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Nick Hollister
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March 15, 2021

Via Electronic Filing

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

Re: FirstLight MA Hydro LLC, Turners Falls Hydroelectric Project (FERC No. 1889)
Northfield Mountain LLC, Northfield Mountain Pumped Storage Project (FERC No. 2485).
Response to FERC Letter of Deficiency and Additional Information Requests

Dear Secretary Bose:

On December 4, 2020, FirstLight MA Hydro LLC, owners of the Turners Falls Hydroelectric Project (Turners Falls Project, FERC No. 1889) and Northfield Mountain LLC, owners of the Northfield Mountain Pumped Storage Project (Northfield Mountain Project, FERC No. 2485) filed with the Federal Energy Regulatory Commission (FERC) Amended Final License Applications (AFLA) for the two projects.

Background

On January 14, 2021, FERC issued separate letters to FirstLight MA Hydro LLC and Northfield Mountain LLC requesting the Licensees address deficiencies and additional information requests (AIRs) for each Project. Several of the AIRs requested information on energy impacts, water levels, flows and Northfield Mountain pumping/generation volumes under FirstLight's AFLA operating proposal. In FirstLight's AFLA proposal it had to make assumptions relative to operations at the upstream three Great River Hydro (GRH) projects[1]. In its AFLA, FirstLight simulated the GRH facilities as peaking projects with minimum flows equivalent to FirstLight's bypass flow proposal but adjusted by drainage area to each of the three GRH projects.

On December 7, 2020, GRH filed its AFLA, which included an agreement on its proposed operations (Inflow Equals Outflow [IEO], and Flexible Operations). In phone calls with FERC on January 25 and February 4, 2021, which are in the public record, FirstLight explained that to address some of the AIRs requiring data under proposed operations it would need the Vernon Hydroelectric Project discharges (generation and flow) based on GRH's proposed operations.

[1] In upstream to downstream order, they include Wilder (FERC No. 1892), Bellows Falls (FERC No. 1855) and Vernon (FERC No. 1904) Hydroelectric Projects.

On February 12, 2021, FERC requested GRH to file year-round hourly water surface elevations and flow releases for current operations and simulated run-of-river operations (i.e., IEO) for the years 2009, 2015, 2016 and 2017 by March 15, 2021.

Once this information is filed, FirstLight can address the AIRs paraphrased below (TF-Turners Falls, NFM- Northfield) that require information under FirstLight and GRH proposed operations.

- TF AIR#4 and NFM AIR#3: FERC requested FirstLight quantify the annual energy impact due to various operating conditions (bypass flows, ramping rates, etc.) included in its AFLAs under proposed operations.

- TF AIR#5: FERC requested FirstLight provide simulated hourly water surface elevations in the Turners Falls Impoundment, flows in the bypass reach, and flow and water surface elevations below Cabot Station under current and proposed operations.

- TF AIR#13: FERC requested FirstLight provide water level duration curves at sensitive plant locations under proposed operations.

- TF AIR#14: FERC requested FirstLight to explain how proposed operations would affect special status plants.

- NFM AIR#4: FERC requested FirstLight provide estimated weekly and monthly pumping volume under proposed operations.

FirstLight will need to conduct the following steps once the Vernon Hydroelectric Project discharge data are available:

- Use the Vernon Hydroelectric Project hourly discharge (spill and generation) as input to FirstLight's operations model.

- Since the FirstLight operations model terminates in 2003, it will need to expand the model to include unregulated inflow for the four years (2009, 2015, 2016 and 2017).

- Run the operations model to produce flow data at key locations- at Turners Falls Dam, bypass reach, and below Cabot Station- and quantify energy impacts.

- Because FERC requested water level data in several AIRs, FirstLight will need to run its hydraulic models to produce water surface elevations.

Due to the amount of modeling and analysis required to fulfill the above AIR's, FirstLight is requesting that they be filed within 90 days of the March 15 FERC due date for the Vernon Hydroelectric Project discharge data or by June 14, 2021.

AIR Response

Please find attached the following responses to FERC's requests in the order listed below.

- Turners Falls Project- Response to Deficiencies

- Turners Falls Project- Response to Additional Information Requests
- Northfield Mountain Project- Response to Deficiencies
- Northfield Mountain Project- Response to Additional Information Requests

Several of the responses include appendices which are attached to the filing.

Please note that TF-AIR#11 seeks information on the proximity of sensitive plants relative to areas of potential disturbance associated with FirstLight's proposed construction projects. FirstLight's response to TF-AIR#11 includes Figure TF-AIR#11 which is a map showing construction areas relative to sensitive plants. Because of this, the response to TF-AIR#11 is being filed separately as privileged. Similarly, TF-AIR#9 requests conceptual level drawings of fish passage structures. These too are being filed as privileged.

If you have any questions regarding the enclosed, please do not hesitate to contact me at the telephone number on the cover sheet.

Respectfully,

Nick Hollister
Senior Operations Manager, North

Attachments: Responses to Deficiencies and Additional Information Requests, including Appendices

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Turners Falls Project- Response to Deficiencies

Exhibit E

TF-D#1

Section 5.1(d) of the Commission's regulations requires an applicant to consult with appropriate federal and state agencies, Native American tribes, and members of the public that may be interested in the proceeding before filing an application for a license. In addition, section 5.18(b)(5)(ii)(G) requires documentation of such consultation in the form of a list of consulted entities. In section 1.4 of Exhibit E, FirstLight states that the documentation of consultation is included in section 6.0 of Exhibit E. However, section 6.0 is not included in Exhibit E. FirstLight must provide documentation of consultation.

Response to TF-D#1:

FirstLight has engaged in consultation with numerous federal, state, and interstate resource agencies, Indian tribes, and members of the public throughout the entire Integrated Licensing Process since the filing of the Notice of Intent and Pre-Application Document, during scoping and study plan development, during study implementation, in study report meetings, and during public comment periods on studies and the License Application (see Section 1.4, Public Review and Consultation). FirstLight has filed all related licensing materials with FERC. FirstLight maintained a website that was established at the onset of the relicensing process. FirstLight notified stakeholders of the website and people signed up to be notified any time new documents were uploaded to the website. Names and addresses for those that subscribed to the website during relicensing are contained in Appendix TF-D#1.

TF-D#2

Section 5.18(b)(5)(ii)(F) of the Commission's regulations requires a review of applicable comprehensive plans, and consideration of the extent to which the proposed project complies with such plans. FirstLight has not provided an evaluation of the consistency of the project with applicable comprehensive plans. Please review the list of comprehensive plans available on the Commission's webpage at https://ferc.gov/sites/default/files/2020-07/ListofComprehensivePlans.pdf to identify all applicable plans and provide a discussion of how and why the project would, would not, or should not comply with each of these plans.

Response to TF-D#2:

Included in Appendix TF-D#2 is the list of comprehensive plans and whether the Project is consistent with those plans.

Exhibit G

TF-D#3

Section 4.41(h) of the Commission's regulations requires an Exhibit G that identifies the owners of lands within the project boundary. The Exhibit G maps included in the FLA for the project do not identify the landowners. FirstLight must provide the landowner identities and may refer to the Commission's guidance document, Managing Hydropower Project Exhibits, dated August 2014, in particular, appendix 3, page 28, which shows an example Exhibit G map with land ownership identified. Given the number of landowners to be identified, the parcels may be identified on the maps and the landowner information can be provided on separate tables in Exhibit G.

Response to TF-D#3:

The FERC Exhibit G request above was also requested of Great River Hydro (GRH), Licensee of the Wilder, Bellows Falls and Vernon Hydroelectric Projects. On January 27, 2021, GRH had a call with the Federal Energy Regulatory Commission (FERC) and FERC filed a memorandum of the call to the public file. On the call GRH asked FERC for clarification whether actual landowner names were required on the Exhibit G maps. Per the notes "*FERC staff indicated that, upon further review of the filing requirements and the Exhibit G maps filed with the amended application, the actual names are not required by the regulations, the maps filed meet the requirements of the regulations, and the maps provide the information necessary to prepare the NEPA document at this time*". Given that FirstLight received the same request and the maps included in the AFLA meet all applicable requirements, revised Exhibit G maps are not being filed.

Installed Capacity

TF-AIR#1:

In section 1.5 of Exhibit A, on page A-5, table 1.5-1, FirstLight provides the ratings for the generators in the Turners Falls Station No. 1 powerhouse in kilowatts (kW). Please revise the table to also provide the ratings in kilovolt-amperes (kVA) with the corresponding power factor (pf). This information will be used to confirm the conversion from kVA to kW for use in determining the appropriate authorized installed capacity of each unit in accordance with 18 CFR 11.1(i).

Response to TF-AIR#1:

Shown in Table TF-AIR#1-1 is Table 1.5.1 from Exhibit A of the Amended Final License Application (AFLA) but updated to include the requested information- kilovolt-amperes and power factor. Note that in Table 1.5-1 (Exhibit A, AFLA), incorrect amperes were provided for the units as well as the electric capacity of Unit 1. These changes are reflected in Table TF-AIR#1-1.

Table TF-AIR#1-1. Generator and Turbine Characteristics of Station No. 1

Unit No.	Generators		Turbines					
	Electrical Capacity (kW)	Amps	Runner Size	Hydraulic Capacity (cfs)	Horsepower (hp)	Speed (rpm)	Kilovolt-amperes (kVa)	Power Factor
1	1,380	432	2-48" horizontal double runners	560	2100	200	1,380	1.0
2*	365	114	1-33" horizontal runner	140	590	257	365	1.0
3	1,276	357	2-42" horizontal double runners	500	1900	200	1,276	1.0
4	Unit 4 was originally a water-powered rotary exciter. A static exciter was installed to replace it in the same floor space in the powerhouse.							
5	1,276	357	2-39" horizontal double runner	490	1635	200	1,276	1.0
6	Note at Unit 6 was decommissioned in-place based on its poor condition						1,276	1.0
7	1,276	357	2-42" horizontal double runner	520	1955	200	1,276	1.0
Total	**5,573**			**2,210**				

*Unit 2 is directly connected to a 1600 amp, 257 rpm, 115 volt exciter.

Net Investment and Cost of Environmental Measures

TF-AIR#2

Section 2.2 of Exhibit D, on page D-1 provides the net investment value but does not state the date for which the value is provided (e.g., as of December 31, 2019). Please provide the applicable date for the net investment value. This will ensure that staff apply the value correctly in the economic analysis.

Response to TF-AIR#2:

The net investment value included in Section 2.2 of Exhibit D, on page D-1, is as of December 31, 2019.

TF-AIR#3

In section 4.5 of Exhibit D, in table 4.5-1, costs are provided for proposed environmental measures. In various places in the application, additional measures are identified that are not listed in table 4.5-1 (e.g., (1) implement the Recreation Management Plan, Historic Properties Management Plan, Bald Eagle Protection Plan, and Invasive Plant Species Management Plan [page E-33]; (2) include or remove lands from the project boundary [page E-37]; and (3) implement northern long-eared bat protection measures [page E-43]). Please provide a revised table 4.5-1 that lists all proposed measures, both environmental and developmental, regardless of cost. If the measures are considered to have no appreciable cost, please provide a brief explanation.

Response to TF-AIR#3:

Table 4.5-1 in the AFLA has been updated as shown in Table TF-AIR#3-1.

Table TF-AIR#3-1. Costs Associated with Proposed PM&E Measures at the Turners Falls Hydroelectric Project

PM&E Measure	Total Capital Cost over 50 years (2019 dollars)	Total Periodic Capital Cost over 50 years (2019 dollars)	Total O&M Cost over 50 years (2019 dollars)	Average[1] Annual Cost over 50 years (2019 dollars)
[2]**Fish Passage Measures**				
Construct a new Spillway Lift with Palisade Entrance at the Turners Falls Dam	$12,187,000	$1,692,300	$15,884,000 $361,000/year for 44 years	$595,000
Construct an Eelway near the Turners Falls Dam	$547,000	$282,000	$308,000 $7,700/year for 40 years	$23,000
Install Permanent Ultrasound Array in the Cabot Tailrace	$2,490,000	$500,000	$3,010,000 $70,000/year for 43 years	$120,000
Construct a Plunge Pool below Bascule Gate No. 1	$4,493,000	$483,800	$3,344,000 $76,000/year for 44 years	$166,000
Construct a Bar Rack at the entrance to Station No. 1	$3,921,000	$524,800	$215,000 $5,000/year for 43 years	$93,000
Recreation				
Construct a formal access trail to a put-in below the Turners Falls Dam	$183,000	-	$329,000 $7,000/year for 47 years	$10,000
Create a formal trail and steps for a take-out at Poplar Street	$286,000	-	$329,000 $7,000/year for 47 years	$12,000
Project Upgrades				
[3]Station No. 1 Upgrades	$1,200,000	$1,200,000	$94,000 $2,000/yr for 47 years	$50,000
Infrastructure needed to pass winter bypass flows (heaters on bascule gate no. 1)	$400,000	-	$587,500 $12,500/year for 47 years	$20,000
Implementation of Management Plans				
Recreation Management Plan			$1,000,000 $20,000/year for 50 years	
Historic Properties Management Plan			$100,000 $2,000/year for 50 years	
Bald Eagle Protection Plan • Prior to tree clearing, if nests are located, MADFW and USFWS will be consulted. Tree clearing will be conducted in accordance with the National Bald Eagle Management Guidelines.			$100,000 $2,000/year for 50 years	

PM&E Measure	Total Capital Cost over 50 years (2019 dollars)	Total Periodic Capital Cost over 50 years (2019 dollars)	Total O&M Cost over 50 years (2019 dollars)	Average[1] Annual Cost over 50 years (2019 dollars)
Invasive Plant Species Management Plan • Monitor areas of disturbance caused by routine O&M to ensure invasive plants do not out-compete native vegetation. • Clean/dry boats coming into contact with water. • Post signage at boat launches explaining threats of non-native aquatic plants. • Post construction monitoring of disturbed areas.			$500,000 $10,000/year for 50 years	
Implement Northern Long-Eared Protection Measures			$100,000 $2,000/year for 50 years	
Project Boundary Adjustments				
Removal of 0.2 acre parcel at 39 Riverview Drive in Gill, MA, addition of 0.8 acre parcel of land owned by FirstLight and removal of 20.1 acre parcel of land occupied by the Conte Lab.	The costs associated with removing land parcels from the Project Boundary is incorporated in the cost under the HPMP's (archaeological investigations). There is no cost associated with the additional 0.8 acres of land as it is already owned by FirstLight.			
Total	**$25,707,000**	**$4,682,900**	**$25,900,500**	**$1,125,000**

[1]Rounded to the nearest $1,000. Average Annual Cost= (Total Capital Costs + Total Periodic Costs + Total O&M Costs)/50 years.

[2]Each fish passage measure assumes 3 years of effectiveness testing that is incorporated into the Capital Cost.

[3]Station No. 1 upgrades include a) for each unit, upgrading the brakes, controls, governors, grounding transformer, protective relaying, excitation system and turbine rehabilitations and b) automation including auto synchronizing equipment and sensors to interface to the programmable logic controller.

TF-AIR#4

In section 9 of Exhibit D, FirstLight provides a list of proposed operational changes and their combined effects on annual generation (table 9.0-1). For each proposed operational change (e.g., operate in accordance with operational flow regime; maintain continuous minimum flow), please note the associated effect on annual generation. This will allow staff to isolate effects of individual measures if resource agencies, stakeholders, or staff identify alternatives to the proposed measures that have different effects on annual generation.

Response to TF-AIR#4

FERC and FirstLight have had two calls to discuss TF-AIR#4 and TF-AIR#5 as documented in FERC's memorandums to the public files. On the calls, FirstLight clarified that in its AFLA proposal it had to make assumptions relative to operations at the three GRH projects. FirstLight simulated the GRH facilities operated as peaking projects with minimum flows equivalent to FirstLight's bypass flow proposal but adjusted by drainage area to each of the three GRH projects. Because FirstLight did not have the benefit of GRH's AFLA proposal when FirstLight prepared and modeled its own AFLA proposal, FirstLight's modeling results, including certain operational, cost, and environmental impacts of FirstLight's proposal, may no longer be accurate. When FirstLight receives from GRH the Vernon Hydroelectric Project discharge (generation and spill flows) under GRH proposed operations it will simulate these conditions in its operations model and will have a response to TF-AIR#4 within 90 days of receipt of the data from GRH.

FirstLight's operations proposal includes several operational changes including bypass flows, whitewater flows, base flows below Cabot Station, expanded use of the Upper Reservoir, rate of rise limitation in the Turners Falls Impoundment water level, peaking flow restrictions at Cabot Station, and up- and down-ramping restrictions at Cabot Station. Relative to breaking out the annual impact of generation due to the proposed changes FirstLight proposes to conduct the following to address TF-AIR#4:

- Quantify the annual impact on generation from whitewater and bypass flows releases.
- Quantify the shift in peak to off-peak annual generation due to base flows below Cabot, expanded use of the Upper Reservoir, rate of rise limitation in the Turners Falls Impoundment water level, and peaking flows restrictions at Cabot Station.
- The up- and down-ramping restrictions at Cabot Station directly impacts economics and does not change annual generation or peak/off peak generation.

FERC is requesting data (water levels, flows, Northfield Mountain pumping volumes, etc.) under proposed operating changes in several of its AIRs including TF-AIR#4, #5, #13 and #14, and NFM-AIR#3 and #4. The responses to these AIRs refer back to this response (TF-AIR#4).

Aquatic Resources

TF-AIR#5

In section 3.3.2.2.1 of Exhibit E, FirstLight evaluates the effects of proposed changes to the operation of the project by comparing summaries for simulated water surface elevations (WSEL) and flows under the baseline and proposed project. These evaluations address changes in the Turners Falls impoundment WSEL, the Turners Falls bypassed reach flow, and the flow and WSEL downstream of Cabot Station. The time period for these summaries varies between location and parameter. The analysis for the reach

downstream of Cabot Station excludes days with average flow at Montague of 18,000 cubic feet per second or more. To enable staff's evaluation of effects of the proposed project on Turners Falls impoundment WSEL, flow in the bypassed reach, and flow and WSEL downstream of Cabot Station, please provide the following for both current and proposed operations:

- *Simulated hourly WSELs for the Turners Falls impoundment near Vernon dam, Pauchaug boat launch, Riverview boat launch, and at Turners Falls dam.*

- *Simulated hourly flows immediately downstream of Turners Falls dam, Station No. 1 discharge, total bypassed reach flow, Cabot Station discharge, and the Montague U.S. Geological Survey gage.*

- *Simulated hourly WSELs for river mile (RM) 118.508 (near Montague), RM 115.07, RM 112.36, RM 109.52, and RM 94.298 (Rainbow Beach).*

Response to TF-AIR#5

See the response to TF-AIR#4.

TF-AIR#6

In section 3.3.2.2.2 of Exhibit E, FirstLight provides a summary of findings of the study 3.2.1 (Water Quality Monitoring Study). Section 2.6.2 of the study report, filed on March 1, 2016, states that 21 percent of the 130,566 continuous dissolved oxygen (DO) data points were adjusted, using the HOBOware DO Data Assistant, in cases where biofouling was believed to compromise the measurements or concurrent spot measurements differed by more than ±0.4 milligram per liter (mg/L). However, the study report does not provide the information needed to evaluate the reliability of these adjusted DO data. To enable staff's evaluation of the reliability of the adjusted DO data, please provide the following information: (1) the monitoring sites where the adjustments occurred; (2) information used to identify when an adjustment was needed, including but not limited to, any observations pertaining to biofouling of the DO sensor; and (3) data used to make those adjustments, including calibration data (e.g., dates, times, DO, water temperature)[2] and any other data used for the adjustment (e.g., barometric pressure).

Response to TF-AIR#6

Table TF-AIR#6-1 lists the number of 15-minute DO measurements obtained at each site, and the number and percentage of those measurements that required adjustments. As described in Table TF-AIR#6-1, data adjustments were not needed at Sites 1, 5, and 7. Up to 53% of the continuous data were adjusted at each location, but 21% were adjusted overall. A more detailed summary of adjustments made to continuous DO data are included in Table TF-AIR#6-3 and are explained later in this response section.

Note that Site 2 and 6 were monitored discretely, not continuously, for DO and temperature via vertical profiles approximately every two weeks.

[2] Specific information requested for the starting and ending calibration points is displayed under "Perform Field Calibration" on page 3 of Onset's Dissolved Oxygen Assistant User's Guide, available at: https://www.onsetcomp.com/files/manual_pdfs/15604-A-Dissolved-Oxygen-Assistant- User-Guide.pdf.

Table TF-AIR#6-1. Continuous DO Monitoring Locations and Number of Adjusted Data Points

Site	DO values (n)	Adjusted (n)	Adjusted (%)
1	12,772	0	0%
3	14,213	6,629	47%
4	14,213	1,458	10%
5	14,210	0	0%
7	14,183	0	0%
8	15,421	1,248	8%
9	15,215	4,092	27%
10	16,154	8,517	53%
11	14,185	6,105	43%
Total (n)	130,566	28,049	
Total Adjusted (%)			**21%**

A YSI handheld meter (ProODO) was calibrated each day prior to use for spot check measurements and vertical profiles. Temperature, barometric pressure (BP), DO concentration and DO saturation were recorded for each calibration (see Table TF-AIR#6-2).

Table TF-AIR#6-2. YSI Handheld Meter Calibration Data

Date & Time	Temp. (ºC)	BP (mm Hg)	DO (mg/L)	DO (%)
5/13/2015 9:52	17.7	768.7	9.55	100.0
5/14/2015 7:15	8.7	766.5	11.78	100.9
5/28/2015 11:00	25.6	761.7	8.20	100.3
5/29/2015 6:51	15.8	765.2	9.97	100.7
6/10/2015 6:30	17.8	753.0	9.47	99.2
6/24/2015 8:43	24.1	758.1	8.39	99.8
7/9/2015 9:40	20.5	759.8	9.04	100.2
7/10/2015 7:30	21.2	755.1	8.77	99.5
7/23/2015 9:18	22.3	756.5	8.64	99.6
7/24/2015 7:10	16.4	756.0	9.74	99.5
8/5/2015 9:44	20.2	756.1	9.02	99.6
8/6/2015 7:24	17.6	755.5	9.49	99.4
8/17/2015 11:19	28.6	761.2	7.75	100.3
8/18/2015 7:00	23.2	758.1	8.52	99.8
9/2/2015 11:51	29.2	--	7.63	99.8
9/3/2015 7:26	21.3	754.4	8.80	99.3
9/17/2015	--	--	8.39	96.7
9/18/2015 7:25	17.1	759.0	9.64	99.9
10/8/2015 10:30	14.8	763.6	10.18	100.5
10/9/2015 7:20	12.2	756.8	10.69	99.7
10/22/2015 10:20	15.0	762.8	10.13	104.0
10/23/2015 7:16	9.8	761.0	11.36	100.2

Date & Time	Temp. (°C)	BP (mm Hg)	DO (mg/L)	DO (%)
10/23/2015 9:28	7.4	--	12.04	99.4
11/4/2015 7:22	6.7	764.0	12.34	100.9
11/11/2015 12:00	16.7	753.8	9.65	99.3
11/17/2015	*Calibration notes not found.*			
11/18/2015 13:34	7.3	769.6	12.21	101.3

* A back-up handheld (YSI 55) was used because the ProODO was not working.

While adjusted DO data are considered flagged, they are also considered representative of environmental conditions. Raw (unadjusted) continuous DO data were adjusted to spot check data if the difference from a spot check was ± 0.4 mg/L, per the approved Sampling Plan[3]. Inaccuracies were usually due to instrument drift. Raw data were adjusted linearly between adjustment points as needed using HOBOware. If raw continuous data passed Quality Control (QC) protocols one week, and did not pass QC protocols the next week, data were adjusted linearly between the passing and failing week to the spot check measurement of the failing week (the degree in which adjustments were made are greater closer to the failed spot check, and lesser towards any passing spot checks). Raw (unadjusted) continuous DO logger data, corresponding YSI handheld spot check data, information about DO data adjustments and dates continuous loggers were calibrated for each site are included in Appendix TF-AIR#6[4].

Most adjustments made to DO data were minor or nonexistent. Continuous DO measurements typically differed from concurrent spot check measurements (i.e., "QC differences[5]") less than 0.8 mg/L, with average and median QC differences of approximately -0.17 and -0.3 mg/L, respectively; both below the ± 0.4 mg/L threshold for making adjustments. Site 3, Site 10, and Site 11 had the greatest percent of adjusted data, measuring between 43% and 53% (per Table TF-AIR#6-1). However, median QC differences for each of these locations remained below the ± 0.4 mg/L threshold and the maximum adjustments made to these data were within ± 0.8 mg/L.

Although most QC checks were conducted approximately every 2 weeks, certain events with associated safety concerns (such as high flow events, or drawdown events, as displayed in Appendix TF-AIR#6) prevented meters from being serviced as regularly. Sometimes QC check differences following these events correlated with greater sensor drift at certain locations, potentially because of biofouling. Note that a high flow event that occurred during the June 25, 2015 site visit prevented the Site 9 meter from being serviced for approximately one month. The QC difference observed after Site 9 became accessible again was the largest one observed throughout the study period for any location (i.e., -2.11 mg/L, where the continuous meter read high and needed to be adjusted down). Despite the large adjustment made for continuous data at Site 9, however, DO concentrations remained well above water quality standards.

As displayed in Appendix TF-AIR#6, and summarized in Table TF-AIR#6-3 (per average and median values), continuous data tended to measure slightly higher than spot check measurements, so adjustments made to raw continuous data often caused a decrease in continuous DO concentrations. All continuous data met state water quality standards throughout the sampling period despite any continuous DO data decreased in value for adjustment purposes.

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[3] FirstLight. 2014. Water Quality Monitoring Study: Field Sampling Plan. September 2014

[4] Note that most loggers were calibrated on July 23 or 24, 2015, even if spot checks passed QC protocol (were within ± 0.4 mg/L) out of precaution, as they had not been calibrated since before deployment in May 2015.

[5] Resulting QC differences specifically reflect continuous data concurrent to spot check data subtracted from spot check data

Table TF-AIR#6-3 provides a summary of differences in DO measurements between spot checks and continuous data[6].

Table TF-AIR#6-3. Summary of QC Differences in DO (mg/L) for each Monitoring Location

Location	No. Failed QCs/total QCs	Min	Max	Avg.	Median	Notes
Site 1	0/10	-0.20	0.27	0.06	0.11	No adjusted data
Site 3	5/11	-0.75	0.44	-0.16	-0.32	
Site 4	1/11	-0.46	0.20	-0.10	-0.14	
Site 5	0/11	-0.33	0.30	0.05	0.07	No adjusted data
Site 7	0/10	-0.38	0.32	-0.13	-0.16	No adjusted data
Site 8	1/6	-0.46	0.00	-0.26	-0.31	
Site 9	2/9	-2.11	-0.01	-0.53	-0.31	
Site 10	3/12	-0.76	0.13	-0.32	-0.37	
Site 11	3/11	-0.66	0.82	-0.19	-0.28	
Overall	**15/91**	**-2.11**	**0.82**	**-0.17**	**-0.28**	

TF-AIR#7

In section 3.3.3.1.7.2 of Exhibit E, FirstLight proposes to install a 58-foot-wide, 21-foot-tall trashrack at the Station No. 1 forebay entrance that has a clear bar spacing of ¾-inch. Please provide the calculated maximum intake velocities at the proposed trashrack (based on the size of the intake and the net open area of the trashrack) at Station No. 1. Please account for the proposed upgrades at Station No. 1 when estimating the intake velocities and include supporting calculations and assumptions of the trashrack design (e.g., vertical bar thickness, number of vertical bars, and dimensions of other supporting structures that would restrict flow through the trashrack) with the filing.

Response to TF-AIR#7

All velocities discussed below are based on Station No .1 operating at its maximum hydraulic capacity of 2,210 cfs. Based on the gross Station No. 1 forebay intake area, the calculated maximum intake velocity in front of the proposed trashracks is 2.0 feet/second. Utilization of the gross trashrack area is consistent with the USFWS design criteria for trashracks. When accounting for the bars, and vertical and horizontal framing members, the calculated maximum net intake velocity through the proposed trashrack, as requested by FERC, is 4.0 feet/second. The maximum sweeping velocity for the main canal at the forebay entrance was calculated to be 6.7 feet/second. The trashrack design assumes 3/8-inch bar thickness and 3/4-inch clear spacing. Appendix TF-AIR#7 includes the velocity calculations.

TF-AIR#8

In section 3.3.3.1.8 of Exhibit E, FirstLight reports the calculated intake velocities at Station No. 1 and Cabot Station to be 1.2 and 2.0 feet per second at the maximum hydraulic capacity of each station, respectively. These estimates of intake velocity were subsequently used to inform your analysis of fish entrainment. However, these calculated intake velocities were based on the gross area of the intake trashrack structure, rather than net open area (subtracting the area of the trashrack occupied by structure

[6] DO differences for individual spot checks of each location are provided in Appendix TF-AIR#6.

from the gross area). Please provide the net open area of the trashrack intakes at Station No. 1 and Cabot Station, estimates of the intake velocities at the maximum hydraulic capacity of each station using the net open area, and supporting documentation and calculations.

Response to TF-AIR#8

All velocities discussed below are based on Cabot and Station No. 1 operating at is maximum hydraulic capacity of 13,728 and 2,210 cfs, respectively. When accounting for the bars, vertical and horizontal framing members, the calculated maximum intake velocity through the existing trashrack at Cabot Station is 3.0 feet/second. These calculations assume 3/8-inch bar thickness, 0.9375-inch clear spacing for the upper 11 feet of the racks, and 3.5625-inch clear spacing for the lower 20 feet of the racks.

When accounting for the bars, vertical and horizontal framing members, the calculated maximum intake velocity through the existing trashrack at Station No. 1 is 1.4 feet/second. These calculations assume 3/8-inch bar thickness and 2.625-inch clear spacing for the racks. Additional structural members restricting flow were accounted for on both trashracks. Appendix TF-AIR#8 includes the velocity calculations.

The gross area of the intakes was used to inform the entrainment analysis because they are consistent with USFWS design criteria calculations which use the gross area as measured immediately in front of the racks.

Terrestrial Resources

TF-AIR#10

In section 2.2.1.2 of Exhibit E, FirstLight proposes to construct several facilities at the project, including various fishways and recreation features. However, there is minimal discussion of these activities in section 3.3.4, where environmental effects on terrestrial resources are discussed. To support staff's analysis of the potential effects of these construction activities on vegetation communities and sensitive plant species, please describe any disturbance to existing vegetation that would occur during the proposed construction activities. If vegetation disturbance would occur, please quantify the extent of temporary and permanent disturbance, by community type.

Response to TF-AIR#10:

Formal Access Trail and Stairs for Take-out at Poplar Street: The proposed take-out occurs in a relatively open area (existing informal take-out). However, a 20-foot corridor will need to be cleared along the forested shore for the stairs and it is likely that one to two trees will need to be removed. No sensitive plant species will be affected.

Riverview Portage Parking and Trail: There is an existing road (Pine Meadow Road) that will be widened for parking and the portage pathway and stairs. Approximately 2,275 sq ft of hardwood forest will need to be cleared for the proposed project. No sensitive plant species will be affected.

Riverview Boat Dock Relocation: This proposed project occurs in an existing park. However, to relocate the dock, the road needs to be extended north which may require a few trees to be removed. No sensitive plant species will be affected.

Formal Access Trail and Put-In at Cabot Camp: This proposed project will establish a formal access trail along an informal pathway. No tree removal is necessary, however minor pruning is likely required to establish the carry-in trail. No sensitive plant species will be affected.

Formal Access Trail and Put-In just below Turners Fall Dam: The proposed project will occur along an existing informal pathway. No clearing is anticipated. No sensitive plant species will be affected.

Spillway Fish Lift, Plunge Pool, and Eelway: All three of these proposed structures are in the same general location. Installation of these new structures may affect populations of Tradecant's aster and sandbar cherry (see TF-AIR#11). No other clearing is anticipated.

Station No. 1 Dog-Leg Exclusion: The dog-leg exclusion will occur along the canal and may require a few select trees to be removed. No sensitive plant species will be affected.

Ultrasound Array at Cabot Station: The ultrasound array project includes installing an ultrasound array in the water and will not require any tree removal. No sensitive plant species will be affected.

Barrier Net: The proposed barrier net would require a small amount of clearing associated with the southern abutment. Additionally, an existing path along the shoreline will need to be widened to create an access road to the site. Approximately 13,000 sq ft of hardwood forest will be cleared for this proposed project. No sensitive plant species will be affected.

TF-AIR #11 (filed as Privileged)

Figure 3.3.5.1.1-1 indicates there are occurrences of sensitive plants in close proximity to Turners Falls dam. However, the scale of the figure is too small to determine the location of these plants in relation to the proposed construction activities. Please describe the proximity of these plants to the limits of the proposed construction, as well as any proposed measures to limit potential disturbance to the sensitive plants.

