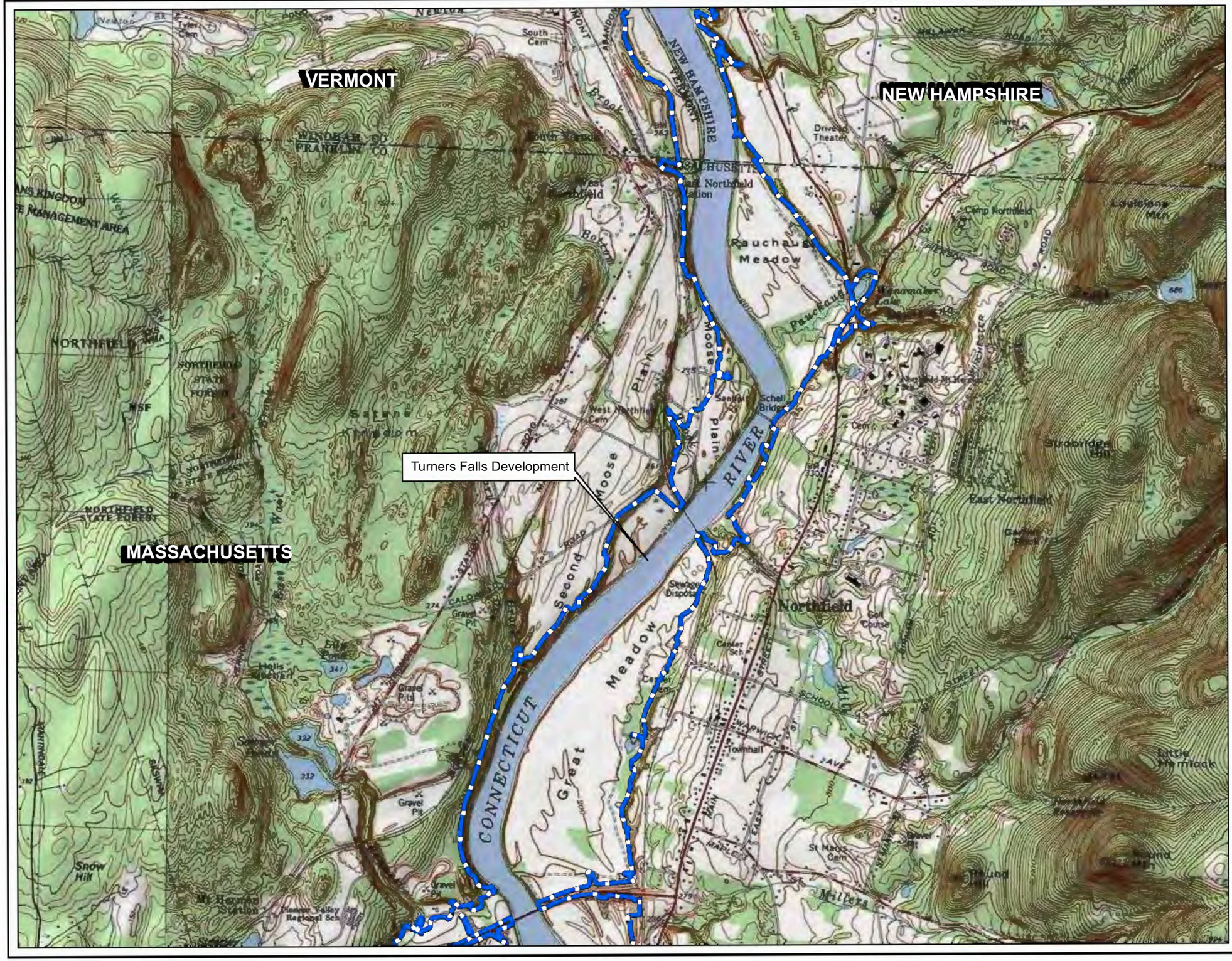

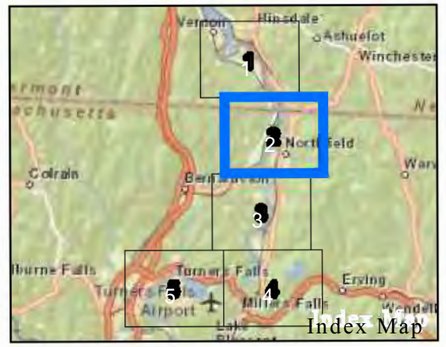

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Exhibit E
Figure 3.3.8.1.1-1: Area of Potential Effects
Map 2

Legend

*Area of Potential Effects**

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* Final Area of Potential Effect defined by Northfield Project Boundary

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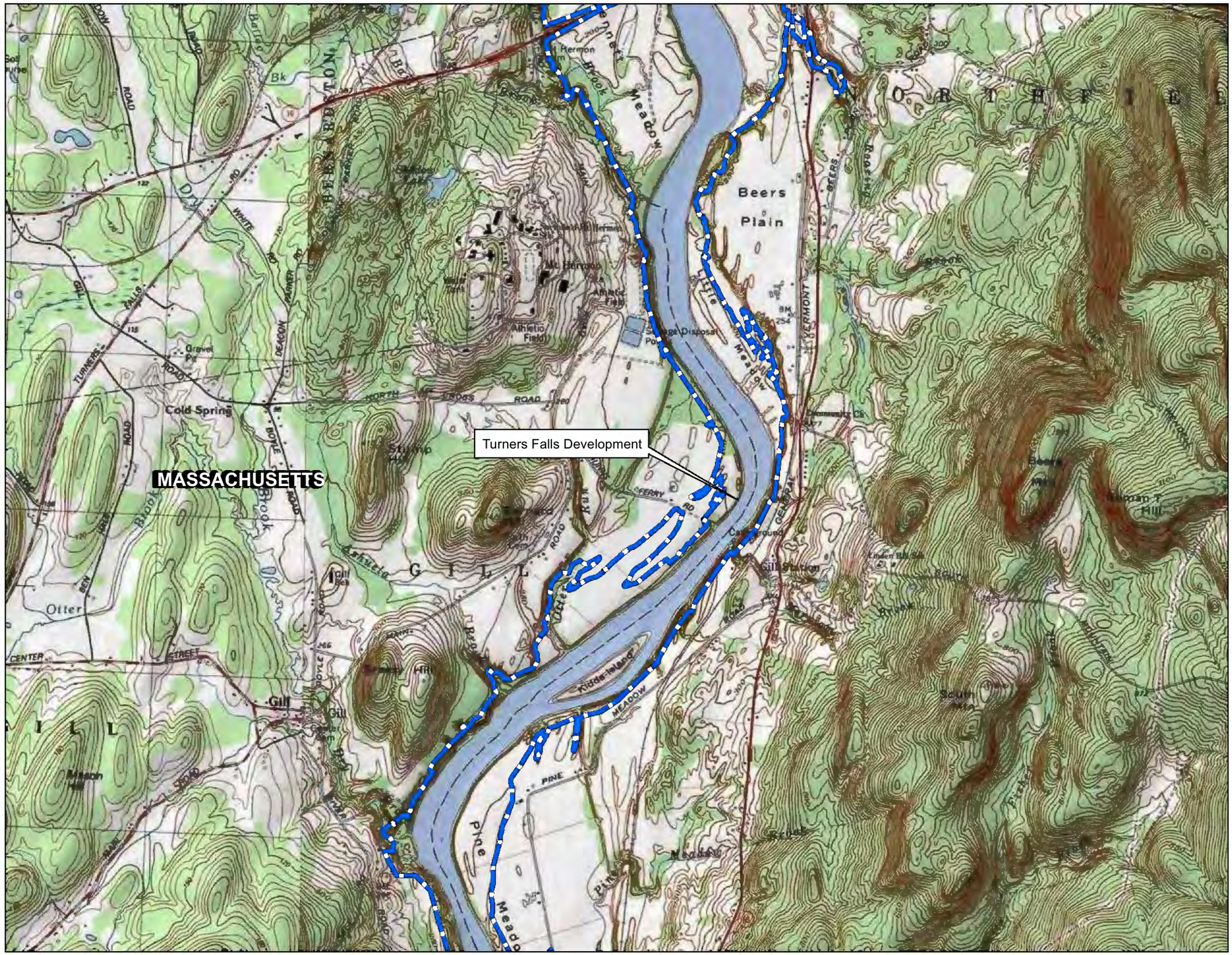

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Exhibit E
Figure 3.3.8.1.1-1: Area of Potential Effects
Map 3

N

Legend

*Area of Potential Effects**

* Final Area of Potential Effect defined by Northfield Project Boundary

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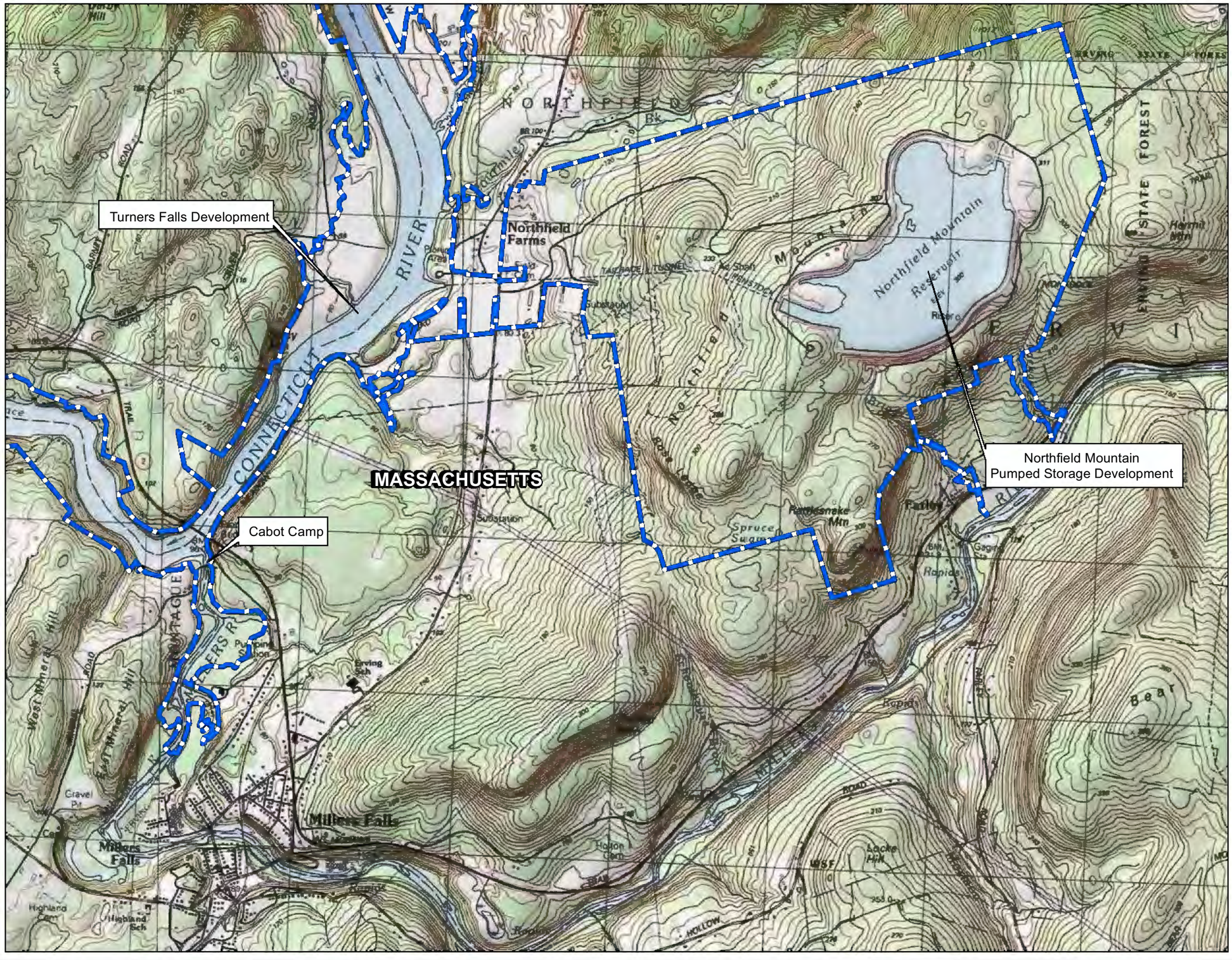

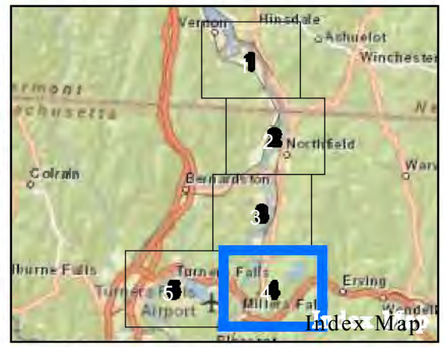

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Exhibit E
Figure 3.3.8.1.1-1: Area of Potential Effects
Map 4

N

Legend

*Area of Potential Effects**

* Final Area of Potential Effect defined by Northfield Project Boundary

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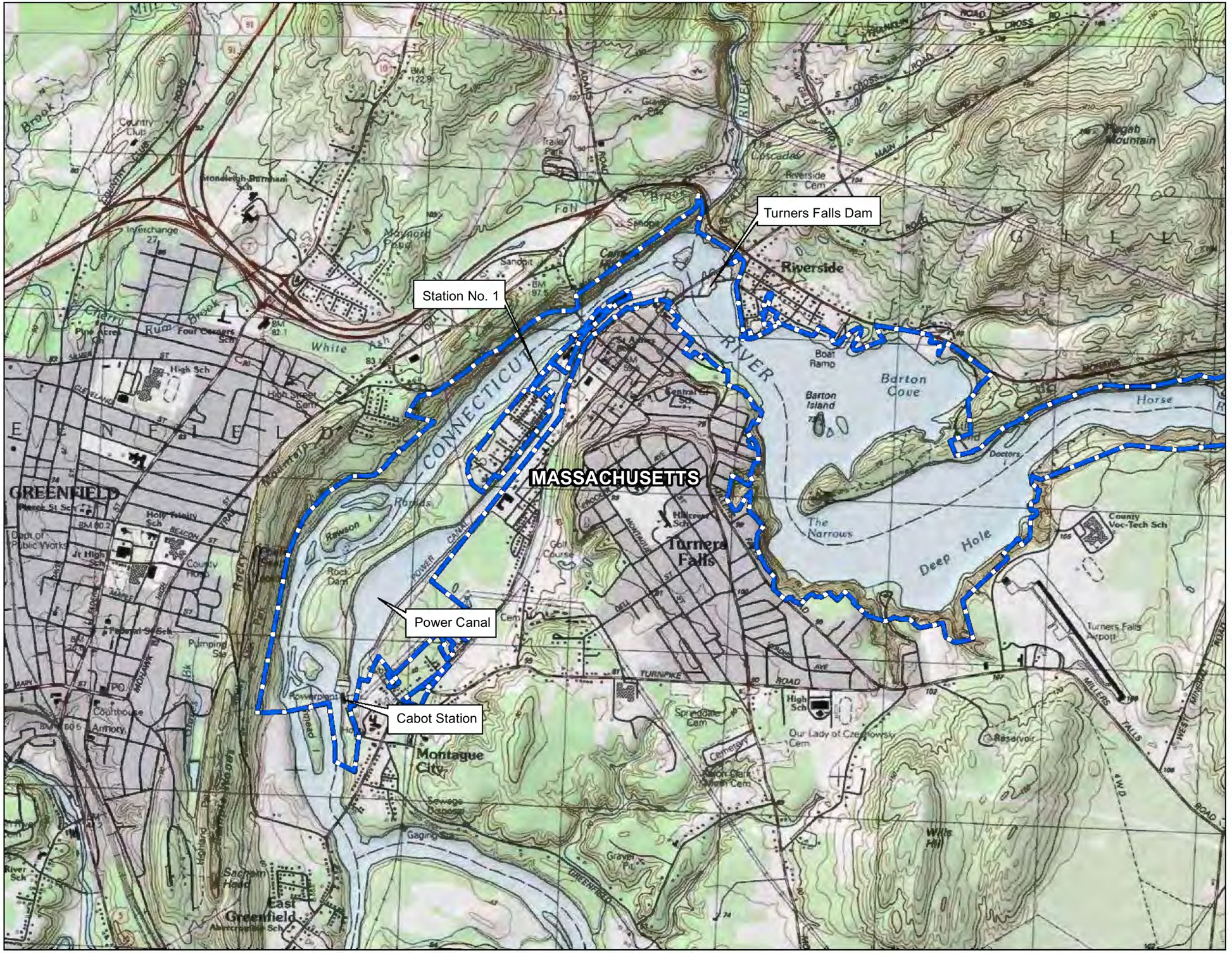

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Exhibit E
Figure 3.3.8.1.1-1: Area of Potential Effects
Map 5

N

Legend

*Area of Potential Effects**

* Final Area of Potential Effect defined by Northfield Project Boundary

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3.3.9 Aesthetic Resources

3.3.9.1 Affected Environment

3.3.9.1.1 Landscape Description

The Connecticut River valley's landscape has distinct natural beauty and classic New England farm village patterns. In the Project vicinity, historic villages and working landscapes combine with natural riverine beauty to create a scenic corridor. The region is comprised of riverside farmlands, woodlands, historic village centers founded in the late 1600s, working landscapes laid out during Colonial times, and vistas of the Connecticut River and mountain ranges. Step-like terraces and floodplains slope up to the bordering hills. The valley is framed by the Berkshire Mountains on the west and by the central uplands on the east. In autumn, the trees blaze with color (PVPC, 2012).

The corridor along TFI was designated as a scenic landscape in 1981 by the MA Department of Conservation and Recreation (then Department of Environmental Management). Below Cabot Station, most of the river corridor down to South Hadley is also considered a scenic landscape. Figure 3.3.9.1.1-1 depicts these scenic landscape designations as well as other aesthetic elements and scenic byways in the Turners Falls Project and Northfield Mountain Pumped Storage Development vicinity.

3.3.9.1.2 Scenic Byways and Viewscapes

Connecticut River National Scenic Byway

The roadways along the Connecticut River in NH, VT, and MA were designated as state scenic byways in 1994, 1999, and 2000, respectively. In 2005, the VT and NH sections were designated as a National Scenic Byway. The MA section, which extends from the state border in Northfield down to South Hadley, was added to the Connecticut River National Scenic Byway in 2009. Scenic byway routes in the Project vicinity include Route 142 through Vernon, VT, Route 63 through Hinsdale, NH and Northfield, Erving, and Montague, MA, and Route 47 through Sunderland, Hadley, and South Hadley, MA. Designated waypoints along the byway include Northfield Mountain Tour and Trail Center and the Great Falls Discovery Center in Turners Falls. Figure 3.3.9.1.1-1 shows the route of the Connecticut River Scenic Byway in the Turners Falls Development and Northfield Mountain Pumped Storage Development vicinity (USDOT, 2012).

Mohawk Trail Scenic Byway

The Mohawk Trail Scenic Byway was one of the earliest scenic byways in New England, receiving its designation in 1953. It follows an east-west corridor along Route 2 from Athol to Williamstown, MA. In Erving, the Byway passes through forested areas along the Millers River with views of the Erving Cliffs (Farley Ledges) as well as of mountains in Wendell and Gill. At the Erving-Gill town line, the Byway crosses the Connecticut River on the French King Bridge with spectacular views up and down the river (see below). In Gill, the Byway has a more rural feel with views of Barton Cove, some views of the river through trees to Montague and farmsteads, and a gently rolling landscape. Near the eastern town line, a panoramic view of the Village of Turners Falls and its historic industrial landscape is visible across the Connecticut River and the power canal. The Byway then turns onto Route 2A and passes through historic downtown Greenfield (FRCOG, 2009).

Connecticut River Water Trail

The Connecticut River Water Trail is a 12-mile-long paddling trail that runs from the Turners Falls Dam to a boat access point one mile north of Hatfield Center (see Figure 3.3.9.1.1-1). It features a nearly unbroken vegetated shoreline, wetlands, high bluffs, long views, and floodplain forests. The water trail is part of the longer Connecticut River Greenway State Park, which encompasses the length of the river in MA (MADCR, 2012).

