606. This provision does not apply to any information that was in the public domain prior to the development of this Settlement Agreement or that became part of the public domain at some later time through no unauthorized act or omission by any Party. This provision does not apply to: (1) any information held by a federal agency that is not protected from disclosure pursuant to the Freedom of Information Act or other applicable law; or (2) any information held by a state or local agency that is not protected from disclosure pursuant to M.G.L. ch. 66 §§ 10-10B or other applicable state or federal law. The withdrawing Party shall continue to maintain the confidentiality of all settlement communications to the extent permitted by applicable law.

6.5 Termination of Settlement Agreement

This Settlement Agreement shall terminate as to all Parties and have no further force or effect upon expiration of the New Project Licenses and any annual licenses issued after expiration thereof, upon withdrawal from this Settlement Agreement by FirstLight or upon FirstLight's decision not to affirmatively accept the New Project Licenses, or upon FERC issuing an order approving FirstLight's surrender of one or both of the New Project Licenses. Upon termination, all documents and communications related to the development, execution, and submittal of this Settlement Agreement to FERC shall not be used as evidence, admission, or argument in any forum or proceeding for any purpose to the fullest extent allowed by applicable law, including 18 C.F.R. § 385.606. This provision does not apply to any information that was in the public domain prior to the development of this Settlement Agreement or that became part of the public domain at some later time through no unauthorized act or omission by any Party. This provision does not apply to: (1) any information held by a federal agency that is not protected from disclosure pursuant to the Freedom of Information Act or other applicable law; or (2) any information held by a state or local agency that is not protected from disclosure pursuant to M.G.L. ch. 66 §§ 10-10B or other applicable state or federal law. Notwithstanding the termination of this Settlement Agreement, all Parties shall continue to maintain the confidentiality of all settlement communications to the extent permitted by applicable law, and all Parties remain subject to Section 2.3 of this Settlement Agreement.

7 General Provisions

7.1 Non-Severable Terms of Settlement Agreement

The terms of this Settlement Agreement are not severable one from the other. This Settlement Agreement is made on the understanding that each term is in consideration and support of every other term, and each term is a necessary part of the entire Settlement Agreement. If a court of competent jurisdiction rules that any provision in Sections 1 through 8.2 of this Settlement Agreement is invalid, this Settlement Agreement is deemed modified to conform to such ruling, unless a Party objects. If a Party objects, the other Parties agree to meet and confer regarding the continued viability of this Settlement Agreement.

7.2 No Third-Party Beneficiaries

This Settlement Agreement shall not create any right or interest in the public, or any member thereof, as a third-party beneficiary hereof, and shall not authorize any non-Party to maintain a suit at law or equity pursuant to this Settlement Agreement. The duties, obligations, and responsibilities of the Parties with respect to third parties shall remain as imposed under applicable law.

7.3 Successors and Assigns

This Settlement Agreement shall be binding on and inure to the benefit of the Parties and their successors and approved assigns, unless otherwise specified in this Settlement.

7.3.1 Assignment

Any voluntary assignment by a Party shall not be effective unless approved by FirstLight, which approval shall not be unreasonably withheld. A partial assignment is not permitted. After FirstLight's approval of the assignment, the assignee shall sign the Settlement Agreement and become a Party.

7.3.2 Succession

In the event of succession between public agencies, whether by statute, executive order, or operation of law, the successor agency shall become a Party to and be bound by the terms of this Settlement Agreement, to the extent permitted by law.

7.3.3 Continuation of Certain Obligations

7.3.3.1 Upon completion of a succession or assignment, the initial Party shall no longer be a Party. It shall continue to be bound by Sections 2.3, 6.4, 6.5, 7.2, and 7.3. The initial Party shall not take any action adverse to the Settlement Agreement, or the New Project Licenses to the extent they incorporate the Settlement Agreement.

7.3.3.2 No change in ownership of the Project or transfer of the existing or New Project Licenses by FirstLight shall in any way modify or otherwise affect any other Party's rights or obligations under this Settlement Agreement. Unless prohibited by applicable law, FirstLight shall require in any transaction for a change in ownership of the Projects or transfer of the existing or New Project Licenses, that such new owner shall be bound by, and shall assume all of the rights and obligations of FirstLight under this Settlement Agreement upon completion of the change of ownership and approval by FERC of the license transfer.

7.3.4 Notice

FirstLight transferring pursuant to Section 7.3.3.2 or an assigning Party shall provide Notice to the other Parties at least 30 days prior to the proposed effective date of such transfer or assignment.

7.4 Extension of Time; Inability to Perform

7.4.1 Obligations under New Project Licenses

7.4.1.1 Extension of Time

If FirstLight has good cause, consistent with FERC's standard in 18 C.F.R. § 385.2008, to seek an extension of time to fulfill an obligation under the New Project Licenses, it may file with FERC such a request after consulting with the relevant Parties. The Parties acknowledge that FERC's standard for any such request shall apply. If any Party provides Notice that it disputes the good cause for extension, FirstLight and the Disputing Party shall follow the dispute resolution process in Section 5 of this Settlement Agreement. If the dispute cannot be timely resolved by such process, FirstLight may proceed with its request, if it has not done so already, and any Disputing Party may oppose the request.

7.4.1.2 Inability of FirstLight to Perform

If FirstLight is unable to perform an obligation under the New Project Licenses due to an event or circumstances beyond its reasonable control, FirstLight may file with FERC an appropriate request for relief. The Parties acknowledge that FERC's standard for any such request shall apply. If any Party provides Notice that it disputes the non-performance, FirstLight and the Disputing Party shall follow the dispute resolution process in Section 5 of this Settlement Agreement. If the dispute cannot be timely resolved by such process, FirstLight may proceed with its request to FERC, if it has not done so already, and any Disputing Party may oppose its request.

7.4.2 Contractual Obligations

No Party shall be liable to the other, or be deemed to be in breach of this Settlement Agreement, for failure or delay in rendering performance arising out of causes factually beyond its control and without its fault and negligence. Such causes may include but are not limited to: acts of God or the enemy, wars, fires, floods, epidemics, quarantine restrictions, strikes, unforeseen freight embargoes, unusually severe weather, or unforeseen breakdown or failure of the Project works for the period of time necessary to cure. Dates and times of performance shall be extended to the extent of the delays excused by this covenant, provided that the Party whose performance is affected notifies the others as provided in Section 7.4.3.

7.4.3 Notice of Delay or Inability to Perform

The Party whose performance of an obligation under this Settlement Agreement is affected by any delay or inability to perform under Section 7.4 shall provide Notice as soon as reasonably practicable. This Notice shall include: (1) a description of the event causing the delay or anticipated delay; (2) an estimate of the anticipated length of the delay; (3) a description of the measures taken or to be taken to avoid or minimize the delay; and (4) a proposed timetable for the implementation of the measures or performance of the obligation. The affected Party shall make all reasonable efforts to promptly resume performance of the obligation. It shall provide Notice when it resumes performance of the obligation.

7.5 Governing Law

The New Project Licenses and any other terms of this Settlement Agreement over which a federal agency has statutory or regulatory jurisdiction shall be governed, construed, and enforced in accordance with such authorities. This Settlement Agreement shall otherwise be governed and construed under the laws of the Commonwealth of Massachusetts. By executing this Settlement Agreement, no federal agency is consenting to the jurisdiction of a state court unless such jurisdiction otherwise exists. All activities undertaken pursuant to this Settlement Agreement shall be in compliance with all applicable law.

7.6 Elected Officials Not to Benefit

No elected officials shall be entitled to any share or part of this Settlement Agreement or to any benefit that may arise from it.

7.7 No Partnership

Except as otherwise expressly set forth herein, this Settlement Agreement does not and shall not be deemed to make any Party the agent for, partner of, or joint venturer with any other Party.

7.8 Reference to Regulations

Any reference in this Settlement Agreement to any federal or state regulation shall be deemed to be a reference to such regulation, or successor regulation, in existence as of the date of the action at the time in question.

7.9 Notice

Except as otherwise provided in this Section, any Notice required by this Settlement Agreement shall be written. Notice shall be sent to all Parties still in existence and, as applicable, filed with FERC. For the purpose of this Settlement Agreement and unless otherwise specified, a Notice shall be effective upon receipt, but if provided by U.S. Mail, seven (7) business days after the date on which it is mailed. The Parties agree that if practicable, electronic mail or fax are the preferred methods of providing Notice under this Settlement Agreement. When this Settlement Agreement requires Notice in fewer than seven (7) business days, Notice shall be provided by telephone, fax, or electronic mail and shall be effective when provided. For the purpose of Notice, the list of authorized representatives of the Parties as of the Effective Date is attached as Appendix D. FirstLight shall keep the names and contact information for the Parties to this Settlement Agreement. The Parties shall provide Notice of any change in the authorized representatives designated in Appendix D, and FirstLight shall maintain the current distribution list of such representatives. The Parties agree it is their responsibility to keep FirstLight informed of their current address, telephone, fax, and electronic mail information, and that failure to provide FirstLight with current contact information will result in a waiver of that Party's right to Notice under this Settlement Agreement.

7.10 Section Titles for Convenience Only

The titles for the Sections of this Settlement Agreement are used only for convenience of reference and organization and shall not be used to modify, explain, or interpret any of the provisions of this Settlement Agreement or the intentions of the Parties. This Settlement Agreement has been jointly drafted by the Parties and therefore shall be construed according to its plain meaning and not for or against any Party.

7.11 Entire Agreement

This Settlement Agreement and its Appendices A-E shall exclusively constitute the entire agreement among the Parties, superseding all oral, written, or other understandings and agreements.

8 Execution of Settlement Agreement

8.1 Signatory Authority

Each signatory to this Settlement Agreement certifies that he or she is authorized to execute this Settlement Agreement and to legally bind the Party he or she represents, and

that such Party shall be fully bound by the terms hereof upon such signature without any further act, approval, or authorization by such Party.

8.2 Signing in Counterparts

This Settlement Agreement may be executed in any number of counterparts, and each executed counterpart shall have the same force and effect as an original instrument as if all the signatory Parties to all of the counterparts had signed the same instrument. Any signature page of this Settlement Agreement may be detached from any counterpart of this Settlement Agreement without impairing the legal effect of any signatures thereon, and may be attached to another counterpart of this Settlement Agreement identical in form hereto but having attached to it one or more signature pages.

IN WITNESS THEREOF,

the Parties, through their duly authorized representatives, have caused this Recreation Settlement Agreement to be executed as of the date set forth in this Recreation Settlement Agreement.

FirstLight MA Hydro LLC and Northfield Mountain LLC,



Date: 5/25/2023

By: Justin Trudell, COO

IN WITNESS THEREOF,

the Parties, through their duly authorized representatives, have caused this Recreation Settlement Agreement to be executed as of the date set forth in this Recreation Settlement Agreement.

National Park Service

K Fellner

Date: 5/15/2023

By: Kelly Fellner

IN WITNESS THEREOF,

the Parties, through their duly authorized representatives, have caused this Recreation Settlement Agreement to be executed as of the date set forth in this Recreation Settlement Agreement.

Massachusetts Department of Conservation and Recreation



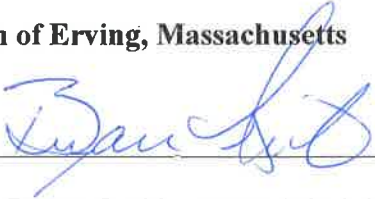
Date: 6.8.23

By:

IN WITNESS THEREOF,

the Parties, through their duly authorized representatives, have caused this Recreation Settlement Agreement to be executed as of the date set forth in this Recreation Settlement Agreement.

Town of Erving, Massachusetts



Date: May 22, 2023

By: Bryan Smith, Town Administrator

IN WITNESS THEREOF,

the Parties, through their duly authorized representatives, have caused this Recreation Settlement Agreement to be executed as of the date set forth in this Recreation Settlement Agreement.

Town of Gill, Massachusetts

Ray Purington

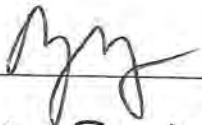
Date: June 5, 2023

By: Ray Purington
Town Administrator

IN WITNESS THEREOF,

the Parties, through their duly authorized representatives, have caused this Recreation Settlement Agreement to be executed as of the date set forth in this Recreation Settlement Agreement.

Town of Montague, Massachusetts



Date: May 15, 2023

By: Richard Kuklewicz
Selectboard Chairman

IN WITNESS THEREOF,

the Parties, through their duly authorized representatives, have caused this Recreation Settlement Agreement to be executed as of the date set forth in this Recreation Settlement Agreement.

Town of Northfield, Massachusetts



Date: May 16th, 2023

By:

IN WITNESS THEREOF,

the Parties, through their duly authorized representatives, have caused this Recreation Settlement Agreement to be executed as of the date set forth in this Recreation Settlement Agreement.

American Whitewater



Date: 5/10/2023

By: Robert Nasdor
Northeast Stewardship & Legal Director
American Whitewater

IN WITNESS THEREOF,

the Parties, through their duly authorized representatives, have caused this Recreation Settlement Agreement to be executed as of the date set forth in this Recreation Settlement Agreement.

Appalachian Mountain Club

Nicole Zussman

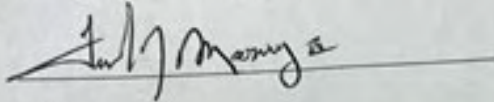
Date: 5/10/2023

By: Nicole Zussman, President & CEO of Appalachian Mountain Club

IN WITNESS THEREOF,

the Parties, through their duly authorized representatives, have caused this Recreation Settlement Agreement to be executed as of the date set forth in this Recreation Settlement Agreement.

Crab Apple Whitewater, Inc.

A handwritten signature in black ink, appearing to read "Julie M...". The signature is written over a horizontal line that extends to the right.

By:

Date: 5-18-23

IN WITNESS THEREOF,

the Parties, through their duly authorized representatives, have caused this Recreation Settlement Agreement to be executed as of the date set forth in this Recreation Settlement Agreement.

New England FLOW

New England FLOW

Date: 6/7/23

By: Thomas J. Christopher
Secretary/Director

IN WITNESS THEREOF,

the Parties, through their duly authorized representatives, have caused this Recreation Settlement Agreement to be executed as of the date set forth in this Recreation Settlement Agreement.

Zoar Outdoor

Janet Cowie

By:

Date: 5/9/2023

IN WITNESS THEREOF,

the Parties, through their duly authorized representatives, have caused this Recreation Settlement Agreement to be executed as of the date set forth in this Recreation Settlement Agreement.

Access Fund

 _____

Date: 05/08/2023

By: *Zachary Lesch-Huie*



IN WITNESS THEREOF,

the Parties, through their duly authorized representatives, have caused this Recreation Settlement Agreement to be executed as of the date set forth in this Recreation Settlement Agreement.

Franklin Regional Council of Governments



Date: 5/18/23

By:

IN WITNESS THEREOF,

the Parties, through their duly authorized representatives, have caused this Recreation Settlement Agreement to be executed as of the date set forth in this Recreation Settlement Agreement.

Western Massachusetts Climbers Coalition



Date: 05.05.2023

By: Pamela Matsuda-Dunn

**Appendix A - Proposed License Article on Recreation to be Included in the New
Turners Falls Hydroelectric Project License**

Draft License Article

Article A100. Recreation Management Plan

The Licensee shall implement the Recreation Management Plan dated May 2023.

**Appendix B - Proposed License Article on Recreation to be Included in the New
Northfield Mountain Pumped Storage Project License**

Draft License Article

Article B100. Recreation Management Plan

The Licensee shall implement the Recreation Management Plan dated May 2023.

Appendix C - Measures Agreed to Among the Parties But Not to be Included in New Project Licenses

RECREATION

Section C101. Pocket Park

Within 3 years of license issuance, the Licensee shall install a pocket park at a location to be determined in the town of Northfield, or an equivalent investment for a single river access point in consultation with the signatories of the Recreation Settlement Agreement. This may include signage for historical and cultural interpretation. The pocket park will be in Northfield; the access point may or may not be in the town of Northfield.

Section C102. Farley Ledges Conservation Restriction

Farley Ledges is a rock climbing area on the eastern side of Northfield Mountain, a portion of which is owned by the Licensee and currently within the Northfield Mountain Project FERC-licensed project boundary. Licensee shall use diligent and commercially reasonable efforts to grant and record a conservation restriction pursuant to M.G.L. c. 184, § 31 (the “Farley CR”) for the purpose of permanently conserving, for recreational purposes, that portion of Farley Ledges owned by Licensee and which Licensee intends to remove from the project boundary as shown in Figure 1 (the “CR Property”). The Licensee will seek FERC approval to revise the project boundary to exclude the portion of Farley Ledges shown in Figure 1 for the purpose of facilitating potential conveyance of property rights under the CR to a third party. The Parties recognize that any conveyance of property rights to a third party may require FERC approval if FERC declines to revise the project boundary to exclude Farley Ledges. The Farley CR shall specifically permit the CR Property to be used for climbing among other defined recreation uses. If, prior to granting the Farley CR, Licensee conveys its interest in any portion of the CR Property to a third party, such conveyance shall be made subject to restrictions, expressly enforceable in gross by any Party to this Agreement, requiring the grantee to (x) make the conveyed property available for public climbing among other defined recreation uses (on substantially the same terms and scope as would be in effect if the Farley CR had been established) and (y) use diligent efforts to encumber the conveyed property with a conservation restriction substantially similar to the Farley CR.

The Licensee shall consult the town of Erving and the Massachusetts Department of Conservation and Recreation regarding the details of the Farley CR, which consultation will be completed within two years after license issuance. Parties intend that the Farley CR will be recorded against the Property no later than six years after FERC license issuance, and Licensee agrees to employ diligent and commercially reasonable efforts to meet that deadline.

If despite these efforts the Farley CR is not in place within six years after FERC license issuance and Licensee has not first conveyed the Property to a third party subject to the conditions specified above, then Licensee shall record an easement or reasonably equivalent instrument that permits the public to access the Property for climbing and other defined recreational uses to an extent and in a manner substantially equivalent to the rights that would have been conferred to the public in the Farley CR.

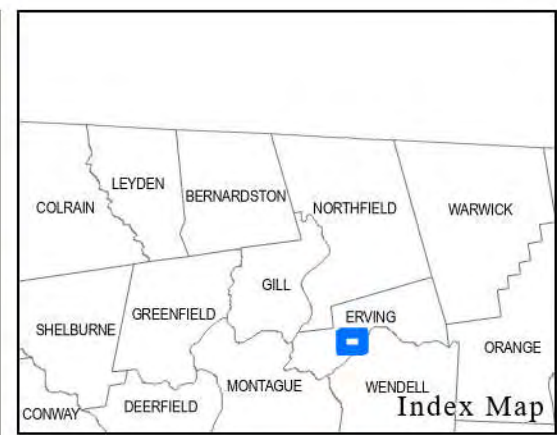
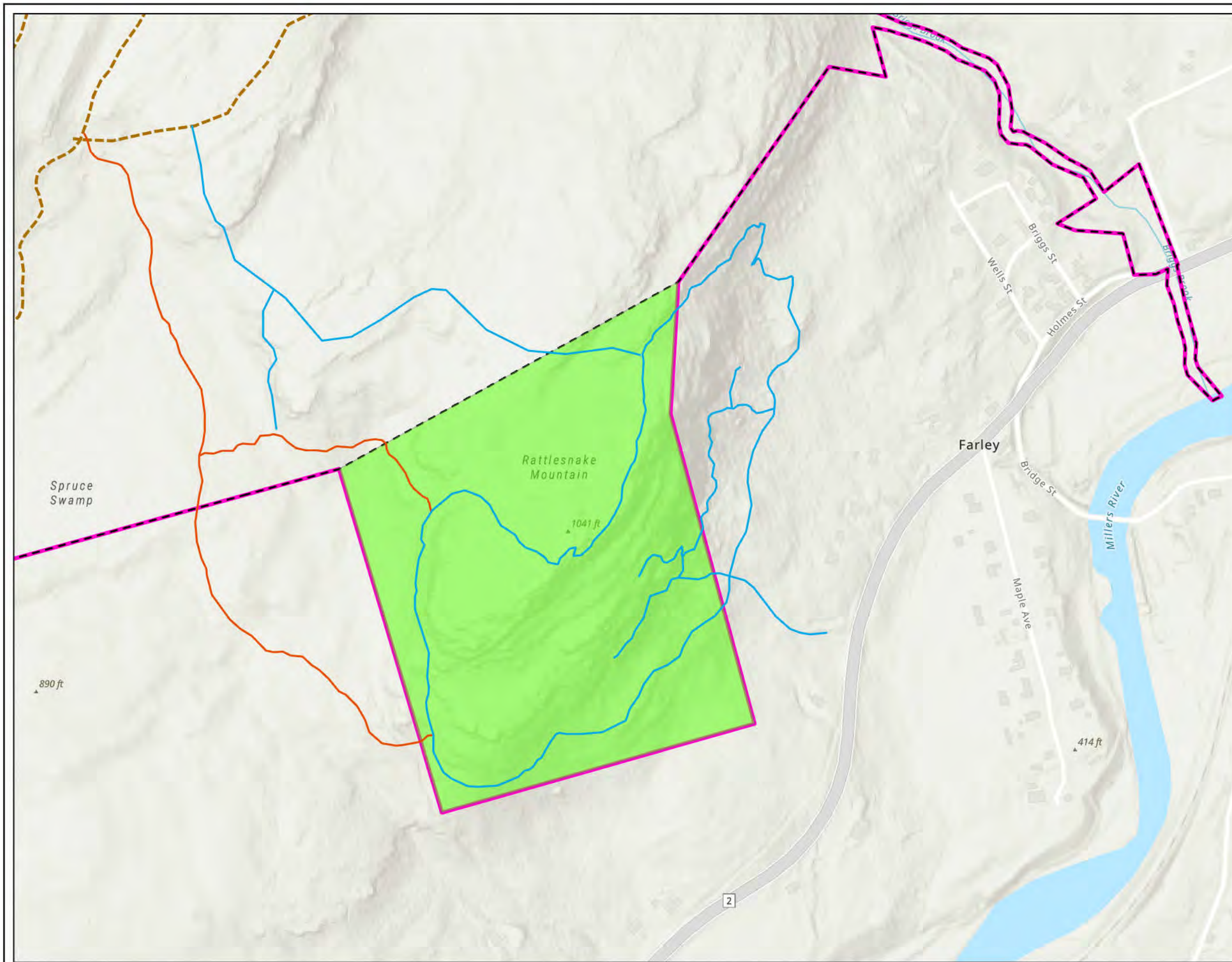
Section C103. Recreation Advisory Group and Recreation Management Plan

The Licensee shall form and chair a Recreation Advisory Group (“RAG”) and shall convene meetings of the RAG (“RAG Meeting”) no less than annually, with the first RAG Meeting to occur within one year of license issuance. Members of the RAG (“RAG Members”) will include signatories to the Recreation

Settlement Agreement, provided that any such signatory may elect not to be a RAG Member by submitting written notice to the Licensee. The purpose of the RAG Meetings shall be to discuss recreation use and operation and maintenance needs at all Project Recreation Facilities included in the Recreation Management Plan.

Section C104. Advertising

Starting one year after license issuance, the Licensee shall coordinate promoting its Turners Falls and Northfield Mountain Project facilities with local communities and organizations and improve its digital presence. The Licensee shall work with the RAG to identify the targeted audiences for this outreach, including Environmental Justice communities, Indigenous communities, those with disabilities, visitors to the region, residents, and local communities and organizations, and a schedule for pushing out facility promotional materials.



FIRSTLIGHT HYDRO GENERATING COMPANY
 Northfield Mountain Pumped Storage Project No. 2485
 Turners Falls Hydroelectric Project No. 1889

Figure 1.
 Proposed Northfield Mountain
 Project Boundary Adjustments
 around Farley Ledges

Legend

- Project Trails
- Non-Project Trails
- WMCC Trail
- Potential Rescue Route
- Current FERC Project Boundaries
- Proposed FERC Project Boundary
- Farley Conservation Restriction

N

Service Layer Credits: World Topographic Map; Esri Community Maps Contributors, MassGIS, © OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA
 World Hillshade: Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

0 200 400 800 Feet
 1:4,800

Copyright © 2023 FirstLight Power Resources All rights reserved.

Appendix D - Authorized Representatives of the Parties

FirstLight MA Hydro LLC

Northfield Mountain LLC

Justin Trudell
Chief Operating Officer
FirstLight Power
111 Soth Bedford Street, Suite 103
Burlington, MA 01803
Phone: 781-653-4247
Email: justin.trudell@firstlightpower.com

Access Fund

Zachary Lesch-Huie
Vice President of Programs & Acquisitions
Access Fund
PO Box 17010
Boulder, CO 80308
Phone: 303-545-6772
Email: zachary@accessfund.org

American Whitewater

Bob Nasdor
Northeast Stewardship & Legal Director
American Whitewater
65 Blueberry Hill Lane
Sudbury, MA 01776
Phone: 617-584-4566
Email: bob@americanwhitewater.org

Appalachian Mountain Club

Mark Zakutansky
Director of Conservation Policy Engagement
Appalachian Mountain Club
45 Jordan Road, PO Box 527
Albrightsville, PA 18210
Phone: 610-868-6915
Email: mzakutansky@outdoors.org

Crab Apple Whitewater, Inc.

Frank Mooney
River Manager/Ownership Family
Crab Apple Whitewater, Inc.
PO Box 295
Charlemont, MA 01370
Phone: 413-824-1842
Email: frank@crabapplewhitewater.com

Franklin Regional Council of Governments

Linda Dunleavy
Executive Director
Franklin Regional Council of Governments
2 Olive Street, Suite 2
Greenfield, MA 01301
Phone: 413-774-3168 x103
Email: lindad@frcog.org

Massachusetts Department of Conservation and Recreation

Brian Arrigo
Commissioner
Massachusetts Department of Conservation and Recreation
251 Causeway Street, 9th Floor
Boston, MA 02114
Phone: 617-626-1250
Email: brian.arrigo@state.ma.us

National Park Service

Kelly Fellner
Superintendent of Springfield Armory National Historic Site
Coltsville National Historic Park
One Armory Street, Suite 2
Springfield, MA 01105
Phone: 413-734-8551 x226
Email: Kelly_fellner@nps.gov

New England FLOW

Tom Christopher
252 Fort Pond Inn Road
Lancaster, MA 01523
Phone: 508-331-4889
Email: tom.christopher@comcast.net

Town of Erving, Massachusetts

Town Administrator
Town of Erving, MA
12 East Main Street
Erving, MA 01344
Phone: 413-422-2800 x1102
Email: adminstrator@erving-ma.gov

Town of Gill, Massachusetts

Town Administrator
Town of Gill, MA
Town Hall
325 Main Road
Gill, MA 01354
Phone: 413-863-9347
Email: administrator@gillmass.org

Town of Montague, Massachusetts

Town Administrator
Town of Montague, MA
1 Avenue A
Turners Falls, MA 01376
Phone: 413-863-3200
Email: townadmin@montague-ma.gov

Town of Northfield, Massachusetts

Town Administrator
Town of Northfield, MA
69 Main Street
Northfield, MA 01360
Phone: 413-498-2901
Email: allamas@northfieldma.gov

Western Massachusetts Climbers Coalition

Pamela Matsuda-Dunn
Western Massachusetts Climbers Coalition
25 Parkview Drive
South Hadley, MA 01075
Phone: 646-734-5776
Email: pmdart@gmail.com

Zoar Outdoor

Janet Cowie
Zoar Outdoor
PO Box 245
Charlemont, MA 01339
Phone: 413-339-4010
Email: janet@zoaroutdoor.com

Appendix E - Recreation Management Plan

Recreation Settlement Agreement

Recreation Management Plan

Turners Falls Hydroelectric Project (FERC Project Number 1889)
Northfield Mountain Pumped Storage Project (FERC Project Number 2485)



MAY 2023

TABLE OF CONTENTS

1	INTRODUCTION AND BACKGROUND	1-1
1.1	Turners Falls Project	1-1
1.2	Northfield Mountain Project	1-1
1.3	Agreement in Principle and Recreation Settlement Agreement.....	1-1
2	PROJECT DESCRIPTIONS	2-2
2.1	Turners Falls Project	2-2
2.2	Northfield Mountain Project	2-2
3	CONTEXT AND IMPORTANCE OF PROJECT RECREATION FACILITIES IN THE REGION	3-1
3.1	State, Local, and Project-Specific Studies and Plans	3-1
3.2	Northfield Mountain Tour and Trail Center.....	3-2
4	OVERARCHING COMPONENTS OF THE RECREATION MANAGEMENT PLAN.....	4-1
4.1	Turners Falls Project and Northfield Mountain Project	4-1
4.1.1	Updates to Recreation Management Plan	4-1
4.1.2	Compliance with Americans with Disabilities Act.....	4-1
4.1.3	Donation of Used Sporting Equipment.....	4-1
4.1.4	Recreation Implementation Schedule	4-2
4.2	Turners Falls Project	4-2
4.2.1	Establish Conservation Easements/Restrictions	4-2
4.2.2	Establish Flow and Water Level Notification Website.....	4-2
4.2.3	Disposition of Cabot Camp Historic Structures.....	4-2
4.3	Northfield Mountain Project	4-3
4.3.1	Establish Conservation Restrictions and Trail Easement.....	4-3
5	EXISTING PROJECT RECREATION SITES.....	5-1
5.1	Turners Falls Project	5-1
5.1.1	Gatehouse Fishway Viewing Area.....	5-1
5.1.2	Turners Falls Branch Canal Area.....	5-1
5.1.3	Cabot Woods Fishing Access	5-1
5.1.4	Turners Falls Canoe Portage	5-2
5.2	Northfield Mountain Project	5-2
5.2.1	Munn’s Ferry Boat Camping Recreation Area	5-2
5.2.2	Boat Tour and Riverview Picnic Area	5-2
5.2.3	Northfield Mountain Tour and Trail Center	5-3
5.2.4	Barton Cove Nature Area and Campground.....	5-3
5.2.5	Barton Cove Canoe and Kayak Rental Area.....	5-4
6	NEW AND UPGRADED RECREATION FACILITIES	6-1
6.1	Turners Falls Project	6-1
6.1.1	Construct Pocket Park.....	6-1
6.1.2	Construct Mallory Brook Campsite	6-1

RECREATION MANAGEMENT PLAN

6.1.3	Construct Formal Access Trail and Put-In at Cabot Camp.....	6-1
6.1.4	Construct Car-Top Access at East End of Unity Park and Reconfigure Parking Lot..	6-1
6.1.5	Construct River Access and Two Put-Ins Just Below Turners Falls Dam.....	6-1
6.1.6	Construct Viewing Platform and Picnic Area just Below Turners Falls Dam.....	6-2
6.1.7	Construct River Access Trail at Station No. 1	6-2
6.1.8	Install Stairs at the Cabot Woods Fishing Access.....	6-2
6.1.9	Construct Portage Trail Around Rock Dam.....	6-2
6.1.10	Improve Poplar Street River Access	6-3
6.1.11	Install Interpretive Cultural Signage at Key Locations.....	6-3
6.2	Northfield Mountain Project	6-4
6.2.1	Enhance Existing Bennett Meadow Trails.....	6-4
6.2.2	Construct Riverview Improvements (Docks)	6-4
6.2.3	Construct New Mountain Biking Trails at Northfield Mountain.....	6-4
6.2.4	Construct Barton Cove Campsite.....	6-4
6.2.5	Establish Rose Ledges as a Project Recreation Facility.....	6-4
6.2.6	Implement Barton Cove Improvements (Locking Canoes and Kayaks).....	6-4
6.3	Summary of Existing and Proposed Recreation Facilities.....	6-5
7	IMPLEMENTATION SCHEDULE FOR RECREATION MODIFICATIONS AND UPGRADES.....	7-1
8	MANAGEMENT AND MAINTENANCE MEASURES FOR PROJECT RECREATION SITES	8-1
8.1	Access Roads and Parking Areas.....	8-1
8.2	Boat Docks.....	8-1
8.3	Picnic Areas	8-1
8.4	Campsites.....	8-1
8.5	Restrooms	8-2
8.6	Shower Facilities (Northfield Mountain Project).....	8-2
8.7	Signs.....	8-2
8.8	Buildings and Other Structures	8-2
8.9	Trails	8-2
8.10	FirstLight Heritage Riverboat (Northfield Mountain Project)	8-2
8.11	Non-Motorized Boat Put-Ins/Take-Outs.....	8-2
9	FEES.....	9-1
10	LITERATURE CITED.....	10-1
11	APPENDIX A: MAPS SHOWING FIRSTLIGHT LANDS TO BE PLACED INTO CONSERVATION RESTRICTION	11-1

LIST OF TABLES

Table 5.0-1. Turners Falls Project: Existing FERC-Approved Project Recreation Sites and Facilities Summary	5-5
Table 5.0-2. Turners Falls Project: Existing FERC-Approved Recreation Sites, Facilities, and Amenities ..	5-6
Table 5.0-3. Northfield Mountain Project: Existing FERC-Approved Recreation Sites and Facilities Summary	5-7
Table 5.0-4. Northfield Mountain Project: Existing FERC Approved Recreation Sites, Facilities, and Amenities.....	5-8
Table 6.3-1. Existing and Proposed Recreation Facilities or Features at the Northfield Mountain and Turners Falls Projects, Listed by Town.....	6-6
Table 7.0-1. Recreation Implementation Schedule.....	7-1
Table 8.0-1. Amenities at Turners Falls Project Recreation Sites to which Management and Maintenance Measures Apply.....	8-3
Table 8.0-2. Amenities at Northfield Project Recreation Sites to which Management and Maintenance Measures Apply.....	8-4

LIST OF FIGURES

Figure 2.1-1. Turners Falls Hydroelectric Project and Northfield Mountain Pumped Storage Project- Project Boundary Map.....	2-3
Figure 2.1-2. Turners Falls Hydroelectric Project Features.....	2-4
Figure 2.2-1. Northfield Mountain Pumped Storage Project Features.....	2-5
Figure 5.0-1. Existing and Proposed Recreation Facilities at the Turners Falls and Northfield Mountain Projects	5-10
Figure 5.0-2. Existing and Proposed Recreation Facilities at the Turners Falls and Northfield Mountain Projects – Blown-Up Map below Turners Falls Dam	5-11
Figure 5.3.2-1. Existing Northfield Mountain Trail System.....	5-12
Figure 6.1.3-1. Conceptual Layout of Access Trail and Put-In at Cabot Camp	6-11
Figure 6.1.3-2. Conceptual Profile of Access Trail and Put-In at Cabot Camp.....	6-12
Figure 6.1.4-1. Conceptual Layout of Cart-Top Access at North End of Unity Park.....	6-13
Figure 6.1.5-1. Conceptual Layout of Two Put-Ins below Turners Falls Dam (Put-in Upstream of Peskeomskut Island).....	6-14
Figure 6.1.5-2. Conceptual Layout of Two Put-Ins below Turners Falls Dam (Put-in Downstream of Peskeomskut Island).....	6-15
Figure 6.1.7-1. Conceptual Layout of Access Trail at Station No. 1	6-16
Figure 6.1.9-1. Conceptual Layout of Portage Trail around Rock Dam.....	6-17
Figure 6.1.10-1. Conceptual Layout of Poplar Street Take-Out	6-18
Figure 6.1.10-2. Conceptual Profile of Poplar Street Take-Out	6-19
Figure 6.2.2-1. Conceptual Layout of Docks and Access at Riverview	6-20
Figure 6.2.2-2. Riverview- Boat Tour Dock Relocation- Profile.....	6-21

LIST OF ABBREVIATIONS

ADA	Americans with Disabilities Act
AIP	Agreement in Principle
AMC	Appalachian Mountain Club
AW	American Whitewater
CFR	Code of Federal Regulations
CMR	Code of Massachusetts Regulations
Conte Lab	U.S. Geological Survey's Conte Anadromous Fish Laboratory
FERC	Federal Energy Regulatory Commission
FirstLight	FirstLight MA Hydro LLC and Northfield Mountain LLC
FRCOG	Franklin Regional Council of Governments
GRH	Great River Hydro
HPMP	Historic Properties Management Plan
MA	Massachusetts
MDCR	Massachusetts Department of Conservation and Recreation
MDFW	Massachusetts Division of Fisheries and Wildlife
Northfield Mountain Project	Northfield Mountain Pumped Storage Project
NH	New Hampshire
NHESP	Natural Heritage and Endangered Species Program
NMFS	National Marine Fisheries Service
NMTTC	Northfield Mountain Tour and Trail Center
NPS	National Park Service
NRF	Naturally Routed Flow
OSRP	Open Space and Recreation Plans
PM&E	Protection, Mitigation and Enhancement
RMP	Recreation Management Plan
TFI	Turners Falls Impoundment
Turners Falls Project	Turners Falls Hydroelectric Project
USGS	United States Geological Survey
VT	Vermont
WMCC	Western Massachusetts Climbers Coalition

1 INTRODUCTION AND BACKGROUND

A single Recreation Management Plan (RMP) has been developed for the Turners Falls Hydroelectric Project (Turners Falls Project, FERC No. 1889) and the Northfield Mountain Pumped Storage Project (Northfield Mountain Project, FERC No. 2485). FirstLight MA Hydro LLC and Northfield Mountain LLC (referred to collectively in this document as FirstLight) own the Turners Falls Project and Northfield Mountain Project. In this RMP, FirstLight has separated what recreation facilities are part of the Turners Falls Project and Northfield Mountain Project.

1.1 Turners Falls Project

The Turners Falls Project is located on the Connecticut River in the states of Massachusetts (MA), New Hampshire (NH), and Vermont (VT). It includes the Turners Falls Dam, which creates the approximate 20-mile-long Turners Falls Impoundment (TFI). Below the dam are two FirstLight hydroelectric projects including Station No. 1 and Cabot Station. The Project Boundary includes the TFI and the reach below the dam. The lands and waters within the Turners Falls Project Boundary provide a variety of recreational activities, such as walking, hiking, angling, boating, camping, biking, and picnicking.

1.2 Northfield Mountain Project

The Northfield Mountain Project is located adjacent to the Connecticut River and uses the TFI as its lower reservoir. It includes an Upper Reservoir, intake, underground powerhouse, tailrace tunnel and tailrace into the TFI. The Project Boundary includes the TFI and the area around Northfield Mountain. The land and water in the Project Boundary provide a variety of recreational activities, such as walking, hiking, cross-country skiing, snowshoeing, angling, boating, camping, biking, rock climbing, and picnicking.

1.3 Agreement in Principle and Recreation Settlement Agreement

Between September 2021 and February 2022, FirstLight and recreation stakeholders met to discuss recreation needs in the Turners Falls and Northfield Mountain Project area. On February 2, 2022, FirstLight and recreation stakeholders reached an Agreement-in-Principle (AIP) on recreation related issues on both Projects. The AIP addresses various recreation issues including, but not limited to, new recreation facilities having Americans with Disabilities Act (ADA) accessibility, upgrades to existing recreation facilities, establishing a website to post real-time flow and forecasted flow information, and establishing conservation easements/restrictions. Also, as part of this AIP, FirstLight and the recreation stakeholders agreed to file a revised RMP for the Turners Falls and Northfield Mountain Projects reflecting the agreements in the AIP as part of a Recreation Settlement Agreement. The revised RMP was updated based on stakeholder input when the Recreation Settlement Agreement was finalized. This revised single RMP replaces the separate RMPs filed with the Federal Energy Regulatory Commission (FERC) as part of the Amended Final License Application in December 2020.

The purpose of this revised RMP is to guide FirstLight's management and maintenance of recreation facilities at the Turners Falls and Northfield Mountain Projects over the new license term consistent with the AIP and FERC's requirements to provide adequate public access to Project lands and waters.

2 PROJECT DESCRIPTIONS

2.1 Turners Falls Project

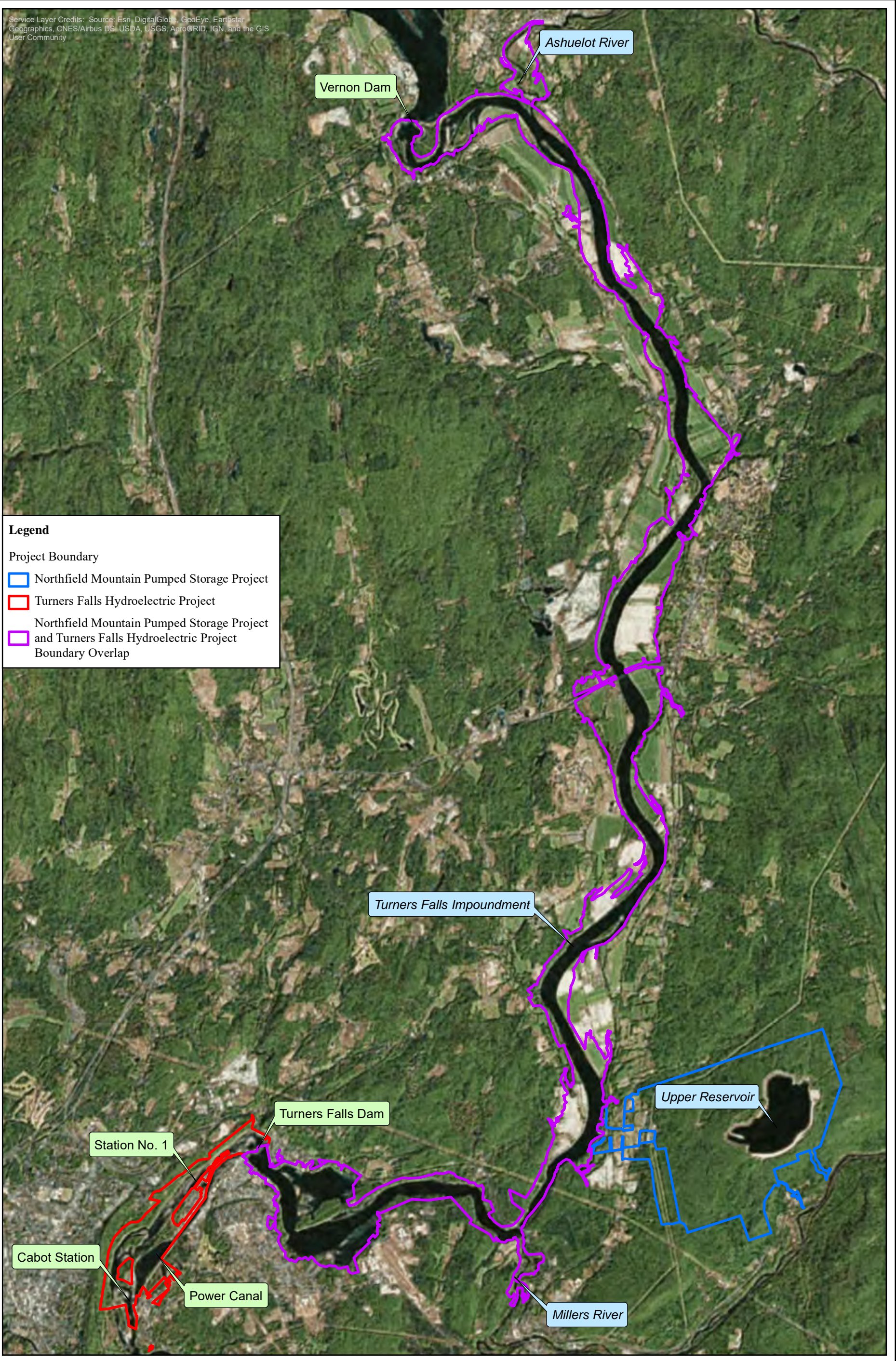
The Turners Falls Project is located on the Connecticut River in the states of MA, NH, and VT. The TFI serves as the lower reservoir for the Northfield Mountain Project. The Project Boundary is shown on [Figure 2.1-1](#) and overlaps with the Northfield Mountain Project Boundary along nearly the entire perimeter of the TFI. The TFI is a shared Project feature with the Northfield Mountain Project. The greater portion of the Turners Falls Project, including developed facilities and most of the lands within the Turners Falls Project Boundary, is located in Franklin County, MA; specifically, in the towns of Erving, Gill, Greenfield, Montague and Northfield. The northern reaches of the shared Project Boundary (TFI) extend into the towns of Hinsdale, in Cheshire County, NH, and Vernon, in Windham County, VT. The TFI extends upstream to the base of Great River Hydro's (GRH) Vernon Hydroelectric Project and Dam (FERC No. 1904). The discharges from GRH's Vernon Project comprise approximately 87% of the drainage area at the Turners Falls Project.

Key Turners Falls Project features are shown in [Figure 2.1-2](#) and consist of the following: a) two individual concrete gravity dams separated by an island; b) a gatehouse controlling flow to the power canal; c) a power canal and a short branch canal leading to Station No. 1; d) two hydroelectric powerhouses, located on the power canal, known as Station No. 1 and Cabot Station; e) a bypassed section of the Connecticut River and f) three fish ladders including the Cabot fish ladder, Spillway fish ladder and Gatehouse fish ladder. Note that as part of the next license, the Cabot fish ladder will be retired and the existing Spillway fish ladder will be replaced with a Spillway Lift.

2.2 Northfield Mountain Project

The Northfield Mountain Project is a pumped-storage facility located on the Connecticut River in MA that uses the TFI as its lower reservoir. The Northfield Mountain Project Boundary is also shown on [Figure 2.1-1](#), which overlaps with the Turners Falls Project Boundary along nearly the entire perimeter of the TFI, but it does not include the Turners Falls Dam. The greater portion of the Northfield Mountain Project, including developed facilities and most of the lands within the Northfield Mountain Project Boundary, are located in Franklin County, MA; specifically, in the towns of Erving, Gill, Montague and Northfield.

Key Northfield Mountain Project features are shown in [Figure 2.2-1](#) and consist of the following: a) Upper Reservoir dam/dikes, b) an intake channel, pressure shaft, c) an underground powerhouse and d) a tailrace tunnel. The tailrace is located approximately 5.2 miles upstream of Turners Falls Dam, on the east side of the TFI. Note that as part of the next license, a barrier net will be installed around the tailrace/intake.