Response to TF-AIR#11:

The response was filed as privileged because it contains location information of sensitive plants.

TF-AIR#12

Table 3.3.4.1-5 of Exhibit E indicates there are 342.2 acres of wetlands at the Turners Falls Project. Table 4.5-1 in the study report for study 3.5.1 (Baseline Inventory of Wetland, Riparian, and Littoral Habitat in the Turners Falls Impoundment and Assessment of Operational Impacts on Special Status Species) filed on March 1, 2016, indicates that 1,438 acres of wetlands (1,382.3 acres of verified National Wetlands Inventory wetlands and 55.7 acres of newly identified wetlands) occur at the project. Please explain this discrepancy and provide the correct acreages of wetlands, by Cowardin[7] wetland type within the study area.

Response to TF-AIR#12

The verified NWI wetlands were underestimated in the Exhibit E. Additionally, the study area in Study 3.5.1 extends down to the Route 116 Bridge in Sunderland, MA while the Project area in Exhibit E ends just south of the bypass reach. With the exclusion of the area south of the bypass reach and the addition of

[7] Cowardin, L.M., Carter, V., Golet, F.C., & LaRoe, E.T. (1979). Classification of wetlands and deepwater habitats of the United States (FWS/OBS-79/31). Washington, D.C.: U.S. Dept. of the Interior – Fish & Wildlife Service.

the wetlands in the Northfield Mountain area there are approximately 1,382 acres of wetlands within the study area. This includes approximately 510.4 acres of freshwater emergent wetland (PEM), 752 acres of freshwater forested wetlands (PFO), 70.2 acres of freshwater shrub wetlands (PSS) and 49.7 acres of freshwater pond (PUB).

TF-AIR#13

Addendum 2 for the study report for study 3.5.1, filed on April 3, 2017, includes figures showing observed elevations of sensitive plant species, average inundation duration, and daily average WSELs based on modeled flows under existing operations (figures 2.8-2 through 2.8-11). These figures are based on elevation data collected at specific transects where these species were observed. In section 3.3.5.2.1 of Exhibit E, FirstLight states that hydraulic models were used to predict WSELs at the surveyed transects under baseline environmental conditions and FirstLight's proposed action. Figures 3.3.2.2.1-1 through 3.3.2.2.1-4 of Exhibit E show WSEL exceedance curves comparing existing and proposed conditions, but the data is not specific to the transects used to prepare the figures in the study report referenced above. Please revise figures 2.8-2 through 2.8-11 to include modeled flows under FirstLight's proposed operations presented in the FLA.

Response to TF-AIR#13:

See the response to TF-AIR#4.

TF-AIR#14

Exhibit E includes a general summary of project effects on special-status plants, but not all species identified in the study report for study 3.5.1, filed on April 3, 2017, are addressed. While Frank's lovegrass, great blue lobelia, intermediate spike-sedge, and ovate spike-sedge are listed in table 3.3.5.1.1-1 as being identified in the project area, these species are not discussed in the environmental effects section. Additionally, while tufted hairgrass is identified in addendum 2 of the study report, this species is not discussed in the FLA. Please provide FirstLight's analysis of how proposed operations would affect Frank's lovegrass, great blue lobelia, intermediate spike-sedge, ovate spike- sedge, and tufted hairgrass.

Response to TF-AIR#14:

See the response to TF-AIR#4.

Cultural Resources

TF-AIR#15

In section 3.3.8.1 of Exhibit E, FirstLight provides a summary of all cultural resources identified within the project Area of Potential Effects (APE), including the status of their eligibility to be listed in the National Register of Historic Places (National Register). In FirstLight's proposed Historic Properties Management Plan (HPMP) for the project, filed on December 4, 2020, further details are provided regarding these resources. However, while FirstLight states that separate HPMPs were prepared for the Turners Falls and Northfield Mountain projects, much of the information in the HPMPs appears to pertain to both projects. For example, table 5.3.1-1 and other information appears to be identical in both HPMPs.

Additionally, letters from the Massachusetts Historical Commission (MHC) dated March 7, 2019, and November 21, 2019 (filed May 6, 2019 and December 3, 2019 respectively), provide MHC's determinations of National Register eligibility. However, staff has identified some minor discrepancies between what is contained in these letters and what is provided in the HPMP. For example, in MHC's March 7, 2019, letter,

site MA-14.2 (Munn's Ferry 1 site) is described as ineligible for listing on the National Register and site GIL.HA.9 (Munn's Ferry site) is eligible. Table 3.1-3 also indicates that MA-14.2 is not eligible, but table 5.3.1-1 of the HPMP states that there has been no determination of eligibility for either site.

To clarify which resources are located only within the APE at the Turner Falls Project, please file a new, comprehensive table of all resources documented within the APE for the project, identifying sites that are also located at the Northfield Mountain Project, and with any necessary updates to site information and the dates of MHC's eligibility determinations.

Response to TF-AIR#15

Following is a new, comprehensive Table TF-AIR#15-1 of all archaeological resources documented within the APE for the Project. All sites shown are also located within the Northfield Mountain Project, with the exception of the yellow highlighted entries, which occur only within the Turners Falls Project below the Turners Falls Dam. Site numbers and site NRHP eligibility status has also been reviewed in the MHC's Inventory of Historic and Archaeological Resources of the Commonwealth and updated accordingly.

Table TF-AIR#15-1. Comprehensive Archaeological Sites

Unshaded Site Entries Located within both Turners Falls and Northfield Mountain Project APEs; Yellow Shaded Site Entries are not Located within Northfield Mountain APE (are below Turners Falls Dam).

Site No.	Site Name	Description	Type of Investigation	Investigated By	Reference (Year)	NR Status
Erving, MA						
ERV.HA.1	Hotel	Commercial, Post-1890 hotel 50-x- 50 foot foundation	Reconnaissance	The Institute for Conservation Archaeology, Harvard University	Mrozowski (1977)	No Determination of Eligibility (DOE)
19FR51	Village	Woodland	NA	Unknown	MHC Site Form	No DOE
Gill, MA						
GIL.HA.5	Chase Foundation	Commercial, Post-1890 hotel 50-x- 50 foot foundation	Reconnaissance	The Institute for Conservation Archaeology, Harvard University	Mrozowski (1977)	No Determination of Eligibility (DOE)
GIL.HA.7	Gorge Narrows Foundation	Industrial, 19th century	Phase IA	TRC	Sara et al. 2014a	No DOE
GIL.HA.8	Barney Hale Upland	Residential, early to mid-20th century	Phase IA	TRC	Sara et al. 2014a	No DOE
GIL.HA.9	Munns Ferry	Commercial, 19th to 20th century	Phase IA	TRC	Sara et al. 2014a	No DOE
19FR450 GIL.HA.9	Munns Ferry 1	Multicomponent	Phase IB	TRC	Sara et al. 2019a	No DOE
*19FR013**	Stemple/Casley	Middle Archaic to Late Woodland	Field School	MAS; UMASS	Weeks (1971)	Not Eligible
*19FR014**	Fort Hill/ Peskeomscut	Middle Archaic to Late Woodland	Field School	MAS; UMASS	Weeks (1971)	Eligible (contributing to Riverside Archaeological District)

Site No.	Site Name	Description	Type of Investigation	Investigated By	Reference (Year)	NR Status
19FR015	WMECO	Middle Archaic to Late Woodland	Phase IB	Thomas 1977	Thomas 1977 b, 1980	Eligible (contributing to Riverside Archaeologic al District)
19FR46	Riverside/ Peskeompscut, Riverside Archeological District	Paleoindian to Late Woodland	Field School	UMASS	Weeks (1971)	Eligible (contributing to Riverside Archaeologic al District)
19FR110	Natanis	Unknown	NA	Reported by Temple and Sheldon (1975)	MHC site form	No DOE
19FR241	River Road Plain	Late Archaic to Early Woodland	Surface Collected	Walter Rodiman	Johnson (1985)	No DOE
19FR266	Unnamed	Middle to Late Archaic	Surface Collected	Walter Rodiman	Johnson (1985)	No DOE
*19FR267**	Rodiman #Y-2	Late Archaic to Early Woodland	Surface Collected	Walter Rodiman	Johnson (1985)	Eligible (contributing to Riverside Archaeologic al District)
19FR269	Unnamed	Middle Archaic to Late Woodland	Surface Collected	Walter Rodiman	Johnson (1985)	No DOE
*19FR271**	Rodiman #Y-6	Late Archaic to Early Woodland	Surface Collected	Walter Rodiman	Johnson (1985)	Eligible (contributing to Riverside Archaeologic al District)
19FR273	Rodiman #Y-8	Late Archaic to Early Woodland	Surface Collected	Walter Rodiman	Johnson (1985)	Eligible (contributing to Riverside Archaeologic al District)
19-FR-299	NA	Unknown	NA	NA	MHC site form	No DOE
19FR300	NA	Unknown	Surface Collected	W. Ellsworth	MHC site form	No DOE
19FR301	NA	Unknown	Surface Collected	W. Ellsworth	MHC site form	No DOE
19FR302	NA	Unknown	Surface Collected	W. Ellsworth	MHC site form	No DOE
19FR303	North Split River Farm Continuation	Woodland	Phase I - III	UMASS	Donta and Barker (2012)	Eligible
19FR307	Otter Run Field Site	Late Archaic to Early Woodland	Phase IB	UMASS	Donta and Mulhollan d (1997)	No DOE
19FR308	NA	Late Archaic	Collection Inspection	Reverend Kenneth E. Johnson	Johnson (1985)	No DOE
19FR309	Johnsons Cornfield	Late Archaic	Surface Collected	K. Johnson	MHC Site Form	No DOE
19FR310	NA	Unknown	Surface Collected	Jane French	MHC Site Form	No DOE

Site No.	Site Name	Description	Type of Investigation	Investigated By	Reference (Year)	NR Status
19FR312	Ashuela Brook Site	Late Archaic to Early Woodland	Phase IB	UMASS	Holmes et al. (1991)	No DOE
*19FR329**	Pine St. Pit/ Bridge St. Pit	Woodland	Monitoring	UMASS	Dincauze (1989)	Eligible (contributing to Riverside Archaeological District)
19FR326	Quinnetuk Narrows	Late Archaic to Late Woodland	Field Survey	Jane McGahan	MHC site form	No DOE
19FR339	Otter Run Rockshelter	Early to Middle Woodland	Phase IB	UMASS	Holmes et al. (1991)	No DOE
19FR348	Scheuzen Verein Findspot	Late Archaic	Phase IB	UMASS	Holmes et al. (1991)	No DOE
19FR349	Barton Island	Unknown	Surface Collected	UMASS	Holmes et al. (1991), Sara et al. 2019a	Eligible
19FR350	Inundated Bank of Barton Field	Unknown	Surface Collected	UMASS	Holmes et al. (1991)	No DOE
19FR351	Northfield- Mt Hermon Lagoon Site	Late Archaic to Late Woodland	Phase I	UMASS	Holmes et al. (1991)	No DOE
19FR367	Taylor Site	Middle Woodland	Surface Collected	Springfield Science Museum	MHC (1997)	No DOE
19FR420	South Split River Farm	Late Archaic to Late Woodland	Phase IB	UMASS	Donta and Barker (2006)	No DOE
19FR421	French King Rock	Woodland	Phase IB	UMASS	Donta and Barker (2006)	No DOE
19FR429	River Road Site	Unknown	Phase IB	UMASS	Donta and Barker (2007)	Eligible
19FR430	Split River Pond	Unknown	Phase IB	UMASS	Donta and Barker (2007)	Eligible
19FR431	Split River West	Unknown	Phase IB	UMASS	Donta and Barker (2007)	Eligible
Greenfield, MA						
GRE.HA.7	Rawson Island Water Diversion Site	Historic	Phase IB	TRC	Sara et al. 2019a	Eligible
19FR012	Mackins Sand Bank	Paleo, Archaic, Early-Late Woodland, Contact	Unknown	UMASS	Weeks (1971)	Eligible (contributing to Riverside Archaeological District)
Deerfield, MA						
*19FR095**	GRF-35	Late Archaic	NA	Dincauze	MHC site form	Eligible (contributing to Riverside Archaeological District)
*19FR034**	Schaffer/GRF23	Early to Late Archaic	NA	UMASS	MHC site form	No DOE
Montague. MA						

Site No.	Site Name	Description	Type of Investigation	Investigated By	Reference (Year)	NR Status
MNT.HA.3	John Russell Cutlery Co	Industrial, 1868 to 1938 cutlery	Phase III	UMASS	Nassaney et al (1989)	No DOE
MNT.HA.10	Montague Highlands	Residential, 19th to 20th century	Phase IA	TRC	Sara et al. 2014a	No DOE
19FR315	Cabot Woods A1	Late Woodland to Contact	Phase I	UMASS	Nassaney et al (1989)	No DOE
19FR316	Cabot Woods F1	Late Archaic to Late Woodland	Phase I	UMASS	Johnson and McArdle (1986)	No DOE
19FR317	Cabot Woods C2	Unknown	Phase I	UMASS	Johnson and McArdle (1986)	No DOE
19FR318	Cabot Woods C1	Unknown	Phase I	UMASS	Johnson and McArdle (1986)	No DOE
19FR319	Cabot Woods E1	Unknown	Phase I	UMASS	Johnson and McArdle (1986)	No DOE
19FR320	Cabot Woods E2	Unknown	Phase I	UMASS	Johnson and McArdle (1986)	No DOE
19FR321	Cabot Woods H1	Unknown	Phase I	UMASS	Johnson and McArdle (1986)	No DOE
19FR353	Cabot Camp Site	Unknown	NA	UMASS	MHC site form	No DOE
19FR391	Cabot Woods Pipeline Site 1	Unknown	Phase I and II	UMASS	Bernstein et al. (1990)	No DOE
19FR392	Cabot Woods Pipeline Site 2	Unknown	Phase I and II	UMASS	Bernstein et al. (1990)	No DOE
19FR393	Cabot Woods Pipeline Site 3	Unknown	Phase I and II	UMASS	Bernstein et al. (1990)	No DOE
19FR394	Cabot Woods Pipeline Site 4	Woodland	Phase I and II	UMASS	Bernstein et al. (1990)	No DOE
19FR443	Camp 3e Findspot	Late Archaic to Early Woodland	Phase IB	UMASS	MHC Site Form	No DOE
Northfield, MA						
NFL.HA.4	Shearer Charcoal Kiln	Agrarian, Late 19th to Early 20th century	Locational	UMASS	Donta and Mulhollan d (1997)	No DOE
NFL.HA.9	Musket ball collecting area	Military or Hunting, Unknown time period	Reconnaissance	UMASS	Holmes et al. (1991)	No DOE

Site No.	Site Name	Description	Type of Investigation	Investigated By	Reference (Year)	NR Status
NFL.HA.10	Great Meadow Ferry	Transportation, 18th to 19th century ferry crossing	Intensive Survey	UMASS	Donta and Barker (2006)	No DOE
NFL.HA.38	Pauchaug Historic Refuse Site	Historic	Phase IB	TRC	Sara et al. 2019a	Not eligible
19FR473 NFL.HA.37	Moose Plain 1 Site	Multicomponent	Phase IB	TRC	Sara et al. 2019a	Not Eligible
19FR472 NFL.HA.36	Moose Plain 2 Site	Multicomponent	Phase IB	TRC	Sara et al. 2019a	Not Eligible
19FR471 NFL.HA.35	Moose Plain 3 Site	Multicomponent	Phase IB	TRC	Sara et al. 2019a	Not Eligible
NFL.HA.34	Moose Plain Historic Refuse Site	Historic	Phase IB	TRC	Sara et al. 2019a	Not Eligible
19FR001	Fowlers Woods/Four Mile Brook	Late Archaic	NA	UMASS	Dorothy Krass	No DOE
19FR003	South Great Meadow	Woodland	Field School	UMASS	Casjens (1977)	No DOE
19FR110	Natanis	Precontact	NA	NA	MHC Site Form	No DOE
19FR114	Horseboat Ferry	Unknown	Historical literature	Temple and Sheldon	Temple and Sheldon (1875)	No DOE
19FR115	Beers Plain	Unknown	Historical literature	Andover, Bronson Museum	MHC site form	No DOE
19FR116	Unnamed	Woodland	NA	Stan Bistrek	Casjens (1977)	No DOE
19FR117	Squenatock	Unknown	Historical literature	Temple and Sheldon	Temple and Sheldon (1875)	No DOE
19FR119	Coassock Site	Early to Late Woodland	Phase I	UMASS	Donta (2005)	No DOE
19FR120	Unnamed	Unknown	NA	NA	MHC Site Form	No DOE
19FR121	Pauchaug Falls	Unknown	Historical literature	Temple and Sheldon	Temple and Sheldon (1875)	No DOE
19FR122	Pauchaug	Unknown	Historical literature	Temple and Sheldon	Temple and Sheldon (1875)	No DOE
19FR304	Mallory Brook	Unknown	Surface Collected	Rev. Johnson	MHC site form	No DOE
19FR305	NA	Unknown	Surface Collected	Rev. Johnson	MHC site form	No DOE
19FR306	NA	Late Archaic	Collection Inspection	Reverend Kenneth E. Johnson	Johnson (1985)	No DOE
19FR312	Ashuela Brook Confluence	Unknown	Phase I	TRC	Sara et al. 2014b	No DOE
19FR341	Steatite Findspot	Late Archaic to Early Woodland	Surface Collected	UMASS	Holmes et al. (1991)	No DOE

Site No.	Site Name	Description	Type of Investigation	Investigated By	Reference (Year)	NR Status
19FR342	Bottom Brook Confluence	Late Archaic to Late Woodland	Phase I	UMASS	Donta and Mulhollan d (1997); Sara et al. 2019a	Eligible
19FR343	Bennett Meadow South	Unknown	Surface Collected	UMASS	Holmes et al. (1991)	No DOE
19FR344	Beers Plain Riverbank Findspot	Unknown	Findspot	NA	Holmes et al. (1991)	No DOE
19FR345	Kidds Island Site	Unknown	Collector interview	UMASS	Holmes et al. (1991)	No DOE
19FR346	Pine Meadow Brook	Early to Late Woodland	Surface Collected	NA	Holmes et al. (1991)	No DOE
19FR347	Durkee's Landing Ravine Site	Late Archaic to Early Woodland	Phase IB	UMASS	Holmes et al. (1991)	No DOE
19FR372	L'Etoile	Early to Late Woodland	Phase I	UMASS	Donta and Mulhollan d (1997)	No DOE
19FR373	Crooker	Early to Late Woodland	Phase I	UMASS	Donta and Mulhollan d (1997)	No DOE
19FR374	Burning Terrace	Late Woodland	Phase I	UMASS	Donta (2005)	No DOE
19FR375	Four Star	Late Woodland	Phase I	UMASS	Donta (2002)	No DOE
19FR376	Pumpkin Field	Late Woodland	Phase I	UMASS	Donta (2002)	No DOE
19FR377	Kidds Island Overlook	Late Woodland	Phase I	UMASS	Donta (2002)	No DOE
19FR379	Effluence Pipe	Unknown	Phase I	UMASS	Donta (2002)	No DOE
19FR419	Great Meadow South	Woodland	Phase I	UMASS	Donta (2002)	No DOE
19FR380	Windy Ridge	Unknown	Phase I	UMASS	Donta (2002)	No DOE
19FR451	Pine Meadow 11 Site	Precontact	Phase IB	TRC	Sara et al. 2019a	Not Eligible
19FR452 NFL.HA.22	Pine Meadow 10 Site	Multicompone nt	Phase IB	TRC	Sara et al. 2019a	Not Eligible
19FR453	Pine Meadow 7 Site	Precontact	Phase IB	TRC	Sara et al. 2019a	Not Eligible
19FR454 NFL.HA.24	Pine Meadow 8 Site	Multicompone nt	Phase IB	TRC	Sara et al. 2019a	Not Eligible
19FR455 NFL.HA.23	Pine Meadow 9 Site	Multicompone nt	Phase IB	TRC	Sara et al. 2019a	Not Eligible
19FR456 NFL.HA.25	Pine Meadow 6 Site	Multicompone nt	Phase IB	TRC	Sara et al. 2019a	Not Eligible
19FR457 NFL.HA.26	Pine Meadow 5 Site	Multicompone nt	Phase IB	TRC	Sara et al. 2019a	Not Eligible
19FR458 (NFL.HA.27)	Pine Meadow 4 Site	Multicompone nt	Phase IB	TRC	Sara et al. 2019a	Not Eligible
19FR459	Pine Meadow 3 Site	Multicompone nt	Phase IB	TRC	Sara et al. 2019a	Not Eligible
19FR460	Pine Meadow 2 Site	Multicompone nt	Phase IB	TRC	Sara et al. 2019a	Not Eligible

Site No.	Site Name	Description	Type of Investigation	Investigated By	Reference (Year)	NR Status
19FR461	Pine Meadow 1 Site	Multicomponent	Phase IB	TRC	Sara et al. 2019a	Not Eligible
19FR462	Bennett Meadow Site	Precontact	Phase IB	TRC	Sara et al. 2019a	Not Eligible
19FR463 NFL.HA.31	Great Meadow 8 Site	Multicomponent	Phase IB	TRC	Sara et al. 2019a	Not Eligible
19FR464	Great Meadow 7 Site	Precontact	Phase IB	TRC	Sara et al. 2019a	Not Eligible
19FR465	Great Meadow 6 Site	Precontact	Phase IB	TRC	Sara et al. 2019a	Eligible
19FR466 NFL.HA.32	Great Meadow 349 Site	Multicomponent	Phase IB	TRC	Sara et al. 2019a	Not Eligible
19FR467	Great Meadow 4 Site	Precontact	Phase IB	TRC	Sara et al. 2019a	Not Eligible
19FR468 NFL.HA.33	Great Meadow 3 Site	Multicomponent	Phase IB	TRC	Sara et al. 2019a	Not Eligible
19FR469	Great Meadow 2 Site	Precontact	Phase IB	TRC	Sara et al. 2019a	Not Eligible
19FR470	Great Meadow 1 Site	Precontact	Phase IB	TRC	Sara et al. 2019a	Eligible
Vernon, VT						
WD-1*	Possible King Phillip Encampment	17th Century, Burial		Unknown	VDHP site form	No DOE
WD-10*	Great Bend Site	Late Woodland; Contact; 17th Century, Village		UVM	VDHP site form	No DOE
WD-124*	Burial	Unknown; Precontact, Burial		UVM	VDHP site form	No DOE
WD-125*	Vernon Burial	Unknown; Precontact, Burial		NA	D. Skinas (1991)	No DOE
Hinsdale, NH						
27CH244	N/A	Precontact (Late Woodland)	Phase IB Survey	TRC	Sara et al. 2018b	Not Eligible
27CH245	N/A	Precontact (Late Woodland)	Phase IB Survey	TRC	Sara et al. 2018b	Not Eligible

TF-AIR#16

In section 3.3.8.2 of Exhibit E, FirstLight identifies two parcels of land that are proposed for removal from the Turner Falls project boundary (Riverview Drive [0.2 acre] and the U.S. Forest Service Silvio Conte Anadromous Fish Laboratory [Conte Lab; 20.1 acres]). According to the HPMP, the Riverview Drive property contains one historic- period resource (GIL.043). In the Exhibit E, FirstLight notes that the Conte Lab parcel contains several previously recorded archaeological resources, none of which have been evaluated for listing on the National Register. However, FirstLight notes that because the parcel will remain under the ownership of USGS (a federal governmental entity), which is subject to Section 106 requirements, there would be no adverse effect as a result of removing the Conte Lab parcel from the Project. According to 36 CFR 800.5(a)(2)(vii), the transfer, lease, or sale of property out of federal control without conditions to ensure the long-term preservation of historic properties on the property may constitute an adverse effect. Please describe any specific proposed measures for the lands proposed for

removal, and any consultation records with MHC involving the proposed measures and/or post-licensing studies.

Response to TF-AIR#16

In its AFLA review letter of January 7, 2021, the MHC requested that an intensive (locational) archaeological evaluation be conducted for archaeologically sensitive portions of 39 Riverview Drive in Gill to identify any intact, significant archaeological resources prior to transfer or removal from federal oversight. A plan for avoidance or mitigation of any intact, significant archaeological resources identified in the properties should be prepared and implemented prior to any transfer or removal out of the project boundaries. Prior to the survey, the MHC requested review of the State Archaeologist's permit application(s) (950 CMR 70) to conduct the intensive (locational) survey for review and comment.

FirstLight intends to conduct the requested State Archaeologists' permit application and intensive (locational) survey for the 39 Riverview Drive property prior to transfer of the property out of FERC jurisdiction. FirstLight will also prepare and implement a plan for avoidance or mitigation of any intact, significant archaeological resources identified in the properties prior to any transfer or removal out of FERC jurisdiction.

Because the Conte Laboratory property in Montague will remain under the ownership of United States Geological Survey (USGS- a federal governmental entity), which is subject to Section 106 requirements, there would be no adverse effect as a result of removing the Conte Lab parcel from the Turners Falls Project boundary. However, the MHC has requested that the boundaries of previously identified archaeological resources within the Conte Laboratory property in Montague be verified and identified on the Project Boundary maps as "Sensitive Resource Areas: No Impact."

TF-AIR#17

In section 3.3.8.2 of Exhibit E, FirstLight states that several recreational improvements are proposed that may affect cultural resources within the APE. Please clarify which cultural resources may be affected by these improvements.

Response to TF-AIR#17

There are no known archaeological resources within the currently proposed boundaries of the new recreational improvement sites, including, near Northfield Mountain: Riverview Boat Tour, Proposed Access Trail at Riverview, and Proposed Formal Access Trail Put-in at Cabot Camp, or below Turners Falls Dam at Proposed Access Trail Put-in, and Proposed Poplar Street Take-out.

The Proposed Formal Access Trail Put-in at Cabot Camp is located adjacent and south of the Cabot Camp Historic District Boundary and archaeological site 19-FR-353 (Cabot Camp site). No impacts are anticipated to these resources. The Proposed Riverview Boat Tour Dock Relocation and Proposed Access Trail at Riverview both occur within the State-Inventoried Northfield Farms Agricultural/Residential District. The Proposed Access Trail Put-in immediately below the Turners Falls Dam occurs within the Turners Falls Historic District. The Proposed Poplar Street Take-out does not occur within a Historic District.

It should be noted that during the planning stages of these projects, FirstLight will be required to consult with the MHC in advance through submittal of Project Notification Forms (PNFs) and scaled existing and proposed Project plans for their review and comment.

TF-AIR#18

In section 3.3.8.2 of Exhibit E, FirstLight states that erosion as a result of project operation was identified at two cultural resource sites. Please identify these sites and provide additional information about the type and extent of project-related erosion at both.

Response to TF-AIR#18:

Section 3.3.8.2 of Exhibit E does not state that erosion as a result of Project operations was identified at two cultural resource sites. Instead, Section 3.3.8.2 (third paragraph on page E-506) provides a summary of the results of the Bank Stability and Toe Erosion Model (BSTEM) analyses conducted for the AFLA as a means of providing context pertaining to erosion dynamics in the Turners Falls Impoundment (TFI). The aforementioned BSTEM analysis examined the potential impact of FirstLight's proposed operating regime on bank stability and erosion. The results of the erosion analysis found that the proposed operating regime was not a major cause of erosion anywhere in the TFI but was found to be a contributing cause of erosion at two detailed study sites – Site 8B-R and 75B. The detailed study sites referenced in the text refer to sites established as part of Study No. 3.1.2 *Northfield Mountain / Turners Falls Operations Impact on Existing Erosion and Potential Bank Instability*, not cultural resource sites. Section 3.3.1.2.1 of Exhibit E provides a detailed discussion of these sites as well as figures showing their location.

TF-AIR#19

In the proposed HPMP, FirstLight notes that visitors to the project area are collecting artifacts at several eligible or unevaluated archaeological sites. Please clarify which sites are being affected by artifact collection, and whether these sites are accessible as a result of project facilities, such as hiking trails, or whether these sites would otherwise be accessible absent project features. Please file this information as privileged pursuant to section 388.112 of the Commission's regulations.

Response to TF-AIR#19:

Both the Phase IA Study and the HPMP report state that historically the Connecticut River Valley has been an attractive region for ancient artifact/relic collecting, and indeed, multiple amateur collectors have amassed sizable and important collections over the last centuries, which in turn, through contemporary examination, has contributed to our understanding of ancient lifeways of the region. Areas that are typically attractive to collectors are plowed fields that occur on the alluvial plains and bordering terraces along the Connecticut River, including lands now controlled by FirstLight and under FERC jurisdiction. Although there are no specific sites known to be targeted by modern-era collectors and/or visitors within the Project boundary, the potential for artifact collecting by casual visitors or future ancient artifact relic collectors does exist. There are no known Project facilities, such as hiking trails, that lead to or bypass known archaeological sites where artifact collection is known to occur.

Project Boundary

TF-AIR#20

The Exhibit G maps identify lands to be acquired. For these lands, please provide an explanation of what the acquisition will entail (e.g., fee ownership, land rights, flowage rights) and how the lands will be used for project purposes.

Response to TF-AIR#20

The Exhibit G maps show two locations where land is to be acquired as summarized below. Note that FirstLight has all the rights at these locations.

- The addition of a 0.8 acre parcel of land owned by FirstLight at 21 Poplar Street (end of the street) in Montague, MA (Sheet 1 of 13, Exhibit G-1). These lands are needed for recreational purposes (take-out or put-in).

  This land is owned in fee by FirstLight MA Hydro LLC. It has been used for decades as the put-in point for portage around the Turners Falls Dam and this change in Project boundary simply memorializes existing Project ownership and operations.

- The addition of 135.5[8] acres of land south of the Northfield Switching Station located in the Towns of Northfield and Erving in Massachusetts (Sheet 3 and Sheet 4 of 13, Exhibit G-3, Exhibit G-4). 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.

  This land is owned in fee by Eversource and FirstLight trails have existed on the property since the creation of the Tour and Trail Center trail system. In 2000, an Eversource predecessor company sold the Northfield Mountain Project and entered into a long-term license agreement with the new Project owner to allow the trail system on Eversource property. This agreement transfers to subsequent Northfield Mountain Project owners and the termination options within the agreement are primarily tied to the closure of the Northfield Mountain Project or the removal of the trails from the Northfield Mountain Project license. As such, FirstLight asserts that this agreement meets the Standard Article 5 requirement, "The Licensee, …shall acquire the title in fee or *the right to use in perpetuity* all lands… necessary for the… operation of the project."

TF-AIR#21

Section 2 of Exhibit G lists lands to be added or removed from the project boundary. While the acreages are provided, it is not clear on the maps where the lands are located. Please revise the maps to clearly outline the lands in question and label them as lands to be added or removed with the corresponding acreage and identification of the landowners

Response to TF-AIR#21

The Exhibit G drawings (see Appendix TF-AIR#21) have been revised to clearly demarcate lands to be added or removed from the Project boundary. These areas have been labeled with the current landowner and acreage.

[8]Of the 135.5 acres, 12.5 acres is owned by FirstLight, while the remaining 122 acres is owned by Eversource.

Northfield Mountain Pumped Storage Project- Response to Deficiencies

Exhibit E

NFM-D#1

Section 5.1(d) of the Commission's regulations requires an applicant to consult with appropriate federal and state agencies, Native American tribes, and members of the public that may be interested in the proceeding before filing an application for a license. In addition, section 5.18(b)(5)(ii)(G) requires documentation of such consultation in the form of a list of consulted entities. In section 1.4 of Exhibit E, Northfield Mountain states that documentation of consultation is included in section 6.0 of Exhibit E. However, this section was not included in Exhibit E. Northfield Mountain must provide documentation of consultation.

Response to NFM-D#1

See the response to TF-D#1.

NFM-D#2

Section 5.18(b)(5)(ii)(F) of the Commission's regulations requires a review of applicable comprehensive plans, and consideration of the extent to which the proposed project complies with such plans. Northfield Mountain has not provided an evaluation of the consistency of the project with applicable comprehensive plans. Please review the list of comprehensive plans available on the Commission's webpage at https://ferc.gov/sites/default/files/2020-07/ListofComprehensivePlans.pdf to identify all applicable plans and provide a discussion of how and why the project would, would not, or should not comply with each of these plans.

Response to NFM-D#2:

See the response to TF-D#2.

Exhibit G

NFM-D#3

Section 4.41(h) of the Commission's regulations requires an Exhibit G that identifies the owners of lands within the project boundary. The Exhibit G maps included in the FLA for the project do not identify the landowners. Northfield Mountain must provide the landowner identities and may refer to the Commission's guidance document, Managing Hydropower Project Exhibits, dated August 2014, in particular, appendix 3, page 28, which shows an example Exhibit G map with land ownership identified. Given the number of landowners to be identified, the parcels may be identified on the maps and the landowner information can be provided on separate tables in Exhibit G.