Metacomet-Monadnock Trail/New England National Scenic Trail

The Metacomet-Monadnock Trail (M-M Trail) is a long distance hiking footpath that extends from the Connecticut state line to Mt. Monadnock in NH (see Figure 3.3.9.1.1-1). In 2001, the National Park Service certified sections of the trail, including those near Northfield Mountain, as a National Recreational Trail. In 2009, the trail was designated as part of the New England National Scenic Trail (NET), which also includes the Mattabesett Trail in CT (collectively known as the M-M-M Trails). In Northfield, the M-M Trail traverses the open ledges of Crag Mountain, from which views of Northfield Mountain Upper Reservoir can be seen to the southwest (see Figure 3.3.9.1.2-1) (AMC, 2010).

Connecticut River National Blueway

The Connecticut River was designated the first National Blueway on May 24, 2012 by the US Department of Interior. The federal designation comprises the entire river, as well as its watershed. The Blueway designation was intended to provide for better coordination of local, state and federal groups to promote best management practices, information sharing and stewardship. Though the National Blueway System has been dissolved, the Connecticut River maintains the designation of the nation's first and only National Blueway.

Scenic Viewpoints

Located between the Northfield Mountain Pumped Storage Development tailrace and the Turners Falls Dam, the French King Gorge, with its 250-foot-high rocky banks, is of ecological and scenic significance. The gorge was formed thousands of years ago by glacial melt waters. The Route 2 Bridge that connects Gill to Erving, also known as the French King Bridge, provides scenic views to the north and south, where the Millers River empties into the Connecticut (see Figure 3.3.9.1.2-2). This is a popular tourist destination and some parking is provided on both sides of the road at the bridge (MADCR, 2012).

The Gill-Montague Bridge just below Turners Falls Dam provides scenic views of the dam and bypass reach for pedestrian and automobile traffic. Figure 3.3.9.1.2-3 is an aerial image showing the bridge, the Village of Turners Falls, and the landscape surrounding the lower TFI.

At more than 1,200 feet in height, Mt. Toby in Sunderland, just south of the Turners Falls Project and Northfield Mountain Pumped Storage Development, looms over the middle Connecticut River valley offering outstanding panoramic views. A moderate hiking trail of about 6 miles leads to the top, and there are shorter hiking trails as well. Related geologically to Mt. Sugarloaf, Mt. Toby features cliffs, caves, waterfalls, wetlands, and open fields (MADCR, 2012).

3.3.9.2 Environmental Effects

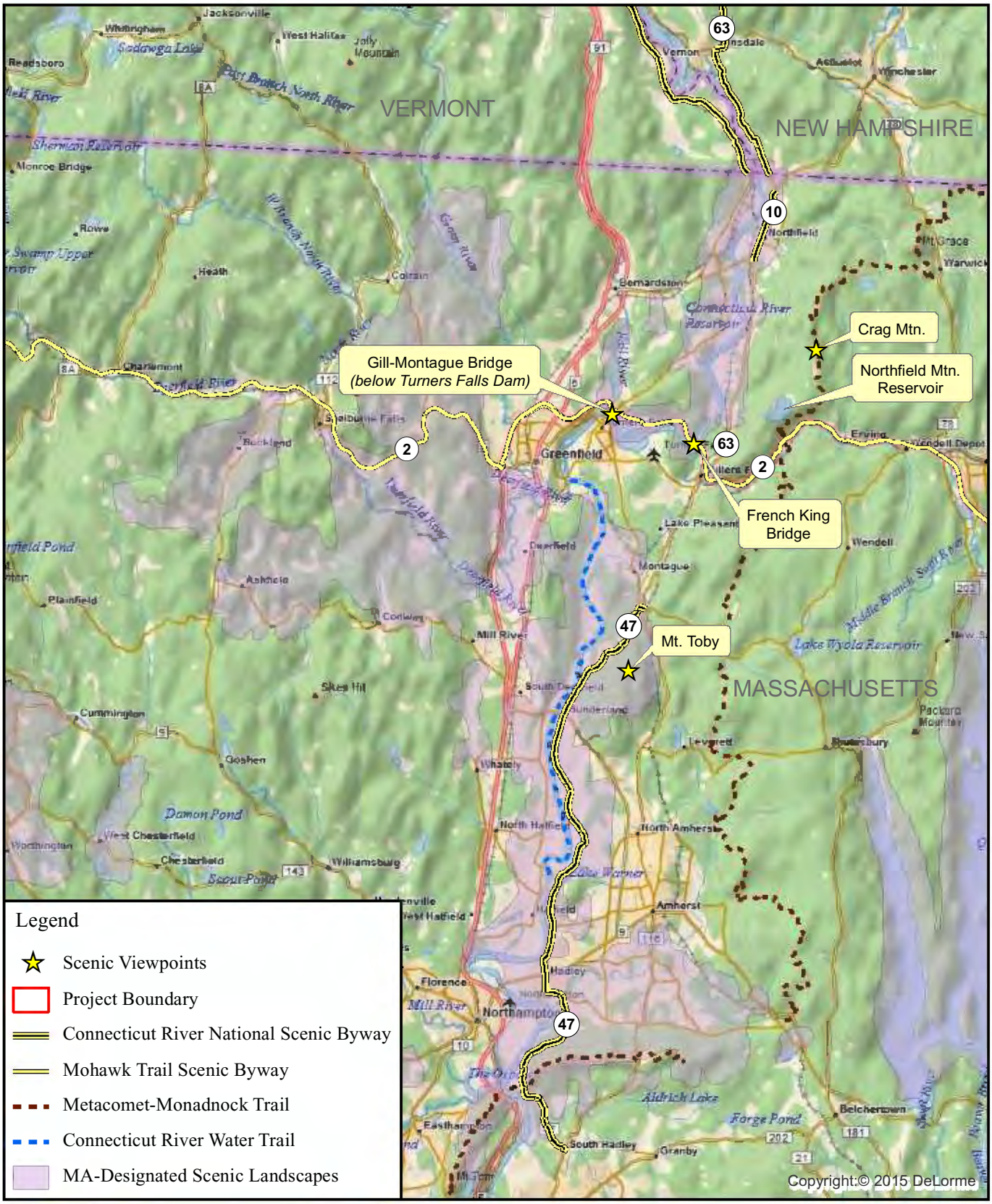
The only proposed change to Project operations is to use more of the Upper Reservoir storage capacity by increasing the storage range from the current operating range of 1000.5 feet to 938 feet to 1004.5 to 920 feet. FirstLight has requested, and FERC has approved, similar amendments to expand the Upper Reservoir operating limits to the same limit proposed during portions of 2001, 2005, 2006, 2014 and 2015. An analysis of intraday water level variations of the TFI during the 2014/2015 winter amendment period, compared to the same periods for the winters 2000-2015, showed less variability. The increase in Upper Reservoir storage is not expected to change the aesthetics of the TFI.

3.3.9.3 Proposed Environmental Measures

FirstLight is not proposing any measures to enhance aesthetic resources. Although FirstLight is proposing to use more of the Upper Reservoir storage capacity, aesthetics are not expected to be affected.

3.3.9.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts are expected on aesthetic resources.



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

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Figure 3.3.9.1.1-1:
Aesthetic Resources
in the Project Vicinity

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Figure 3.3.9.1.2-1: View of Northfield Mountain Reservoir from Crag Mountain

Figure 3.3.9.1.2-2: French King Bridge over Turners Falls Impoundment

Figure 3.3.9.1.2-3: Aerial View of Turners Falls Dam Area, Looking Upstream

3.3.10 Socioeconomic Conditions

3.3.10.1 Affected Environment

3.3.10.1.1 Population Patterns

The Pioneer Valley region encompasses 43 cities and towns in the Connecticut River Valley in western MA. An estimated 608,000 people live in the nearly 1,200-square-mile region, which includes the fourth largest metropolitan area in New England (Springfield). The Pioneer Valley's diverse economic base, its renowned academic institutions, and its wealth of natural resources make it a unique place to live and work. Residents live in downtown areas, suburban neighborhoods, quiet villages, historic areas, and rural homesteads. People work in downtown offices in Springfield, the region's cultural and economic center; in plants and factories in Holyoke and Chicopee, the first planned industrial communities in the nation; in academic halls in Amherst, Northampton, and South Hadley, home to venerable colleges and a flagship university; in tobacco fields in Hadley, where families have worked the land for generations; in distribution centers in Westfield, near the crossroads of two interstate highways; and in offices scattered throughout the region (PVPC, 2012).

The area immediately surrounding the Project is relatively rural in nature. Franklin County is the most rural in MA, and Greenfield is its largest municipality. Based on the results of the 2010 census (presented in Table 3.3.10.1.1-1), the estimated populations of the three counties within the Project boundary—Franklin County, MA, Cheshire County, NH, and Windham County, VT—are 71,444, 77,274, and 44,453, respectively. This translates to population densities of 99 people per square mile in Franklin County, 106 people per square mile in Cheshire County, and 56 people per square mile in Windham County. Housing densities are roughly 46, 48, and 37 units per square mile, respectively (US Census Bureau, 2010).

Table 3.3.10.1.1-2 shows that over the last decade, populations have remained relatively stable in the Project vicinity—ranging from a decline of 0.1 percent in Franklin County to an increase of 4.7% in Cheshire County (US Census Bureau, 2010).

The nearest major town is Greenfield, MA, which has a population of 17,610 (2010) and a town center located about 4 miles southwest of the Turners Falls Dam. Other significant population centers near the Project are shown in Table 3.3.10.1.1-3 and include Northampton (28,709 residents, 28 miles south of the Turners Falls Development and Northfield Mountain Pumped Storage Development), Amherst (37,819 residents, 17 miles south of the facilities), Holyoke (39,885 residents, 38 miles south), Springfield (152,906 residents, 48 miles south), and Hartford, CT (124,775 residents, 70 miles south). For reference, Boston is approximately 106 miles east of the Project and has about 602,609 residents (US Census Bureau, 2010).

3.3.10.1.2 Economic Patterns

Income distributions of the counties in the Project vicinity are shown in Table 3.3.10.1.2-1. Median household income in the region was lower than that for MA overall ($62,072), ranging from $47,386 in Windham County to $52,644 in Cheshire County. In 2010, 12.7% of households throughout the state earned less than $15,000; this figure was identical for Franklin County and was bracketed by Cheshire and Windham counties at 9.7% and 13.3%, respectively. Additionally, while over 29% of MA households earned more than $100,000 in 2010, only 17.2% of households in Franklin County, 17.7% in Cheshire County, and 14.5% in Windham County surpassed that amount (US Census Bureau, 2010).

Table 3.3.10.1.2-2 displays the distribution of the civilian employed population (age 16 or over) for each county and the Commonwealth of MA. In general, counties in the Project vicinity have a higher percentage of people employed in the natural resources, construction and maintenance sector and the production, transportation, and material moving sector than in MA overall, while less people are employed in the management, business, science, and arts sector. Additionally, unemployment rates are lower in the Project

vicinity—ranging from 6.5% in Windham County, 9.7% in Cheshire County, and 10.2% for MA (US Census Bureau, 2010).

Some of the larger employers in the Project vicinity include the Greenfield Community College (300 employees in 2010), Yankee Candle in Whately (1,500 employees), Cooley Dickinson Hospital and Smith College in Northampton (1,800 and 1,000 employees, respectively), and the University of MA in Amherst (7,900 employees) (Clarke, 2011). FirstLight employs approximately 53 full-time employees at the Northfield Mountain Pumped Storage Development and 12 full-time employees at the Turners Falls Development.

As summarized in Exhibit E, FirstLight pays considerable federal, state and local taxes. Based on fiscal year 2015 dollars, the local, state and federal taxes for both developments combined was $12,055,322, $827,638 and $13,793,991, respectively.

3.3.10.2 Environmental Effects

FirstLight proposed to operate the Project in the same manner in which it has been historically operated, continuing to supply low cost electricity and jobs, which benefits the socioeconomic health of the region.

3.3.10.3 Proposed Measures

Because the proposed Project would continue to have a beneficial effect on socioeconomic resources, FirstLight does not proposed any new measures related to socioeconomic resources.

3.3.10.4 Unavoidable Adverse Impacts

The Project has no known unavoidable adverse effects on socioeconomic resources.

Table 3.3.10.1.1-1: Population and Housing Data in the Project Vicinity

County	Population (2010)	Housing Units (2010)	Land Area (sq. mi.)	Population Density (people/sq. mi.)	Housing Density (units/sq. mi.)
Franklin Co., MA	71,444	33,695	725	99	46
Cheshire Co., NH	77,274	34,682	729	106	48
Windham Co., VT	44,453	29,601	798	56	37

Source: (US Census Bureau, 2010)

Table 3.3.10.1.1-2: Population Trends in the Project Vicinity

County	Population (2000)	Population (2010)	Percent Change
Franklin Co., MA	71,535	71,444	-0.13%
Cheshire Co., NH	73,825	77,274	4.67%
Windham Co., VT	44,216	44,453	0.54%

Source: (US Census Bureau, 2010)

Table 3.3.10.1.1-3: Major Population Centers near the Project

Town or City	Population (2010)	Approximate Distance from Turners Falls Dam (mi)
Greenfield, MA	17,610	4
Amherst, MA	37,819	17
Brattleboro, VT	7,136	22
Northampton, MA	28,709	28
Keene, NH	23,547	36
Holyoke, MA	39,885	38
Springfield, MA	152,906	48
Hartford, CT	124,775	70
Boston, MA	602,609	106

Source: (US Census Bureau, 2010)

Table 3.3.10.1.2-1: Income Distribution for Households in the Project Vicinity

County or State	Median Household Income (2010)	Percent of Households with Incomes More than $100,000	Percent of Households with Incomes Less than $15,000
Franklin Co., MA	$50,514	17.2%	12.7%
Cheshire Co., NH	$52,644	17.7%	9.7%
Windham Co., VT	$47,386	14.5%	13.3%
Massachusetts	$62,072	29.2%	12.7%

Source: (US Census Bureau, 2010)

Table 3.3.10.1.2-2: Occupation Distribution in the Project Vicinity

County or State	Occupation					Percent Unemployed
	Management, business, science, and arts	Service	Sales and office	Natural resources, construction, and maintenance	Production, transportation, and material moving	
Franklin Co., MA	37.5%	15.6%	23.3%	10.1%	13.5%	7.8%
Cheshire Co., NH	34.5%	17.3%	23.0%	9.0%	16.1%	9.7%
Windham Co., VT	39.0%	18.1%	20.2%	11.2%	11.5%	6.5%
Massachusetts	43.5%	17.4%	23.5%	6.8%	8.9%	10.2%

Source: (US Census Bureau, 2010)

3.4 No-Action Alternative

Under the No-action Alternative, the existing Project would continue to operate as it has historically operated as described in Section 2.1. The measures in the current licenses as described in Section 2.1 would continue - none of FirstLight's proposed measures or those that may be proposed by others would be required and any environmental or recreation benefits from such recommendations would not occur. The Project would continue to be of importance to recreation, generation of renewable energy, and minimization of atmospheric pollutants.

4 DEVELOPMENTAL ANALYSIS

This section analyzes the cost of continued operation and maintenance of the Project under the No Action and Proposed Alternatives. Costs are associated with the operation and maintenance of hydropower facilities, as well as the costs of providing the proposed PM&E measures. The economic analysis has been conducted using a 50-year time period.

4.1 Power and Economic Benefits of the Project

Consistent with FERC's approach to economic analysis, the value of the Project's power benefits is determined by estimating the cost of obtaining the same amount of energy and capacity using likely alternative resources available in the region. This analysis is based on current costs and does not consider future escalation of fuel prices in valuing the Project's power benefits.[55]

The Project has generation facilities associated with the Turners Falls Development—specifically Station No. 1 and Cabot Station and the Northfield Mountain Pumped Storage Development located approximately 5.2 miles upstream of the Turners Falls Dam. The first generation facility on the power canal is Station No. 1 which has a total authorized installed capacity of 5.693 MW. There are five operational horizontal Francis turbines operating under a gross head of approximately 43.7 feet and the individual turbines have maximum hydraulic capacities ranging from 140 to 560 cfs. Cabot Station is located at the downstream terminus of the power canal and has a total authorized installed capacity of 62.016 MW or approximately 10.336 MW for each of the 6 units. The vertical Francis turbines operate at a normal head of 60 feet and have a maximum total hydraulic capacity of approximately 13,728 or 2,288 cfs/unit. Under the No Action alternative the Turners Falls Development will generate an average of approximately 328,022 MWh per year (based on the period 2000-2014). For the analysis in Section 4.1.1 below, which is based on 2013 pricing data, the 2013 Turners Falls Development annual generation of 356,376 MWh was used.

The Northfield Mountain Pumped Storage Development contains four reversible pump/turbines operating at gross heads ranging from 753 to 824.5 feet. Each turbine has an electrical capacity of 291.7 MW, for a total station capacity of 1,166.8 MW. When operating in a pumping mode, the maximum hydraulic capacity (4 pumps) is approximately 15,200 cfs (3,800 cfs/pump). Alternatively, when operating in a generation mode, the approximate maximum hydraulic capacity (4 turbines) is approximately 20,000 cfs (5,000 cfs/turbine). The licensed operating range of the Upper Reservoir is between 1,000.5 and 938 ft resulting in a storage capacity of 12,318 acre-feet and 8,729 MWh (formerly 8,475 MWh) of generation. Under the No Action alternative the Northfield Mountain Pumped Storage Development will generate an average of approximately 1,053,891 MWh per year while using 1,437,464 MWh per year for pumping (based on the period 2000-2009, 2011-2014). For the analysis in Section 4.1.1 below, which is based on 2013 pricing data, the 2013 Northfield Mountain Pumped Storage Development annual generation of 808,943 MWh and annual pumping 1,069,438 MWh was used.

4.1.1 Economic Assumptions

FirstLight operates the Project with the primary purpose to supply energy, capacity, regulation and other ancillary services to the ISO-NE Interconnection. In operating the Project, FirstLight ensures dam safety, provides a range of existing environmental measures and ensures capacity, peaking, reserve, and ancillary/regulation power services to the New England Power Pool. The power value at the Turners Falls Development and Northfield Mountain Pumped Storage Development varies as shown in Table 4.1.1-1 due to the different timing of operation as described in more detail in Exhibit B and D.

[55] Mead Corporation, Publishing Paper Division, 72 FERC ¶ 61,027 (July 13, 1995).

Table 4.1.1-1: Assumptions for Economic Analysis (2013)

Assumption	Turners Falls Development	Northfield Mountain Pumped Storage Development	Source of Information
Average Power Value (Generation) (2013 value)	$58.185/MWh	$85.172/MWh	FirstLight
Average Power Value (Pumping) (2013 Value)	---	$40.012/MWh	FirstLight
2013 Annual Generation (MWh)	356,376 MWh	808,943 MWh	FirstLight
2013 Annual Energy for Pumping (MWh)	---	1,069,438 MWh	FirstLight
Period of Analysis	50 years	50 years	---
Net Investment (book value)	$284,970,827	$926,156,091	FirstLight
Capacity Value (67.709 MW) (2013 value)	$2,214,660	---	FirstLight
Capacity Value (1143 MW) [1] (2013 value)	---	$35,520,940	FirstLight
Locational Forward Reserve Market and Real-Time Reserves	---	$14,931,318	FirstLight
Reserve	$77,441	---	FirstLight
Ancillary Service (2013 value)	($112,592)[2]	$1,670,097	FirstLight

[1]In 2013, the electrical capacity was 1143 MW; however, it is currently 1,166.8 MW.
[2]Ancillary includes Utility charges for electric production.

4.1.2 Annual Power Value

Table 4.1.2-1 shows the total valuation of power for the No-Action and Proposed Alternatives. For both scenarios, this assumes a 2013 annual generation of 356,376 MWh at the Turners Falls Development, 808,943 MWh at the Northfield Mountain Pumped Storage Development and 1,069,438 MWh used in pumping at the Northfield Mountain Pumped Storage Development.