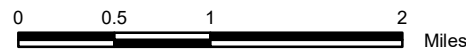
Legend

Project Boundary

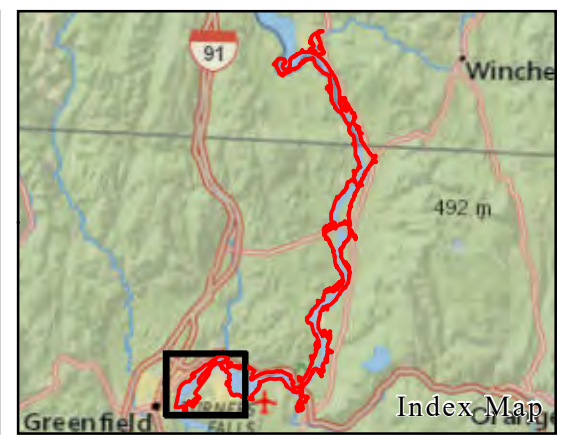
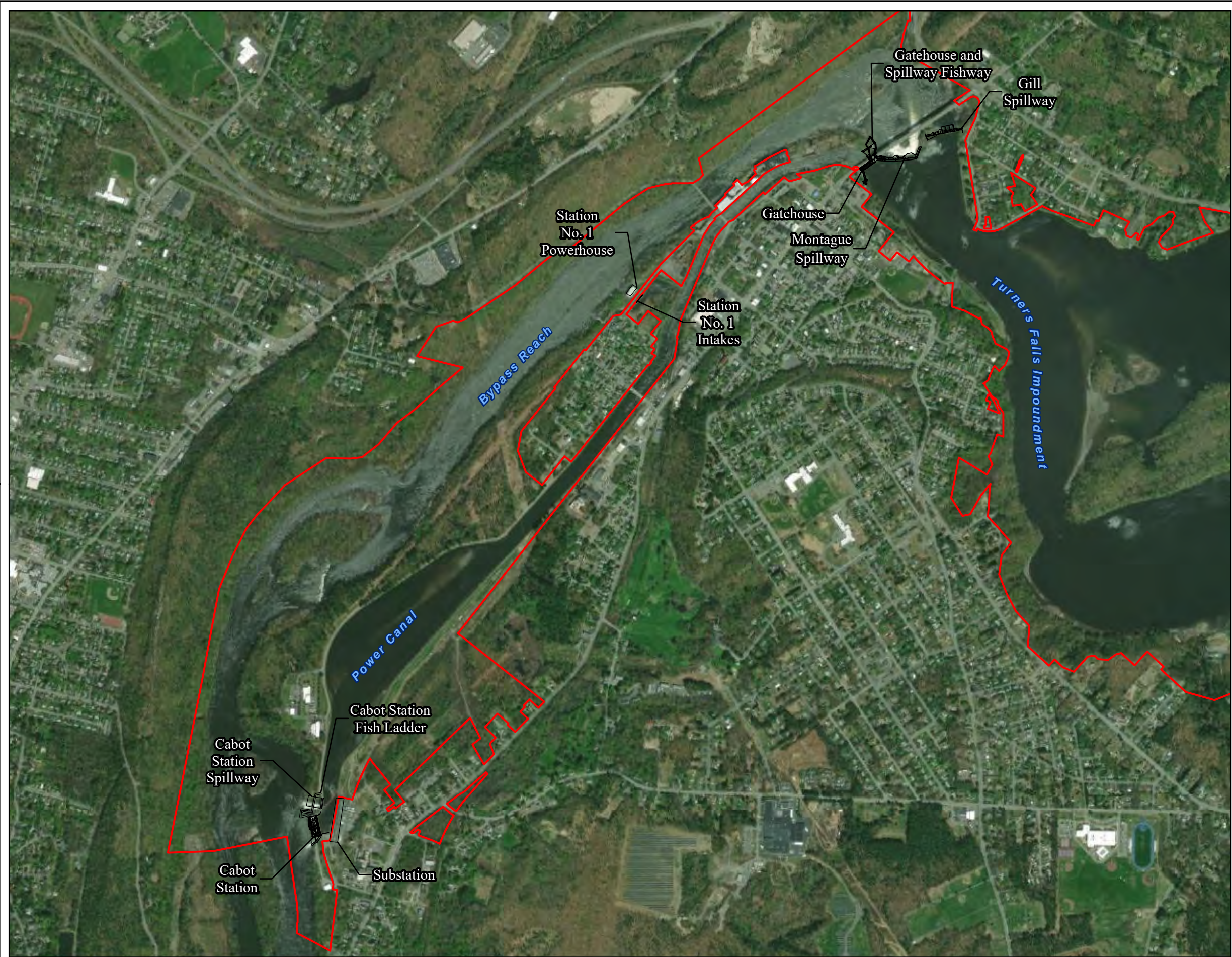
- Northfield Mountain Pumped Storage Project
- Turners Falls Hydroelectric Project
- Northfield Mountain Pumped Storage Project and Turners Falls Hydroelectric Project Boundary Overlap



Turners Falls Hydroelectric Project (No. 1889)
Northfield Mountain Pumped Storage Project (No. 2485)
Recreation Management Plan



**Figure 2.1-1:
Turners Falls Hydroelectric Project and
Northfield Mountain Pumped Storage
Project- Project Boundary Map**



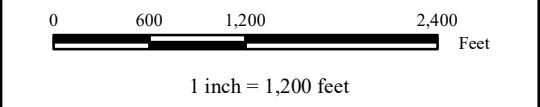
Turners Falls Hydroelectric Project (No. 1889)
 Northfield Mountain Pumped Storage Project (No. 2485)
 Recreation Management Plan

Figure 2.1-2:
 Turners Falls Hydroelectric Project Features

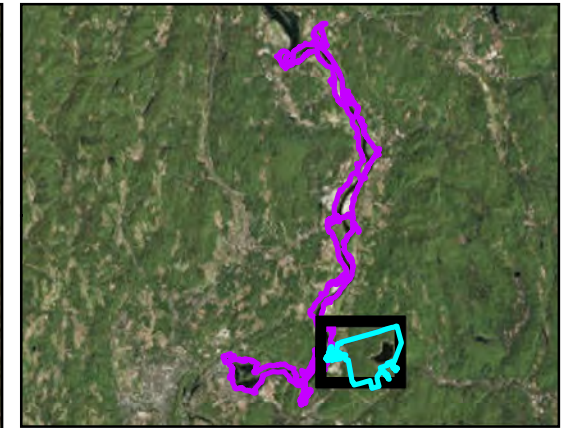
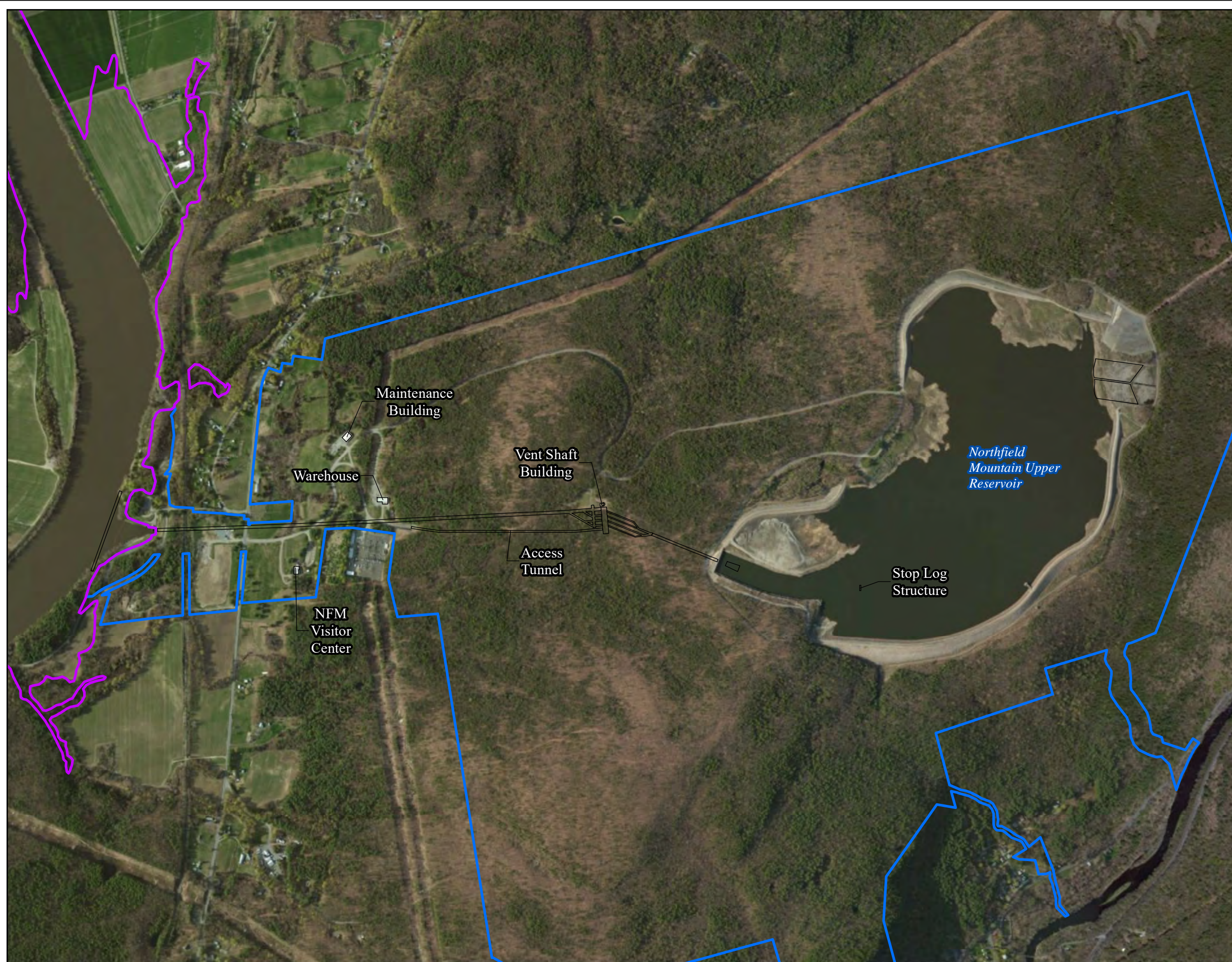
Legend

Project Boundary

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
 National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.



Copyright © 2020 FirstLight MA Hydro LLC All rights reserved.



Turners Falls Hydroelectric Project (No. 1889)
 Northfield Mountain Pumped Storage Project (No. 2485)
 Recreation Management Plan

Figure 2.2-1:
 Northfield Mountain Pumped Storage
 Project Features

Legend

Project Boundary Polygon

- ▭ Northfield Mountain (NFM) Project Boundary
- ▭ Combined TF/NFM Project Boundary

N

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

0 600 1,200 2,400
 Feet

1 inch = 1,200 feet



3 CONTEXT AND IMPORTANCE OF PROJECT RECREATION FACILITIES IN THE REGION

Outdoor recreation is vital to the economy of rural Franklin County and plays a major role in shaping the identity of this area. The recreation facilities provided by FirstLight under the FERC Licenses for the Northfield Mountain Project and the Turners Falls Project are a critical part of the regional network of recreational assets. Outdoor recreation opportunities are a major attraction for residents and businesses to locate in Franklin County. Supporting projects that enhance outdoor adventure, recreation and cultural tourism was among the top strategic goals for the 2021 regional economic development plan for Franklin County.¹

The FERC relicensing process provides an opportunity for diverse stakeholders to discuss recreation needs with FirstLight. It is also an opportunity to collaborate to conserve, protect and enhance the outstanding recreational, cultural, and natural resources found in the Project Area. Franklin County is the most rural and one of the poorest counties in the state of Massachusetts.² Recreation opportunities enhance the lives of those who reside or work here and attract visitors to the region. In an area struggling economically, recreation opportunities should remain affordable and accessible to residents.

FirstLight owns and/or operates multiple recreation sites along the Connecticut River in the Project Area, making it the largest manager of recreation sites in central Franklin County. The vibrancy and sustainability of recreation opportunities along the Connecticut River is inextricably tied to the health of the river ecosystem. With this as context, FirstLight is committed to protecting ecosystem health. A healthy, easy-to-access river, with abundant recreation opportunities, will greatly enhance life for all those who call Franklin County home and will attract new people to visit here. FirstLight seeks to ensure equitable access to recreational facilities for residents, disabled and underserved populations, and Environmental Justice and Indigenous communities. FirstLight is committed to working with host communities and regional stakeholders to maintain and improve our recreational facilities and to protect cultural and natural resources located in the Project Area.

3.1 State, Local, and Project-Specific Studies and Plans

The existing recreation amenities at the Turners Falls and Northfield Mountain Projects were originally developed as part of a Recreation Management Plan written in 1968. To inform recommendations and planning for the new license, FirstLight conducted seven recreation-related studies as part of the relicensing effort as follows:

- Study No. 3.6.1 Recreation Use/User Contact Survey
- Study No. 3.6.2 Recreation Facilities Inventory and Assessment Report and Addendum
- Study No. 3.6.3 Whitewater Boating Evaluation
- Study No. 3.6.4 Assessment of Day Use and Overnight Facilities Associated with Non-motorized Boating
- Study No. 3.6.5 Land Use Inventory
- Study No. 3.6.6 Assessment of Effects of Project Operation on Recreation and Land Use
- Study No. 3.6.7 Recreation Study at Northfield Mountain, including Assessment of Sufficiency of Trails for Shared Use

¹ [2021 Annual Report Draft 06.10.21 FINAL \(frcog.org\)](#) - Comprehensive Economic Development Strategy

² Residents of Franklin County earn less money than others in the state. According to estimates from the 2016-2020 American Community Survey, Franklin County has a much lower median household income of \$61,198 compared to \$84,385 statewide.

RECREATION MANAGEMENT PLAN

These studies have been summarized in FirstLight’s Amended Final License Application (2020), and results were used and referenced to develop ideas for the new recreation facilities included in this RMP.

Statewide Recreation Priorities

As part of Study No. 3.6.1, FirstLight researched the Statewide Comprehensive Outdoor Recreation Plan (SCORP) for Massachusetts, Vermont, and New Hampshire. FirstLight found that the recreation opportunities, sites, facilities, and amenities proposed to be provided for the Turners Falls and Northfield Mountain Projects are consistent with the findings of, and goals/objectives established by, the three state SCORPs. All three state SCORPs identified outdoor recreation as being of great importance to state residents.

Among the more popular activities identified by the three SCORPs were hiking and walking, and the MA SCORP in particular noted that trails were of particular importance for meeting future recreation demand. This is generally consistent with the findings of FirstLight’s use and user survey which found that hiking/walking/jogging is the most popular recreation activity at the Project. Other popular outdoor recreation activities identified by the three state SCORPs include water-based sports including boating, paddling, and fishing. Again, the use and user surveys conducted at the Projects’ recreation sites also found these activities to be popular and well supported by existing recreation sites, facilities, and amenities.

Local and Regional Open Space and Recreation Plans

FirstLight reviewed local plans, ordinances, statutes, policies, and guidelines that may affect the use and/or management of lands inside the Projects’ boundaries. Table 4.6.5-1 in Study No. 3.6.1 lists the Open Space and Recreation Plans (OSRPs) for the communities in the Project area. Generally, the local plans reviewed recommend the protection of natural resources, farmland, and open space, and promote additional recreation opportunities along the Connecticut River in the vicinity of the Projects. In addition, some of the plans provide specific acknowledgement or notations regarding public recreation use of the Projects. Some of the plans also provide general recommendations for public recreation in the Project vicinity, while others provide more specific recommendations regarding public recreation site/facility needs and improvements at the Projects. Acknowledgements and recommendations regarding Project-related public recreation needs and improvements that are included in the open space plans are summarized in Table 4.6.5-2 of Study No. 3.6.1. Many town OSRPs recommend additional access along the Connecticut River.

These plans informed the discussion between FirstLight and recreation stakeholders when negotiating the Agreement in Principle that led to this RMP.

3.2 Northfield Mountain Tour and Trail Center

The Northfield Mountain Tour and Trail Center (NMTTC) is the central hub of all of the Projects’ recreation facilities, and so is highlighted here in this plan and described in this section. The Visitor Center building has restrooms, seasonal rental equipment, and parking. The parking area is designed to accommodate 50 vehicles and has an additional three (3) American with Disabilities Act (ADA) spaces. The Center is accessible by ramp and has ADA accessible sanitation facilities. Amenities at the Center include three (3) men’s and three (3) women’s bathroom units, one of each being ADA accessible, a rental Yurt, numerous picnic tables, some grills, a fire ring, benches, trash cans and interpretive displays.

The Northfield Mountain trail system includes over 26 miles of trail, which are available for hiking, biking, horseback riding, snowshoeing, and cross-country skiing. The trail system also provides access to additional recreational opportunities, such as rock climbing at Rose Ledge. The trail system begins at the Visitor Center near the parking lot. Most of the trails are located within the Northfield Mountain Project boundary, and the trails can be used to access the mountaintop observation area offering panoramic views of the Northfield Mountain Project’s Upper Reservoir. Surrounding the NMTTC are a variety of important

RECREATION MANAGEMENT PLAN

recreational facilities including a fishway viewing area, river access put-ins for canoes and kayaks, camp sites, picnic areas and hiking trails. These facilities are located in the host communities of Northfield, Montague, Gill, and Erving and support recreational tourism in the towns and region, which benefits businesses that serve visitors as well as residents.

NMTTC staff provide monthly environmental education activities to the public and also educate school groups and field trips. NMTTC staff coordinate with the FirstLight staff at the Barton Cove paddle boat rental and campground, run the staffing and ticket sales of the Heritage Boat Tours, and schedule reservations of the Riverview Pavilion and the Munn's Ferry camp site. Events are often held at the NMTTC, such as state or regional cross-country running races.

This RMP outlines the current and new recreation amenities that will be offered in the renewed license, some of which will be located or related to the NMTTC. The goal of the NMTCC is to be a recreation destination and regional asset offering varied and affordable recreation and education opportunities for visitors and residents of the region.

4 OVERARCHING COMPONENTS OF THE RECREATION MANAGEMENT PLAN

[Section 5](#) describes the existing recreation facilities at the Turners Falls and Northfield Mountain Projects and [Section 6](#) describes the proposed new recreation facilities or upgrades to existing recreation facilities. Overarching components are discussed below.

4.1 Turners Falls Project and Northfield Mountain Project

4.1.1 Updates to Recreation Management Plan

Recreation use and activities may change over the license term. Given this, the RMP will be reviewed following each 10 years of the license, to evaluate recreation use and demand. FirstLight will review information it collects at its recreation facilities as well as feedback from the towns of Gill, Montague, Northfield and Erving, Massachusetts Department of Conservation and Recreation (MDCR), Franklin Regional Council of Governments (FRCOG), Appalachian Mountain Club (AMC), American Whitewater (AW), Access Fund, Crab Apple Whitewater, Inc, New England Flow, Western Massachusetts Climbers' Coalition (WMCC) and Zoar Outdoor relative to evaluating recreation use³, demand, maintenance, user fees, and condition of the recreation facilities. Any update to the RMP will be based on the consensus of the consulted entities and FirstLight. FirstLight will file any updated RMP with FERC for FERC's approval. If an updated RMP is not filed, FirstLight will file a letter with FERC explaining why no changes are needed, including any written comments from the consulted entities.

4.1.2 Compliance with Americans with Disabilities Act

For any new construction or rehabilitation of existing FirstLight recreation buildings and facilities over the license term, FirstLight will comply with 521 CMR⁴ and with Title III⁵ of the ADA to the extent applicable. In addition, FirstLight will conduct a programmatic assessment of the existing public recreation buildings and facilities for consistency with the requirements of the ADA and will implement ADA improvements within a reasonable period, to the extent applicable. The programmatic assessment, with expected timelines for updates, will be completed within two (2) years of license issuance and will be distributed to the towns of Gill, Montague, Northfield, Erving, MDCR, FRCOG, AMC, AW, Access Fund, Crab Apple Whitewater, Inc, New England Flow, New England Mountain Bike Association, WMCC, and Zoar Outdoor for a 30-day comment period before being filed with FERC.

4.1.3 Donation of Used Sporting Equipment

FirstLight will donate used sporting equipment to local youth organizations.

³ In the case of the Poplar Street take-out, after the first year of operation, FirstLight, the town of Montague, AW, AMC, Crab Apple Whitewater, New England FLOW, Zoar Outdoors, and MDCR will consult relative to vandalism (including to the porta-potty), overnight parking, and inappropriate uses at the location, given its proximity to the residential neighborhood.

⁴ CMR- Code of Massachusetts Regulations Title 521.

⁵ Title III prohibits discrimination on the basis of disability in the activities of place of public accommodations (businesses that are generally open to the public and fall into one of 12 categories listed in the ADA including recreation facilities) and requires newly constructed or altered places of public accommodation to comply with ADA standards.

4.1.4 Recreation Implementation Schedule

FirstLight will complete construction of the proposed and upgraded recreation facilities and meet the other commitments in this RMP according to the schedule shown in [Table 7.0-1](#).

4.2 Turners Falls Project

4.2.1 Establish Conservation Easements/Restrictions

FirstLight will place lands it owns that are not used for specific Project activities (e.g., power production, Project recreation facilities, conflicting existing uses, etc.) located on river right⁶ immediately downstream of the Turners Falls Dam into conservation easement/restriction subject to existing third party property rights. [Appendix A](#) shows FirstLight parcels to be placed in conservation easement/restrictions. FirstLight will consult with the towns of Gill and Greenfield and the MDCR relative to the details of the conservation easement/restriction within two (2) years of license issuance along with a timeline for implementation, with implementation to be completed within six (6) years of license issuance, contingent on any necessary FERC approvals.

4.2.2 Establish Flow and Water Level Notification Website

Real-Time Data

FirstLight will provide real-time (every hour) TFI water level information where it is measured at the Turners Falls Dam. Also, FirstLight will provide real-time (hourly) Turners Falls Dam spill rates and Station No. 1 discharges (in cubic feet per second or cfs). All of the real-time data will be provided year-round, 24 hours a day, on a website accessible to the public within one (1) year of license issuance.

Forecasted Data

FirstLight will also include on its website the Naturally Routed Flow⁷ (NRF), the anticipated Turners Falls Dam spill rate, and the anticipated Station No. 1 discharge for a 12-hour window into the future at any given time. Should FirstLight deviate from passing the 12-hour previous NRF, it will post the revised flows (in the 12-hour look ahead window) to the website as soon as practicable after those flows are known.

4.2.3 Disposition of Cabot Camp Historic Structures

FirstLight, in consultation with the town of Montague (Selectboard and Historical Commission), will attempt to find a qualified organization within the first three (3) years of license issuance to take responsibility for preserving the Cabot Camp historic buildings. During this three (3) year period FirstLight will: a) conduct a topographic and property survey, and a condition assessment of the Cabot Camp parcel, and b) plan and conduct a market/re-development study of Cabot Camp in collaboration with the town of Montague. If no acceptable means to otherwise preserve the historic structures of Cabot Camp is identified, including through a potential transfer of stewardship to a credible and well-established preservation-focused

⁶ River-right assumes one is looking in a downstream direction.

⁷ From December 1 through June 30, the NRF is defined as the hourly sum of the discharges from 12 hours previous as reported by the: Vernon Hydroelectric Project (FERC No. 1904), Ashuelot River United States Geological Survey gauge (USGS, Gauge No. 01161000), and Millers River USGS gauge (Gauge No. 01166500).

From July 1 through November 30, the NRF is defined as the hourly sum of the discharges averaged from 1 to 12 hours previous as reported by the: Vernon Hydroelectric Project, Ashuelot River USGS gauge, and Millers River USGS gauge. Upon license issuance until 3 years thereafter, the Licensee shall operate the Turners Falls Project based on the NRF computational method from July 1 through November 30 to determine if the Turners Falls Project can be operated in this manner. If the Turners Falls Project cannot be operated in this manner, the Licensee shall consult MDFW, NMFS, and United States Fish and Wildlife Service on alternative means of computing the NRF that are feasible for Turners Falls Project operation and sufficiently dampen upstream hydroelectric project flexible operations.

RECREATION MANAGEMENT PLAN

organization, the property will be repurposed for other recreation or alternative uses consistent with the Historic Properties Management Plan (HPMP) and the RMP within eight (8) years of license issuance. During this period of time, FirstLight will continue to maintain the property and address any emergent safety issues associated with the condition of these structures, in consultation with the town of Montague and, as appropriate, its Historical Commission.

4.3 Northfield Mountain Project

4.3.1 Establish Conservation Restrictions and Trail Easement

FirstLight will place lands it owns that are not used for specific Project activities (e.g., power production, Project recreation facilities, etc.) along the TFI shoreline into conservation easement/restriction to maintain riparian buffers. [Appendix A](#) shows FirstLight parcels to be placed in conservation easement/restrictions. FirstLight will consult with the towns of Gill, Northfield, Montague, and Erving and MDCR relative to the details of the conservation easements/restrictions within two (2) years of license issuance along with a timeline for implementation, with implementation to be completed within six (6) years of license issuance, contingent on any necessary FERC approvals.

FirstLight will permanently conserve its lands within Bennett Meadow within six (6) years of license issuance. Within (2) years of license issuance FirstLight will consult with the Massachusetts Division of Fisheries and Wildlife (MDFW) on provisions necessary to include in the conservation easement/restriction that would allow continued operation of the property as a Wildlife Management Area., including provisions for hunting, fishing, and wildlife management.

FirstLight will also, in consultation with the National Park Service (NPS), town of Erving, MDCR and AMC conserve via a permanent trail easement the approximately 1.3-mile-long portion of the New England National Scenic Trail in the Project boundary on the eastern side of the Northfield Mountain Upper Reservoir in Erving, MA. FirstLight will consult with these same groups relative to the details of the permanent trail easement and allocation of responsibility within two (2) years of license issuance along with a timeline for implementation, with conveyance of the trail easement to be completed within six (6) years of license issuance, contingent on any necessary FERC approvals.

Collectively, the conservation easements/restrictions that are part of the Turners Falls (see Section 4.2.1) and Northfield Mountain Projects equates to 761.4 acres, which breaks down on a town basis as follows:

Town	Acres FirstLight is Placing into Conservation Easement/Restriction
Northfield, MA	238.4
Erving, MA	65.8
Gill, MA	93.7
Montague, MA	251.4
Greenfield, MA	112.1
Total	761.4

5 EXISTING PROJECT RECREATION SITES

From upstream to downstream, FirstLight operates and maintains the following existing Turners Falls Project and Northfield Mountain Recreation Sites, as shown in [Figure 5.0-1](#) and [Figure 5.0-2](#) (blown up below Turners Falls Dam). Consistent with past practice, FirstLight will continue to operate and maintain the Recreation Sites as part of the RMP. [Table 5.0-1](#) and [Table 5.0-2](#) list the facilities and amenities associated with the Turners Falls Project Recreation Sites. [Table 5.0-3](#) and [Table 5.0-4](#) list the facilities and amenities associated with the Northfield Mountain Project Recreation Sites. (FirstLight, [2014](#) & [2015](#)).

5.1 Turners Falls Project

5.1.1 Gatehouse Fishway Viewing Area

Location: The Gatehouse Fishway Viewing Area is located on the north side of 1st Street across from the town operated Unity Park in the town of Montague.

Description of Facilities: The Gatehouse Fishway Viewing Area provides the public an opportunity to view the fish using the fishway. There are two floors to the facility. On the upper level there are ADA accessible restrooms. The upper level also has a viewing platform that is ADA accessible and contains interpretive displays and a closed-circuit television feed from the fishway counting room. The bottom level contains the fishway viewing area, additional interpretive displays, and also contains the counting room, which is not open to the public. The facility is staffed with seasonal employees during viewing times. The site also contains a picnic area on the north side of 1st Street. The picnic area contains picnic tables, grills, a bike rack, and parking, including an electric vehicle charging station. The Canalside Rail Trail starts at the upstream parking lot adjacent to the old Turners Falls-Gill Bridge abutment and continues along the Turners Falls Power Canal.

Site Operation: The fishway viewing facility is open to the public free of charge during fish migration season, typically mid-May to mid-June. Timing may vary depending on weather and river conditions. Hours of operation are Wednesday through Sunday from 9:00 am to 5:00 pm. The viewing area is contained within a fence which is locked during the off-season. The picnic area is located outside of the fence, allowing it to be open year-round from dawn until dusk, unless there is a scheduled event.

5.1.2 Turners Falls Branch Canal Area

Location: Turners Falls Branch Canal Area is located off Power Street in Montague, along the Station No. 1 forebay.

Description of Facilities: The Turners Falls Branch Canal Area is a day use overlook that provides benches.

Site Operation: The site is available to the public free of charge year-round. There are no posted hours of operation.

5.1.3 Cabot Woods Fishing Access

Location: Cabot Woods Fishing Access is located on Migratory Way in Montague between the power canal and the bypass reach.

Description of Facilities: Cabot Woods Fishing Access is open for day use activities. Recreation facilities provided at the site include picnic tables and two parking areas (upper and lower). The access road along the canal is open to the public. Over time, several informal trails to the shore have been established by anglers.

Site Operation: The fishing access is open year-round free of charge. Anglers access the river either by walking in at the corner of 12th and I Streets, or along paths from Migratory Way. The site abuts a fence

RECREATION MANAGEMENT PLAN

belonging to the U.S. Geological Survey's Conte Anadromous Fish Laboratory (Conte Lab). At the head of the road (Migratory Way), there is a gate leading to Cabot Woods and the Conte Lab. If the gate is closed, the upper parking lot can be used. Migratory Way is plowed in the winter by the Conte Lab allowing use of the access road, although the parking areas are not plowed. Swimming is prohibited at this site and signs are posted indicating that it is not safe to swim.

Please see [Section 6.1.8](#) for updates to the Cabot Woods Fishing Access under the new license term.

5.1.4 Turners Falls Canoe Portage

Location: The Turners Falls canoe portage operation provides boaters with transportation around the Turners Falls Dam and canal/river section downstream of the dam. Boaters not wishing to navigate the section directly downstream of the dam can get out at Barton Cove and call FirstLight for vehicular portage. They are then picked up and driven downstream of the Turners Falls Dam to the Poplar Street Access site in Montague, where they can continue their trip. Signs explaining the canoe portage operation procedures and providing the portage request call-in number are located at the following Project and Northfield Mountain Project Recreation Sites: Munn's Ferry Boat Camping Recreation Area, Boat Tour and Riverview Picnic Area, Barton Cove Nature Area and Campground, Barton Cove Canoe and Kayak Rental Area, and at the Poplar Street Access Site. Instructions are to paddle to the Barton Cove Canoe and Kayak Rental Area, unload gear, and then call (413) 659-3761 to request a pickup. Typically, a vehicle for the portage will arrive within 15 to 90 minutes of the telephone call. Barton Cove Canoe and Kayak Rental Area has a phone during business hours that boaters can use from Memorial Day through Labor Day. During the off-season, boaters need to use their own phones to make the portage request.

Site Operation: Portage around the Turners Falls Dam for paddlers is available to the public at no charge seven days per week during the paddling season, typically May 1 to October 15. The site is open from dawn until dusk.

5.2 Northfield Mountain Project

5.2.1 Munn's Ferry Boat Camping Recreation Area

Location: Munn's Ferry is located on the east side of the Connecticut River in Northfield.

Description of Facilities: Munn's Ferry is a water access-only overnight and day use site. The camping area at Munn's Ferry includes tent campsites each with a trash can, tent platform, picnic table, grill, and, in some cases, a fire ring.

Site Operation: Munn's Ferry is open from Memorial Day to Columbus Day. Individuals must reserve a site and pay a fee prior to camping. The dock is available during the operating season.

5.2.2 Boat Tour and Riverview Picnic Area

Location: The Boat Tour and Riverview Picnic Area is located off Pine Meadow Road on the east shore of the Connecticut River in Northfield.

Description of Facilities: The Boat Tour and Riverview Picnic area provides an area for picnicking along the river, which includes picnic tables and grills. There is a pavilion, which can be rented from Memorial Day to Columbus Day for group events. The site includes restroom facilities and benches. The site also offers river tours on the Heritage Riverboat, which travels along the Connecticut River between Barton Cove and the Riverview Picnic Area. The riverboat is operated by FirstLight and typically leaves from the Riverview Picnic Area dock.

A formal parking lot is available for those using the picnic area and those who are boarding the Heritage Riverboat. There are ADA accessible parking spaces and an ADA compliant bathroom at the site.

Please see [Section 6.2.2](#) for upgrades to this site under the new license term.

Site Operation: The site is open from dawn to dusk free of charge, although there is a fee to rent the pavilion or cruise on the riverboat. The site opens once the FirstLight boat barrier upstream of Turners Falls Dam is installed (typically May 15th) through Columbus Day weekend. The river boat operates from July to mid-October. The dock is in place during the operating season once the FirstLight boater barriers are installed and removed during the off-season. The entrance to the site has a gate, which is open when the site is open to the public.

5.2.3 Northfield Mountain Tour and Trail Center

Location: The NMTTC is located off Millers Falls Road in Northfield, MA.

Description of Facilities: The NMTTC offers a Visitor Center, parking area, trails, and a mountaintop observation area. The Visitor Center offers self-guided interpretive displays, meeting rooms, a lounge, and public restrooms. The center also offers recreation and environmental education programs year-round, including programs for school classes and organized groups. There is a paved parking area located adjacent to the Visitor Center. Additional overflow parking is provided on a nearby mowed area. Horse trailers and buses utilize the cul-de-sac on the west side of the Visitor Center for parking. ADA accessible parking is available at the Visitor Center, along with a ramp to access the facility.

Site Operation: The Visitor Center is typically open year-round for day use activities from 9:00 am to 4:30 pm Wednesday through Sunday. The Center is also open on certain holidays, which are noted on FirstLight's web page. The Northfield Mountain trail system is also open year round, depending on trail and weather conditions. Use of the Visitor Center is free, as is summer trail use and snowshoeing. FirstLight charges a fee for cross country skiing. Seasonal equipment is rented out to users in the winter. A fee may also be charged for the recreation and environmental educational activities to help offset costs.

Mountaintop Observation Area

The Mountaintop Observation Area is a wooden observation platform providing views of the Upper Reservoir from its southern shore. The platform is approximately 20 feet by 20 feet and is accessible from the Northfield Mountain Trail System's Summit Trail.

Trail System

The Northfield Mountain Trail System includes approximately 26 miles of trails, which are used for hiking, mountain biking, equestrian use, snowshoeing, cross-country skiing, and other non-motorized multi-use activities. Trails will continue to be maintained for these uses. A map of the trail system is provided in [Figure 5.3.2-1](#). Approximately 19 miles of trail are wide (8'-15') level corridors with an improved base. Approximately 7 miles are narrow single track trails on natural soils. These trails are typically used for hiking, biking, and snowshoeing. Rose Ledge and a portion of the Farley Ledges are also located within the vicinity of the Northfield Mountain Tour and Trail Center. Rose Ledges can be accessed via the NMTTC parking area and trail system. Both Rose Ledge and Farley Ledges can be accessed via parking and trails outside the Project Boundary on private property.

5.2.4 Barton Cove Nature Area and Campground

Location: Barton Cove Nature Area and Campground are located on Barton Cove Road in Gill.

Description of Facilities: The Barton Cove Nature Area has a set of flush toilets and showers. The site has grills, picnic tables, and a walking trail leading to an overlook. There is a paved parking area at the Nature Area and an adjacent overflow parking area.

The Barton Cove Campground has group campsites, trailer sites, and tent sites. One of the tent sites is considered ADA accessible. Each campsite has a picnic table and fire ring. There are community trash

RECREATION MANAGEMENT PLAN

containers in the campground. The group sites also have grills and additional picnic tables. There are vault toilets located within the campground. There is an additional parking area within the campground.

See Section 5.2 for improvements to this facility under the new license agreement.

Site Operation: The Nature Area is open to the public free of charge, from dawn to dusk year round. The parking area at the Nature Area is plowed during the winter months. The campground is open from Memorial Day to Labor Day. Quiet hours are from 10:00pm to 8:00 am. There is a fee for overnight camping and sites may be reserved ahead of time.

5.2.5 Barton Cove Canoe and Kayak Rental Area

Location: This site is located on the northern shore of the Connecticut River, off Route 2 in Gill.

Description of Facilities: Barton Cove Canoe and Kayak offers paddlecraft rentals and picnicking. There is a natural gravel carry-in paddlecraft launch, a rental office, picnic tables, parking, and a portable sanitation facility. Paddlecraft rentals include personal flotation devices and paddles or oars.

Site Operation: The facility is open from Memorial Day weekend to Labor Day weekend and is gated in the off-season. The rental office is open on weekends from 9:00 am to 6:00 pm and Monday through Friday 9:00 am to 5:00 pm. Individuals can use the site free of charge, although there is a fee to rent paddlecraft.

RECREATION MANAGEMENT PLAN

Table 5.0-1. Turners Falls Project: Existing FERC-Approved Project Recreation Sites and Facilities Summary

Recreation Site Name	Recreation Facilities/Amenities
Gatehouse Fishway Viewing Area	<ul style="list-style-type: none"> • parking area (approximately 27 single vehicle spaces; 2 ADA spaces) • picnic area (approximately 6 tables) • bike rack • trail • fishway viewing visitor center (ADA accessible) • restrooms (ADA accessible) • interpretive sign
Turners Falls Branch Canal Area	<ul style="list-style-type: none"> • Overlook (approximately 4 benches) for fishing and picnicking
Cabot Woods Fishing Access	<ul style="list-style-type: none"> • parking areas (approximately 17 single vehicle spaces; 2 ADA spaces) • picnic area (approximately 3 tables)
Turners Falls Canoe Portage	<ul style="list-style-type: none"> • canoe portage take-out (at Barton Cove Canoe & Kayak Rental area) • canoe portage put-in (at Poplar Street Access Site) • On-call vehicular canoe & kayak transport service

RECREATION MANAGEMENT PLAN

Table 5.0-2. Turners Falls Project: Existing FERC-Approved Recreation Sites, Facilities, and Amenities

Recreation Site Name	Recreation Facility/Amenity Type	Facility/Amenity Status	Latitude	Longitude	FERC Citation & Date	Notes
Barton Cove Canoe and Kayak Rental Area	Take-out	Constructed	42.6082	72.5375	18 FERC 62,467 03/17/1982	Put-in and take-out counted as 1 canoe portage
Gatehouse Fishway Viewing Area	Visitor Center	Constructed	42.6097	72.5542	18 FERC 62,467 03/17/1982	fishway viewing areas
Gatehouse Fishway Viewing Area	Picnic Area	Constructed	42.6088	72.5532	18 FERC 62,467 03/17/1982	Approximately 6 tables
Gatehouse Fishway Viewing Area	Interpretive Sign	Constructed	42.6092	72.5536	18 FERC 62,467 03/17/1982	fish species traveling through fish ladder system
Turners Falls Branch Canal Area	Overlook	Constructed	42.6062	72.5629	18 FERC 62,467 03/17/1982	Approximately 4 benches
Cabot Woods Fishing Access	Picnic Area	Constructed	42.5948	72.5788	18 FERC 62,467 03/17/1982	Approximately 3 tables
Cabot Woods Fishing Access	Access Point	Constructed	42.5950	72.5772	18 FERC 62,467 03/17/1982	Angler access
Turners Falls Canoe Portage	Put-in	Constructed	42.5802	72.5752	18 FERC 62,467 03/17/1982	Poplar Street Access Site

RECREATION MANAGEMENT PLAN

Table 5.0-3. Northfield Mountain Project: Existing FERC-Approved Recreation Sites and Facilities Summary

Recreation Site Name	Recreation Facilities/Amenities
Munn’s Ferry Boat Camping Recreation Area	<ul style="list-style-type: none"> • water access only campsites (approximately 4-5 tent platform sites) • pedestrian foot bridge • picnic area (approximately 1 table) • dock
Boat Tour and Riverview Picnic Area	<ul style="list-style-type: none"> • parking area (approximately 54 single vehicle spaces; 2 ADA) • restroom (ADA compliant) • picnic area (approximately 10 tables) • pedestrian foot bridge • picnic pavilion (approximately 8 tables) • boat tour • dock
Northfield Mountain Tour and Trail Center	<ul style="list-style-type: none"> • parking area (approximately 50 single vehicle spaces; 3 ADA) • restroom • picnic area (approximately 7 tables) • overlook • visitor center and interpretive displays • winter area • trail system • Winter rentals such as cross-country skis • Staffing for educational programming
Barton Cove Nature Area and Campground	<ul style="list-style-type: none"> • nature area parking area (approximately 26 single vehicle spaces) • campground parking (approximately 28 single vehicle spaces) • showers • restroom facilities (2 facilities; ADA compliant) • picnic area (approximately 15 tables) • overlook • interpretive sign • walk-in campground (approximately 2 group sites; 28 campsites; and 1 ADA campsite) • nature trail • dock
Barton Cove Canoe and Kayak Rental Area	<ul style="list-style-type: none"> • parking area (approximately 28 single vehicle spaces) • picnic area (approximately 6 tables) • seasonal restroom • paddlecraft rental service

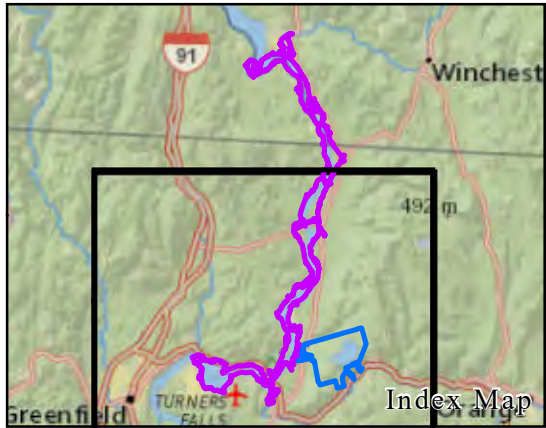
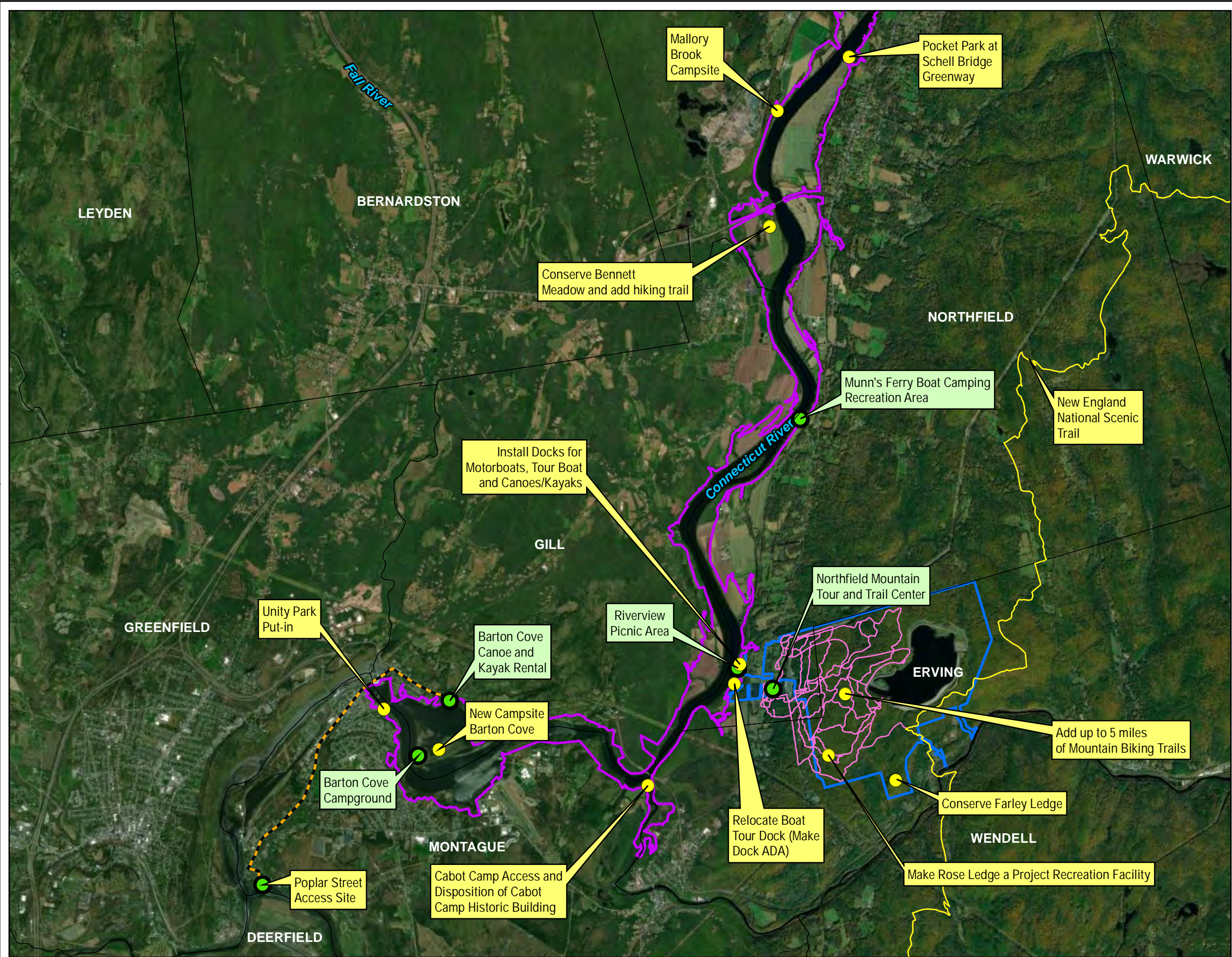
RECREATION MANAGEMENT PLAN

Table 5.0-4. Northfield Mountain Project: Existing FERC Approved Recreation Sites, Facilities, and Amenities

Recreation Site Name	Recreation Facility/Amenity Type	Facility/Amenity Status	Latitude	Longitude	FERC Citation & Date	Notes
Munn's Ferry Boat Camping Recreation Area	Campground	Constructed	42.6512	72.4666	59 FPC 126 July 5, 1977	Water access only, approximately 4 tent sites and 1 shelter site
Munn's Ferry Boat Camping Recreation Area	Picnic Area	Constructed	42.6512	72.4666	59 FPC 126 July 5, 1977	Approximately 1 table
Boat Tour and Riverview Picnic Area	Picnic Area	Constructed	42.6133	72.4792	59 FPC 126 July 5, 1977	Approximately 12 tables
Boat Tour and Riverview Picnic Area	Picnic Pavilion	Constructed	42.6140	72.4788	59 FPC 126 July 5, 1977	Approximately 8 tables
Boat Tour and Riverview Picnic Area	Other Use (Interpretive Boat Tour)	Constructed	42.6130	72.4797	59 FPC 126 July 5, 1977	Heritage Dock
Northfield Mountain Tour and Trail Center	Picnic Area	Constructed	42.6104	72.4713	59 FPC 126 July 5, 1977	Approximately 7 tables
Northfield Mountain Tour and Trail Center	Overlook	Constructed	42.6095	72.4495	59 FPC 126 July 5, 1977	Platform overlooking upper reservoir
Northfield Mountain Tour and Trail Center	Trails	Constructed	N/A	N/A	59 FPC 126 July 5, 1977	
Northfield Mountain Tour and Trail Center	Visitor Center	Constructed	42.6108	72.4716	59 FPC 126 July 5, 1977	Environmental and Educational programs, video displays
Northfield Mountain Tour and Trail Center	Interpretive Display	Constructed	42.6108	72.4716	59 FPC 126 July 5, 1977	
Northfield Mountain Tour and Trail Center	Winter Area	Constructed	42.6108	72.4716	59 FPC 126 July 5, 1977	Skiing, cross country skiing, snowshoeing

RECREATION MANAGEMENT PLAN

Recreation Site Name	Recreation Facility/Amenity Type	Facility/Amenity Status	Latitude	Longitude	FERC Citation & Date	Notes
Barton Cove Nature Area and Campground	Picnic Area	Constructed	42.6040	72.5332	59 FPC 126 July 5, 1977	Approximately 15 tables
Barton Cove Nature Area and Campground	Overlook	Constructed	42.6031	72.5336	59 FPC 126 July 5, 1977	Platform overlooking Barton Cove
Barton Cove Nature Area and Campground	Campground	Constructed	42.5999	72.5440	59 FPC 126 July 5, 1977	Approximately 2 group sites and 29 camp sites (1 ADA)
Barton Cove Nature Area and Campground	Interpretive Display	Constructed	42.6042	72.5328	59 FPC 126 July 5, 1977	
Barton Cove Nature Area and Campground	Trail	Constructed	N/A	N/A	59 FPC 126 July 5, 1977	Approx. 4,250 feet long nature trail
Barton Cove Canoe and Kayak Rental Area	Picnic Area	Constructed	42.6082	72.5377	103 FERC 62,189 06/30/2003	Approximately 6 tables
Barton Cove Canoe and Kayak Rental Area	Other Use (paddlecraft rentals)	Constructed	42.6082	72.5377	103 FERC 62,189 06/30/2003	Paddlecraft for rent



Turners Falls Hydroelectric Project (No. 1889)
 Northfield Mountain Pumped Storage Project (No. 2485)
 Recreation Management Plan

Figure 5.0-1:
 Existing and Proposed Recreation Facilities
 at the Turners Falls and Northfield
 Mountain Projects

Legend

- Proposed Recreation Facility
- Existing Project Recreation Facility
- Canoe Portage
- Northfield Mountain Trail System
- New England National Scenic Trail
- Northfield Mountain (NFM) Project Boundary
- Combined TF/NFM Project Boundary