Response to NFM-D#3:

See response to TF-D#3.

Net Investment and Cost of Environmental Measures

NFM-AIR#1

Section 2.2 of Exhibit D, on page D-1, provides the net investment value, but does not state the date for which the value was provided (e.g., as of December 31, 2019). Please provide the applicable date for the net investment value. This will ensure that staff apply the value correctly in the economic analysis.

Response to NFM-AIR#1

The net investment value included in Section 2.2 of Exhibit D, on page D-1, is as of December 31, 2019.

NFM-AIR#2

In section 4.5 of Exhibit D, in table 4.5-1, costs are provided for proposed environmental measures. In various places in the application, additional measures are identified that are not listed in table 4.5-1, including, but not limited to: (1) implement the Recreation Management Plan, Historic Properties Management Plan, Bald Eagle Protection Plan, and Invasive Plant Species Management Plan (pages E-36 to E-37); (2) include or remove lands from the project boundary (page E-37); and (3) implement northern long-eared bat protection measures (page E-45). Please provide a revised table 4.5-1 that lists all proposed measures, both environmental and developmental, and any associated costs. If the measures are considered to have no appreciable cost, please provide a brief explanation.

Response to NFM-AIR#2:

Table 4.5-1 in the AFLA has been updated as shown in Table NFM-AIR#2-1.

Table NFM-AIR#2-1: Cost Estimate of Proposed PM&E Measures at the Northfield Mountain Project

PM&E Measure	Total Capital Cost over 50 years (2019 dollars)	Total Periodic Capital Cost over 50 years (2019 dollars)	Total O&M Cost over 50 years (2019 dollars)	Average[1] Annual Cost over 50 years (2019 dollars)
Periodic Dredging of the Upper Reservoir Intake Channel				
[2]Cost of Dredging Upper Reservoir Intake Channel- 10 hydraulic dredges at $4,000,000/dredge and 4 mechanical dredges at $5,000,000/dredge.	$60,000,000		$70,000 $5,000 x 14 events	$1,201,000
Fish Passage Measures				
Install a Barrier Net at Tailrace/Intake to prevent entrainment	$4,095,000	[3]$931,000	$20,148,000 $438,000/yr for 46 years	$503,000
Recreation				
[4]At Riverview- Relocate the existing Boat Tour Dock given that it would be enclosed by the Barrier Net	$316,000	-	$470,000 $10,000/yr for 47 years	$16,000
Create a new access trail with stairs for a put-in at Riverview	$134,000	-	$329,000 $7,000/yr for 47 years	$9,000
Create a formal access trail for a put-in at Cabot Camp	$30,000		$329,000 $7,000/yr for 47 years	$7,000
Implementation of Management Plans				
Recreation Management Plan			$50,000 $1,000/year for 50 years	
Historic Properties Management Plan			$1,000,000 $20,000/year for 50 years	
Bald Eagle Protection Plan • Prior to tree clearing, if nests are located, MADFW and USFWS will be consulted. Tree clearing will be conducted in accordance with the National Bald Eagle Management Guidelines.			$100,000 $2,000/year for 50 years	
Invasive Plant Species Management Plan • Monitor areas of disturbance caused by routine O&M to ensure invasive plants do not out-compete native vegetation. • Clean/dry boats coming into contact with water. • Post signage at boat launches explaining threats of non-native aquatic plants. Post construction monitoring of disturbed areas.			$500,000 $10,000/year for 50 years	
Implement Northern Long-Eared Protection Measures			$100,000 $2,000/year for 50 years	

PM&E Measure	Total Capital Cost over 50 years (2019 dollars)	Total Periodic Capital Cost over 50 years (2019 dollars)	Total O&M Cost over 50 years (2019 dollars)	Average[1] Annual Cost over 50 years (2019 dollars)
Project Boundary Adjustments				
Removal of 0.2 acre parcel at 39 Riverview Drive in Gill, MA, removal of 8.1 acre parcel referred to as Fuller Farm and addition of 135.5 acres of land south of the Northfield Switching Station.	The costs associated with removing land parcels from the Project Boundary is incorporated in the cost under the HPMP's (archaeological investigations). There is no cost associated with the additional 135.5 acres of land.			
Total	**$64,575,000**	**$931,000**	**$25,146,000**	**$1,772,000**

[1]Rounded to the nearest $1,000. Average Annual Cost= (Total Capital Costs + Total Periodic Costs + Total O&M Costs)/50 years.

[2]FirstLight dredged the Upper Reservoir in 2015 for $4.0M. Assuming a 50-year license term, it was assumed a similar Upper Reservoir dredge would occur 10 times over the 50-year period totaling $40,000,000. Additionally, the Upper Reservoir will be dewatered, and mechanical silt removal will take place every 15 years for a total cost of $20,000,000 over the 50-year period.

[3]Periodic costs include replacing two net panels every 2 years, replacing portions of the debris boom every 10 years and replacing/repairing the riverbed anchors every 10 years. O&M costs are based on removing/installing net annually and is also based on past experience with a smolt barrier net in the same general location.

[4]The proposed barrier net would enclose the existing floating dock at Riverview. Thus, it would be relocated outside of the barrier net.

NFM-AIR#3

In section 9 of Exhibit D, Northfield Mountain provides a list of proposed operational changes and their combined effects on annual generation (table 9.0-1). For each proposed operational change (e.g., operate in accordance with operational flow regime; maintain continuous minimum flow), please note the associated effect on annual generation. This will allow staff to isolate effects of individual measures if resource agencies, stakeholders, or staff identify alternatives to the proposed measures that may have different effects on annual generation.

Response to NFM-AIR#3

See response to TF-AIR#4.

Aquatic Resources

NFM-AIR#4

In section 3.3.2.2.1 of Exhibit E, Northfield Mountain proposes to operate the Northfield Mountain Project Upper Reservoir between elevation 1004.5 and 920 feet National Geodetic Vertical Datum of 1929 (NGVD29). Northfield Mountain evaluates the effects of the proposed changes relative to baseline conditions by using hourly data from the Operations Model to develop flow and elevation duration curves for the Turner Falls Impoundment. In section 3.3.1.8, Northfield Mountain provides approximate hydraulic capacities for the Northfield Mountain Project when operating in pumping mode and generation mode. To enable staff's evaluation of effects of the proposed project on fish entrainment at the Northfield Mountain Project, please provide estimated weekly and/or monthly pumping flow volumes for both current and proposed operations in a typical year.

Response to NFM-AIR#4

See response to TF-AIR#4.

Terrestrial Resources

Response to NFM-AIR#5

In section 2.2.1.2 of Exhibit E, Northfield Mountain proposes to construct several facilities at the project, including a fish barrier and recreation features. However, there is minimal discussion of these activities in section 3.3.4, where environmental effects on terrestrial resources are discussed. To support staff's analysis on the potential effects of these construction activities on vegetation communities, please describe any disturbance to existing vegetation that would occur during the proposed construction activities. If vegetation disturbance would occur, please quantify the extent of temporary and permanent disturbance, by community type.

Response to NFM-AIR#5

See response to TF-AIR#10.

NFM-AIR#6

In section 2.2.4 of Exhibit E, Northfield Mountain proposes to modify the operational range of the Northfield Mountain upper reservoir from 1,000.5-938 feet to 1,004.5-920 feet NGVD29. Please identify vegetation communities, by acreage, in the proposed new inundation zone between elevations 1,000.5 and 1,004.5 feet NGVD29 and describe the effects of the proposed operation on terrestrial resources in that range.

Response to NFM-AIR#6

There is no vegetation on the inboard side of the Upper Reservoir Dam and Dikes and there are no vegetation communities in the proposed inundation zone. FirstLight has never had to control vegetation on the inboard side. Figure NFM-AIR#6-1 shows the drawdown zone when the reservoir elevation was lowered. There are some small areas where the dikes abut the rock outcroppings where some grass has become established as shown in Figure NFM-AIR#6-2.

Figure NFM-AIR#6-1. Northfield Mountain Upper Reservoir Drawdown Zone

Figure NFM-AIR#6-2. Northfield Mountain Upper Reservoir Aerial Photo

Cultural Resources

NFM-AIR#7

In section 3.3.8.1 of Exhibit E, Northfield Mountain provides a summary of all cultural resources identified within the project's Area of Potential Effects (APE), including the status of their eligibility to be listed in the National Register of Historic Places (National Register). In Northfield Mountain's proposed Historic Properties Management Plan (HPMP) for the project, filed on December 4, 2020, further details are provided regarding these resources. However, while Northfield Mountain states that separate HPMPs were prepared for the Northfield Mountain and Turners Falls projects, much of the information in the HPMPs appears to pertain to both projects. For example, table 5.3.1-1 and other information appears to be identical in both HPMPs.

Additionally, letters from the Massachusetts Historical Commission (MHC) dated March 7, 2019, and November 21, 2019 (filed May 6, 2019, and December 3, 2019 respectively), provide the MHC's determinations of National Register eligibility. However, staff has identified some minor discrepancies between what is contained in these letters and what is provided in the HPMP. For example, in MHC's March 7, 2019, letter, site GIL-MA-14.2 (Munn's Ferry 1 site) is described as ineligible for listing in the National Register and site GIL.HA.9 (Munn's Ferry site) is eligible. Table 3.1-3 also indicates that MA-14.2 is not eligible, but table 5.3.1-1 of the HPMP states that there has been no determination of eligibility for either site.

To clarify which resources are located only within the APE at the Northfield Mountain Project, please file a new, comprehensive table of all resources documented within the APE for the project, identifying sites that are also located at the Turners Falls Project, and with any necessary updates to site information and the dates of MHC's eligibility determinations.

Response to NFM-AIR#7

See Response to TF-AIR#15.

NFM-AIR#8

In section 3.3.8.2 of Exhibit E, Northfield Mountain identifies two parcels of land that are proposed for removal from the Northfield Mountain Project boundary (Riverview Drive [0.2 acres] and Fuller Farm [8.1 acres]). According to the HPMP, the Riverview Drive property contains one historic-period resource (GIL.043). The Fuller Farm property is considered sensitive for both precontact and historic-period resources. Northfield Mountain indicates in Exhibit E that the house, barn, and outbuildings are not historically significant, and a footnote refers to the Historic Architectural Resources Survey filed on January 21, 2015. However, while the 2015 report refers to the nearby Frederick Morgan, Sr. property, it does not appear to specifically reference the Fuller Farm property itself. The Phase IA report filed on May 15, 2015 does discuss the farm but does not provide a National Register evaluation of the structures. In the HPMP, Northfield Mountain proposes to conduct a Phase IB archaeological survey of the property if required for transfer. According to 36 CFR 800.5(a)(2)(vii), the transfer, lease, or sale of property out of federal control without conditions to ensure the long-term preservation of historic properties on the property may constitute an adverse effect. Please clarify the National Register status of the Fuller Farm property, describe any specific proposed measures for the lands proposed for removal, including the Riverview Drive property, and any consultation records with MHC involving any proposed measures and/or post-licensing studies.

Response to NFM-AIR#8

The Fuller Farm property, including the house, barn, outbuildings, and associated pastureland off Millers Falls Road in Northfield, is included in the MHC's *Inventory of Historic and Archaeological Assets* as the Frederick Morgan, Sr. House/Morgan-Fuller Residence (MHC NFL.178). The 2015 technical report, *Relicensing Study 3.7.2, Historic Architectural Resources Survey & National Register Evaluation, Northfield Mountain Pumped Storage Project (No. 2485), And Turners Falls Hydroelectric Project (No. 1889), Franklin County, Massachusetts, Cheshire County, New Hampshire, Windham County, Vermont*, did not recommend the property as eligible for listing in the National Register of Historic Places.

FirstLight has previously corresponded with MHC regarding removal of the property from FERC jurisdiction. In its review letter of January 20, 2011, the MHC indicated that undisturbed portions of the parcel are archaeologically sensitive and that an archaeological survey should be conducted to determine the presence or absence of significant archaeological resources. To assist in preserving the property's potentially significant historic and archaeological characteristics, the MHC also recommended that FirstLight consult with local and regional land trusts and/or conservation organizations to place the parcel under a conservation easement. If a conservation restriction (M.G.L C.184, ss.31-33) is proposed for the parcel, then the MHC would request the opportunity to review and comment on suitable stipulation language.

In its AFLA review letter of January 7, 2021, the MHC requested that an intensive (locational) archaeological investigation be conducted for archaeologically sensitive portions of the Fuller Farm in Northfield and 39 Riverside Drive in Gill to identify any intact, significant archaeological resources prior to transfer or removal from federal oversight. A plan for avoidance or mitigation of any intact, significant archaeological resources identified in the properties should be prepared and implemented prior to any transfer or removal out of the project boundaries. Prior to the survey the MHC requested review of the State Archaeologist's permit application(s) (950 CMR 70) to conduct the intensive (locational) survey for review and comment.

FirstLight intends to conduct the requested State Archaeologists' permit application and intensive (locational) survey for both the Fuller Farm property and 39 Riverview Drive property following issuance of its license and prior to transfer of the properties out of FERC jurisdiction. FirstLight will also prepare and implement a plan for avoidance or mitigation of any intact, significant archaeological resources identified in the properties prior to any transfer or removal out of FERC Jurisdiction.

NFM-AIR#9

In section 3.3.8.2 of Exhibit E, Northfield Mountain states that several recreational improvements are proposed that may affect cultural resources within the APE. Please clarify which cultural resources may be affected by these improvements.

Response to NFM-AIR#9

There are no known archaeological resources within the currently proposed boundaries of the new recreational improvement sites, including, near Northfield Mountain: Riverview Boat Tour, Proposed Access Trail at Riverview, and Proposed Formal Access Trail Put-in at Cabot Camp.

The Proposed Formal Access Trail Put-in at Cabot Camp is located adjacent and south of the Cabot Camp Historic District Boundary and archaeological site 19-FR-353 (Cabot Camp site). No impacts are anticipated to these resources. The Proposed Riverview Boat Tour Dock Relocation and Proposed Access

Trail at Riverview both occur within the State-Inventoried Northfield Farms Agricultural/Residential District.

It should be noted that during the planning stages of these projects, FirstLight will be required to consult with the MHC in advance through submittal of Project Notification Forms (PNFs) and scaled existing and proposed project plans for their review and comment.

NFM-AIR#10

In section 3.3.8.2 of Exhibit E, Northfield Mountain states that erosion as a result of project operation was identified at two cultural resource sites. Please identify these sites and provide additional information about the type and extent of project-related erosion at both.

Response to NFM-AIR#10

See response to TF-AIR#18.

NFM-AIR#11

In the proposed HPMP, Northfield Mountain notes that visitors to the project area are collecting artifacts at several eligible or unevaluated archaeological sites. Please clarify which sites are being affected by artifact collection, and whether these sites are accessible as a result of project features, such as hiking trails, or whether these sites would otherwise be accessible absent project features. Please file this information as privileged pursuant to section 388.112 of the Commission's regulations.

Response to NFM-AIR#11

See Response to TF-AIR#19.

Project Boundary

NFM-AIR#12

The Exhibit G maps identify lands to be acquired. For these lands, please provide an explanation of what the acquisition will entail (e.g., fee ownership, land rights, flowage rights) and how the lands will be used for project purposes.

Response to NFM-#12:

See response to TF-AIR#20.

NFM-AIR#13

Section 2 of Exhibit G lists lands to be added or removed from the project boundary. While the acreages are provided, it is not clear on the maps where the lands are located. Please revise the maps to clearly outline the lands in question and label them as lands to be added or removed with the corresponding acreage and identification of the landowners.

Response to NFM-AIR#13

The Exhibit G drawings (see Appendix NFM-AIR#13) have been revised to clearly demarcate lands to be added or removed from the project boundary. These areas have been labeled with the current landowner and acreage.

Appendices

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Appendix TF-D#1. List of Consulted Stakeholders

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Throughout the ILP, FirstLight has engaged in substantive consultation with relicensing participants, and have filed all licensing materials with FERC. Names and addresses for federal, state, and interstate resource agencies, Indian tribes, or members of the public with which FirstLight has consulted during relicensing, is included below.

Kate Atwood
US Army Corps of Engineers
696 Virginia Road
Concord, MA, 04712

Edward and Nancy Aubrey
Citizen
PO Box 41
Turners Falls, MA, 01376

Roger and Kathleen Augustine
Citizen
124 North Cross Rd
Gill, MA, 01354

Ms. Liz Austin
CT River Watershed Council
lizaustin44@comcast.net

Ms. Stephanie Axon and Mr. Frank Podlesney
Citizen
174 Millers Falls Rd
Northfield, MA, 01360

Ms. Senator Kelly Ayotte
US Senate
144 Russell Senate Office Bldg
Washington, DC, 20510

Mr. Andy Backman
Department of Conservation and Recreation
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andy.backman@state.ma.us

Barrows Coal Co Inc.
Citizen
35 Main Street
Brattleboro, VT, 05301-3263

Ms. Maggie Bartenhagen
Windham Regional Commission
139 Main St Ste 505
Brattleboro, VT, 05301
wrc@sover.net

Christi Bartos and Morton Lucas
Citizen
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Yvonne Basque
Vermont State Historic Preservation Office
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Mr. Michael Bathory
Landowners and Concerned Citizens for License Compliance
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Mr. Adam Beeco
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John Bennett
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Kristina Bergeron
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Charlie Blanker
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Jeffrey Blomstedt
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Mr. Richard Blumenthal
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702 Hard Senate Office Bldg
Washington, DC, 20510

Board of Selectmen, Town of Hinsdale
Town of Hinsdale
Town Hall, 11 Main St
Hinsdale, NH, 03451

Barry and Brian Bordner
Citizen
35 Holly Avenue
Northfield, MA, 01360

Francis and Thomas Bertrang
Citizen
46 South Third Street
Meriden, CT, 06450

Mr. Clay J. Bishop
Citizen
288 Northfield Rd
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Mr. Wade Blackwood
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Natalie.Blais@mail.house.gov

Donald and Lillie Mae Blodgett
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124 Blodgett Rd
Vernon, VT, 05354

Mr. Keith Bluecloud
Bureau of Indian Affairs
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Board of Selectmen
Town of Gill
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Ellery & Diane Boutin
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Gill, MA, 01354

Paul and Barbara Boyce
Citizen
P.O. Box 65
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Mr. Bruce "Two Dogs" Bozsum
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Appendix TF-D#2. Consistency with Comprehensive Plans

Section 10(a) (2) of the Federal Power Act requires the Applicant to review applicable federal and state comprehensive plans, and to consider the extent to which a Project is consistent with the federal or state plans for improving, developing, or conserving a waterway or waterways affected by the Project. A list of existing FERC-approved States of Massachusetts, New Hampshire and Vermont and federal comprehensive plans published by FERC in July 2020 was reviewed. Of these, the following plans are pertinent to the Project. The Licensee found no inconsistencies with the plans except the following plan:

Connecticut River Atlantic Salmon Commission. 2020. Connecticut River American Shad Management Plan. Sunderland, Massachusetts. June 9, 2017, updated February 28, 2020.

The Licensee has addressed the inconsistency in Exhibit E, Aquatic Resources, Section 3.3.3.1.2.2.1 of the Amended Final License Application.

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List of Comprehensive Plans in Massachusetts		
1	Atlantic States Marine Fisheries Commission. 1995. Interstate fishery management plan for Atlantic Striped Bass: • Report No. 24, March 1995, and • Report No. 34 January 1998.	These management plans for Atlantic striped bass (Morone saxatilis) present striped bass management history, fishery data, and catch and weight-at-age for commercial and recreational landings. A virtual population analysis is presented by a variety of resource agencies. The 1998 report concludes that the Atlantic coastal stocks of striped bass are at a high level of abundance and are being exploited at a sustainable level. ASMFC estimates that spawning stock biomass should continue to increase over the short term under current levels of management. The Project is not located on a river segment managed for striped bass, and this plan is therefore, not applicable to the Project.
2	Atlantic States Marine Fisheries Commission (ASMFC). 1999. Amendment 1 to the Interstate Fishery Management Plan for shad and river herring. (Report No. 35). April 1999.	The stated goal of the ASMFC 1999 Amendment 1 to the Interstate FMP for shad and river herring was to protect, enhance, and restore East Coast migratory spawning stocks of American shad (*Alosa sapidissima*), hickory shad (*Alosa mediocris*), and river herrings in order to achieve stock restoration and maintain sustainable levels of spawning stock biomass. Objectives identified in the plan were to prevent overfishing of American shad stocks by constraining fishing mortality; develop definitions of stock restoration; determine appropriate target mortality rates and specify rebuilding schedules for American shad populations within the management unit; maintain existing or more conservative regulations for hickory shad and river herring fisheries until new stock assessments suggest changes are necessary; and promote improvements in degraded or historic alosine habitat throughout the species range. The AFLA is consistent with this Plan.
3	Atlantic States Marine Fisheries Commission. 2000. Technical Addendum 1 to Amendment 1 of the Interstate Fishery Management Plan for shad and river herring. February 9, 2000.	The ASMFC 2000 Technical Addendum 1 to Amendment 1 of the Interstate FMP for shad and river herring addresses clarifications and corrections in Amendment 1. Many of the clarifications and corrections are minor. Amendment 1 was written to "protect, enhance, and restore East Coast migratory spawning stocks of American shad, hickory shad, and river herrings in order to achieve stock restoration and maintain sustainable levels of spawning stock biomass." The AFLA is consistent with this Plan.
4	Atlantic States Marine Fisheries Commission. 2009. Amendment 2 to the Interstate Fishery Management	The objectives of Amendment 2 were: 1) Prevent further declines in river herring (alewife and blueback herring) abundance, 2) Improve our understanding of bycatch

	Plan for shad and river herring, Arlington, Virginia. May 2009.	mortality by collecting and analyzing bycatch data, 3) Increase the understanding of river herring fisheries, stock dynamics and population health through fishery-dependent and independent monitoring, in order to allow for evaluation of management performance, 4) Retain existing or more conservative regulations for American shad and hickory shad. Requirements for American shad and hickory shad regulations and monitoring are detailed in Amendment 1 to the Shad and River Herring Fishery Management Plan, and 5) Promote improvements in degraded or historic alosine critical habitat throughout the species' range. The AFLA is consistent with this Plan.
5	Atlantic States Marine Fisheries Commission. 2010. Amendment 3 to the Interstate Fishery Management Plan for shad and river herring, Arlington, Virginia. February 2010.	The objectives of Amendment 3 were: 1) Maximize the number of juvenile recruits emigrating from freshwater stock complexes, 2) Restore and maintain spawning stock biomass and age structure to achieve maximum juvenile recruitment, 3) Manage for an optimum yield harvest level that will not compromise Objectives 1 and 2, and 4) Maximize cost effectiveness to the local, state, and federal governments, and the ASMFC associated with achieving Objectives 1 through 3. The AFLA is consistent with this Plan.
6	Atlantic States Marine Fisheries Commission. 2000. Interstate Fishery Management Plan for American Eel (*Anguilla rostrata*). (Report No. 36). April 2000.	The goal of this plan is to conserve and protect the American eel resource to ensure its continued role in the ecosystems while providing the opportunity for its commercial, recreational, scientific, and educational use. The objectives of the Plan were: 1) Improve knowledge of eel utilization at all life stages through mandatory reporting of harvest and effort by commercial fishers and dealers, and enhanced recreational fisheries monitoring, 2) Increase understanding of factors affecting eel population dynamics and life history through increased research and monitoring, 3) Protect and enhance American eel abundance in all watersheds where eel now occur, 4) Where practical, restore American eel to those waters where they had historical abundance but may now be absent by providing access to inland waters for glass eel, elvers, and yellow eel and adequate escapement to the ocean for pre-spawning adult eel, and 5) Investigate the abundance level of eel at the various life stages, necessary to provide adequate forage for natural predators and support ecosystem health and food chain structure. The AFLA is consistent with this Plan.
7	Atlantic States Marine Fisheries Commission. 2013. Amendment 3 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. August 2013.	The 2012 American Eel Benchmark Stock Assessment found that the coastwide stock has declined in recent decades and the stock was declared depleted. Additionally, the prevalence of significant downward trends in multiple surveys across the coast is a

		cause for concern. In response the American Eel Management Board (Board) initiated the development of Addendum 3 with the goal of furthering eel conservation and reducing mortality throughout all life stages. As approved, this addendum reduces overall mortality of American eel. The AFLA is consistent with this Plan.
8	Atlantic States Marine Fisheries Commission. 2014. Amendment 4 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. October 2014.	As the second phase of management in response to the 2012 stock assessment, the goal of Addendum 4 was to continue to reduce overall mortality and increase overall conservation of American eel stocks of commercial glass, yellow, and silver eel fisheries. The AFLA is consistent with this Plan.
9	Connecticut River Atlantic Salmon Commission. 1998. Strategic plan for the restoration of Atlantic Salmon in the Connecticut River. Sunderland, Massachusetts. July 1998. 106 pp.	The Plan describes how the multi-state/federal, interagency Atlantic Salmon Restoration Program (Program) was guided by the Commission with recommendations from the Technical Committee. The plan describes the goals, objectives, and strategies for the restoration of Atlantic Salmon in the Connecticut River Watershed. In 2012, the restoration plan was stopped and therefore the consistency of the AFLA with this plan is not necessary.
10	Connecticut River Atlantic Salmon Commission. 2020. Connecticut River American Shad Management Plan. Sunderland, Massachusetts. June 9, 2017, updated February 28, 2020.	The objective of this plan is to: 1. Achieve and sustain a minimum population of 1.7 million adult American Shad entering the mouth of the Connecticut River annually, 2. Achieve and sustain a management target adult return rate of a minimum of 203 adults per hectare in the main stem, 3. Achieve a run of > 1,027,000 shad downstream of Holyoke; Pass > 687,000 shad at Holyoke Dam; and Pass >397,000 shad at Turners Falls Dam; and Pass >227,000 shad at Vernon Dam, 4. Achieve and sustain a management target adult return rate of a minimum of 111 adults per hectare in targeted tributaries, 5. Achieve an adult stock structure that over a five-year running average has a repeat spawner component minimum of 15% for each sex; maintains a sex ratio close to 1:1, and is composed of a diverse age structure, including fish age-6 and older, 6. Establish safe, timely, and effective upstream and downstream fish passage for returning adults, post spawn adults, and juveniles, 7. Establish upstream passage performance measures, addressing fishway attraction, entry, internal passage efficiency and delay at these three stages,

		as suitable information is available, to support other objectives of this Plan, and 8. Establish downstream performance measures, for adult and juvenile life stages that maximizes survival for through-project passage and that address downstream bypass route attraction, entry, passage efficiency, and delay, as suitable information is available to support objectives of this Plan. The Licensee has addressed the inconsistency with this Plan in Exhibit E, Aquatic Resources, Section 3.3.3.1.2.2.1 of the Amended Final License Application (AFLA).
11	Massachusetts Department of Environmental Quality Engineering. 1983. Connecticut River Basin water quality management plan. Westborough, Massachusetts. June 1983. 95 pp.	The Massachusetts Department of Environmental Quality Engineering 1983 Connecticut River Basin water quality management plan relates to water quality information on the portion of the Connecticut River Basin in the State of Massachusetts and updates the 1975 plan. It includes a section on water quality, wastewater discharges and abatement programs, combined sewer, and stormwater discharges, wasteload allocations, non-point pollution, toxic pollutants, and future monitoring programs. The AFLA is consistent with this Plan.
12	Massachusetts Executive Office of Energy and Environmental Affairs. Statewide Comprehensive Outdoor Recreation Plan (SCORP): Massachusetts Outdoor 2006. Boston, Massachusetts	See below (#13) for the 2012 plan.
13	Massachusetts Executive Office of Energy and Environmental Affairs. Statewide Comprehensive Outdoor Recreation Plan (SCORP) 2012. Boston, MA.	The SCORP helps guide the distribution of federal funding from the Land and Water Conservation Fund (LWCF) to state agencies and municipalities for the acquisition of open space, renovation of parks, and development of new parks. In Massachusetts, the LWCF is administered through the Executive Office of Energy and Environmental Affairs (EEA). The SCORP provides information on population trends, economics, and the history of outdoor recreation in Massachusetts. It discusses the state and demand of outdoor recreation in the state and identifies goals and objectives of the SCORP. The four goals identified in the SCORP are: 1. Increase the availability of all types of trails for recreation, 2. Increase the availability of water-based recreation, 3. Invest in recreation and conservation areas that are close to home for short visits, and 4. Invest in racially, economically, and age diverse neighborhoods given their projected increase in participation in outdoor recreation.