Table 4.1.2-1: Valuation of the Annual Output of the Turners Falls Development and Northfield Mountain Pumped Storage Development (2013)

	Turners Falls Development		Northfield Mountain Pumped Storage Development		Total	
	No Action	Proposed	No Action	Proposed	No Action	Proposed
Energy Generated at $85.172/MWh (for 808,943 MWh)	--	--	$68,899,098	$68,899,098	$68,899,098	$68,899,098
Energy for Pumping at $40.012/MWh (for 1,069,438 MWh)	--	--	($42,790,965)	($42,790,965)	($42,790,965)	($42,790,965)
Energy Generated at $58.185 (for 356,376 MWh)	$20,735,750	$20,735,750	--	--	$20,735,750	$20,735,750
Capacity Value	--	--	$35,520,940	$35,520,940	$35,520,940	$35,520,940
Capacity Value	$2,214,660	$2,214,660	--	--	$2,214,660	$2,214,660
Locational Forward Reserve Market and Real-Time Reserves	--	--	$14,931,318	$14,931,318	$14,931,318	$14,931,318
Reserve	$77,441	$77,441			$77,441	$77,441

	Turners Falls Development		Northfield Mountain Pumped Storage Development		Total	
	No Action	Proposed	No Action	Proposed	No Action	Proposed
Ancillary Service	($112,592)	($112,592)	$ 1,670,097	$ 1,670,097	$ 1,557,505	$ 1,557,505
Regulation			$3,561,234	$3,561,234	$3,561,234	$3,561,234
Total Value (Energy + Capacity Value +Reserve + Ancillary + Regulation)	$22,915,259	$22,915,259	$81,791,722	$81,791,722	$104,706,981	$104,706,981
Total value per MWh	$64.30	$64.30	$101.11	$101.11	$89.85	$89.85

NOTE: Numbers may not be exact due to rounding.

4.1.3 Project Costs under the No-Action Alternative

The total annualized current costs for the Project No-Action Alternative is $94,370,566 (Table 4.1.3-1).

Table 4.1.3-1: Summary of Current Annual Costs and Future Costs under the No-Action Alternative (2013)

Items	Annual Cost		
	Turners Falls Development	Northfield Mountain Pumped Storage Development	Total
Capital Costs[56]	$1,901,763	$15,308,478	$17,210,241
Local, State and Federal Taxes[57]	$6,533,061	$20,143,890	$26,676,951
Annual Depreciation and Amortization Expense[58]	$6,771,000	$28,957,000	$35,728,000
Operation and Maintenance Expenses[59]	$3,731,591	$11,023,783	$14,755,374
Total	$18,937,415	$75,433,151	$94,370,566

4.1.4 Project Costs under the Proposed Alternative

At this time, FirstLight is not proposing environmental measures as many studies are incomplete or have not been started. Thus, at this time, FirstLight has not included costs associated with added capital costs, or additional operation and maintenance costs for the Project.

4.2 Comparison of Alternatives

4.2.1 No-Action Alternative

Under the No Action Alternative, the Project would continue to operate as it does now. In 2013, the Project generated 1,165,319 MWh (356,376 MWh at Turners Falls Development + 809,943 at Northfield Mountain Pumped Storage Development) and the Northfield Mountain Pumped Storage Development used 1,069,438 MWh. The 2013 power value of the Project (Table 4.2.2-1) under the no-action alternative would be $104,706,981 ($89.85/MWh). The 2013 cost of producing this power including depreciation, operation and maintenance costs, and taxes would be approximately $94,370,566 ($80.98/MWh). The 2013 net benefit of the Project would be approximately $10,336,415 ($8.87/MWh).

4.2.2 Proposed Alternative

Under the Proposed Alternative, the range of operation at the Northfield Mountain Pumped Storage Development's Upper Reservoir would be increased from the current range of 938 and 1000.5 feet to 920

[56] As described in Exhibit D, Section 4.1.
[57] As described in Exhibit D, Section 4.2.
[58] As described in Exhibit D, Section 4.3.
[59] As described in Exhibit D, Section 4.4.

and 1004.5 feet for a total range of 84.5 feet. This added range of operation would result in an increased storage capacity of 3,009 acre-feet resulting in a total of 15,327 acre-feet of storage and an added generation capacity of 2,050 MWh (formerly 1,990 MWh). However, at the time of filing of this Final License Application, not all of the FirstLight studies are complete. As noted earlier, FirstLight is proposing to file an amended Final License Application on April 30, 2017 which will include a complete proposal for future Project operations and PM&E measures. Therefore FirstLight has not finalized its proposed operation of the Project and is not proposing other operational changes or other PMEs at this time.

Historically, FirstLight has been granted temporary license amendments to operate the Upper Reservoir at its proposed range several times in the past 15 years, most recently between December 1, 2015 and March 31, 2016. Based on historical information, including the most recent license amendment period, pumping and generation values did not substantially change with a higher amount of storage in the Upper Reservoir. In general, the most substantial change was an increase in the reserve storage in the Upper Reservoir that could be used during emergencies associated with grid instabilities in the Northeast. While additional generation could occur based on the expanded range of storage at the Upper Reservoir, this has not historically occurred or was very limited and therefore no substantial changes in the proposed alternative are expected. Under the proposed alternative, the generation would remain at 1,165,319 MWh and the Northfield Mountain Pumped Storage Development would use 1,069,438 MWh. The 2013 power value of the Project (Table 4.2.2-1) under the proposed alternative would be $104,706,981 ($89.85/MWh). The 2013 cost of producing this power including depreciation, operation and maintenance costs, and taxes would be approximately $94,370,566 ($80.98/MWh). The 2013 net benefit of the Project would be approximately $10,336,415 ($8.87/MWh).

Table 4.2.2-1: Comparison of the Power Value, Annual Costs, and Net Benefits of the No Action and Proposed Alternatives (2013)

	No-Action Alternative			Proposed Alternative		
	Turners Falls Development	Northfield Mountain Pumped Storage Development	Total	Turners Falls Development	Northfield Mountain Pumped Storage Development	Total
Annual Generation (MWh)	356,376	808,943	1,165,319	356,376	808,943	1,165,319
Annual Power Value:						
$ per year	$22,915,259	$81,791,722	$104,706,981	$22,915,259	$81,791,722	$104,709,981
$/MWh	$64.30	$101.11	$89.85	$64.30	$101.11	$89.85
Annual Costs:						
$ per year	$18,937,415	$75,433,151	$94,370,566	$18,937,415	$75,433,151	$94,370,566
$/MWh	$53.14	$93.25	$80.98	$53.14	$93.25	$80.98
Annual Net Benefits:						
$ per year	$3,977,844	$6,358,571	$10,336,415	$3,977,844	$6,358,571	$10,336,415
$/MWh	$11.16	$7.86	$8.87	$11.16	$7.86	$8.87

5 CONCLUSIONS

5.1 Comparison of Development and Recommended Alternative

[This section will be completed by FERC in its DEIS.]

5.2 Unavoidable Adverse Impacts

Geology and Soils

Northfield Mountain Pumped Storage Development operations, under FirstLight's proposed action, would continue to alter water levels on an intra-daily time step in the TFI. Ongoing Study No. 3.1.2 *Northfield Mountain/Turners Falls Operations Impact on Existing Erosion and Potential Bank Instability* will identify the causes of erosion in the TFI and the impact of fluctuating water levels, if any, on TFI streambank erosion. Study No. 3.1.3 *Northfield Mountain Project Sediment Management Plan* is also still ongoing and will be used to develop management measures to minimize the entrainment of sediment into the Northfield Mountain Pumped Storage Development and discharge to the Connecticut River during drawdown or dewatering activities.

Water Resources

Under FirstLight's proposed action, Northfield Mountain Pumped Storage Development operations would continue to alter water levels on an intra-daily time step in the TFI. Similarly, the Turners Falls Development's Cabot Station peaking operations would continue to alter flow on an intra-daily time step in the Connecticut River below Cabot Station. Ongoing Study No. 3.1.3 *Northfield Mountain Project Sediment Management Plan* will be used to develop management measures to minimize the effects on water quality from entrainment of sediment into the Northfield Mountain Pumped Storage Development and discharge to the Connecticut River during drawdown or dewatering activities. Study No. 3.8.1 *Evaluate the Impact of Current and Proposed Future Modes of Operation on Flow, Water Elevation and Hydropower Generation* which is also ongoing, will assess whether there are adverse impacts to flows and water levels.

Aquatic Resources

The nine (9) on-going relicensing studies listed below will assess whether there are unavoidable adverse impacts to aquatic resources based on FirstLight's proposed action:

- 3.3.1 *Conduct Instream Flow Habitat Assessments in the Bypass Reach and below Cabot Station;*
- 3.3.2 *Evaluate Upstream and Downstream Passage of Adult American Shad;*
- 3.3.3 *Evaluate Downstream Passage of Juvenile American Shad;*
- 3.3.5 *Evaluate Downstream Passage of American Eel (2015 & 2016 study);*
- 3.3.7 *Fish Entrainment and Turbine Passage Mortality Study;*
- 3.3.13 *Impacts of the Turners Falls Project and Northfield Mountain Project on Littoral Zone Fish Habitat and Spawning Habitat;*
- 3.3.15 *Assessment of Adult Sea Lamprey Spawning within the Turners Falls Project and Northfield Mountain Project Area;*
- 3.3.19 *Evaluate the Use of an Ultrasound Array to Facilitate Upstream Movement to Turners Falls Dam by Avoiding Cabot Station Tailrace; and*
- 3.3.20 *Ichthyoplankton Entrainment Assessment at the Northfield Mountain Project (second year of study).*

Terrestrial Resources

Vegetation management activities including mowing, are necessary in areas around the Northfield Mountain Upper Reservoir which are maintained for safety and surveillance as part of the development's Dam Safety Surveillance and Monitoring Program. Vegetation management also occurs for maintenance associated with the Power Canal. Vegetation management activities associated with the developments represent a minor, unavoidable adverse impact to terrestrial resources, but are necessary for public safety and the integrity of Project facilities.

Threatened and Endangered Species

As noted above, there are a number of ongoing studies related to aquatic resources. These studies will further assess whether there are unavoidable adverse effects to aquatic resources, including threatened and endangered aquatic resources. No unavoidable adverse impacts to terrestrial threatened and endangered resources would occur because FirstLight is proposing to continue to manage its lands to be protective of sensitive resources.

Recreational Resources

No unavoidable adverse effects on recreational resources would occur because implementation of the RMP would assure that the effects of the Project on recreational resources will be taken into account.

Land Use

No unavoidable adverse effects on land use would occur.

Cultural Resources

No unavoidable adverse impacts on historic properties would occur since the implementation of the HPMP would assure that the effects of the Project on cultural resources will be taken into account.

Aesthetic Resources

No unavoidable adverse effects on aesthetic resources would occur.

Socioeconomics

No unavoidable adverse effects on socioeconomics would occur.

5.3 Consistency with Comprehensive Plans

Section 10(a) (2) of the FPA 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 State of MA, NH and VT and federal comprehensive plans was provided in FERC's Scoping Document 2, issued April 15, 2013. This list of plans is consistent with FERC's latest list of approved plans, issued August 2015, with the exception that *U.S. Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American waterfowl management plan. Department of the Interior. Environment Canada. May 1986* is now not listed for NH or VT. . Of those listed, the Applicant identified and reviewed 23 plans. Of these, the following plans are pertinent to the Project. No inconsistencies were found.

Massachusetts

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Atlantic States Marine Fisheries Commission. 1998. Interstate fishery management plan for Atlantic Striped Bass. (Report No. 34). January 1998.

Atlantic States Marine Fisheries Commission. 1999. Amendment 1 to the Interstate Fishery Management Plan for shad and river herring. (Report No. 35). April 1999.

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.

Atlantic States Marine Fisheries Commission. 2009. Amendment 2 to the Interstate Fishery Management Plan for shad and river herring, Arlington, Virginia. May 2009.

Atlantic States Marine Fisheries Commission. 2010. Amendment 3 to the Interstate Fishery Management Plan for shad and river herring, Arlington, Virginia. February 2010.

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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.

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New Hampshire

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Vermont

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6 CONSULTATION DOCUMENTATION

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.

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APPENDIX A: LETTER FROM MASSACHUSETTS OFFICE OF COASTAL ZONE MANAGEMENT

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
251 Causeway Street, Suite 800, Boston, MA 02114-2136
(617) 626-1200 FAX: (617) 626-1240

June 9, 2015

John S. Howard
Director FERC Compliance, Hydro
FirstLight Power Resources, Inc.
99 Millers Falls Road
Northfield, MA 01360

RE: Federal Consistency Certification: Turners Falls Hydroelectric Project (FERC No. 1889) and Northfield Mountain Pumped Storage Project (FERC No. 2485).

Dear Mr. Howard:

The Massachusetts Office of Coastal Zone Management (CZM) has completed its review of the information provided in your April 27, 2015 letter regarding relicensing of the Turners Falls Hydroelectric Project (FERC No. 1889) and Northfield Mountain Pumped Storage Project (FERC No. 2485) with the Federal Energy Regulatory Commission. These activities are located in the towns of Greenfield, Montague, Gill, Northfield, and Erving MA.

The activities associated with this project fall outside the geographical boundaries of the Massachusetts Coastal Zone as delineated in *Chapter 5: Massachusetts Coastal Regions and An Atlas of Resources, 1 June 1977* and further described in the Massachusetts Coastal Zone Management Plan. Therefore, these activities are not subject to federal consistency review by this office.

Thank you for submitting the information to CZM. If you have any questions regarding our review process, feel free to call me at (617) 626-1050.

Sincerely,

Robert L. Boeri
Project Review Coordinator

APPENDIX B: RESPONSE TO COMMENTS ON THE DRAFT LICENSE APPLICATION

Commenter	Comment	Response	FLA Section
United States Fish and Wildlife Service (USFWS)- filed 2.22.2016			
USFWS-1	Schedule: Given FirstLight's filing proposal (which the Service understands is really the only way to address the issue of the Integrated Licensing Process's rigid filing schedule), the Service requests and urges FirstLight to request that the Federal Energy Regulatory Commission (FERC) issue an updated Filing Schedule that considers the Study Report Schedule filed by FirstLight in its Updated Study Report. For example, if FirstLight will not be filing some studies until March of 2017, when would FERC have FirstLight file its supplement to the FLA and how much time would the stakeholders have to review and comment on it?	As noted by FERC at the March 16, 2016 study report meeting, it will be issuing a new process plan and schedule. FirstLight is proposing to file an Amended Final License Application (FLA) on April 30, 2017 which would include a more complete proposal for future project operations and PME measures. FirstLight anticipates that FERC's revised process plan and schedule will include an opportunity for comment on the Amended FLA.	N/A
USFWS-2	DLA content: Because most of its studies have yet to be completed, FirstLight has not proposed any operational changes other than adding storage capacity at NMPS's Upper Reservoir (discussed below), nor has it proposed any Protection, Mitigation or Enhancement measures (PMEs). Due to the lack of substantive information in the DLA, the Service is unable to provide comprehensive comments at this point in the licensing process. Further, the Service is unable to provide preliminary recommendations, terms and conditions, and prescriptions until the license application is complete.	Due to the number of incomplete studies, FirstLight's proposal for future operations and PME measures in the FLA is the largely the same as the DLA, although FirstLight is including in the FLA draft plans for managing both recreation and historic properties for the new license term. Once studies are complete, FirstLight will develop a more complete proposal for inclusion in an Amended FLA which FirstLight intends to file on April 30, 2017.	N/A
USFWS-3	Exhibit E: Proposed Project Operations: In the DLA, FirstLight states that it has not finalized the proposed operation of the project, due to a number of studies that are yet to be completed. However, one change it is proposing at this point in time is to increase the operating range of NMPS's Upper Reservoir. Currently, it operates between elevation 938 feet and 1000.5 feet msl. It seeks to increase that range by 22 feet (from 920 feet to 1004.5 feet msl). As this proposal was made after all of the studies had been approved (and most have been conducted), potential impacts of the increased operating range were not considered in stakeholders' study requests. Therefore, we request that FirstLight explicitly analyze potential impacts of the use of the additional storage capacity within all relevant studies (e.g., Upstream and Downstream Adult Shad Passage, Downstream Juvenile Shad Passage, American Eel Passage, Ichthyoplankton Entrainment Assessment, Erosion, etc.). Based on the final reports, the Service will determine whether it believes any of the approved studies need to be modified in light of this new proposal or if data collected as part of the approved studies is sufficient to conduct the effects analyses.	In Section 3.4.4 of the Pre-Applicaton Document, FirstLight proposed potential operational modifications which included utilizing more storage in the Northfield Mountaion Project's Upper Reservoir. To evaluate the impacts of expanding the Upper Storage Reservoir operating limits on various resources, FirstLight proposes to use the operations model which it is continuing to develop. FirstLight proposes to simulate baseline conditions, which would reflect the current pump-generation schedule at Northfield Mountain. The baseline model will provide information on: (a) the magnitude of flow used for pumping and generating; (b) the water surface elevations in the Turners Falls Impoundment (TFI); (c), the flow through Cabot and Station No. 1; and (d) the flow regime in the bypass reach and below Cabot Station. A production run will be developed to simulate the expanded Upper Reservoir operating limits, and a revised pump-generation schedule at Northfield Mountain will be developed to reflect the expanded limits of the Upper Reservoir. The production run would yield the same information as described above for the baseline model and the results will be compared. For some studies, other steps will be conducted after simulating the expanded Upper Reservoir storage capacity in the operations model. For example, in the case of the erosion study (3.1.2), the operations modeling output will be used as input to the TFI hydraulic model to simulate water surface elevations (WSELs) in the TFI under baseline and other production runs. The output from the hydraulic model- WSEL and energy grade line will be used as input BSTEM to evaluate the causes of erosion.	N/A
USFWS-4	Exhibit E: Magnuson-Fishery Conservation and Management Act: In this section, FirstLight states that the Connecticut River Atlantic Salmon Commission (CRASC) has ceased its Atlantic salmon restoration efforts and is shifting focus to other anadromous fish. It would be more accurate to state that CRASC is shifting focus to other migratory fish (including the catadromous American eel) *(Anguilla rostrata).*	FL has clarified in the FLA that CRASC is focusing on other migratory fish including American eel.	Section 1.3.3, Section 3.3.3.1.2