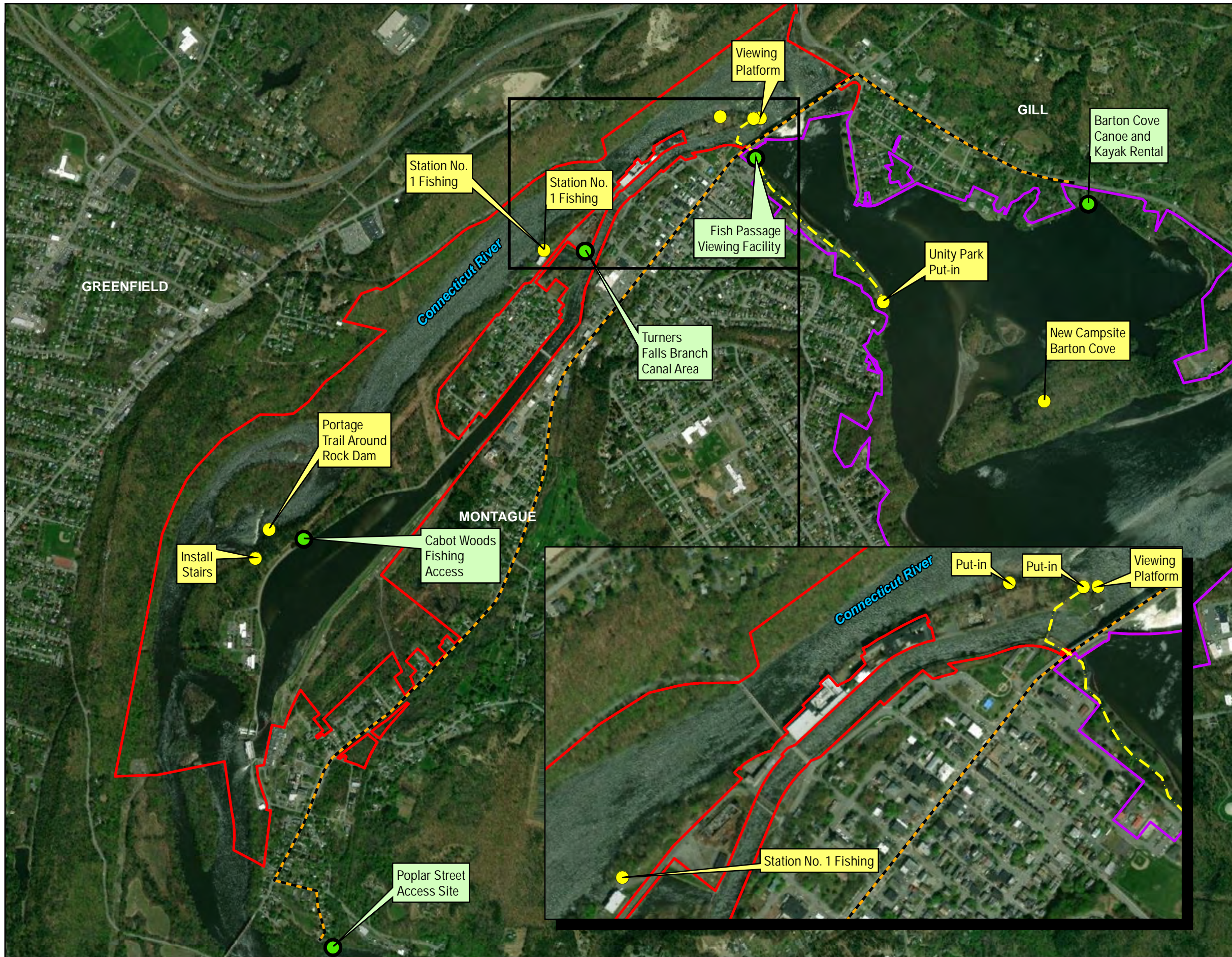
Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
 National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS,

N

0 0.5 1 2 Miles

1 inch = 1 miles





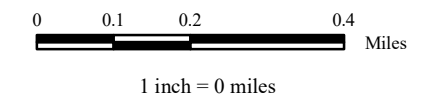
Turners Falls Hydroelectric Project (No. 1889)
 Northfield Mountain Pumped Storage Project (No. 2485)
 Recreation Management Plan

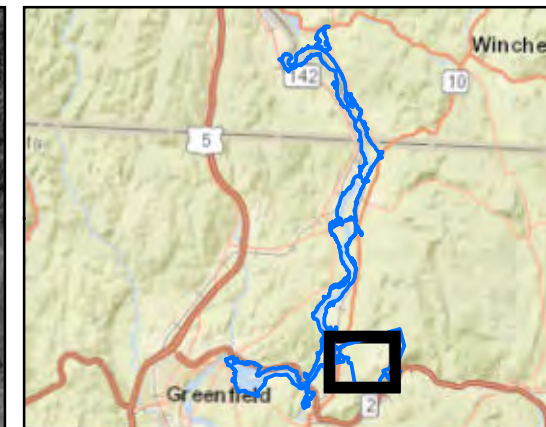
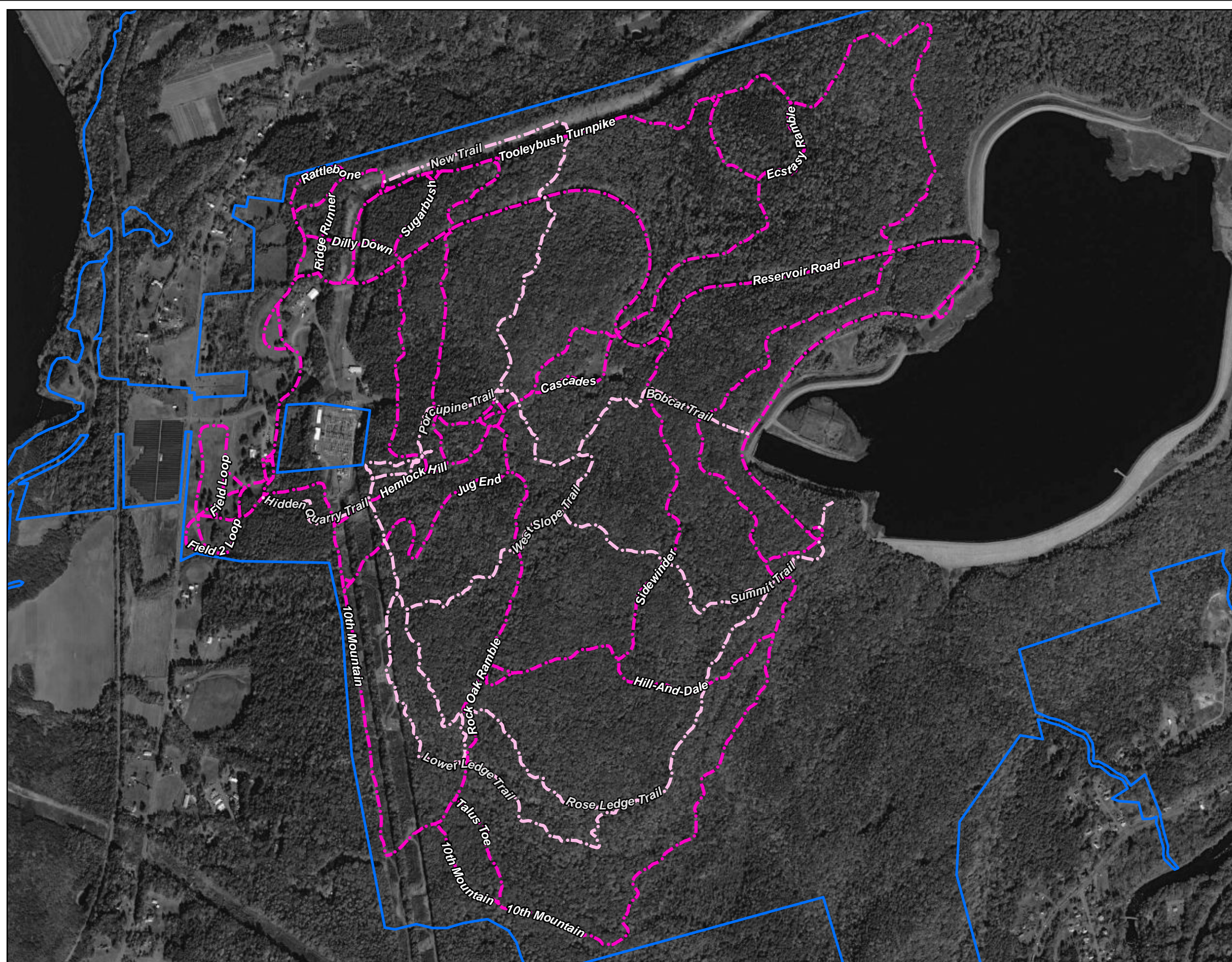
Figure 5.0-2:
 Existing and Proposed Recreation
 Facilities at the Turners Falls and
 Northfield Mountain Projects
 Blown-Up Map below Turners Falls Dam

- Legend
- Proposed Recreation Facility
 - Existing Project Recreation Facility
 - - - Walking Portage
 - - - Canoe Portage
 - ▭ Turners Falls (TF) Project Boundary
 - ▭ Combined TF/NFM Project Boundary



Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
 National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.





Turners Falls Hydroelectric Project (No. 1889)
 Northfield Mountain Pumped Storage Project (No. 2485)
 Recreation Management Plan

Figure 5.3.2-1:
 Existing Northfield Mountain
 Trail System

Legend

FERC Project Boundary

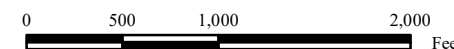
NFM Trail Type

Ski Trail

Snowshoe Trail



Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community



1 inch = 1,000 feet



Copyright © 2022 Northfield Mountain LLC All rights reserved.

6 NEW AND UPGRADED RECREATION FACILITIES

New and upgraded recreation facilities are summarized below. [Figure 5.0-1](#) and [Figure 5.0-2](#) (blown up version below Turners Falls Dam) show the general location of existing and proposed recreation facilities.

6.1 Turners Falls Project

6.1.1 Construct Pocket Park

New Project Recreation Site: FirstLight will construct one pocket park (viewing location, picnic table) at the Pauchaug-Schell Bridge Greenway and include signage for historical and cultural interpretation. FirstLight will consult with the town of Northfield and MDCR in finalizing the design and will consult with the Nolumbeka Project Inc, Elnu Abenaki Tribe, and the town of Northfield (Historical Commission) regarding signage.

6.1.2 Construct Mallory Brook Campsite

New Project Recreation Site: FirstLight will provide paddle access camping at a new campsite at Mallory Brook (if for some reason that location proves to be problematic, another site will be chosen) in the town of Northfield in consultation with AMC, and the town of Northfield.

6.1.3 Construct Formal Access Trail and Put-In at Cabot Camp

New Project Recreation Site: FirstLight will construct a 10-foot-wide formal path leading from the Cabot Camp parking area to an access point on the Millers River just upstream of the confluence with the Connecticut River. A sign (Project Name and FERC No.) and directional portage sign will be installed along the formal path leading the public from the parking lot directly to the 10-foot-wide gravel path leading to the water's edge. A picnic area will also be added. FirstLight will consult with the town of Montague, AMC, and MDCR in finalizing the design. Shown in [Figure 6.1.3-1](#) and [6.1.3-2](#) is a conceptual layout of the Access Trail and Put-In at Cabot Camp.

6.1.4 Construct Car-Top Access at East End of Unity Park and Reconfigure Parking Lot

New Project Recreation Site: FirstLight will add a new car-top access and put-in at the eastern end of Unity Park, provide a means of storing and locking vessels, and will reconfigure the Unity Park parking lot to improve vehicle and pedestrian safety. The put-in will require construction of a gated road, controlled by FirstLight, from the parking lot to the eastern end of Unity Park that will be usable by cars to off-load canoes/kayaks, and then return to park. FirstLight will consult with the town of Montague, which will conduct public outreach, and MDCR to provide input on the design. Signage will assist paddlers portaging their craft from this location to below the dam (those who will not be using FirstLight's assistance to portage down to the Poplar Street Access). Shown in [Figure 6.1.4-1](#) is a conceptual layout of the Car-Top Access at the North End of Unity Park.

6.1.5 Construct River Access and Two Put-Ins Just Below Turners Falls Dam

New Project Recreation Site: The new access will start via the existing bridge (aka the "IP Bridge") spanning the power canal just below the Gatehouse. Once over the power canal, a 12-foot-wide path will lead recreationists to an elevated bench and opening above the river channel. From this elevated bench there will be two routes to access the river. One route will continue with a 12-foot wide path leading further upstream to a put-in closer to the dam and upstream of Peskeomskut Island. This route will be designed to accommodate whitewater rafters. The second route will lead further downstream to a put-in below Peskeomskut Island. The second route currently consists of an uneven path with jagged rocks creating

unstable footing. The proposed second route will require clearing and grubbing to create an approximate 12-foot-wide level path with better footing before turning right to the put-in. This route will be designed to accommodate pass-through boaters (canoes and kayaks) that want to avoid Peskeomskut Island. Shown in [Figure 6.1.5-1](#) and [6.1.5-2](#) is a conceptual layout of the Two Put-Ins below Turners Falls Dam.

Paddlers using this access can park either at the Fishway Viewing and Picnic area or the Great Falls Discovery Center parking lots and can carry or wheel their boats along the bike path to the IP Bridge. Signage for the walkable portage from Unity Park to the access areas will assist both through-paddlers and paddlers putting in at this location.

Signage including the Project name and FERC No. will be included just after exiting the IP bridge. Signage with directional signs will also be added along the two river access paths leading to the two put-ins. FirstLight will consult with the town of Montague, AW, AMC, MDCR, Massachusetts Natural Heritage and Endangered Species Program (NHESP), and National Marine Fisheries Service (NMFS) (relative to Shortnose Sturgeon) in finalizing the design. Aesthetic improvements to landscaping and man-made features will be made and maintained throughout the area to ensure a respectfulness of the physical environment commensurate with the cultural significance of the Great Falls area to Native American Tribes.

FirstLight, in consultation with the town of Montague (including the town's Historical Commission) will develop ways to restrict access to some of the historic industrial caverns and structures in this area, to reduce the possibility of accidents and degradation from misuse.

6.1.6 Construct Viewing Platform and Picnic Area just Below Turners Falls Dam

New Recreation Site: A viewing platform and picnic area will be constructed below the Turners Falls Dam with the best feasible view of Great Falls (the Turners Falls Dam). The exact location of the viewing platform and picnic area are yet to be determined, with one option being forming a platform atop the existing Spillway Ladder as it is elevated and provides a good view of the Turners Falls Dam. Signage will be added as well. FirstLight will consult with the town of Montague and MDCR in finalizing the design.

6.1.7 Construct River Access Trail at Station No. 1

New Recreation Site: Although there is currently informal access to the Station No. 1 tailrace, FirstLight will provide formal access for fishing and non-motorized boats. It will include an approximately 10-foot-wide path leading from Power Street to a put-in just upstream of the Station No. 1 tailrace. Signage will be added to the path entrance. FirstLight will consult with the town of Montague, AW, AMC, MDCR, NHESP, and NMFS (relative to Shortnose Sturgeon) in finalizing the design. Shown in [Figure 6.1.7-1](#) is a conceptual layout of the Access Trail at Station No. 1.

6.1.8 Install Stairs at the Cabot Woods Fishing Access

Improvements: Historically, there were stairs along the steep topography leading from the picnic area in Cabot Woods to the river's edge; however, they are no longer in place. FirstLight will install and maintain new stairs at the same location as the previous stairs, which leads to just below Rock Dam. Signage will be added to steer the public to the stairs.

6.1.9 Construct Portage Trail Around Rock Dam

New Recreation Site: The "Rock Dam" is a natural rock feature with a sizeable vertical drop located in the bypass reach of the Connecticut River near the Cabot Woods Fishing Area. With boating opportunities expected to increase under the new flow regime, some boaters may opt to avoid Rock Dam and portage around it for safety reasons. Alternatively, some boaters may view the vertical drop at Rock Dam as a "play" area and may want to "run" the drop more than once. For these reasons, FirstLight will construct a portage trail around Rock Dam. Shown in [Figure 6.1.9-1](#) is a conceptual layout for the Portage Trail around Rock Dam.

RECREATION MANAGEMENT PLAN

The portage trail route and design will be determined in consultation with NMFS, NHESP, MDCR, AW, AMC, the Nolumbeka Project Inc., the Elnu Abenaki Native American Tribe, and the town of Montague. The pool below Rock Dam contains habitat for the federally endangered Shortnose Sturgeon. Consultation with NMFS will minimize the potential for construction of the portage trail and potential increased recreation usage of the area to disrupt Shortnose Sturgeon habitat and spawning activity. Consultation with NHESP will minimize the potential for impacts to state-listed rare plants. Consultation with the Nolumbeka Project Inc. and Elnu Native American Tribe will minimize the potential to disturb sensitive cultural resources.

The portage trail is not slated to be completed until Year 5 after license issuance. However, given that the new bypass flow regime will be in place after license issuance, the Licensee will consult with the above parties in Year 1 to stake out and/or flag a desired trail, with directional signage, to avoid critical features. It is anticipated that the portage trail may require clearing of some low lying vegetation and tree saplings after consultation is completed. In Year 5, if needed, the portage trail will be improved.

6.1.10 Improve Poplar Street River Access

Project Recreation Site Improvements: There is existing cartop access at Poplar Street; however, it is extremely steep. Due to steep topography and land ownership restrictions, FirstLight will use the existing gravel parking lot, leading to 20-foot-wide timber stairs with a boat slide railing leading to a 5-foot-long, 20-foot-wide concrete landing/abutment. A 32-foot-long gangway will be anchored to the concrete abutment and lead to a floating dock in the Connecticut River to accommodate fluctuations in the river elevation. As soon as flows, as measured at the USGS (Gage No. 01170500) on the Connecticut River at Montague City are below 38,000 cfs, the floating dock will be installed but no sooner than April 1. The floating dock will be removed by October 31. The site will include signage (Project name and FERC No.) at the top of the timber stairs. In addition, a porta-potty will be added between Memorial Day and Labor Day subject to re-evaluation as discussed below. Shown in [Figure 6.1.10-1](#) and [6.1.10-2](#) is a conceptual layout for the Poplar Street Take-Out. Final design will consider input from the town of Montague, AW, AMC, Crab Apple Whitewater, New England FLOW, Zoar Outdoors, MDCR, NHESP and NMFS (relative to Shortnose Sturgeon).

The take-out is located at the end of Poplar Street in a residential neighborhood. The existing gravel parking area will be slightly re-designed to make the parking pattern and lot boundaries more obvious; signage will also assist with parking directions. After the first year the Poplar Street take-out is operational, FirstLight, the town of Montague, AW, AMC, Crab Apple Whitewater, New England FLOW, Zoar Outdoors, and MDCR will consult relative to vandalism (including to the porta-potty), variable flow release events⁸ and overnight parking, and inappropriate uses at the location, given its proximity to the residential neighborhood. Modifications to the take-out may be required pending usage. FirstLight will also consult with the same group in finalizing the design. FirstLight will actively engage and support efforts of the town of Montague and relevant state agencies with regard to the potential to link this lot to other available overflow parking, including via the adjacent state-owned Rail Trail.

6.1.11 Install Interpretive Cultural Signage at Key Locations

FirstLight will install interpretive signage in consultation with the Nolumbeka Project Inc., Elnu Abenaki Tribe, and the town of Montague Historical Commission at Cabot Woods (Rock Dam) and Peskeompskut/Great Falls (Turners Falls Dam). FirstLight will work with these parties in the consideration of any other proposed historical/cultural interpretative installations to be located in these areas. Interpretive

⁸The Variable Flow Releases are defined in the Flows and Fish Passage Settlement Agreement filed with FERC on March 31, 2023 (see Draft License Article A150).

signage at Cabot Woods (Rock Dam) will be completed when a) the Cabot Wood stairs are installed and b) the two put-ins below the Turners Falls Dam are constructed.

6.2 Northfield Mountain Project

6.2.1 Enhance Existing Bennett Meadow Trails

Enhance Project Recreation Site: FirstLight will enhance existing riverfront trails south of Route 10 off the parking lot at Bennett Meadow and include historical and cultural interpretive signage. FirstLight will consult with the town of Northfield, MDCR, MDFW, Nolumbeka Project Inc, and the Elnu Abenaki Tribe in finalizing the design, placement of a bench, and the interpretive signage.

6.2.2 Construct Riverview Improvements (Docks)

Modification: The proposed barrier net will be in place during a portion of the summer recreation season. The current layout of the barrier net encloses the existing Boat Tour Dock. Given this, FirstLight proposes to relocate the dock further upstream of its current location. Moving the dock will entail extending the existing road further north and allowing boaters or users of the area the ability to drop a boat closer to the dock or operate a wheelchair down the access road. The dock will be integrated into the New Project Recreation Facility described below.

New Project Recreation Facility: FirstLight will provide an ADA-accessible dock layout that supports motor boats, canoes/kayaks, and Riverboat. Shown in [Figure 6.2.2-1](#) and [6.2.2-2](#) is a conceptual layout for the docks and access at Riverview. FirstLight will try to design access to preserve as many pre-existing trees as possible.

FirstLight will consult with the town of Northfield, MDCR, FRCOG, and AMC in finalizing the design.

6.2.3 Construct New Mountain Biking Trails at Northfield Mountain

New Project Recreation Facility: FirstLight will construct approximately five (5) miles of new trails for mountain biking to be designed all in consultation with the New England Mountain Bike Association and MDCR and to be incorporated into the NMTCC trail system.

6.2.4 Construct Barton Cove Campsite

New Project Recreation Sites: FirstLight will provide paddle access camping at a new campsite in the Barton Cove area in Gill, in consultation with the town of Gill and AMC.

6.2.5 Establish Rose Ledges as a Project Recreation Facility

New Project Recreation Site: Rose Ledges is a rock climbing area on the eastern side of Northfield Mountain. FirstLight will make Rose Ledges a new Project Recreation Facility to allow rock climbing as it is already in the Northfield Mountain Project Boundary. Notwithstanding any other provision of this RMP, access to Rose Ledges shall remain free of charge for the duration of FirstLight's license. FirstLight is not proposing to include additional parking and is limiting the use at Rose Ledges to only climbing.

6.2.6 Implement Barton Cove Improvements (Locking Canoes and Kayaks)

Modification: FirstLight will add the ability to lock canoes and kayaks during the day at the Barton Cove Canoe and Kayak rental facility in the picnic area.

6.3 Summary of Existing and Proposed Recreation Facilities

[Table 6.3-1](#) is a summary of the existing and new/upgraded recreation facilities at the Northfield Mountain and Turners Falls Project, by town.

RECREATION MANAGEMENT PLAN

Table 6.3-1. Existing and Proposed Recreation Facilities or Features at the Northfield Mountain and Turners Falls Projects, Listed by Town

Recreation Facility or Feature	Existing or Proposed	Part of NFM or TF License
Town of Northfield		
<u>Bennett Meadow</u> <ul style="list-style-type: none"> • FirstLight will permanently conserve its lands within Bennett Meadow that are not already under conservation easement. • FirstLight will enhance the existing riverfront trails at Bennett Meadow (southern side of Route 10) and include historical and cultural interpretation and bench. 	Proposed	Northfield
<u>Munn’s Ferry Boat Camping Recreation Area</u> <ul style="list-style-type: none"> • Water access only at camping sites. • Pedestrian footbridge. • Tent campsites, each with trash can, tent platform, picnic table, grill, and some fire rings. 	Existing	Northfield
<u>Riverview</u> <ul style="list-style-type: none"> • Parking lot for 54 vehicles, 2 ADA. • Provides picnic tables (10) and grills along the river, Pavilion (8 tables), ADA compliant restrooms, benches. • Tours on the Riverboat travelling between Barton Cove and Riverview. • Site currently includes dock for Riverboat tours. 	Existing	Northfield
<u>Riverview</u> <ul style="list-style-type: none"> • FirstLight to relocate the dock that would be enclosed by the fish barrier net in the Northfield Mountain Project tailrace. • FirstLight to provide for an ADA-accessible dock layout that supports motor boats, canoes/kayaks, and Riverboat. 	Proposed	Northfield
<u>Northfield Mountain Tour and Trail Center</u> (also includes the Town of Erving) <ul style="list-style-type: none"> • Parking for up to 50 vehicles, 3 ADA. • Visitors Center with self-guided interpretive displays, meeting rooms, lounge, and ADA accessible restrooms. • Offers recreation and environmental education programs year-round. • 26 miles of trails used for mountain biking, x-country skiing, snowshoeing, horseback riding and walking. • Mountaintop Observation Deck. • Retain seasonal ski equipment rentals at the Northfield Visitors Center and continue to maintain ski trails. 	Existing	Northfield

RECREATION MANAGEMENT PLAN

Recreation Facility or Feature	Existing or Proposed	Part of NFM or TF License
<p><u>Northfield Mountain Tour and Trail Center</u></p> <ul style="list-style-type: none"> • FirstLight will construct approximately 5 miles of new trails for mountain biking to be incorporated into the NMTCC trail system. • FirstLight to donate used sporting equipment to local youth organizations. 	Proposed	Northfield
<p><u>Turners Falls Impoundment Access and Viewing</u> (also includes the Town of Gill)</p> <ul style="list-style-type: none"> • FirstLight to provide paddle access camping at 2 new campsites- one in the Barton Cove area in Gill and the other (if possible) at Mallory Brook in Northfield. If for some reason the Mallory Brook location is problematic, another site will be chosen. • FirstLight will install one pocket park at the Pauchaug-Schell Bridge Greenway and include signage for historical and cultural interpretation. 	Proposed	Northfield Turners Falls
Town of Erving		
<p><u>Climbing Ledges</u></p> <ul style="list-style-type: none"> • FirstLight will make Rose Ledges a designated Project Recreation Facility to allow climbing. 	Proposed	Northfield
Town of Montague		
<p><u>Cabot Camp</u></p> <ul style="list-style-type: none"> • FirstLight will construct a formal path leading from the Cabot Camp parking area to a put-in to the Millers River and add a picnic table and improve signage. • FirstLight will attempt to find a qualified organization to take responsibility for preserving the Cabot Camp historic buildings as summarized in Section 4.2.3. 	Proposed	Northfield
<p><u>Unity Park</u></p> <ul style="list-style-type: none"> • FirstLight will add a new car-top access and put-in at the northern end of Unity Park, provide a means of storing and locking vessels, and reconfigure the Unity Park parking lot to improve vehicle and pedestrian safety. 	Proposed	Northfield
<p><u>Gatehouse Fishway Viewing Area</u></p> <ul style="list-style-type: none"> • Continue with providing approximately 27 parking spaces, picnic tables, bike rack, trail, fishway view visitor facility (with feed to above ground TV), ADA accessible restrooms and interpretive signage. 	Existing	Northfield
<p><u>River Access below Turners Falls Dam</u> FirstLight will provide the following river access points:</p> <ul style="list-style-type: none"> • Turners Falls bypass both upstream and downstream of Peskeomskut Island (located just below the Turners Falls Dam). • At the Station No. 1 tailrace for fishing and non-motorized boats. 	Proposed (note that Poplar Street is an existing facility that	Turners Falls

RECREATION MANAGEMENT PLAN

Recreation Facility or Feature	Existing or Proposed	Part of NFM or TF License
<ul style="list-style-type: none"> Improvements at the Poplar Street put-in and take-out to include placement of stairs with boat slide leading to a landing/concrete abutment, a gangway, and a floating dock. 	is being improved)	
<p><u>Safety Improvements</u></p> <ul style="list-style-type: none"> FirstLight will make safety improvements to abandoned water passages, under FirstLight’s ownership, in the Turners Falls bypass (focused between the dam and upstream of Station No. 1 on river left). 	Proposed	Turners Falls
<p><u>Viewing Platform</u></p> <ul style="list-style-type: none"> FirstLight will construct a viewing platform and picnic area below the Turners Falls Dam with the best feasible view of the Great Falls and their surrounding natural environment. FirstLight to maintain the adjacent area near the bridge crossing. 	Proposed	Turners Falls
<p><u>Turners Falls Branch Canal</u></p> <ul style="list-style-type: none"> FirstLight will continue to provide the overlook and benches. 	Existing	Turners Falls
<p><u>Cabot Woods</u></p> <ul style="list-style-type: none"> FirstLight will continue to provide parking for approximately 17 cars, picnic tables, and offer fishing access at Cabot Woods. 	Existing	Turners Falls
<p><u>Cabot Woods</u></p> <ul style="list-style-type: none"> FirstLight will replace and maintain stairs at Cabot Woods. 	Proposed	Turners Falls
<p><u>Portage</u></p> <ul style="list-style-type: none"> Continue with the current portage where boaters can call FirstLight for transport, and maintain signage explaining canoe portage operations, procedures, and the call number. (May 1 – October 15). 	Existing	Turners Falls
<p><u>Portage</u></p> <ul style="list-style-type: none"> FirstLight will construct a portage trail around Rock Dam (on river left; on the Cabot Woods side of the river). 	Proposed	Turners Falls
Town of Gill		
<p><u>Barton Cove Nature Area and Campground</u></p> <ul style="list-style-type: none"> Nature Area Parking for 26 vehicles, Campground Parking for 28 vehicles. Restrooms (2 facilities, ADA compliant). Walking trail to an overlook. Campground for trailer and tents sites, 28 campsites (1 ADA compliant), sites include picnic table, grills and fire ring, trash containers. Nature trail, dock. 	Existing	Northfield

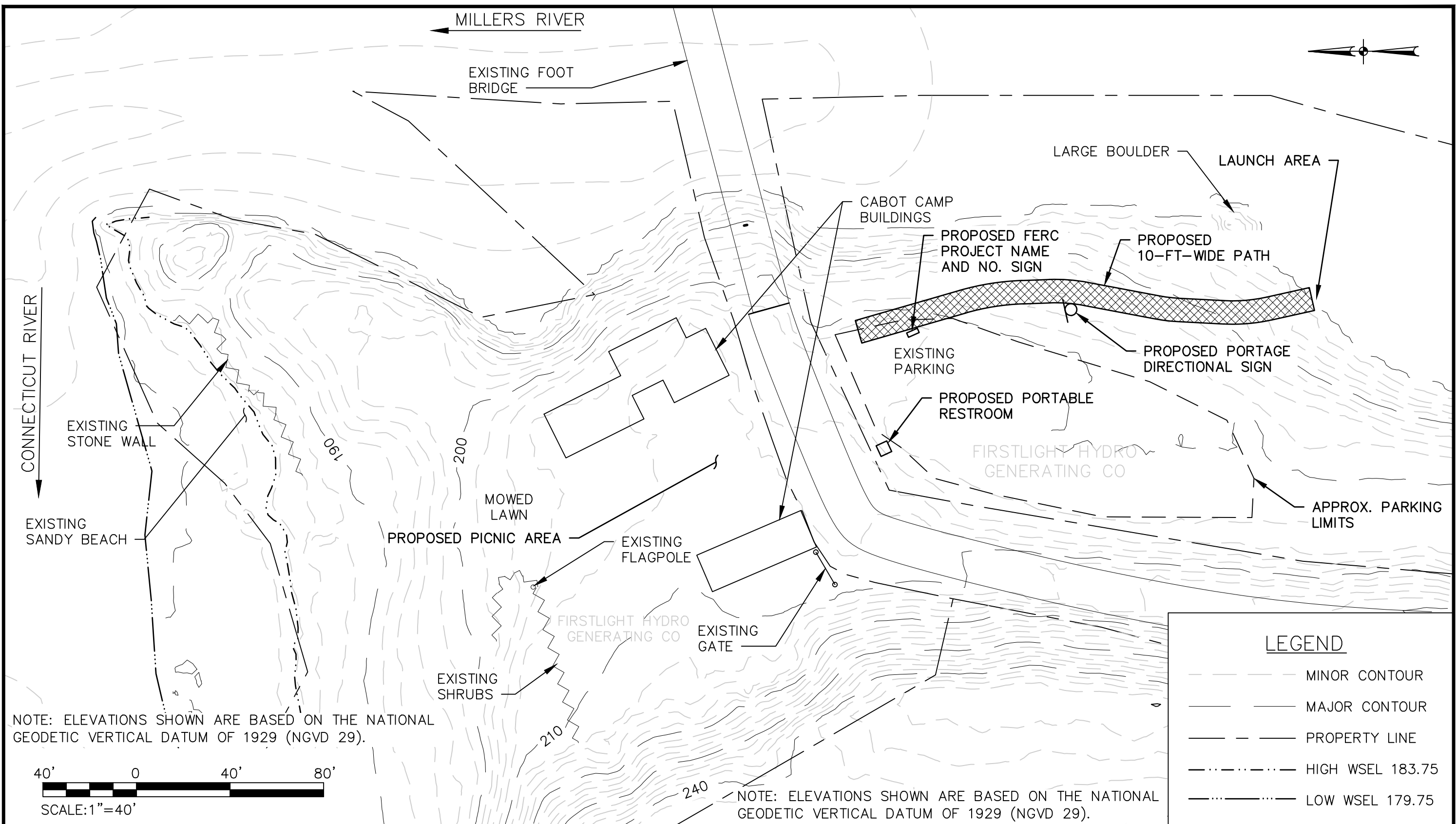
RECREATION MANAGEMENT PLAN

Recreation Facility or Feature	Existing or Proposed	Part of NFM or TF License
<p><u>Barton Cove Canoe and Kayak Rental Area</u></p> <ul style="list-style-type: none"> • Parking for 28 vehicles. • 6 picnic tables, seasonal restroom. • Offers paddlecraft rentals with PFDs, and picnicking. • Paddlecraft rental service. • On-call vehicular canoe and kayak transport service. 	Existing	Northfield
<p><u>Barton Cove Canoe and Kayak Rental Area</u></p> <ul style="list-style-type: none"> • FirstLight will add the ability to lock canoes and kayaks during the day at Barton Cove in the Town of Gill. • FirstLight will donate used sporting equipment to local youth organizations. 	Proposed	Northfield
<p><u>Flow Notification</u></p> <ul style="list-style-type: none"> • FirstLight will provide real-time TFI water level information as measured at the Turners Falls Dam and provide real-time Turners Falls Dam spill rates and Station No. 1 discharges year-round on a website that will be accessible to the public. • FirstLight will develop a flow monitoring plan with the agencies. • FirstLight will provide digital flow notification of the NRF and the anticipated Turners Falls Dam spillage and anticipated Station No. 1 discharge for a 12-hour window into the future at any given time contingent upon advance notification procedures to be followed by the Licensee of the Vernon Hydroelectric Project (FERC No. 1904). Should FirstLight take deviations to passing the 12-hour previous NRF it will post the revised flows (in the 12-hour look ahead window) to the digital location as soon as practicable after they are known. Should the Licensee of the Vernon Hydroelectric Project provide FirstLight with flow data more than 12 hours in advance, FirstLight will publish the information sooner. 	Proposed	Northfield and Turners Falls
<p><u>ADA</u></p> <ul style="list-style-type: none"> • For any new construction and rehabilitation of existing public recreation buildings and facilities, FirstLight will comply with 521 CMR to the extent applicable pursuant to 521 CMR and Title III of the Americans with Disabilities Act. As part of the RMP process and updates, FirstLight will conduct a programmatic assessment of the existing and proposed public recreation buildings and facilities for consistency with the requirements of the ADA and will implement applicable ADA improvements. 	Proposed	Northfield and Turners Falls
<p><u>Recreation Management Plan</u></p> <ul style="list-style-type: none"> • The RMP will be revisited once every 10 years to evaluate recreation use and demand. 	Proposed	Northfield and Turners Falls

RECREATION MANAGEMENT PLAN

Recreation Facility or Feature	Existing or Proposed	Part of NFM or TF License
<p><u>Conservation Easements</u></p> <ul style="list-style-type: none"> • FirstLight will place lands it owns and are not used for specific project activities (e.g., power production, project recreation facilities, etc.) along the TFI shoreline in conservation easement to maintain riparian buffers and river right (looking downstream) downstream of the Turners Falls Dam. The easements will include those lands where agricultural farming occurs up to the river’s edge; however, no conservation easements will be sought on existing developed lands along the TFI. • FirstLight will conserve the approximately 1.3-mile portion of the New England National Scenic Trail in the Project boundary on the eastern side of the Northfield Mountain Upper Reservoir in Erving, MA. 	Proposed	Northfield and Turners Falls

IT IS A VIOLATION OF THE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANYWAY UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER. ALTERATIONS MUST HAVE THE ENGINEER'S SEAL AFFIXED ALONG WITH A DESCRIPTION OF THE ALTERATION, THE SIGNATURE AND DATE.



NO.	DATE	DESCRIPTION	BY	APP

FOR:



BY:



Williamsville, NY • Utica, NY • Albany, NY • Henniker, NH
www.gomezandsullivan.com

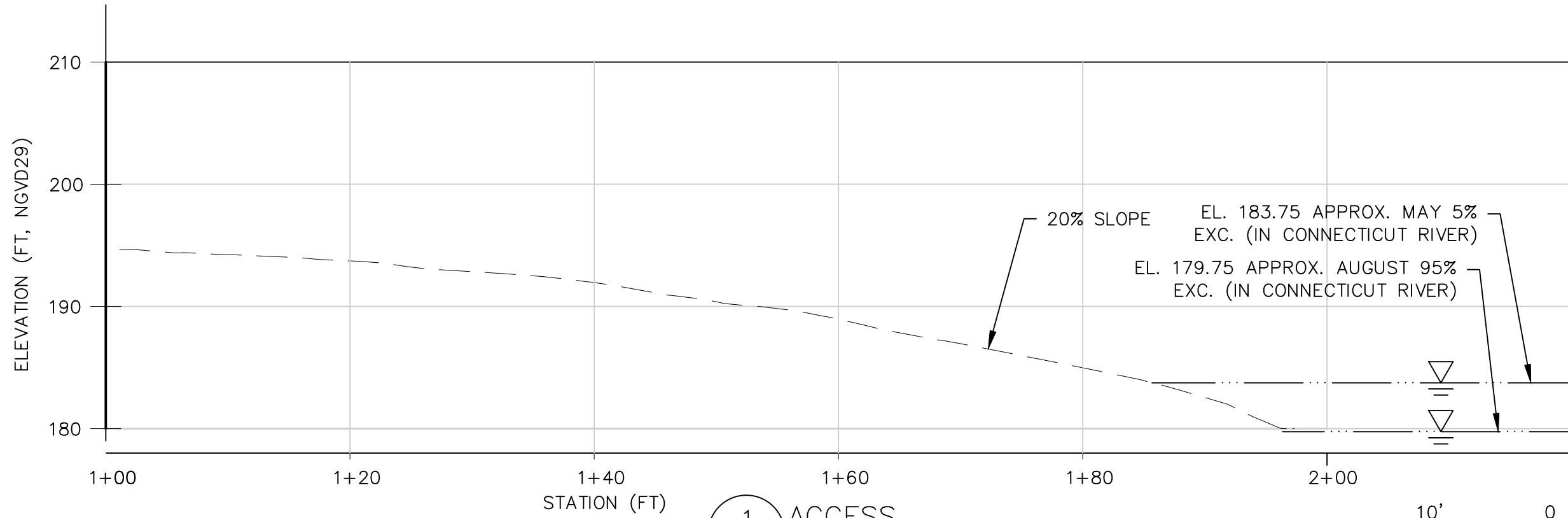
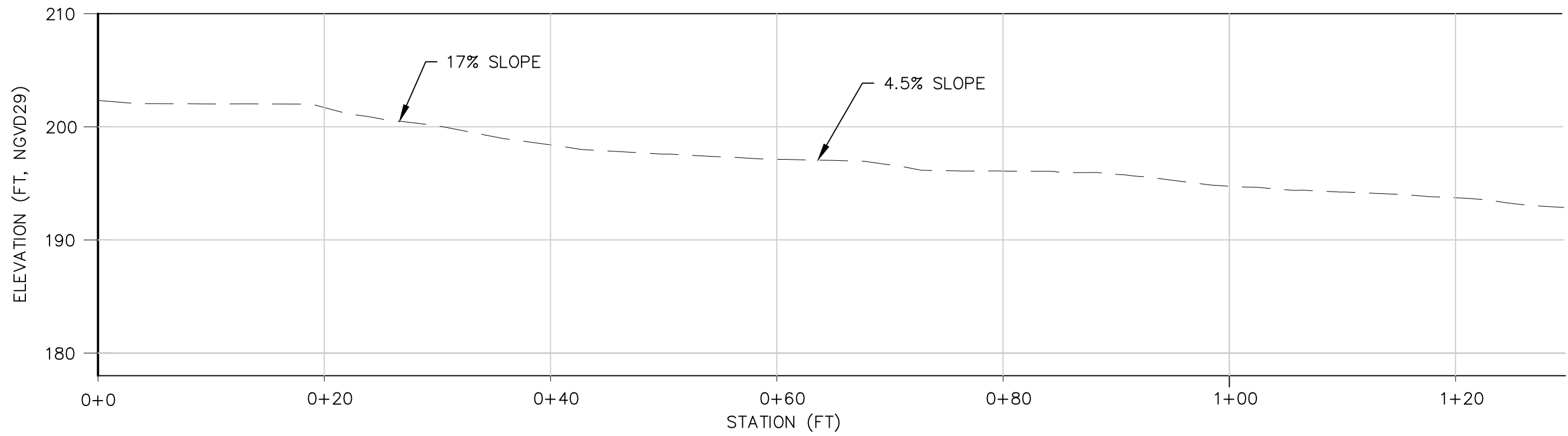
DESIGNED BY:	KJC
DRAWN BY:	JSC
CHECKED BY:	RLS
APPROVED BY:	-
PROJECT NO.:	1490
DATE:	5-4-22

AMENDED FINAL LICENSE APPLICATION

CONCEPTUAL LAYOUT OF ACCESS TRAIL AND PUT-IN AT CABOT CAMP

SCALE:	1" = 40'	DRAWING NO.:	6.1.3-1
--------	----------	--------------	---------

IT IS A VIOLATION OF THE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANYWAY UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER. ALTERATIONS MUST HAVE THE ENGINEER'S SEAL AFFIXED ALONG WITH A DESCRIPTION OF THE ALTERATION, THE SIGNATURE AND DATE.



1 ACCESS
2 SCALE: 1" = 10'



NOTE: ELEVATIONS SHOWN ARE BASED ON THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD 29).

NO.	DATE	DESCRIPTION	BY	APP

FOR:

DESIGNED BY: KJC

DRAWN BY: JSC

CHECKED BY: RLS

APPROVED BY: -

PROJECT NO.: 1490

DATE: 2-19-20

BY:

Williamsville, NY • Utica, NY • Albany, NY • Henniker, NH
www.gomezandsullivan.com

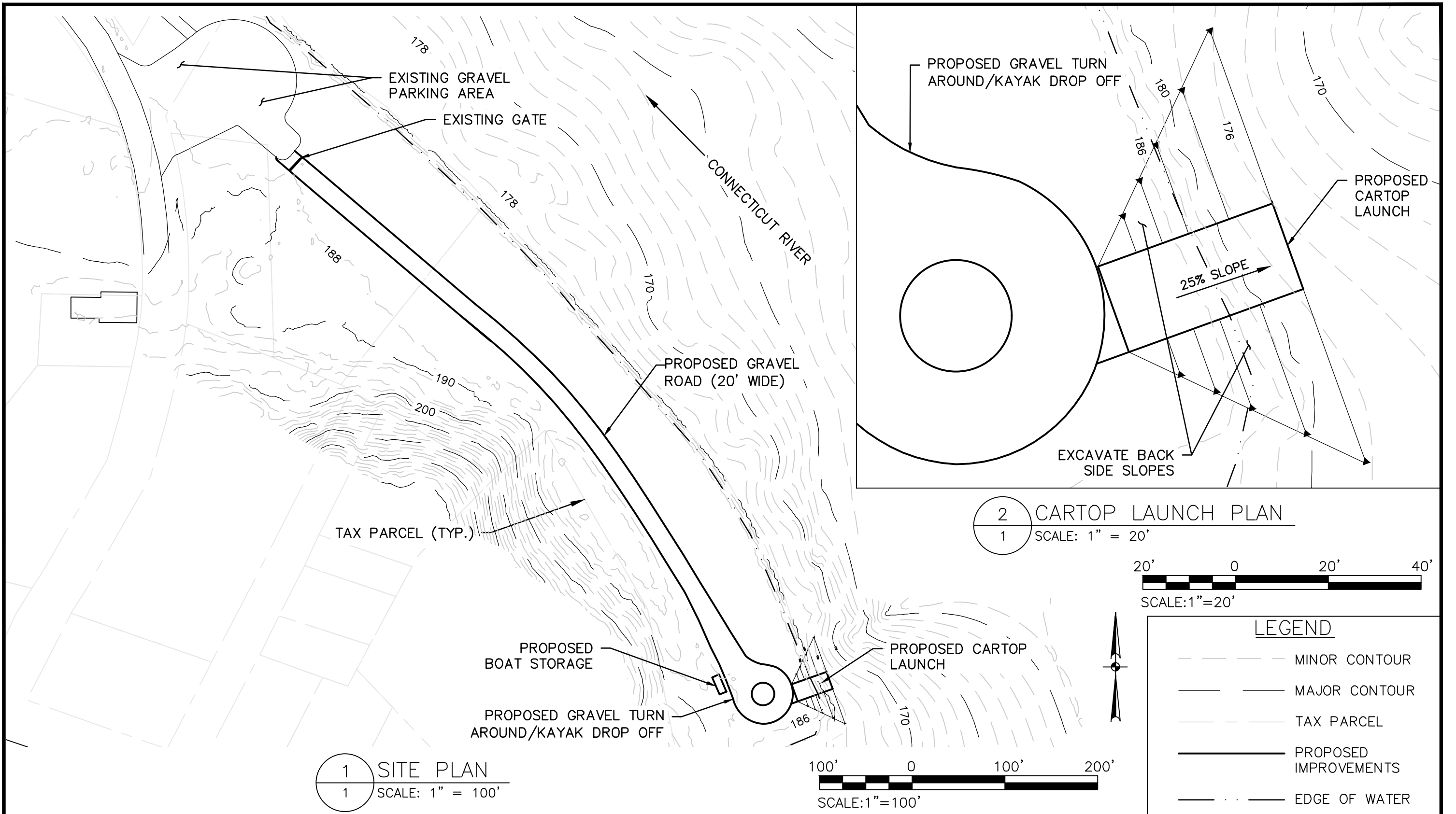
AMENDED FINAL LICENSE APPLICATION

CONCEPTUAL PROFILE OF ACCESS TRAIL AND PUT-IN

SCALE: 1" = 10'

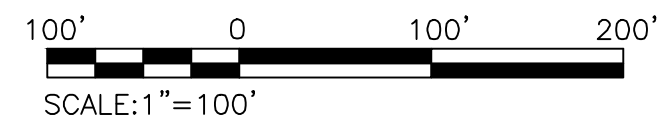
DRAWING NO.: 6.1.3-2

IT IS A VIOLATION OF THE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANYWAY UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER. ALTERATIONS MUST HAVE THE ENGINEER'S SEAL AFFIXED ALONG WITH A DESCRIPTION OF THE ALTERATION, THE SIGNATURE AND DATE.