		The Connecticut River area in proximity of the Projects is highly utilized for many different recreational including water-based activities, hiking, and cross country skiing, including many areas within the Project boundaries and the AFLA is in consistent with this Plan. .
14	Massachusetts Department of Fish and Game. 2006. Comprehensive Wildlife Conservation Strategy. West Boylston, MA. September 2006.	The goal of the Massachusetts Department of Fish and Game 2006 Comprehensive Wildlife Conservation Strategy (CWCS) is to conserve the wildlife biodiversity of Massachusetts. The plan identifies the habitats and species in the greatest need of conservation and lists the primary strategies used to conserve these species and their habitats. It is organized around 22 habitat types ranging from large-scale habitats (i.e., large unfragmented landscape mosaics) to small- scale habitats (i.e., vernal pools). The plan identifies 257 animal species in greatest need of conservation within these habitat types and provides a summary for each species including distribution, life-history information, and a list of key threats. The AFLA is consistent with this Plan.
15	National Marine Fisheries Service. 1998. Final Amendment #11 to the Northeast Multi-species Fishery Management Plan; Amendment #9 to the Atlantic sea scallop Fishery Management Plan; Amendment #1 to the monkfish Fishery Management Plan; Amendment #1 to the Atlantic Salmon Fishery Management Plan; and Components of the proposed Atlantic herring Fishery Management Plan for Essential Fish Habitat. Volume 1. October 7, 1998.	The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act, known as the Sustainable Fisheries Act (SFA), emphasized the importance of habitat protection to healthy fisheries and strengthened the essential fish habitat (EFH) protection of marine, estuarine, and anadromous finfish, mollusks, and crustaceans. The objectives of these amendments were to: 1. To the maximum extent possible, to identify and describe all essential fish habitat for the managed species of finfish and mollusks, 2. To identify all major threats (fishing and non-fishing related) to the essential fish habitat of the managed species, and 3. To identify existing and potential mechanisms to protect, conserve and enhance the essential fish habitat of the managed species, to the extent practicable. The AFLA is consistent with these Plans.
16	National Marine Fisheries Service. 1998. Final Recovery Plan for the Shortnose Sturgeon (*Acipenser brevirostrum*). Prepared by the Shortnose Sturgeon Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. December 1998.	The National Marine Fisheries Service (NMFS) is responsible for administering the Endangered Species Act (ESA) for marine and anadromous species including the shortnose sturgeon. Under the direction of Section 4(f) of the ESA, the NMFS developed a recovery plan to work towards delisting the shortnose sturgeon, which was listed as endangered on March 11, 1967 (32 [FR] 4001). The goal of the recovery plan is to delist shortnose sturgeon populations throughout their range. The long-term

		recovery objective for the shortnose sturgeon is to recover all discrete population segments to levels of abundance at which they no longer require protection under the ESA by establishing listing criteria for shortnose sturgeon population segments, protecting shortnose sturgeon and their habitats, rehabilitating shortnose sturgeon populations and habitats, as well as implementing recovery tasks. As described in the Biological Assessment filed by FirstLight for Shortnose Sturgeon, the AFLA is consistent with this Plan.
17	National Park Service. The Nationwide Rivers Inventory. Department of the Interior, Washington, D.C. 1993.	The Project location is included in the inventory of this management plan and it is a comprehensive study of one or more of the beneficial uses of a waterway, waterways, and/or water body. It specifies the standards, data, and methodology used in the inventory and is filed with the Secretary of the Commission. The AFLA is consistent with these Plans.
18	Technical Committee for Fisheries Management of the Connecticut River. 1981. Connecticut River Basin fish passage, flow, and habitat alteration considerations in relation to anadromous fish restoration. Hadley, Massachusetts. October 1981.	The Technical Committee for Fisheries Management of the Connecticut River 1981 Connecticut River Basin Fish Passage, Flow, and Habitat Alterations Considerations in Relation to Anadromous Fish Restoration report is divided into the three sections, each of which addresses an area critical to the restoration of anadromous fish. The first section addresses fish passage requirements associated with the program, the second section discusses the relationship between river flows and the restoration effort, and the third section delineates reaches of the river that are important to anadromous fish. There is substantial overlap with this plan from 40 years ago and Connecticut River Atlantic Salmon Commission. 2020. Connecticut River American Shad Management Plan. Sunderland, Massachusetts. June 9, 2017, updated February 28, 2020. Consistency with the 2020 American Shad Management Plan is discussed under #10.
19	U.S. Fish and Wildlife Service. 1989. Atlantic Salmon restoration in New England: Final environmental impact statement 1989-2021. Department of the Interior, Newton Corner, Massachusetts. May 1989.	The USFWS's 1989 Atlantic salmon restoration in New England: Final Environmental Impact Statement, proposes to restore self-sustaining populations of Atlantic salmon by the year 2021 to the species' historical range in New England. To accomplish the goal, USFWS will: 1) Utilize USFWS hatcheries and Fisheries Assistance field stations to reestablish and evaluate salmon populations, 2) Consider the needs of salmon restoration in the process of reviewing Federal projects, permits, and licenses,

		3) Provide funding to state agencies for salmon restoration through the administration of the Federal Aid programs, and 4) Conduct research on the biology of the Atlantic salmon. USFWS states that effective upstream and downstream fish passage is a fundamental requirement of the goal of restoring self-sustaining populations of Atlantic salmon by the year 2021. The program was discontinued in 2012 and therefore the Plan is not applicable to the Projects.
20	U.S. Fish and Wildlife Service. 1995. Silvio O. Conte National Fish and Wildlife Refuge final action plan and environmental impact statement. Department of the Interior Turners Falls, Massachusetts. October 1995.	This Plan and environmental impact statement provide: 1. Background on the refuge, 2. The planning process and laws that affect the planning and public and partner issues, opportunities, and concerns, 3. An overview of the Connecticut River watershed and the existing environment, 4. Analysis of the different scenarios for managing the refuge, 5. The benefits and adverse impacts for implementing the different scenarios, and 6. Descriptions and details of the public and partner meetings held during the planning process. The AFLA is consistent with this Plan.
21	U.S. Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American waterfowl management plan. Department of the Interior. Environment Canada. May 1986.	The USFWS's 1986 North American Waterfowl Management Plan, updated in 1998, expands on the 1986 Plan seeking to restore waterfowl populations in Canada, the United States, and Mexico to levels recorded during the 1970s, which was considered a benchmark decade for waterfowl. The plan outlines the following three visions to advance waterfowl conservation: 1. Ensure that plan implementation is guided by biologically based planning and is refined through ongoing evaluation, 2. Define the landscape conditions needed to sustain waterfowl and other wetland associated species. Participate in the development of conservation, economic, management, and social policies and programs that affect the ecological health of these landscapes, and

		3. Collaborate with other conservation efforts and reach out to other sectors and communities to form alliances. These visions are designed to improve the status of North America's waterfowl, promote sustainable landscapes, and broaden partnerships internationally, nationally, regionally, and locally. The Projects are not located in an area managed for waterfowl, and this plan is, therefore, not applicable to the Projects.
List of Comprehensive Plans in New Hampshire		
22	Atlantic States Marine Fisheries Commission. 1999. Amendment 1 to the Interstate Fishery Management Plan for shad and river herring. (Report No. 35). April 1999.	(See response to #2)
23	Atlantic States Marine Fisheries Commission. 2000. Technical Addendum 1 to Amendment 1 of the Interstate Fishery Management Plan for shad and river herring. February 9, 2000.	(See response to #3)
24	Atlantic States Marine Fisheries Commission. 2009. Amendment 2 to the Interstate Fishery Management Plan for shad and river herring, Arlington, Virginia. May 2009.	(See response to #4)
25	Atlantic States Marine Fisheries Commission. 2010. Amendment 3 to the Interstate Fishery Management Plan for shad and river herring, Arlington, Virginia. February 2010.	(See response to #5)
26	Atlantic States Marine Fisheries Commission. 1998. Interstate fishery management plan for Atlantic Striped Bass. (Report No. 34). January 1998.	(See response to #1)

27	Atlantic States Marine Fisheries Commission. 2000. Interstate Fishery Management Plan for American Eel (*Anguilla rostrata*). (Report No. 36). April 2000.	(See response to #6)
28	Atlantic States Marine Fisheries Commission. 2008. Addendum II to the Fishery Management Plan for American Eel. Arlington, Virginia. October 23, 2008. Pages 1-7.	This Addendum recommends stronger regulatory language to improve upstream and downstream passage of American eel to state and federal regulatory agencies. However, it does not alter any provisions of the Interstate Fishery Management Plan for American Eels or the subsequent Addendum 1. The AFLA is consistent with this Plan.
29	Atlantic States Marine Fisheries Commission. 2013. Amendment 3 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. August 2013.	(See response to #7)
30	Atlantic States Marine Fisheries Commission. 2014. Amendment 4 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. October 2014.	(See response to #8)
31	Connecticut River Atlantic Salmon Commission. 2020. Connecticut River American Shad Management Plan. Sunderland, Massachusetts. June 9, 2017, updated February 28, 2020.	(See response to #10)
32	Connecticut River Joint Commission. New Hampshire Department of Environmental Services. 1997. Connecticut River corridor management plan. Charlestown, New Hampshire. Concord, New Hampshire. May 1997.	This plan focus is the recreation issues of river-wide significance in New Hampshire and Vermont, this overview and was based upon input from the Connecticut River Joint Commissions (CRJC) and its five local river management advisory subcommittees for the Headwaters, Riverbend, Upper Valley, Mount Ascutney, and Wantastiquet regions. Each region has its own distinct plan, yet many of the same themes emerge and are reflected in CRJC's overview of the issues and opportunities that are important throughout the Connecticut River valley. The AFLA is consistent with this Plan.

33	Connecticut River Joint Commission. New Hampshire Department of Environmental Services. 2013. Connecticut River Recreation Management Plan: Upper Valley Region. Concord, New Hampshire.	The Upper Valley Region's plan is a blueprint for stewardship of the Connecticut River – for communities, landowners, visitors, businesses, and agencies on both shores. Gathering together to create this plan for the Upper Valley segment of the river were representatives from the towns of Piermont, Orford, Lyme, Hanover, and Lebanon, New Hampshire, and Bradford, Fairlee, Thetford, Norwich, and Hartford, Vermont. Due to the Upper Valley location of this Plan, it is not applicable to the Projects.
34	Connecticut River Joint Commission. New Hampshire Department of Environmental Services. 2013. Connecticut River Recreation Management Plan: Wantastiquet Region. Concord, New Hampshire.	The Wantastiquet Region's plan is a blueprint for stewardship of the Connecticut River – for communities, landowners, visitors, businesses, and agencies on both shores. Gathering together to create this plan for the Wantastiquet segment of the river were representatives from the towns of Walpole, Westmoreland, Chesterfield, and Hinsdale, New Hampshire and Westminster, Putney, Dummerston, and Brattleboro, Vermont. The AFLA is consistent with this Plan.
35	Connecticut River Joint Commission. New Hampshire Department of Environmental Services. 2013. Connecticut River Recreation Management Plan: Riverbend Region. Concord, New Hampshire.	The Riverbend Region's plan is a blueprint for stewardship of the Connecticut River – for communities, landowners, visitors, businesses, and agencies on both shores. Gathering together to create this plan for the Riverbend segment of the river were representatives from the towns of Lancaster, Dalton, Littleton, Monroe, Bath, and Haverhill, New Hampshire and Guildhall, Lunenburg, Concord, Waterford, Barnet, and Newbury, Vermont. Due to the Riverbend location of this Plan, it is not applicable to the Projects.
36	Connecticut River Joint Commission. New Hampshire Department of Environmental Services. 2013. Connecticut River Recreation Management Plan: Mt. Ascutney Region. Concord, New Hampshire.	The Mt Ascutney Region plan is a blueprint for stewardship of the Connecticut River – for communities, landowners, visitors, businesses, and agencies on both shores. Gathering together to create this plan for the Mt. Ascutney segment of the river were representatives from the towns of Plainfield, Cornish, and Claremont, NH, and Hartland, Windsor, Weathersfield, Springfield, and Rockingham, VT. Due to the Mt Ascutney location of this Plan, it is not applicable to the Projects.
37	National Marine Fisheries Service. 1998. Final Amendment #11 to the Northeast Multi-species Fishery Management Plan; Amendment #9 to the Atlantic sea scallop Fishery Management Plan;	(See response to #15)

	Amendment #1 to the monkfish Fishery Management Plan; Amendment #1 to the Atlantic Salmon Fishery Management Plan; and Components of the proposed Atlantic herring Fishery Management Plan for Essential Fish Habitat. Volume 1. October 7, 1998.	
38	National Marine Fisheries Service. 1998. Final Recovery Plan for the Shortnose Sturgeon (*Acipenser brevirostrum*). Prepared by the Shortnose Sturgeon Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. December 1998.	(See response to #16)
39	National Park Service. The Nationwide Rivers Inventory. Department of the Interior, Washington, D.C. 1993.	(See response to #17)
40	New Hampshire Office of State Planning. 1977. Wild, scenic, & recreational rivers for New Hampshire. Concord, New Hampshire. June 1977. 63 pp.	This document contains guidance for establishing a state-level rivers program in accordance with the Nationwide Rivers Inventory (see above) and for preparing detailed individual river studies and plans for potential wild, scenic, and recreational rivers. The plan does not include any specific management guidance for the Connecticut River.
41	New Hampshire Office of State Planning. 1989. New Hampshire wetlands priority conservation plan. Concord, New Hampshire. 95 pp.	This plan was developed under the Emergency Wetlands Resources Act of 1986, and each State Comprehensive Outdoor Recreation Plan must specifically address wetlands with that state as an important outdoor recreation resource. The AFLA is consistent with this Plan.
42	New Hampshire Office of Energy and Planning. New Hampshire Statewide Comprehensive Outdoor Recreation Plan (SCORP): 2008-2013. Concord, New Hampshire. December 2007.	The NH SCORP focuses on enhancing and increasing the supply of urban parks, diversifying the type of recreational opportunities available, and promoting health and wellness through local outdoor recreation opportunities in the state of New Hampshire. The Projects are consistent with this Plan because they provide numerous FERC Project recreational areas with a variety of activities, amenities, and facilities.

43	New Hampshire Office of State Planning. 1991. Public access plan for New Hampshire's lakes, ponds, and rivers. Concord, New Hampshire. November 1991. 65 pp.	The NH Public Access Plan contains guidance on improving year-round public access to state waters, increasing public access to facilities and support services for boaters and non-boaters, and enhancing access for the handicapped. The Projects are consistent with this Plan because they provide access to recreational opportunities for both boaters and non-boaters alike without discrimination and with many barrier free options.
44	State of New Hampshire. 1991. New Hampshire rivers management and protection program [as compiled from NH RSA Ch. 483, HB 1432-FN (1990) and HB 674-FN (1991)]. Concord, New Hampshire. 19 pp.	This program was created due to competing interests and demands for limited river resources and recognized the need for coordinated and local river resources management. The purpose of this plan is to protect unique NH rivers for the benefit of present and future generations through local and state resource management. The AFLA is consistent with this Plan.
45	State of New Hampshire. 1992. Act designating segments of the Connecticut River for New Hampshire's rivers management and protection program. Concord, New Hampshire. May 15, 1992. 7 pp.	NH R.S.A. 483:15 VIII designated sections of the Connecticut River in New Hampshire as protected under the NH Rivers Management and Protection Program. The designation includes a listing of river sections classified as natural, rural, or community sections with varying levels of protection as defined in NH RSA 483:9 through 483:9-c. An outcome of this designation was the development of a River Management Plan by CRJC in five regional plans for the Connecticut River (Headwaters, Riverbend, Upper Valley, Mount Ascutney, and Wantastiquet). The AFLA is consistent with this Plan.
46	U.S. Fish and Wildlife Service. 1989. Atlantic Salmon restoration in New England: Final environmental impact statement 1989-2021. Department of the Interior, Newton Corner, Massachusetts. May 1989.	(See response to #19)
47	U.S. Fish and Wildlife Service. Undated. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C.	The Recreational Fisheries Policy sets forth FWS's national goals and strategies for recreational fisheries management. These goals include: 1. The preservation/increase in productivity of fisheries resources through conservation and enhancement as well as promoting support, conducting research, and development in support of fisheries management,

		2. Ensure and enhance the quality, quantity, and diversity of recreational fishing opportunities through access, designation of additional lands, development, increased productivity, and conservation, 3. Develop and enhance partnerships with agencies and private sector to manage and conserve fisheries, and 4. Cooperate to maintain a healthy recreation fishing industry through management and conservation. The AFLA is consistent with this Plan.
List of Comprehensive Plans in Vermont		
48	Atlantic States Marine Fisheries Commission. 2000. Interstate Fishery Management Plan for American Eel (*Anguilla rostrata*). (Report No. 36). April 2000.	(See response to #6)
49	Atlantic States Marine Fisheries Commission. 2008. Amendment 2 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. October 2008.	(See response to #28)
50	Atlantic States Marine Fisheries Commission. 2013. Amendment 3 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. August 2013.	(See response to #7)
51	Atlantic States Marine Fisheries Commission. 2014. Amendment 4 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. October 2014.	(See response to #8)
52	Connecticut River Atlantic Salmon Commission. 2020. Connecticut River American Shad Management Plan. Sunderland, Massachusetts. June 9, 2017, updated February 28, 2020.	(See response to #10)

53	Connecticut River Atlantic Salmon Commission. 1998. Strategic plan for the restoration of Atlantic Salmon to the Connecticut River. Sunderland, Massachusetts. July 1998. 106 pp.	(See response to #16)
54	Connecticut River Joint Commission. New Hampshire Department of Environmental Services. 2013. Connecticut River Recreation Management Plan: Upper Valley Region. Concord, New Hampshire.	(See response to #33)
55	Connecticut River Joint Commission. New Hampshire Department of Environmental Services. 2013. Connecticut River Recreation Management Plan: Wantastiquet Region. Concord, New Hampshire. 114	(See response to #34)
56	Connecticut River Joint Commission. New Hampshire Department of Environmental Services. 2013. Connecticut River Recreation Management Plan: Riverbend Region. Concord, New Hampshire.	(See response to #35)
57	Connecticut River Joint Commission. New Hampshire Department of Environmental Services. 2013. Connecticut River Recreation Management Plan: Mt. Ascutney Region. Concord, New Hampshire.	(See response to #36)
58	National Marine Fisheries Service. 1998. Final Amendment #11 to the Northeast Multi-species Fishery Management Plan; Amendment #9 to the Atlantic sea scallop Fishery Management Plan; Amendment #1 to the monkfish Fishery Management Plan; Amendment #1 to the Atlantic Salmon Fishery Management Plan; and Components of the proposed	(See response to #15)

	Atlantic herring Fishery Management Plan for Essential Fish Habitat. Volume 1. October 7, 1998.	
59	National Park Service. The Nationwide Rivers Inventory. Department of the Interior, Washington, D.C. 1993.	(See response to #17)
60	U.S. Fish and Wildlife Service. Undated. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C	(See response to #47)
61	Vermont Agency of Environmental Conservation. 2002. White River Basin plan. Waterbury, Vermont. November 2002.	The 2002 White River Basin Plan describes the water quality and water resources within the basin for the purpose of improving water quality through the examination of streambank erosion, stream channel stability, awareness of water quality issues, extent and quality of public access and impacts to fisheries. The White River flows into the Connecticut River more than 90 miles above the upstream end of the Turners Falls Impoundment and above Great River Hydropower Projects of Bellow Falls and Vernon. While water quality and flows from the White River do effect flows in the Connecticut River in the area of the FirstLight Projects, this plan is not applicable.
62	Vermont Agency of Environmental Conservation. 1986. Vermont Rivers Study. Waterbury, Vermont. 236 pp.	The Rivers Study is a compilation of river-related natural, physical, and cultural resources on the 17 river basins of Vermont. An outcome of this document was the development of "Basin Plans", none of which enter the Connecticut River below Great River Hydro's Vernon Dam and are therefore not applicable to the FirstLight Projects.
63	Vermont Agency of Natural Resources. 1988. Hydropower in Vermont: an assessment of environmental problems and opportunities. Waterbury, Vermont. May 1988.	Guidance in this document includes environmental assessments of the impacts from hydropower projects in rivers throughout Vermont. Assessments of water quality and fisheries are included along with recommendations for environmental improvements. From the list of hydropower stations included in the plan, only those on the Ottauquechee River and Black River eventually feed into Connecticut River but into the upstream Great River Hydro Projects-affected area and are therefore, not applicable to the FirstLight Projects.

64	Vermont Agency of Natural Resources. 1988. Wetlands component of the 1988 Vermont recreation plan. Waterbury, Vermont. July 1988. 43 pp.	Similar to the New Hampshire wetlands priority plan, this Vermont plan is limited to identifying wetland resources that can be prioritized for acquisition under the guidelines of the Federal Land and Water Conservation Fund (LWCF) Program. This Plan is not applicable to the Projects.
65	Vermont Agency of Natural Resources. 1990. Vermont's lake trout management plan for inland waters. Waterbury, Vermont. May 1990. St. Johnsbury, Vermont. July 1990. 50 pp.	The focus of this plan is on the management of Lake Trout populations in Vermont inland waters. Lake Trout are not typically found within Project impacted waters nor are waters within the Project boundaries managed for this species. This Plan is not applicable to the Projects.
66	Vermont Agency of Natural Resources. 1986. The waterfalls, cascades, and gorges of Vermont. Waterbury, Vermont. May 1986. 320 pp.	This document provides information the waterfalls, cascades, and gorges in Vermont, however these do not exist within the Projects Boundary on the Vermont side of the Turners Falls Impoundment.
67	Vermont Agency of Natural Resources. 2005. Vermont's wildlife action plan. Waterbury, Vermont. November 2005.	The 2005 Vermont Wildlife Action Plan (WAP) was updated in 2015 but the 2015 version remains in draft form at this time. The stated goal of the Plan is "to prevent wildlife from becoming endangered through early, strategic efforts to conserve wildlife and habitat." The Plan identifies Species of Greatest Conservation Need (SGCN) species and focuses upon them in implementation of the WAP. The state developed six classes of strategies intended to address the problems facing the SGCNs. Three strategies that are applicable to the Projects include: 1. Land and Water Protection – This strategy aims to designate lands where wildlife conservation is a primary objective of management. These include public reserves, privately-owned protected areas, and easements, 2. Land/Water/Species Management – Implementation of this strategy involves actively managing for wildlife, such as prescribed burns, habitat restoration, and invasive species control, and 3. Research, Education, and Awareness – This strategy involves continued collection of data concerning SGCNs, as well as the dissemination of those data to stakeholders to promote awareness of conservation concerns and increase the sharing of information. The AFLA is consistent with this Plan.
68	Vermont Agency of Natural Resources. 2014. Deerfield River and Southern Connecticut River	The basin plan includes tributaries that enter within Connecticut River largely above Great River Hydro's Vernon Dam, and the Deerfield River flows into the Connecticut

	Tributaries of Vermont (Basin 12/13) Tactical Basin Plan. Montpelier, Vermont. March 2014.	River about a half mile below the Turners Falls Project's Cabot Station. The management plan provides a watershed-wide perspective on water quality and aquatic resources as well as tactical means to protect, maintain and improve surface waters impacted by known stressors and activities. This plan is not applicable to the Projects.
69	Vermont Agency of Natural Resources. 2015. Tactical Basin Plan for the West, Williams and Saxtons Rivers and Adjacent Connecticut River Tributaries (Basin 11/13). Montpelier, Vermont. December 2015.	The goal of the Basin Plan is to provide watersheds of sufficient quality to support the people, wildlife, and landscape uses that are most valued. The Plan includes recommended actions and offers strategies to improve and protect these waters, but these tributaries flow into the Connecticut River upstream of Great River Hydro's Vernon Dam and are not applicable to the FirstLight Projects.
70	Vermont Department of Fish and Wildlife. 1993. The Vermont plan for brook, brown, and rainbow trout. Waterbury, Vermont. September 1993.	This plan provides a comprehensive approach to the management of these species by integrating public opinion and desires with scientific studies of trout biology and management conducted both in and outside Vermont. The document serves as guidance for fisheries biologists to use in managing Vermont's trout resources and as a public education resource which formally outlined the biological and social justifications of various trout management strategies. The AFLA is consistent with this Plan.
71	Vermont Fish and Wildlife Department. 2017. Statewide Management Plan for Largemouth and Smallmouth Bass. Montpelier, Vermont. August 2017.	This Plan recommendations that before engaging in water level manipulation efforts, the state should actively participate in the review process for hydroelectric dam and reservoir operations such as Vermont 401 Water Quality Certifications, Dam Safety Permits and Federal Energy Regulatory Commission (FERC) licensing, to ensure that fisheries and fish habitat considerations are represented. The AFLA is consistent with this Plan.
72	Vermont Department of Forests, Parks and Recreation. 2013. Vermont State Comprehensive Outdoor Recreation Plan (SCORP): 2014-2018. Montpelier, Vermont. August 2013.	The 2005 VT SCORP was updated in 2013 (Vermont State Comprehensive Outdoor Recreation Plan (SCORP): 2014 – 2018. Waterbury, VT) with the goal of assessing the supply, demand, quality, priorities, and issues surrounding outdoor recreation in Vermont. Guidance in these Plans includes increasing awareness of recreational and natural resource based activities, providing direction on funding support for these types of programs, and encouraging partnerships and coordination for recreation programs.

		The AFLA is consistent with this plan.
73	Vermont Natural Heritage Program. New Hampshire Natural Heritage Inventory. 1988. Natural shores of the Connecticut River: Windham County, Vermont, and Cheshire County, New Hampshire. December 1988.	This document presents the results of an inventory that surveyed sites along portions of the Connecticut River that possess valuable natural features. Sensitive habitats were identified, specifically floodplain forests and riverside seeps, that represent unique and valuable natural communities. The communities were ranked according to their priority for protection. The AFLA is consistent with this plan and as part of the licensing process Study 3.5.1 was conducted along the VT shoreline of the Turners Falls Impoundment.

Appendix TF-AIR#6. Dissolved Oxygen Data- Raw (Unadjusted) and Spot Check Data

Raw (Unadjusted) Continuous Data				Spot Check Data						Notes
Date & Time	**DO (mg/L)**	**Temp (°C)**	**DO (%)**	**Date & Time**	**Temp (°C)**	**DO (mg/L)**	**DO (%)**	**QC DO Difference (mg/L)**	**DO adjusted to spot check?**	
Site 1 (Below Vernon Dam and Ashuelot River Confluence, DO Meter SN:10685645)										
5/14/15 8:15	10.07	14.9	98.6	5/14/15 8:01	15.1	9.92	98.6	-0.15	No	
5/29/15 9:15	9.32	19.5	100.7	5/29/15 9:28	19.6	9.38	102.0	0.06	No	
6/10/15 9:15	9.97	17.9	105.9	6/10/15 9:19	18.0	9.84	103.9	-0.13	No	
6/25/15 10:45	10	19.1	108.4	6/25/15 10:51	19.2	9.88	107.0	-0.12	No	
7/10/15 11:15	8.87	21.8	101.6	7/10/15 11:30	22.1	8.67	99.3	-0.20	No	
7/24/15 9:00	8.03	22.9	94	7/24/15 9:14	23.1	8.19	95.6	0.16	No	Logger calibrated
8/6/15 9:00	7.79	24.3	93.5	8/6/15 9:07	24.3	8.06	96.2	0.27	No	
8/18/15 9:15	7.98	24.7	96.2	8/18/15 9:23	24.9	8.2	99	0.22	No	
9/3/15 10:00	7.77	24.5	93.7	9/3/15 10:05	24.5	8.03	96.3	0.26	No	
9/18/15 9:49	*missing data 9/3/15 - 9/18/15 (logger error)*			9/18/15 9:49	21.2	8.71	98.2	--	No	
10/9/15 9:30	9.66	14.6	95.5	10/9/15 9:40	14.5	9.89	97	0.23	No	
Site 3 (Above Northfield Mountain Discharge, DO Meter SN: 10685635)										
5/14/15 9:00	9.99	15.2	98.4	5/14/15 8:55	15.6	9.67	97.1	-0.32	No	
5/29/15 8:15	9.78	19.4	105.4	5/29/15 8:17	19.5	9.4	102.4	-0.38	No	
6/10/15 8:00	9.76	17.6	103.2	6/10/15 8:06	17.7	9.27	97.3	-0.49	Yes, sensor drift	DO data between 5/29/15 and 6/10/15 adjusted to 6/10/15 spot check
6/25/15 11:45	10.43	19.3	113.4	6/25/15 11:59	19.5	9.72	105.9	-0.71	Yes, sensor drift	DO data between 6/10/15 and 6/25/15 adjusted to 6/25/15 spot check
7/10/15 13:00	9.16	21.8	104.9	7/10/15 13:06	22.2	8.41	96.4	-0.75	Yes, sensor drift	DO data between 6/25/15 and 7/10/15 adjusted to 7/10/15 spot check

Raw (Unadjusted) Continuous Data				Spot Check Data						Notes
Date & Time	**DO (mg/L)**	**Temp (°C)**	**DO (%)**	**Date & Time**	**Temp (°C)**	**DO (mg/L)**	**DO (%)**	**QC DO Difference (mg/L)**	**DO adjusted to spot check?**	
7/24/15 10:45	8.4	23.1	98.7	7/24/15 10:56	23.3	7.99	93.7	-0.41	Yes, sensor drift	DO data between 7/10/15 and 7/24/15 adjusted to 7/24/15 spot check
8/6/15 9:45	7.42	24.8	90	8/6/15 9:48	25	7.86	95.1	0.44	Yes, sensor drift	DO data between 7/24/15 and 8/6/15 adjusted to 8/6/15 spot check
8/18/15 11:00	8.36	25.6	102.6	8/18/15 11:02	25.7	8.51	104.4	0.15	No	
9/3/15 10:30	7.65	25.3	93.7	9/3/15 10:35	25.3	7.89	96.1	0.24	No	
9/18/15 10:45	7.96	22.1	91.3	9/18/15 10:46	22.2	8.23	94.6	0.27	No	
10/9/15 10:15	9.56	14.7	94.8	10/9/15 10:25	14.6	9.8	96.4	0.24	No	
Site 4 (Northfield Mountain Tailrace, DO Meter SN: 10685634)										
5/14/15 9:30	9.88	15.8	98.6	5/14/15 9:11	16.2	9.74	99.0	-0.14	No	
5/29/15 8:00	9.24	19.2	99.3	5/29/15 8:04	19.1	9.03	97.6	-0.21	No	
6/10/15 7:45	9.63	18.0	102.6	6/10/15 7:55	18.0	9.32	98.4	-0.31	No	
6/25/15 12:15	10.04	19.8	110.3	6/25/15 12:30	19.7	9.58	104.6	-0.46	Yes, sensor drift	DO data between 6/10/15 and 6/25/15 adjusted to 6/25/15 spot check
7/10/15 13:15	8.8	21.2	99.6	7/10/15 13:20	21.8	8.49	96.7	-0.31	No	
7/24/15 11:00	8.11	24.2	97.3	7/24/15 11:16	24.4	7.94	95.0	-0.17	No	Logger calibrated
8/6/15 10:00	7.92	25.2	96.6	8/6/15 10:04	25.3	8.05	98	0.13	No	
8/18/15 11:15	8	25.7	98.2	8/18/15 11:19	25.7	8.1	99.3	0.10	No	
9/3/15 10:45	7.39	25.4	90.6	9/3/15 10:48	25.3	7.47	90.9	0.08	No	
9/18/15 10:45	7.79	22.2	89.6	9/18/15 10:58	22.2	7.99	91.7	0.20	No	
10/9/15 10:45	9.36	15.2	94	10/9/15 10:50	15.3	9.35	93.3	-0.01	No	

Raw (Unadjusted) Continuous Data				Spot Check Data						Notes
Date & Time	DO (mg/L)	Temp (°C)	DO (%)	Date & Time	Temp (°C)	DO (mg/L)	DO (%)	QC DO Difference (mg/L)	DO adjusted to spot check?	
Site 5 (Below Northfield Mountain Tailrace, DO Meter SN: 10685640)										
5/14/15 10:00	9.62	15.8	96.1	5/14/15 9:43	16.1	9.69	98.3	0.07	No	
5/29/15 7:45	9.25	19.9	100.7	5/29/15 7:54	19.7	9.14	100.0	-0.11	No	
6/10/15 7:45	9.46	18.0	100.7	6/10/15 7:50	18.0	9.33	98.5	-0.13	No	
6/25/15 12:30	9.94	19.5	108.7	6/25/15 12:39	19.7	9.7	105.9	-0.24	No	
7/10/15 13:15	9.06	22.1	104.3	7/10/15 13:29	22.2	8.73	100.2	-0.33	No	
7/24/15 11:15	8.04	23.9	90.8	7/24/15 11:30	23.7	8.09	95.4	0.05	No	Logger calibrated
8/6/15 10:00	7.67	25.2	93.6	8/6/15 10:12	25.3	7.96	96.9	0.29	No	
8/18/15 11:30	7.83	25.6	96	8/18/15 11:31	25.8	8	98.2	0.17	No	
9/3/15 10:45	7.31	25.3	89.5	9/3/15 10:55	25.3	7.61	92.6	0.30	No	
9/18/15 11:00	7.66	22.4	88.5	9/18/15 11:03	22.4	7.94	91.5	0.28	No	
10/9/15 11:00	9.15	15.2	91.9	10/9/15 11:03	15.3	9.35	93.3	0.20	No	
Site 7 (Turners Falls boat barrier, DO Meter SN: 10685639)										
5/14/15 12:15	9.76	16.0	98.1	5/14/15 11:53	16.0	9.63	97.6	-0.13	No	
5/29/15 6:45	9.22	19.5	99.7	5/29/15 6:51	19.2	9.21	99.6	-0.01	No	
6/10/15 6:30	9.58	17.7	101.4	6/10/15 6:30	17.7	9.20	96.6	-0.38	No	
6/25/2015	*No spot check/data collected. Per FirstLight - flows too high to permit access (>30,000 cfs).*							--	No	
7/10/15 9:30	8.9	21.7	101.7	7/10/15 10:04	22.2	8.54	97.8	-0.36	No	
7/24/15 7:15	8.26	24.1	98.8	7/24/15 7:22	24	8.0	95.1	-0.26	No	Logger calibrated
8/6/15 7:15	7.77	25.2	94.9	8/6/15 7:18	25.2	7.7	93.5	-0.07	No	
8/18/15 7:15	8.15	25.6	99.9	8/18/15 7:23	25.6	7.96	97.5	-0.19	No	
9/3/15 7:30	7.08	25.0	86.3	9/3/15 7:37	25	7.4	89.6	0.32	No	
9/18/15 7:15	8.18	22.9	95.2	9/18/15 7:26	22.5	8.3	95.9	0.12	No	
10/9/15 7:30	10	14.9	99.4	10/9/15 7:31	15	9.62	95.4	-0.38	No	
Site 8 (Bypass - Upstream of Station 1, DO Meter SN: 10685643)										

Raw (Unadjusted) Continuous Data				Spot Check Data						Notes
Date & Time	**DO (mg/L)**	**Temp (°C)**	**DO (%)**	**Date & Time**	**Temp (°C)**	**DO (mg/L)**	**DO (%)**	**QC DO Difference (mg/L)**	**DO adjusted to spot check?**	
5/14/15 15:30	10.96	17.1	113.1	5/14/15 15:15	17	10.68	110.5	-0.28	No	
5/29/15 14:45	9.72	20.8	--	5/29/15 15:00	21.5	9.38	106.3	-0.34	No	
7/10/15 15:26	*No data concurrent to QC check. Logger out of water.*			7/10/15 15:26	22.9	9.42	109.3	--	No	
7/23/15 17:00	9.26	25.6	114.2	7/23/15 17:15	25.5	8.80	107.5	-0.46	Yes, sensor drift	DO data between 7/10/15 and 7/23/15 adjusted to 7/23/15 spot check
8/6/15 14:15	9.15	25.9	113.2	8/6/15 14:26	25.8	8.81	108.2	-0.34	No	
8/18/15 12:30	9.2	26.5	114.8	8/18/15 12:48	25.9	9.08	112.4	-0.12	No	
***Logger inaccessible 9/2/15, 9/18/15 and 10/9/15 due to Station 1 running.*								--	No	
10/22/15 17:15	11.01	12.7	104	10/22/15 17:30	13	11.01	104.3	0.00	No	
Site 9 (Bypass - Downstream of Rock Dam, DO Meter SN: 10685641)										
5/13/15 15:45	10.83	17.6	113.7	5/13/14 15:32	17.7	10.56	111.1	-0.27	No	
5/28/15 11:15	9.65	19.1	104.1	5/28/15 11:30	19.6	9.30	101.2	-0.35	No	
6/10/15 14:00	10.08	19.0	109.6	6/10/15 14:15	19.1	9.7	105.2	-0.38	No	
7/9/15 15:00	11.61	22.1	133.8	7/9/15 15:05	22.3	9.5	109.2	-2.11	Yes, sensor drift	DO data between 6/10/15 and 7/9/15 adjusted to 7/9/15 spot check
7/23/15 14:30	9.91	25.4	121.9	7/23/15 14:51	25.5	8.77	107.1	-1.14	Yes, sensor drift	DO data between 7/9/15 and 7/23/15 adjusted to 7/23/15 spot check
8/6/15 13:00	8.89	25.0	108.3	8/6/15 13:03	25.4	8.58	104.6	-0.31	No	Logger calibrated
8/17/15 17:00	9.16	26.9	115.1	8/17/15 17:13	27.5	9	113.7	-0.16	No	
9/2/15 11:45	8.01	25.0	97.3	9/2/15 11:53	25.6	8	97.6	-0.01	No	