Commenter	Comment	Response	FLA Section
USFWS-5	Geology and Soils: With respect to entrainment of suspended sediments, FirstLight does not explicitly state that the proposed increase in storage capacity at Upper Reservoir will be evaluated as part of Study 3.1.3 (which is still ongoing). There are at least two ways that additional storage capacity at Upper Reservoir could influence suspended sediment. First, if current operations result in net deposition of sediment at Upper Reservoir over time (as preliminary results suggest), then increasing storage capacity (and thus, overall volume of water) likely would increase the rate of sediment deposition. Second, operating down to a lower elevation (18 feet below that currently allowed) could increase the likelihood of Upper Reservoir sediments becoming resuspended during generation. These and other potential impacts of FirstLight's proposal must be fully analyzed within Study 3.1.3 as well as in Study 3.1.2. The Service agrees that, while Figure 3.3.1.1.4-2 suggests that suspended sediment concentration (SSC) increases with increasing discharge during the spring freshet, Figures 3.3.1.1.4-3 and 3.3.1.1.4-4 suggest that there may be a relationship between SSC and flow even during the summer and fall periods (i.e., at lower flows within the operational capacity of the project). These data should be analyzed further to determine what factors or combination of factors may be contributing to elevated SSC (e.g., the number of units and/or duration of generation at Northfield Mountain, the Upper Reservoir water level, etc.).	FirstLight will examine what impact, if any, the proposed increased upper reservoir storage capacity may have on sediment transport dynamics into and out of the Upper Reservoir. FirstLight will review the results of the computer and physical models developed by Alden and identify and execute additional model runs, if necessary, to examine this in more detail. The results of this analysis will be presented in the final report to be filed in October 2016. Review of the data collected as part of Study No. 3.1.3 suggests that the relationship between flow and SSC is not limited to the spring freshet but is instead observed year round. That is, as flow increases so too does SSC, regardless of season. The data depicted in Figures 3.3.1.1.4-2 through 3.3.1.1.4-4 were collected at the LISST-StreamSide located upstream of the Rt. 10 Bridge. The Rt. 10 Bridge is located approximately 6 miles upstream of the Northfield Mountain Tailrace. Review of the StreamSide data as compared to the LISST-HYDRO data (collected at the Northfield Mountain tailrace) showed no obvious relationship between Northfield Mountain operations and increased SSC values observed at the StreamSide. Based on the findings of Study 3.1.3, it appears that Northfield Mountain operations have no impact on SSC levels at the StreamSide monitoring location. Review of all data collected as part of Study 3.1.3, including any correlations between project operations and elevated SSC values, are discussed extensively in the December 2015 report titled *Northfield Mountain Pumped Storage Project Sediment Management Plan – 2015 Summary of Annual Monitoring*.	N/A
USFWS-6	Water Quantity: FirstLight states that the Northfield Mountain development does not receive headwater benefits because its operation is independent of river flow, but then later says that the magnitude and timing of discharges from the upstream Vernon Project (FERC No. 1904) are critical to the operation of NMPS. FirstLight should clarify these seemingly conflicting statements.	Headwater benefits are realized by the operation of upstream seasonally operated storage reservoirs. Since the operation of the Northfield Mountain Pumped Storage Development is independent of seasonal river flows, it does not receive any benefit from the seasonally operated upstream reservoirs. The Northfield Mountaion Pumped Storage Development cycles the flow between the TFI and Upper Reservoir. However, its operation is dependent on maintaining a continuous flow regime from the Vernon Hydroelectric Project.	Section 3.3.2.1.1
USFWS-7	Fisheries: In general, for all of the species discussed in this section of the DLA, FirstLight incorporated information from the relevant studies being conducted. However, for American shad *(Alosa sapidissima),* only the shad spawning survey is discussed. Although final reports are not ready at this time, a summary of study methodology and any preliminary results should be included in the FLA for the Upstream and Downstream Adult Shad Passage and Downstream Juvenile Shad Passage studies.	FirstLight in the FLA has (a) included a description of study methodologies for any studies that have not resulted in a study report and (b) included results for those studies whereby reports have been completed. However, FirstLight has not included preliminary results in the FLA of any study report that has not been completed and filed with FERC.	Various sections of Exhibit E
USFWS-8	Fisheries: In this section of the DLA and other places where Study 3.3.5 is discussed, it is unclear when the final report will be distributed. Two components of the study (the balloon tag survival and telemetry passage route assessments) are single-year studies completed in 2015. The third component (eel migration timing assessment) is a two-year study that will not be completed until late 2016. We request that FirstLight clarify whether it will withhold releasing the study report until all components have been completed or whether an interim report with results of the single year components will be released earlier.	As noted in its cover letter filed with FERC on 3/1/2016, FirstLight intends on filing one report for Study 3.3.5 on March 1, 2017.	N/A

Commenter	Comment	Response	FLA Section
USFWS-9	Fisheries: FirstLight states that, since the tailrace fish lift at the Holyoke Project (FERC No. 2004) was improved in 1976, shortnose sturgeon *(Acipencer brevirostrum)* have been able to pass above Holyoke Dam and access the Connecticut River up to Turners Falls. However, sturgeon have not been allowed to pass upstream of the Holyoke Dam due to concern over safe passage for downstream migrants. A new downstream fish passage system is being constructed at Holyoke Darn and is scheduled to be completed this spring. After studies have verified that it provides safe, timely and effective passage for sturgeon, they will be allowed to pass upstream to utilize habitat between the Turners Falls and Holyoke darns.	FirstLight has added text to clarify that a new downstream fish passage system has been constructed at Holyoke Dam and sturgeon will again be lifted starting in the spring of 2016.	Section 3.3.3.1.2
USFWS-10	Fisheries: In this section of the DLA, FirstLight discusses one of the studies it is conducting that relates to upstream fish passage (Study No. 3.3.9), but not others. All relevant studies (regardless of whether they have been completed or not) should be noted. For example, Study Nos. 3.3.2 and 3.3.4 directly pertain to upstream passage and therefore, a brief description of their purpose, methodology and status should be included.	FirstLight describes in the FLA all of the upstream fish passage studies, whether complete or not. If not complete, a brief description of the study purpose, methodology and status is included.	Section 3.3.3.1.2
USFWS-11	Fisheries: Similar to our comments under Upstream Passage, FirstLight discusses some, but not all, of the studies it is conducting that relate to downstream fish passage. In this section of the DLA, FirstLight implies that Studies 3.3.3, 3.3.5 and 3.3.8 are being undertaken to assess passage at Station 1, when those studies, as well as Study 3.3.2, were designed to assess passage routes and mortality at the spillway, Station 1 and Cabot Station.	See response to USFWS-7 and USFWS-10.	Section 3.3.3.1.2
USFWS-12	Fisheries: FirstLight states, "While the NMPS intake does not physically impede migrants passing upstream in the TFI, currents and velocities resulting from pumping and generating may affect migrants." It would be more appropriate to state that, while the intake does not present a structural barrier to upstream or downstream migrants, the currents and velocities resulting from pumping and generating may affect migrants moving past the intake.	The text was removed from Exhibit E.	N/A
USFWS-13	Effect on Fish Passage: The first sentence of the fourth paragraph refers to studies conducted by the Service's Connecticut River Coordinator and CRASC. It was the U.S. Geological Survey's Conte Anadromous Fish Research Laboratory (Conte Lab) that worked with the Service on the shad telemetry study.	This comment has been addressed in the FLA.	Section 3.3.3.2.1
USFWS-14	Effect on Fish Passage: As noted above, there are three components to Study 3.3.5: passage route; mortality; and migration timing. The first two components are single-year evaluations, while the migration timing will take two years. In this section, FirstLight states that a final report for the first year of study will be completed by March 1, 2016. It is unclear from the DLA whether that report will only cover the passage route and mortality components of the study, or if it also will provide results of the first year of the migration timing assessment. FirstLight should clarify which components will be included in the "final" report, scheduled to be issued by March 1, 2016. If data from the second year of the hydroacoustic assessment will be used in the passage route and/or mortality analyses, any report issued prior to its completion this fall should be characterized as interim.	There was an error in the DLA. As noted in FirstLight's March 1, 2016 filing, the final report for Study 3.3.5, which will address passage route, mortality and migration timing in a single report, will be filed on 3/1/2017.	Section 3.3.3.1.2
USFWS-15	Entrainment: This section of the DLA lacks information and is confusing. FirstLight discusses the telemetry portion of Study 3.3.5 as it relates to NMPS, but fails to mention that radio-tagged eels also were released downstream of NMPS to evaluate passage routes through the Turners Falls Project. Further, FirstLight states that a final report will be completed by March 1, 2017. This appears to be the same report that FirstLight says will be issued by March 1, 2016. The Service requests clarification regarding exactly what will be included in both the 2016 and 2017 reports.	See response to USFWS-8. FirstLight has included a discussion of the eels released downstream of Northfield Mountain Pumped Storage Development in the FLA.	Section 3.3.3.2.1

Commenter	Comment	Response	FLA Section
USFWS-16	Threatened and Endangered Species: FirstLight states that it would follow the Service's published conservation measures to avoid effects to the NLEB. However, since submitting the DLA, the Service has issued a final 4(d) rule that differs from the interim rule. Therefore, FirstLight should visit http://www. fws.gov/Midwest/endangered/mammals/nleb/index.html (accessed February 2016) to determine whether their project will avoid prohibited take (i.e., tree removal within a quarter-mile of a hibernaculum, removal in June or July of a known occupied roost tree and trees within 150 feet of a known occupied roost tree). FERC may consult under section 7 of the ESA for actions that may affect the NLEB, or FERC (or FirstLight as the applicant) may implement an optional framework for consultation outlined in the key to the rule for Federal actions that may affect the NLEB.	FirstLight's draft BA will assess whether any proposal set forth in the Amended FLA is likely to affect any listed species. FirstLight has reviewed the final 4(d) rule and determined that it is not proposing any actions that will involve prohibited take.	Section 3.3.5.1
Massachusetts Division Fish and Wildlife (MDFW)- filed 2.25.2016			
MDFW-1	Pursuant to Section 5.16(e) of the Commission's regulations, comments on the DLA are due by March 1, 2016, 90 days after the date of this filing. However, most of the required studies have yet to be completed and FirstLight has not proposed any operational changes other than increasing the storage capacity at the NMPSP's upper reservoir, nor has it proposed any Protection, Mitigation or Enhancement measures (PME's). Given that DLA is incomplete, the Division is unable to provide substantive comments at this point. Further, the Division is unable to provide preliminary recommendations, terms and conditions until the DLA is complete. The Division therefore reserves the right to provide substantive comments, recommendations, terms and conditions after FirstLight has filed a more comprehensive proposal for relicensing the Project.	See response to USFWS-1.	N/A
Town of Montague (Mont)- filed 2.29.2016			
Mont-1	The Town is asking that FirstLight identify a management plan for the Strathmore Bridge, IP Bridges, and Canal Access Road with a commitment to repair and maintain and public access over the power canal to the Historic-Industrial Mill District. If FirstLight is not willing to improve access to the historic-canal district, the town suggests that that Power Company be required to acquire and remediate the vacant properties which have been rendered unusable and un-developable because of the hydro Project.	As set forth in the Historic Architectural Resources Survey & National Register Evaluation reports (Study No. 3.7.2)(FirstLight, 2014c and FirstLight, 2015j), FirstLight assessed a number of bridges in the NRHP-listed Turners Falls Historic District, including the International Paper Company Footbridge, the Keith's Mill Footbridge (aka the Strathmore Bridge), and the Fifth Street Pedestrian Footbridge, which are owned by FirstLight. The reports noted that the bridges are contributing resources to the Turners Falls Historic District and/or the Turners Fall Power & Electric Company Historic District but that issuance of a new license would have no effect on the bridges. FirstLight has drafted an Historic Properties Management Plan, which is included as an Appendix to the FLA. The HPMP includes procedures to address the impacts, if any, on historic properties that may result from any proposed changes to the Project during the term of a new license. At this time, however, FirstLight is not proposing to improve or reconstruct the bridges because it is not clear how doing so would serve a Project purpose.	N/A
Mont-2	The Town supports completion of the remaining aquatic studies to further refine appropriate bypass flows. In order to restore the aquatic habitat in the natural river channel that has been so damaged by the Licensee's operation, it is our position that the "bypass" minimum flows should be released through the bascule gates at the dam rather than through Station 1 or Cabot Station as currently done. We suggest that the Licensee should consider installing a fish friendly, low-flow generator at the bascule gate to concurrently benefit hydropower generation.	Pending the magnitude of any future minimum flow releases from the Turners Falls Dam, FirstLight may evaluate installing a minimum flow turbine-generator at the dam.	Section 2.2.1.1

Commenter	Comment	Response	FLA Section
Mont-3	The Downtown Turners Falls Livability Plan and Montague Open Space and Recreation Plan call for improved and user friendly public access points to the river, especially at put-in below the Turners Falls Dam, cartop boat access at Unity Park, foot access to the Rock Dam, improvements to the Poplar Street access point, and cartop boat access at Cabot Camp. The DLA proposes no improvements to these important community resources, which we believe are historically underutilized because of lack of visibility, necessary infrastructure, and routine maintenance.	FirstLight's recreation studies demonstrate that the Project offers multiple recreation opportunities, including multiple access points to Project waters, that users of the recreation sites are satisfied with the amenities offered, and that the sites have sufficient capacity over the long term to meet Project recreation needs. FirstLight has prepared a draft Recreation Management Plan (RMP), which is included as an Appendix to the FLA. In the RMP, FirstLight has proposed improvements to make the Poplar Street more accessible to the public. The draft RMP also sets forth processes to provide for the operation and maintenance of the Project recreation sites identified in the RMP, for periodic monitoring of the current use of recreation sites, and for periodic updates of the RMP.	N/A
Mont-4	The Town recommends that the Licensee work with the Town and area tribes to establish and provide funding for a Native American Cultural Interpretive Center in Turners Falls.	Establishment and provision of funding for a Native American Cultural Interpretive Center in Turners Falls is not a measure that is related to any effects of the continued operation of the Project on NRHP-eligible historic properties and therefore is not within the scope of FERC's jurisdiction.	N/A
Karl Meyer (Meyer)- filed on 2.29.2016			
Meyer had no comments at this time indicating that the studies are incomplete.			
The Nature Conservancy (TNC)- filed on 3.1.2016			
TNC-1	As of December 2, 2015, many of the FERC-approved studies required as part of this relicensing process were incomplete; FirstLight has therefore not included a complete licensing proposal within the DLA. We will therefore refrain from offering substantive comment until the studies have been completed and a more comprehensive licensing proposal has been provided.	See response to USFWS-1 and USFWS-2	N/A
TNC-2	With regard to the change in the utilized storage capacity of the Upper Reservoir, because studies remain incomplete, we cannot assess the potential impacts of this change at this time. Furthermore, we encourage FirstLight to explicitly evaluate the potential impacts of this operational change in the context of all relevant studies.	See response to USFWS-3	N/A
National Marine Fisheries Service (NMFS)- filed on 3.1.2016			
NMFS-1	Process: The DLA is incomplete and does not meet FERC's minimal regulatory requirements (18 CFR §5.18). In fact, FirstLight acknowledges in its filing that the document is "incomplete" and that information from further studies is necessary. Unfortunately, the decommissioning of the Vermont Yankee nuclear power plant delayed several requested studies, especially those that pertain to aquatic species. As a result, the information from these studies will not be available until 2017 (at the earliest), which is well beyond the present spring 2016 deadline for filing the Final License Application. Clearly, the project is not ready for environmental analysis and likely will not be until after necessary studies are completed. Additionally, after the first-year study results are known, additional study requests may be necessary; we reserve the right to request a second year of studies in accordance with 18 CFR §5.15(c) and (d).	See response to USFWS-1 and USFWS-2.	N/A

Commenter	Comment	Response	FLA Section
NMFS-2	Shortnose Sturgeon: As discussed in previous correspondence, the proposed actions may affect endangered shortnose sturgeon. As such, consultation pursuant to section 7 of the Endangered Species Act must be completed. We are particularly concerned about the impacts of flow and impacts on habitat and the ability of shortnose sturgeon to successfully spawn and rear. In accordance with 18 CFR § 5.16(d), an application for a new FERC license may include a draft Biological Assessment (BA) for threatened or endangered species. A draft BA must be included in any final license application filed with the Commission (18 CFR § 5.18(b). In Exhibit E of the DLA, FirstLight states a draft BA will be prepared following the completion of several relicensing studies. We expect that the BA for shortnose sturgeon can be prepared following the completion of sediment monitoring study (Study No. 3.1.3), Hydraulic Study (Study No. 3.2.2), and Instream Flow Habitat Assessment (Study No. 3.3.1). According to FirstLight, each of these studies will be completed by September 2016. Although there are no statutory or regulatory mandated contents for a BA, recommended elements are identified at 50 CFR §402.12(f). We fully expect FirstLight to thoroughly analyze the effects of operating the Turners Falls Project on all aspects of shortnose sturgeon biology including spawning, incubation, rearing, foraging, and migrations. FirstLight should use the results of relicensing studies for this analysis as well published information concerning shortnose sturgeon populations in the Connecticut River. To facilitate the preparation of the BA, we strongly urge you to follow the guidance prepared by the U.S. Fish and Wildlife Service at: We would be happy to meet with you or the licensee to discuss the section 7 consultation process, likely effects of the action on shortnose sturgeon, potential measures to minimize those effects, and information needs for the BA.	FirstLight plans to develop a draft BA once the Instream Flow Habitat Assessment (Study No. 3.3.1) is completed. FirstLight plans on filing an Amended FLA by April 30, 2017. The draft BA will be included in the Amended FLA.	N/A
NMFS-3	Suspended Sediment (pages F.41-42): Section 3.3.1. 1.4 states that causes of erosion in the Turners Falls impoundment are currently being evaluated in Study 3.1.2 and that the study will determine to what extent bank erosion and the forces on the bank are related to Project operations. The current evaluation is based on an historic analysis of the cause of bank erosion under the previous operation scenario, whereas FirstLight has proposed, and FERC has acknowledged, the proposed change in NMPS project operations. We consider the change in operation as a change that will affect the duration that NMPS is either in pumping or generation mode. Therefore, we request that the FirstLight's March 1, 2016 filing include information as to how it intends to analyze the level of bank erosion Northfield Mountain proposed operations could cause. This analysis can be done using the data from Relicensing Study 3.8.1.	FirstLight included in its cover letter of the 3/1/2016 filing of study reports its proposed approach to evaluate how the expanded storage capacity of the Upper Reservoir will be evaluated relative to TFI erosion.	N/A

Commenter	Comment	Response	FLA Section
NMFS-4	The first paragraph mentions that male shortnose sturgeon mature at 5-10 years and females mature at 7-13 years in the northern extent of their range. To include the Saint John River, Canada population as part of the northern extent of their range, it is recommended that the age ranges are adjusted to 5-13 years for males and 7-18 years for females. It is mentioned that spawning is dependent on water temperature. It is also dependent on photoperiod (day-length) and bottom water velocity. It is known that male shortnose sturgeon spawn every two years, but they may spawn annually in some rivers. Larvae begin downstream migrations at about 15-mm total length, not 20-mm. Include the five shortnose sturgeon overwintering sites located upstream of the Holyoke Dam as listed in the Connecticut River section of SSSRT, 2010. Spawning period needs to be changed to 3-17 days and the reference needs to be changed to Kynard et al., 2012. For spawning environmental conditions, please see the water temperature, daylight hours, and daily mean discharge ranges listed in the Connecticut River section of SSSRT,2010 This spawning paragraph should be updated with the information from the upstream spawning Connecticut River section in SSSRT, 2010. Change reference "NMFS, 2005" to "Kynard et al., 2012". References are needed in this paragraph. Change larval hiding period from 12 days to 15 days (SSSRT, 2010).	The FLA reflects these comments.	Section 3.3.3.1.2
NMFS-5	The DLA states "it appeared that a passage bottleneck existed at Vernon Dam". This statement is not relevant to FirstLight's license application for Turners Falls or Northfield Mountain. The low passage ratio data in 3.3.3.1.2-6 for over 35 years and how FirstLight intends to achieve stated management goals is pertinent information that should be included in the final application.	Comment noted.	N/A
NMFS-6	The data in Table 3.3.3.1.2-5 only present fish count data at the counting station window. While we agree these are important data and counting efforts should continue going forward, these data provide no insight into the number of fish arriving in the Project boundary but not passing to upstream habitat. To date, the best available practice for determining the number of fish arriving at a project comes from studies using radiotelemetry and tagged fish. These studies are vital for determining the extent of delay occurring at the Project. In addition, radio-tag studies provide information on the number of study fish present below the project versus the number of study fish successfully passing each fishway. We consider radiotelemetry based studies as setting the standard for providing important fishway performance information. Relicensing Studies 3.3.2, 3.3.3, 3.3.19 all contain relevant radio-tag data that we have yet to review. The final license application should include information about the amount of upstream and downstream migratory delay that occurs at the project.	As noted in its 3/1/2016 letter transmitting study reports, FirstLight proposed to file reports for Study Nos. 3.3.2 and 3.3.3 in October 2016 and for Study No. 3.3.19 in March 2017. The final reports for Study Nos.3.3.2 and 3.3.3 will address delay as outlined in the study objectives. The objective of Study No. 3.3.19 is to establish a high frequency sound (ultrasound) array across the entire Cabot Station tailrace and determine the effect of the ensonified field on upstream migrating shad moving past Cabot Station.	N/A