1 SITE PLAN
SCALE: 1" = 100'

2 CARTOP LAUNCH PLAN
SCALE: 1" = 20'



LEGEND	
	MINOR CONTOUR
	MAJOR CONTOUR
	TAX PARCEL
	PROPOSED IMPROVEMENTS
	EDGE OF WATER

NO.	DATE	DESCRIPTION	BY	APP

FOR:

BY:

Williamsville, NY Utica, NY Albany, NY Henniker, NH
www.gomezandsullivan.com

DESIGNED BY:	KJC
DRAWN BY:	JSC
CHECKED BY:	KJC
APPROVED BY:	-
PROJECT NO.:	1490
DATE:	3-1-23

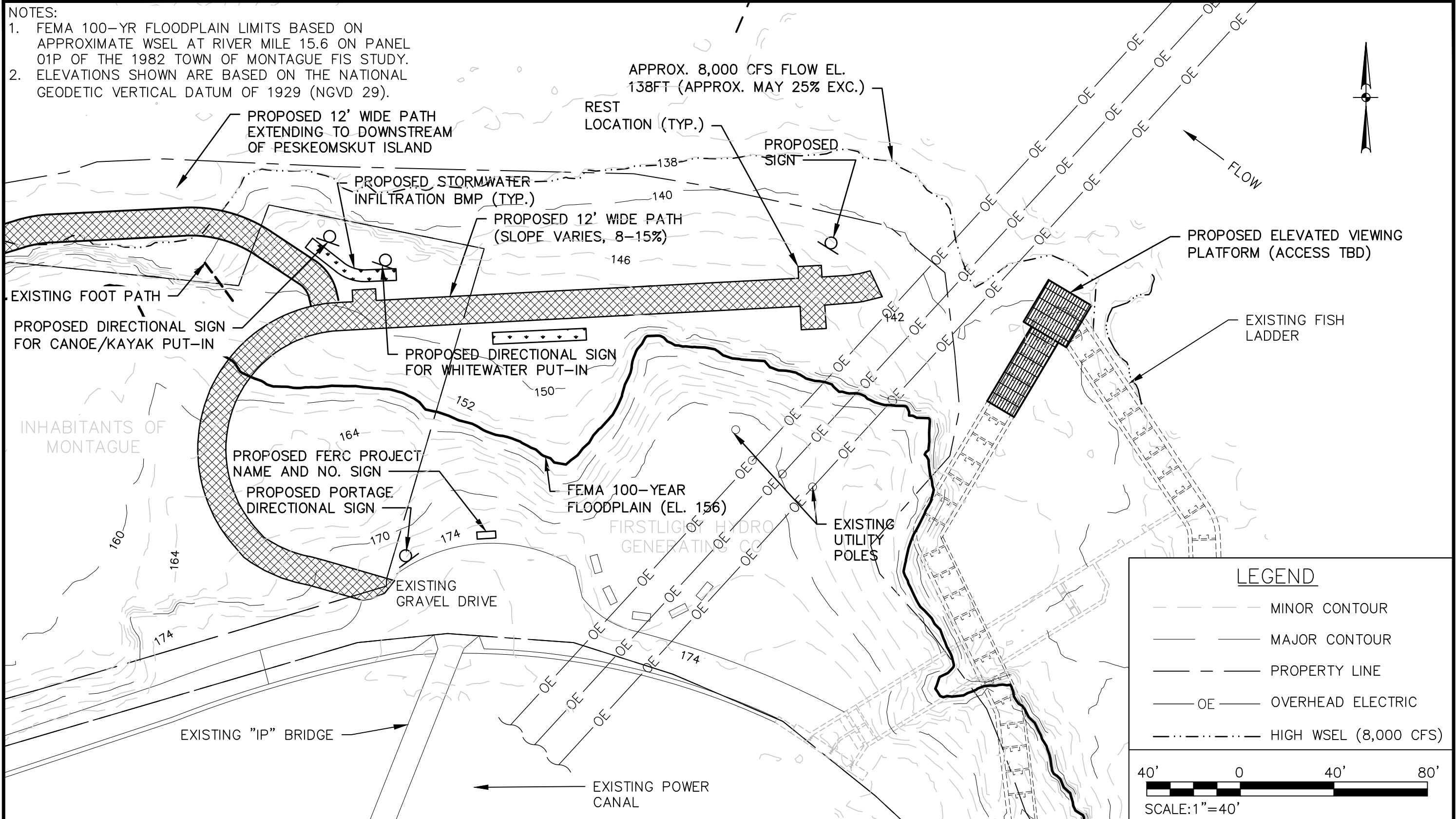
CONCEPTUAL LAYOUT OF CAR-TOP ACCESS AT NORTH END OF UNITY PARK

SCALE: AS NOTED DRAWING NO.: 6.1.4-1

IT IS A VIOLATION OF THE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANYWAY UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER. ALTERATIONS MUST HAVE THE ENGINEER'S SEAL AFFIXED ALONG WITH A DESCRIPTION OF THE ALTERATION, THE SIGNATURE AND DATE.

NOTES:

1. FEMA 100-YR FLOODPLAIN LIMITS BASED ON APPROXIMATE WSEL AT RIVER MILE 15.6 ON PANEL 01P OF THE 1982 TOWN OF MONTAGUE FIS STUDY.
2. ELEVATIONS SHOWN ARE BASED ON THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD 29).



LEGEND

- MINOR CONTOUR
- MAJOR CONTOUR
- - - PROPERTY LINE
- OE — OVERHEAD ELECTRIC
- · - · - · HIGH WSEL (8,000 CFS)

40' 0 40' 80'

SCALE: 1"=40'

NO.	DATE	DESCRIPTION	BY	APP

FOR: **FirstLight**

BY: **GOMEZ AND SULLIVAN ENGINEERS**
Williamsville, NY • Utica, NY • Albany, NY • Henniker, NH
 www.gomezandsullivan.com

DESIGNED BY: KJC
 DRAWN BY: KSC
 CHECKED BY: KJC
 APPROVED BY: -
 PROJECT NO.: 1490
 DATE: 5-3-22

AMENDED FINAL LICENSE APPLICATION

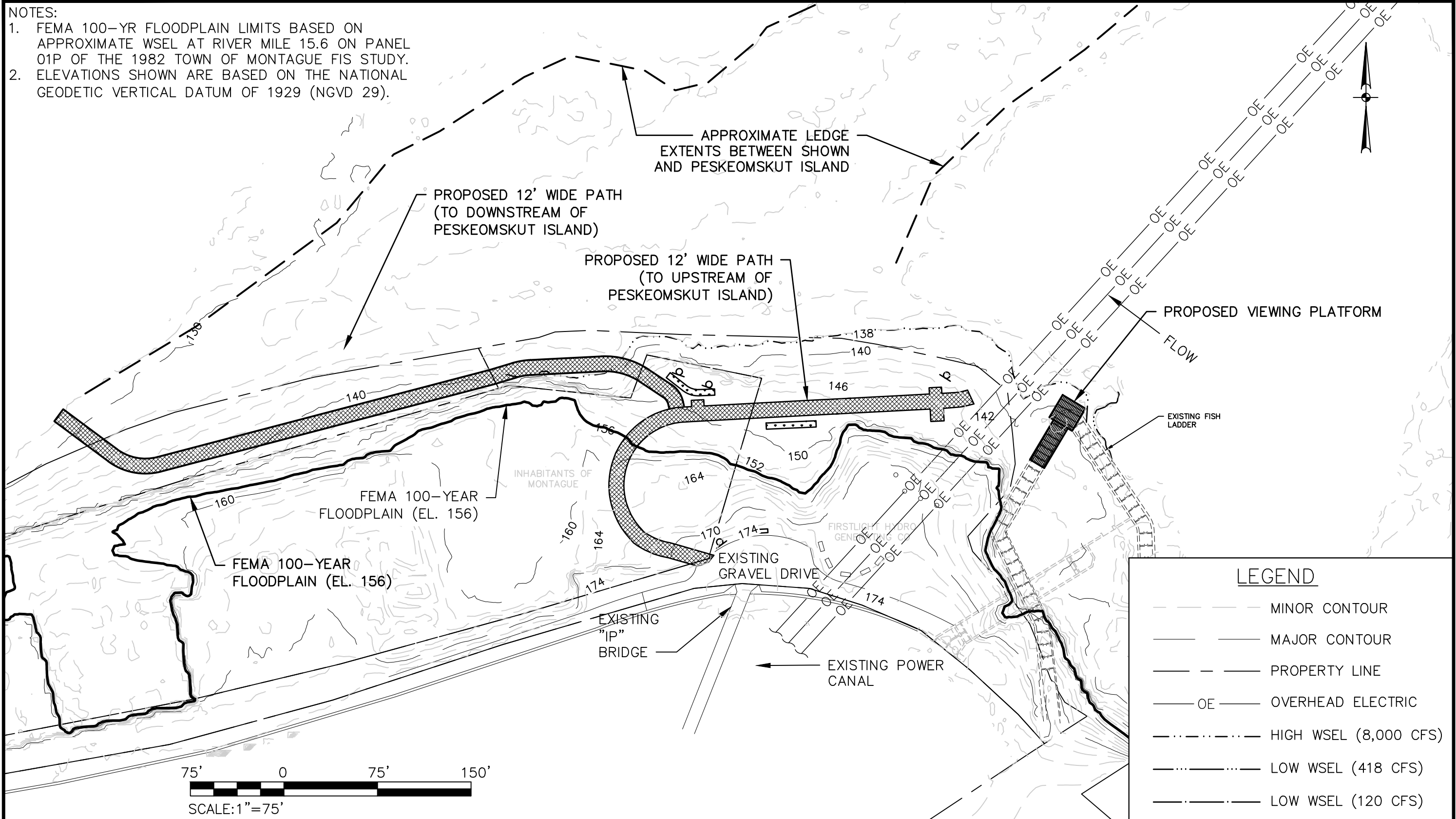
CONCEPTUAL LAYOUT OF TWO PUT-INS BELOW TURNERS FALLS DAM
 (PUT-IN UPSTREAM OF PESKEOMSKUT ISLAND)

SCALE: 1" = 40' DRAWING NO.: 6.1.5-1

IT IS A VIOLATION OF THE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANYWAY UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER. ALTERATIONS MUST HAVE THE ENGINEER'S SEAL AFFIXED ALONG WITH A DESCRIPTION OF THE ALTERATION, THE SIGNATURE AND DATE.

NOTES:

1. FEMA 100-YR FLOODPLAIN LIMITS BASED ON APPROXIMATE WSEL AT RIVER MILE 15.6 ON PANEL 01P OF THE 1982 TOWN OF MONTAGUE FIS STUDY.
2. ELEVATIONS SHOWN ARE BASED ON THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD 29).



NO.	DATE	DESCRIPTION	BY	APP

FOR: **FirstLight**

BY: **GOMEZ AND SULLIVAN ENGINEERS**
Williamsville, NY • Utica, NY • Albany, NY • Henniker, NH
 www.gomezandsullivan.com

DESIGNED BY: KJC
 DRAWN BY: JSC
 CHECKED BY: KJC
 APPROVED BY: -
 PROJECT NO.: 1490
 DATE: 5-3-22

AMENDED FINAL LICENSE APPLICATION

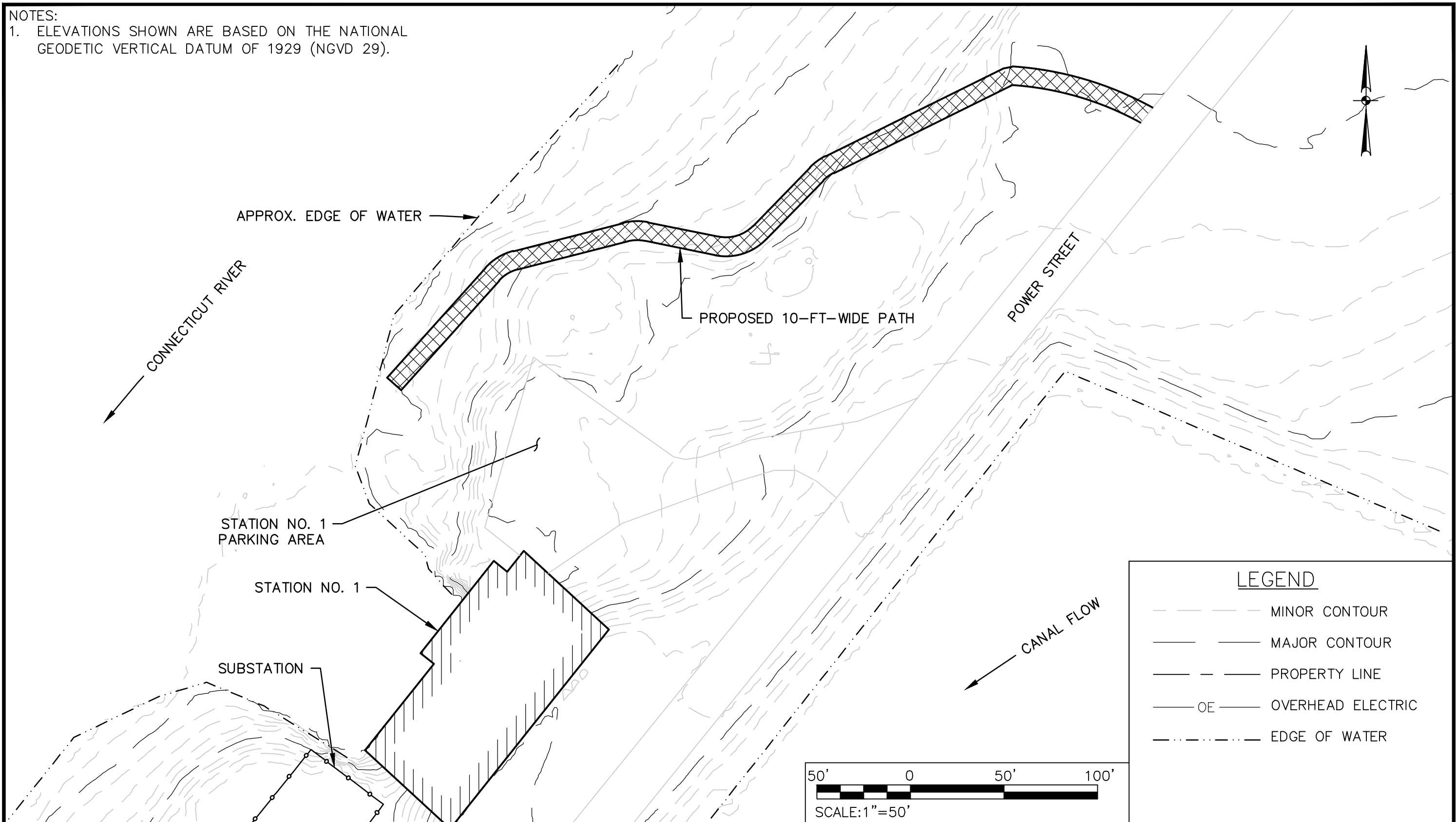
**CONCEPTUAL LAYOUT OF TWO PUT-INS BELOW TURNERS FALLS DAM
 (PUT-IN DOWNSTREAM OF PESKEOMSKUT ISLAND)**

SCALE: 1" = 75' DRAWING NO.: 6.1.5-2

IT IS A VIOLATION OF THE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANYWAY UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER. ALTERATIONS MUST HAVE THE ENGINEER'S SEAL AFFIXED ALONG WITH A DESCRIPTION OF THE ALTERATION, THE SIGNATURE AND DATE.

NOTES:

- ELEVATIONS SHOWN ARE BASED ON THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD 29).



NO.	DATE	DESCRIPTION	BY	APP

FOR: 

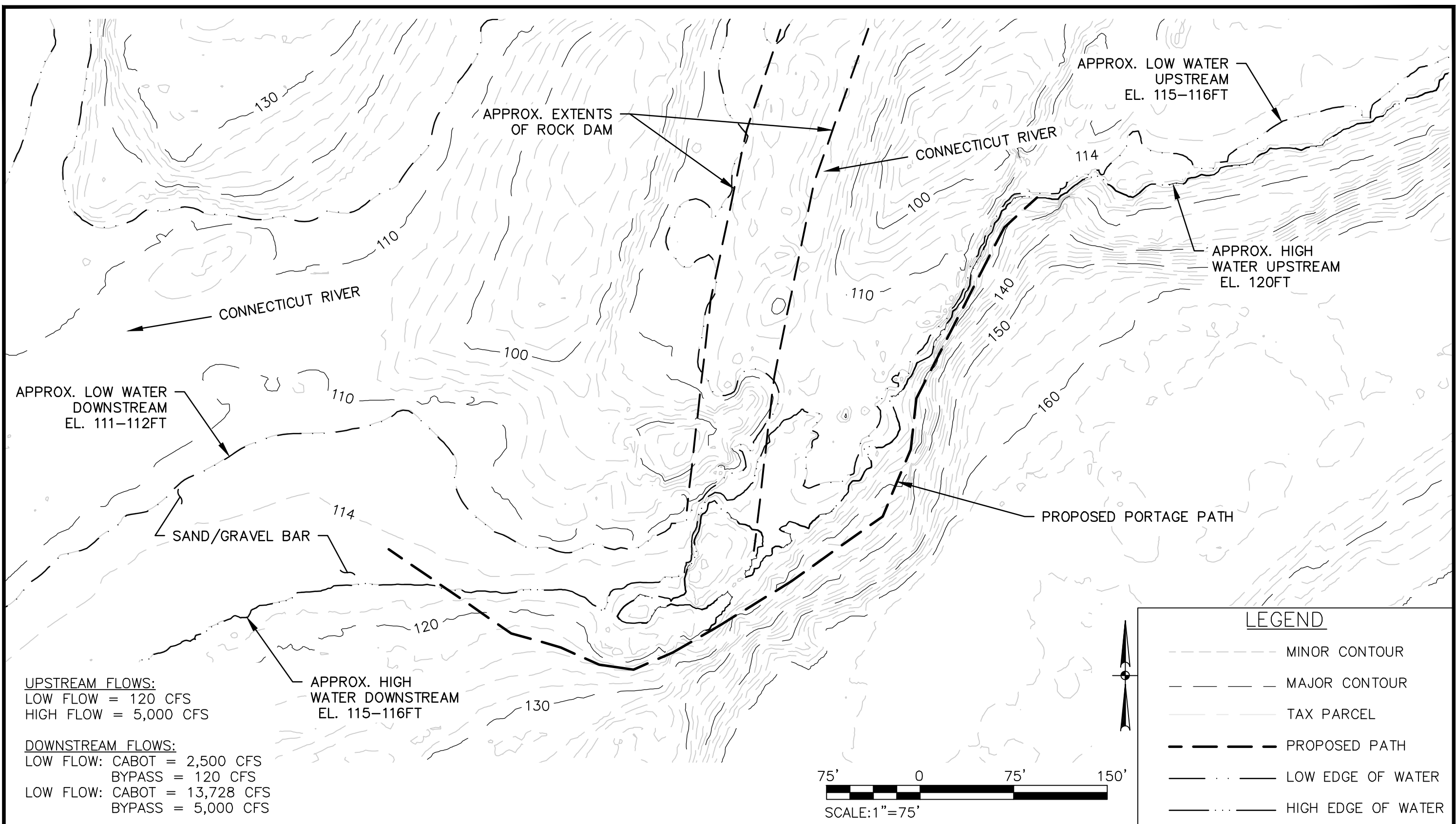
BY: 
Williamsville, NY Utica, NY Albany, NY Henniker, NH
 www.gomezandsullivan.com

DESIGNED BY:	KJC
DRAWN BY:	JSC
CHECKED BY:	KJC
APPROVED BY:	-
PROJECT NO.:	1490
DATE:	3-1-23

CONCEPTUAL LAYOUT OF ACCESS TRAIL AT STATION NO. 1

SCALE:	1" = 50'	DRAWING NO.:	6.1.7-1
--------	----------	--------------	---------

IT IS A VIOLATION OF THE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANYWAY UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER. ALTERATIONS MUST HAVE THE ENGINEER'S SEAL AFFIXED ALONG WITH A DESCRIPTION OF THE ALTERATION, THE SIGNATURE AND DATE.



UPSTREAM FLOWS:
 LOW FLOW = 120 CFS
 HIGH FLOW = 5,000 CFS

DOWNSTREAM FLOWS:
 LOW FLOW: CABOT = 2,500 CFS
 BYPASS = 120 CFS
 LOW FLOW: CABOT = 13,728 CFS
 BYPASS = 5,000 CFS

NO.	DATE	DESCRIPTION	BY	APP

FOR: 

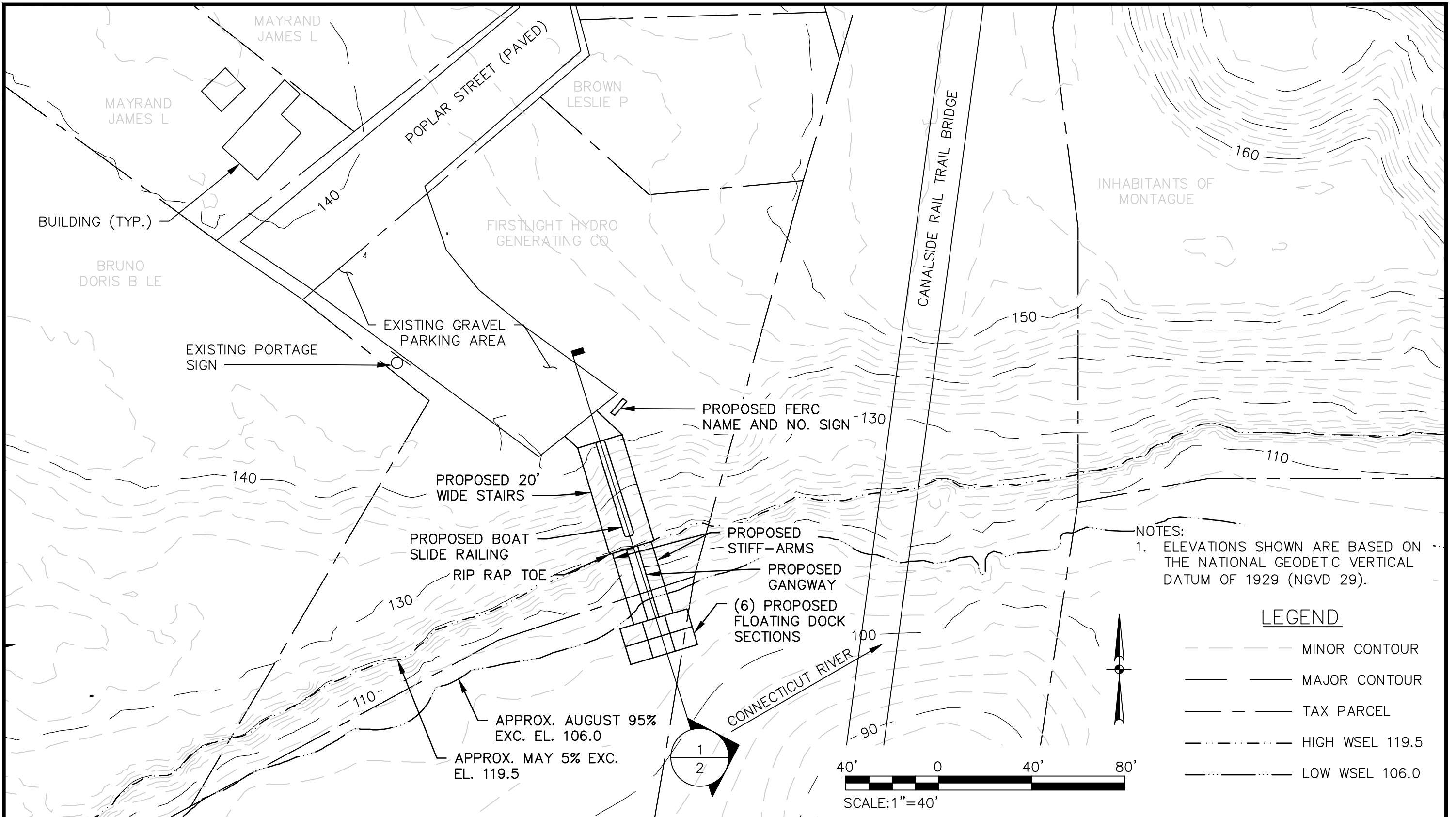
BY: 
 Williamsville, NY Utica, NY Albany, NY Henniker, NH
 www.gomezandsullivan.com

DESIGNED BY:	KJC
DRAWN BY:	JSC
CHECKED BY:	KJC
APPROVED BY:	-
PROJECT NO.:	1490
DATE:	3-1-23

**CONCEPTUAL LAYOUT OF PORTAGE TRAIL
AROUND ROCK DAM**

SCALE: 1" = 75' DRAWING NO.: 6.1.9-1

IT IS A VIOLATION OF THE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANYWAY UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER. ALTERATIONS MUST HAVE THE ENGINEER'S SEAL AFFIXED ALONG WITH A DESCRIPTION OF THE ALTERATION, THE SIGNATURE AND DATE.



NOTES:
 1. ELEVATIONS SHOWN ARE BASED ON THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD 29).

LEGEND

	MINOR CONTOUR
	MAJOR CONTOUR
	TAX PARCEL
	HIGH WSEL 119.5
	LOW WSEL 106.0

NO.	DATE	DESCRIPTION	BY	APP

FOR:

BY:

Williamsville, NY • Utica, NY • Albany, NY • Henniker, NH
 www.gomezandsullivan.com

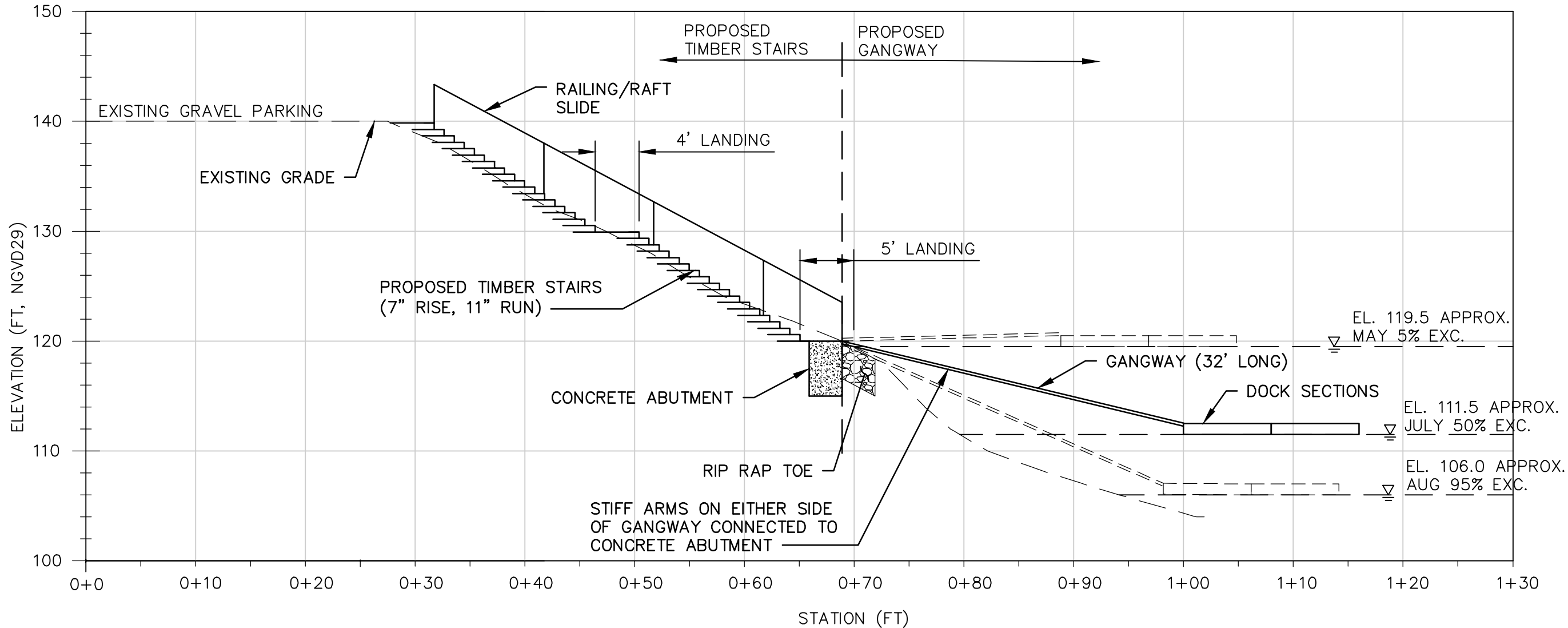
DESIGNED BY:	KJC
DRAWN BY:	KJC
CHECKED BY:	RLS
APPROVED BY:	-
PROJECT NO.:	1490
DATE:	4-9-20

AMENDED FINAL LICENSE APPLICATION

CONCEPTUAL LAYOUT OF POPLAR STREET TAKE-OUT

SCALE:	1" = 40'	DRAWING NO.:	6.1.10-1
--------	----------	--------------	----------

IT IS A VIOLATION OF THE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANYWAY UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER. ALTERATIONS MUST HAVE THE ENGINEER'S SEAL AFFIXED ALONG WITH A DESCRIPTION OF THE ALTERATION, THE SIGNATURE AND DATE.



NOTES:
 1. ELEVATIONS SHOWN ARE BASED ON THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD 29).

1 STAIR PROFILE
 2 SCALE: 1" = 10'



NO.	DATE	DESCRIPTION	BY	APP

FOR: 

BY: 
 Williamsville, NY • Utica, NY • Albany, NY • Henniker, NH
 www.gomezandsullivan.com

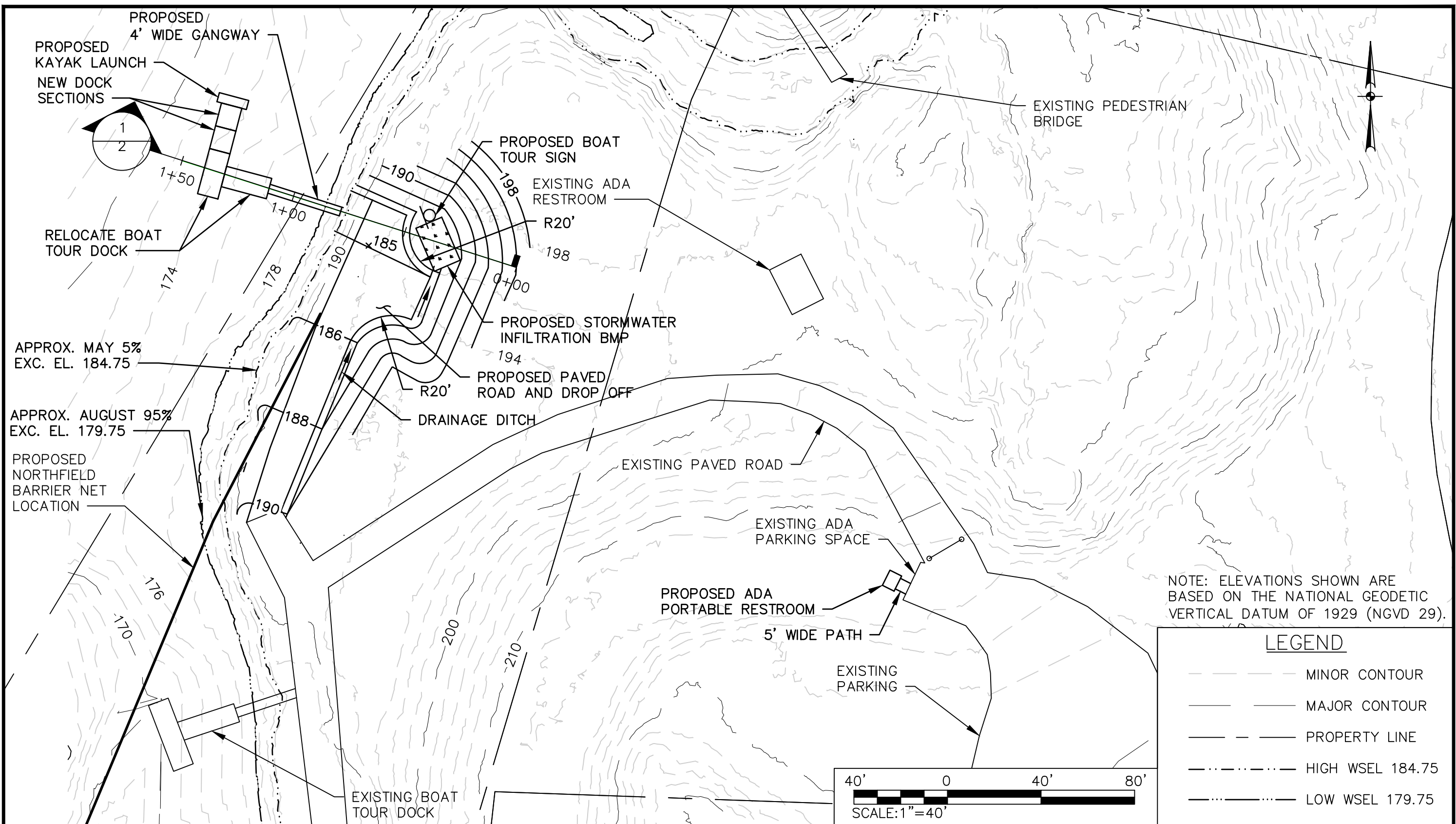
DESIGNED BY: KJC
 DRAWN BY: KJC
 CHECKED BY: RLS
 APPROVED BY: -
 PROJECT NO.: 1490
 DATE: 4-9-20

AMENDED FINAL LICENSE APPLICATION

CONCEPTUAL PROFILE OF POPLAR STREET TAKE-OUT

SCALE: 1" = 10' DRAWING NO.: 6.1.10-2

IT IS A VIOLATION OF THE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANYWAY UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER. ALTERATIONS MUST HAVE THE ENGINEER'S SEAL AFFIXED ALONG WITH A DESCRIPTION OF THE ALTERATION, THE SIGNATURE AND DATE.



NOTE: ELEVATIONS SHOWN ARE BASED ON THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD 29).

LEGEND	
	MINOR CONTOUR
	MAJOR CONTOUR
	PROPERTY LINE
	HIGH WSEL 184.75
	LOW WSEL 179.75

NO.	DATE	DESCRIPTION	BY	APP

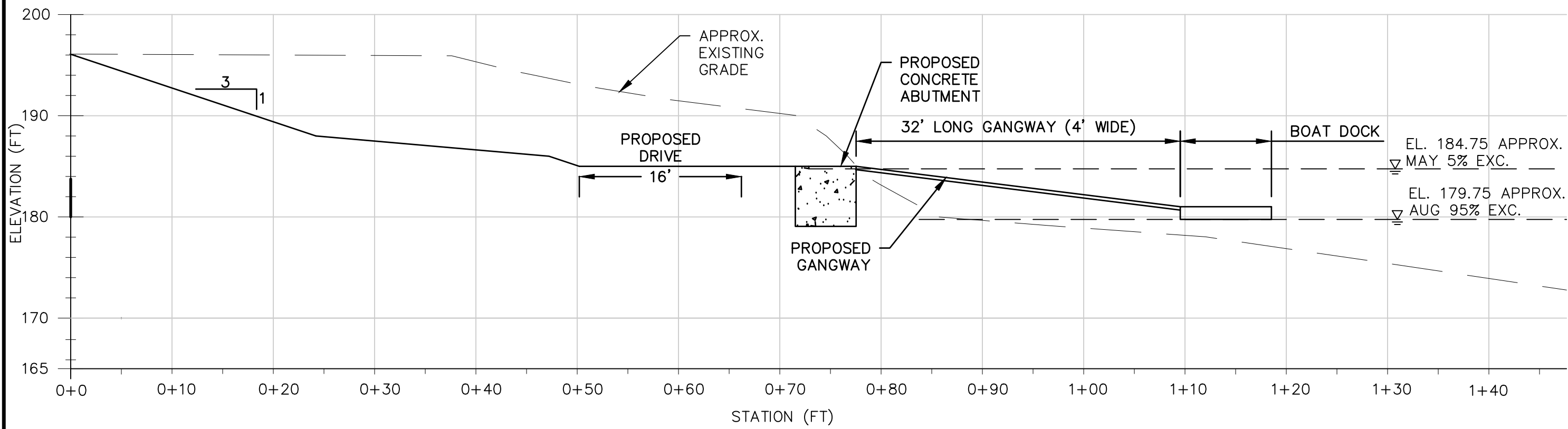
FOR: **FirstLight**

BY: **GOMEZ AND SULLIVAN ENGINEERS**
Williamsville, NY • Utica, NY • Albany, NY • Henniker, NH
www.gomezandsullivan.com

DESIGNED BY:	KJC
DRAWN BY:	KJC
CHECKED BY:	RLS
APPROVED BY:	-
PROJECT NO.:	1490
DATE:	02-19-20

AMENDED FINAL LICENSE APPLICATION	
RIVERVIEW - BOAT TOUR DOCK RELOCATION - PLAN	
SCALE:	1" = 40'
DRAWING NO.:	6.2.2-1

IT IS A VIOLATION OF THE LAW FOR ANY PERSON TO ALTER THIS DRAWING IN ANYWAY UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER. ALTERATIONS MUST HAVE THE ENGINEER'S SEAL AFFIXED ALONG WITH A DESCRIPTION OF THE ALTERATION, THE SIGNATURE AND DATE.



1 BOAT DOCK PROFILE
2 SCALE: 1" = 10'

NOTE: ELEVATIONS SHOWN ARE BASED ON THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD 29).



NO.	DATE	DESCRIPTION	BY	APP

FOR: 

BY: 
Williamsville, NY • Utica, NY • Albany, NY • Henniker, NH
www.gomezandsullivan.com

DESIGNED BY: KJC
 DRAWN BY: KJC
 CHECKED BY: RLS
 APPROVED BY: -
 PROJECT NO.: 1490
 DATE: 02-19-20

AMENDED FINAL LICENSE APPLICATION

RIVERVIEW - BOAT TOUR DOCK RELOCATION - PROFILE

SCALE: 1" = 10' DRAWING NO.: 6.2.2-2

7 IMPLEMENTATION SCHEDULE FOR RECREATION MODIFICATIONS AND UPGRADES

There are many new recreation features associated with the Turners Falls and Northfield Mountain Projects. FirstLight will complete construction of the proposed and upgraded recreation facilities within six (6) years of license issuance. [Table 7.0-1](#) lists FirstLight's new and upgraded recreation protection, mitigation, and enhancement (PM&E) measures including the number of years after license issuance the recreation feature will become operational.

Table 7.0-1. Recreation Implementation Schedule

Feature	Year after License Issuance Feature becomes Operational					
	1	2	3	4	5	6
Updates to Recreation Management Plan	completed					
Compliance with American with Disabilities Act	x	x	x	x	x	x
Donate Used Sporting Equipment	when available					
Establish Conservation Easements/Restrictions (details in Year 2, implementation in Year 6)		x				x
Install Interpretive Signage at Cabot Woods (Rock Dam) and at the Put-in below Turners Falls Dam		x	x			
Turners Falls Project						
Establish Flow and Water Level Notification Website	x					
Disposition of Cabot Camp Historic Structures			x			
Construct Pocket Park			x			
Construct Mallory Brook Campsite			x			
Construct Formal Access Trail and Put-In at Cabot Camp				x		
Construct Car-Top Access at North End of Unity Park and Reconfigure Parking Lot (locking canoes and kayaks)					x	
¹ Construct River Access and Two Put-Ins just below Turners Falls Dam			x			
¹ Construct Viewing Platform and Picnic Area just below Turners Falls Dam					x	
Construct River Access Trail at Station No. 1			x			
Install Stairs at the Cabot Woods Fishing Access		x				
Construct Portage Trail around Rock Dam (trail to be marked in Year 1 after consultation)					x	
Improve Poplar Street River Access/Take-Out			x			
Northfield Mountain Project						
Construct Bennett Meadow Trail	x					
Construct Riverview Improvements (Docks)				x		
Construct New Mountain Biking Trails at Northfield Mountain					x	
Construct Barton Cove Campsite			x			
Establish Rose Ledges as a Project Recreation Facility		x				
Implement Barton Cove Improvements (locking canoes and kayaks)	x					

¹These facilities will be constructed prior to Year 9 when the Spillway Lift will be completed. The facilities may be temporarily disturbed during the Spillway Lift construction.

8 MANAGEMENT AND MAINTENANCE MEASURES FOR PROJECT RECREATION SITES

FirstLight will continue to operate and maintain the existing Project Recreation Sites, as well as the new Project Recreation Sites. [Table 8.0-1](#) and [Table 8.0-2](#) identifies the amenities at the Turners Falls Project and Northfield Mountain Project Recreation Sites, respectively, that are governed by the management and maintenance measures discussed herein. Note that some of the maintenance measures only apply to the Northfield Mountain Project, which are called out below.

8.1 Access Roads and Parking Areas

Access roads and parking areas with paved or gravel surfaces will be inspected prior to the beginning of the summer recreation season and periodically over the course of the operating season. If an issue with the condition of a road or paved surface is noted, a plan to repair the road will be developed and action will be taken. If the road condition is unsafe, it will be closed until repairs can be made. Parking lots shall be maintained and re-graded as needed over the course of the year to ensure the public's ability to use them safely.

8.2 Boat Docks

Prior to installation, boat docks will be inspected. The inspection will include access ramps, docks, deck surface, hardware, and other components. If a problem is noted, plans to repair, or replace the docks will be developed and implemented. Docks will be periodically inspected during the operating season. In the case of the Poplar Street dock access, during the boating season the steps leading to the floating dock may need to be maintained/cleaned from excess sediment build-up.

8.3 Picnic Areas

Picnic areas will be inspected prior to the beginning of the summer recreation season to ensure that the sites are free of debris. Amenities such as picnic tables, grills, and benches will be reviewed for vandalism and condition prior to opening of the sites. Excess vegetation will be removed as needed. If an issue with the amenities arises, a plan to repair or replace the amenity will be developed and implemented. If recreationists note an issue at a facility, an inspection will occur to determine if actions are needed.

8.4 Campsites

Campsites will be inspected prior to opening to assure that the sites are free of debris. Amenities such as picnic tables, grills, and fire rings will be reviewed for vandalism and condition prior to opening of the sites. Excess vegetation will be removed as needed. If an issue with the amenities arises, a plan to repair or replace the amenity will be developed and implemented. If recreationists note an issue at a facility, an inspection will occur to determine if actions are needed.

For the two new primitive campsites at Mallory Brook and Barton Cove, subject to a maintenance agreement, AMC, or its designee, will inspect the facilities at the beginning of the camping season and maintain the campsites throughout the season. AMC, or its designee, will be responsible for notifying FirstLight upon completion of its inspection and indicate what, if any, repairs are needed or if equipment replacement is needed. FirstLight will be responsible for major repairs to the two campsites and replacing equipment, specifically tent platforms, stairs (if applicable) and moldering privy.

8.5 Restrooms

Project Recreation Sites containing restroom facilities will be inspected prior to opening to assure that they are clean and functioning properly. These facilities will be maintained on a regular basis. Vault toilets and portable restroom facilities will be pumped out as necessary to maintain sanitary conditions. If a problem with the structure or facility is noted, it may be closed to execute needed repairs. Restrooms will be inspected on a routine basis and repairs or maintenance will be performed as issues arise. Any portable toilets will be well maintained and monitored for signs of abuse and shall be accessible in design.

8.6 Shower Facilities (Northfield Mountain Project)

Shower facilities will be inspected prior to opening to assure that they are clean and functioning properly. These facilities will be maintained on a regular basis and will be inspected on a routine basis. Repairs or maintenance will be performed as issues arise. If a problem with the structure or facility is noted, it may be closed to execute needed repairs.

8.7 Signs

All signs posted at points of public access to the Project as required by 18 CFR Section 8.2 (known as Part 8 signs) and public safety signs at recreation sites will be inspected and repaired prior to the beginning of the summer recreation season. This inspection will include the condition of the sign and a review of presented information to ensure that it is appropriate and legible. If an issue with the sign is noted or reported the sign will be scheduled for repair or replacement.

8.8 Buildings and Other Structures

Buildings and other structures that are part of the Project Recreation Sites will be maintained and cleaned on a regular basis during the operating season. Structures will be inspected annually and if a structure requires repair, it may be closed until the repairs are complete.

8.9 Trails

All access trails will be inspected on an annual basis to determine if there are existing safety hazards. If an issue is observed FirstLight will establish a plan to correct the issue and execute the plan.

Northfield Mountain Project

The NMTTC trail system, Barton Cove Nature Trail, and Bennett Meadow Trail will be inspected on a routine basis to determine if there is a need for maintenance to the trail tread or drainage, as well as the need for trail clearing or grading. The trail system will be routinely inspected for potential damaged or hazard trees. If an issue is reported or observed, a plan to correct the issue will be developed and implemented.

In the winter, trails at Northfield Mountain will be maintained for cross-country skiing when snow is present.

8.10 FirstLight Heritage Riverboat (Northfield Mountain Project)

The Heritage will be maintained and operated in accordance with Federal (including U.S. Coast Guard), State, and Local, laws and regulations.

8.11 Non-Motorized Boat Put-Ins/Take-Outs

Non-motorized boat put-ins/take-outs will be inspected for condition prior to the beginning of the summer recreation season and periodically over the course of the operating season. If an issue with the condition of the put-in/take-out is noted, a plan to repair the site will be developed and action will be taken. If recreationists note an issue at a put-in/take-out, an inspection will occur to determine if actions are needed.

RECREATION MANAGEMENT PLAN

Table 8.0-1. Amenities at Turners Falls Project Recreation Sites to which Management and Maintenance Measures Apply

Project Recreation Site	Management and Maintenance Measures								
	Access Roads and Parking Areas	Boat Docks	Picnic Areas	Campsites	Restrooms	Signs	Buildings and Other Structures	Trails	Non-motorized Boat Put-ins/Take-Outs
Construct Pocket Park			✓			✓			
Construct Mallory Brook Campsite				✓ (Maintenance by AMC, or its designee)					
Construct Formal Access Trail and Put-in at Cabot Camp	✓		✓		✓ (Porta-potty)				✓
Construct Car-Top Access at North End of Unity Park and Reconfigure Parking Lot	✓					✓	✓ Lockers/racks for canoes	✓	✓
Gatehouse Fishway Viewing Area	✓		✓		✓	✓	✓		
Construct River Access and Two Put-Ins below Turners Falls Dam						✓		✓	✓
Construct Viewing Platform and Picnic Area just below Turners Falls Dam			✓			✓	✓	✓	
Construct River Access Trail at Station No. 1						✓		✓	✓
Turners Falls Branch Canal Area							✓		
Install Stairs at the Cabot Woods Fishing Access	✓		✓			✓			
Construct Portage Trail around Rock Dam						✓		✓	
Turners Falls Canoe Portage	✓					✓			✓
Improve Poplar Street Access	✓	✓			✓ (Porta-potty)	✓			✓
Install Interpretive Cultural Signs at Key Locations						✓			

RECREATION MANAGEMENT PLAN

Table 8.0-2. Amenities at Northfield Project Recreation Sites to which Management and Maintenance Measures Apply

Project Recreation Site	Management and Maintenance Measures										Non-motorized Boat Put-ins/Take-Outs
	Access Roads and Parking Areas	Boat Docks	Picnic Areas	Campsites	Restrooms	Shower Facilities	Signs	Buildings and Other Structures	Trails	Riverboat	
Munn's Ferry Boat Camping Recreation Area		✓	✓	✓	✓		✓	✓			✓
Construct Bennett Meadow Trail							✓		✓		
Boat Tour and Riverview Picnic Area	✓	✓	✓		✓		✓	✓		✓	✓
Construct Riverview Improvements (docks)	✓	✓					✓				✓
Construct New Mountain Biking Trails at Northfield Mountain							✓		✓		
Construct Barton Cove Campsite				✓ (Maintenance by AMC, or its designee)			✓				
Northfield Mountain Tour and Trail Center	✓		✓		✓		✓	✓	✓		
Establish Rose Ledge as a Project Recreation Facility									✓		
Barton Cove Nature Area and Campground	✓	✓	✓	✓	✓	✓	✓		✓		✓
Barton Cove Canoe and Kayak Rental Area	✓		✓		✓		✓	✓			✓
Implement Barton Cove Improvements (locking canoes and kayaks)							✓	✓ (Locking canoes)			
Install Interpretive Cultural Signs at Key Locations							✓				

9 FEES

FirstLight will provide free access to Project waters and undeveloped Project Lands. FERC allows FirstLight to collect fees at Project-developed Recreation Sites to help defray the cost of constructing, operating, and maintaining such facilities. FERC does not allow FirstLight to earn a profit on recreation amenities it offers. FirstLight currently does not charge fees for many of its existing recreation features but may do so for new recreation features to offset operating and maintenance costs. Over the term of the new license, FirstLight may choose to implement reasonable fees to offset rising costs in labor and utilities; changes in operation; or to offset the costs of operating and maintenance costs at the Project Recreation Sites and capital recreation investments. FirstLight will not charge fees at recreation facilities that provide sole direct access to Project waters or undeveloped Project lands unless FirstLight is required to provide additional amenities or services not currently contemplated.