Raw (Unadjusted) Continuous Data				Spot Check Data						Notes
Date & Time	**DO (mg/L)**	**Temp (°C)**	**DO (%)**	**Date & Time**	**Temp (°C)**	**DO (mg/L)**	**DO (%)**	**QC DO Difference (mg/L)**	**DO adjusted to spot check?**	
***Logger inaccessible 9/18/15 and 10/9/15 due to Station 1 running.*										
10/22/15 16:30	11.11	12.6	104.9	10/22/15 4:25	12.9	11.08	104.8	-0.03	No	
Site 10 (Turners Falls Power Canal, DO Meter SN: 10685644)										
5/13/15 18:00	9.89	17.1	102.5	5/13/15 17:24	17.1	9.69	100.5	-0.20	No	
5/29/15 14:30	9.44	19.7	102.6	5/29/15 14:42	20.1	9.05	99.8	-0.39	No	
6/12/15 18:30	9.83	19.2	107.6	6/12/15 18:44	19.3	9.45	102.4	-0.38	No	
6/24/15 15:15	9.83	20.8	110.3	6/24/15 15:29	21	9.25	103.8	-0.58	Yes, sensor drift	DO data between 6/12/15 and 6/24/15 adjusted to 6/24/15 spot check
7/9/15 16:45	9.28	21.6	106.1	7/9/15 17:00	21.7	8.8	100.8	-0.48	Yes, sensor drift	DO data between 6/24/15 and 7/9/15 adjusted to 7/9/15 spot check
7/23/15 17:30	8.66	24.9	105.5	7/23/15 17:40	24.9	8.31	100.3	-0.35	No	
8/6/15 15:00	7.8	25.3	95.6	8/6/15 15:00	25.3	7.57	92.1	-0.23	No	Logger calibrated
8/18/15 13:00	8.02	25.7	98.7	8/18/15 13:12	25.9	8.13	100	0.11	No	
9/3/15 12:00	7.32	25.2	89.6	9/3/15 12:13	25.4	7.45	90.8	0.13	No	
9/17/15 17:00	8.17	23.6	96.6	9/17/15 17:10	23.5	7.75	91.2	-0.42	No	
***Logger not offloaded during canal drawdown event on 10/9/15 due to safety concerns.*								--	No	
10/23/15 12:45	10.26	11.9	94.4	10/23/15 12:51	11.9	9.5	--	-0.76	Yes, sensor drift	Data between 9/17/15 and 10/23/15 adjusted to 10/23/15 spot check.
11/4/15 12:00	11.05	9.8	96.6	11/4/15 12:02	10.1	10.79	95.8	-0.26	No	
11/17/15 15:30	11.78	8.1	98.4	11/17/15 15:33	8.2	--	--	--	No	No DO spot so no adjustment.
Site 11 (CT River Below Cabot Station, SN: 10685633)										

Raw (Unadjusted) Continuous Data				Spot Check Data						Notes
Date & Time	DO (mg/L)	Temp (°C)	DO (%)	Date & Time	Temp (°C)	DO (mg/L)	DO (%)	QC DO Difference (mg/L)	DO adjusted to spot check?	
5/13/15 15:15	10.09	17.2	104.8	5/13/15 14:40	17.2	9.95	103.5	-0.14	No	
5/28/15 12:15	9.61	19.3	104.2	5/28/15 12:26	19.7	9.22	101.2	-0.39	Yes, sensor drift	DO data between 5/13/15 and 5/28/15 adjusted to 5/28/15 spot check
6/10/15 14:30	10.05	18.9	109.2	6/10/15 14:38	19.1	9.78	105.6	-0.27	No	
6/24/15 13:15	10.01	20.9	112.6	6/24/15 13:34	21	9.59	108.5	-0.42	No	
7/9/15 13:30	9.3	21.5	105.8	7/9/15 13:37	21.8	9.02	102.6	-0.28	No	
7/23/15 13:15	8.55	25.2	104.7	7/23/15 13:17	25.5	8.39	102.1	-0.16	No	
8/5/15 9:30	7.22	25.3	88.6	8/5/15 9:46	25.3	8.04	97.8	0.82	Yes, sensor drift	DO data between 7/23/15 and 8/5/15 adjusted to 8/5/15 spot check
8/17/15 16:00	8.15	25.9	100.6	8/17/15 16:01	25.9	8.2	100.9	0.05	No	Logger calibrated
9/2/15 13:30	8.33	25.5	102.4	9/2/15 13:42	25.7	8	97.9	-0.33	No	
9/17/15 9:45	8.46	22.5	97.4	9/17/15 9:48	22.5	7.8	88.4	-0.66	Yes, sensor drift	DO data between 9/2/15 and 9/17/15 adjusted to 9/17/15 spot check
10/8/15 10:30	11.29	14.8	111.2	10/8/15 10:31	14.9	11.01	108.9	-0.28	No	

Appendix TF-AIR#7. Intake Velocity Calculations at Proposed Station No. 1 Rack

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GOMEZ AND SULLIVAN ENGINEERS, D.P.C.
Engineers and Environmental Scientists

DESIGN BRIEF

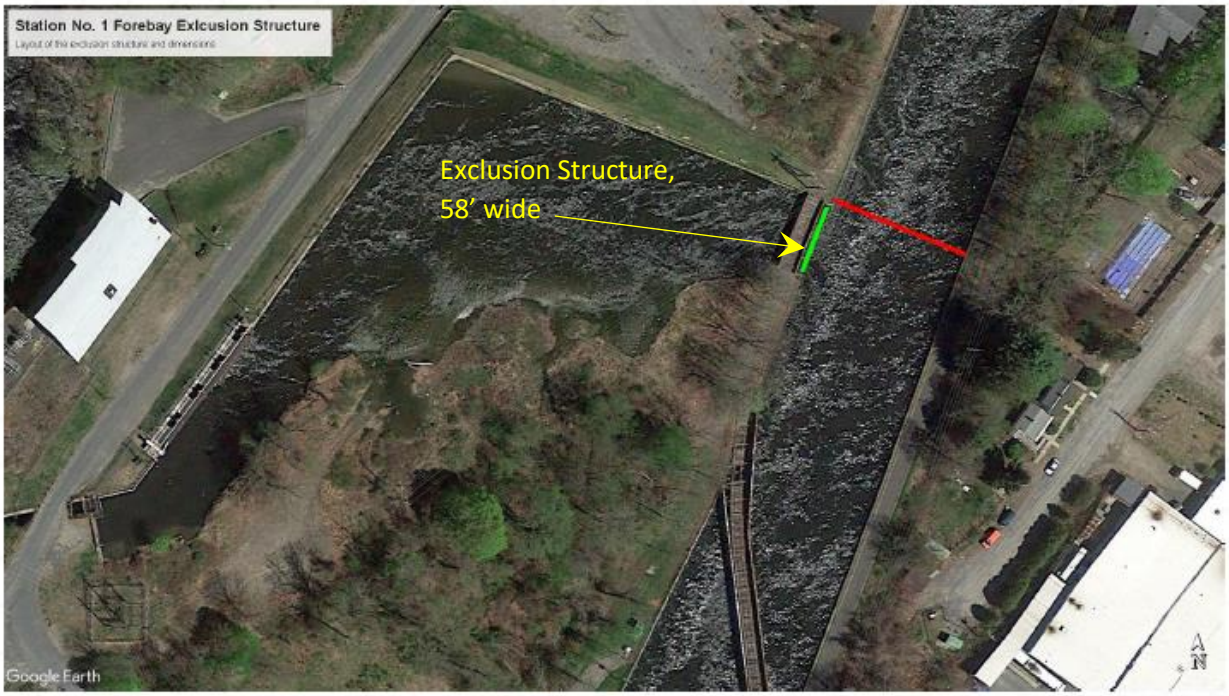
PROJECT NAME Turners Falls
SUBJECT Station No. 1 Branch Canal Fish Exclusion Structure – Maximum Intake Velocities

SHEET 1 of 3
PROJECT NO. 1490
BY BAS DATE 2/18/21
CHK'D WJF DATE 2/19/21

Basis of Design:

Station No. 1 Forebay Exclusion Structure

- Normal Pool Elevation: 173.5' (Exhibit A, Project Description)
- Base Elevation Trashracks: 154.0' (Exhibit F, Drawing ST1)
- Overall Structure Width = 58' (Exhibit F, Drawing ST1)
- Total Flow through Structure: 2,210 cfs (Exhibit A, Project Description)
- Total Flow through Power Canal: 13,728 cfs (Exhibit A, Project Description)
- Assume bar size similar to existing trashrack structures at Cabot Station and Station No. 1: Bar Width = 0.375" (Drawing 49201-42010)
- Assume 1.125" Center-to-Center bar spacing.
- Power Canal at entrance to Station No. 1 forebay
  - Bottom of Excavation Elevation at Entrance: 154' (Exhibit F, Drawing ST1)
  - Bottom of Power Canal Elevation: 158' (Exhibit F, Drawing ST1)
  - Total Canal Width: 120' (interpolated between STA. 29+00 and STA. 39+00; Exhibit F, Drawing F-13)
  - Excavated Width: 50' (Exhibit F, Drawing ST1)
  - Unexcavated Width: 70' (Total Width minus Excavated Width)



Shown in red: 120' total canal width; shown in green: 58' overall structure width

GOMEZ AND SULLIVAN ENGINEERS, D.P.C.
Engineers and Environmental Scientists

DESIGN BRIEF

PROJECT NAME Turners Falls
SUBJECT Station No. 1 Branch Canal Fish Exclusion Structure – Maximum Intake Velocities

SHEET 2 of 3
PROJECT NO. 1490
BY BAS DATE 2/18/21
CHK'D WJF DATE 2/19/21

Determine the maximum intake velocities for the conceptual Station No. 1 branch canal exclusion rack based on the following assumptions.

Back bars: $t = 0.375^{IN}$ clear spacing, $s = 0.75^{IN}$

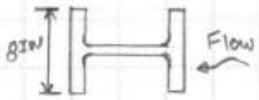
WSEL = 173.5^{IN} Base EL. = 154.0^{FT} $\Rightarrow h = 173.5^{FT} - 154.0^{FT} = 19.5^{FT}$

Opening Width, $w = 58^{FT}$

Station Flow = 2,210 cfs

→ Assume 1.5^{IN} spacers every 4.0^{FT} of rack height for total height of $5 \times 1.5^{IN} = 7.5^{IN}$

→ Assume (2) horizontal framing members oriented with flanges perpendicular to flow. Flange width similar to W12x40 = 8^{IN} for total height of 16^{IN}.



→ Assume (11) vertical framing members oriented with flanges perpendicular to flow. Flange width similar to W12x40 = 8^{IN} for total width of 88^{IN}.

5'-3" rack width

→ Main canal approximately 120^{FT} wide at Station No. 1 forebay entrance. Section at entrance to be excavated.
- 19.5^{FT} deep over 50^{FT} wide section in front of forebay entrance.
- 15.5^{FT} deep over 70^{FT} wide remaining width.

Rack Gross Area and Velocity:

$A_g = (19.5^{FT})(58^{FT}) = 1{,}131\ FT^2$

$V_g = Q/A_g = (2{,}210^{CFS})/(1{,}131^{FT^2}) = \underline{2.0^{FT/S}}$

Rack Net Area and Velocity:

Center-to-center spacing = $0.375^{IN} + 0.75^{IN} = 1.125^{IN}$

Per foot of rack width: 1 bar per 1.125^{IN} = $12^{IN/FT} / 1.125^{IN/bar}$

= 10.67 bars per foot

GOMEZ AND SULLIVAN ENGINEERS, D.P.C.
Engineers and Environmental Scientists

DESIGN BRIEF

PROJECT NAME Turners Falls
SUBJECT Station No. 1 Branch Canal Fish Exclusion Structure – Maximum Intake Velocities

SHEET 3 of 3
PROJECT NO. 1490
BY BAS DATE 2/18/21
CHK'D WJF DATE 2/19/21

Clear opening width = $(58^{FT})(10.67^{bars/FT})(0.75^{IN\ clear/bar} / 12^{IN/FT}) = 38.67^{FT}$

→ Less width from structural members.

$w_N = 38.67^{FT} - 88^{IN} \times 12^{IN/FT} = 31.33^{FT}$

Clear opening height = 19.5^{FT}

→ Less height from spacers and structural members

$h_N = 19.5^{FT} - 7.5^{IN}/12^{IN/FT} - 16^{IN}/12^{IN/FT} = 17.54^{FT}$

$A_N = (31.33^{FT})(17.54^{FT}) = 549.6^{FT^2}$

$V_N = (2,210^{CFS})/(549.6^{FT^2}) = \underline{4.0^{FT/S}}$

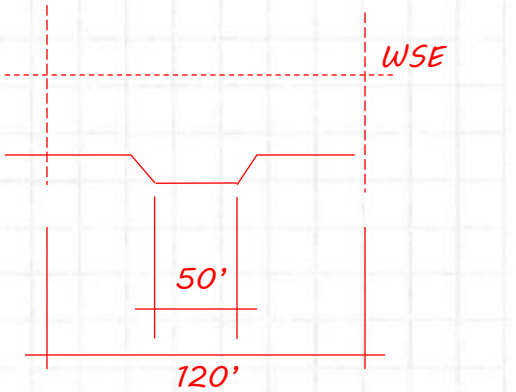
Calculated net velocity at bar racks (exclusion)

Check sweeping velocities:
Area of main canal, $A_c = (19.5^{FT})(50^{FT}) + (15.5^{FT})(70^{FT}) = 2,060^{FT^2}$

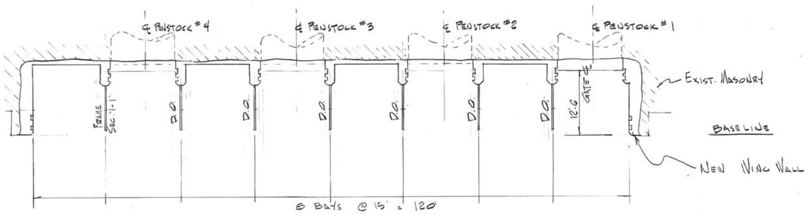
Conservative

→ Flow to Cabot Station = $13,728^{CFS}$

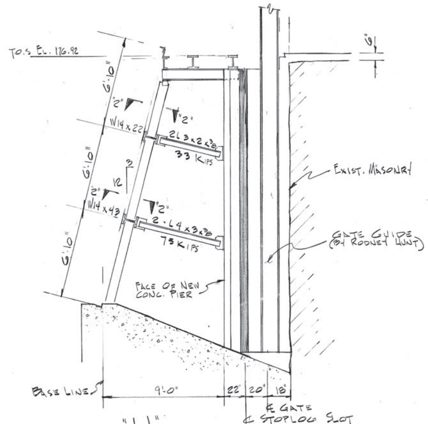
$V_S = (13,728^{CFS})/(2,060^{FT^2}) = \underline{6.7^{FT/S}}$



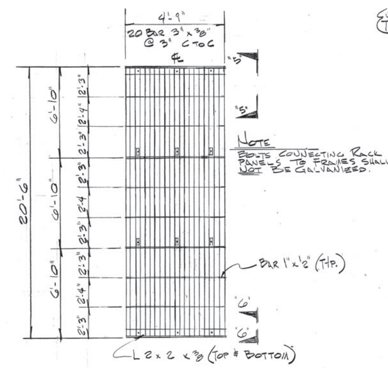
13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1



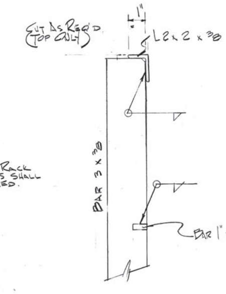
PLAN @ INTAKE



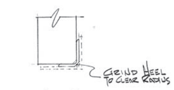
"1-1"
SCALE: 1/4" = 1'-0"



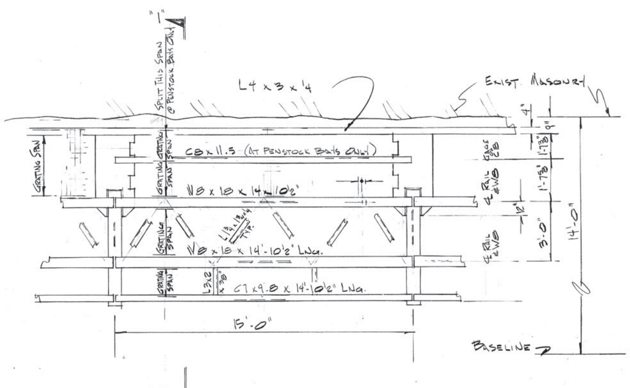
TYPICAL RACK PANEL
24 REQ'D.



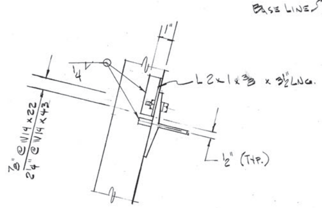
"5 - 5"



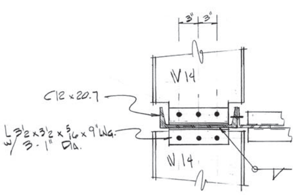
6 - 6



TYPICAL BAY FRAMING



DETAIL "A"



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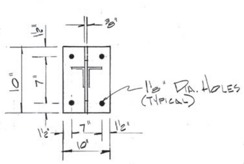
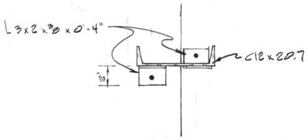
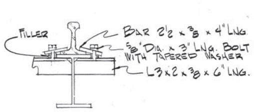


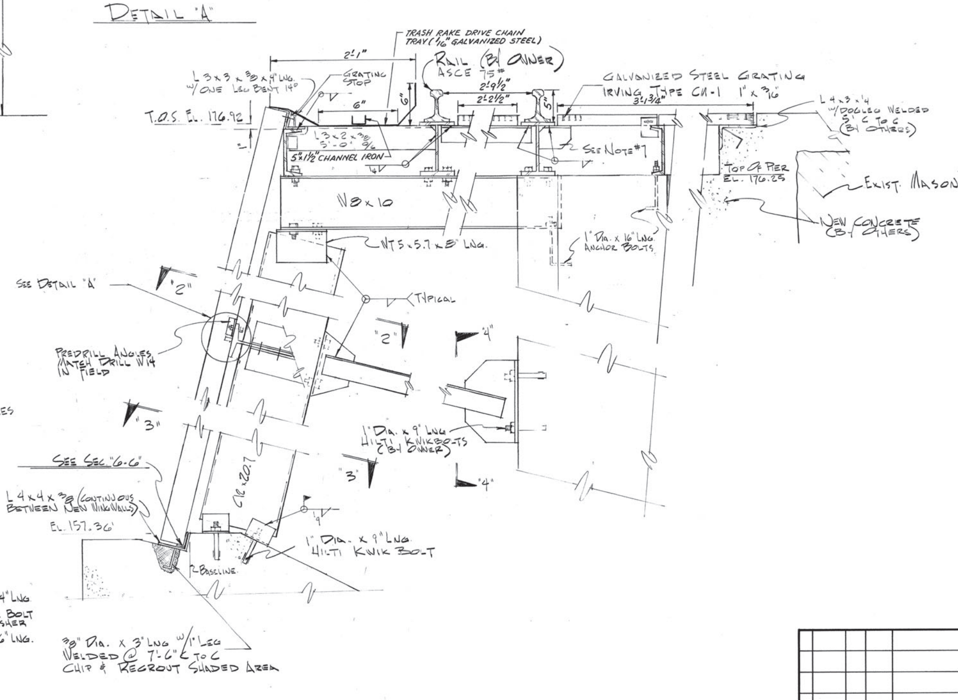
"4 - 4"



"3 - 3"



TYPICAL RAIL CONNECTION



CONNECTION DETAILS

NOTES

1. ALL STRUCTURAL STEEL SHALL COMPLY WITH THE "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS" AND THE "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES" OF THE A.I.S.C.
2. ALL STRUCTURAL STEEL SHALL BE ASTM A-36
3. ALL FASTENERS SHALL BE GALVANIZED AS PER ASTM A-153 AND SHALL BE 5/8" DIA. A-307 BOLTS UNLESS OTHERWISE NOTED OR REQ'D.
4. ALL WELDS SHALL BE IN ACCORDANCE WITH LATEST AWS
5. ALL STRUCTURAL STEEL, EXCEPT FOR RACK PANELS, SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A-123. PRIOR TO GALVANIZING ALL WELDING SLAG SHALL BE REMOVED BY SANDBLASTING
6. ALL ANCHOR BOLTS SHALL BE SUPPLIED BY OWNER.
7. STEEL FABRICATOR SHALL DESIGN SUPPORTS & STOPS FOR GRATING USING 200 PSF LIVE LOAD. GRATING SHALL BE BOLTED

REFERENCE DRAWINGS:
NUSCO 49201-42001 CONCRETE DETAILS

REVISIONS DURING CONSTRUCTION | P. A. NO.

MF	P. A. #	NO.	DATE	REVISIONS	BY	CHK	APP	APP
	78-747	1	2/19/83	AS BUILT PER DSR-TF-S-232-83	EJD	[illegible]	FJS 5/2/83	FJS 5/2/83

NORTHEAST UTILITIES SERVICE CO.

FOR WESTERN MASS. ELECTRIC CO.

TITLE TURNERS FALLS #1 STATION
INTAKE STRUCTURE REFURBISHMENT
STEEL DETAILS
TURNERS FALLS, MASSACHUSETTS

BY D.A. DUCAT	CHKD [signature]	APP [signature]	APP [signature]
DATE 3-30-79	DATE 4-26-79	DATE 4-26-79	DATE 4-26-79
SCALE		DWG. NO. 49201-42010	
P.A.# 78-747			

A | B | C | D | E | F | G | H | J

BRUNING 35886

Appendix TF-AIR#8. Intake Velocity Calculations at Existing Racks at Station No. 1 and Cabot Station

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PROJECT NAME Turners Falls
SUBJECT Cabot Station and Station No1 Rack Velocities

SHEET 1 of 5
PROJECT NO. 1490
BY BAS DATE 2/18/21
CHK'D WJF DATE 2/24/21

Basis of Design:

Cabot Station Existing Rack

- Normal Pool Elevation: 173.5' (Exhibit A, Project Description)
- Base Elevation Trashracks: 144.26' (Exhibit F, Drawing F-11)
- Overall Intake Width = 217' (Drawing 49218-43005)
- Number of Units: 6 (Exhibit A, Project Description)
- Total Hydraulic Capacity: 13,728 cfs (Exhibit A, Project Description)
- Trashracks (Drawing 49218-43001)
    - Bar Width: 0.375"
    - Center-to-Center Spacing
        - Upper section: 1.3125"
        - Lower section: 3.9375"
- Structural Framing (Drawing 49218-43005)
    - Horizontal: (4) W12's (varies between W12x31.5 and W12x40), spacing varies between 4'-3", 5'-6", and 6'-6", Perpendicular to Flow
    - Vertical: (17) 2L3x3x1/4's, spacing varies between 10'-4", 11'-4", and 12'-10", Perpendicular to Flow

Station No. 1 Existing Rack

- Normal Pool Elevation: 173.5' (Exhibit A, Project Description)
- Base Elevation Trashracks: 157.36' (Drawing 49201-42010)
- Rack Angle: 3H:12V ≈ 14.0° (Drawing 49201-42010)
- Overall Intake Width = 120' (Drawing 49201-42010)
- Number of Units: 5 (Exhibit A, Project Description)
- Total Hydraulic Capacity: 2,210 cfs (Exhibit A, Project Description)
- Trashracks (Drawing 49201-42010)
    - Bar Width: 0.375"
    - Center-to-Center Spacing: 3.0"
- Structural Framing (Drawing 49201-42010)
    - Horizontal: (1) W14x22 and (1) W14x43, Perpendicular to Flow
    - Vertical: (7) C12x20.7's @ 15'-0" o.c., Perpendicular to Flow

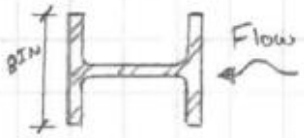
Determine the net open areas and maximum intake velocities for the existing Station No.1 and Cabot Station trashracks.

Cabot Station

WSEL = 173.5 FT Base EL. = 144.26 FT h = 173.5 FT - 144.26 FT = 29.2 FT
Width = 217 FT Station Flow = 13,728 CFS

→ Based on Project drawings (No. 49218-43001 and No. 49218-43005):

- (17) vertical 2L3x3 members supporting racks (plus ½ member assumed at each end of opening for total of 18). Angles Run Full Height ✓
  $w_s = (18)(2 \times 3^{IN}) = 9.0^{FT}$
- (4) horizontal W12 members supporting racks with flanges perpendicular to flow. Assume similar to W12x40 with flange width = 8 IN.



  → (2) members along bottom 7 FT of upper rack & (2) along lower rack
- Top 11 FT of upper rack has 0.375 IN thick bars at 0.9375 IN clear spacing. Bars are separated by 1 IN nom. SCH 160 pipe spacers (outer dia. = 1.315 IN) along (7) rows.
  $h_{as} = (7)(1.315^{IN}) / 12^{IN}/_{FT} = 0.77^{FT}$ ✓
- Bottom 7 FT of upper rack has 0.375 IN thick bars at 3.5625 IN clear spacing. Bars are separated by 1 IN nom. SCH 160 pipe spacers along (2) rows.
  $h_{bs} = (2)(1.315^{IN}) / 12^{IN}/_{FT} = 0.22^{FT}$
- Lower rack is 13 FT tall with 0.375 IN thick bars at 3.5625 IN clear spacing. Bars are separated by 1 IN nom. SCH 160 pipe spacers along (6) rows.
  $h_{cs} = (6)(1.315^{IN}) / 12^{IN}/_{FT} = 0.66^{FT}$

Gross Flow Area, $A_g = (217^{FT})(29.2^{FT}) = 6,336^{FT^2}$

Gross Velocity, $v_g = (13,728^{CFS}) / (6,336^{FT^2}) = \underline{2.2^{FT}/_{S}}$ ✓

Upper Rack, top section:

Center-to-center spacing = $0.375^{IN} + 0.9375^{IN} = 1.3125^{IN}$
Per foot of rack width: 1 bar per $1.3125^{IN} = 12^{IN/FT} / 1.3125^{IN/bar}$

$= 9.14$ bars per foot

Clear opening width $= (217^{FT})(9.14^{bars/FT})(0.9375^{IN\ clear/bar} / 12^{IN/FT}) = 155.0^{FT}$ ✓

→ Less width from structural members, w_{bs}
$w_1 = (155.0^{FT}) - w_s = 155.0^{FT} - 9.0^{FT} = 146^{FT}$

Clear opening height = 11^{FT}
→ Less height from structural members and spacers, h_{as}
$h_1 = (11^{FT}) - h_{as} = 11^{FT} - 0.77^{FT} = 10.23^{FT}$

$A_1 = w_1 h_1 = (146^{FT})(10.23^{FT}) = 1{,}494^{FT^2}$ ✓

Upper Rack, bottom section:

Center-to-center spacing = $0.375^{IN} + 3.5625^{IN} = 3.9375^{IN}$
Per foot of rack width: 1 bar per $3.9375^{IN} = 12^{IN/FT} / 3.9375^{IN/bar}$
$= 3.05$ bars per foot

Clear opening width $= (217^{FT})(3.05^{bars/FT})(3.5625^{IN\ clear/bar} / 12^{IN/FT}) = 196.5^{FT}$ ✓

→ Less width from structural members, w_{bs}
$w_2 = (196.5^{FT}) - w_s = 196.5^{FT} - 9.0^{FT} = 187.5^{FT}$

Clear opening height = 7^{FT}
→ Less height from structural members and spacers h_{bs} and h_s
$h_2 = (7^{FT}) - h_{as} - h_s = 7^{FT} - 0.22^{FT} - (2)(8^{IN}) / 12^{IN/FT} = 5.45^{FT}$

$A_2 = w_2 h_2 = (187.5^{FT})(5.45^{FT}) = 1{,}022^{FT^2}$ ✓

Lower Rack:

Center-to-center spacing and no. bars per foot width same as upper rack, bottom section.

Same Bar Size & Spacing as Lower Section of Upper Rack, Therefore Same "W"

Clear opening width, $w_3 = 187.5^{FT}$

Clear opening height = 13^{FT}

→ Less height from structural members and spacers, h_{cs} and h_s

$h_3 = (13^{FT}) - h_{cs} - h_s = 13^{FT} - 0.66^{FT} - (2)(8^{IN})/12^{\frac{IN}{FT}} = 11.0^{FT}$

$A_3 = w_3 h_3 = (187.5^{FT})(11.0^{FT}) = 2{,}063\ FT^2$ √

Total Net Opening Area, $A_N = A_1 + A_2 + A_3$

$A_N = 1{,}494^{FT^2} + 1{,}022^{FT^2} + 2{,}063^{FT^2} = 4{,}579\ FT^2$

$V_N = (13{,}728^{CFS})/(4{,}579\ FT^2) = \underline{\underline{3.0\ \frac{FT}{S}}}$ √

→ Minimal sweeping velocities due to ±130 cfs flow through log sluice during fish passage season (Exhibit A, Project Description)

Station No. 1

WSEL = 173.5^{FT} | Base EL. = 157.36^{FT} | $h = 173.5^{FT} - 157.36^{FT} = 16.14^{FT}$
Width = 120^{FT} | Rack Angle = 3H:12V ≈ 14° | Station Flow = 2,210 cfs

→ Based on Project Drawings (No. 49201-42010):

- (7) vertical C12x20.7 members supporting racks (flanges perpendicular)
  $w_s = (7)(3^{IN})/12^{\frac{IN}{FT}} = 1.75^{FT}$
- (2) horizontal members (W14x22 and W14x43) supporting racks with flanges perpendicular to flow.
  $h_s = (5^{IN} + 8^{IN})/12^{\frac{IN}{FT}} = 1.08^{FT}$

- Bars are braced by (8) $1^{IN} \times \frac{1}{2}^{IN}$ horizontal bars with $\frac{1}{2}^{IN}$ face perpendicular to flow.
  $h_b = (8)(\frac{1}{2}^{IN})/12^{\frac{IN}{FT}} = 0.33^{FT}$
- Top and bottom of racks capped with L2x2. Assume angle on top of racks normally not in flow area since at approx. EL. 177^{FT}
  $h_c = (1)(2^{IN})/12^{\frac{IN}{FT}} = 0.17^{FT}$
- Rack bars are 0.375^{IN} thick at 3^{IN} center-to-center spacing

Rack Gross Area and Velocity:

$A_g = (120^{FT})(16.14^{FT}) = 1{,}937^{FT^2}$

$V_g = (2{,}210^{CFS})/(1{,}937^{FT^2}) = \underline{1.1^{FT/S}}$ √

Rack Net Area and Velocity:

Clear spacing $= 3.0^{IN} - 0.375^{IN} = 2.625^{IN}$
Per foot of rack width: 1 bar per $3.0^{IN} = 12^{\frac{IN}{FT}}/3.0^{\frac{IN\ clear}{bar}}$
$= 4.0$ bars per foot

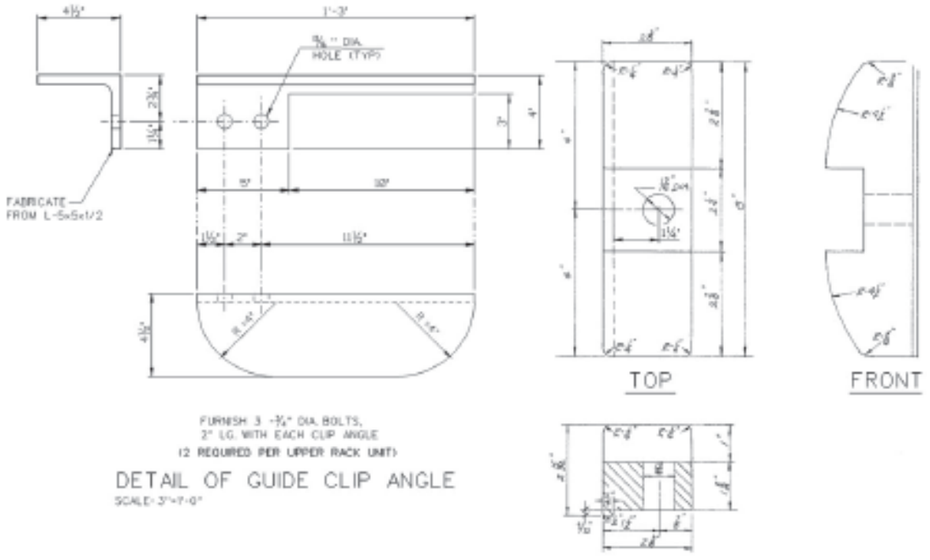
Clear opening width $= (120^{FT})(4.0^{\frac{bars}{FT}})(2.625^{\frac{IN\ clear}{bar}})/12 = 105^{FT}$
→ Less width from structural members, w_s
$w_N = 105^{FT} - 1.75^{FT} = 103.25^{FT}$

Clear opening height $= (16.14^{FT})/\cos(15°) = 16.71^{FT}$
→ Less width from structural members, braces, and caps; h_s, h_b & h_c
$h_N = 16.71^{FT} - 1.08^{FT} - 0.33^{FT} - 0.17^{FT} = 15.13^{FT}$

$A_N = w_N h_N = (103.25^{FT})(15.13^{FT}) = 1{,}562^{FT^2}$

$V_N = (2{,}210^{CFS})/(1{,}562^{FT^2}) = \underline{1.4^{FT/S}}$ √

→ No expected sweeping velocities.