Commenter	Comment	Response	FLA Section
NMFS-7	This section does not discuss the effect of the power canal on fisheries resources. Given that upstream and downstream migrating shad are found in the power canal, the final license application should provide information on the effect of the power canal on migratory fish. In particular, the Licensee needs to evaluate the effects of delay and the number of fish successfully passing the Cabot Station ladder compared to the number of fish passing the Gatehouse ladder. Downstream survival information via spill, Station 1, Cabot Station and the Cabot Station bypass from Relicensing Studies 3.3.2,3.3.3 and 3.3.7 should also be included in this section of the final application.	See response to NMFS-6.	N/A
NMFS-8	This section mentions some of the work that biologists from the CRASC have conducted evaluating entrance conditions at the Gatehouse flume. However, no data or findings are presented. These previous fishway evaluations provide relevant facts about the overall passage performance of the Turners Falls Project. The final application should include the factual findings of the past passage research that has occurred at the project. In addition, this section should include more information about the many modifications that have been made to the Cabot Station and Gatehouse entrances. This section should also summarize the data collection and published results that discuss how well the modifications performed. Further background on the existing fishways should be provided in the final application. This section references work conducted at the U.S. Geological Survey's Silvio O. Conte Anadromous Fish Research Center (Conte Lab) in 2005. Researchers (Castro-Santos and Haro) at the Conte Lab continued to evaluate the Gatehouse fishway entrance from 2008 to 2012. Their findings are available from the Conte Lab as white papers and should be included in this section.	FirstLight has provided a historical summary of modifications made to the fishways. A final report of the recent work conducted at the Gatehouse fishway entrances by the U.S. Geological Survey's Silvio O. Conte Anadromous Fish Research Center researchers (Castro-Santos and Haro) has not submitted been to FirstLight yet.	Section 3.3.3.2.2
NMFS-9	An energetics based shad model for the Connecticut River was developed to explore the effect that downstream delay at hydroelectric projects on the mainstem Connecticut River had on survival rates (Castro-Santos and Letcher, 2010). The final license application should reference the findings in this paper, especially as it relates to shad expending energy over time. Specifically, it should discuss how downstream delay relates to diminished survival, and upstream delay limits the upstream range that immigrating shad reaches.	Adult American shad delay will be determined and discussed as part of Study Report No. 3.3.2 when it is filed in October 2016.	N/A
NMFS-10	The end of this section discusses some of the measures taken at the Gatehouse Fishway entrances and it states “shad appear to pass readily through the new entrance, but not through the original entrance.” This statement should be clarified and supported with data. No mention of the delay that occurs at these entrances is made or of the observations that were made of fish making repeated attempts to enter the fishway. The final license application should include data on the extent of delay that occurs for fish attempting to enter the Gatehouse ladder, delay occurring in the ladder, and the efficiency of the ladder. It should also indicate that if a shad that passes either the Spillway counting window or the Cabot ladder window but does not pass the Gatehouse window then indicate the likely outcome for that fish.	This will be addressed in the Amended FLA once the results of Study 3.3.2 Adult shad passage is final.	N/A
NMFS-11	We strongly recommend that the Licensee compare the numbers in this table to the fish count data that are held with the Connecticut River Coordinator's office in Sunderland, MA. It is unclear whether the passage ratio in this table is the ratio of fish counts at Holyoke to fish passage counts at Gatehouse or fish counts at Vernon. This ratio should be clarified in the final license application.	This table has been corrected and clarified in the FLA as table labels were incorrect in the DLA.	Table 3.3.3.1.2-13 Table 3.3.3.1.2-14
Connecticut River Watershed Council (CRWC)- filed on 3.1.2016			
CRWC-1	DLA Patently Incomplete: CRWC requests that FirstLight’s Draft Application for New License for Major Water Power Project – Existing Dam for the Northfield Mountain Pumped Storage Project and the Turners Falls Hydroelectric Project (DLA) be rejected as deficient or patently deficient. 18 C.F.R. § 5.20. Alternatively, CRWC requests that stakeholders be afforded a process equivalent to the right to comment on a complete DLA. *See* 18 C.F.R. §§ 5.16(e)(comment on DLA), 5.18(b)(5)(C)(ii)(C) (FLA must address environmental measures proposed by resource agencies and stakeholders), 5.21 (additional information), 5.27 (amendment of application).	As noted in response to USFWS-1 and in FirstLight’s cover letter to the FLA, FirstLight plans to file an Amended FLA on April 30, 2017, and fully anticipates that stakeholders will have an opportunity to comment on FirstLight’s amended proposal at that time.	N/A

Commenter	Comment	Response	FLA Section
CRWC-2	Comment on DLA Should be Provided: Alternatively, process equivalent to comment on a complete DLA should be provided as part of the postfiling process.	See response to CRWC-1.	N/A
CRWC-3	Mitigation: The DLA contained little in the way of mitigation proposals because so many studies are incomplete. We request that the FLA propose specific protection, mitigation and enhancement (PM&E) measures, or include placeholders for them, that address the Project's environmental effects. We further request that the FLA propose objectives, or leave placeholders for them, for the purpose of effectiveness monitoring of PM&E measures which may require adaptation in design or operation.	See response to USFWS-1.	N/A
CRWC-4	Water Quality: Section 3.3.2 of the DLA's Exhibit E should acknowledge the Long Island Sound Total Maximum Daily Load (TMDL) and there should be an analysis on how project operations impact the amount of nutrients contributed to the Connecticut River system.	FirstLight discusses the Long Island Sound TMDL in the FLA. According to the TMDL, there are a number of significant sources of nitrogen that contribute to low DO in Long Island Sound: • Municipal and industrial wastewater treatment facilities. • Combined sewer overflows (CSOs). • Nonpoint sources, or runoff from land use activities, which includes stormwater from urban areas, and runoff and groundwater transport from all land covers. • Atmospheric deposition directly to water surfaces and to the land, a portion of which eventually washes into Long Island Sound. These sources of nitrogen originate within the New York and Connecticut portions of the watershed, from sources within the watershed north of Connecticut, and from oceanic delivery through the eastern and western connections of the Sound with the Atlantic Ocean. Neither FirstLight's Revised Study Plan nor FERC's Study Plan Determination proposed a study to assess how Project operations may contribute to nutrient loading.	Section 3.3.2.1.2
CRWC-5	Water Quality: We would like to clarify that CRWC's dissolved oxygen (DO) testing at Barton Cove in 2007 and 2008 was done at the Franklin County Boat Club docks and our bacteria monitoring 2010 – 2015 is done at the state boat launch nearby. It is more accurate to state that CRWC has been monitoring bacteria at the Barton Cove state boat launch on a weekly basis from the week after Memorial Day to the first week of October since 2010. With the exception of 2010, this effort is done only by CRWC and not in cooperation with the organizations listed in the DLA.	FirstLight has addressed this comment in the FLA.	Section 3.3.2.1.2
CRWC-6	Water Quality: We are not sure why the DLA only contained bacteria data from 2010 to 2011, but limiting the data to these two years presents an inaccurate picture of Barton Cove's attainment of water quality standards. Data for the years 2012 through 2015 can be obtained online at http://www.connecticutriver.us/site/content/sites-list by searching for the site by name, town, waterbody, etc. We recommend further analysis on how the operation of Northfield Mountain Pumped Storage may cause or contribute to the violations of bacterial standards at Barton's Cove due to its ability to impact water levels and flow.	FirstLight has included these additional years in the FLA. Approved Study No. 3.2.1 did not require collection of bacterial data needed to assess the impact of Northfield Mountain Project Operations on bacteria in Barton Cove.	Section 3.3.2.1.2

Commenter	Comment	Response	FLA Section
CRWC-7	Erosion: Under the current license, the permittee has worked on many riverbank restoration and monitoring projects. We expect the FLA to include additional PM&E measures, including *operational* mitigation strategies to reduce riverbank erosion. CRWC re-iterates our recommendation that FL consider converting to a closed loop operation, which would eliminate or reduce project-induced erosion.	Study No. 3.1.2, the Erosion Causation Study, will be filed with FERC on October 14, 2016, although FirstLight is targeting to complete the report in June 2016 and uploading it to its website at that time. Until this report is complete, FirstLight is not in a position to propose operational mitigation as the causes of erosion have not been fully investigated and understood. Relative to the closed-loop system, as FERC stated in its April 15, 2013 Scoping Document 2: "*Construction of a new lower reservoir would likely have significant impacts on the environment and a high cost. Therefore, we will not commit to conducting a detailed analysis of such an alternative until we better understand the environmental effects of the project*". As FirstLight has indicated previously, it is not proposing to construct a closed-loop system.	N/A
CRWC-8	Erosion: Section 2.1.6 in Exhibit E of the DLA describes several "key license requirements." CRWC believes that license requirements related to erosion are also key license requirements and should be acknowledged as such in future filings.	FirstLight added the Northfield License Articles 19 and 20 to Section 2.1.6 of the FLA.	Section 2.1.6
CRWC-9	Erosion: CRWC continues to believe that Study 3.1.1, the Full River Reconnaissance (FRR), was completed in a way that differed from the Approved Study Plan.	On 9/15/2014, FirstLight filed the Study 3.1.1 Report. On 1/22/2015, FERC issued its Determination on Request for Study Modifications and New Studies and found that FirstLight conducted the FRR as required by its study plan determination and concluded that it provides the information necessary to inform the Commission's decision on issuing a new license.	N/A
CRWC-10	Erosion: CRWC requests that FirstLight re-submit the January 22, 2013 transect report, showing all historical data for existing transects, following the same protocol as ordered by FERC in their December 16, 2015 ruling. A revised report is necessary for adequate review of the FLA. That means the transect report should include the following: (1) a standardized definition of left and right bank used for the transect charts (e.g., extending from 175 feet msl to the top of the bank, or other definition if determined to be more appropriate) (2) charts showing the results of the 22 annual cross-sectional surveys with the left and right banks in separate charts scaled to fully accommodate five-foot increments on both axes and without any vertical exaggeration	As part of the report for Study 3.1.2, slated for filing on October 14, 2016, FirstLight will include updated transect data in the form and format required by FERC in its December 16, 2015 order approving the temporary amendment for Northfield Upper Reservoir operation. As part of the Study 3.1.2 filing, FirstLight will include the 22 annual cross-section surveys with the right and left banks broken out separately.	N/A
CRWC-11	Erosion: Under the new license, we expect to see proposed operational mitigation strategies as well as a plan developed in coordination with stakeholders for objectively monitoring erosion and fixing problems before they get to be severe. Protection of archaeological resources should be enhanced as part of this work.	Study No. 3.1.2, the Erosion Causation Study, will not be filed with FERC until October 14, 2016, although FirstLight is targeting to complete the report in June 2016 and upload it to its website. Until this report is complete, FirstLight is not in a position to propose operational mitigation or to commit to additional monitoring or erosion repair as the causes of erosion have not been fully investigated or understood. Relative to archaeological resources, FirstLight has indicated that Phase 1B surveys would be conducted at those locations, if any, where it is determined that FirstLight's operations are the cause of the erosion.	N/A
CRWC-12	Habitat-Bypass Reach and below Cabot: Pages E-123 and E-132 of the DLA do not include burbot (*Lota lota*) as occurring in the project, or as a list of fish species located in or below the Turners Falls development. Hartel et al. 2002 notes its presence below the dam. Burbot are a state listed species of special concern. Section 3.3.5 of Exhibit E of the DLA also did not list burbot in its description of listed species in the project area.	There are several other fish that Hartel et al. 2002 also discuss which are not listed. This section discusses common fish in the area. Hartel et al. 2002 indicates that burbot in Massachusetts are an enigma and speculates any found in the Massachusetts portion of the Connecticut River may have been washed downstream from New Hampshire.	N/A
CRWC-13	Habitat- Fish Passage: Page E-1 of the DLA describes fish migrating up the spillway ladder as entering the power canal, which is not accurate. Fish leaving the spillway ladder enter a channel that runs across the downstream side of the power house and is independent of the power canal. That channel leads to the gatehouse ladder.	FirstLight has made this correction in the FLA.	Section 1.1

Commenter	Comment	Response	FLA Section
	Page E-129 of the DLA refers to the Holyoke Dam as being located at river mile 36. It is at river mile 86. Page E-131 of the DLA should describe the velocity in front of the racks at Station #1 as an average velocity. Similarly on the following page the velocity in front of the Cabot station should be described as an average velocity.	FirstLight has made this correction in the FLA, but believes it is river mile 87. FirstLight has eliminated the velocities in the FLA. Velocities are discussed in detail in the CFD model report.	Section 3.3.3.1.2 Section 3.3.3.1.2
CRWC-14	Habitat- Tributary Access: Study 3.3.17 is complete and assessed the impacts of project operations on tributary and backwater area access and habitat, both upstream and downstream of the Turners Falls dam. We disagree with the statement on page E-134 of the DLA that Study 3.3.17 results indicated that only three tributaries had barriers and these were attributable to natural phenomena. The study did not superimpose the ~4ft daily elevation changes on the maps and graphs provided. The study has not identified how low the river elevations could go at the confluence of each tributary if the project operations used the full extent of the allowable range on the CT River at the Turners Falls dam (176-185 ft river elevation). However, using the elevations on Table 5.1-1 and figures in Section 5.3.1 of Study 3.3.17, and assuming river levels could drop to an elevation of at least 178 ft from the levels measured in the summer, there would be operation induced barriers on the Ashuelot River, Pauchaug Brook, Bottom Brook, Mallory Brook, and Millers Brook. The report already identifies project-related barrier at Fourmile Brook, along with other contributing factors. If river levels were dropped to 176 at the Turners Falls dam, as they are allowed to do under the current license (again using the elevations on Table 5.1-1 and figures in Section 5.3.1 of Study 3.3.17), CRWC expects barriers would be created at all 15 tributaries, save possibly Dry Brook. We expect a final license application will take into account the impacts of project-induced barriers into tributaries. Possible mitigation should include a narrower range of allowable river levels from Northfield Mountain operations, including raising the minimum river level on the river to eliminate the creation of barriers at tributaries.	For the summer tributary access field work (August 2014), at the request of TransCanada, FirstLight lowered the water surface elevation at the Turners Falls Dam to elevation 178.3 feet. This was done to coordinate with instream flow study work TransCanada was conducting below the Vernon Dam. FirstLight did not conduct the tributary access study when the water surface elevation at the Turners Falls Dam was established at the lowest FERC permitted elevation of 176 ft. FirstLight proposes to file an addendum to the tributary access report to include a series of rating curves at the tributary mouths – the rating curves would be based on running the HECRAS model of the TFI under steady state conditions whereby the water level at the dam would be fixed at 176 ft, 177 ft, and 178 ft and a series of flows would be simulated to predict the water surface elevation at each tributary mouth. Based on this assessment, tributary access will be evaluated. FirstLight does not plan to propose mitigation alternatives at this time, as the Study showed the only barriers were caused by fallen trees and shifts in sediments.	N/A
CRWC-15	Habitat- Canal Drawdown: Study 3.3.18 and an addendum are complete. This study looked at impacts of the annual Turners Falls canal drawdown on aquatic organisms. We disagree with the statement on page E-34, “Based on results of the 2014 sampling effort, it appears that the annual drawdown has little effect on Connecticut River aquatic species.” CRWC noted in our comments on the USR dated November 13, 2015 that the Revised Study Plan (RSP) submitted as Appendix to ISR for 3.3.18 said that in Task 1, “A field crew of experienced biologists will systematically traverse each of the zones in a meander survey fashion recording observations of estimated number of each species encountered.” We could not find a record of a meander survey having taken place, or any information about any observation, in the final report. FirstLight’s response to comments dated December 14, 2015 did not respond to the question about meander surveys, and the addendum to the report also did not describe any meander survey taking place. As such, we believe that this study was not completed according to the study plan, which appears to have skewed the results.	The addendum addressed the meander survey. As stated in the addemdum, *Species and abundance were estimated from photos taken at **all** observed stranding occurrences* and *Between sampling pools and quadrats crews also took observations of any stranding, noting species and estimating abundance.* The addendum contained a map and photos of all the stranding locations along with the requested Tables of stranded fish by species, location and zone.	N/A

Commenter	Comment	Response	FLA Section
CRWC-16	Habitat- Canal Drawdown: FirstLight has explained how the numbers of fish in pools could not be extrapolated to make any assessment of mortality numbers overall in the canal (see response letter dated December 14, 2015. However, results from quadrats could theoretically be expanded using realistic assumptions. Study 3.3.18 reported quadrat survey results as the number of animals found, but no expansion of those counts was provided. No area within zones 2 to 6, the area of the canal randomly sub-sampled, is reported so an expansion of the counts within each zone is not possible. A crude analysis of the total area of zones 2 to 6 shows approximately 200,000 square meters. Sixty-four one meter square quadrats were sampled during the two sampling events. The expansion factor is calculated as 3,125 [200,000 / 64]. During the quadrat sampling 534 elliptio mussels, 1 alewife floater mussel, 3 mudpuppies, and 12 juvenile lampreys were found.	After consultation with the stakeholders, FirstLight expanded the number of quadrats in this study and all were sampled according to the study plan. These species are sediment dependent and there are several different sediment types in the canal. Even if all the sediment types were mapped it would not be appropriate to extrapolate as described since organisms may have moved to less preferred sediment during the dewatering.	N/A
CRWC-17	Habitat- Canal Drawdown: And, after giving no numbers of stranded individuals in the original report, the addendum now estimates that 766 fish were counted as stranded. Again, we don't know if a meander survey was done, and the methods section of the addendum gives no description of the methods used to locate stranded fish. As such, we do not know what proportion of stranded fish was photographed. Twelve of sixteen photographs did not include dates. As at least two of the photographs were taken on Day 2 (10/3) additional mortalities are likely due to the presence of avian predation throughout the week of the drawdown. We expect a final license application to acknowledge impacts from the drawdown and to suggest ways to minimize impacts. This could include drawdowns every other year, or shortening the weeklong annual maintenance to 4-5 days. We also note that the drawdown used to occur in July, but Study 3.3.18 took place in September, and if the dates of the drawdown changed back to hotter weather, or if climate change progressed to make September significantly warmer, impacts of the drawdown would increase and would need to be evaluated anew	See CRWC-15 The FLA includes the canal drawdown study (3.3.18) results. Results from Study 3.3.3 Downstream Juvenile shad to be filed in October 2016, need to be considered before any final decisions are made regarding dradown changes.	N/A
CRWC-18	Habitat- Fish Entrainment: Page E-138 of the DLA says that the shad studies will be completed by March 1, 2016, but Table 1.4.3.5-1 lists the proposed completion dates as 9/1/2016.	The date in the DLA is an error. As noted in our March 1, 2016 filing of the study reports, FirstLight is proposing to file the report on October 14, 2016, but to post to the website in September 2016.	N/A
CRWC-19	Flow Regime- Northfield Mountain: We expect the FLA will consider impacts from the flow regime and recommend PM&E measures.	FirstLight has not yet completed all of the relicensing studies. As such, the FLA does not include proposed changes in operation or PM&E measures relating to flows at this time.	N/A