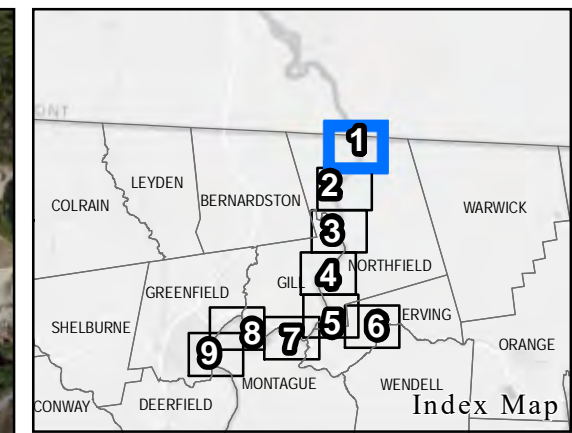
FirstLight will develop a schedule for reduced or no fees for residents in the host towns and Franklin County. No fees will be imposed without consultation with host community officials.

10 LITERATURE CITED

FirstLight (2014). Initial Study Report Summary Relicensing Study 3.6.2 Recreation Facilities Inventory and Assessment. Prepared for FirstLight Hydro Generating Company.

FirstLight (2015). Relicensing Study 3.6.2 Recreation Facilities Inventory and Assessment Addendum. Prepared for FirstLight Power Resources. Northfield, MA.

**11 APPENDIX A: MAPS SHOWING FIRSTLIGHT LANDS TO BE
PLACED INTO CONSERVATION RESTRICTION**




FIRSTLIGHT HYDRO GENERATING COMPANY
 Northfield Mountain Pumped Storage Project No. 2485
 Turners Falls Hydroelectric Project No. 1889

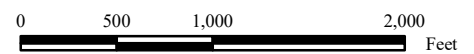
Appendix A:
 Conservation Easement/Restriction Areas
 Map 1

Legend

- Conservation Easements/Restrictions
- Conservation Easements/Restrictions (Subdivided Parcel)



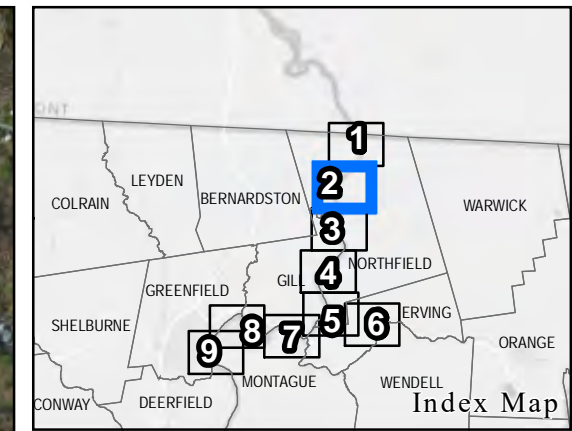
Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
 Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community



1 inch = 1,000 feet



Copyright © 2023 FirstLight Power Resources All rights reserved.




FIRSTLIGHT HYDRO GENERATING COMPANY
 Northfield Mountain Pumped Storage Project No. 2485
 Turners Falls Hydroelectric Project No. 1889

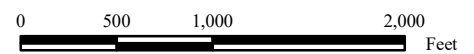
Appendix A:
 Conservation Easement/Restriction Areas
 Map 2

Legend

- Conservation Easements/Restrictions
- Conservation Easements/Restrictions (Subdivided Parcel)



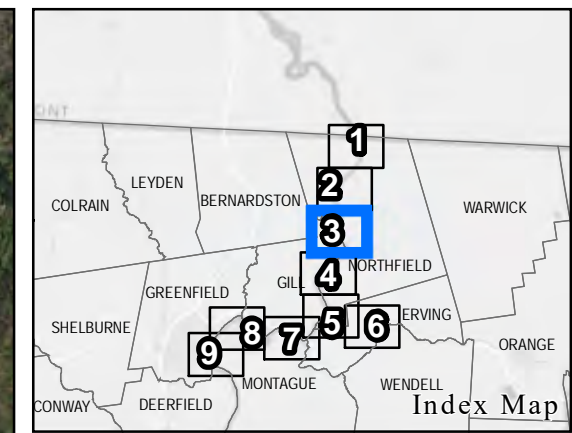
Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
 Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community



1 inch = 1,000 feet



Copyright © 2023 FirstLight Power Resources All rights reserved.



FIRSTLIGHT HYDRO GENERATING COMPANY
 Northfield Mountain Pumped Storage Project No. 2485
 Turners Falls Hydroelectric Project No. 1889

Appendix A:
 Conservation Easement/Restriction Areas
 Map 3

Legend

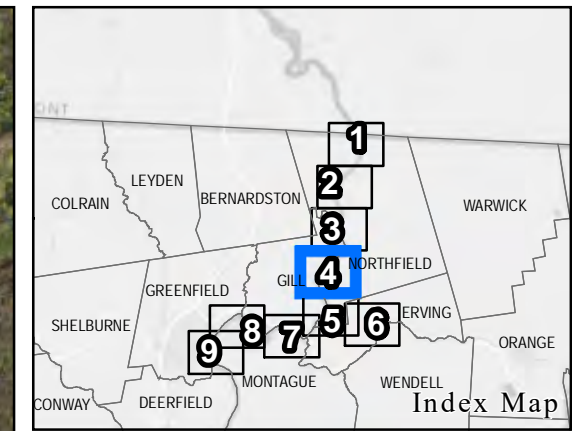
- Conservation Easements/Restrictions
- Conservation Easements/Restrictions (Subdivided Parcel)

Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
 Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

0 500 1,000 2,000 Feet

1 inch = 1,000 feet

Copyright © 2023 FirstLight Power Resources All rights reserved.



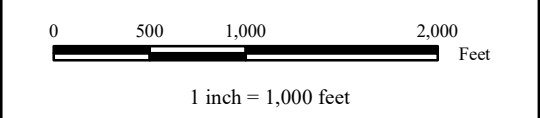
FIRSTLIGHT HYDRO GENERATING COMPANY
 Northfield Mountain Pumped Storage Project No. 2485
 Turners Falls Hydroelectric Project No. 1889

Appendix A:
 Conservation Easement/Restriction Areas
 Map 4

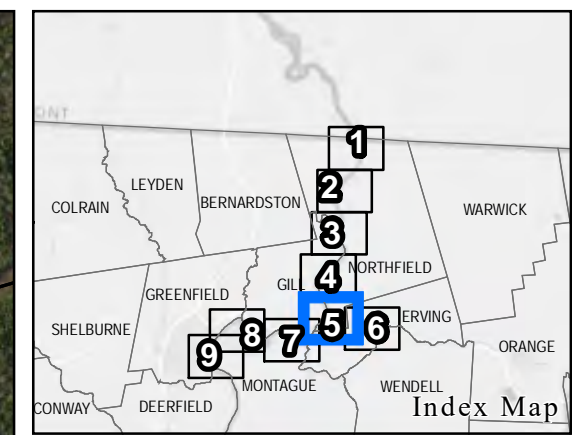
Legend

- Conservation Easements/Restrictions
- Conservation Easements/Restrictions (Subdivided Parcel)

Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
 Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community



Copyright © 2023 FirstLight Power Resources All rights reserved.



FIRSTLIGHT HYDRO GENERATING COMPANY
 Northfield Mountain Pumped Storage Project No. 2485
 Turners Falls Hydroelectric Project No. 1889

Appendix A:
 Conservation Easement/Restriction Areas
 Map 5

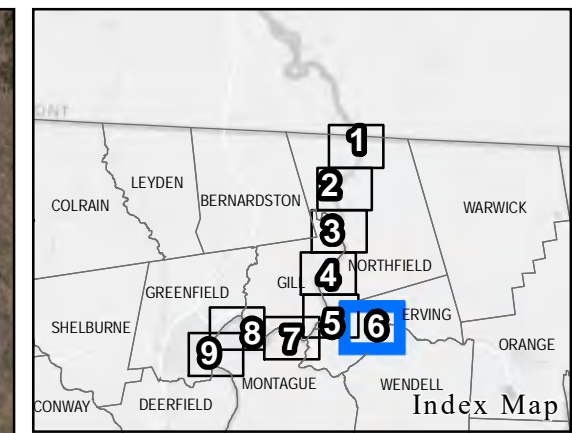
Legend

- Conservation Easements/Restrictions
- Conservation Easements/Restrictions (Subdivided Parcel)

Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
 Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

1 inch = 1,000 feet



Copyright © 2023 FirstLight Power Resources All rights reserved.




FIRSTLIGHT HYDRO GENERATING COMPANY
Northfield Mountain Pumped Storage Project No. 2485
Turners Falls Hydroelectric Project No. 1889

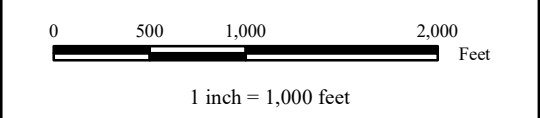
Appendix A:
Conservation Easement/Restriction Areas
Map 6

Legend

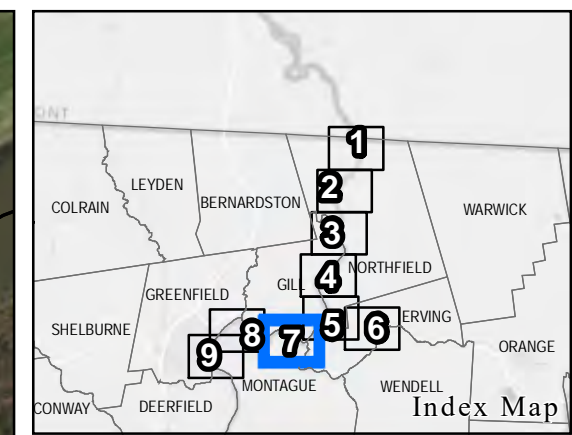
-  Conservation Easements/Restrictions
-  Conservation Easements/Restrictions (Subdivided Parcel)



Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community



Copyright © 2023 FirstLight Power Resources All rights reserved.



FIRSTLIGHT HYDRO GENERATING COMPANY
 Northfield Mountain Pumped Storage Project No. 2485
 Turners Falls Hydroelectric Project No. 1889

Appendix A:
 Conservation Easement/Restriction Areas
 Map 7

Legend

- Conservation Easements/Restrictions
- Conservation Easements/Restrictions (Subdivided Parcel)

N

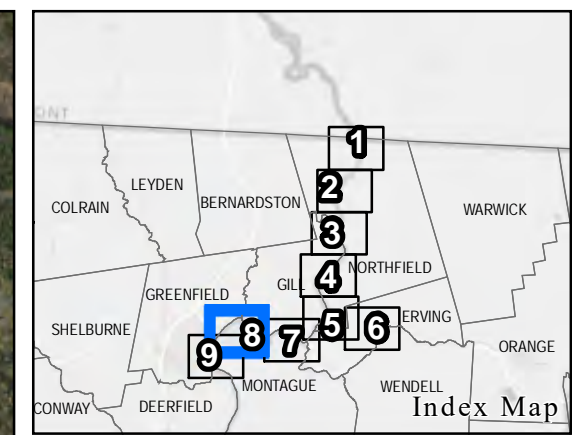
Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
 Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

0 500 1,000 2,000

 Feet

1 inch = 1,000 feet

Copyright © 2023 FirstLight Power Resources All rights reserved.



FIRSTLIGHT HYDRO GENERATING COMPANY
 Northfield Mountain Pumped Storage Project No. 2485
 Turners Falls Hydroelectric Project No. 1889

Appendix A:
 Conservation Easement/Restriction Areas
 Map 8

Legend

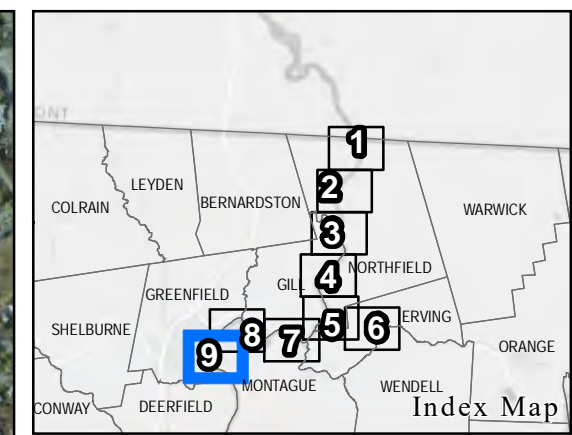
- Conservation Easements/Restrictions
- Conservation Easements/Restrictions (Subdivided Parcel)

Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
 Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

0 500 1,000 2,000 Feet

1 inch = 1,000 feet

Copyright © 2023 FirstLight Power Resources All rights reserved.




FIRSTLIGHT HYDRO GENERATING COMPANY
 Northfield Mountain Pumped Storage Project No. 2485
 Turners Falls Hydroelectric Project No. 1889

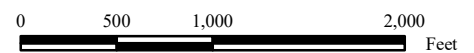
Appendix A:
 Conservation Easement/Restriction Areas
 Map 9

Legend

- Conservation Easements/Restrictions
- Conservation Easements/Restrictions (Subdivided Parcel)



Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
 Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community



1 inch = 1,000 feet



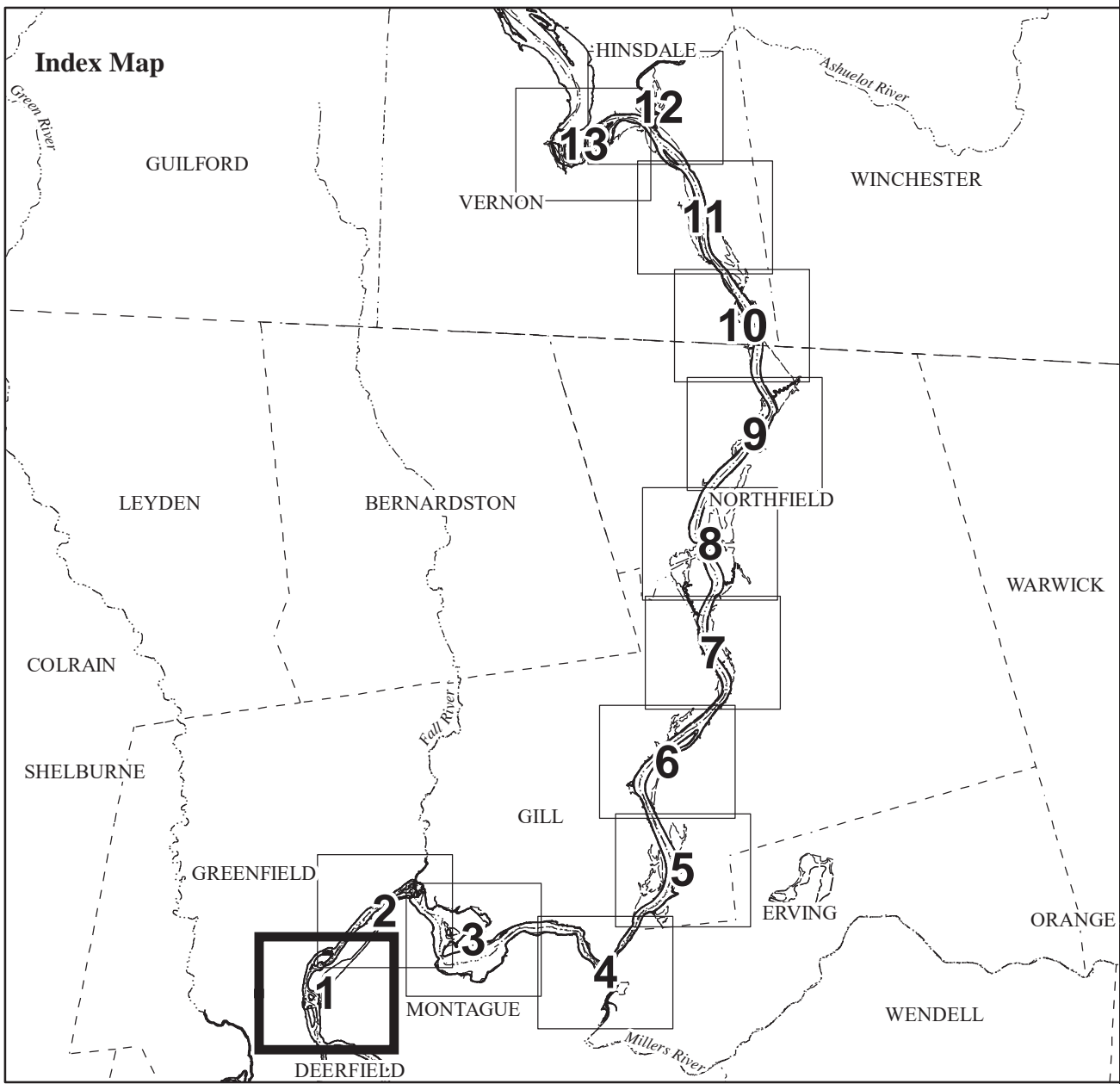
Copyright © 2023 FirstLight Power Resources All rights reserved.

APPENDIX C: CONSULTATION RECORD

Consultation Timeline

Date	Action
03/29/18	Meeting between FirstLight and NMFS to discuss concerns with regarding SNS
10/17/19	Conference call between FirstLight and NMFS to discuss concerns regarding SNS
04/17/20	FirstLight sent NMFS preliminary Draft BA
05/08/20	Conference call between FirstLight and NMFS on preliminary Draft BA
06/08/20	Conference call between FirstLight and NMFS on preliminary Draft BA
06/24/20	FirstLight files Flow and Fish Passage Settlement reflecting changes in Project operations.
03/31/23	FirstLight files Flow and Fish Passage Settlement reflecting changes in Project operations.
09/28/23	FirstLight sent NMFS revised Draft BA reflecting Project operations in the Flow and Fish Passage Settlement Agreement
12/19/23	NMFS provides markup and comments to FirstLight on revised Draft BA
02/26/24	Conference call between FirstLight and NMFS to discuss and resolve comments to the revised Draft BA

APPENDIX D: PROPOSED PROJECT BOUNDARY

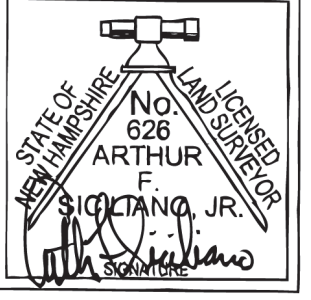


- Legend**
- Project Boundary
 - Point No. (see Project Boundary Data table for metes and bounds)
 - Project Recreation Site
 - Project Recreation Site Proposed to be Non-Project Recreation Site
 - Town Boundary
 - Own in Fee
 - Flowage Easement
 - Right to be Acquired
 - Reference Point
 - Maximum Water Surface Elevation (in feet)
 - Minimum Water Surface Elevation (in feet)
 - Shoreline
 - Major Creek
 - Project Trail
 - Railroad
 - Transmission Lines
 - Roads

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
 Horizontal Datum:
 NAD 1983
 Vertical Datum:
 NGVD 1929

Declination changing by
 0° 5' E/Year

I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE TURNERS FALLS HYDROELECTRIC PROJECT (FERC #1889) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +40 FEET. THE TURNERS FALLS HYDROELECTRIC PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.



FirstLight MA Hydro LLC
 TURNERS FALLS HYDROELECTRIC PROJECT
 FERC PROJECT NO. 1889

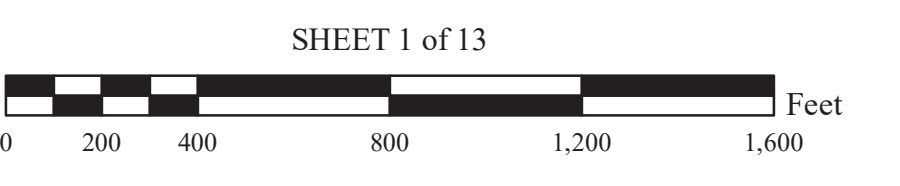
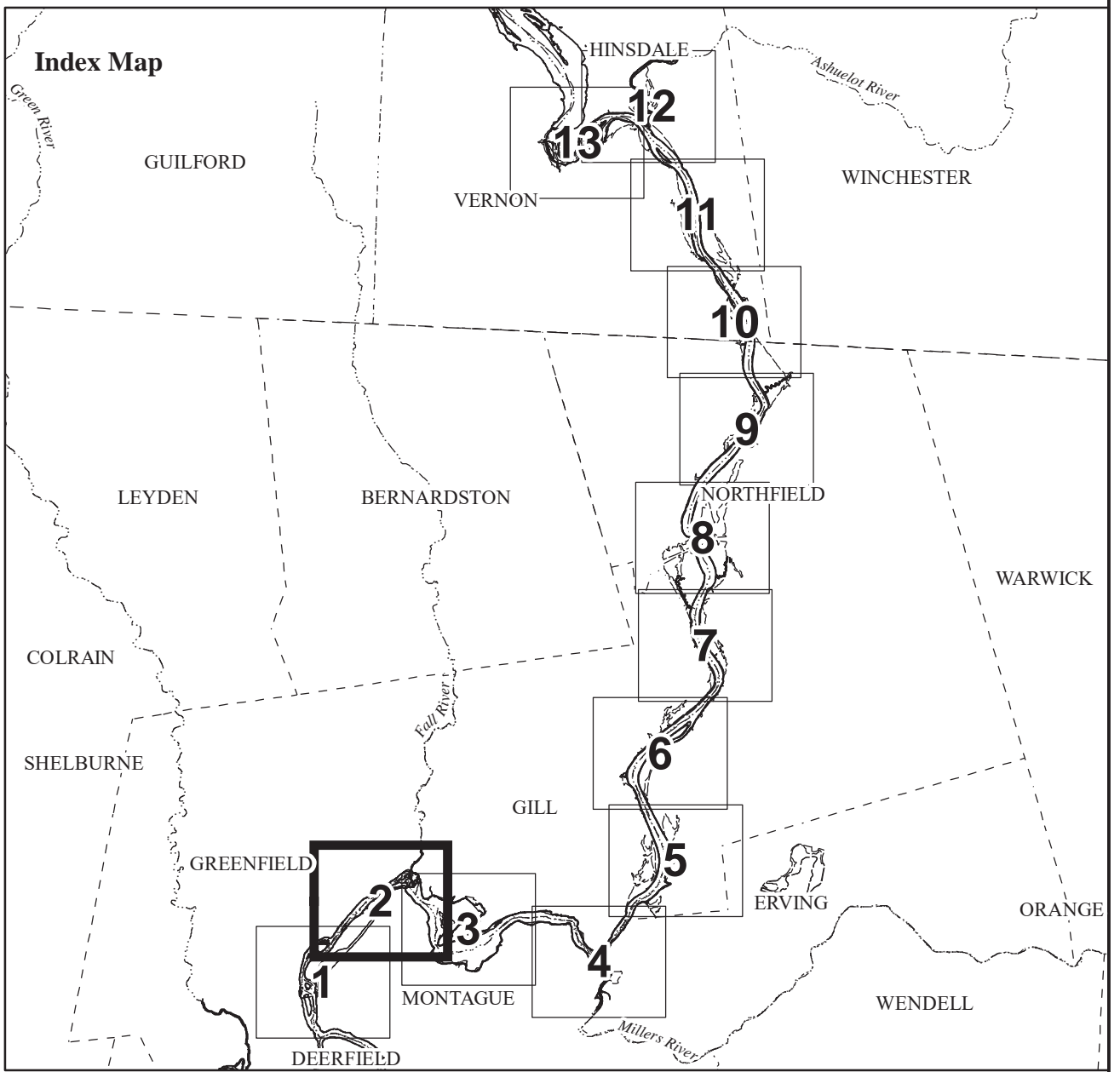
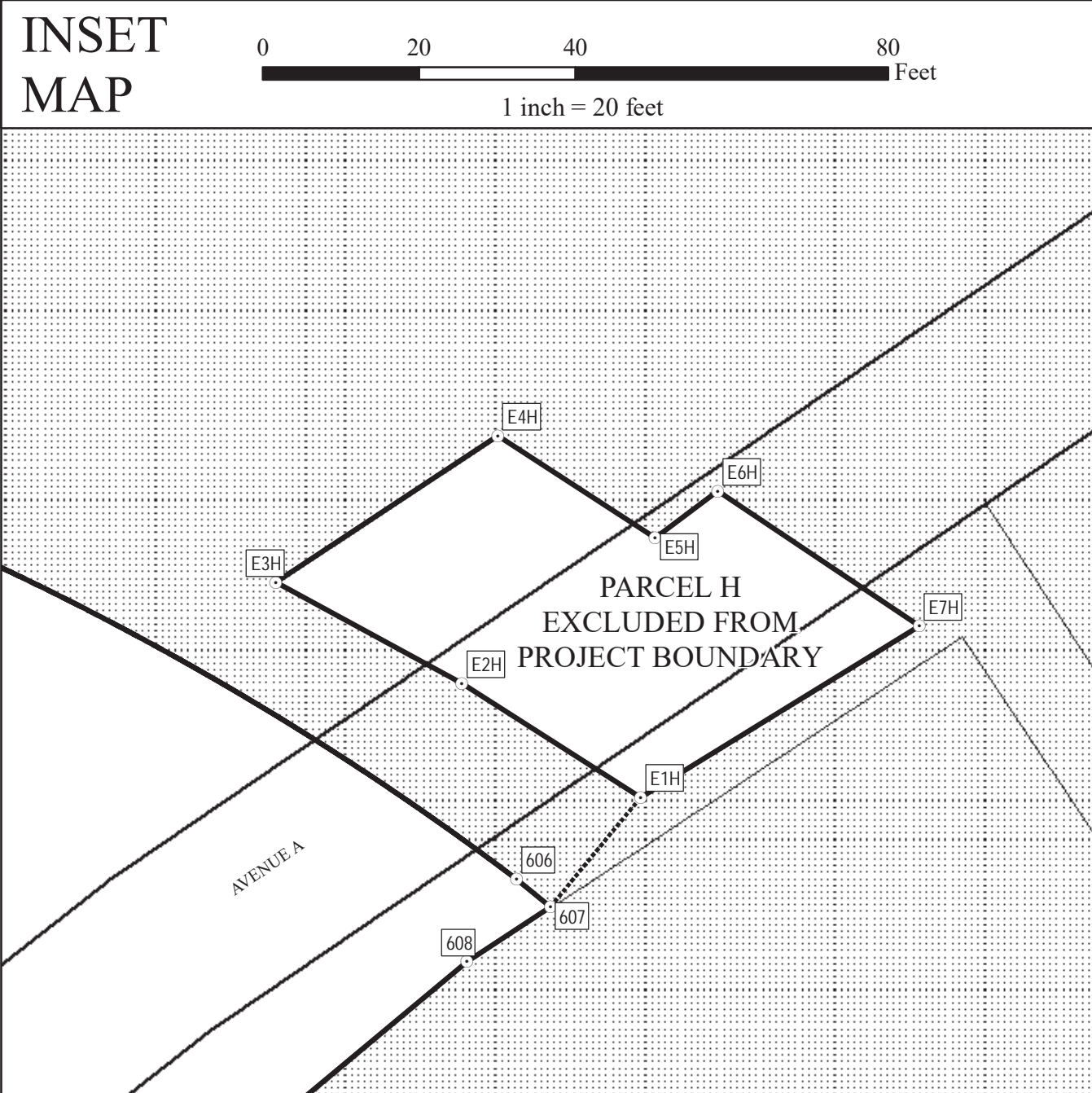
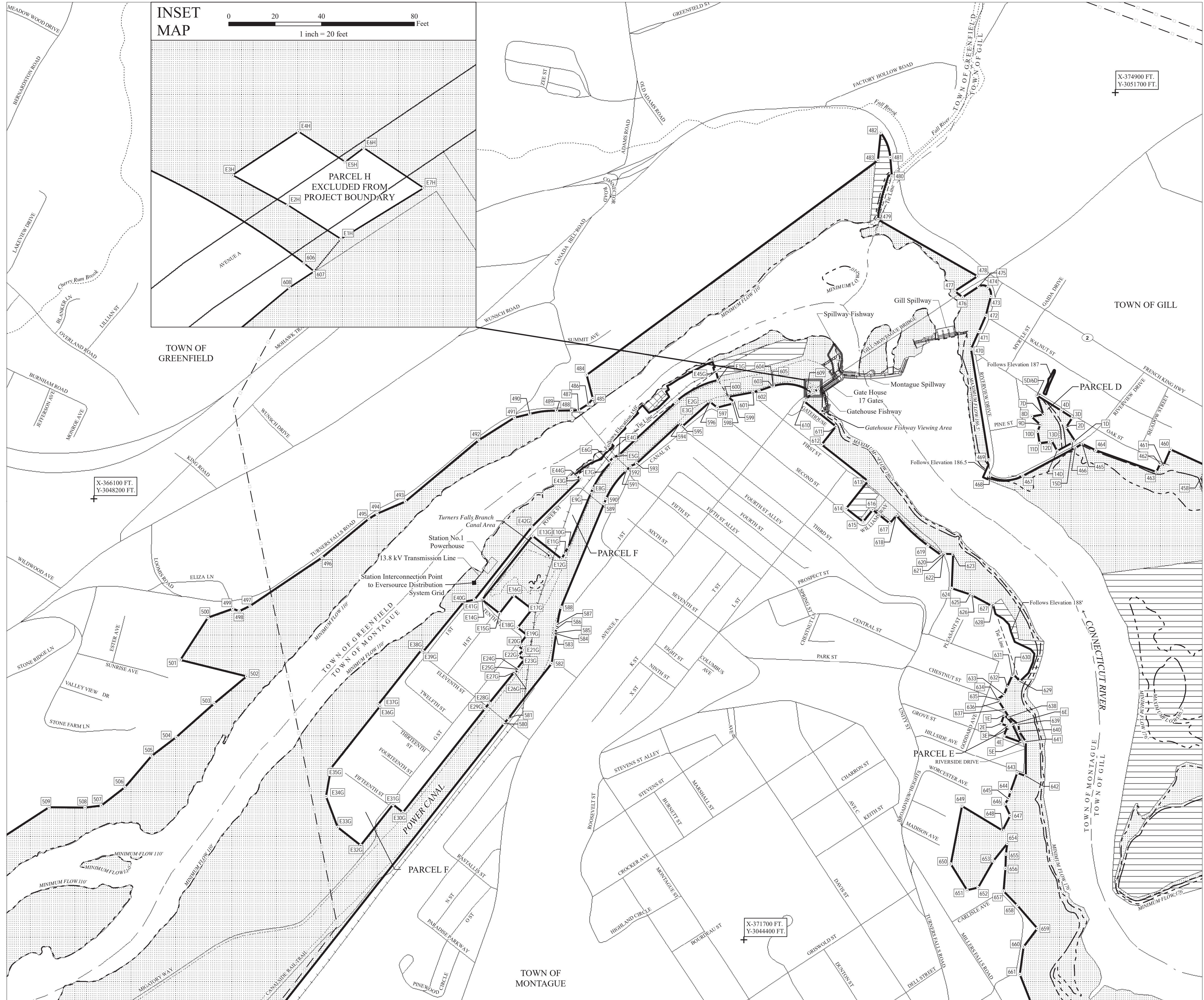
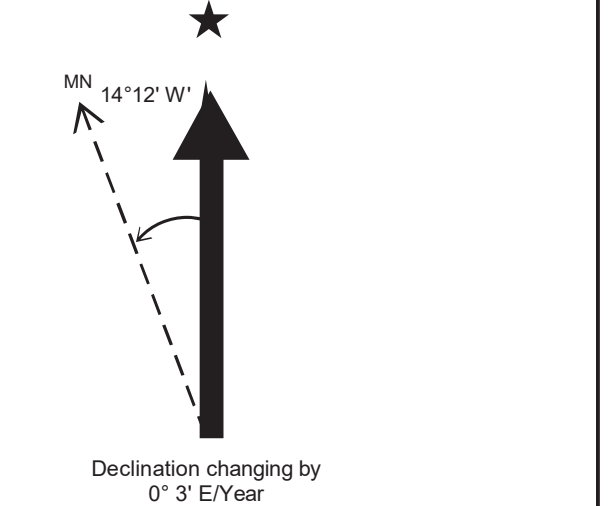


EXHIBIT G-1 SHEET 1 of 13 1 inch = 400 feet 1:4,800

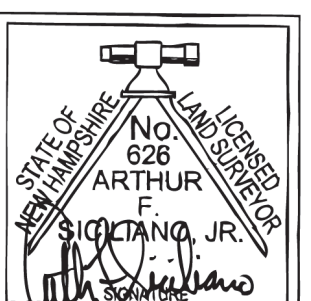


- Legend**
- Project Boundary
 - Point No. (see Project Boundary Data table for meters and bounds)
 - Project Recreation Site
 - Project Recreation Site Proposed to be Non-Project Recreation Site
 - Town Boundary
 - Own in Fee
 - Flowage Easement
 - Right to be Acquired
 - Reference Point
 - Maximum Water Surface Elevation (in feet)
 - Minimum Water Surface Elevation (in feet)
 - Shoreline
 - Major Creek
 - Project Trail
 - Railroad
 - Transmission Lines
 - Roads

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
 Horizontal Datum:
 NAD 1983
 Vertical Datum:
 NGVD 1929



I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE TURNERS FALLS HYDROELECTRIC PROJECT (FERC #1889) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +/-40 FEET. THE TURNERS FALLS HYDROELECTRIC PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND/OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.

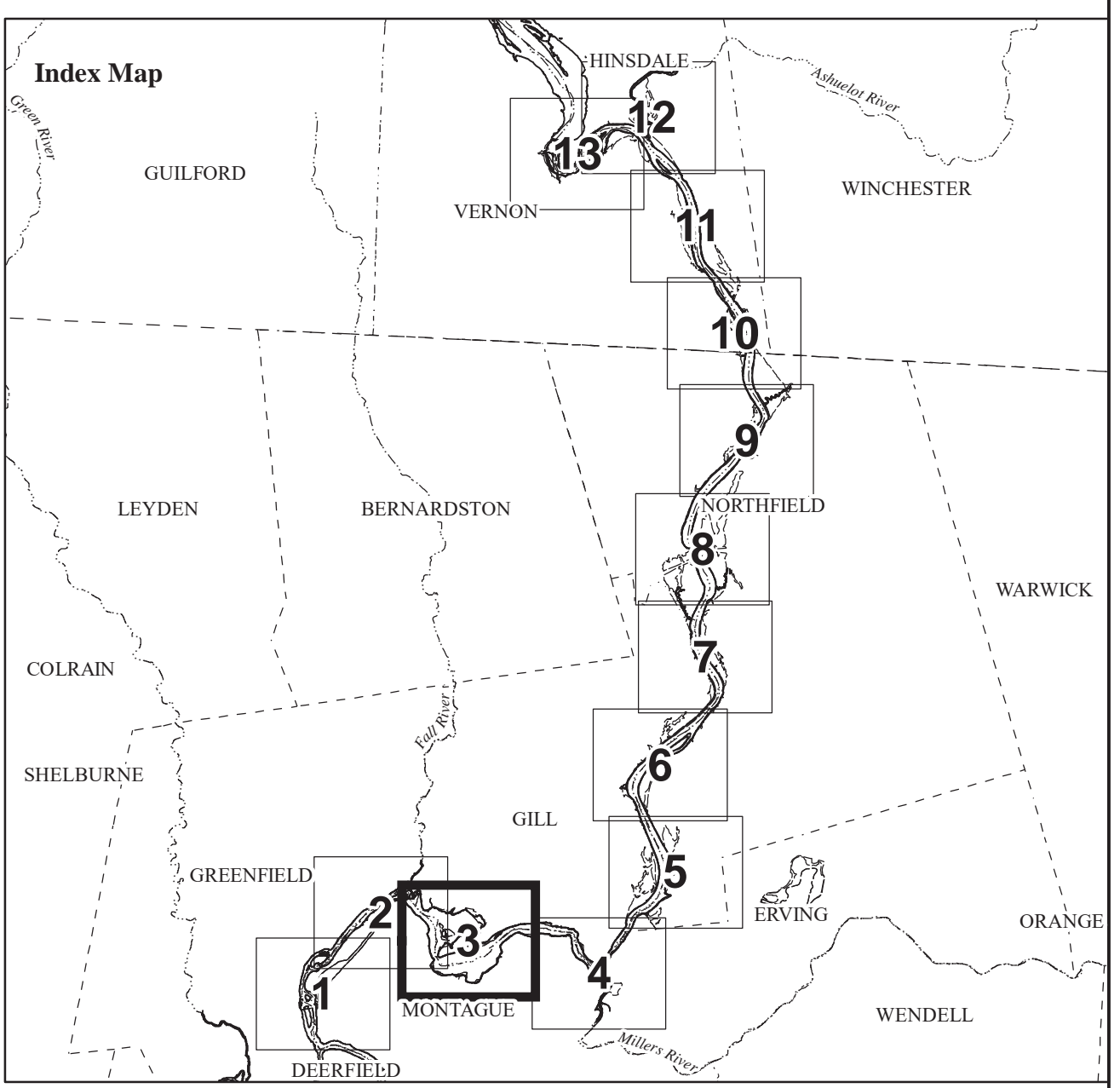


FirstLight MA Hydro LLC
 TURNERS FALLS HYDROELECTRIC PROJECT
 FERC PROJECT NO. 1889

SHEET 2 of 13

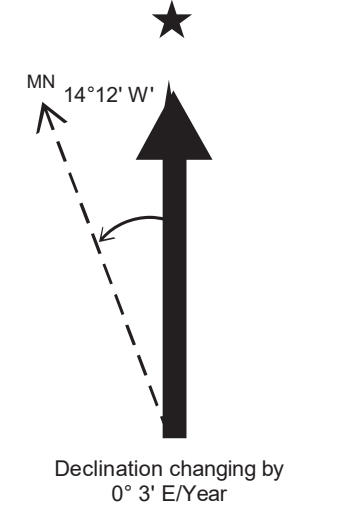
0 200 400 800 1,200 1,600 Feet

EXHIBIT G-2 1 inch = 400 feet 1:4,800

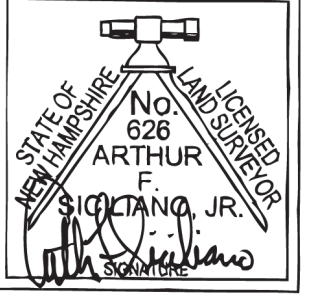


- Legend**
- Project Boundary
 - Point No. (see Project Boundary Data table for metes and bounds)
 - Project Recreation Site
 - Project Recreation Site Proposed to be Non-Project Recreation Site
 - Town Boundary
 - Own in Fee
 - Flowage Easement
 - Right to be Acquired
 - Reference Point
 - Maximum Water Surface Elevation (in feet)
 - Minimum Water Surface Elevation (in feet)
 - Shoreline
 - Major Creek
 - Project Trail
 - Railroad
 - Transmission Lines
 - Roads

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
 Horizontal Datum:
 NAD 1983
 Vertical Datum:
 NGVD 1929



I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE TURNERS FALLS HYDROELECTRIC PROJECT (FERC #1889) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +/-40 FEET. THE TURNERS FALLS HYDROELECTRIC PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND/OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.



FirstLight MA Hydro LLC
 TURNERS FALLS HYDROELECTRIC PROJECT
 FERC PROJECT NO. 1889

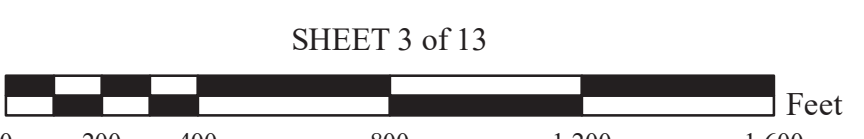
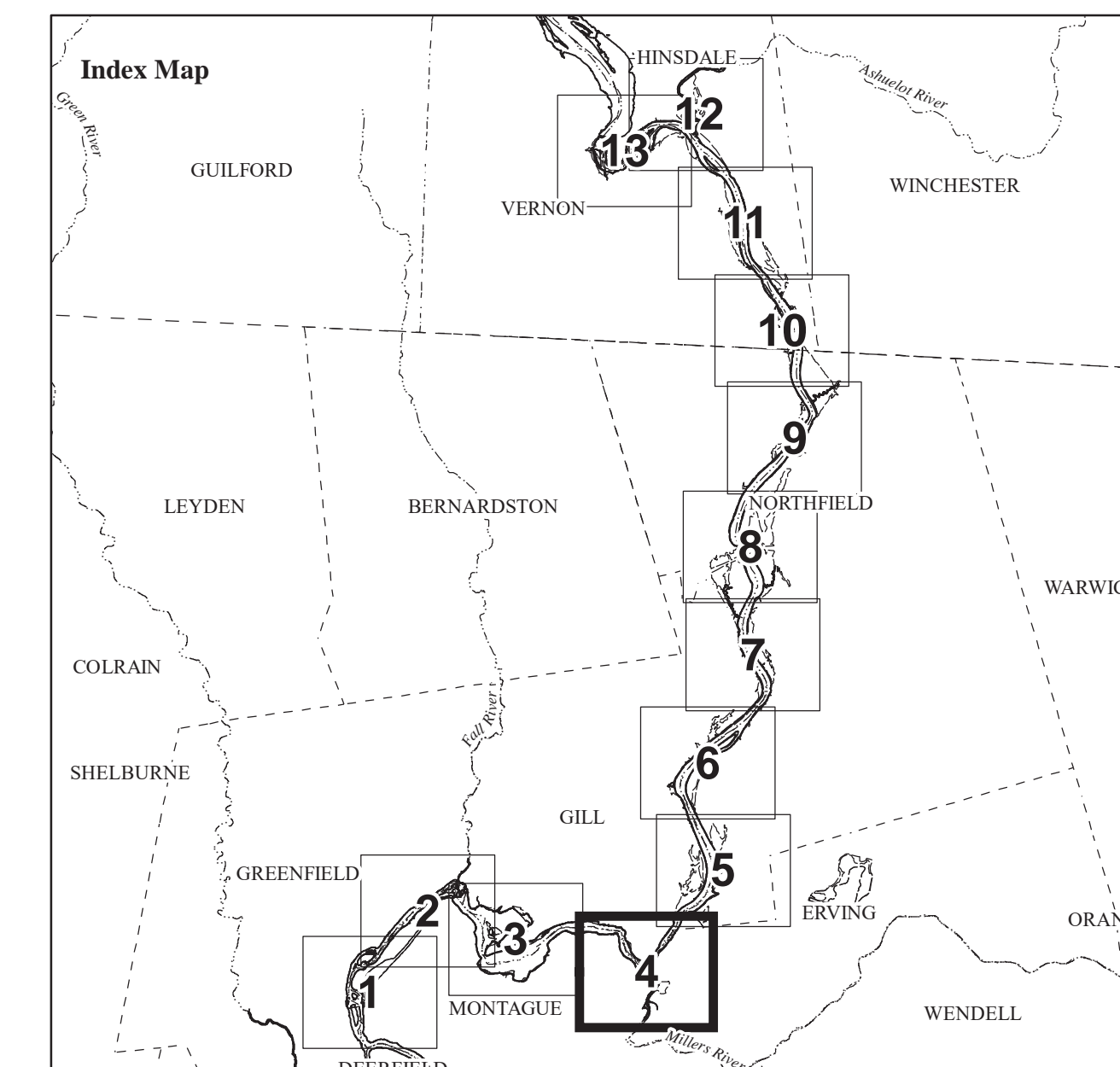
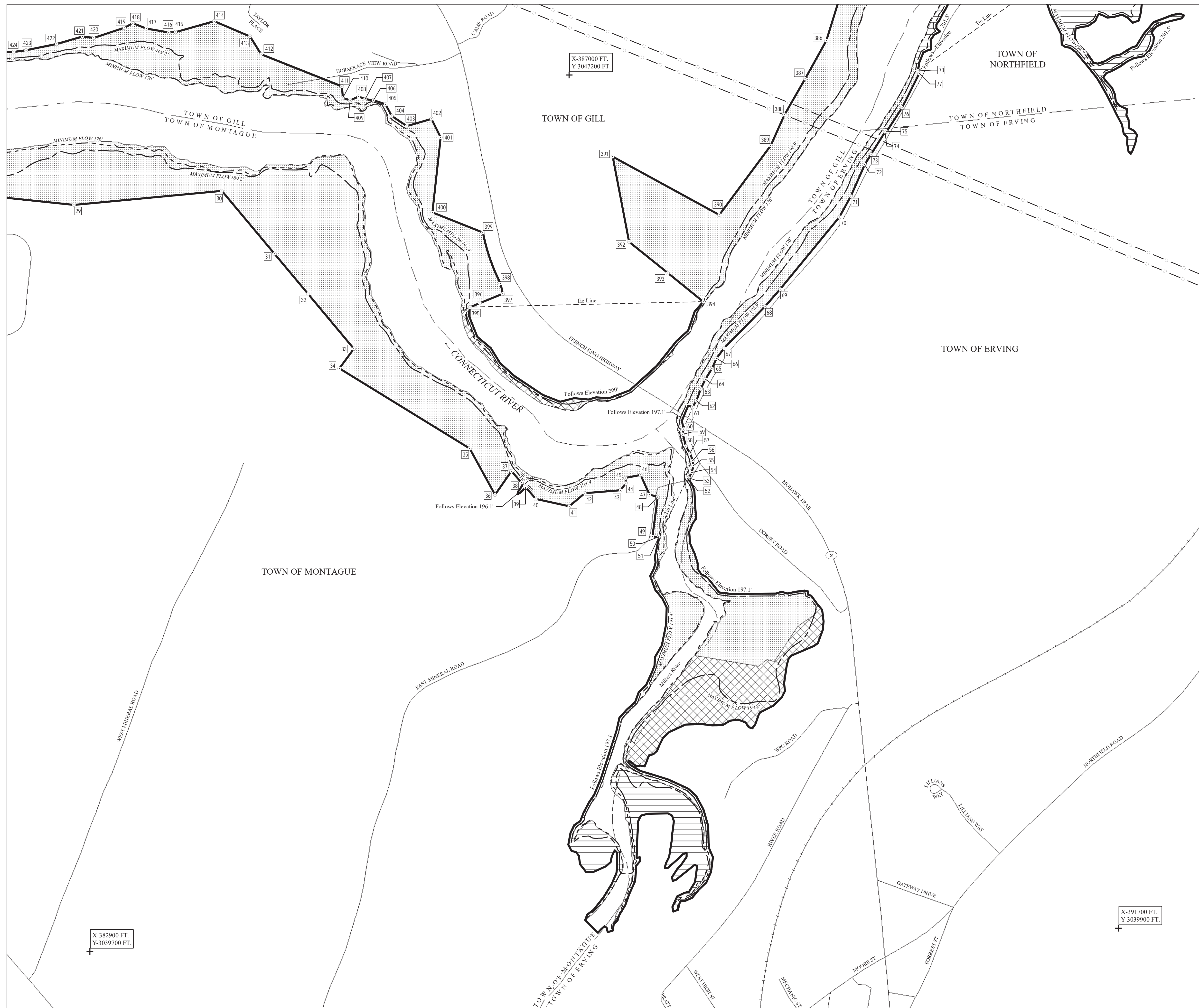


EXHIBIT G-3 SHEET 3 of 13 1 inch = 400 feet 1:4,800



Legend

Project Boundary	Reference Point
Point No. (see Project Boundary Data table for metes and bounds)	Maximum Water Surface Elevation (in feet)
Project Recreation Site	Minimum Water Surface Elevation (in feet)
Project Recreation Site Proposed to be Non-Project Recreation Site	Shoreline
Town Boundary	Major Creek
Licensee Land Rights	Project Trail
Own in Fee	Railroad
Flowage Easement	Transmission Lines
Right to be Acquired	Roads

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
 Horizontal Datum:
 NAD 1983
 Vertical Datum:
 NGVD 1929

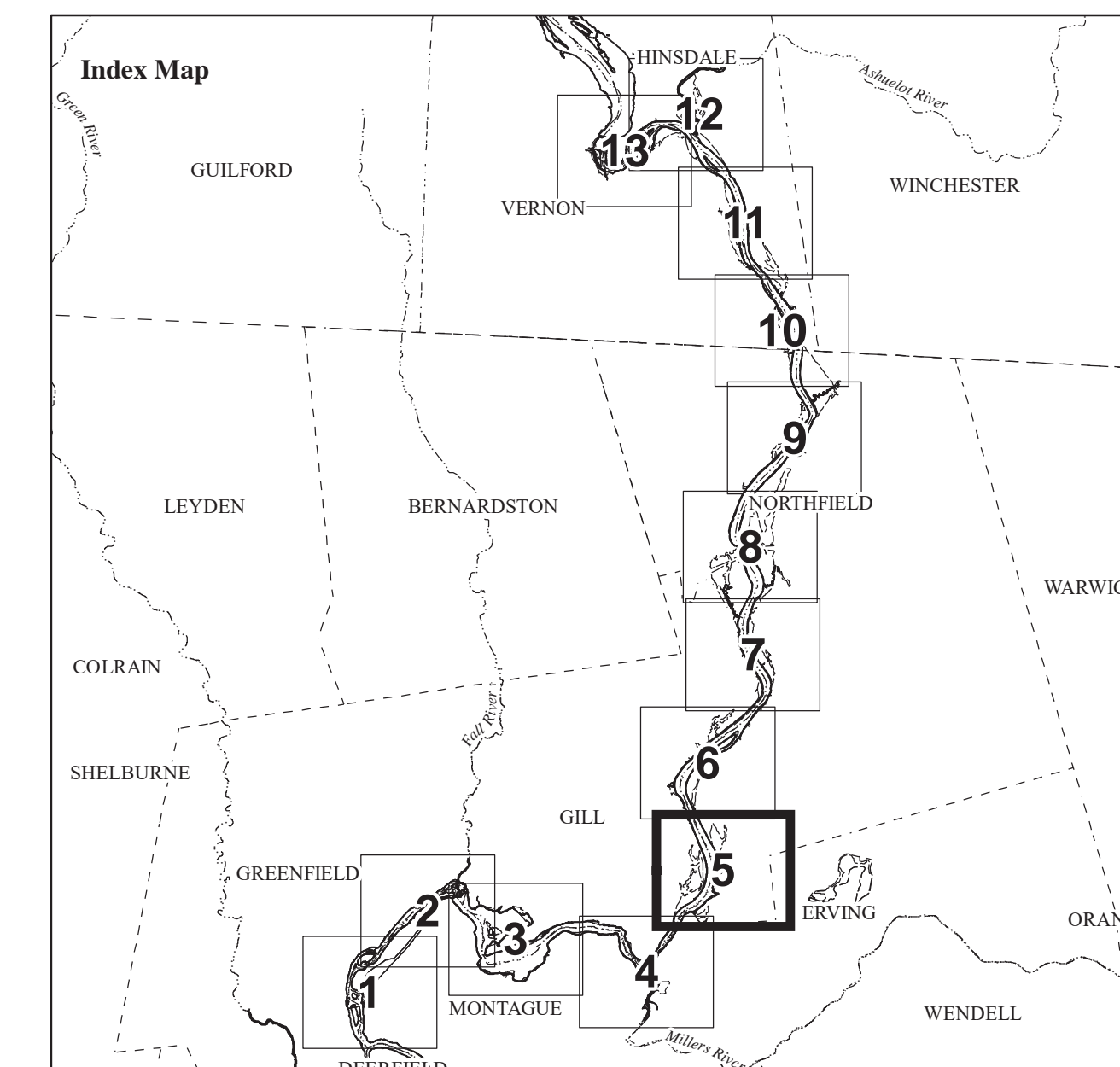
Declination changing by 0° 5' E/Year

I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE TURNERS FALLS HYDROELECTRIC PROJECT (FERC #1889) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +/-40 FEET. THE TURNERS FALLS HYDROELECTRIC PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND/OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.