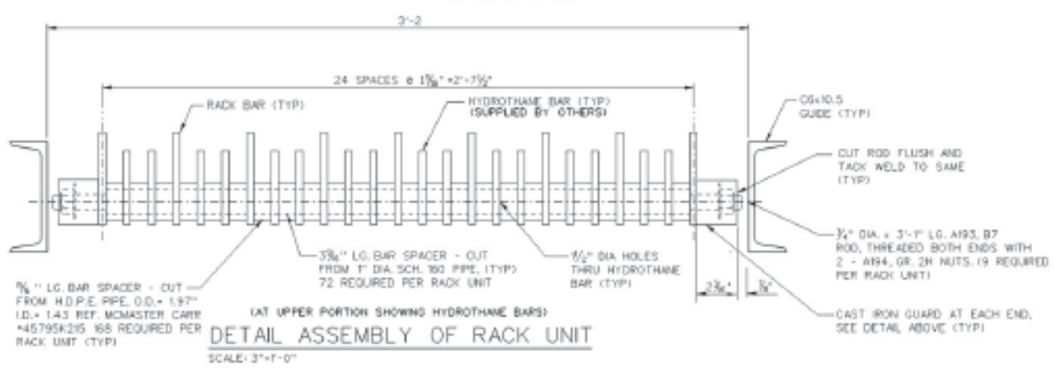
FURNISH 3 -7/8" DIA. BOLTS, 2" LG. WITH EACH CLIP ANGLE (12 REQUIRED PER UPPER RACK UNIT)

DETAIL OF GUIDE CLIP ANGLE

SCALE: 3"=1'-0"

DETAIL OF CAST IRON GUARD FOR HEXAGONAL NUT

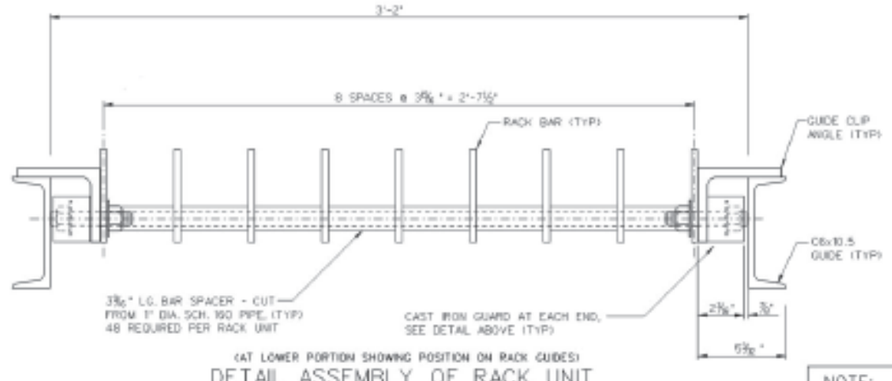
SCALE: HALF SIZE
(18 REQ. PER UPPER RACK UNIT)
(12 REQ. PER LOWER RACK UNIT)
(SUPPLIED BY OTHERS)



(AT UPPER PORTION SHOWING HYDROTHANE BARS)

DETAIL ASSEMBLY OF RACK UNIT

SCALE: 3"=1'-0"



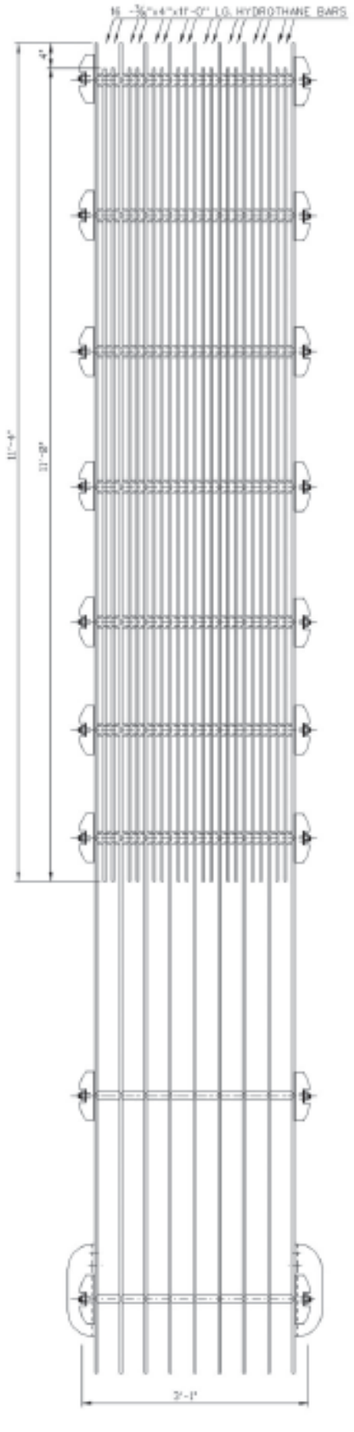
(AT LOWER PORTION SHOWING POSITION ON RACK GUIDES)

DETAIL ASSEMBLY OF RACK UNIT

SCALE: 3"=1'-0"

NOTE:
DO NOT TACK WELD LAST RACK AND FRAME UNTIL SIZE IS CONFIRMED.

NOTE:
ALL STEEL PLATES & SHAPES TO BE ASTM A-36

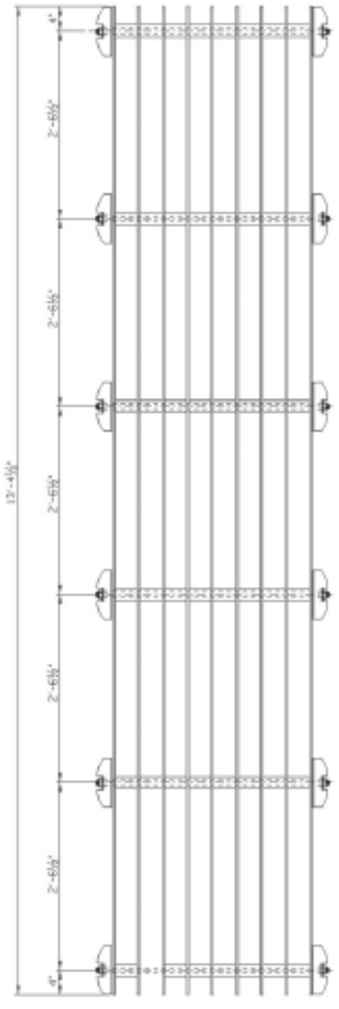


ASSEMBLY OF UPPER RACK UNIT

SCALE: 1"=1'-0"

UPPER RACK BAR

SCALE: 1"=1'-0"



ASSEMBLY OF LOWER RACK UNIT

SCALE: 1"=1'-0"

NO.	DATE	REVISIONS	BY	APP	APP
2.	04-04-06	ISSUED FOR CONSTRUCTION	VJG	JRW	
2.	04-30-05	REVISE AND RE-DRAWN FOR RACK STRUCTURE REPLACEMENT WINTER 2005	PPC	JRW	JRW

Northeast Generation Services Co.

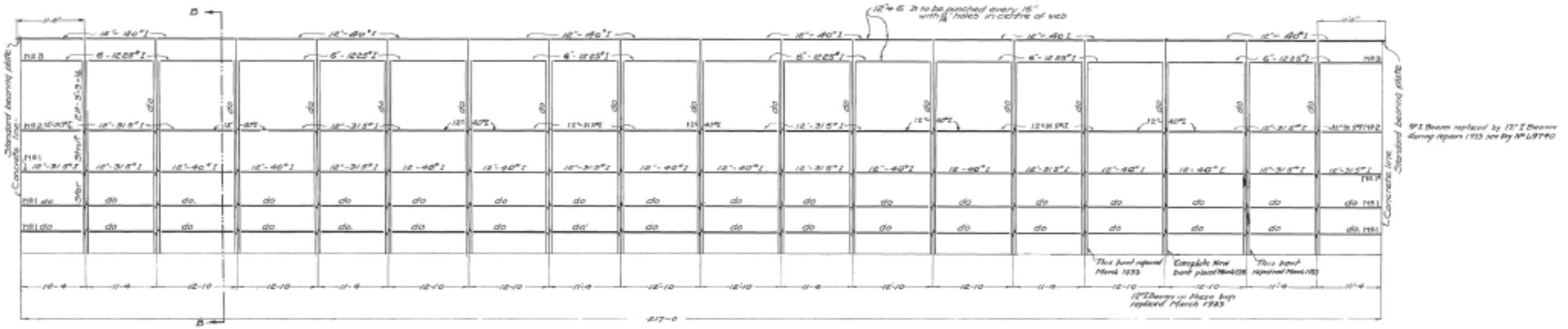
FOR NORTHEAST GENERATION COMPANY

CABOT STATION

TITLE: BOLTED TRASH RACKS DETAILS

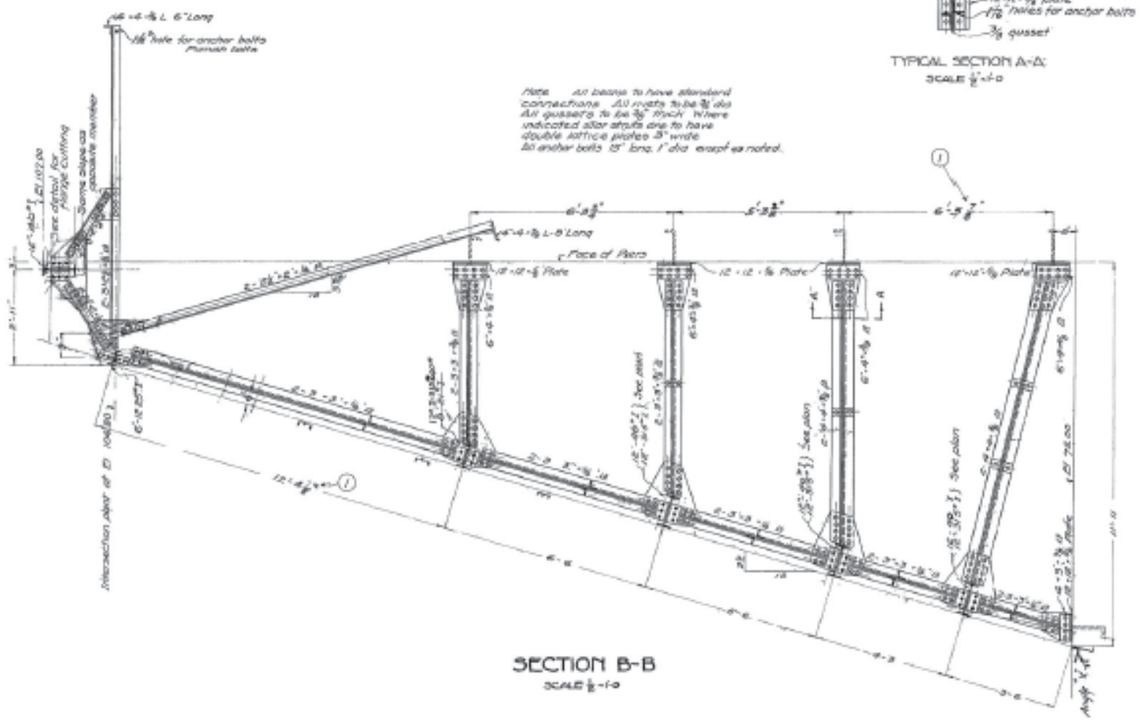
TURNER FALLS, MASSACHUSSETTS

BY	CHKD.	APP.	APP.
PPC	JRW	JRW	JRW
DATE 02-04-05	DATE 04-30-05	DATE 04-30-05	DATE
SCALE AS NOTED	DWG. NO. 49218-43001		
PAPER			



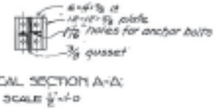
FRAMING PLAN OF RACK BAR SUPPORTS

SCALE 1/8"-1'-0"



SECTION B-B

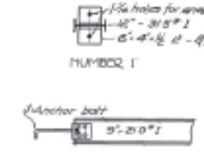
SCALE 1/8"-1'-0"



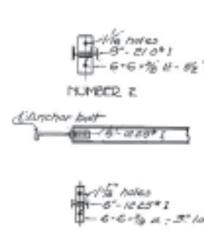
TYPICAL SECTION A-D.

SCALE 1/2"-1'-0"

NUMBER 1



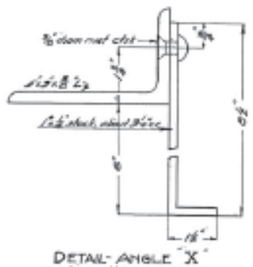
NUMBER 2



NUMBER 3

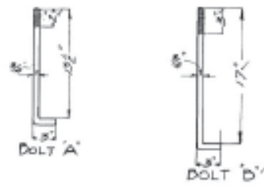
CONNECTIONS FOR END BEAMS

SCALE 1/2"-1'-0"

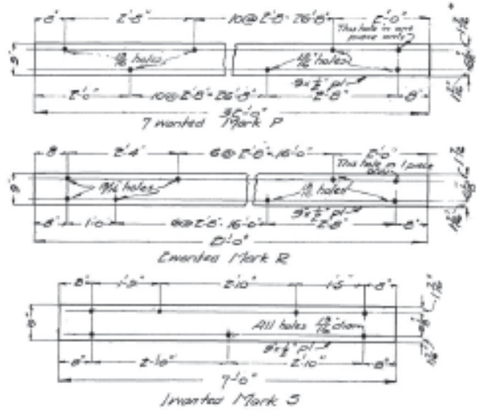


DETAIL ANGLE "X"

(1) linear ft required with washers as shown. Start another at each end of each length of angle bar



Furnish also:—
16-30 lengths A.S.C.E. standard 75 lb Rail
2-5' " " "
16 pairs of splice bars and bolts for same
350 rail clips No 103 Carnegie Steel Co
180 bolts- like Bolt A" with hex nut -
120 bolts- like Bolt B" with hex nut -
Each to be drilled for splice bar connections



Note All steel shall be painted in the shop one coat of Detroit Graphite Co's special hydraulic paint 1M 601

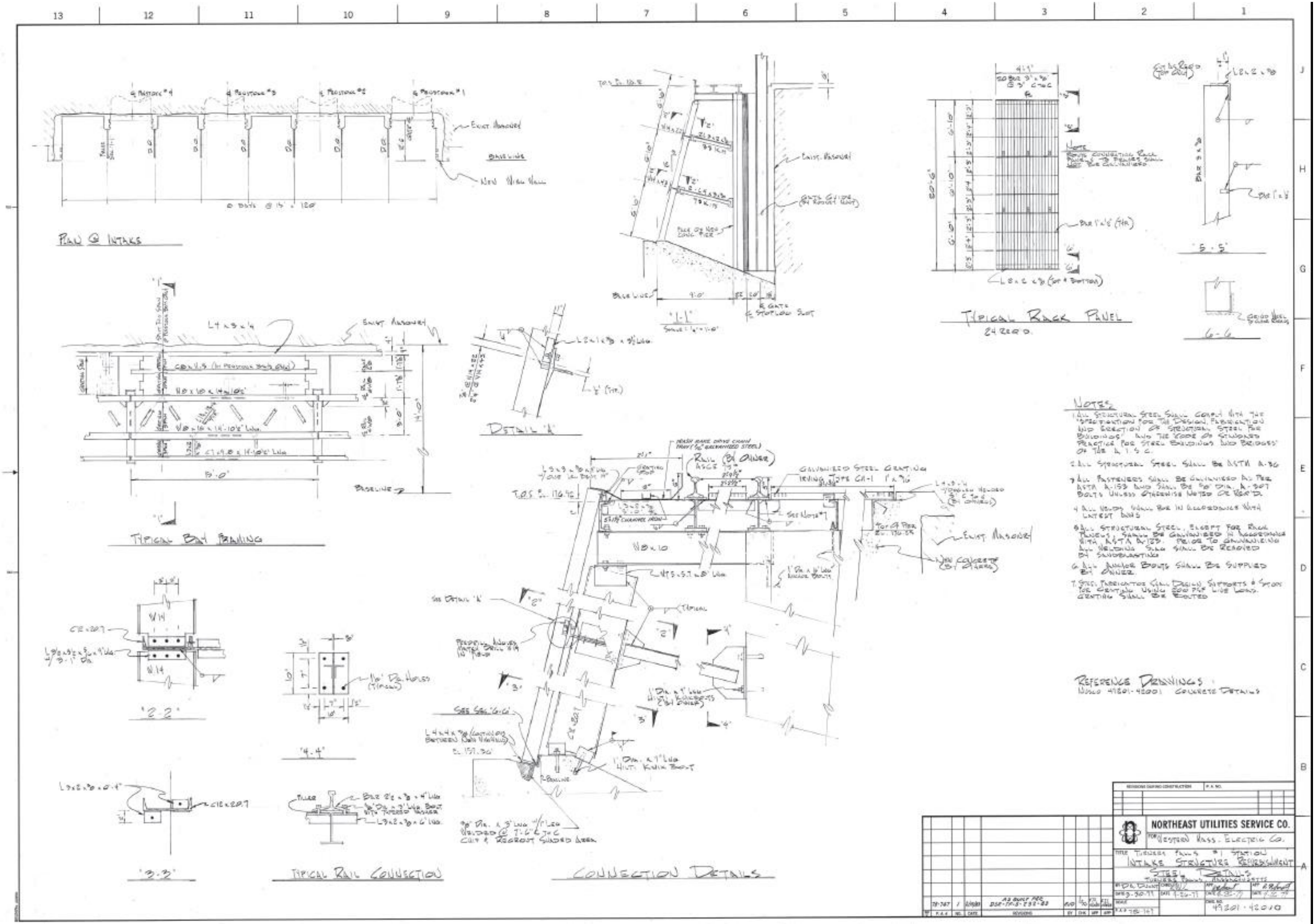
49218-43005

RACK SUPPORTS
POWER STATION N°2
TURNERS FALLS COMPANY

ENGINEERING DEPT — TURNERS FALLS OFFICE
SCALES AS NOTED — JULY 2, 1914

DRAWN BY
CHECKED BY
TRACED
CHECKED

DRAWING NO
F 4033



Plan @ Intakes
℄ Penstock #4
℄ Penstock #3
℄ Penstock #2
℄ Penstock #1
Exist. Masonry
Baseline
New Wing Wall
Typical Bay Framing
Exist. Masonry
L4 x 3 x 1/4
Baseline
15'-0"
14'-0"
Detail 'A'
"1-1"
Exist. Masonry
Gate Guide (By Rodney Hunt)
Face of New Conc. Pier
Base Line
℄ Gate
℄ Stoplog Slot
Typical Rack Panel
24 Req'd.
Note
Bolts connecting rack panels to frames shall not be galvanized.
"5-5"
"6-6"
"2-2"
"4-4"
"3-3"
Typical Rail Connection
Connection Details
Rail (By Owner)
Galvanized Steel Grating
W8 x 10
See Note #7
Top of Pier
Exist. Masonry
New Concrete (By Others)
See Detail 'A'
Typical
See Sec. "6-6"
1" Dia. x 9" Lg. Hilti Kwik Bolt
Notes:
1. All structural steel shall comply with the "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings" and the "Code of Standard Practice for Steel Buildings and Bridges" of the A.I.S.C.
2. All structural steel shall be ASTM A-36
3. All fasteners shall be galvanized as per ASTM A-153 and shall be 3/4" dia. A-307 bolts unless otherwise noted or req'd.
4. All welds shall be in accordance with latest AWS
5. All structural steel, except for rack panels, shall be galvanized in accordance with ASTM A-123. Prior to galvanizing all welding slag shall be removed by sandblasting.
6. All anchor bolts shall be supplied by owner.
7. Steel fabricator shall design supports & stops for grating using 200 PSF live load. Grating shall be bolted.
Reference Drawings:
WMECO 49201-42001 Concrete Details
Revisions During Construction
As Built Per
Revisions
Northeast Utilities Service Co.
For Western Mass. Electric Co.
Title Turners Falls #1 Station
Intake Structure Refurbishment
Steel Details
Turners Falls, Massachusetts
49201-42010

Appendix TF-AIR#21. Turners Falls Exhibit G Maps

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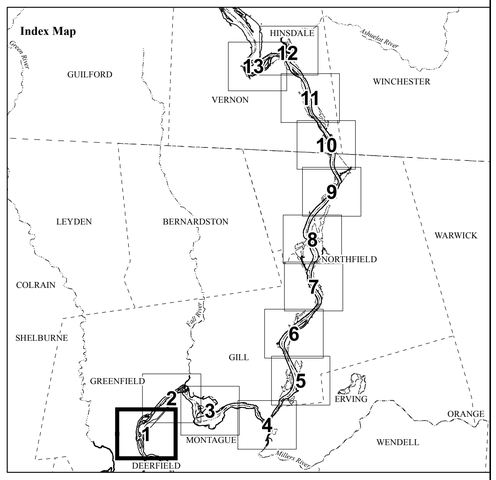

Legend

- 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
- Reference Point
- Maximum Water Surface Elevation (in feet)
- Minimum Water Surface Elevation (in feet)
- Shoreline
- Major Creek
- Project Trail
- Railroad
- Transmission Lines
- Roads

Licensee Land Rights

- Own in Fee
- Flowage Easement
- Right to be Acquired
- Area Added to Project Boundary
- Area Removed From Project Boundary

Coordinate System:
NAD83 State Phase
Massachusetts Mainland Zone (feet)
Horizontal Datum:
NAD 1983
Vertical Datum:
NGVD 1929

MN 14°11' W

Declination changing by 0° 3' 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.

STATE OF NEW HAMPSHIRE — No. 626 — ARTHUR F. SCIACCHITANO, JR. — LICENSED LAND SURVEYOR

FirstLight MA Hydro LLC
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 1 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-1 — 1 inch = 400 feet — 1:4,800

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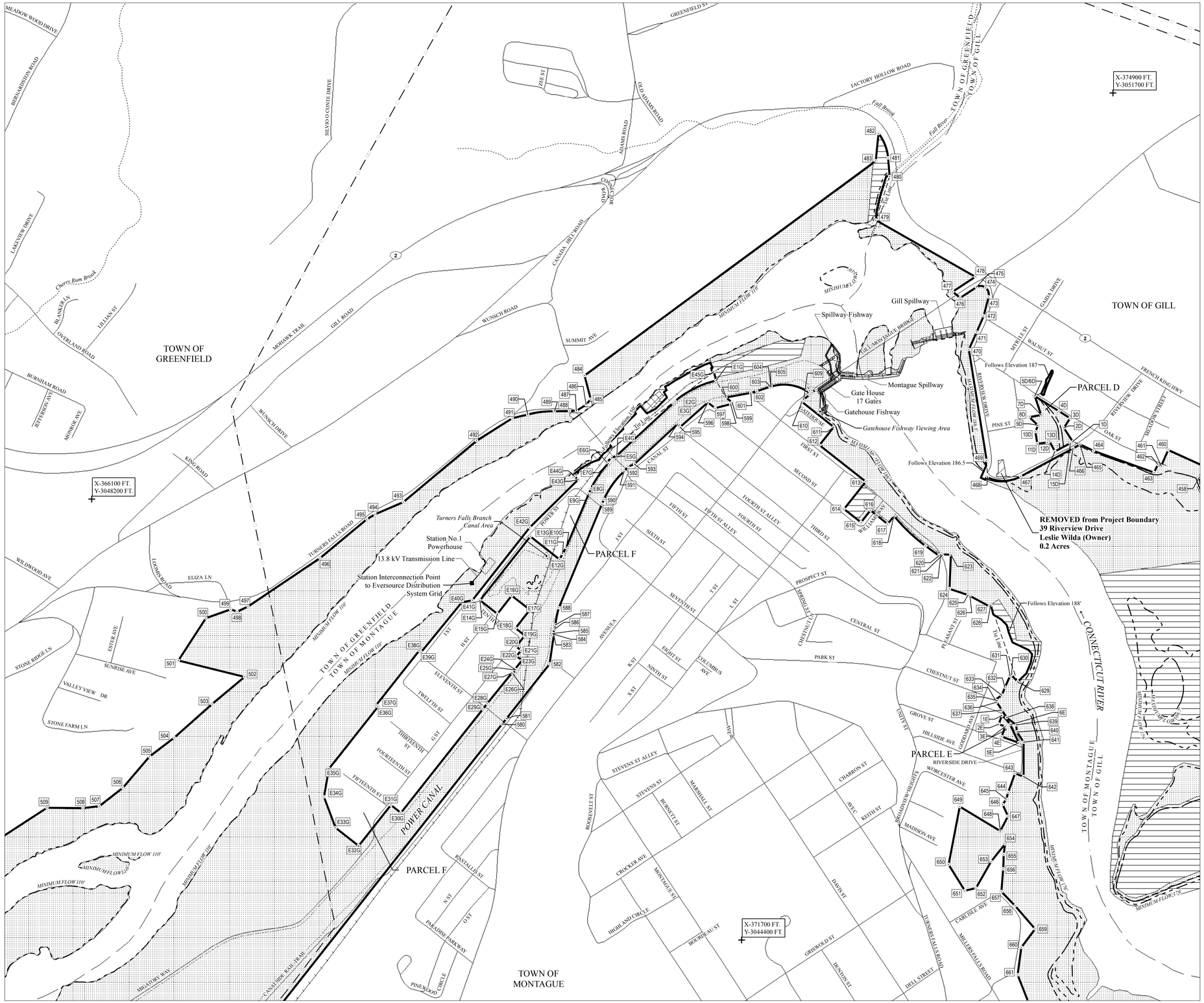

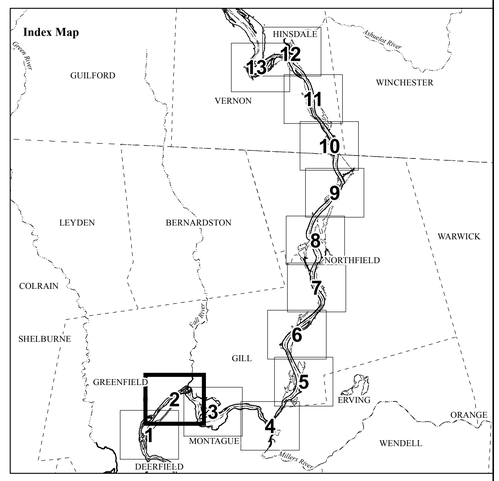

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NGVD 1929

MN 14°12' W

Declination changing by 0° 3' E/Year

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STATE OF NEW HAMPSHIRE No. 628 ARTHUR F. SIGNATANO, JR. LICENSED LAND SURVEYOR

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

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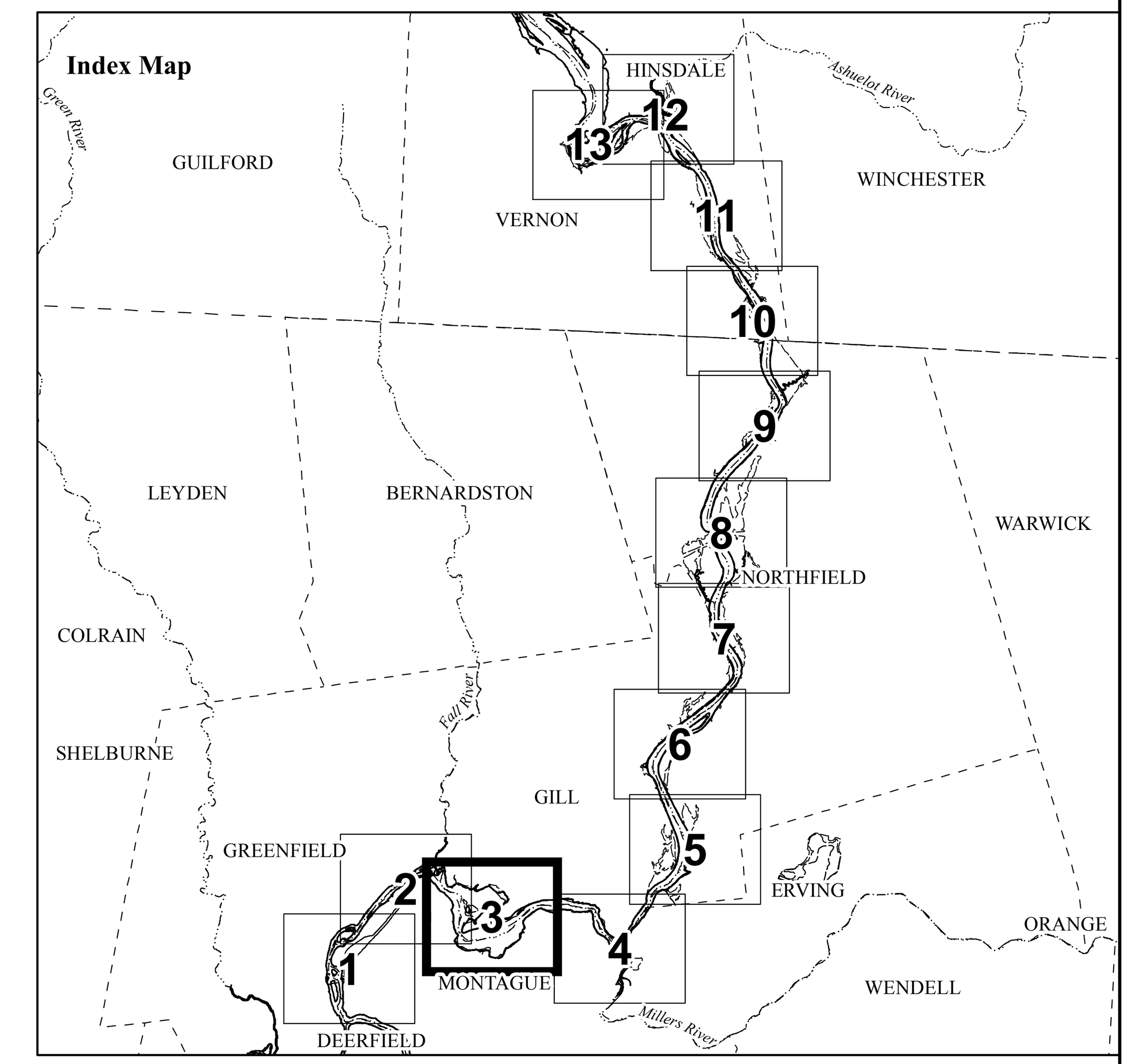

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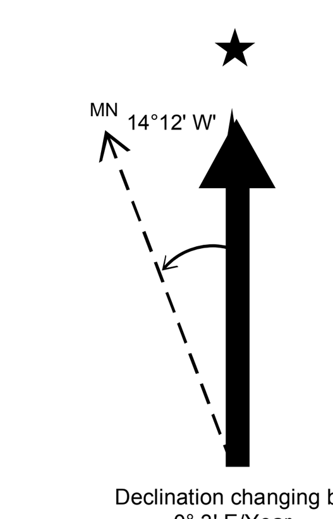

Coordinate System:
NAD83 State Plane
Massachusetts Mainland Zone (feet)
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NAD 1983
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STATE OF NEW HAMPSHIRE LICENSED LAND SURVEYOR No. 626 ARTHUR F. SICILIANO, JR. SIGNATURE

FirstLight MA Hydro LLC
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 3 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-3 1 inch = 400 feet 1:4,800