Commenter	Comment	Response	FLA Section
CRWC-21	Recreation: CRWC recommends that FirstLight organize a visioning session for recreational facility improvements for the new license. CRWC's preliminary thoughts are as follows: • The recreational offerings, facilities, displays, and programming at Northfield Mountain Recreation Center has been a valuable resource to the area since it was established. Recreational interests of the public and even the climate has changed since the 1970's, however. Stakeholders, together with FirstLight, need to craft a vision for making the best use of the recreation center for the next 30-50 years. • FirstLight should re-establish a river shuttle service to locations upstream of the Turners Falls Dam. • Cabot Camp should be made accessible to the public and river access improved. • The Poplar Street launch is inadequate and in poor condition; this was one of the more frequent comments made among whitewater study participants and among recreation comments on the USR. Improvements to parking are needed, as is the access down to the river, so that it can be made functional for paddlers. A design was completed for improvements by the Conway School of Landscape Design and these changes should be implemented, or a new design developed. Land acquisition could solve some of the limitations of the current site. • Cabot Woods needs to be improved and redesigned, with better parking, weekend and evening access, trails improved including better park access from 15th Street in Turners Falls, and boat access for whitewater paddlers. Connecticut River Watershed Council comments on FirstLight Draft License Application March 1, 2016 • The fish ladder viewing area needs to be improved. • River access and campsites sites should be available every 5 miles along the Connecticut River from the Vernon Dam to the Sunderland Bridge. • There is public interest in creating more trails along the Connecticut River. FirstLight should commit to funding some of the work and allowing access in order to establish riverside trails. • Boatable flows need to be established in the bypass channel. • The whitewater study indicated that there was much potential and interest in whitewater releases in the bypass channel. FirstLight should provide for scheduled whitewater releases that are seasonally appropriate. • Rather than the 3-mile proposal by FirstLight, a walkable and short portage should be established around the Turners Falls Dam, where details can be determined once a new minimum flow in the bypass channel is established. New access points in the bypass channel are possible and should be provided by FirstLight. • An analysis should be made regarding the percent of project lands (outside of Northfield Mountain) that are under private vs. public use, and also areas where public is allowed to access the river or other properties vs. areas where it is not.	See Montague-3. FirstLight's proposal for recreation management during the term of a new license is contained in the draft RMP, which is attached to the FLA. FirstLight is not proposing any flow-related measures at this time. The intent of the FERC- approved study plan for the Land Use Inventory (Study No. 3.6.5) was to develop appropriate land use designations in order to aid in future land management decisions for lands within the Project boundary. The approved study plan did not require an analysis of the percent of lands within the Project boundary under public versus private use.	N/A
CRWC-22	A better understanding of the permits or contracts between FirstLight and individual parties related to the private camps, the private clubs, private docks, and water withdrawals is needed to allow further comment.	Additional detail regarding the non-Project uses has been included in the FLA.	Section 3.3.7.1.5

Commenter	Comment	Response	FLA Section
CRWC-23	Historic and Cultural Resources: CRWC did not review Study 3.7.2, which looked at historical architectural resources. We also understand that the Traditional Cultural Properties study, 3.7.3, has been submitted but the study is not complete without adequate participation by the tribes. We are unclear why FirstLight has not funded the completion of this important study and is not responsive to the participation of the Nolumbeka Project in this study. The FLA should show a commitment to project access, historic preservation, economic development, and Native American culture and history.	FirstLight has repeatedly tried to engage the Narragansett Indian Tribe as part of the Traditional Cultural Properties Management Plan. These efforts have been described in the study report for the Traditional Cultural Properties Study (Study 3.7.3), the DLA, and the FLA. Although FirstLight has no obligation to fund tribal participation in the relicensing process, in 2015 FirstLight offered to compensate the Naragansett Indian Tribe for its time in completing the Traditional Cultural Properties study.	N/A
CRWC-24	Aesthetic Resources: The DLA did not discuss the two largest aesthetic impacts of its operations: a dry river channel in the bypass region and the extent of modified riverbanks from erosion control projects in the Turners Falls pools. The FLA should propose operational changes and/or PME measures for these two impacts.	FirstLight has not completed all of the studies. As such, the FLA does not include proposed changes in operation or PM&E measures at this time.	N/A
United States Department of the Interior, National Park Service (NPS)- filed on 3.1.2016			
NPS supported the comments filed by the Connecticut River Watershed Council (CRWC), American Whitewater (AW), Appalachian Mountain Club (AMC) and New England Flow (NEFLOW) relative to recreation. NPS also endorsed the comments of the Town of Montague. NPS did not file any specific comments or recommendations. Thus, see the responses to comments of CRWC, AW/AMC/NEFLOW, and the Town of Montague herein.			N/A
Massachusetts Department of Environmental Protection (MDEP)- filed on 3.1.2016			
MDEP-1	There is no mention of the Long Island Sound TMDL for nitrogen. The need to reduce the amount of nitrogen entering Long Island Sound is documented in this report. Project lands can be managed to help achieve this goal.	See response to CRWC-4.	Section 3.3.2.1.2
American Whitewater (AW), Appalachian Mountain Club (AMC) and New England Flow (NEFLOW)- filed on 3.1.2016			
AW/AMC/NEFLOW -1	The Licensee asserts in its Study Report there are sufficient boating opportunities as a result of spillage from the dam. We disagree. Of the 4 days on which the Licensee spilled in excess of 2,500 cfs into the natural river channel in the time period between April-November 2014, only 4 such days occurred during the peak boating season between Memorial Day and Labor Day. Most of the days identified in the Study Report occurred during April, and oftentimes these flows were out of the Licensee's control and in excess of the flows tested, which diminished the recreational value of these flows for boaters of varying abilities. More to the point, none of these uncontrolled spillage events are predictable or are scheduled for maximum recreation benefit, and few are in the optimal flow range.	As set forth in the Whitewater Boating Evaluation Report (Study No. 3.6.3) and the DLA, the Licensee calculated the percentage of time that flows in the bypass reach would be expected to exceed the study flows of 2,500 cfs, 5,000 cfs, and 10,000 cfs using monthly flow duration curves for a period of record from 1940 – 2013. In addition in the FLA, the Licensee provided further analysis regarding the availability of flows above 2,500 cfs during the boating season months (April – October) and between 2,500 cfs and 13,000 cfs (the range of flows that were tested by boaters during the field component of the Whitewater Boating Evaluation). Depending on the year, it is possible that there may be 4 days of flows which exceed 2,500 cfs during the period Memorial Day to Labor Day. On the other hand, in any given year the boating season begins in April and or May and may extend to the end of October. During the months of April and May, there may be 23 days and 12 days, respectively of flows exceeding 2,500 cfs, and 8 days and 7 days respectively when flows are between 2,500 cfs and 13,000 cfs. The months of September and October add an additional 2 days of flows that are in the range of flows studied. Flows above 13,000 cfs were not evaluated and it is likely that some flows in excess of 13,000 cfs provide additional days of boating opportunity.	Table 3.3.6.1.9-1

Commenter	Comment	Response	FLA Section
AW/AMC/NEFLOW -2	Given that FirstLight lacks meaningful control over the river prior to May 1 and that October 31 typically represents the end of the whitewater boating season for most paddlers, we focused our analysis on these boating months. We then compared the monthly number of days on which flows fell within the range of boatable flows evaluated during the Whitewater Boating Evaluation, based on project inflows and based on current project operations. The results were as follows: **Boatable Flows** **1905-2013** M J J A S O Inflows 9 20 24 23 21 22 Bypass 7 2 1 1 0 1 The chart above makes clear that project operations virtually eliminate all boatable pulse flows into the natural river channel during the months of June through October at the peak of the recreational boating season when incoming flows are typically below 18,000 cfs. The historical flow data show that on average there are 119 days annually when daily mean flows are expected to be in the range of 2,500 to 13,000 cfs during the months of May through October. The current operations only spill boatable flows on 12 days, primarily in spring. The restoration of a more natural flow regime will require regularly occurring pulses ranging from 2,500 to 13,000 cfs throughout the late spring through fall period. Restoring variable flows will also provide significant recreation benefits.	See response to AW/AMC/NEFLOW-1.	N/A
AW/AMC/NEFLOW -3	AW, AMC, and FLOW request (i) boatable flows in the natural river channel, or bypass reach, such as the US Fish and Wildlife Service's minimum Aquatic Base Flows (ABF) minimum (3,582 cfs or inflow when less, based on 0.5 csm and a drainage area of 7,163 mi2), and (ii) scheduled seasonal pulse flows in sufficient frequency, magnitude, and timing, which will restore aquatic habitat and provide the opportunity for whitewater boating below the Turners Falls Dam.	See response to USFWS-2.	N/A
AW/AMC/NEFLOW -4	AW, AMC, and FLOW support completion of the remaining aquatic studies to further refine appropriate bypass flows. In order to restore the aquatic habitat in the natural river channel that has been so damaged by the Licensee's operation, it is our position that the "bypass" minimum flows should be released through the bascule gates at the dam rather than through Station 1 or Cabot Station as is currently done.	See response to USFWS-2.	N/A
AW/AMC/NEFLOW -5	We also recommend that the Licensee consider decommissioning Station 1 in order to provide adequate flows throughout the natural river channel.	In Scoping Document 2 (April 2012), FERC stated that "we do not consider decommissioning to be a reasonable alternative for the Connecticut River projects, at this time." To the extent that it is determined upon the completion of all relicensing studies, that increased flows should be provided in the bypass reach, the commenters provide no evidence that the decommissioning of Station No. 1 is needed to provide minimum flows to the bypass reach or a that it is a reasonable alternative to be considered by FERC.	N/A
AW/AMC/NEFLOW -6	If Station 1 is to remain, then in the alternative, the Licensee should consider installing a fish friendly, low-flow generator at the bascule gate to concurrently benefit hydropower generation.	Pending the magnitude of any future minimum flow requirement to be released at the dam, FirstLight will evaluate the feasibility of a minimum flow turbine generator at the Turners Falls dam.	N/A

<table>
<tr><th>Commenter</th><th>Comment</th><th>Response</th><th>FLA Section</th></tr>
<tr><td>AW/AMC/NEFLOW -7</td><td>In order to provide suitable aquatic habitat, the Licensee should provide minimum conservation flows year round. Higher flows may be needed during the Shortnose Sturgeon and other species' spawning and rearing period, following which an ABF flow of 3,582 or inflows could be workable. The project could provide variable base flows between 3,582-5,000 cfs in order to provide more natural pulses with added recreational benefits. Outside of the spawning and rearing periods, minimum flows should remain at 0.5 csm throughout the rest of the year. When incoming flows fall below 0.5 csm, the Licensee can reduce minimum conservation flows to minimum boatable flows.</td><td>See response to USFWS-2.</td><td>N/A</td></tr>
<tr><td>AW/AMC/NEFLOW -8</td><td>While minimum flows from gates at the dam will provide some recreational value, it will not provide an optimal whitewater boating experience. The Licensee should provide additional scheduled recreation releases ranging from 5,000-8,000 cfs or larger during each weekend and holiday day from May 1 – October 31. According to the Whitewater Boating Study, optimal boating flows are estimated in the range of 5,000 to 8,000 cfs for most craft, and seasonally appropriate flows up to 13,000 cfs (higher flows in the spring, and lower flows in the late summer and early fall) should be provided.

Based on the 2016 calendar, the number of releases each month would be as follows:
<table><tr><th>May</th><th>Jun</th><th>Jul</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Total</th></tr><tr><td>10</td><td>8</td><td>11</td><td>8</td><td>9</td><td>11</td><td>57</td></tr></table></td><td>See response to USFWS-2</td><td>N/A</td></tr>
<tr><td>AW/AMC/NEFLOW -9</td><td>The ability of the Licensee to provide scheduled releases above minimum flows would depend on the availability of incoming flows; however, storage from the Northfield Mountain development could be used to augment releases and stabilize reservoir levels provided that anticipated flows from Vernon would replenish and augment releases within a reasonable period of time.</td><td>The Northfield Mountain Pumped Storage Development provides important energy, operating reserves and operational flexibility to ISO-New England (ISO-NE) system operation. The fact that ISO-NE, as part of its daily operational planning processes, can rely on the Northfield Mountain Pumped Storage Development to supply these operational flexibilities from a certain fuel supply is of high value to ISO-NE and the New England region. In many periods, this significant supply of operational flexibility has avoided the commitment of many other less flexible resources to provide for a more efficient system dispatch. This peak load ability provides rapid response power resources to the grid to assure reliable operation and prevent regional blackouts. The Licensee is not proposing to use storage from the upper reservoir of the Northfield Mountain Pumped Storage Development for the purpose of augmenting flows in the Turners Falls Impoundment because this would jeopardize the Licensee's ability to provide energy, operating reserves, and operational flexibility on an instantaneous basis when called upon by ISO-NE.</td><td>N/A</td></tr>
<tr><td>AW/AMC/NEFLOW -10</td><td>In addition to scheduled recreational releases, AW, AMC, and FLOW seek improvements to access at the put-in near the fishway below the dam, the restoration of access at Rock Dam, and improvements to the take-out at Poplar Street, and the creation of a walkable and short portage around the Turners Falls Dam. Another portage is needed around Rock Dam on the island that could be used by downriver paddlers and by playboaters who would not need to carry their watercraft over the rocks.</td><td>See response to Montague-3.</td><td>N/A</td></tr>
<tr><td>AW/AMC/NEFLOW -11</td><td>It is also appropriate with today's technology that real-time flow information be publicly provided through WaterLine, http://www.h2oline.com.</td><td>See response to Montague-3.</td><td>N/A</td></tr>
<tr><td>AW/AMC/NEFLOW -12</td><td>Northfield Mountain Recreation Center

The Northfield Mountain Recreation Center was constructed as initial mitigation when the pumped storage facility was created. It is the position of our organizations that the extension of this original mitigation be extended and made permanent in any FirstLight license renewal. Additional facilities and improvements should be added, including snow making for early and late cross country skiing, improved mountain biking and hiking trails, and rock climbing benefits.</td><td>See response to Montague-3.</td><td>N/A</td></tr>
</table>

Commenter	Comment	Response	FLA Section
AW/AMC/NEFLOW-13	In addition, to ensure that water is available on weekends and holidays for whitewater releases at the Turners Falls Dam, generation from the Northfield Mountain Pumped Storage facility should be timed to provide adequate water for those releases.	See response to AW/AMC/NEFLOW-9.	N/A
AW/AMC/NEFLOW-14	Downriver paddlers should be provided with maintained campsites every three to five miles from the Vernon Dam to the Sunderland Bridge. Maintenance should be provided by FirstLight, and should include toilets, tent sites, and privacy from road traffic. These campsites should be free to the boating public.	See response to Montague-3.	N/A
AW/AMC/NEFLOW-15	When a new license is issued, many changes in flow and timing will happen on the Connecticut River. FirstLight should provide funds to produce and publish a revised version of the *Connecticut River Boating Guide* for the benefit of through paddlers on extended river trips.	FERC's regulations require that a licensee inform the public of the opportunities for recreation at its project and following the issuance of a license make reasonable efforts to keep the public informed of the availability of project lands and waters for recreational purposes. In accordance with FERC's regulations, the Licensee will make reasonable efforts to inform the recreating public regarding any continuing, new, or modified recreational opportunities that are required as conditions in a new license.	N/A
Federal Energy Regulatory Commission (FERC)- filed on 3.1.2016			
FERC-1	Verification Statement: The FLA should include this notarized verification statement.	FirstLight includes a verification statement.	vii
FERC-2	Exhibit A: Modify Exhibit A to further describe the Turners Falls Development and Northfield Mountain Pumped Storage Development	FirstLight includes the requested data in Exhibit A of the FLA.	Various pages
FERC-3	Exhibit D: Exhibit D of the FLA does not provide monetary estimates of the fair value and severance damages. The FLA should include this information.	FirstLight includes the requested data in Exhibit D of the FLA.	D-1
FERC-4	Exhibit F: The Exhibit F drawings do not show and label the intake bays at Station No. 1 or the portal at the Northfield Mountain Pumped Storage Development. The FLA should include this information on the Exhibit F drawings.	FirstLight includes the requested data in Exhibit F of the FLA.	Edits made
FERC-5	Exhibit F: Exhibit A, page A-4 includes a table that lists the characteristics of the Station No. 1 turbines and generators. The table indicates that turbine-generator units 2 and 5 have a single runner; however, the Exhibit F drawings do not include a section drawing that shows and labels a turbine-generator unit with a single runner. The FLA should include this section drawing in Exhibit F.	FirstLight includes the requested data in Exhibit F of the FLA.	Edits made
FERC-6	Exhibit G Maps- Exhibit A describes transmission lines associated with the Station No. 1 and Northfield Mountain powerhouses; however, the Exhibit G maps do not show or label these transmission lines or the location of interconnection with the regional grid or interconnected transmission system. The FLA should show and label this information on the Exhibit G maps. The Exhibit G maps include some project recreation sites and facilities; however, not all project recreation sites are identified and labeled. Therefore, the Exhibit G maps in the FLA should show and consistently label all project recreation sites listed in table 3.3.6.1.2-1 of the DLA within the project boundary.	FirstLight includes the requested data in Exhibit G of the FLA.	Edits made

APPENDIX C: RECREATION MANAGEMENT PLAN

DRAFT

Final Application for New License for Major Water Power Project – Existing Dam

Northfield Project
Northfield Mountain Pumped Storage Project (FERC Project Number 2485)
Turners Falls Hydroelectric Project (FERC Project Number 1889)

Recreation Management Plan

Submitted by:

FirstLight
GDF SUEZ

Prepared by:

TRC

APRIL 2016

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LIST OF ABBREVIATIONS

ADA	Americans with Disabilities Act
FERC	Federal Energy Regulatory Commission
FLA	Final License Application
FirstLight	FirstLight Hydro Generating Company
ILP	Integrated Licensing Process
MA	Massachusetts
MADFW	Massachusetts Division of Fisheries and Wildlife
NH	New Hampshire
NMTTC	Northfield Mountain Tour and Trail Center
PFD	Personal floatation device
QII	Quinnetukut II
RMP	Recreation Management Plan
TFI	Turners Falls Impoundment
TV	Television
VT	Vermont
WMA	Wildlife Management Area

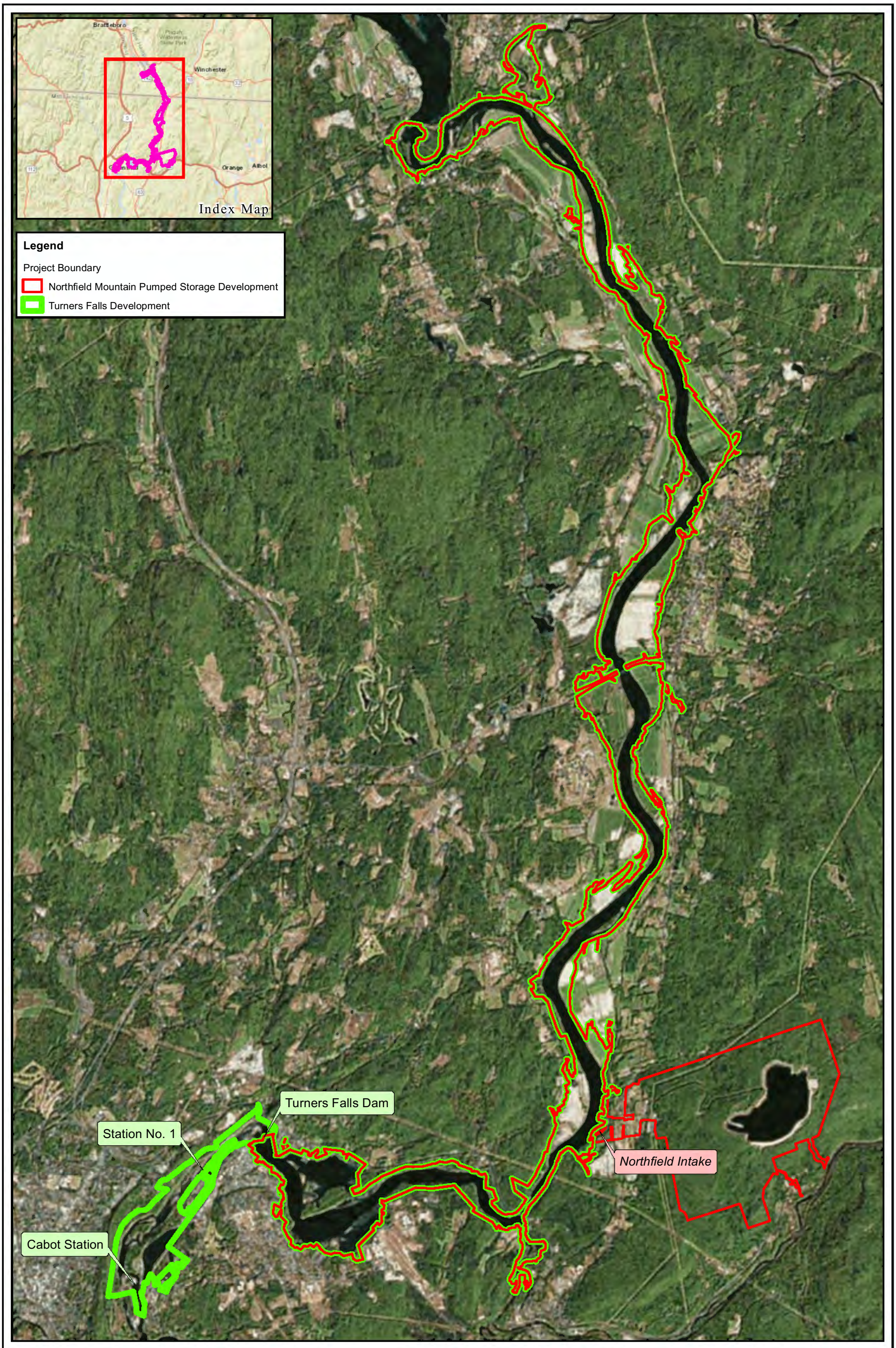
1 INTRODUCTION AND PURPOSE

FirstLight Hydro Generating Company (FirstLight or Licensee) is the current Licensee of the Northfield Mountain Pumped Storage Project (FERC No. 2485) and the Turners Falls Hydroelectric Project (FERC No. 1889). The Licensee has initiated with the Federal Energy Regulatory Commission (FERC) the process of relicensing the two Projects using FERC's Integrated Licensing Process (ILP). The current licenses for Northfield Mountain and Turners Falls Projects were issued on May 14, 1968 and May 5, 1980, respectively, with both set to expire on April 30, 2018. The Final License Application (FLA), filed in April 2016, proposes that the two Projects be licensed as a single Project, to be called the Northfield Project (or Project) with two developments to be called the Turners Falls Development and the Northfield Mountain Pumped Storage Development. The Northfield Project is located on the Connecticut River in the states of Massachusetts (MA), New Hampshire (NH), and Vermont (VT). Figure 1-1 shows the location of the Project and its two developments.