FirstLight MA Hydro LLC
 TURNERS FALLS HYDROELECTRIC PROJECT
 FERC PROJECT NO. 1889

SHEET 4 of 13

EXHIBIT G-4 1 inch = 400 feet 1:4,800



Legend

	Project Boundary		Reference Point
	Point No. (see Project Boundary Data table for metes and bounds)		Maximum Water Surface Elevation (in feet)
	Project Recreation Site		Minimum Water Surface Elevation (in feet)
	Project Recreation Site Proposed to be Non-Project Recreation Site		Shoreline
	Town Boundary		Major Creek
	Project Trail		Railroad
	Own in Fee		Transmission Lines
	Flowage Easement		Roads
	Right to be Acquired		

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
 Horizontal Datum:
 NAD 1983
 Vertical Datum:
 NGVD 1929

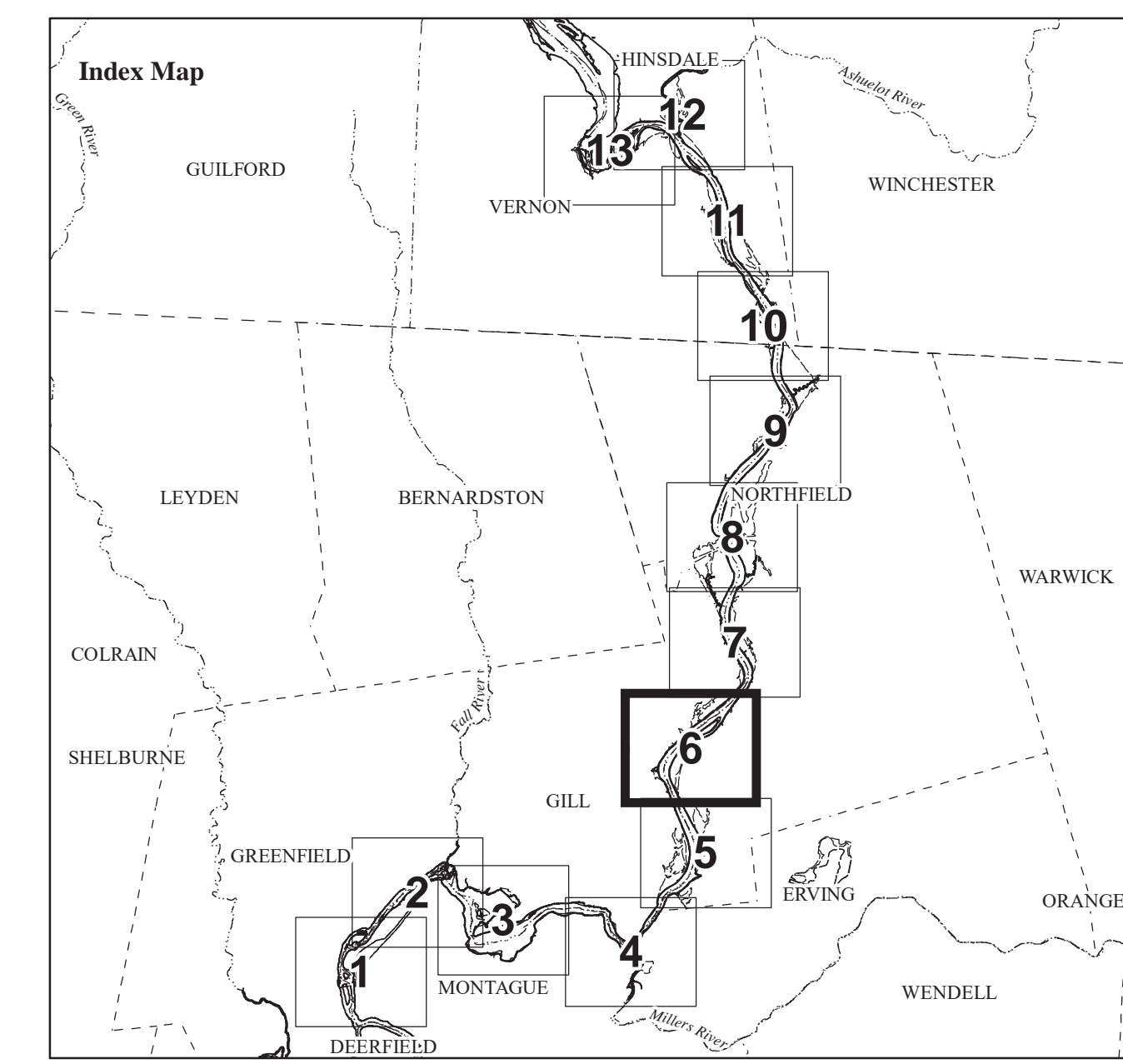
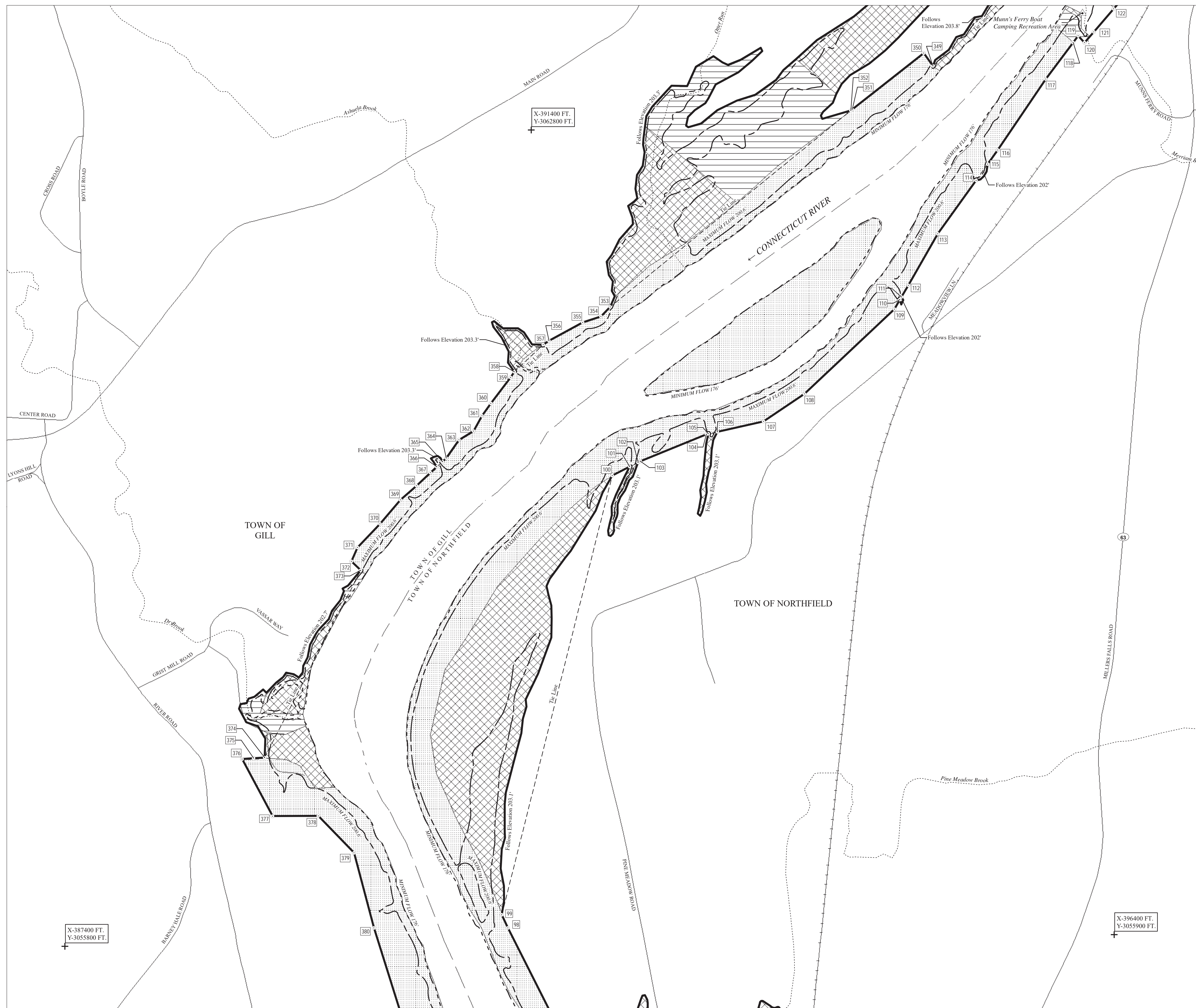
Declination changing by 0° 5' E/Year

I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE TURNERS FALLS HYDROELECTRIC PROJECT (FERC #1889) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +40 FEET. THE TURNERS FALLS HYDROELECTRIC PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND/OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.

FirstLight MA Hydro LLC
 TURNERS FALLS HYDROELECTRIC PROJECT
 FERC PROJECT NO. 1889

SHEET 5 of 13

EXHIBIT G-5 1 inch = 400 feet 1:4,800



Legend

	Project Boundary		Reference Point
	Point No. (see Project Boundary Data table for metes and bounds)		Maximum Water Surface Elevation (in feet)
	Project Recreation Site		Minimum Water Surface Elevation (in feet)
	Project Recreation Site Proposed to be Non-Project Recreation Site		Shoreline
	Town Boundary		Major Creek
	Project Trail		Railroad
	Own in Fee		Transmission Lines
	Flowage Easement		Roads
	Right to be Acquired		

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
Horizontal Datum:
 NAD 1983
Vertical Datum:
 NGVD 1929

Licensee Land Rights

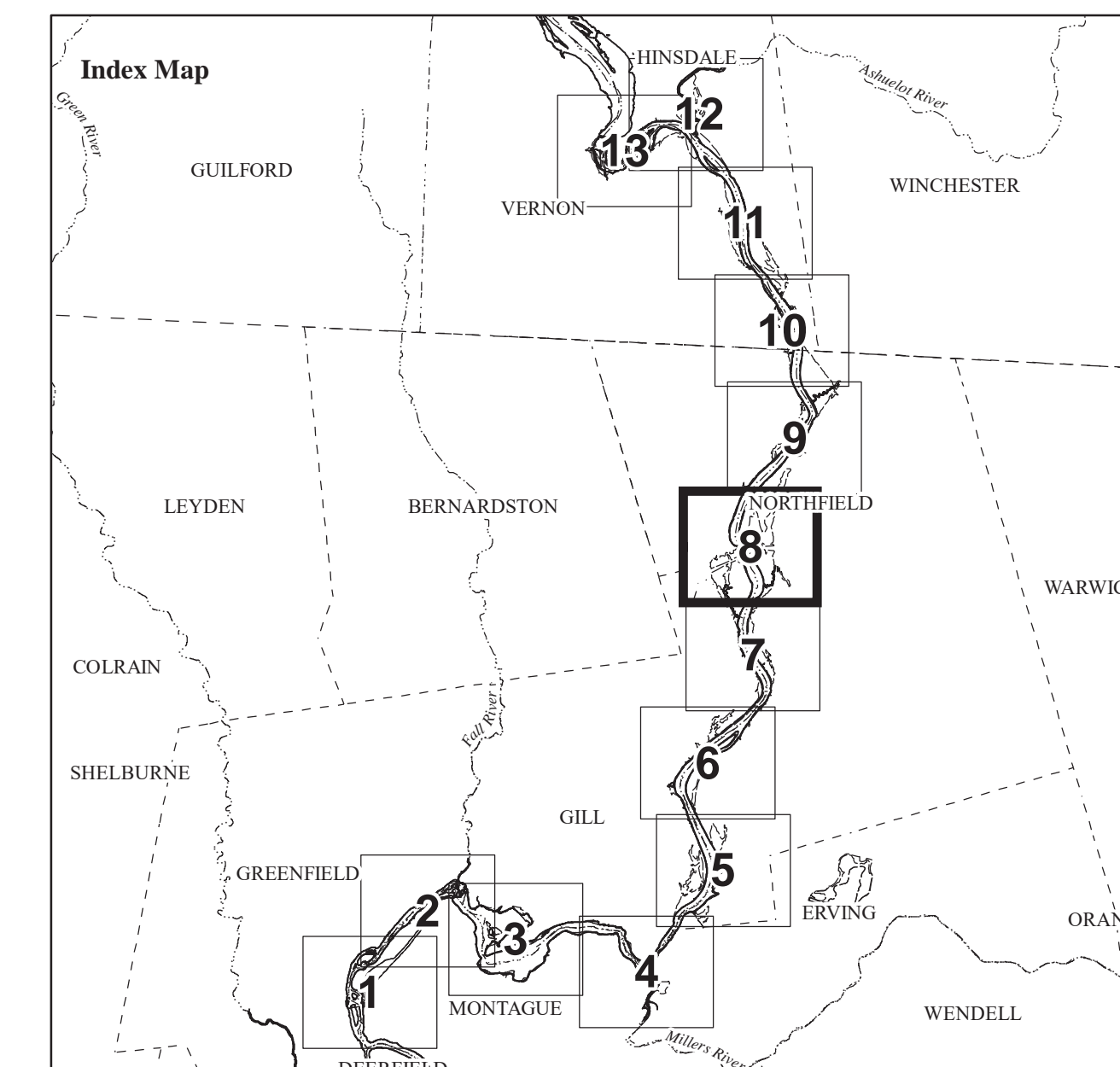
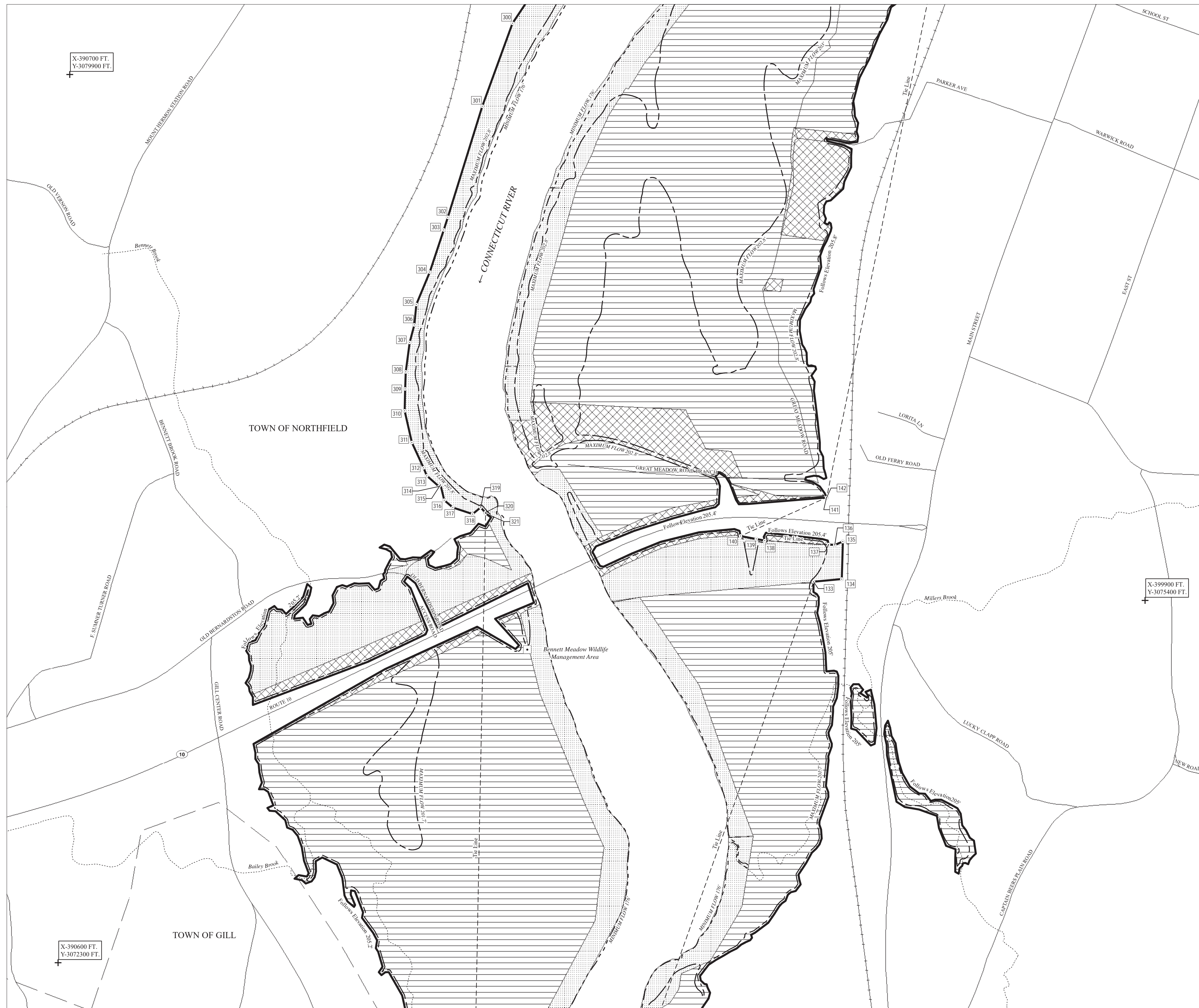
Declination changing by 0° 5' E/Year

I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE TURNERS FALLS HYDROELECTRIC PROJECT (FERC #1889) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +/-40 FEET. THE TURNERS FALLS HYDROELECTRIC PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.

FirstLight MA Hydro LLC
 TURNERS FALLS HYDROELECTRIC PROJECT
 FERC PROJECT NO. 1889

SHEET 6 of 13

EXHIBIT G-6 1 inch = 400 feet 1:4,800



Legend

Project Boundary	Reference Point
Point No. (see Project Boundary Data table for metes and bounds)	Maximum Water Surface Elevation (in feet)
Project Recreation Site	Minimum Water Surface Elevation (in feet)
Project Recreation Site Proposed to be Non-Project Recreation Site	Shoreline
Town Boundary	Major Creek
Licensee Land Rights	Project Trail
Own in Fee	Railroad
Flowage Easement	Transmission Lines
Right to be Acquired	Roads

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
 Horizontal Datum:
 NAD 1983
 Vertical Datum:
 NGVD 1929

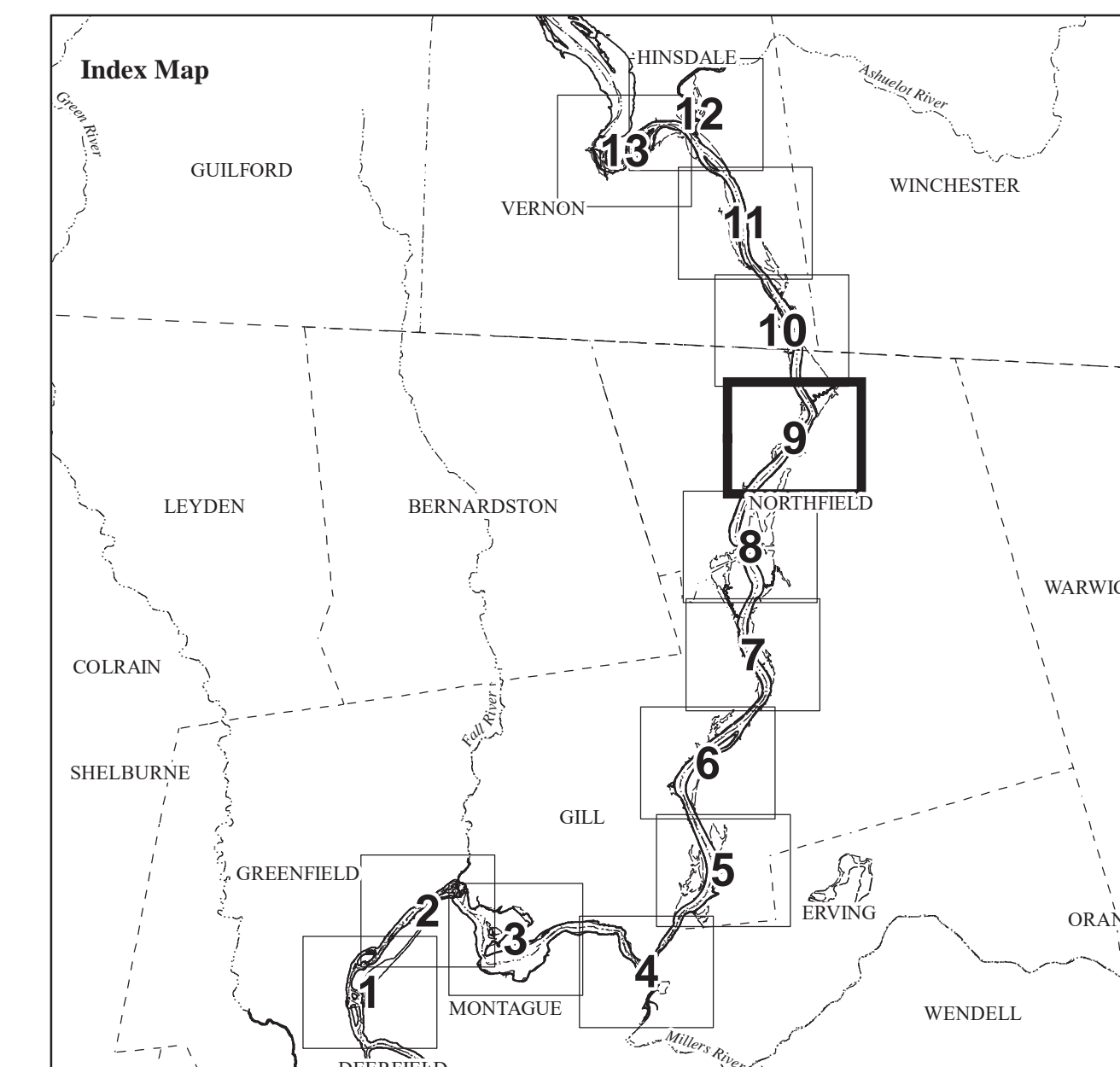
Declination changing by 0' 9" E/Year

I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE TURNERS FALLS HYDROELECTRIC PROJECT (FERC #1889) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +/-40 FEET. THE TURNERS FALLS HYDROELECTRIC PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND/OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.

FirstLight MA Hydro LLC
 TURNERS FALLS HYDROELECTRIC PROJECT
 FERC PROJECT NO. 1889

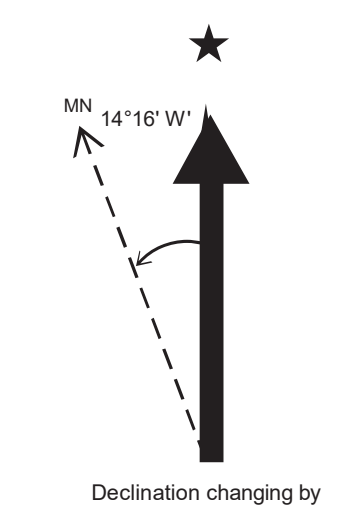
SHEET 8 of 13

EXHIBIT G-8 1 inch = 400 feet 1:4,800

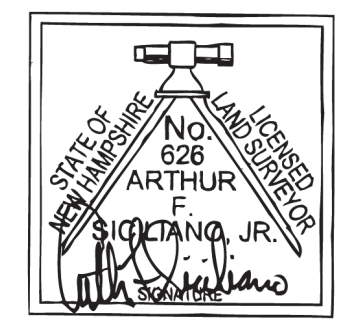


- Legend**
- Project Boundary
 - Point No. (see Project Boundary Data table for meters and bounds)
 - Project Recreation Site
 - Project Recreation Site Proposed to be Non-Project Recreation Site
 - Town Boundary
 - Own in Fee
 - Flowage Easement
 - Right to be Acquired
 - Reference Point
 - Maximum Water Surface Elevation (in feet)
 - Minimum Water Surface Elevation (in feet)
 - Shoreline
 - Major Creek
 - Project Trail
 - Railroad
 - Transmission Lines
 - Roads

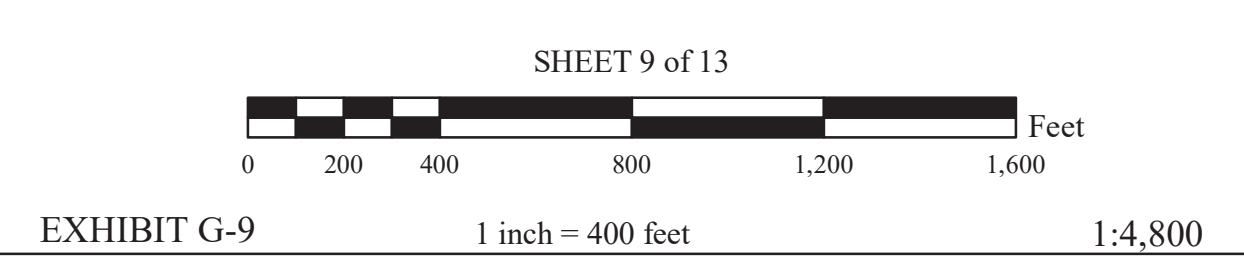
Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
 Horizontal Datum:
 NAD 1983
 Vertical Datum:
 NGVD 1929

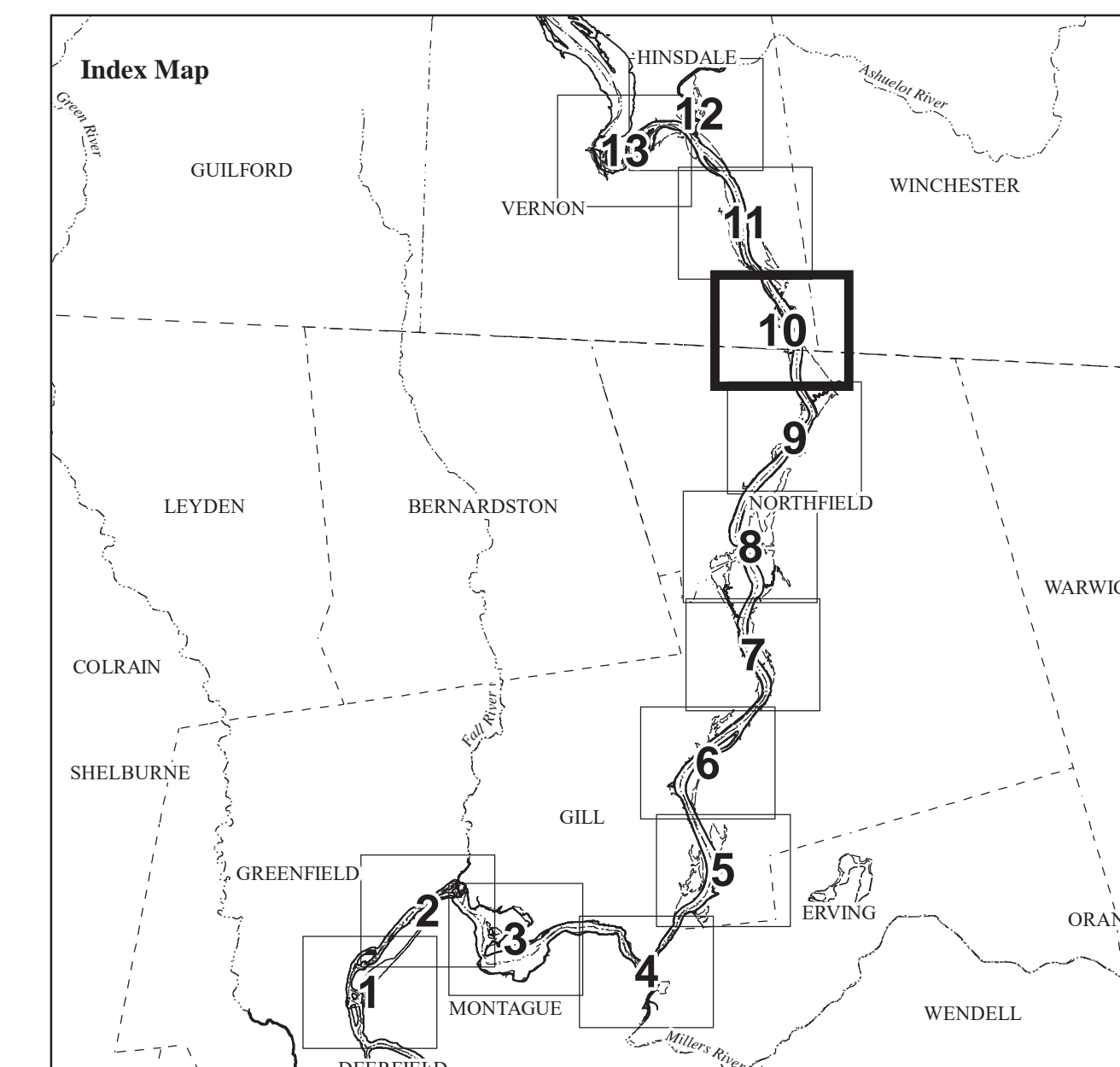


I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE TURNERS FALLS HYDROELECTRIC PROJECT (FERC #1889) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +40 FEET. THE TURNERS FALLS HYDROELECTRIC PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.



FirstLight MA Hydro LLC
 TURNERS FALLS HYDROELECTRIC PROJECT
 FERC PROJECT NO. 1889





Legend

	Project Boundary		Reference Point
	Point No. (see Project Boundary Data table for metes and bounds)		Maximum Water Surface Elevation (in feet)
	Project Recreation Site		Minimum Water Surface Elevation (in feet)
	Project Recreation Site Proposed to be Non-Project Recreation Site		Shoreline
	Town Boundary		Major Creek
	Railroad		Project Trail
	Transmission Lines		
	Roads		

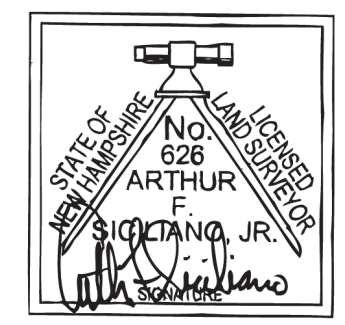
Licensee Land Rights

	Own in Fee
	Flowage Easement
	Right to be Acquired

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
 Horizontal Datum:
 NAD 1983
 Vertical Datum:
 NGVD 1929

Declination changing by 0° 5' E/Year

I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE TURNERS FALLS HYDROELECTRIC PROJECT (FERC #1889) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +/-40 FEET. THE TURNERS FALLS HYDROELECTRIC PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.

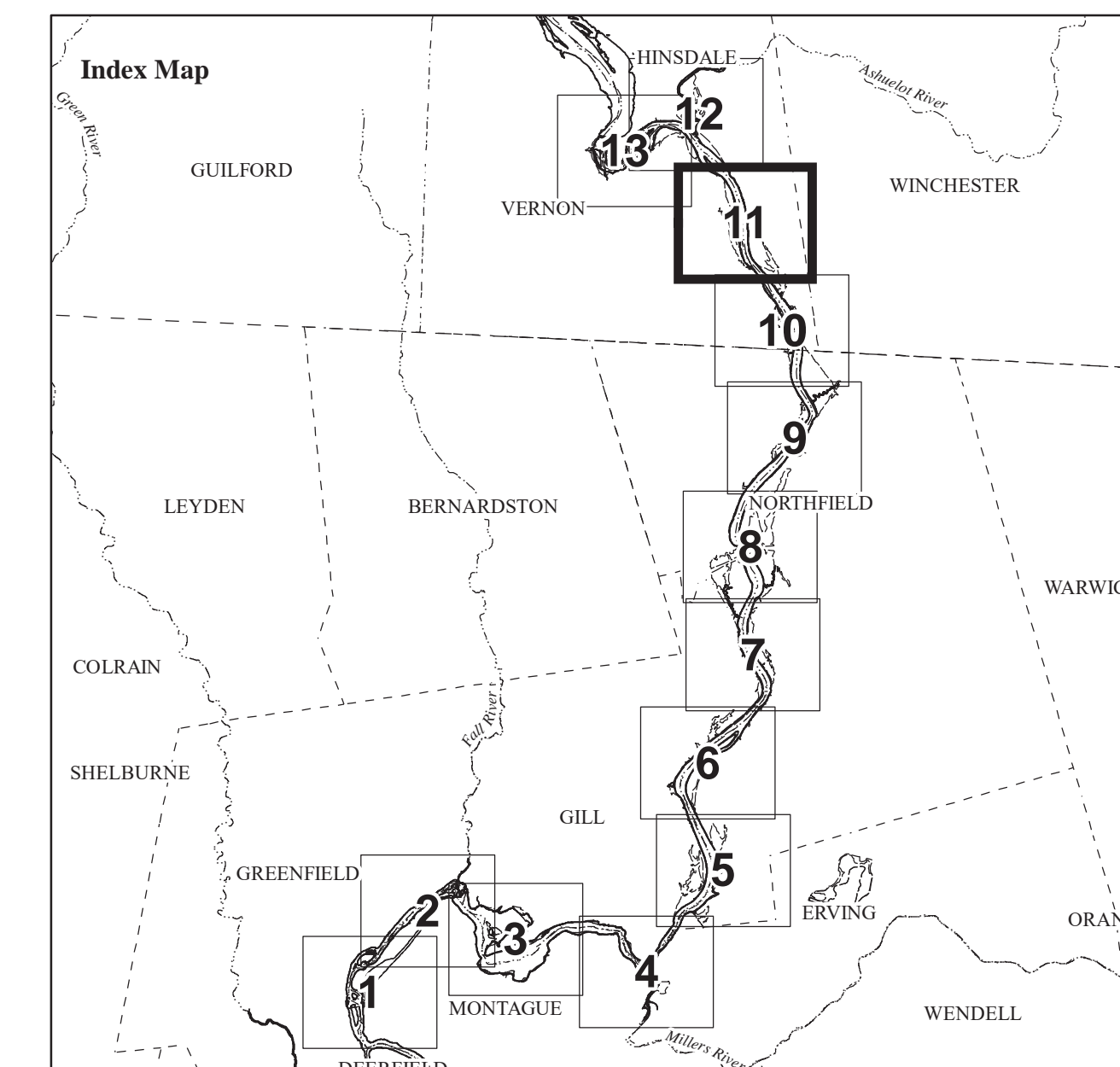


FirstLight MA Hydro LLC
 TURNERS FALLS HYDROELECTRIC PROJECT
 FERC PROJECT NO. 1889

SHEET 10 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-10 1 inch = 400 feet 1:4,800



Legend

	Project Boundary		Reference Point
	Point No. (see Project Boundary Data table for metes and bounds)		Maximum Water Surface Elevation (in feet)
	Project Recreation Site		Minimum Water Surface Elevation (in feet)
	Project Recreation Site Proposed to be Non-Project Recreation Site		Shoreline
	Town Boundary		Major Creek
	Own in Fee		Project Trail
	Flowage Easement		Railroad
	Right to be Acquired		Transmission Lines
			Roads

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
 Horizontal Datum:
 NAD 1983
 Vertical Datum:
 NGVD 1929

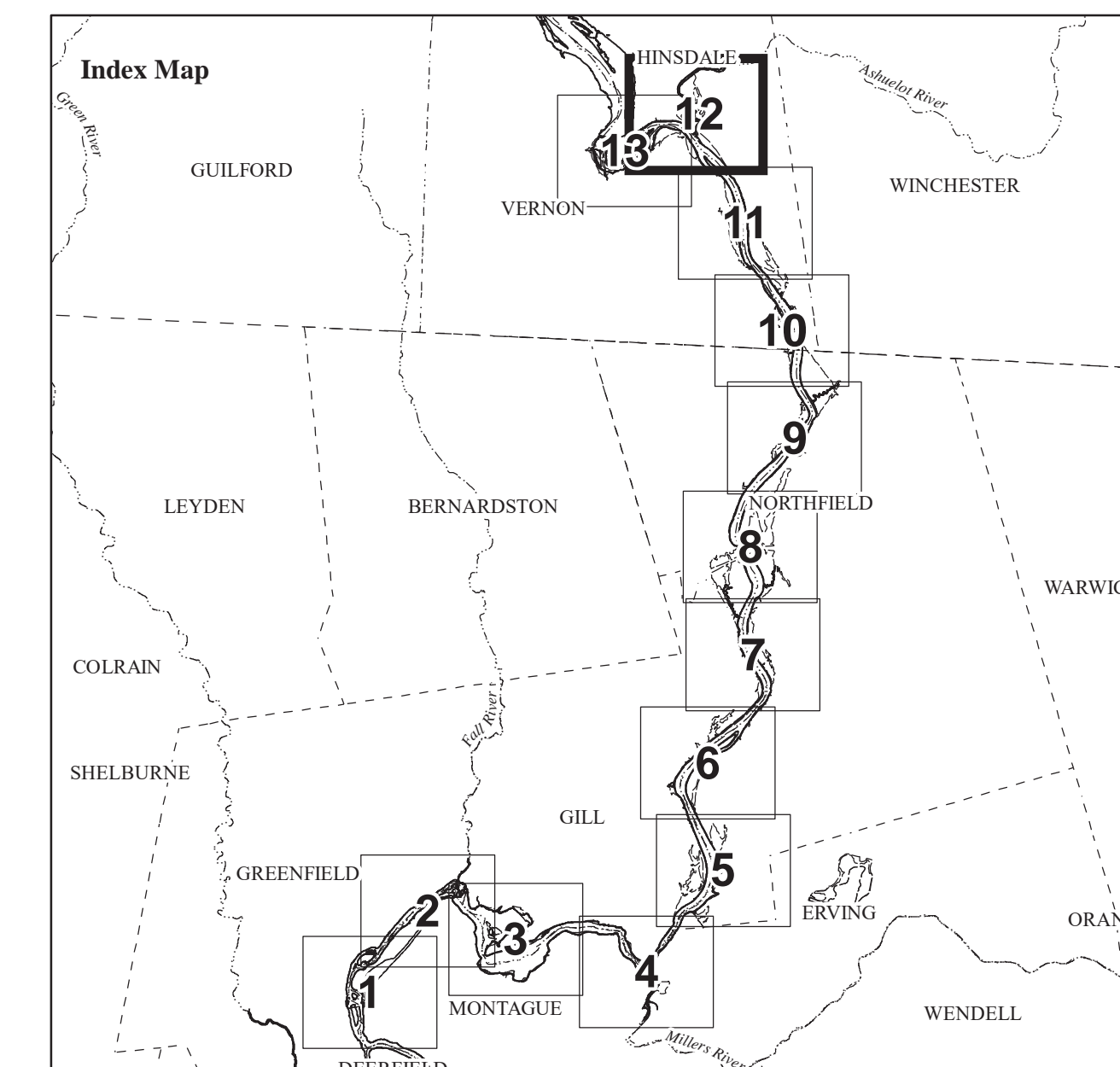
Declination changing by 0" S / E / Year

I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE TURNERS FALLS HYDROELECTRIC PROJECT (FERC #1889) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +/-40 FEET. THE TURNERS FALLS HYDROELECTRIC PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.

FirstLight MA Hydro LLC
 TURNERS FALLS HYDROELECTRIC PROJECT
 FERC PROJECT NO. 1889

SHEET 11 of 13

EXHIBIT G-11 1 inch = 400 feet 1:4,800



Legend

	Project Boundary		Reference Point
	Point No. (see Project Boundary Data table for metes and bounds)		Maximum Water Surface Elevation (in feet)
	Project Recreation Site		Minimum Water Surface Elevation (in feet)
	Project Recreation Site Proposed to be Non-Project Recreation Site		Shoreline
	Town Boundary		Major Creek
	Town Boundary		Project Trail

Licensee Land Rights

	Own in Fee		Railroad
	Flowage Easement		Transmission Lines
	Right to be Acquired		Roads

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
 Horizontal Datum:
 NAD 1983
 Vertical Datum:
 NGVD 1929

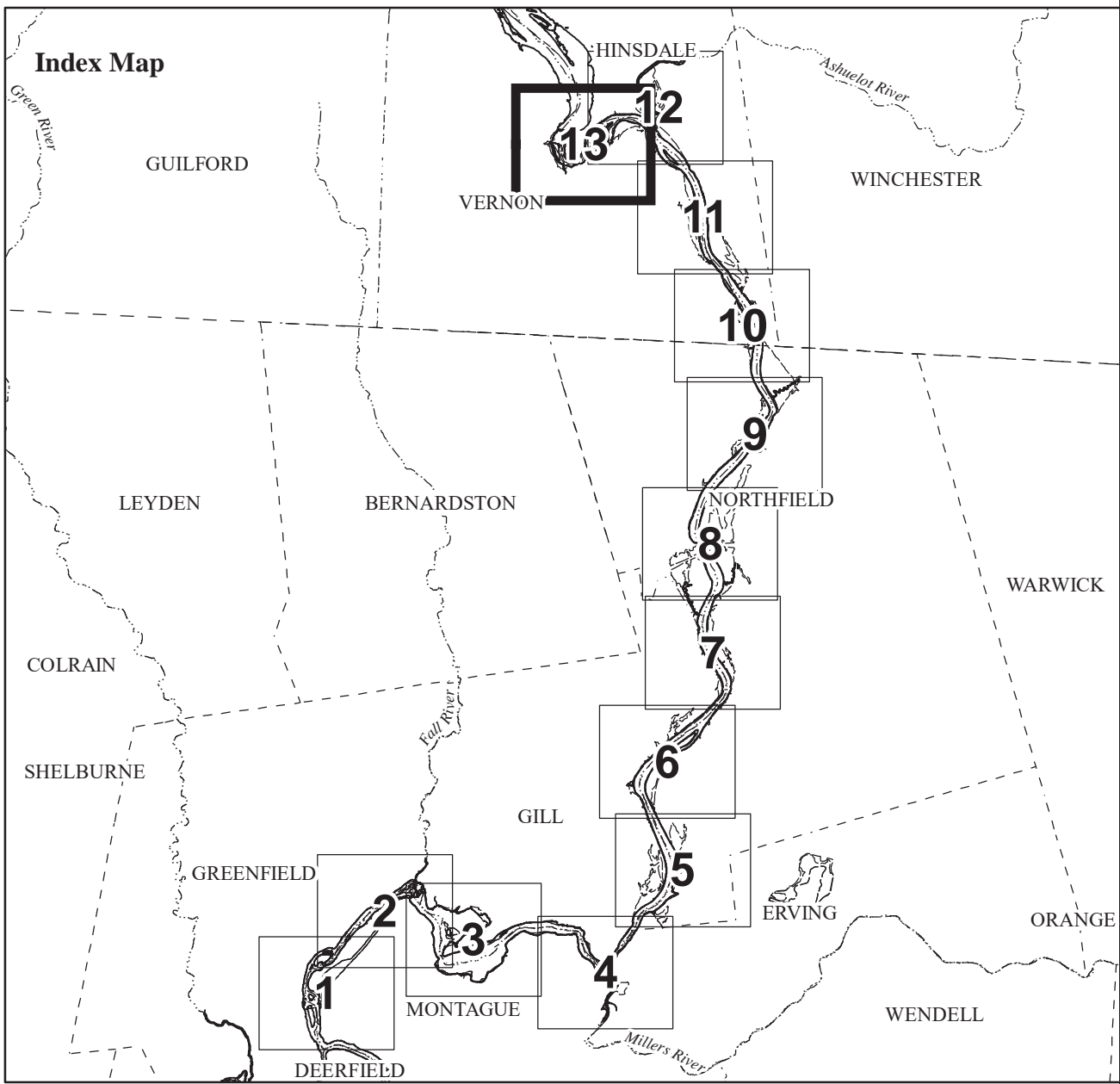
Declination changing by 0° 5' E/Year

I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE TURNERS FALLS HYDROELECTRIC PROJECT (FERC #1889) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +40 FEET. THE TURNERS FALLS HYDROELECTRIC PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.