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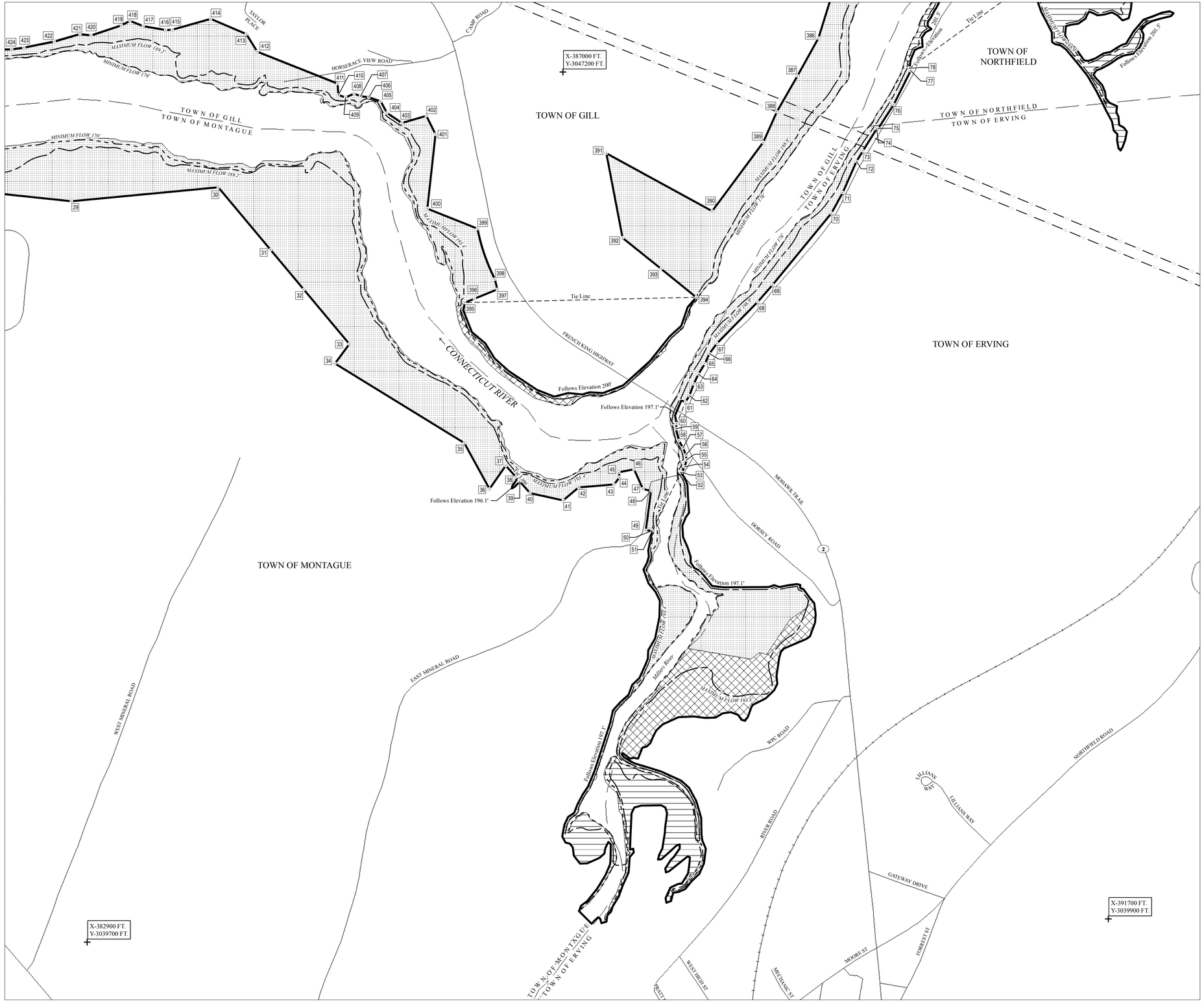

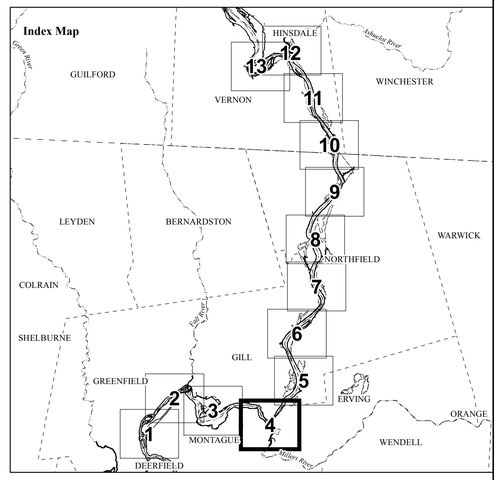

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Coordinate System:
NAD83 State Plane
Massachusetts Mainland Zone (feet)
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NAD 1983
Vertical Datum:
NGVD 1929

MN 14°13' W

Declination changing by 0° 3' E/Year

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STATE OF NEW HAMPSHIRE — LICENSED LAND SURVEYOR — NO. 626 — ARTHUR F. SCOTT NO. JR

FirstLight MA Hydro LLC
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 4 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-4 — 1 inch = 400 feet — 1:4,800

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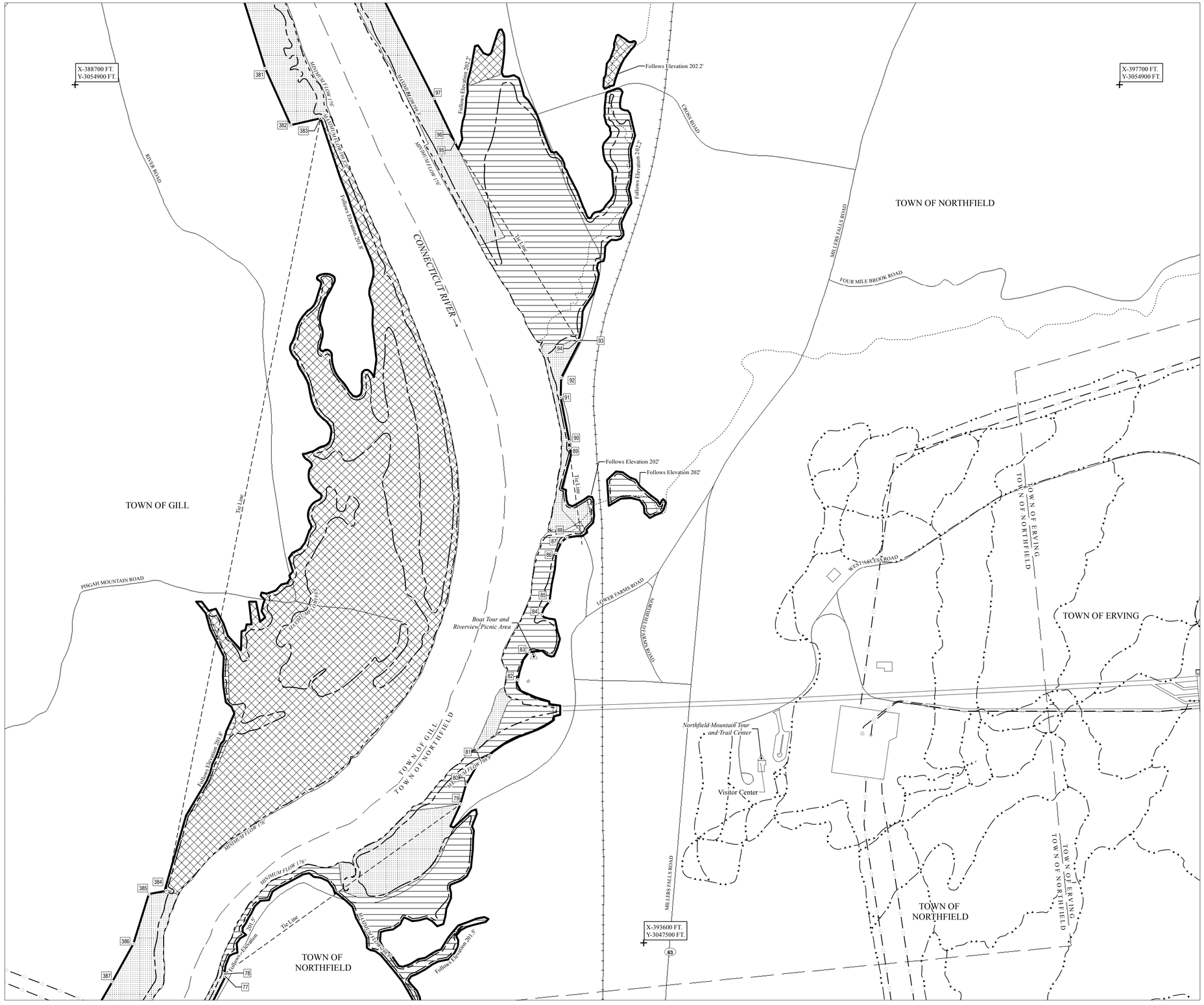

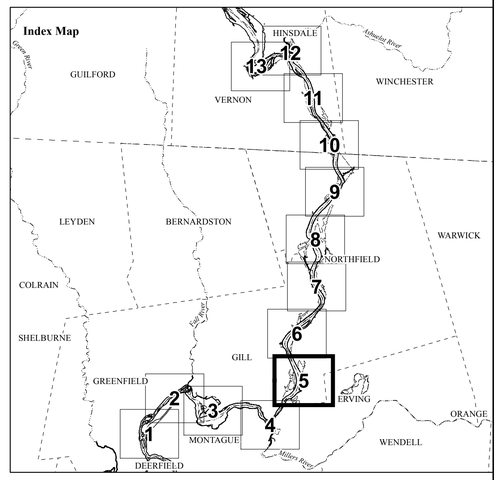

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Coordinate System:
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NAD 1983
Vertical Datum:
NGVD 1929

MN 14°14 ' W'

Declination changing by 0° 3' E/Year

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COMMONWEALTH OF MASSACHUSETTS — LICENSED LAND SURVEYOR — No. 626 — ARTHUR F. SCIACTANO, JR.

FirstLight MA Hydro LLC
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 5 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-5 — 1 inch = 400 feet — 1:4,800

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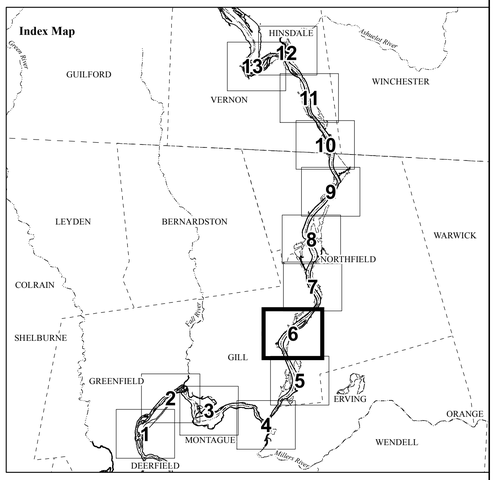

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NAD83 State Plane
Massachusetts Mainland Zone (feet)
Horizontal Datum:
NAD 1983
Vertical Datum:
NGVD 1929

MN 14°14' W

Declination changing by 0° 3' E/Year

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STATE OF NEW HAMPSHIRE — LICENSED LAND SURVEYOR — No. 626 — ARTHUR F. SCIOTANO, JR.

FirstLight MA Hydro LLC
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 6 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-6 — 1 inch = 400 feet — 1:4,800

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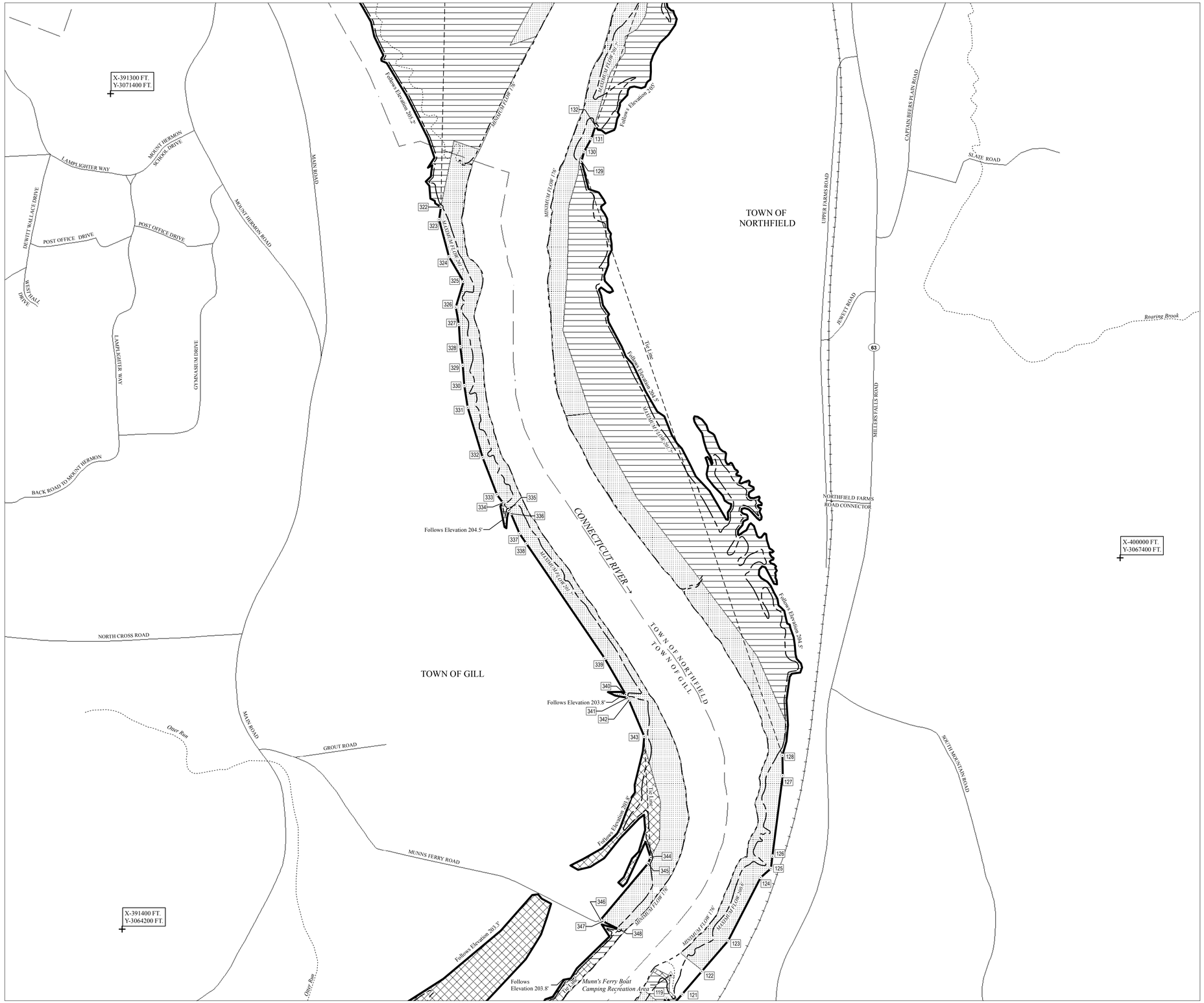

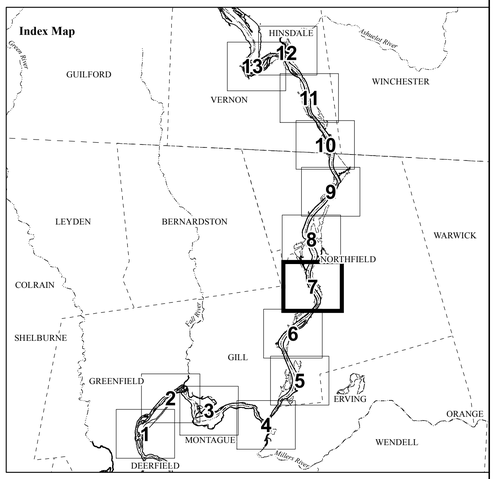

Legend

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Coordinate System:
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Massachusetts Mainland Zone (feet)
Horizontal Datum:
NAD 1983
Vertical Datum:
NGVD 1929

MN 14°15' W

Declination changing by 0° 3' E/Year

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STATE OF NEW HAMPSHIRE — No. 636 — ARTHUR F. SCIACCHITANO, JR. — LICENSED LAND SURVEYOR

FirstLight MA Hydro LLC
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 7 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-7 — 1 inch = 400 feet — 1:4,800

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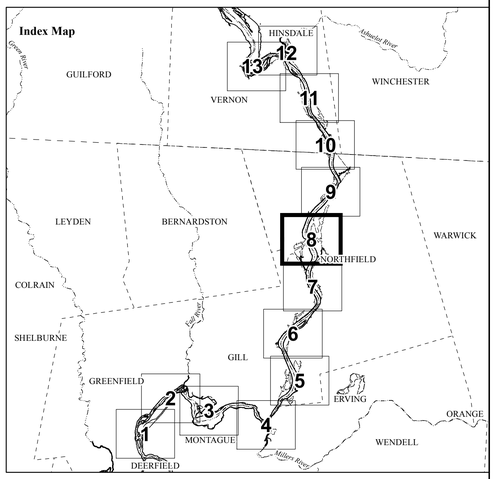

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NGVD 1929

MN 14°16' W

Declination changing by 0° 3' E/Year

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STATE OF NEW HAMPSHIRE — No. 626 — ARTHUR F. SCIACCHITANO, JR. — LICENSED LAND SURVEYOR

FirstLight MA Hydro LLC
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 8 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-8 — 1 inch = 400 feet — 1:4,800

Path: W:\gis\maps\exhibit_g\tf_amended\tf_exhibit_g.mxd

X-394100 FT.
Y-3088200 FT.

X-403100 FT.
Y-3088400 FT.

X-399200 FT.
Y-3080800 FT.

TOWN OF NORTHFIELD

Follows Elevation 207.2'

Follows Elevation 207.2'

Follows Elevation 207.2'

Follows Elevation 207.2'

Follows Elevation 206.9'

Follows Elevation 206.7'

Follows Elevation 206.6'

Follows Elevation 206.5'

Follows Elevation 206.1'

Follows Elevation 206'

Follows Elevation 205.8'

MAXIMUM FLOW 207.2'

MAXIMUM FLOW 206.9'

MAXIMUM FLOW 206.7'

MAXIMUM FLOW 206.6'

MAXIMUM FLOW 206.5'

MAXIMUM FLOW 206.1'

MINIMUM FLOW 206'

MINIMUM FLOW 205.8'

Tie Line

CONNECTICUT RIVER

Pauchaug Brook

Louisiana Brook

Mattoon Brook

Mill Brook

WEST ROAD

MOUNT HERMON STATION ROAD

RANDALL ROAD

CALDWELL CROSS ROAD

WEST NORTHFIELD ROAD

PAUCHAUG RAMP ROAD

CALDWELL ROAD

MUSIC HALL DRIVE

EAST HALL DRIVE

WINCHESTER ROAD

BOLTON ROAD

THE WILLOWS

EAST NORTHFIELD ROAD

MOODY ST

NORTH LN

PINE ST

HOWARD ST

ALDRICH ST

GLENWOOD AVE

HIGHLAND AVE

ELM AVE

BIRNAM ROAD

HOLTON ST

NORTHFIELD INN DRIVE

BRIDGE ST

MILL ST

MAIN ST

PETTICOST ROAD

DICKINSON ST

MEADOW ST

SCHOOL ST

GREAT MEADOW ROAD

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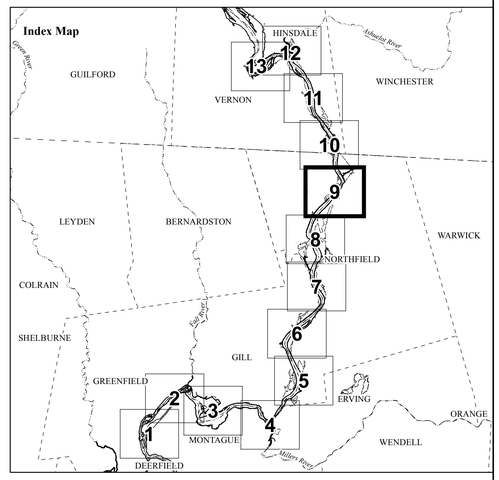
Index Map



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
- Reference Point
- Maximum Water Surface Elevation (in feet)
- Minimum Water Surface Elevation (in feet)
- Shoreline
- Major Creek
- Project Trail
- Railroad
- Transmission Lines
- Roads

Licensee Land Rights

- Own in Fee
- Flowage Easement
- Right to be Acquired
- Area Added to Project Boundary
- Area Removed From Project Boundary

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° 3' 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.

STATE OF NEW HAMPSHIRE — No. 626 — ARTHUR F. SCIACCHITANO, JR. — LICENSED LAND SURVEYOR

FirstLight MA Hydro LLC
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 9 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-9 — 1 inch = 400 feet — 1:4,800

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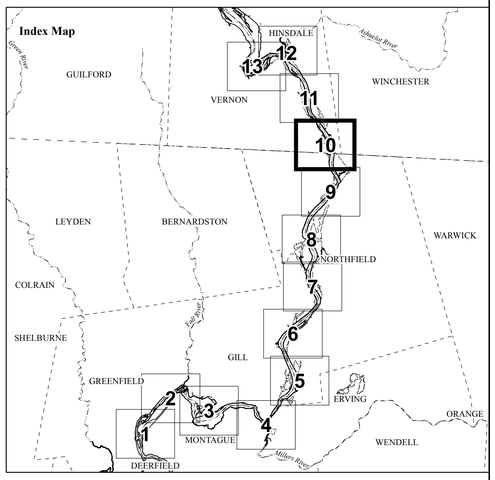

Legend

- Project Boundary
- Point No. (see Project Boundary Data table for metes and bounds) (164)
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NAD 1983
Vertical Datum:
NGVD 1929

MN 14°16' W

Declination changing by 0° 3' E/Year

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STATE OF NEW HAMPSHIRE — No. 626 — ARTHUR E. SIGNATURE, JR. — LICENSED LAND SURVEYOR

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

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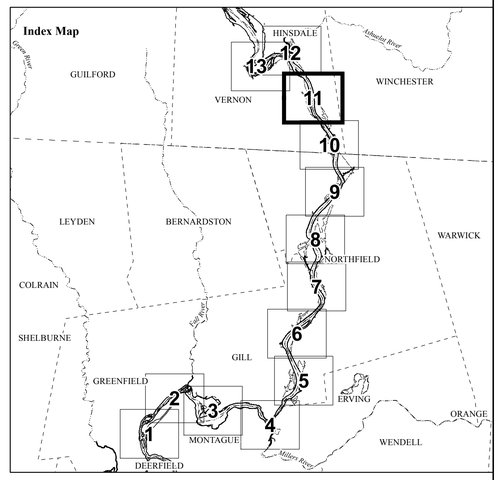

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Coordinate System:
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NAD 1983
Vertical Datum:
NGVD 1929

MN 14°17' W

Declination changing by 0° 3' E/Year

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STATE OF NEW HAMPSHIRE — LICENSED LAND SURVEYOR — NO. 626 — ARTHUR F. SCIACNO, JR.

FirstLight MA Hydro LLC
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 11 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-11 — 1 inch = 400 feet — 1:4,800

Path: W:\gis\maps\exhibit_g\tf_amended\tf_exhibit_g.mxd

X-386600 FT.
Y-3113000 FT.

X-395600 FT.
Y-3112700 FT.

X-390300 FT.
Y-3105500 FT.

CECIL DR
TAYLOR HEIGHTS ST
MOHAWK ST
APACHE DR
PLAIN RD
COTTAGE ST
HIGHLAND AV
PLEASANT ST
SPRING ST
HIGH ST
HANCOCK ST
CHURCH ST
FITZGERALD CT
STEARNS CT
MAIN ST
CURTIS HILL RD
HOWE DR
CANAL ST
BRATTLEBORO RD
ROLLING HILLS DR
HOPKINS ST
SNOW AV
GLEN ST
STRAWBERRY LN
SCHOOL ST
HINSDALE HEIGHTS ST
RIVER RD
PROSPECT ST
OLD STAGE RD
DEPOT ST
TOWER HILL RD
NORTHFIELD RD
OLD NORTHFIELD RD
TRANSFER STATION RD
STEBBINS RD
63

Hog Brook
Ashuelot River
Ashuelot River
Follows Elevation 209.7'
MAXIMUM FLOW 176'
MINIMUM FLOW 176'
Follows Elevation 209.7'
MAXIMUM FLOW 306'
Follows Elevation 210.6'
Follows Elevation 209.7'
MAXIMUM FLOW 306'
Follows Elevation 211.5'
MINIMUM FLOW 176'
MINIMUM FLOW 176'
MAXIMUM FLOW 306'
Follows Elevation 210.2'
Tie Line
Tie Line
Tie Line
Follows Elevation 210.2'
MINIMUM FLOW 176'
MAXIMUM FLOW 306'
MINIMUM FLOW 176'
Follows Elevation 209.7'
MAXIMUM FLOW 306'
MINIMUM FLOW 176'
Follows Elevation 211.5'

TOWN OF HINSDALE
TOWN OF HINSDALE
TOWN OF VERNON
TOWN OF HINSDALE
TOWN OF VERNON
NEW HAMPSHIRE
VERMONT
CONNECTICUT RIVER
CONNECTICUT RIVER

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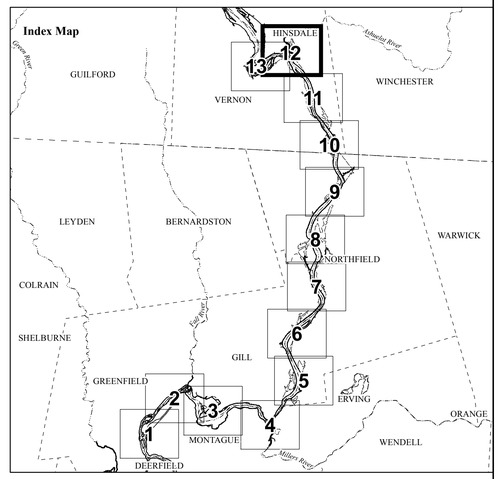
Index Map



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NGVD 1929

MN 14°16' W

Declination changing by 0° 3' E/Year

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COMMONWEALTH OF MASSACHUSETTS
No. 526
ARTHUR F. SCIOTTINO, JR.
LICENSED LAND SURVEYOR

FirstLight MA Hydro LLC
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 12 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-12 1 inch = 400 feet 1:4,800

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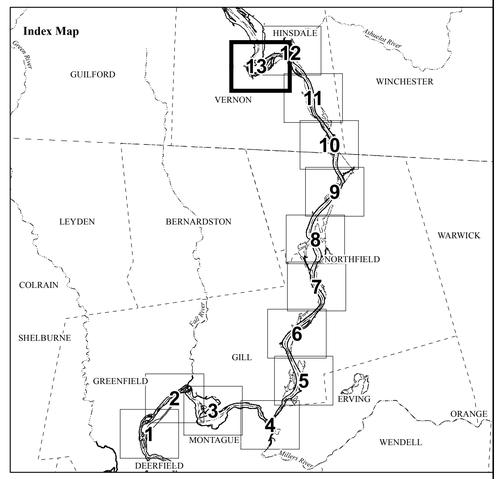
Index Map



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STATE OF NEW HAMPSHIRE — LICENSED LAND SURVEYOR — NO. 628 — ARTHUR F. SCIOTTINO, JR.

FirstLight MA Hydro LLC
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 13 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-13 1 inch = 400 feet 1:4,800

Path: W:\gis\maps\exhibit_g\tf_amended\tf_exhibit_g.mxd

Appendix NFM-AIR#13. Northfield Mountain Exhibit G Maps

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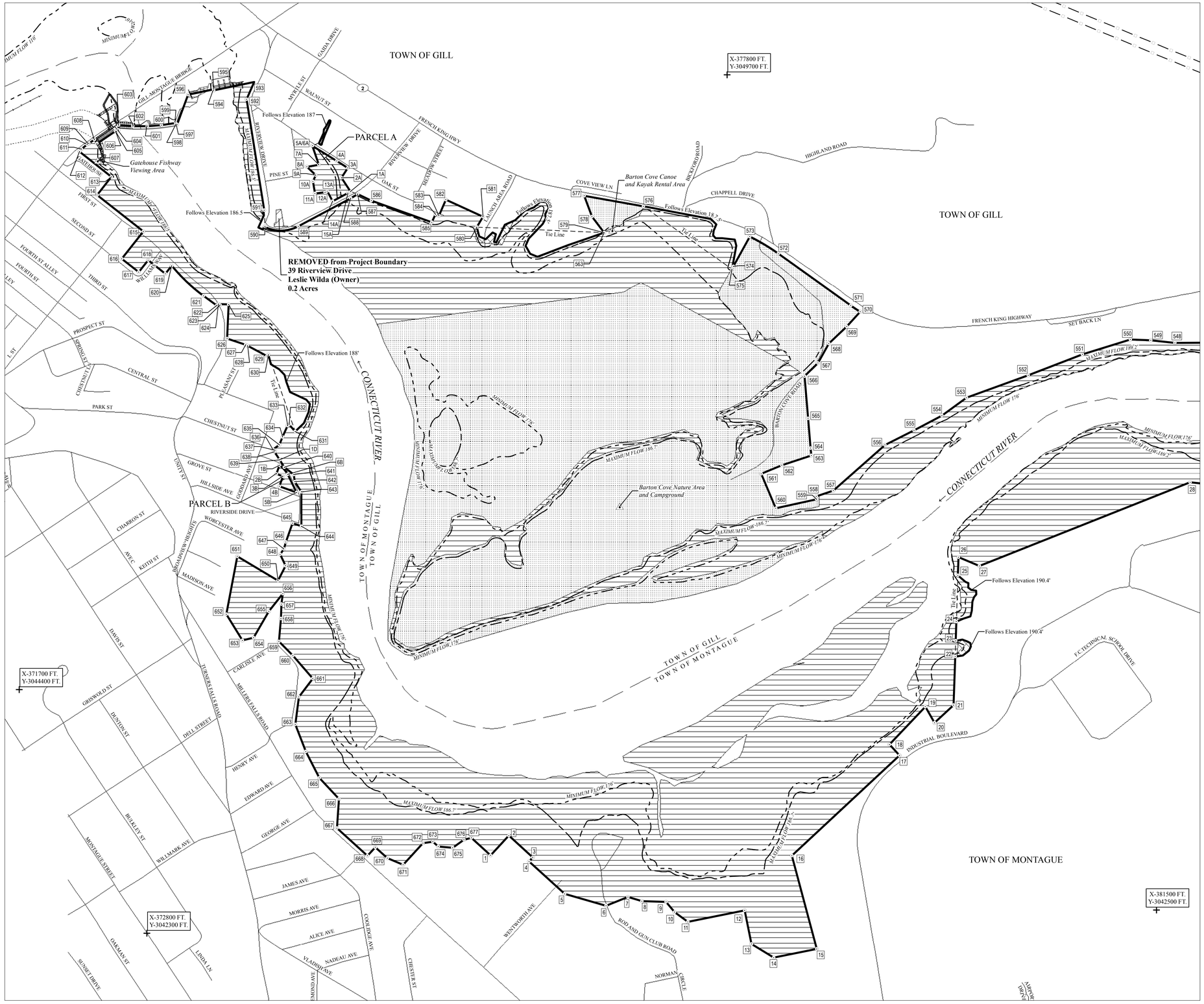
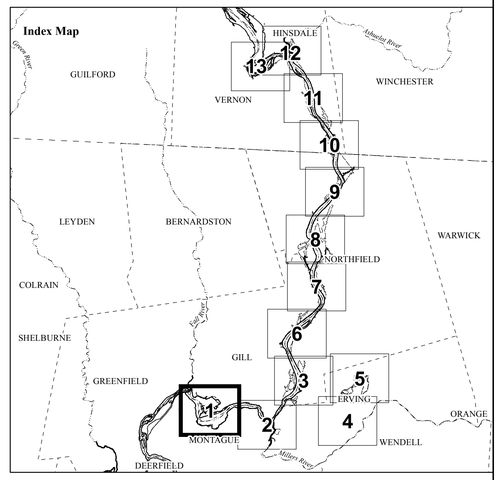


Index Map



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NAD83 State Plane
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Horizontal Datum:
NAD 1983
Vertical Datum:
NGVD 1929

MN 14°12' W

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.