The Project lands and waters provide a variety of recreational activities, such as walking, hiking, cross-country skiing, snowshoeing, angling, boating, camping, biking, climbing, and picnicking. In connection with the relicensing process, the Licensee conducted several recreational studies to assess recreational use and demand at the Project. These studies included a recreational use and user survey, an inventory and assessment of recreational facilities at the Project, a whitewater boating evaluation, an assessment of day use and overnight facilities associated with non-motorized boating, and a recreation study of the Northfield Mountain Tour and Trail Center (NMTTC). As the studies showed, the Project's recreational sites and facilities meet current demand and are sufficient to meet expected future demand without the need for expansion or new land acquisition over the term of the new license.

As part of the FLA, the Licensee has prepared this recreation management plan (RMP). The purpose of the RMP is to guide the Licensee's management and maintenance of recreation facilities at the Project over the new license term consistent with FERC's requirements to provide adequate public access to Project lands and waters. The RMP describes the Project Recreation Sites (Commission-Approved Recreation Sites) that were previously approved by the Commission as part of the current license, and proposes modified Project Recreation Sites to be operated and maintained by the Licensee during the term of a new license.

Proposed Project Recreation sites for the Northfield Project Recreation Management Plan (RMP) include the existing Munn's Ferry Boat Camping Recreation Area, Boat Tour and Riverview Picnic Area, Northfield Mountain Tour and Trail Center, which includes the Northfield Mountaintop Observation Area and the Northfield Mountain Trail System, Barton Cove Nature Area and Campground, Barton Cove Canoe and Kayak Rental, , the Cabot Woods Fishing Access, the Turners Falls Branch Canal Area, the Gatehouse Fishway Viewing Area, and the Turners Falls Canoe Portage. These facilities were originally approved by FERC by Orders dated July 5, 1977, March 17, 1982, and June 30, 2003. The Licensee also proposes to add the Poplar Street Access site with modifications as set forth herein as a Project Recreation site.



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

Figure 1-1
Project Location

FirstLight GDF SUEZ

N

0 0.5 1 2
Miles

Path: W:\gis\studies\RMP\maps\11_x_17_RMP_Figure_1_1_Project_Location.mxd

2 PROJECT DESCRIPTION

The Project consists of the Turners Falls Development and Northfield Mountain Pumped Storage Development.

2.1 Turners Falls Development

The Turners Falls Development is located on the Connecticut River in the states of Massachusetts (MA), New Hampshire (NH) and Vermont (VT). The greater portion of the Turners Falls Development, including developed facilities and most of the lands within the Project boundary, is located in Franklin County, MA; specifically, in the towns of Erving, Gill, Greenfield, Montague and Northfield. The northern reaches of Project boundary extend into the towns of Hinsdale, in Cheshire County, NH, and Vernon, in Windham County, VT. The Turners Falls Dam is located at approximately river mile 122 (above Long Island Sound) on the Connecticut River, at coordinates 42°36'38.77" north and 72°33'05.76" west, in the towns of Gill and Montague, MA.

The Turners Falls Dam creates the Turners Falls Impoundment (TFI), which is approximately 20 miles long, and extends upstream to the base of TransCanada's Vernon Hydroelectric Project and Dam (FERC No. 1904). Most of the TFI lies in MA, however, approximately 5.7 miles of the northern portion of the TFI is located in NH and VT. The TFI also serves as the lower reservoir for the Northfield Mountain Pumped Storage Development.

The Turners Falls Development consists of: a) two individual concrete gravity dams separated by an island; b) a gatehouse controlling flow to the power canal; c) the power canal and a short branch canal; d) two hydroelectric powerhouses, located on the power canal, known as Station No. 1 and Cabot Station; e) a bypassed section of the Connecticut River and f) a reservoir known as the TFI.

2.2 Northfield Mountain Pumped Storage Development

The Northfield Mountain Pumped Storage Development is a pumped-storage facility located on the Connecticut River in MA that uses the TFI as its lower reservoir. The tailrace of the Northfield Mountain Pumped Storage Development is located approximately 5.2 miles upstream of Turners Falls Dam, on the east side of the TFI. The Development's Upper Reservoir is a man-made structure situated atop Northfield Mountain, to the east of the Connecticut River. During pumping operations, water is pumped from the TFI to the Upper Reservoir. When generating, water is passed from the Upper Reservoir back to the TFI.

The Northfield Mountain Pumped Storage Development consists of: a) the Upper Reservoir dam/dikes; b) an intake; c) pressure shaft; d) an underground powerhouse; and c) a tailrace.

3 PROJECT RELICENSING STUDIES

Recreation-related studies conducted by the Licensee as part of the relicensing process demonstrate that the proposed Project Recreation sites, combined with other public recreation sites and facilities, as well as informal access areas, provide the public with a diversity of recreation opportunities, and an abundance of options for accessing and utilizing Project lands and waters for recreation. These studies included Study 3.6.1 *Recreation Use/User Contact Survey* (FirstLight, 2015e), Study 3.6.*2 Recreation Facilities Inventory and Assessment Report* (FirstLight, 2014; FirstLight 2015), 3.6.3 *Whitewater Boating Evaluation* (FirstLight, 2015b), 3.6.4 *Assessment of Day Use and Overnight Facilities Associated with Non-motorized Boating* (FirstLight, 2015c), and 3.6.7 *Recreation Study at Northfield Mountain, including Assessment of Sufficiency of Trails for Shared Use* (FirstLight, 2015d). These studies found that Project recreation sites and facilities are currently meeting recreation demand and are adequate to meet demand in the reasonably foreseeable future.

The *Recreation Facilities Inventory and Assessment Report*, which consisted of an inventory of both Project and other improved recreation sites found that with few exceptions all of the sites and their associated facilities and amenities are well maintained and are functioning as designed. The *Recreation Use/User Contact Survey* consisted of a year-long survey of users at the Project recreation sites as well as other public recreation sites. This survey found that users felt that the existing sites were generally well operated and maintained. The major recreation facilities at the most popular Project recreation sites received favorable marks from most users, including the Barton Cove Campground, the Barton Cove Canoe and Kayak rental area, the Gatehouse Fishway Viewing Area, and the Northfield Mountain Tour and Trail Center (NMTTC) and NMTTC Trail System. These studies show that the continued operation and maintenance of the existing recreation sites is supportive of current recreation use and demand levels. The study also found that current facility capacities at the proposed Project-recreation sites do not exceed 50% with one exception. While a portion of the Gatehouse Fishway Viewing Area building was utilized at 90% capacity during the fishway viewing season, even this site is expected to provide adequate use capacity for the foreseeable future.

Study results from the *Recreation Study at Northfield Mountain, including Assessment of Sufficiency of Trails for Shared Use* found that visitors to the NMTTC consistently gave it favorable marks for its facilities and amenities, as well as for how the facilities are operated and maintained by FirstLight. This study also found that users of the NMTTC Trail system consistently gave it favorable remarks and there were almost no negative comments. The trails overall, were found to be well maintained and in good condition. The Trail System will continue to operate year-round and provide hiking, mountain biking and horseback riding opportunities in the spring, summer and fall, as well as skiing and snowshoeing opportunities in the winter. The Trail System will also continue to provide parking and access for those wishing to access the New England National Scenic Trail, and the Rose Ledge climbing site.

Continued operation of the Project, as proposed, including the operation and maintenance of the proposed Project Recreation sites will also be supportive of the Connecticut River Paddlers' Trail's goals of expanding the Connecticut River Trail to include the TFI and Project areas downstream of Turners Falls Dam. The *Assessment of Day Use and Overnight Facilities Associated with Non-motorized Boating* found that existing access and camping opportunities located throughout the TFI, including the Licensee's Munn's Ferry and Barton Cove campgrounds, are located and spaced consistent with water trail design standards and practices. FirstLight's proposed maintenance of its existing campsites and access areas will ensure that these facilities will be available for water trail users and multi-day through paddlers in the future.

The Poplar Street Access site, which is located downstream of the Turners Falls bypass reach serves as the put-in for the Turners Falls Canoe Portage. The majority of the boaters who participated in the evaluation of various boating flows conducted as part of the *Whitewater Boating Evaluation* rated the Poplar Street Access Site as providing moderate/difficult access. Thus, as set forth herein, FirstLight proposes to improve the Poplar Street Access site, which will support water trail users and paddlers.

Continued operation and maintenance of the proposed Project Recreation sites (Munn's Ferry Boat Camping Recreation Area, the Boat Tour and Riverview Picnic Area, the NMTTC and its trail system, the Baron Cove Nature Area and Campground, the Barton Cove Canoe and Kayak Rental Area, the Gatehouse Fishway Viewing Area, the Turners Falls Branch Canal Area, the Cabot Woods Fishing, the Turners Falls Canoe Portage, including improvements to the Poplar Street Access site) will ensure that the public continues to benefit from the recreational opportunities afforded by Project lands and waters. In addition, as demonstrated by the aforementioned studies, the proposed Project Recreation sites are adequate to meet recreation needs and demand in the reasonably foreseeable future.

4 PROPOSED PROJECT RECREATION SITES

Proposed Project Recreation sites to be managed under this RMP are shown in Figure 4-1.

4.1 Existing Project Recreation Sites

From upstream to downstream, the Licensee operates and maintains the following existing Project Recreation sites. Consistent with past practice, the Licensee will continue to operate and maintain these Project Recreation sites as part of the Project's RMP. Table 4.1-1 and Table 4.1-2 summarize the facilities and amenities associated with the proposed Project Recreation sites (FirstLight, 2014 & 2015).

4.1.1 Munn's Ferry Boat Camping Recreation Area

Location: Munn's Ferry is located on the east side of the Connecticut River in Northfield, MA.

Description of Facilities: Munn's Ferry is a water access only overnight and day use site. The camping area at Munn's Ferry includes tent campsites each with a trash can, tent platform, picnic table, fire ring, and grill. There is also a lean-to site with a trash can, picnic table, fire ring and grill. Also available are pit toilets and a dock.

Site Operation: Munn's Ferry is open from Memorial Day to Columbus Day. Individuals must reserve a site prior to camping and pay a fee. The dock is available during the operating season.

4.1.2 Boat Tour and Riverview Picnic Area

Location: The Boat Tour and Riverview Picnic Area is located off Pine Meadow Road on the east shore of the Connecticut River in Northfield, MA.

Description of Facilities: The Boat Tour and Riverview Picnic area provides an area for picnicking along the river, which includes picnic tables and grills. There is a pavilion, which can be rented for group events. The site includes restroom facilities and benches. The site also offers river tours on the Quinnetukut II (QII) Riverboat, which travels along the Connecticut River between Barton Cove and the Riverview Picnic Area. The tour is operated by FirstLight and typically leaves from the Riverview Picnic Area dock.

There is a formal parking lot available for those using the picnic area and those who are boarding the riverboat. There are Americans with Disabilities Act (ADA) accessible parking spaces and an ADA compliant bathroom at the site.

Site Operation: The site is open from dawn to dusk free of charge, although there is a fee to rent the pavilion or cruise on the riverboat. The site opens Memorial Day weekend and closes Columbus Day weekend. The river boat operates from July to mid-October. The dock is in place during the operating season and removed during the off-season. The entrance to the site has a gate, which is open when the site is open to the public.

4.1.3 Northfield Mountain Tour and Trail Center

Location: The NMTTC is located off Millers Falls Road in Northfield, MA.

Description of Facilities: The NMTTC offers a Visitor Center, parking area, trails and a mountaintop observation area. The Visitor Center offers self-guided interpretive displays, meeting rooms, cross-country ski rentals, a lounge, and public restrooms. The center also offers recreation and environmental education programs year-round, including programs for school classes and organized groups. There is a paved parking area located adjacent to the Visitor Center. Additional overflow parking is provided on a nearby mowed area. Horse trailers and buses utilize the cul-de-sac on the west side of the Visitor Center for parking. ADA accessible parking is available at the Visitor Center, along with a ramp to access the facility.

Site Operation: The Visitor Center is typically open year-round for day use activities from 9:00 am to 4:30 pm Wednesday through Sunday. The Center is also open on certain holidays, which are noted on the Licensee's web page. The Northfield Mountain trail system is also open year round, depending on trail and weather conditions. Use of the Visitor Center is free, as is summer trail use and snowshoeing. The Licensee charges a fee for cross country skiing as well as a fee for ski and snowshoe rentals. A fee may also be charged for the recreation and environmental educational activities to help offset their cost.

4.1.3.1 Mountaintop Observation Area

The Mountaintop Observation Area is a wooden observation platform that provides views of the Upper Reservoir from its southern shore. The platform is approximately 20 feet by 20 feet and is accessible from the Northfield Mountain Trail System's Summit Trail.

4.1.3.2 Trail System

The Northfield Mountain Trail System includes approximately 25 miles of trail, which are used for hiking, mountain biking, equestrian use, snowshoeing, cross-country skiing, and other non-motorized multi-use activities. A map of the trail system is provided in Figure 4.1-1. Approximately 18 miles of trail are wide (8'-15') level corridors with an improved base. These trails are groomed for cross country skiing during the winter months. Approximately 7 miles are narrow single track trails on natural soils. These trails are typically used for hiking and snowshoeing. Rose Ledge and a portion of the Farley Ledge are also located within the vicinity of the Northfield Mountain Tour and Trail Center. Rose Ledge can be accessed via the Northfield Mountain Tour and Trail Center parking area and trail system. Both Rose Ledge and Farley Ledge can be accessed via parking and trails that start outside the Project on private property.

4.1.4 Barton Cove Nature Area and Campground

Location: Barton Cove Nature Area and Campground is located on Barton Cove Road in Gill, MA.

Description of Facilities: The Barton Cove Nature area has a set of flush toilets and showers, along with a seasonal portable toilet. The site has grills, picnic tables, and a walking trail leading to an overlook. There is a paved parking area at the Nature Area and an adjacent overflow parking area.

The Barton Cove Campground has group campsites, trailer sites, and tent sites. One of the tent sites is considered ADA accessible. Each campsite has a picnic table, fire ring, and garbage can. The group sites also have grills and additional picnic tables. There are vault toilets and additional portable restrooms located within the campground. There is an additional parking area within the campground.

Site Operation: The Nature Area is open to the public free of charge, from dawn to dusk year round. The parking area at the Nature Area is plowed during the winter months. The campground is open Memorial Day to Labor Day. Quiet hours are from 10:00pm to 8:00 am. There is a fee for overnight camping and sites may be reserved ahead of time.

4.1.5 Barton Cove Canoe and Kayak Rental Area

Location: This site is located on the northern shore of the Connecticut River, off Route 2 in Gill, MA.

Description of Facilities: Barton Cove Canoe and Kayak offers paddlecraft rentals and picnicking. There is a natural gravel carry-in paddlecraft launch, a rental office, picnic tables, parking and a portable sanitation facility. Paddlecraft rentals include personal flotation devices (PFDs) and paddles or oars.

Site Operation: The facility is open from Memorial Day Weekend to Labor Day Weekend and is gated in the off-season. The rental office is open on weekends from 9:00 am to 6:00 pm and Monday through Friday 9:00 am to 5:00 pm. Individuals can use the site free of charge, although there is a fee to rent paddlecraft.

4.1.6 Gatehouse Fishway Viewing Area

Location: The Gatehouse Fishway Viewing Area is located off 1st Street on the southern shore of the Connecticut River, in Montague, MA.

Description of Facilities: The Gatehouse Fishway Viewing Area provides the public an opportunity to view the fish that use the fishway. There are two floors to the facility. On the upper level there are ADA accessible restrooms. The upper level also has a viewing platform that is ADA accessible and contains interpretive displays and a closed circuit television feed from the fishway counting room. The bottom level contains the fishway viewing area, additional interpretive displays, and also contains the counting room, which is not open to the public. The facility is staffed with seasonal employees during viewing times. The site also contains a picnic area on the north side of 1st Street. The picnic area contains picnic tables, grills, a bike rack and parking. The Canalside Rail Trail starts at the picnic area within the site and continues along the Turners Falls Power Canal.

Site Operation: The fishway viewing facility is open to the public free of charge during fish migration season, typically mid-May to mid-June. Timing may vary depending on weather and river conditions. Hours of operation are Wednesday through Sunday from 9:00 am to 5:00 pm. The viewing area is contained within a fence which is locked during the off-season. The picnic area is located outside of the fence, allowing it to be open year-round from dawn until dusk, unless there is a scheduled event.

4.1.7 Turners Falls Branch Canal Area

Location: Turners Falls Branch Canal Area is located off Power Street in Montague, MA, along the Station No. 1 forebay.

Description of Facilities: The Turners Falls Branch Canal Area is a day use overlook that provides benches.

Site Operation: The site is available to the public free of charge year-round. There are no posted hours of operation.

4.1.8 Cabot Woods Fishing Access

Location: Cabot Woods Fishing Access is located on Migratory Way in Montague, MA between the power canal and the bypass reach.

Description of Facilities: Cabot Woods Fishing Access is open for day use activities. Recreation facilities provided at the site include picnic tables and two parking areas (upper and lower). The access road along the canal is open to the public. Over time, several informal trails to the shore have been established by anglers

Site Operation: The fishing access is open year-round free of charge from dawn to dusk. The site abuts a fence belonging to the U.S. Geological Survey's Conte Anadromous Fish Laboratory. The gate at the head of the road into the fishing access and Conte Fish Laboratory closes at 5:00 pm daily. However, the upper parking lot can be used when the gate is closed. Migratory Way is plowed in the winter allowing use of the access road, although the parking areas are not plowed. Swimming is prohibited at this site and signs are posted indicating that it is not safe to swim.

4.1.9 Turners Falls Canoe Portage

Location: The Turners Falls canoe portage operation provides boaters with a means of circumventing the Turners Falls Dam. Boaters wishing to proceed downriver of Barton Cove call FirstLight for vehicular portage. They are then picked up and driven downstream of the Turners Falls Dam to the Poplar Street Access site in Montague, where they can continue their trip. Signs explaining the canoe portage operation procedures and providing the portage request call-in number are located at the following recreation sites:

Munn's Ferry Boat Camping Recreation Area, Boat Tour and Riverview Picnic Area, Barton Cove Nature Area and Campground, Barton Cove Canoe and Kayak Rental Area, and at the Poplar Street Access site. Instructions are to paddle to the Barton Cove Canoe and Kayak Rental Area, unload gear, and then call (413) 659-3761 to request a pick up. Typically a vehicle for the portage will arrive within 15 to 90 minutes of the telephone call. Barton Cove Canoe and Kayak Rental Area has a phone during business hours that boaters can use from Memorial Day through Labor Day. During the off-season, boaters need to use their own phones to make the portage request.