FirstLight MA Hydro LLC
 TURNERS FALLS HYDROELECTRIC PROJECT
 FERC PROJECT NO. 1889

SHEET 12 of 13

EXHIBIT G-12 1 inch = 400 feet 1:4,800

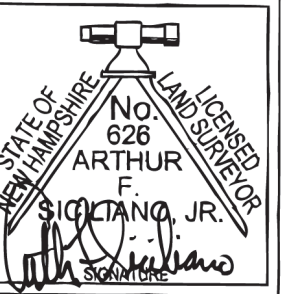


- Legend**
- Project Boundary
 - Point No. (see Project Boundary Data table for meters and bounds)
 - Project Recreation Site
 - Project Recreation Site Proposed to be Non-Project Recreation Site
 - Town Boundary
 - Own in Fee
 - Flowage Easement
 - Right to be Acquired
 - Reference Point
 - Maximum Water Surface Elevation (in feet)
 - Minimum Water Surface Elevation (in feet)
 - Shoreline
 - Major Creek
 - Project Trail
 - Railroad
 - Transmission Lines
 - Roads

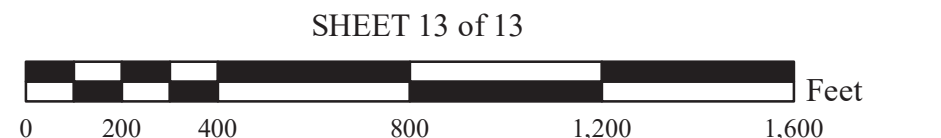
Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
 Horizontal Datum:
 NAD 1983
 Vertical Datum:
 NGVD 1929

MN 14°16' W
 Declination changing by 0" S E/Year

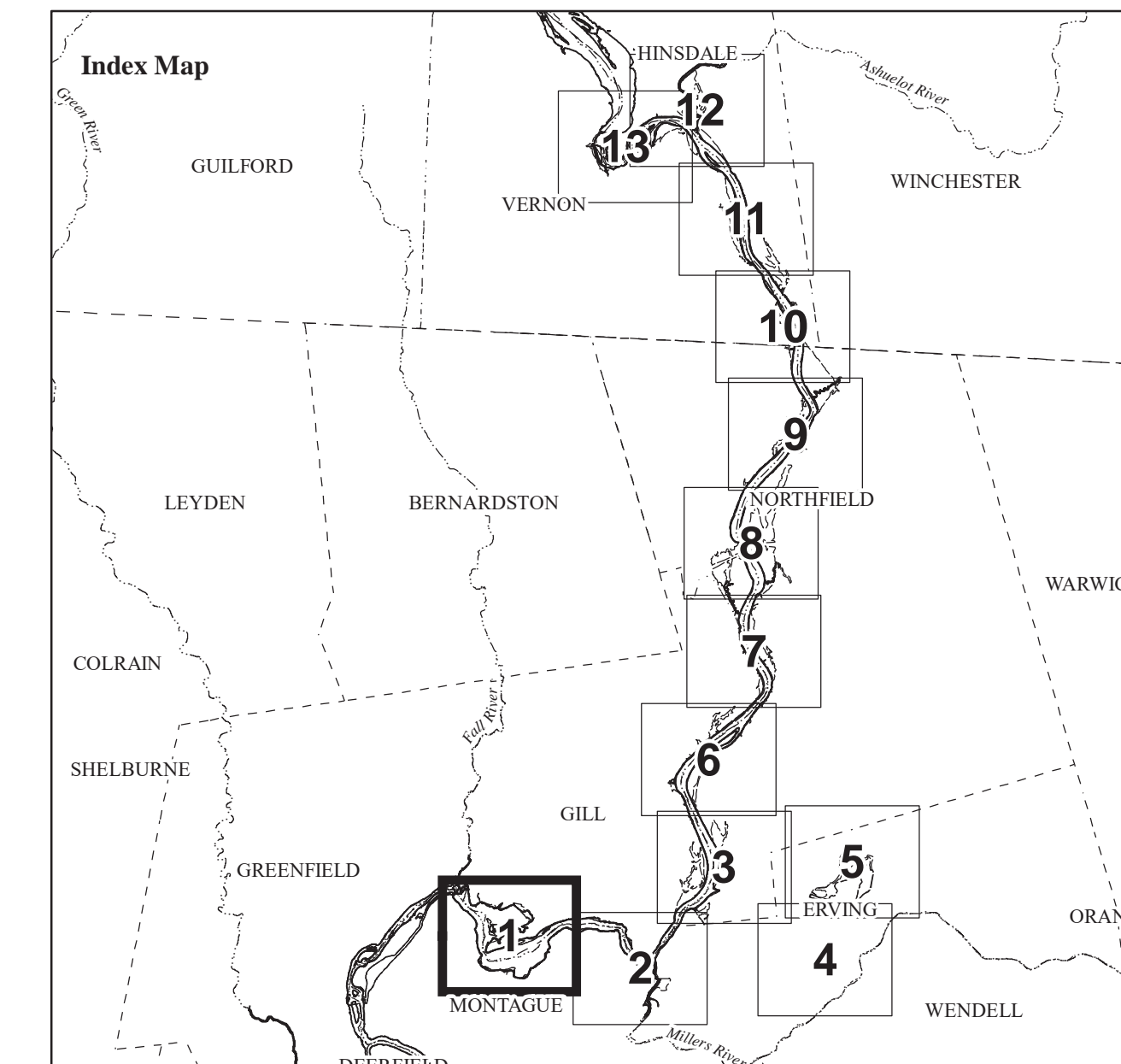
I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE TURNERS FALLS HYDROELECTRIC PROJECT (FERC #1889) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +40 FEET. THE TURNERS FALLS HYDROELECTRIC PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.



FirstLight MA Hydro LLC
 TURNERS FALLS HYDROELECTRIC PROJECT
 FERC PROJECT NO. 1889



SHEET 13 of 13
 EXHIBIT G-13 1 inch = 400 feet 1:4,800



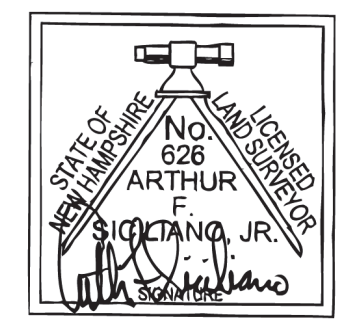
Legend

	Project Boundary		Reference Point
	Point No. (see Project Boundary Data table for meters and bounds)		Maximum Water Surface Elevation (in feet)
	Project Recreation Site		Minimum Water Surface Elevation (in feet)
	Project Recreation Site Proposed to be Non-Project Recreation Site		Shoreline
	Town Boundary		Major Creek
	Licensee Land Rights		Project Trail
	Own in Fee		Railroad
	Flowage Easement		Transmission Lines
	License to Occupy		Roads
	Right to be Acquired		

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
Horizontal Datum:
 NAD 1983
Vertical Datum:
 NGVD 1929

Declination changing by 0" S / E / Year

I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT (FERC #2485) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +/-40 FEET. THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND/OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.

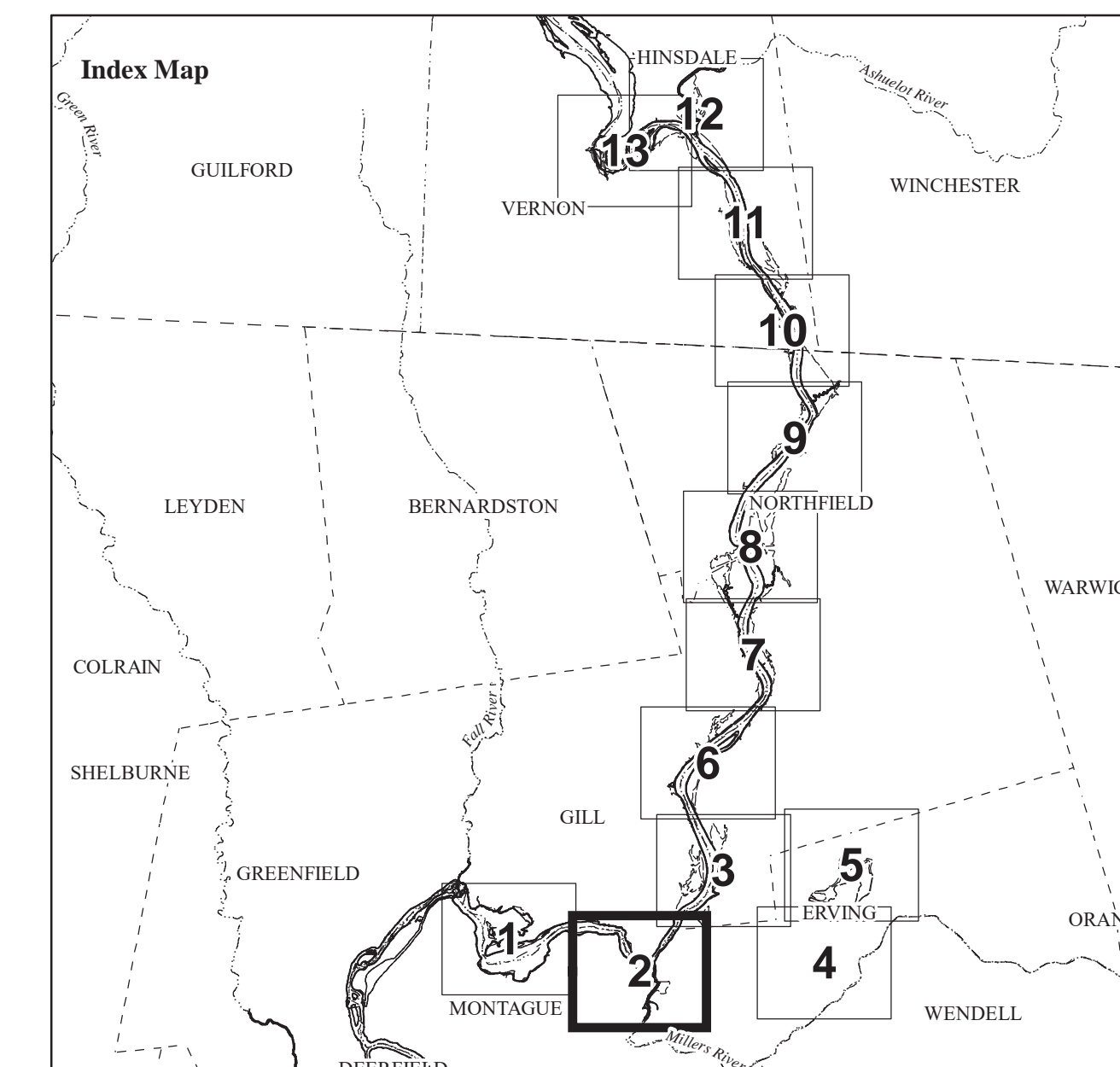
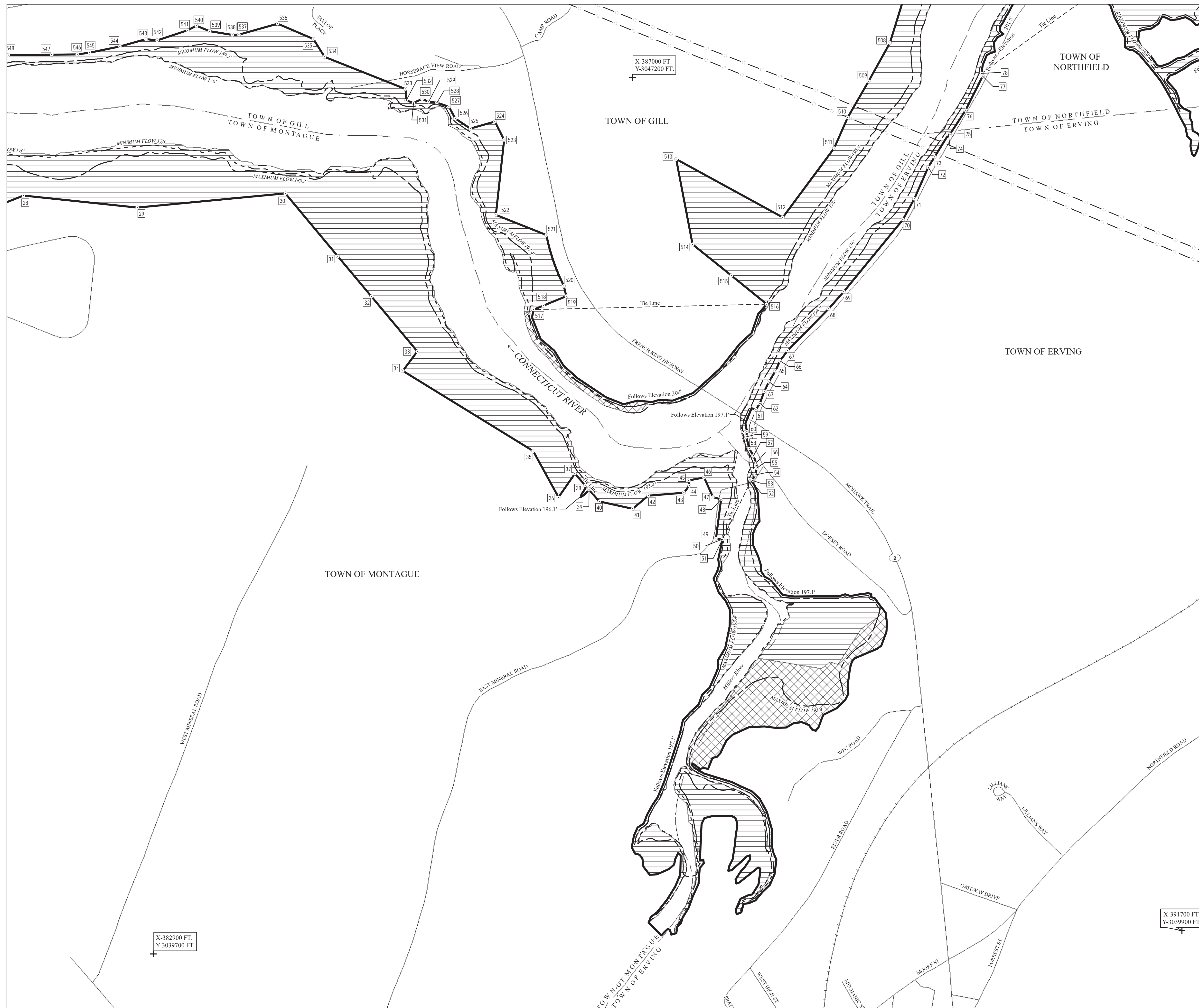


**Northfield Mountain LLC
 NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
 FERC PROJECT NO. 2485**

SHEET 1 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-1 1 inch = 400 feet 1:4,800



Legend

	Project Boundary		Reference Point
	Point No. (see Project Boundary Data table for meters and bounds)		Maximum Water Surface Elevation (in feet)
	Project Recreation Site		Minimum Water Surface Elevation (in feet)
	Project Recreation Site Proposed to be Non-Project Recreation Site		Shoreline
	Town Boundary		Major Creek
	Project Trail		Railroad
	Own in Fee		Transmission Lines
	Flowage Easement		Roads
	License to Occupy		
	Right to be Acquired		

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
Horizontal Datum:
 NAD 1983
Vertical Datum:
 NGVD 1929

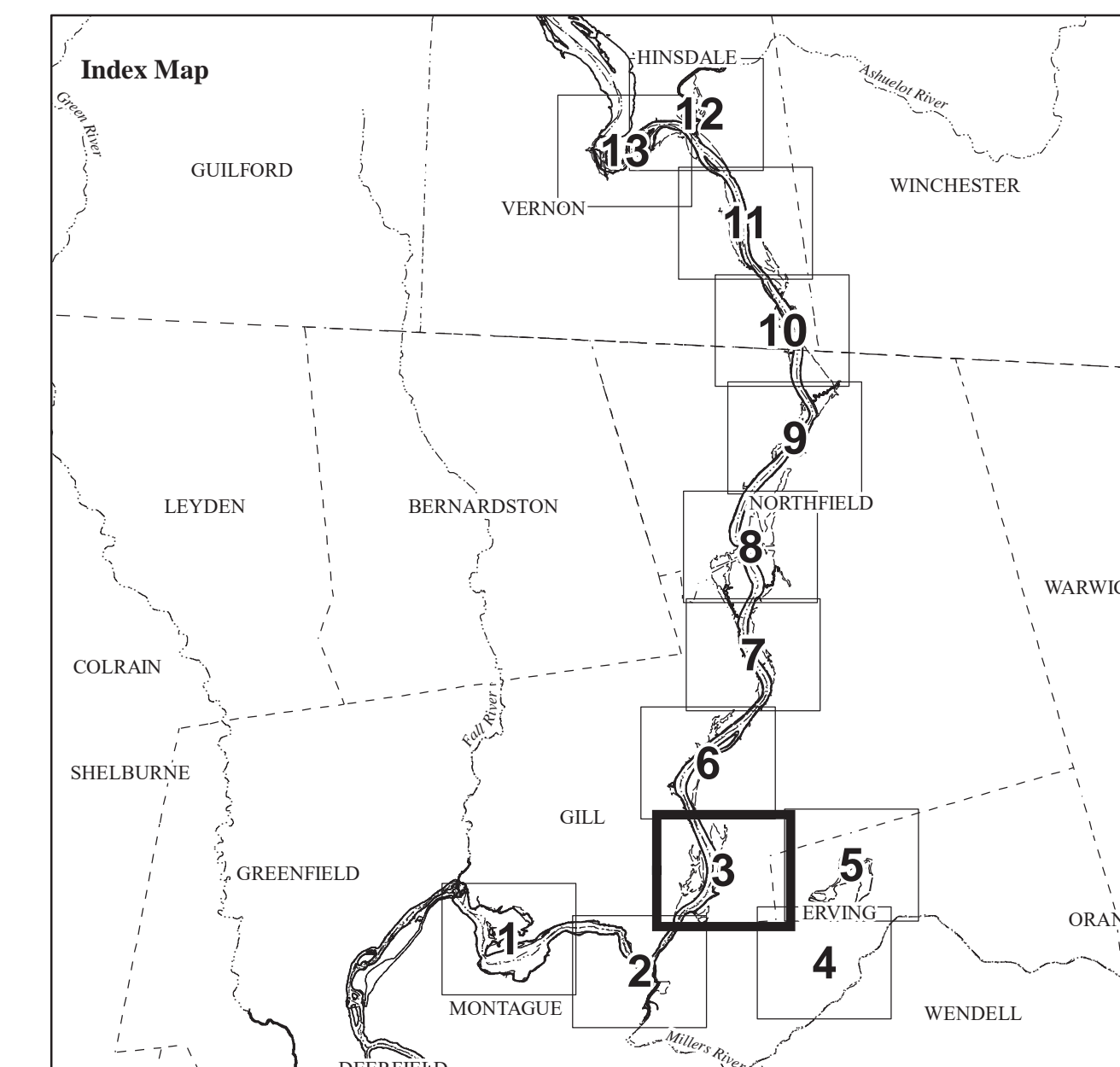
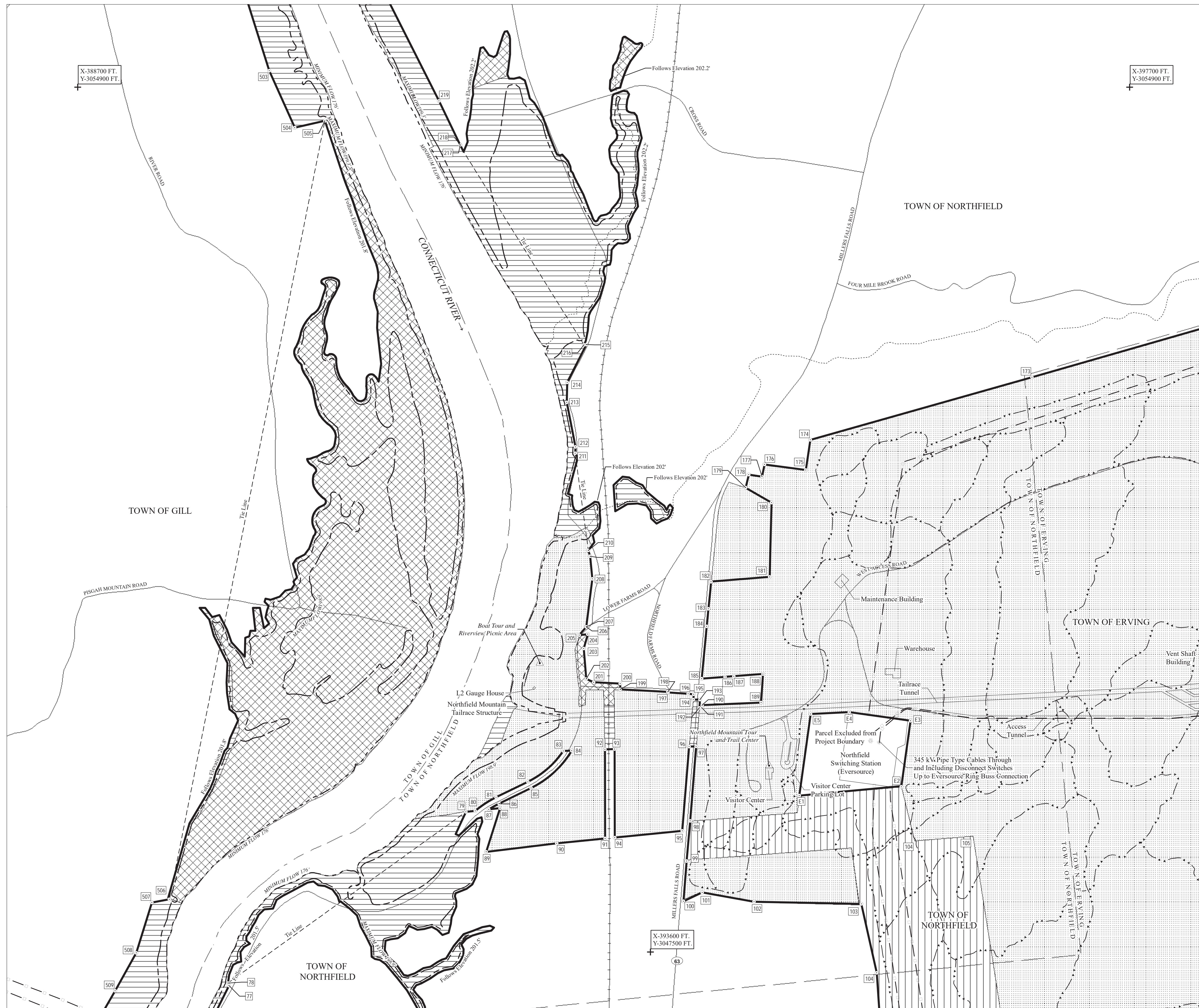
Declination changing by 0" S E/Year

I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT (FERC #2485) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +/-40 FEET. THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND/OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.

Northfield Mountain LLC
 NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
 FERC PROJECT NO. 2485

SHEET 2 of 13

EXHIBIT G-2 1 inch = 400 feet 1:4,800



Legend

	Project Boundary		Reference Point
	Point No. (see Project Boundary Data table for metes and bounds)		Maximum Water Surface Elevation (in feet)
	Project Recreation Site		Minimum Water Surface Elevation (in feet)
	Project Recreation Site Proposed to be Non-Project Recreation Site		Shoreline
	Town Boundary		Major Creek
	Licensee Land Rights		Project Trail
	Own in Fee		Railroad
	Flowage Easement		Transmission Lines
	License to Occupy		Roads
	Right to be Acquired		

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
 Horizontal Datum:
 NAD 1983
 Vertical Datum:
 NGVD 1929

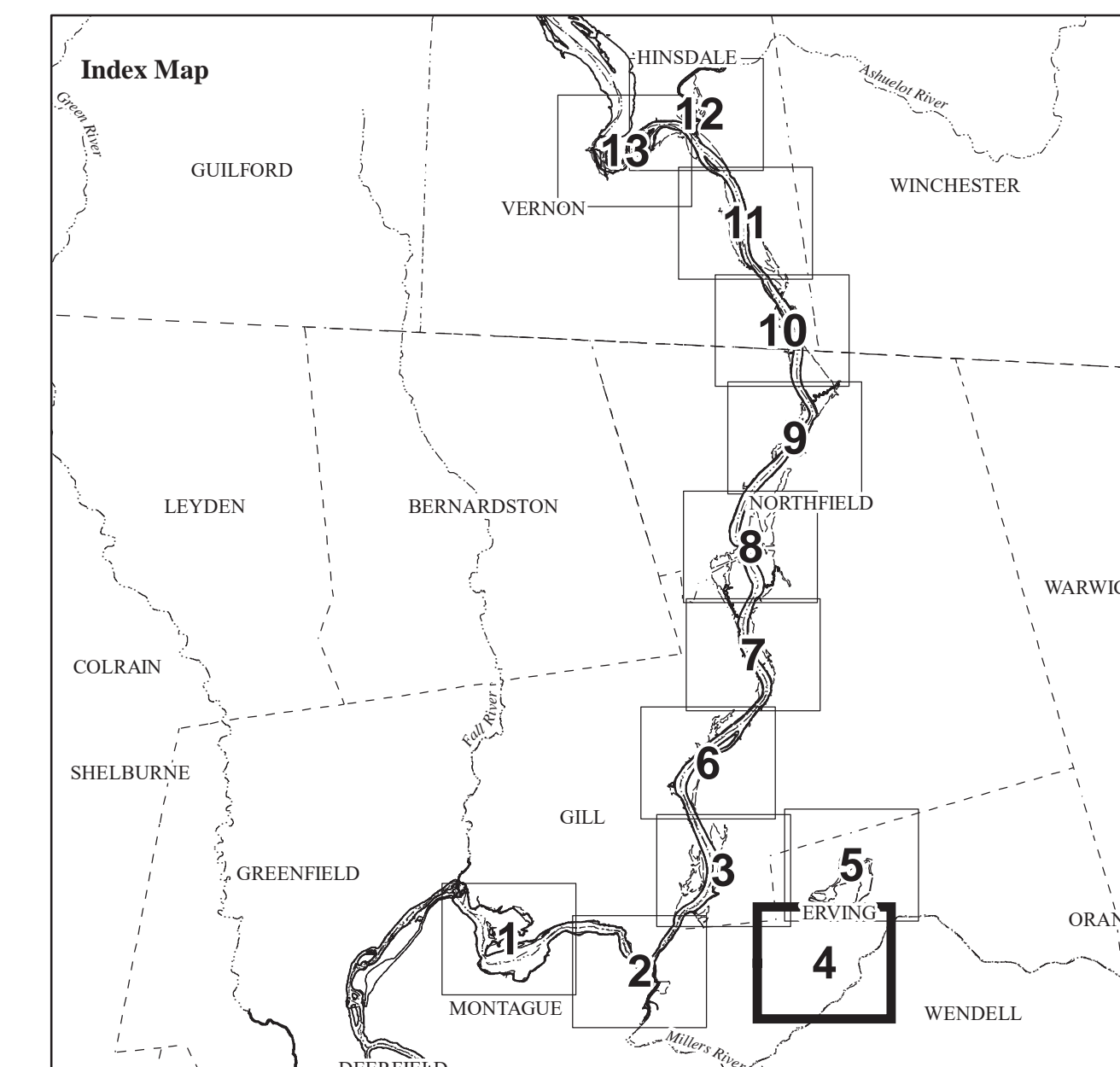
Declination changing by 0" S E/Year

I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT (FERC #2485) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +/-40 FEET. THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND/OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.

Northfield Mountain LLC
 NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
 FERC PROJECT NO. 2485

SHEET 3 of 13

EXHIBIT G-3 1 inch = 400 feet 1:4,800



Legend

	Project Boundary		Reference Point
	Point No. (see Project Boundary Data table for metes and bounds)		Maximum Water Surface Elevation (in feet)
	Project Recreation Site		Minimum Water Surface Elevation (in feet)
	Project Recreation Site Proposed to be Non-Project Recreation Site		Shoreline
	Town Boundary		Major Creek
	Project Trail		Railroad
	Own in Fee		Transmission Lines
	Flowage Easement		Roads
	License to Occupy		
	Right to be Acquired		

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
 Horizontal Datum:
 NAD 1983
 Vertical Datum:
 NGVD 1929

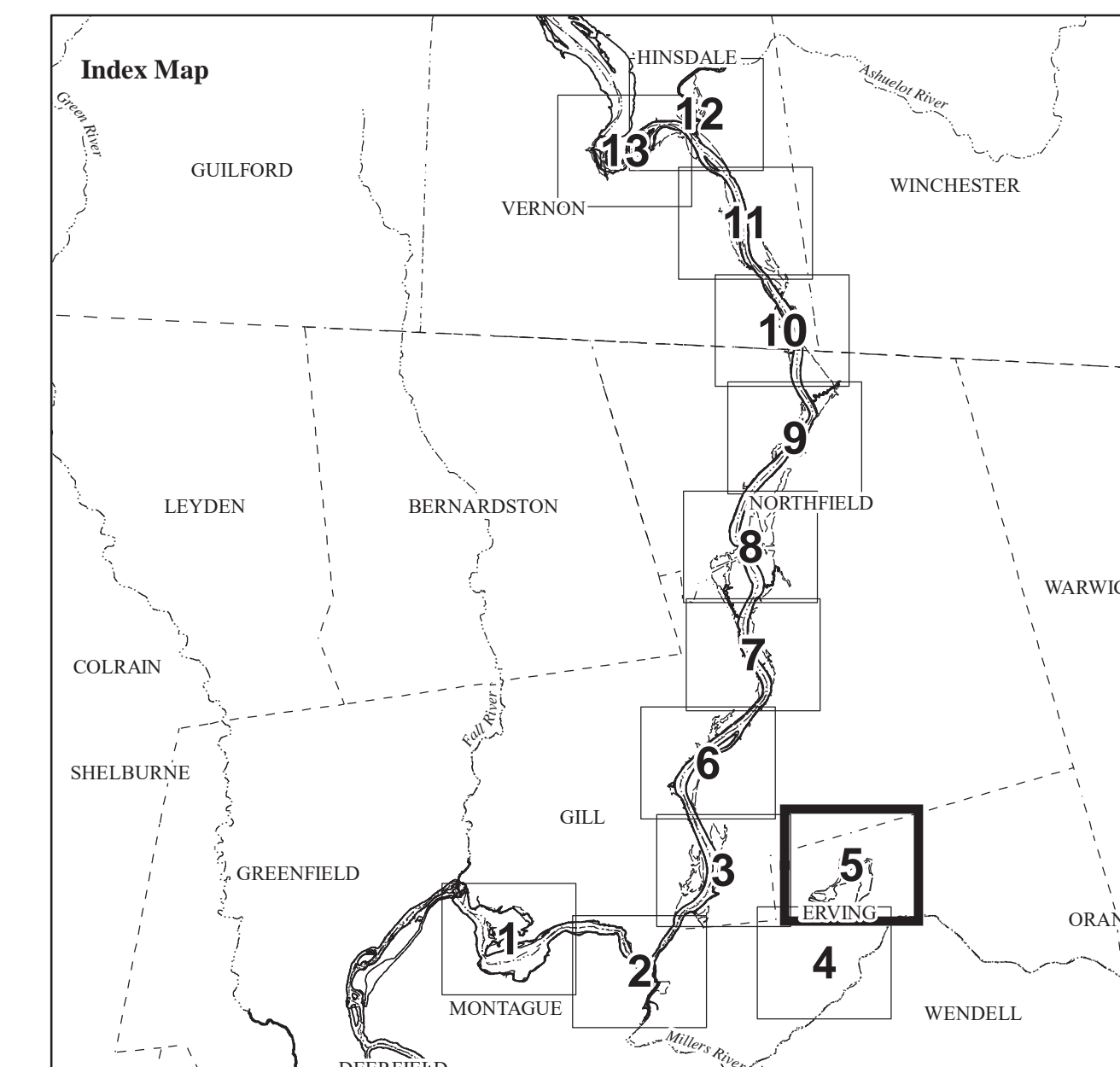
Declination changing by 0° 5' E/Year

I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT (FERC #2485) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +/-40 FEET. THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND/OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.

Northfield Mountain LLC
 NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
 FERC PROJECT NO. 2485

SHEET 4 of 13

EXHIBIT G-4 1 inch = 400 feet 1:4,800



Legend

Project Boundary	Reference Point
Point No. (see Project Boundary Data table for metes and bounds)	Maximum Water Surface Elevation (in feet)
Project Recreation Site	Minimum Water Surface Elevation (in feet)
Project Recreation Site Proposed to be Non-Project Recreation Site	Shoreline
Town Boundary	Major Creek
Licensee Land Rights	Project Trail
Own in Fee	Railroad
Flowage Easement	Transmission Lines
License to Occupy	Roads
Right to be Acquired	

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
 Horizontal Datum:
 NAD 1983
 Vertical Datum:
 NGVD 1929

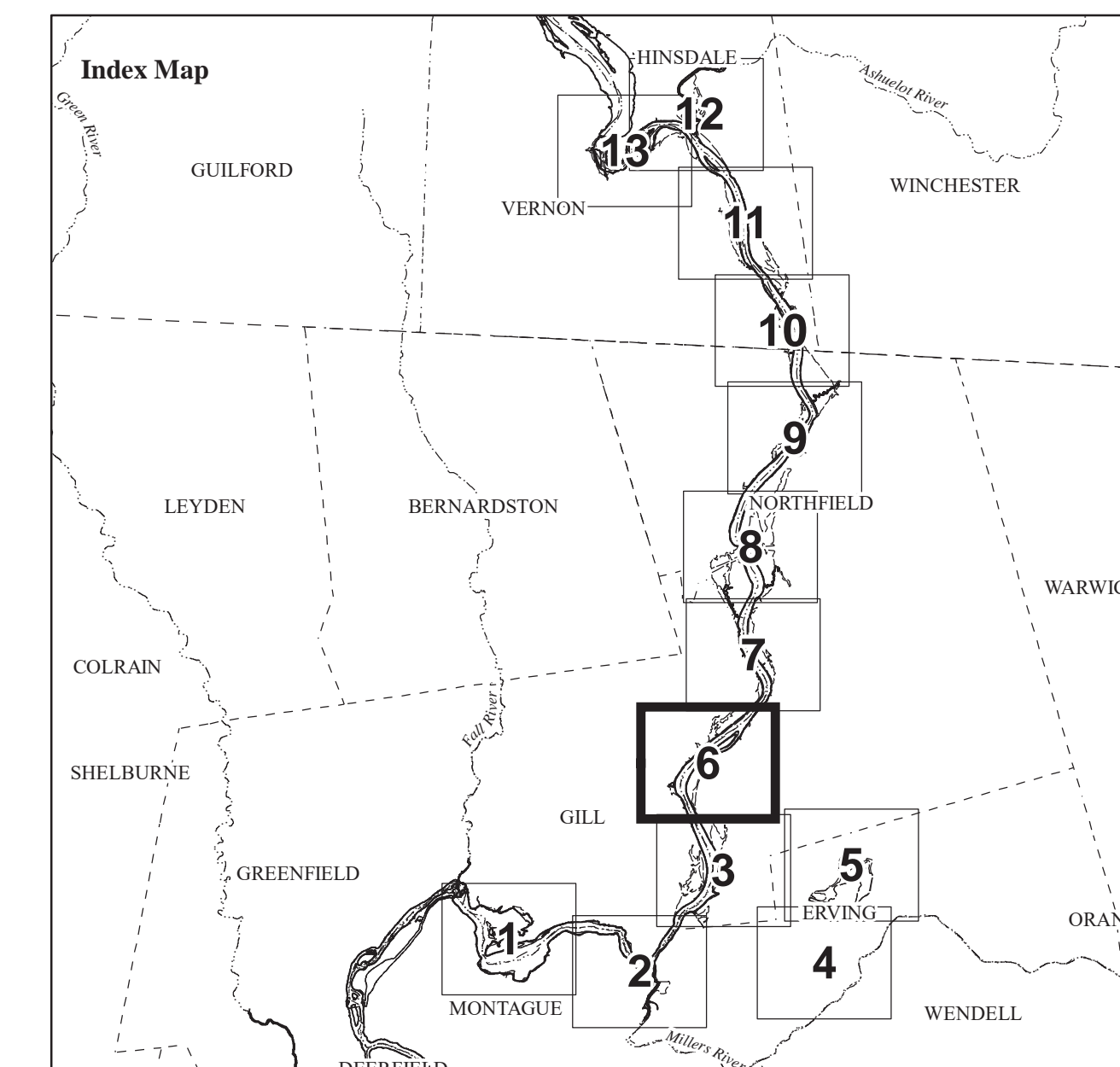
Declination changing by 0° 5' E/Year

I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT (FERC #2485) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +/-40 FEET. THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND/OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.

Northfield Mountain LLC
 NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
 FERC PROJECT NO. 2485

SHEET 5 of 13

EXHIBIT G-5 1 inch = 400 feet 1:4,800



Legend

	Project Boundary		Reference Point
	Point No. (see Project Boundary Data table for metes and bounds)		Maximum Water Surface Elevation (in feet)
	Project Recreation Site		Minimum Water Surface Elevation (in feet)
	Project Recreation Site Proposed to be Non-Project Recreation Site		Shoreline
	Town Boundary		Major Creek
	Project Trail		Railroad
Licensee Land Rights			Transmission Lines
	Own in Fee		Roads
	Flowage Easement		
	License to Occupy		
	Right to be Acquired		

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
 Horizontal Datum:
 NAD 1983
 Vertical Datum:
 NGVD 1929

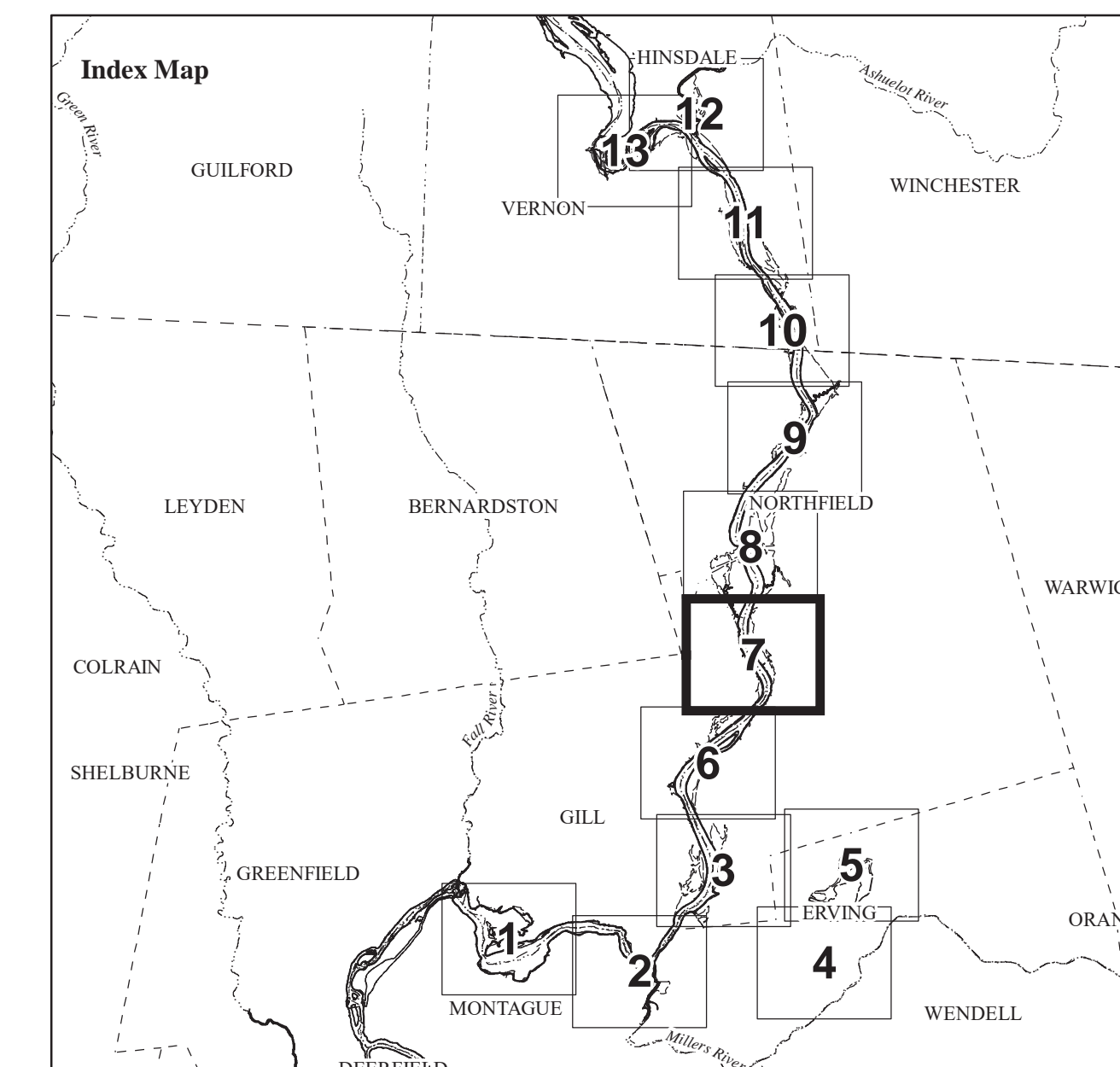
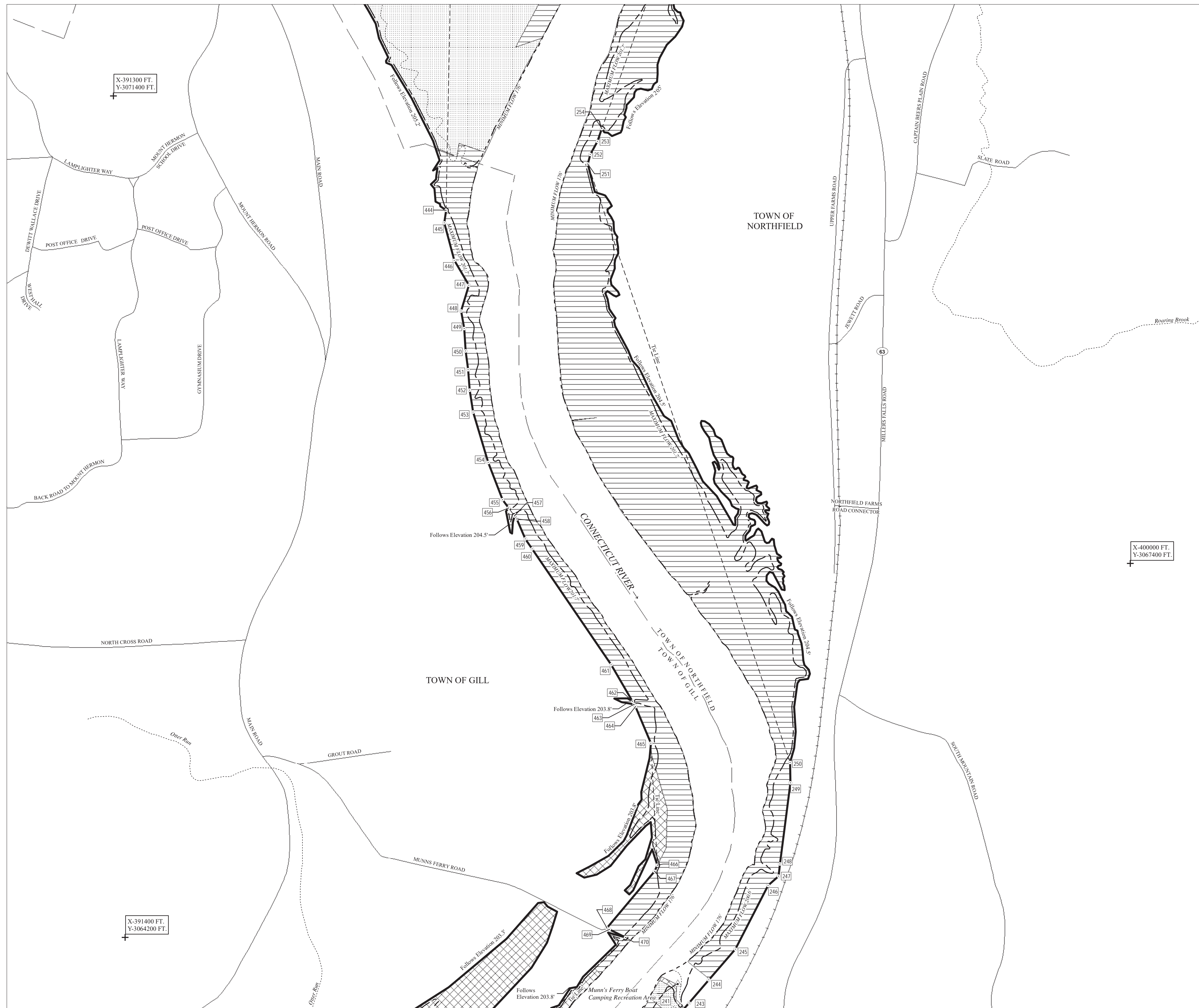
Declination changing by 0° 5' E/Year

I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT (FERC #2485) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +/-40 FEET. THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND/OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.