STATE OF NEW HAMPSHIRE — No. 626 — ARTHUR F. SCIACCHITANO, JR. — LICENSED LAND SURVEYOR

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

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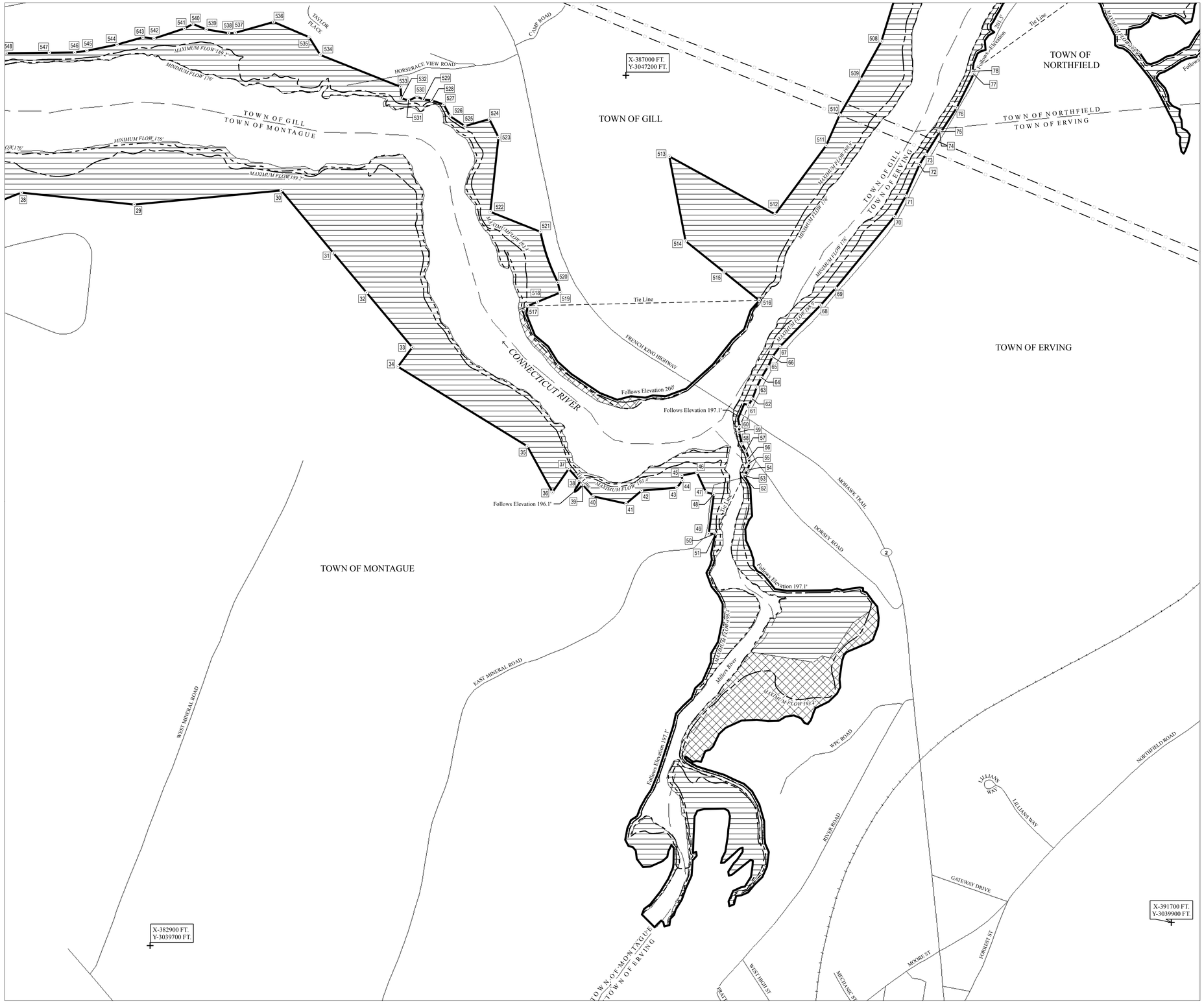

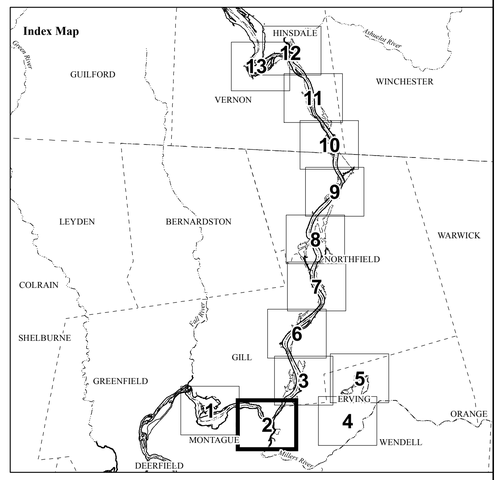

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Coordinate System:
NAD83 State Plane
Massachusetts Mainland Zone (feet)
Horizontal Datum:
NAD 1983
Vertical Datum:
NGVD 1929

MN 14°13' W

Declination changing by 0° 3' E/Year

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STATE OF NEW HAMPSHIRE — No. 626 — ARTHUR F. SCIOTINO, JR. — LICENSED LAND SURVEYOR

Northfield Mountain LLC
NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485

SHEET 2 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-2 — 1 inch = 400 feet — 1:4,800

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X-388700 FT.
Y-3054900 FT.

X-397700 FT.
Y-3054900 FT.

X-391600 FT.
Y-3047500 FT.

TOWN OF GILL

TOWN OF NORTHFIELD

TOWN OF ERVING

RIVER ROAD

PISGAH MOUNTAIN ROAD

CROSS ROAD

MILLERS FALLS ROAD

FOUR MILE BROOK ROAD

LOWER FARMS ROAD

NORTHFIELD FARM ROAD

WEST GILL ROAD

CONNECTICUT RIVER

MAXIMUM FLOW 178'

MINIMUM FLOW 176'

MAXIMUM FLOW 198.9'

MINIMUM FLOW 176'

MAXIMUM FLOW 201.9'

Follows Elevation 202.2'

Follows Elevation 202'

Follows Elevation 201.9'

Follows Elevation 201.8'

Tie Line

Boat Tour and Riverview Picnic Area

L2 Gauge House
Northfield Mountain
Tailrace Structure

Northfield Mountain Tour and Trail Center

Visitor Center

Visitor Center
Parking Lot

Maintenance Building

Warehouse

Tailrace
Tunnel

Vent Shaft
Building

Access
Tunnel

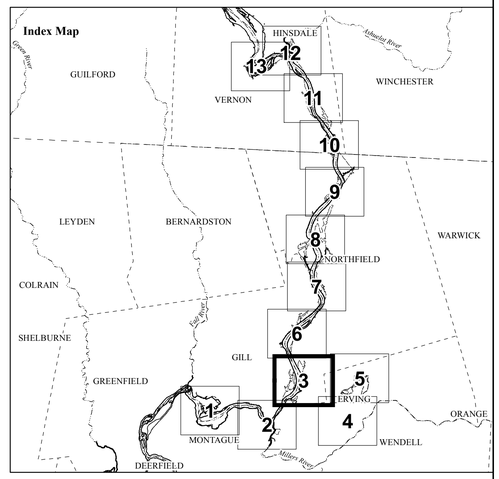
Parcel Excluded from
Project Boundary
Northfield
Switching Station
(Eversource)

345 kV Pipe Type Cables Through
and Including Disconnect Switches
Up to Eversource Ring Buss Connection

REMOVED
from Project Boundary
FirstLight (Owner)
8.1 Acres

ADDED
to Project Boundary 135.5 (acres)
Eversource Owner (122.0 acres)
FirstLight Owner (13.5 acres)

Index Map



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MN 14°14' W

Declination changing by 0° 3' E/Year

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STATE OF MASSACHUSETTS
No. 526
ARTHUR F. SIGOTANO, JR.
LICENSED LAND SURVEYOR

Northfield Mountain LLC
NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485

SHEET 3 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-3 1 inch = 400 feet 1:4,800

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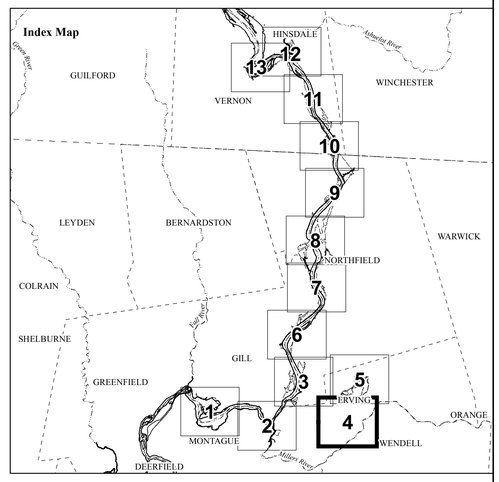

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STATE OF NEW HAMPSHIRE — LICENSED LAND SURVEYOR — No. 626 — ARTHUR F. SCIOTANO, JR. — SURVEYED

Northfield Mountain LLC
NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485

SHEET 4 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-4 — 1 inch = 400 feet — 1:4,800

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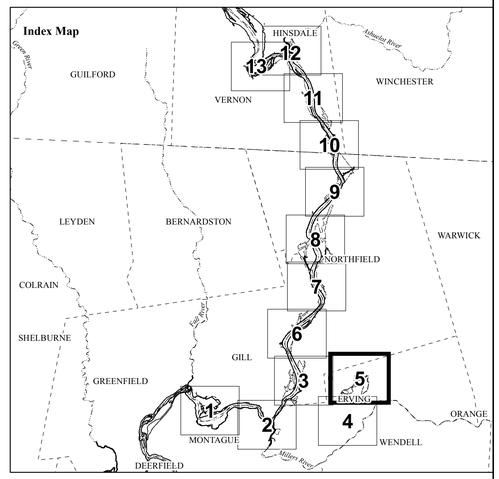

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MN 14°15' W

Declination changing by 0° 3' E/Year

I HEREBY STATE THAT THE PROJECT BOUNDARY DELINEATION FOR THE NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT (FERC 02485) 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.

STATE OF NEW HAMPSHIRE — No. 628 — ARTHUR F. SCIACNO, JR. — LICENSED LAND SURVEYOR

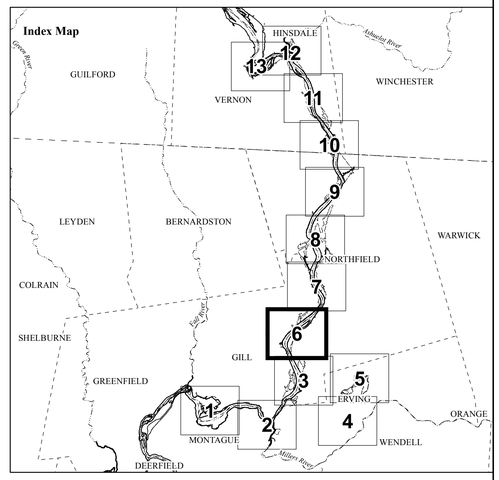
Northfield Mountain LLC
NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485

SHEET 5 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-5 — 1 inch = 400 feet — 1:4,800

Path: W:\gis\maps\exhibit_g\nfm_amendednfm_exhibit_g.mxd



Legend

- Project Boundary
- Point No. (see Project Boundary Data table for metes and bounds) — 164
- Project Recreation Site
- Project Recreation Site Proposed to be Non-Project Recreation Site
- Town Boundary
- Area Added to Project Boundary
- Area Removed From Project Boundary
- Reference Point
- Maximum Water Surface Elevation (in feet)
- Minimum Water Surface Elevation (in feet)
- Shoreline
- Major Creek
- Project Trail
- Railroad
- Transmission Lines
- Roads

Licensee Land Rights

- Own in Fee
- 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

MN 14°14' W

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.

STATE OF NEW HAMPSHIRE — LICENSED LAND SURVEYOR — No. 628 — ARTHUR F. SCIACCHITANO, JR.

Northfield Mountain LLC
NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485

SHEET 6 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-6 — 1 inch = 400 feet — 1:4,800

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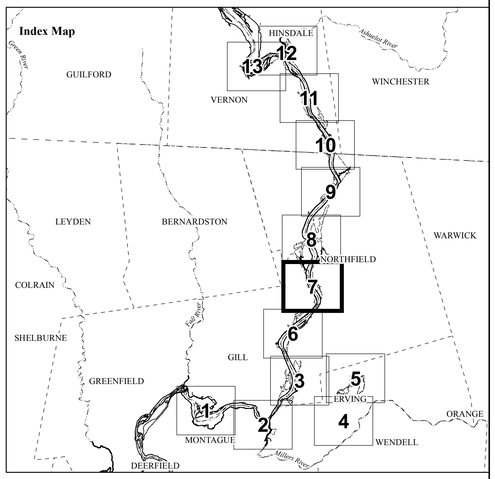


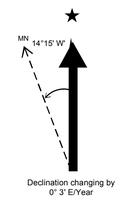
Legend

- Project Boundary
- 164 — 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
- Area Added to Project Boundary
- Area Removed From Project Boundary
- Reference Point
- Maximum Water Surface Elevation (in feet)
- Minimum Water Surface Elevation (in feet)
- Shoreline
- Major Creek
- Project Trail
- Railroad
- Transmission Lines
- Roads

Licensee Land Rights

- Own in Fee
- 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



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Northfield Mountain LLC
NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485

SHEET 7 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-7 1 inch = 400 feet 1:4,800

Path: W:\gis\maps\exhibit_g\ntm_amended\ntm_exhibit_g.mxd

X-390700 FT.
Y-3079900 FT.

MOUNTHERMON STATION ROAD

OLD VERNON ROAD

Bennet Brook

HUNNEWELL BROOK ROAD

TOWN OF NORTHFIELD

422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 490

← CONNECTICUT RIVER

MAXIMUM FLOW 179'

MAXIMUM FLOW 179'

MAXIMUM FLOW 179'

MAXIMUM FLOW 205'

MAXIMUM FLOW 205'

MAXIMUM FLOW 205.8'

MAXIMUM FLOW 205.8'

MAXIMUM FLOW 205'

MAXIMUM FLOW 205'

MAXIMUM FLOW 205'

GREAT MEADOW ROAD BRANCH

GREAT MEADOW ROAD

Follows Elevation 305.8'

Follows Elevation 205.4'

Tie Line

Follows Elevation 205.4'

Tie Line

262 261 260 259 258 257 256 255 264 263

Follows Elevation 205'

Tie Line

SCHOOL ST

PARKER AVE

WARWICK ROAD

MAIN STREET

EAST ST

LORITA LN

OLD FERRY ROAD

X-399900 FT.
Y-3075400 FT.

Millers Brook

LUCKY CLAPP ROAD

NEW ROAD

CAPTAIN SHERS PLAIN ROAD

F. SUMNER TURNER ROAD

OLD BERNARDSTON ROAD

Follows Elevation 205.2'

OLD BERNARDSTON ROAD (CLASS 3 ROAD)

Bennett Meadow Wildlife Management Area

Bennett Meadow Wildlife Management Area

GILL CENTER ROAD

ROUTE 10

10

MAXIMUM FLOW 205'

Tie Line

Bailey Brook

Follows Elevation 205.2'

MINIMUM FLOW 176'

Tie Line

MINIMUM FLOW 176'

MINIMUM FLOW 205'

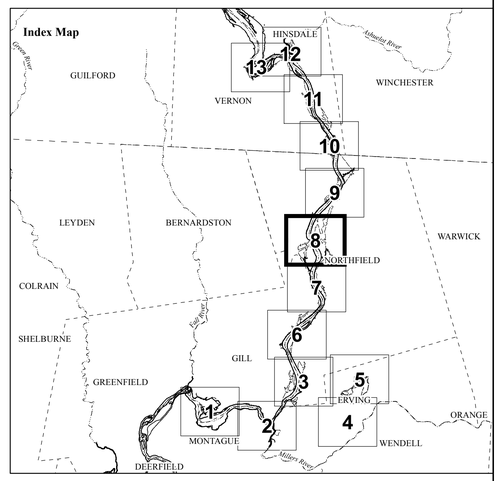
Follows Elevation 205'

Follows Elevation 205'

TOWN OF GILL

X-390600 FT.
Y-3072300 FT.

Index Map



Legend

- Project Boundary
- Point No. (see Project Boundary Data table for metes and bounds) (164)
- Project Recreation Site
- Project Recreation Site Proposed to be Non-Project Recreation Site
- Town Boundary
- Area Added to Project Boundary
- Area Removed From Project Boundary
- Reference Point
- Maximum Water Surface Elevation (in feet)
- Minimum Water Surface Elevation (in feet)
- Shoreline
- Major Creek
- Project Trail
- Railroad
- Transmission Lines
- Roads

Licensee Land Rights

- Own in Fee
- 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

MN 14°16' W

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.

STATE OF NEW HAMPSHIRE — No. 628 — ARTHUR F. SCIOTANO, JR. — LICENSED LAND SURVEYOR

Northfield Mountain LLC
NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485

SHEET 8 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-8 — 1 inch = 400 feet — 1:4,800

Path: W:\gis\maps\exhibit_g\nfm_amended\nfm_exhibit_g.mxd

X-394100 FT.
Y-3088200 FT.

X-403100 FT.
Y-3088400 FT.

X-399200 FT.
Y-3080800 FT.

TOWN OF NORTHFIELD

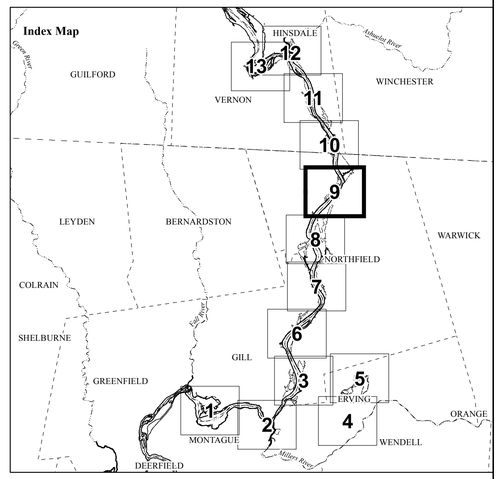
WEST ROAD
MOUNT HERMON STATION ROAD
Mattoon Brook
RANDALL ROAD
CALDWELL CROSS ROAD
CALDWELL ROAD
WEST NORTHFIELD ROAD
PAUCHAUG-RAMP ROAD
Pauchaug Brook
Louisiana Brook
MUSIC HALL DRIVE
EAST HALL DRIVE
WINCHESTER ROAD
BOLTON ROAD
THE WILLOWS
EAST NORTHFIELD ROAD
MOODY ST
NORTH LN
PINE ST
HOWARD ST
ALDRICH ST
ELM AVE
GLENWOOD AVE
HIGHLAND AVE
BIRNAM ROAD
HOLTON ST
NORTHFIELD INN DRIVE
BRIDGE ST
MILL ST
BRIDGE ST
MAIN ST
PETTICOST ROAD
Mill Brook
DICKINSON ST
MEADOW ST
SCHOOL ST
OMEGA MEADOW ROAD
63

CONNECTICUT RIVER

Follows Elevation 207.2'
Follows Elevation 207.2'
Follows Elevation 207.2'
Follows Elevation 206.7'
Follows Elevation 206.6'
Follows Elevation 206'
Follows Elevation 206.1'
Follows Elevation 206.9'
Follows Elevation 206.9'
MAXIMUM FLOW 207'
MAXIMUM FLOW 207'
MAXIMUM FLOW 207'
MAXIMUM FLOW 207'
MAXIMUM FLOW 207'
MAXIMUM FLOW 207'
MAXIMUM FLOW 206'
MAXIMUM FLOW 206'
Tie Line
Tie Line
Tie Line
Tie Line
Tie Line
Tie Line
Tie Line

389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422
264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289

Index Map



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
- Area Added to Project Boundary
- Area Removed From Project Boundary
- Reference Point
- Maximum Water Surface Elevation (in feet)
- Minimum Water Surface Elevation (in feet)
- Shoreline
- Major Creek
- Project Trail
- Railroad
- Transmission Lines
- Roads

Licensee Land Rights

- Own in Fee
- 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

MN 14°16' W

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.

STATE OF NEW HAMPSHIRE — LICENSED LAND SURVEYOR — NO. 626 — ARTHUR T. SCIACCHITANO, JR. — 10 NOVEMBER

Northfield Mountain LLC
NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485

SHEET 9 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-9 1 inch = 400 feet 1:4,800

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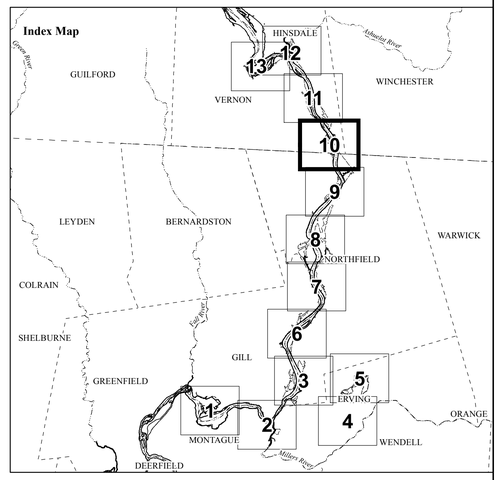
Index Map



Legend

- Project Boundary
- 164 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
- Area Added to Project Boundary
- Area Removed From Project Boundary
- Reference Point
- Maximum Water Surface Elevation (in feet)
- Minimum Water Surface Elevation (in feet)
- Shoreline
- Major Creek
- Project Trail
- Railroad
- Transmission Lines
- Roads

Licensee Land Rights

- Own in Fee
- 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

MN 14°16' W

Declination changing by 0° 3' E/Year

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STATE OF NEW HAMPSHIRE LICENSED LAND SURVEYOR No. 626 ARTHUR F. SCIOTANO, JR. SURVEYOR

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

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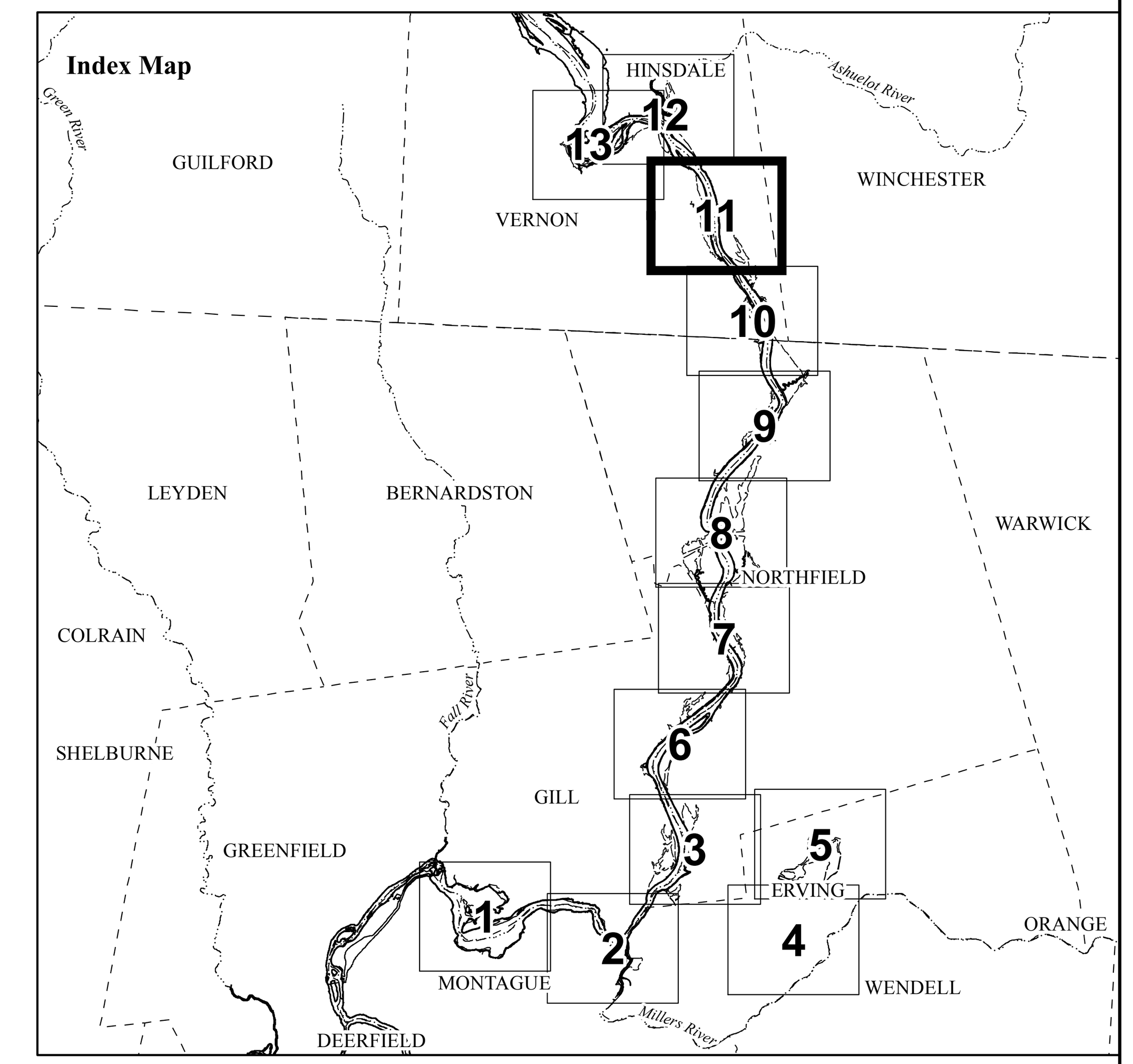
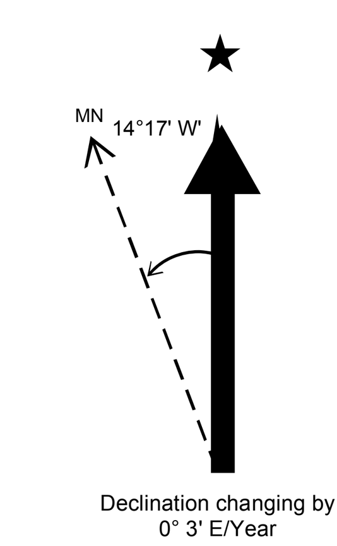


Legend

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
	Transmission Lines
	Roads

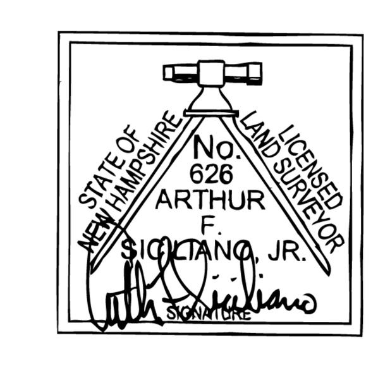
Licensee Land Rights

- Own in Fee
- 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

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

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-11 — 1 inch = 400 feet — 1:4,800

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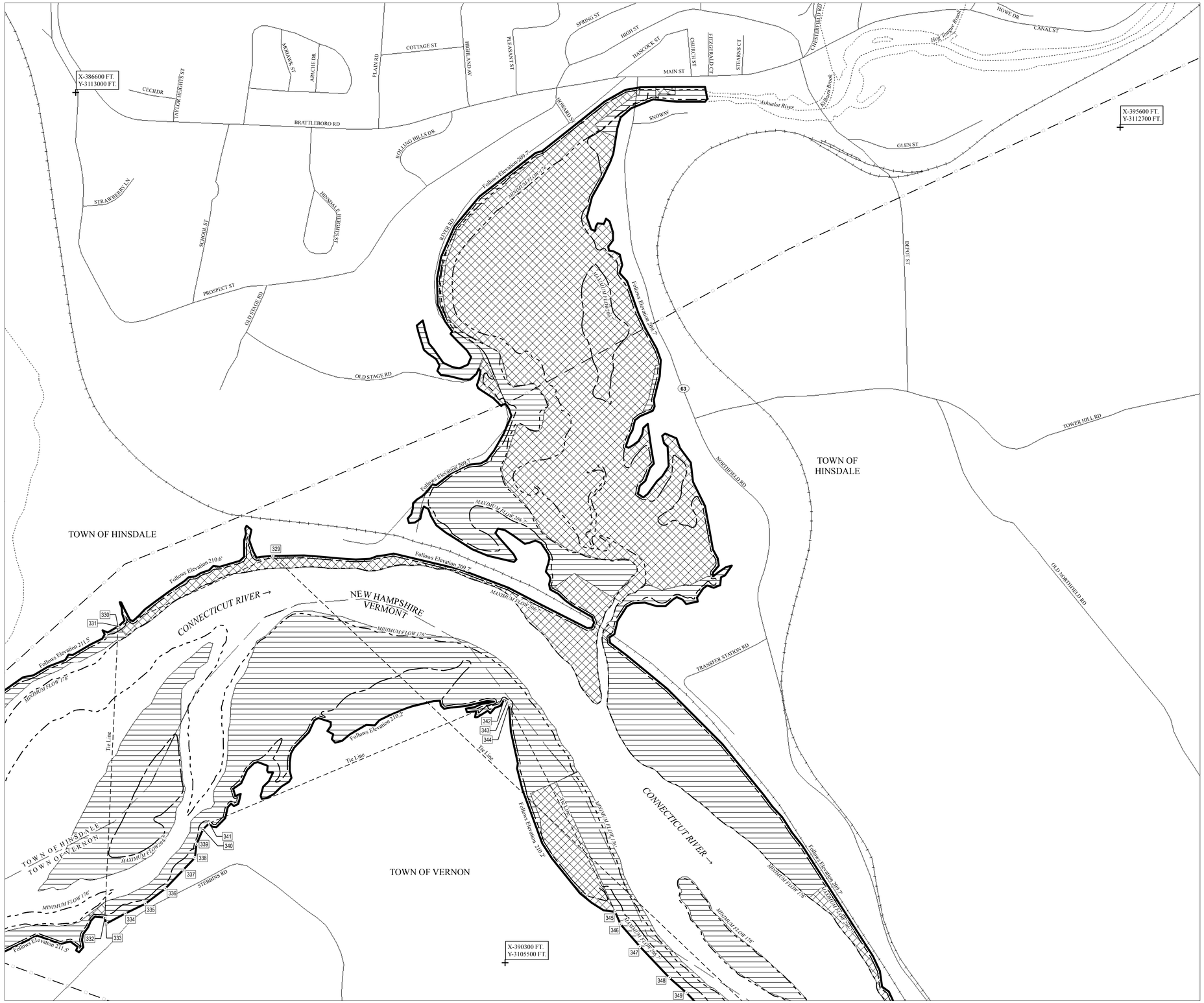

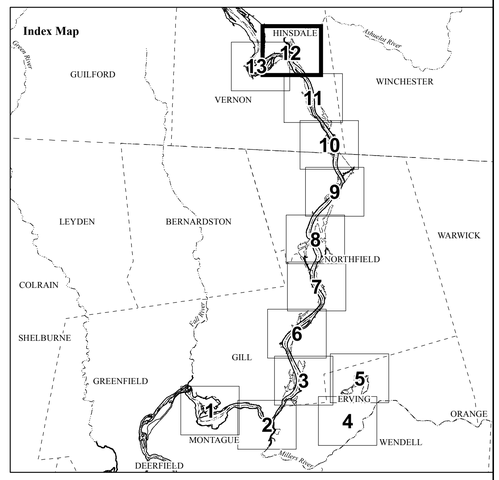

Legend

- 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
- Area Added to Project Boundary
- Area Removed From Project Boundary
- Reference Point
- Maximum Water Surface Elevation (in feet)
- Minimum Water Surface Elevation (in feet)
- Shoreline
- Major Creek
- Project Trail
- Railroad
- Transmission Lines
- Roads

Licensee Land Rights

- Own in Fee
- 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

MN 14°16' W

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.

STATE OF MASSACHUSETTS — LICENSED LAND SURVEYOR
NO. 526
ARTHUR F. SCIOTTINO, JR.

Northfield Mountain LLC
NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485

SHEET 12 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-12 1 inch = 400 feet 1:4,800

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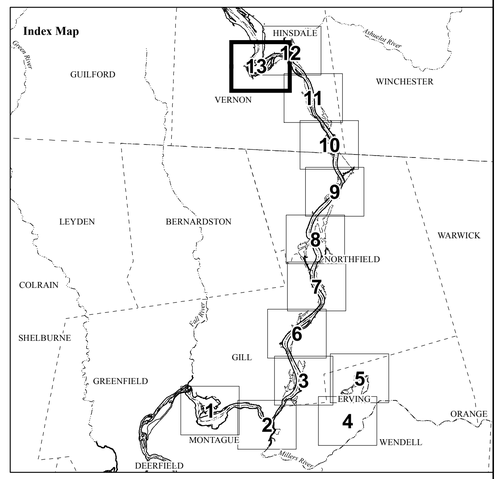

Legend

- Project Boundary
- Point No. (see Project Boundary Data table for metes and bounds) (164)
- Project Recreation Site
- Project Recreation Site Proposed to be Non-Project Recreation Site
- Town Boundary
- Area Added to Project Boundary
- Area Removed From Project Boundary
- Reference Point
- Maximum Water Surface Elevation (in feet)
- Minimum Water Surface Elevation (in feet)
- Shoreline
- Major Creek
- Project Trail
- Railroad
- Transmission Lines
- Roads

Licensee Land Rights

- Own in Fee
- 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

MN 14°16' W

Declination changing by 0° 3' E/Year

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STATE OF NEW HAMPSHIRE — No. 828 — ARTHUR F. SCIOTTINO, JR. — LICENSED LAND SURVEYOR

Northfield Mountain LLC
NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485

SHEET 13 of 13

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-13 1 inch = 400 feet 1:4,800

Path: W:\gis\maps\exhibit_g\nfm_amendednfm_exhibit_g.mxd