Northfield Mountain LLC
 NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
 FERC PROJECT NO. 2485

SHEET 6 of 13

EXHIBIT G-6 1 inch = 400 feet 1:4,800



Legend

	Project Boundary		Reference Point
	Point No. (see Project Boundary Data table for metes and bounds)		Maximum Water Surface Elevation (in feet)
	Project Recreation Site		Minimum Water Surface Elevation (in feet)
	Project Recreation Site Proposed to be Non-Project Recreation Site		Shoreline
	Town Boundary		Major Creek
	Licensee Land Rights		Project Trail
	Own in Fee		Railroad
	Flowage Easement		Transmission Lines
	License to Occupy		Roads
	Right to be Acquired		

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
 Horizontal Datum:
 NAD 1983
 Vertical Datum:
 NGVD 1929

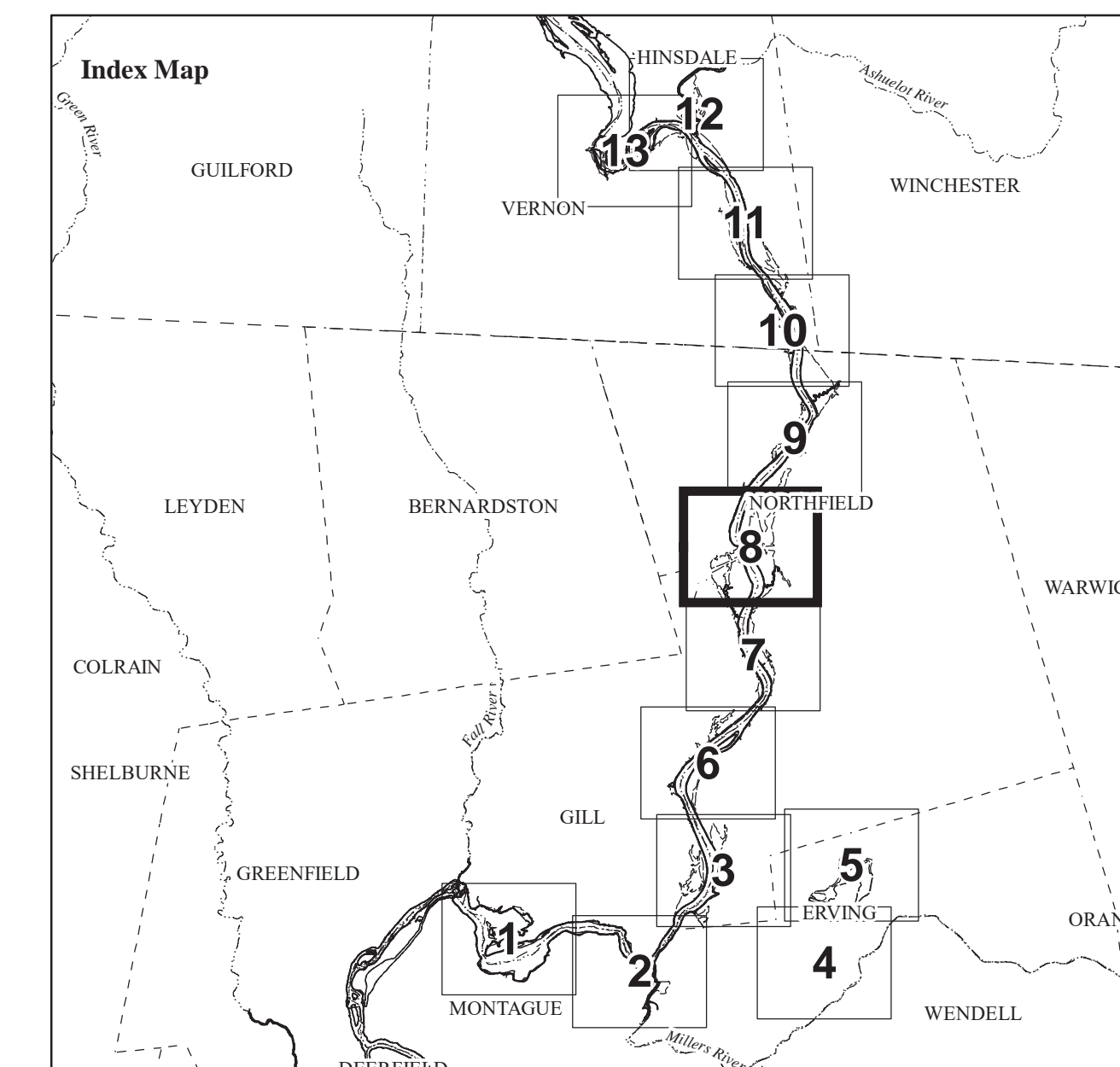
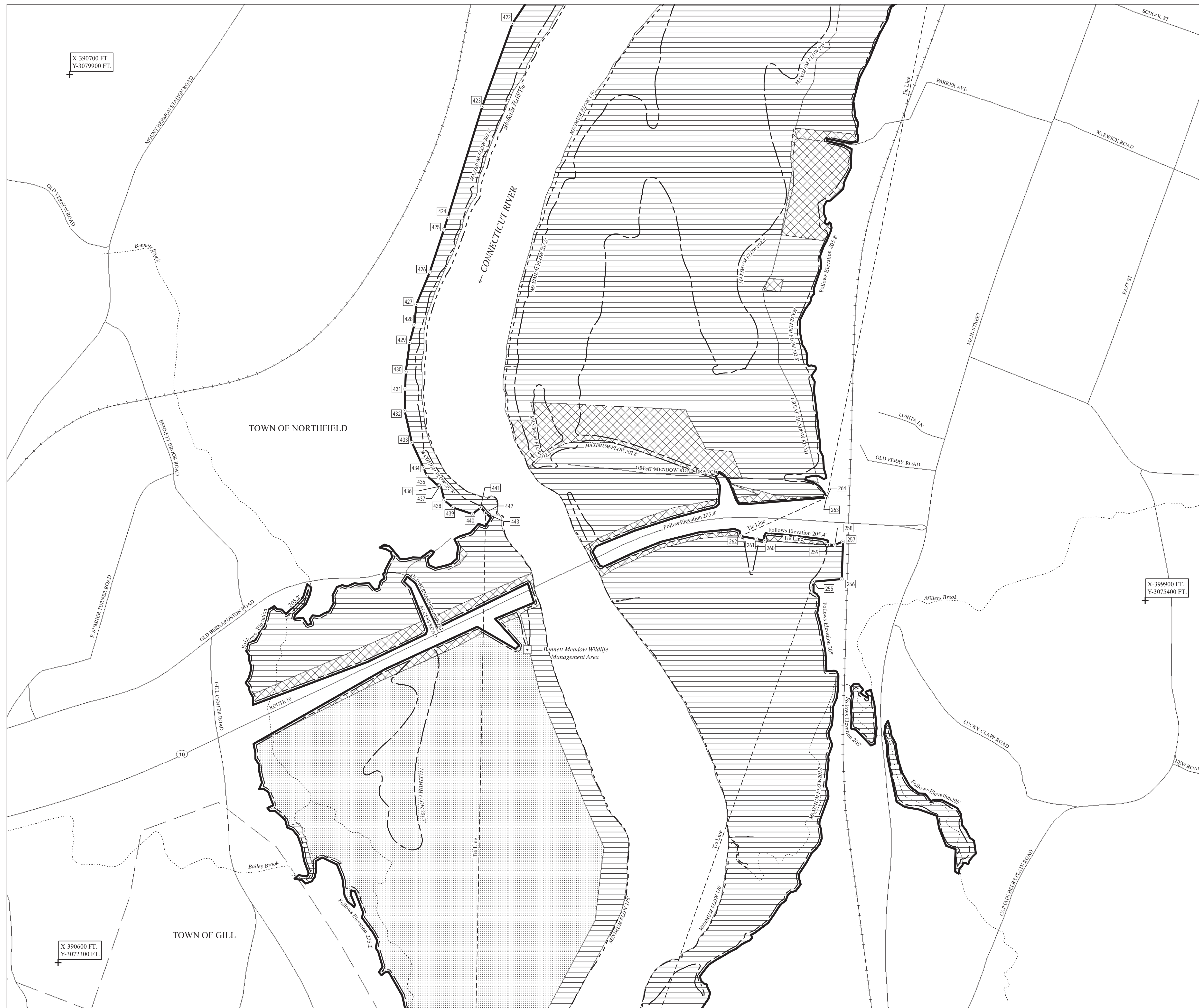
Declination changing by 0" S E/Year

I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT (FERC #2485) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +/-40 FEET. THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND/OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.

Northfield Mountain LLC
 NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
 FERC PROJECT NO. 2485

SHEET 7 of 13

EXHIBIT G-7 1 inch = 400 feet 1:4,800



Legend

	Project Boundary		Reference Point
	Point No. (see Project Boundary Data table for metes and bounds)		Maximum Water Surface Elevation (in feet)
	Project Recreation Site		Minimum Water Surface Elevation (in feet)
	Project Recreation Site Proposed to be Non-Project Recreation Site		Shoreline
	Town Boundary		Major Creek
	Project Trail		Railroad
	Own in Fee		Transmission Lines
	Flowage Easement		Roads
	License to Occupy		
	Right to be Acquired		

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
 Horizontal Datum:
 NAD 1983
 Vertical Datum:
 NGVD 1929

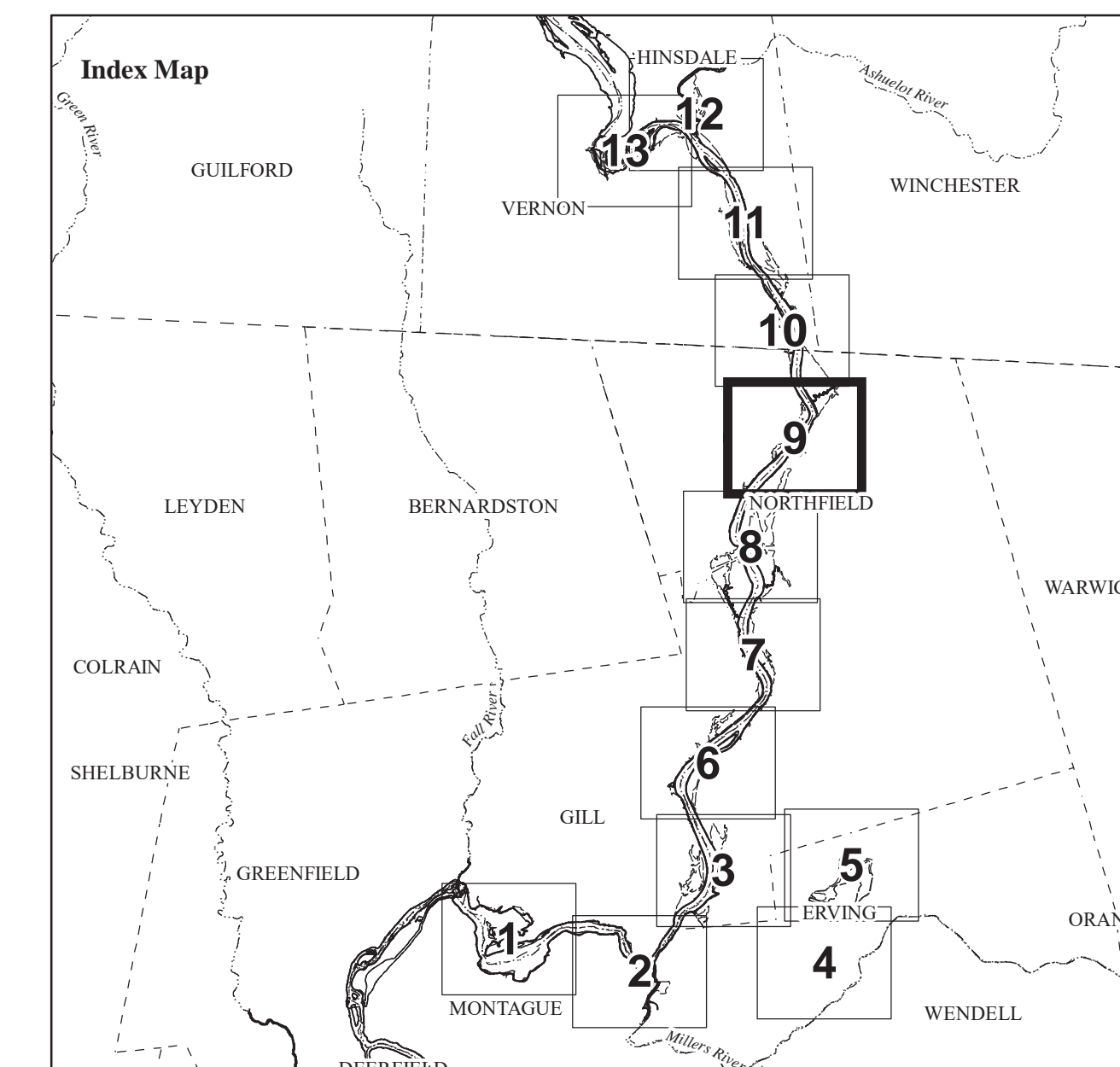
Declination changing by 0" S E/Year

I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT (FERC #2485) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +/-40 FEET. THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND/OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.

Northfield Mountain LLC
 NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
 FERC PROJECT NO. 2485

SHEET 8 of 13

EXHIBIT G-8 1 inch = 400 feet 1:4,800



Legend

	Project Boundary		Reference Point
	Point No. (see Project Boundary Data table for meters and bounds)		Maximum Water Surface Elevation (in feet)
	Project Recreation Site		Minimum Water Surface Elevation (in feet)
	Project Recreation Site Proposed to be Non-Project Recreation Site		Shoreline
	Town Boundary		Major Creek
	Project Trail		Railroad
	Own in Fee		Transmission Lines
	Flowage Easement		Roads
	License to Occupy		
	Right to be Acquired		

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
Horizontal Datum:
 NAD 1983
Vertical Datum:
 NGVD 1929

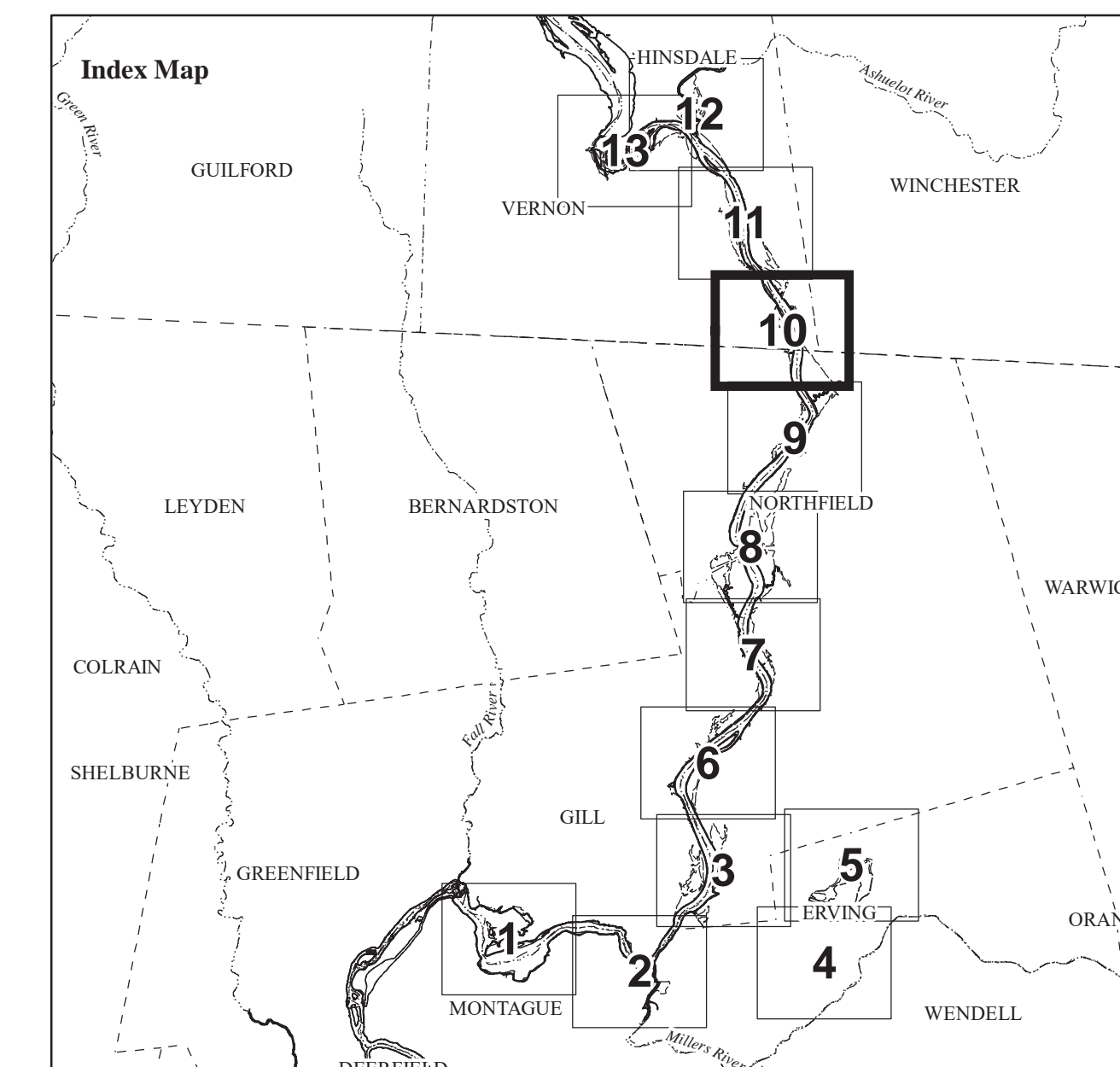
Declination changing by 0° 5' E/Year

I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT (FERC #2485) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +/-40 FEET. THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND/OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.

**Northfield Mountain LLC
 NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
 FERC PROJECT NO. 2485**

SHEET 9 of 13

EXHIBIT G-9 1 inch = 400 feet 1:4,800



Legend

	Project Boundary		Reference Point
	Point No. (see Project Boundary Data table for meters and bounds)		Maximum Water Surface Elevation (in feet)
	Project Recreation Site		Minimum Water Surface Elevation (in feet)
	Project Recreation Site Proposed to be Non-Project Recreation Site		Shoreline
	Town Boundary		Major Creek
	Project Trail		Railroad
	Own in Fee		Transmission Lines
	Flowage Easement		Roads
	License to Occupy		
	Right to be Acquired		

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
Horizontal Datum:
 NAD 1983
Vertical Datum:
 NGVD 1929

Licensee Land Rights

North Arrow: Declination changing by 0° 5' E/Year

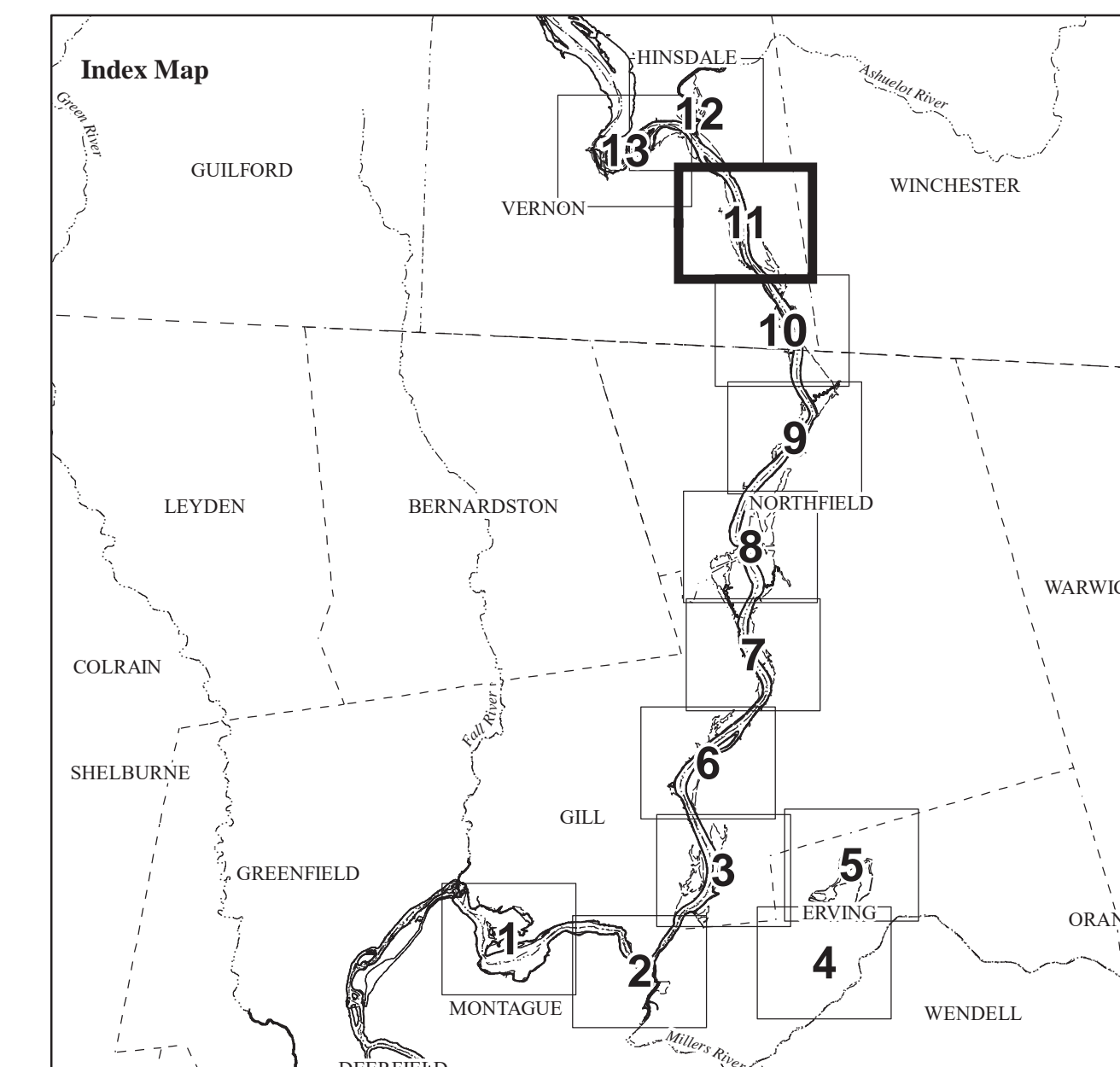
I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT (FERC #2485) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +/-40 FEET. THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND/OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.

Northfield Mountain LLC
 NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
 FERC PROJECT NO. 2485

SHEET 10 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-10 1 inch = 400 feet 1:4,800



Legend

	Project Boundary		Reference Point
	Point No. (see Project Boundary Data table for metes and bounds)		Maximum Water Surface Elevation (in feet)
	Project Recreation Site		Minimum Water Surface Elevation (in feet)
	Project Recreation Site Proposed to be Non-Project Recreation Site		Shoreline
	Town Boundary		Major Creek
	Project Trail		Railroad
	Own in Fee		Transmission Lines
	Flowage Easement		Roads
	License to Occupy		
	Right to be Acquired		

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
 Horizontal Datum:
 NAD 1983
 Vertical Datum:
 NGVD 1929

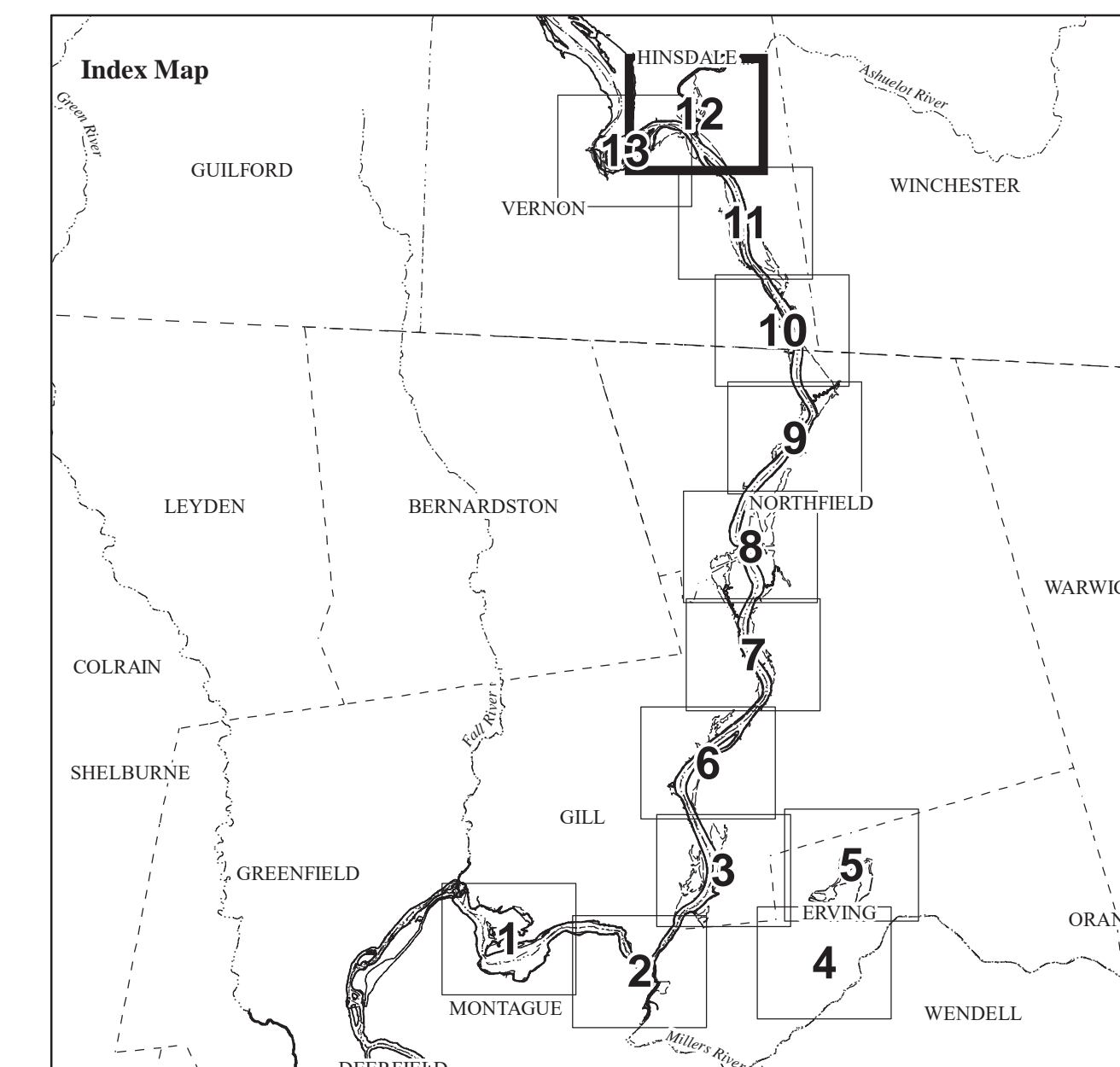
Declination changing by 0" S E/Year

I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT (FERC #2485) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +/-40 FEET. THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND/OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.

Northfield Mountain LLC
 NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
 FERC PROJECT NO. 2485

SHEET 11 of 13

EXHIBIT G-11 1 inch = 400 feet 1:4,800



Legend

	Project Boundary		Reference Point
	Point No. (see Project Boundary Data table for meters and bounds)		Maximum Water Surface Elevation (in feet)
	Project Recreation Site		Minimum Water Surface Elevation (in feet)
	Project Recreation Site Proposed to be Non-Project Recreation Site		Shoreline
	Town Boundary		Major Creek
	Project Trail		Railroad
	Own in Fee		Transmission Lines
	Flowage Easement		Roads
	License to Occupy		
	Right to be Acquired		

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
 Horizontal Datum:
 NAD 1983
 Vertical Datum:
 NGVD 1929

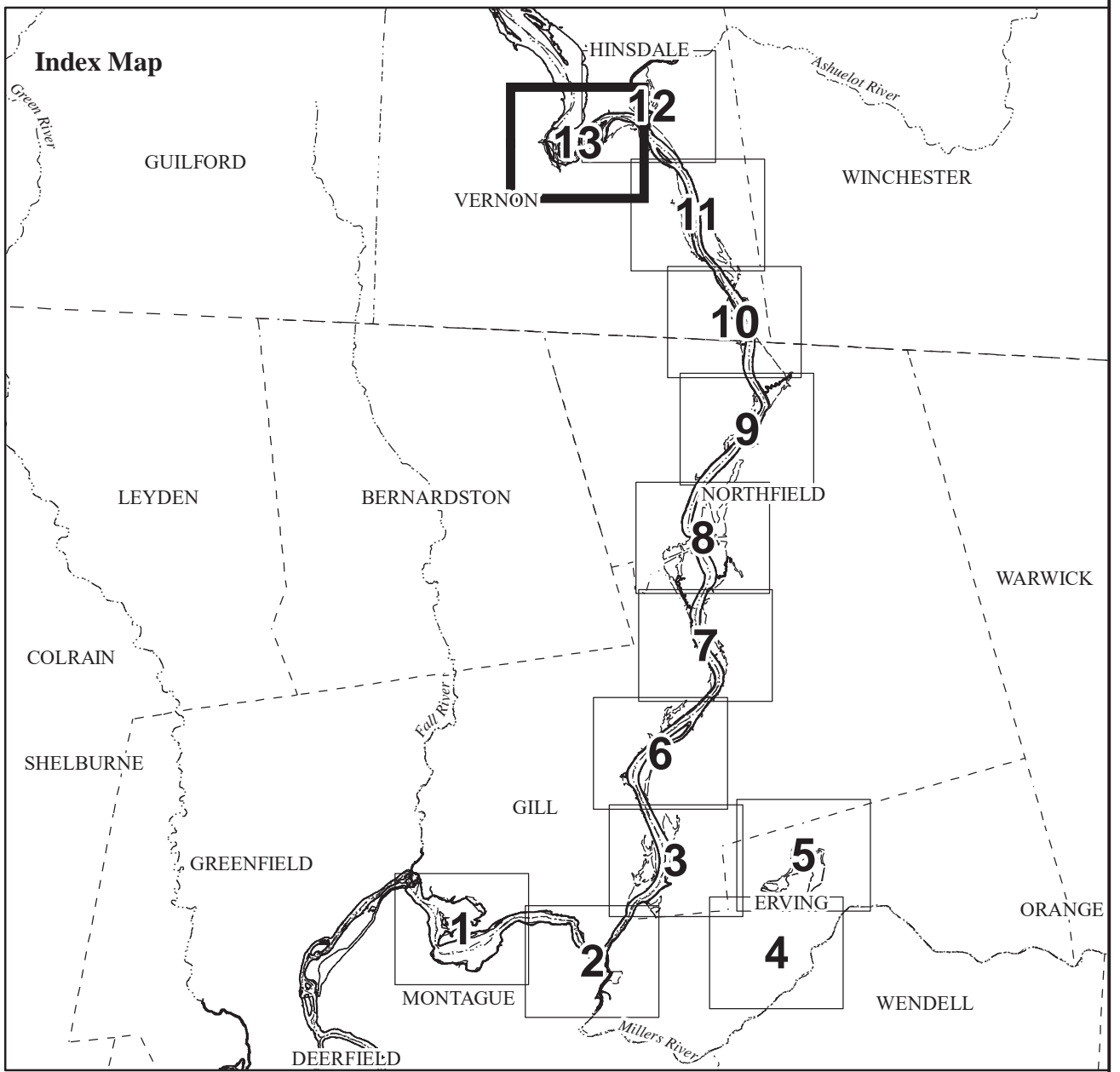
Declination changing by 0" S E/Year

I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT (FERC #2485) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +/-40 FEET. THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND/OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.

Northfield Mountain LLC
 NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
 FERC PROJECT NO. 2485

SHEET 12 of 13

EXHIBIT G-12 1 inch = 400 feet 1:4,800



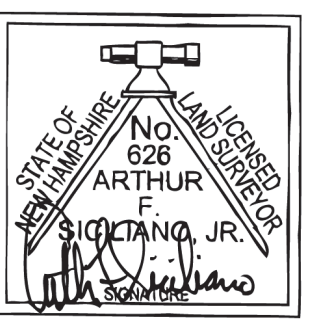
Legend

	Project Boundary		Reference Point
	Point No. (see Project Boundary Data table for metes and bounds)		Maximum Water Surface Elevation (in feet)
	Project Recreation Site		Minimum Water Surface Elevation (in feet)
	Project Recreation Site Proposed to be Non-Project Recreation Site		Shoreline
	Town Boundary		Major Creek
	Project Trail		Railroad
	Own in Fee		Transmission Lines
	Flowage Easement		Roads
	License to Occupy		
	Right to be Acquired		

Coordinate System:
 NAD83 State Plane
 Massachusetts Mainland Zone (feet)
 Horizontal Datum:
 NAD 1983
 Vertical Datum:
 NGVD 1929

Declination changing by 0" S E/Year

I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT (FERC #2485) AS SHOWN ON THIS EXHIBIT "G" DRAWING IS DEVELOPED WITHIN REASONABLE ACCURACIES AS REQUIRED IN 18CFR4.41 TO THE GEOGRAPHIC LOCATION BASED ON A GRAPHICAL POSITIONING IN REFERENCE TO USGS QUADRANGLE MAPPING WITHIN +/-40 FEET. THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT DOCUMENTED PROJECT BOUNDARY LINE WAS ADJUSTED AND/OR ROTATED TO BEST FIT WITH THE USGS QUADRANGLE MAP FEATURES GRAPHICALLY AND WAS NOT FIELD SURVEYED.



Northfield Mountain LLC
 NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
 FERC PROJECT NO. 2485

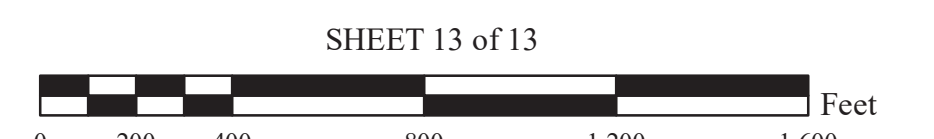


EXHIBIT G-13 1 inch = 400 feet 1:4,800

SHEET 13 of 13

APPENDIX E: SNS HANDLING PLAN

SHORTNOSE STURGEON HANDLING PLAN FOR THE TURNERS FALLS HYDROELECTRIC PROJECT (FERC NO. 1889)

1. INTRODUCTION

The Turners Falls Hydroelectric Project is located in Montague, MA. In its Amended Final License Application (AFLA), FirstLight has proposed to install, maintain, and operate a fish lift at the Turners Falls Dam spillway. The current facilities include a fish ladder at the dam spillway, and another further downstream at Cabot Station. The proposed fish lift, designed primarily to pass American Shad (*Alosa sapidissima*), could also attract Shortnose Sturgeon (*Acipenser brevirostrum*, SNS) where they would then become captured by the lift. SNS are listed as endangered under the federal Endangered Species Act (ESA). No SNS have been captured in the Turners Falls fish passage facilities to date, no sturgeon have been documented spawning upstream of Rock Dam, and only one SNS has ever been observed in the Turners Falls Dam spillway area (Kieffer and Kynard, 2012; Kynard et al. 2012). However, SNS may more readily enter a fish lift than the current fish passage facilities and applicable protocols need to be in place to ensure proper handling of these endangered fish if they are found in the lift.

This plan provides procedures for the handling and documentation of any SNS that may be incidentally collected by the Spillway Fishway at Turners Falls Dam during routine fishway operations and maintenance. Agency Contact information and reporting forms follow these procedures. This handling plan has been adapted for the Turners Falls Project from handling plans for other hydroelectric facilities with mechanical fish passage structures that incidentally capture SNS (HG&E 2010, NextEra 2012; Exelon 2018).

2. TRAINING

All personnel potentially handling sturgeon as outlined in this plan will be trained in proper handling by NMFS staff or a NMFS designated representative, such as a current Section 10 permit holder. Contact NMFS (see contact list below) for approved trainers.

3. MONITORING

During fish lift operations, monitoring of fish passed through the lift will be identified and counted at a viewing window. If SNS are observed at this viewing window, the exit to the Turners Falls Impoundment will be closed until any SNS are captured and processed. During potential maintenance activities that require dewatering of the lift components, any areas being dewatered will be monitored for SNS that could be residing in the lift. If any are observed during the dewatering process, SNS will be captured and processed in accordance with this plan.

4. STURGEON PROCESSING AND DATA COLLECTION

Any SNS collected in the Turners Falls Spillway Fish Lift will be safely secured in an appropriate container, such as a transport bag, holding tank, or fish sampling table, such that the fish remains completely submerged except when necessarily removed from the water briefly for measurements or tagging procedures. The fish should be shielded from direct sunlight and prevented from leaping out of holding containment. Dissolved oxygen concentrations of at least 5 mg/l must be maintained. Circulating flow, water exchanges, mechanical aeration, or bubbling oxygen gas may be used.

The following Handling and Data Collection Procedures shall be implemented:

1. Wear rubber or plastic gloves to prevent abrasion and mucus removal.
2. Record date, time and physical conditions on a reporting sheet (see attached).
3. Record location where fish was collected on reporting sheet.
4. Record the weight, length, and condition of the fish on the reporting sheet.
5. Standardized length measurements will be taken from the tip of the snout to the fork in the tail (fork length) and from the tip of the snout to the end of the long (dorsal) caudal lobe.
6. Scan entire body for existing PIT tags using a handheld scanner and visually for any external tags. Note identifiers for any tags detected on the reporting sheet.
7. If no PIT tag is detected, a new tag (FDXb, 134.2 kHz) will be inserted immediately anterior to the dorsal fin, and posterior to the dorsal scutes on the left side (Figure 1), following the methods of Kahn and Mohead (2010). Insertion instruments and tags should be cleaned, sterilized by immersion in alcohol, and allowed to air dry prior to tag insertion. The new tag should be scanned, and its unique identifier recorded prior to insertion, and scanned again immediately after insertion (prior to release) to verify function and identifier recording.
 - a. Sturgeon < 300 mm fork length will not be tagged. If necessary, to prevent harm or mortality to small juvenile sturgeon (300 – 500 mm), a PIT tag may be inserted in the widest dorsal position just to the left of the dorsal scute.
8. Photographs of the sturgeon including a) dorsal view, b) ventral view, c) left side, and d) right side, plus any additional photos to document any injuries. A card with the date, time, location, any identifying numbers (sample number, PIT number), and Section 7 permit number should also be visible in any photographs taken.
9. Obtain a genetic sample.
 - a. Wash hands and use disposable gloves.
 - b. Take a one-cm square clip from the pelvic fin. Ensure that any knife, scalpel or scissors used for sampling has been thoroughly cleaned and wiped with alcohol to minimize the risk of contamination.
 - c. Place clip into an individual vial of 95% non-denatured ethanol and, using permanent marker, label with the species, date, name of project, fork length and total length, and an identifier linking the sample to the appropriate observer report.
 - d. Seal vial with a lid and secure lid with tape. Cover any markings with cellophane tape to minimize the chance of smearing or erasure.
 - e. If possible, place the vial on ice for the first 24 hours. If ice is not available, please refrigerate the vial. Send to the NMFS-approved lab for processing. Contact NMFS (see Contact List) for lab, chain-of-custody and shipping requirements.
 - f. At least two fish lift operating staff will be trained in these procedures. These staff will be on-site during the normal fish passage operating season from mid-March to early-June, and on-call for the remainder of the year.
10. Sturgeon will be returned to the river in the Turners Falls Spillway area immediately after processing.

11. If any live or dead sturgeon are found, the licensee will report to NMFS within 24 hours or on the next business day (see contact information below). Any dead specimens or body parts will be photographed, measured and retained by FirstLight until NMFS has contacted the co-investigators on NOAA's Sturgeon Salvage Permit to determine the need for sturgeon parts for scientific or educational use.

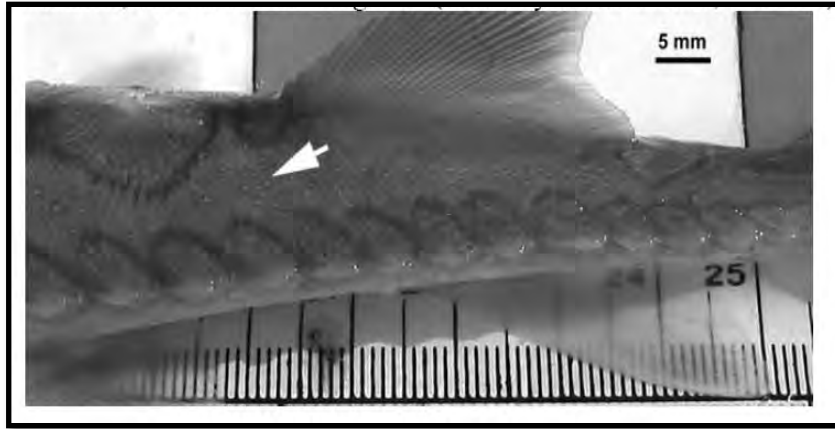


Figure 1: Standardized location for PIT tagging sturgeon (Photo credit, James Henne, USFWS, Figure 2 in Kahn and Mohead, 2010)

5. REPORTING

1. Any documentation of SNS occurrence in the Turners Falls Dam Spillway Fishway, shall be reported to NMFS (see contact information below) within 24 hours or on the next business day.
2. Any handling of collected sturgeon shall be reported to NMFS within 24 hours or on the next business day via submission of the reporting form.
3. Any severely injured (e.g., with apparently life-threatening injury) sturgeon shall be reported to NMFS immediately.
4. A report detailing and compiling any sturgeon handling shall be submitted to NMFS annually.

Contact Information

Julie Crocker
Protected Resource Division
NOAA Fisheries
55 Great Republic Drive
Gloucester, MA 01930
978-281-9300
julie.crocker@noaa.gov

Jesse Leddick
Chief of Regulatory Review
Massachusetts Division of Fisheries & Wildlife
1 Rabbit Hill Road, Westborough, MA 01581
Jesse.Leddick@mass.gov

Any observations of SNS will be made to: incidental.take@noaa.gov

FirstLight Contact

Steve Leach
Fisheries Biologist
FirstLight Power
15 Cabot Street
Montague, MA 01376
413-422-5950
sleach@firstlightpower.com

Shortnose Sturgeon Reporting Sheet for the Turners Falls Project Spillway Fish Lift

Date: _____

Time: _____

Sample No.: _____

Physical Conditions

Spill Gates Open (circle one): YES NO

If yes, circle gate: BG1 BG2 BG3 BG4 TG1 TG2

Estimated Spill Flow: _____ cfs

Gauged River Flow (USGS Gage 01170500): _____ cfs

Water Temperature, Surface: _____ °C Bottom: _____ °C

Indexed fish lift fullness: (circle one): **0 1 2 3 4 5**

Location where fish was recovered:

Biological Data Total Length: _____ mm Fork Length: _____ mm Weight: _____ kg

General Condition (circle one): Excellent Good Fair Poor Mortality

Does the sturgeon have visible injuries/abrasions? (circle one): YES NO

If Yes, denote and code on sturgeon diagram on back of sheet.

Photo Checklist Dorsal: Ventral: Left: Right: Injuries:

(include card or sample envelope with Sample No., Date, and Time in photos)

Tagging Data

Existing Tag Detected? (circle one): YES NO

If Yes, what type? (circle applicable and note tag number): CARLIN PIT RADIO OTHER:

If No, was fish tagged? (circle one): YES NO Type: _____ ID:

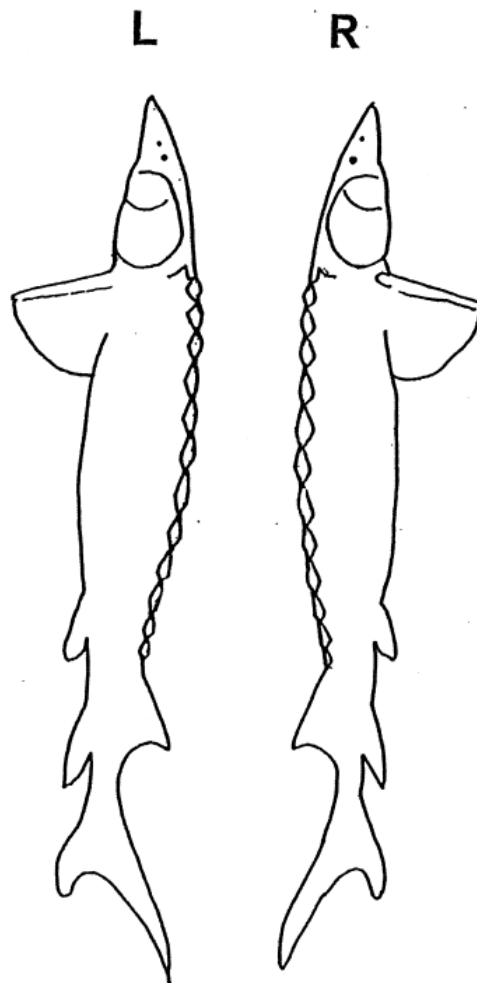
Comments/Disposition of Fish:

print name:	Observer Signature:
-------------	------------------------

ABRASION CODES

Code	Description
0	none
Abrasion	1 Light abrasions or worn scutes, whitened but not red.
	2 Moderate abrasions of skin or scutes, erosion of skin over bony structure, reddening.
	3 Excessive wear of skin, scutes, or other bony structure, bony structure exposed, excessive reddening or minor bleeding, patches of skin missing
Tears	4 minor fin tears
	5 major fin tears, bleeding or missing large portions of fin
	6 skin tears, bleeding, loose skin flaps
Puncture	7 minor puncture wounds
	8 major punctures into body cavity or skull
Other	9 spinal damage, severe lacerations

Sample No.: _____



Coding Instructions for STURGEON REPORTING SHEET

1. **Date:** enter today's date in the format mm/dd/yyyy.
2. **Time:** enter time that fish was collected (if known lift time, note that in comments).
3. **Spill Gates Open:** if any spill gates open circle yes and enter estimated total spill flow.
4. **Gauged River Flow:** enter discharge from the Montague USGS gage:
https://waterdata.usgs.gov/ma/nwis/uv?site_no=01170500
5. **Water Temperature:** enter water temperature in °C.
6. **Fishway Operating (circle):** circle as appropriate (yes or no)
7. **Indexed fish lift fullness:** For the fish lift, if operating, circle fullness according to the following criteria:

Fullness Index	Criteria	Count Estimate Range Guideline ^{1,32}		
		Low	Mid	High
0	No fish observed	0	0	0
1	Fish present, no accumulation at exit gate as hopper emptied	10	50	100
2	Fish accumulated at exit gate, but covered not more than approximately half of the hopper floor as hopper emptied.	100	150	200
3	Hopper appeared to contain a substantial number of fish but much of the hopper floor was visible before hopper emptied; once most water was gone fish covered most of the hopper floor.	200	250	400
4	Hopper more crowded but some floor was visible before hopper emptied; once most water was gone, multiple layers of fish covered most of the hopper floor.	300	400	600
5	Hopper crowded, nearly all of the hopper floor obscured by fish before hopper emptied; multiple layers of fish covered the hopper floor; emptying process lasts longer.	400	600	1000

8. **Location where fish was recovered:** write in location.
9. **Total Length:** measure from tip of snout to tip of longest lobe of caudal fin.
10. **Fork Length:** measure from tip of snout to shortest point between lobes of caudal fin.
11. **Weight:** Be sure to subtract the weight of wet weighing bag, etc. from total weight to record fish weight.
12. **General Condition:** Circle one according to description:
 - a. **Excellent:** fish does not appear stressed, behavior appears normal, no injuries beyond minor abrasions (non-reddened or bleeding) consistent with lift, trap, and handling or healed wounds.
 - b. **Good:** fish does not appear stressed, behavior appears normal; injuries may include non-deleterious abrasions, scute wear and fin tear.
 - c. **Fair:** fish may show signs of stress (purpling of snout, belly), but behavior appears normal and maintains equilibrium in water; fish may have multiple non-life threatening injuries including abrasion, scute wear, fin tear, and minor punctures.
 - d. **Poor:** fish shows signs of stress, behavior is unusually excited or unusually lethargic (handling does not elicit response); fish has difficulty maintaining equilibrium; abrasions and / or injuries are extensive with significant eroded or torn tissue that is raw or bleeding. [if

³² Numeric estimates are guidelines only. Qualitative descriptions are the approved indexing criteria.

condition does not improve in circulating water tank, hold and report immediately per life-threatening injury protocol]; major injuries (even if fish otherwise appears to behave normally, such as major puncture to body cavity or skull, damaged spine, or severe lacerations [hold fish and report immediately per life-threatening injury protocol]).

- e. **Mortality:** retain and report per protocol.
13. **Visible injuries/abrasions?:** circle yes or no; if yes, circle locations on diagram and code severity:
14. **Photo Checklist:** check-list to indicate that required photographs have been taken. If not, note why in comments. [note: multiple injuries can be captured in one photograph where applicable – not necessary to take one photograph for each area indicated in diagram if they can be captured in the same frame]. Include scale envelope or label with Sample #, Date, and Time in each photo].
15. **Existing Tag Detected:** scan visually, with Biomark Pocket Reader, Avid Power Tracker II, and metal detector. If any tag(s) detected circle yes, if not, circle no; if yes, circle appropriate and record number and any other pertinent descriptions; if no:
16. **Was fish tagged?:** if no existing tag, was a new PIT inserted? Circle yes or no; if yes, record the number; if no, record reason.
17. **Comments/Disposition:** record any specific comments, release point and time and note fish behavior upon release; if fish was held and reported note that, reason, and who was contacted.
18. **Observer:** print and sign.

6. REFERENCES

- Exelon. 2018. Conowingo Hydroelectric Project – Draft Biological Assessment. Prepared by Normandeau Associates, Inc. and Gomez and Sullivan Engineers, March, 2018.
- HG&E (City of Holyoke Gas and Electric Dept.). 2010. 2010 Shortnose Sturgeon Incidental Take Monitoring Report for the Holyoke Project (FERC No. P-2004). Annual report submitted to FERC, December 2010.
- Kahn, J., and M. Mohead. 2010. A Protocol for Use of Shortnose, Atlantic, Gulf, and Green Sturgeons. U.S. Dep. Commerce, NOAA Tech. Memo. NMFS-OPR-45, 62 p.
- Kieffer, M. and B. Kynard. 2012. Spawning and Non-Spawning Migrations, Spawning, and the Effect of River Regulation on Spawning Success of Connecticut River Shortnose Sturgeon. Life History and Behaviour of Connecticut River Shortnose and Other Sturgeons. Kynard, B., Bronzi, P, and Rosenthal H. (eds). World Sturgeon Conservation Society: Special Publication No. 4 (2012).
- Kynard, B., Kieffer, M., Horgan, M., Kynard, B.E., Burlingame, M., and P. Vinogradov. 2012. Seasonal Movements Among River Reaches, Migration Strategies, and Population Structure of the Divided Connecticut River Shortnose Sturgeon Population: The Effects of Holyoke Dam. Life History and Behaviour of Connecticut River Shortnose and Other Sturgeons. Kynard, B., Bronzi, P, and Rosenthal H. (eds). World Sturgeon Conservation Society: Special Publication No. 4 (2012).
- NextEra Energy. 2012. Shortnose Sturgeon Handling Plan for Lockwood Project (FERC No. 2574). Submitted to FERC, March, 2012.