Site Operation: Portage around the Turners Falls Dam for paddlers is available to the public at no charge seven days per week during the paddling season, typically mid-May through mid-November. The site is open from dawn till dusk.

4.2 Proposed Modifications to Project Recreation Sites and Facilities

4.2.1 Bennett Meadow WMA

Proposed Modification: Under the current license, the Bennett Meadows Wildlife Management Area (WMA) is a Commission-approved Project recreation site. The WMA is primarily managed by the Massachusetts Department of Fisheries and Wildlife (MADFW). The WMA was utilized at less than 10% of capacity by the public during 2014 based on parking area usage. Based on the fact that the site is managed for wildlife, does not provide access to Project waters due to steep banks, has no recreation facilities and receives a low amount of use, in its license application the Licensee proposes that the Bennett Meadow WMA be considered a non-Project recreation area.

4.2.2 Poplar Street Access

Proposed Modifications: The Licensee is proposing that the Poplar Street Access, which is currently an informal access area on land owned by the Licensee be included as a Project Recreation Site. The Licensee proposes to improve carry-in boat access to this site, which will include a staircase with boat slide and improved parking. A proposed concept drawing is included in Appendix A.

Table 4.1-1: Proposed Commission-Approved Project Recreation Sites and Facilities Summary

Recreation Site Name	Recreation Facilities/Amenities
Munn's Ferry Boat Camping Recreation Area	• water access only campsites (approximately 4 tent platform sites and 1 shelter site) • pedestrian foot bridge • restrooms • picnic area (approximately 1 table) • dock
Boat Tour and Riverview Picnic Area	• parking area (approximately 54 single vehicle spaces; 2 ADA) • restroom (ADA compliant) • picnic area (approximately 12 tables) • pedestrian foot bridge • picnic pavilion (approximately 8 tables) • interpretive boat tour • dock
Northfield Mountain Tour and Trail Center	• parking area (approximately 50 single vehicle spaces; 3 ADA) • restroom • picnic area (approximately 7 tables) • overlook • visitor center and interpretive displays • winter area • trail system
Barton Cove Nature Area and Campground	• nature area parking area (approximately 26 single vehicle spaces) • campground parking (approximately 28 single vehicle spaces) • showers • restroom facilities (2 facilities; ADA compliant) • picnic area (approximately 15 tables) • overlook • interpretive sign • walk-in campground (approximately 2 group sites; 28 campsites; and 1 ADA campsite) • nature trail • dock
Barton Cove Canoe and Kayak Rental Area/Turners Falls Canoe Portage	• parking area (approximately 28 single vehicle spaces) • picnic area (approximately 6 tables) • seasonal restroom • paddlecraft rental service • canoe put-in and take-out (serves as portage take-out) • on-call vehicular canoe & kayak transport service
Gatehouse Fishway Viewing Area	• parking area (approximately 27 single vehicle spaces; 2 ADA spaces) • picnic area (approximately 6 tables) • bike rack • trail

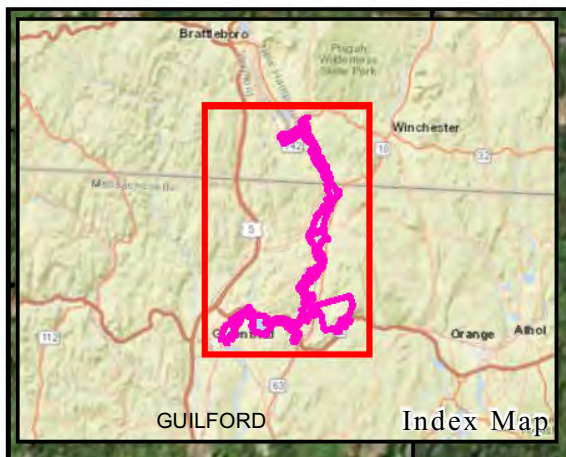
Recreation Site Name	Recreation Facilities/Amenities
	• fishway viewing visitor center (ADA accessible) • restrooms (ADA accessible) • interpretive sign
Turners Falls Branch Canal Area	• Overlook (approximately 4 benches)
Cabot Woods Fishing Access	• parking areas (approximately 17 single vehicle spaces; 2 ADA spaces) • picnic area (approximately 3 tables)
Turners Falls Canoe Portage	• canoe portage take-out (at Barton Cove Canoe & Kayak Rental area) • canoe portage put-in (at Poplar Street Access site) • On-call vehicular canoe & kayak transport service

Table 4.1-2: Proposed Commission Approved Recreation Sites, Facilities, and Amenities

Project No.	Development Name	Recreation Site Name	Recreation Facility/Amenity Type	Facility/ Amenity Status	Latitude	Longitude	FERC Citation & Date	Notes
P-2485	Northfield Mountain Pumped Storage	Munn's Ferry Boat Camping Recreation Area	Campground	Constructed	42.6512	72.4666	59 FPC 126 July 5, 1977	Water access only, approximately 4 tent sites and 1 shelter site
P-2485	Northfield Mountain Pumped Storage	Munn's Ferry Boat Camping Recreation Area	Picnic Area	Constructed	42.6512	72.4666	59 FPC 126 July 5, 1977	Approximately 1 table
P-2485	Northfield Mountain Pumped Storage	Boat Tour and Riverview Picnic Area	Picnic Area	Constructed	42.6133	72.4792	59 FPC 126 July 5, 1977	Approximately 12 tables
P-2485	Northfield Mountain Pumped Storage	Boat Tour and Riverview Picnic Area	Picnic Pavilion	Constructed	42.61405	72.4788	59 FPC 126 July 5, 1977	Approximately 8 tables
P-2485	Northfield Mountain Pumped Storage	Boat Tour and Riverview Picnic Area	Other Use (Interpretive Boat Tour)	Constructed	42.6130	72.4797	59 FPC 126 July 5, 1977	Quinnetukut II Dock
P-2485	Northfield Mountain Pumped Storage	Northfield Mountain Tour and Trail Center	Picnic Area	Constructed	42.6104	72.4713	59 FPC 126 July 5, 1977	Approximately 7 tables
P-2485	Northfield Mountain Pumped Storage	Northfield Mountain Tour and Trail Center	Overlook	Constructed	42.6095	72.4495	59 FPC 126 July 5, 1977	Platform overlooking upper reservoir
P-2485	Northfield Mountain Pumped Storage	Northfield Mountain Tour and Trail Center	Trails	Constructed	N/A	N/A	59 FPC 126 July 5, 1977	
P-2485	Northfield Mountain Pumped Storage	Northfield Mountain Tour and Trail Center	Visitor Center	Constructed	42.6108	72.4716	59 FPC 126 July 5, 1977	Environmental and Educational programs, rentals, video displays

Project No.	Development Name	Recreation Site Name	Recreation Facility/Amenity Type	Facility/ Amenity Status	Latitude	Longitude	FERC Citation & Date	Notes
P-2485	Northfield Mountain Pumped Storage	Northfield Mountain Tour and Trail Center	Interpretive Display	Constructed	42.6108	72.4716	59 FPC 126 July 5, 1977	
P-2485	Northfield Mountain Pumped Storage	Northfield Mountain Tour and Trail Center	Winter Area	Constructed	42.6108	72.4716	59 FPC 126 July 5, 1977	Skiing, cross country skiing, snowshoeing
P-2485	Northfield Mountain Pumped Storage	Barton Cove Nature Area and Campground	Picnic Area	Constructed	42.6040	72.5332	59 FPC 126 July 5, 1977	Approximately 15 tables
P-2485	Northfield Mountain Pumped Storage	Barton Cove Nature Area and Campground	Overlook	Constructed	42.6031	72.5336	59 FPC 126 July 5, 1977	Platform overlooking Barton Cove
P-2485	Northfield Mountain Pumped Storage	Barton Cove Nature Area and Campground	Campground	Constructed	42.5999	72.5440	59 FPC 126 July 5, 1977	Approximately 2 Group sites and 29 camp sites (1 ADA)
P-2485	Northfield Mountain Pumped Storage	Barton Cove Nature Area and Campground	Interpretive Display	Constructed	42.6042	72.5328	59 FPC 126 July 5, 1977	
P-2485	Northfield Mountain Pumped Storage	Barton Cove Nature Area and Campground	Trail	Constructed	N/A	N/A	59 FPC 126 July 5, 1977	Approx. 4,250 feet long nature trail
P-2485	Northfield Mountain Pumped Storage	Barton Cove Canoe and Kayak Rental Area	Picnic Area	Constructed	42.6082	72.5377	103 FERC 62,189 06/30/2003	Approximately 6 tables
P-1889 P-2485	Turners Falls, Northfield Mountain Pumped Storage	Barton Cove Canoe and Kayak Rental Area	Take-out	Constructed	42.6082	72.5375	18 FERC 62,467 03/17/1982	Put-in and take-out counted as 1 canoe portage on Form 80

Project No.	Development Name	Recreation Site Name	Recreation Facility/Amenity Type	Facility/ Amenity Status	Latitude	Longitude	FERC Citation & Date	Notes
P-2485	Northfield Mountain Pumped Storage	Barton Cove Canoe and Kayak Rental Area	Other Use (paddlecraft rentals)	Constructed	42.6082	72.5377	103 FERC 62,189 06/30/2003	Paddlecraft for rent
P-1889	Turners Falls	Gatehouse Fishway Viewing Area	Visitor Center	Constructed	42.6097	72.5542	18 FERC 62,467 03/17/1982	fishway viewing areas
P-1889	Turners Falls	Gatehouse Fishway Viewing Area	Picnic Area	Constructed	42.6088	72.5532	18 FERC 62,467 03/17/1982	Approximately 6 tables
P-1889	Turners Falls	Gatehouse Fishway Viewing Area	Interpretive Sign	Constructed	42.6092	72.5536	18 FERC 62,467 03/17/1982	fish species traveling through fish ladder system
P-1889	Turners Falls	Turners Falls Branch Canal Area	Overlook	Constructed	42.6062	72.5629	18 FERC 62,467 03/17/1982	Approximately 4 benches
P-1889	Turners Falls	Cabot Woods Fishing Access	Picnic Area	Constructed	42.5948	72.5788	18 FERC 62,467 03/17/1982	Approximately 3 tables
P-1889	Turners Falls	Cabot Woods Fishing Access	Access Point	Constructed	42.5950	72.5772	18 FERC 62,467 03/17/1982	Angler access
P-1889	Turners Falls	Turners Falls Canoe Portage	Put-in	Constructed	42.5802	72.5752	18 FERC 62,467 03/17/1982	Poplar Street Access Site



Proposed Project Recreation Sites

1 Munn's Ferry Boat Camping Recreation Area
2 Boat Tour and Riverview Picnic Area
3 Northfield Mountain Tour and Trail Center
4 Barton Cove Campground & Barton Cove Nature Area
5 Barton Cove Canoe and Kayak Rental Area & Turner's Falls Canoe Portage Take-Out
6 Gatehouse Fishway Viewing Area
7 Turners Falls Branch Canal Area
8 Cabot Woods Fishing Access
9 Poplar Street Access & Turner's Falls Canoe Portage Put-In

Legend
- Proposed Project Recreation Sites
- Project Boundary

HINSDALE
VERNON
WINCHESTER
BERNARDSTON
LEYDEN
NORTHFIELD
GILL
GREENFIELD
MONTAGUE
ERVING
WENDELL
DEERFIELD
Turners Falls Canoe Portage Take-Out
Turners Falls Canoe Portage Put-In
1
2
3
4
5
6
7
8
9

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Miles

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

Figure 4.1
Proposed Project Recreation Sites

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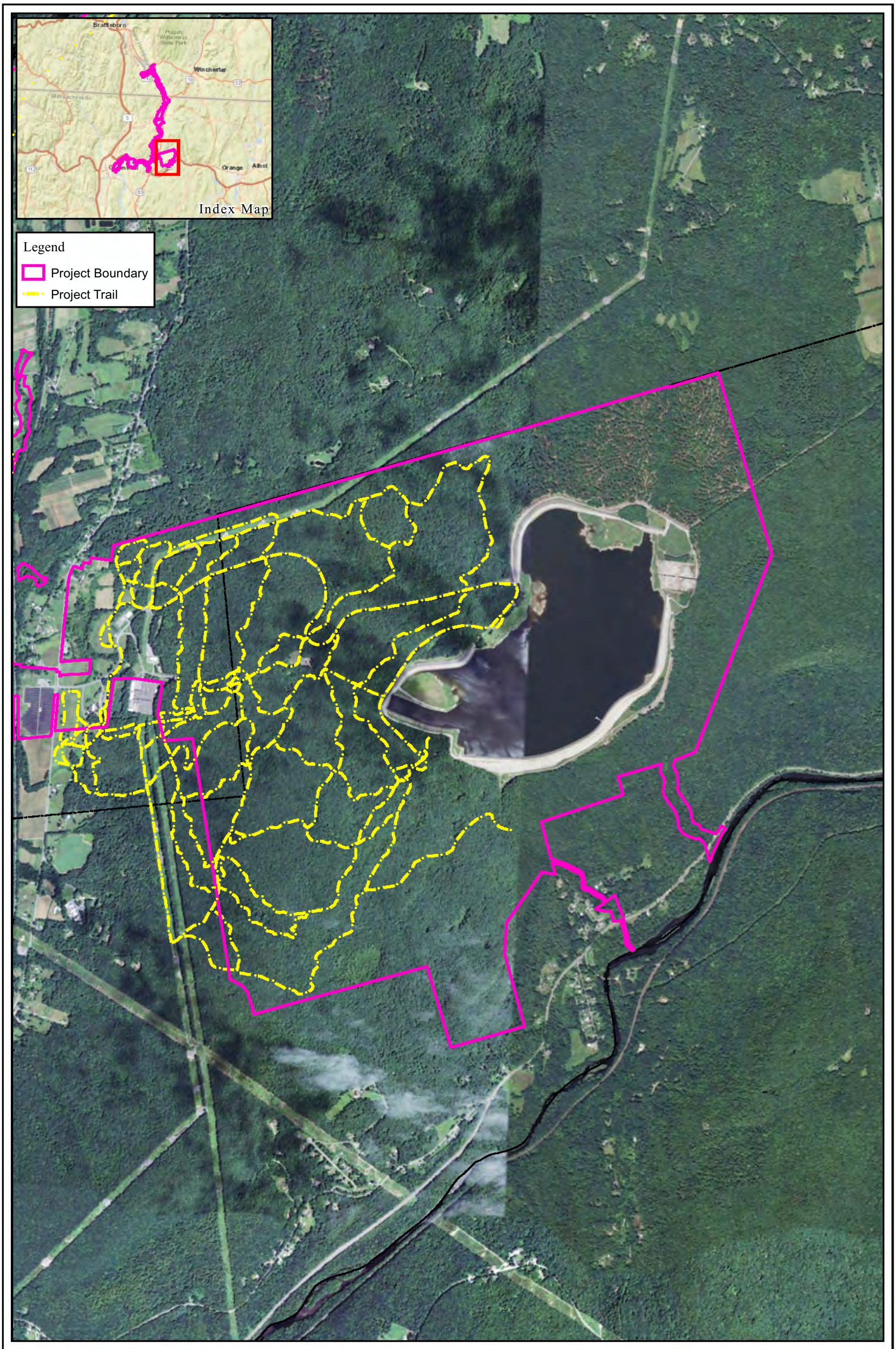

Northfield Mountain Pumped Storage Project (No. 2485)
and Turners Falls Hydroelectric Project (No. 1889)
Recreation Management Plan

Figure 4.1-1
Existing Northfield Mountain Trail System

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5 OTHER RECREATION SITES LOCATED WITHIN THE PROJECT BOUNDARY

The following recreation sites also offer public recreational access and opportunities at the Project (Figure 5-1). The majority of these recreation sites are not owned or maintained by FirstLight but they are located within the Project boundary. Table 5-1 summarizes the existing and proposed Project Recreation sites and facilities, along with these non-Project recreation sites. The sole purpose for identifying these other recreation sites in the RMP is to provide context for the multitude of recreation opportunities available at the Project. As noted earlier, the purpose of the RMP is to guide the Licensee's management and maintenance of the proposed Project Recreation sites identified in Section 4 of the RMP.

5.1 Governor Hunt Boat Launch/Picnic Area

Governor Hunt Boat Launch/Picnic Area is located just downstream of the Vernon Project Dam, and is owned and managed by TransCanada, which owns the Vernon Hydroelectric Project (Project No. 1904). While this site is located within the Project boundary for the Vernon Project, a portion of the site along the shoreline is also located within the existing Project boundary for the Turners Falls and Northfield Mountain Pumped Storage Developments. Recreational facilities at this site include a picnic area, and a single lane, concrete plank boat launch. The picnic area includes picnic tables, grills, and portable toilets (1 ADA accessible). Parking for the site is accommodated by several informal parking areas.

5.2 Pauchaug Wildlife Management Area

The Pauchaug WMA is located on the eastern side of the Connecticut River in Northfield, MA. This WMA is owned and managed by the Massachusetts Department of Fish and Wildlife (MADFW). The WMA is 161 acres and includes the Pauchaug Boat Launch (discussed separately), which is located within the southern portion of the WMA. Not including the boat launch and boat launch parking, the WMA was estimated to be utilized at 1% of capacity based on parking area usage. Aside from the boat launch and associated parking area, there are no recreation facilities or amenities associated with the WMA, nor is there any access to the TFI, other than at the boat launch. The lands associated with WMA and the boat launch are separated by Pauchaug Brook.

5.3 Pauchaug Boat Launch

Pauchaug Boat Launch is located within the Project boundary on the eastern shore of the Connecticut River, in Northfield, MA on the southern side of Pauchaug Brook opposite Pauchaug WMA. The site is owned and operated by the MADFW. Facilities at this site include a hard surface boat launch with two launching lanes, parking, informational signage, and a portable toilet. The parking lot is delineated by curbing and can accommodate approximately 32 vehicles with trailers. The site is open to the public free of charge, year-round.

5.4 Bennett Meadow Wildlife Management Area

The Bennett Meadow WMA is located on the west side of the Connecticut River, just south of the Route 10 Bridge in Northfield, MA. Bennett Meadow WMA is primarily managed as a wildlife management area by the MADFW. The site does not have formal recreation facilities or provide access to Project waters, but offers day use recreation opportunities such as hunting, walking, and hiking on the existing agricultural roads. There is an active farming operation on the site that is used to enhance the area for wildlife. The parking area at the site is an open flat area with no delineation or curbing and is partially covered in grass. The site is intended for day use and is open year round from dusk to dawn.

5.5 Cabot Camp Access Area

This area is located on land owned by the Licensee within the Project boundary at the end of Mineral Road in Montague, MA. While there is a parking area at the site that originally served other purposes, the public currently utilizes the parking area in order to fish from the river bank. The parking area is approximately 100 feet by 45 feet and provides parking for approximately 15 vehicles. There are no recreation facilities at the site.

5.6 State Boat Launch

The State Boat Launch is located upstream of the Turners Falls Dam off of Route 2 in Gill. A portion of this site is within the Project boundary. A portion of this site is owned by the Licensee, and a portion is owned by the Commonwealth of Massachusetts. The boat launch is managed by the Commonwealth of Massachusetts, and is open to the public free of charge.

There is a hard surface boat ramp with two launching lanes, a dock and portable sanitation facility (seasonal) at the site. There is a parking lot, which is delineated for vehicles with trailers. There is also ADA parking for a vehicle and trailer, along with a single vehicle ADA parking space. Hours of operation are from 4:00 am to 10:00 pm, although exceptions can be made by special permit. The launch is closed during the winter, typically November through March.

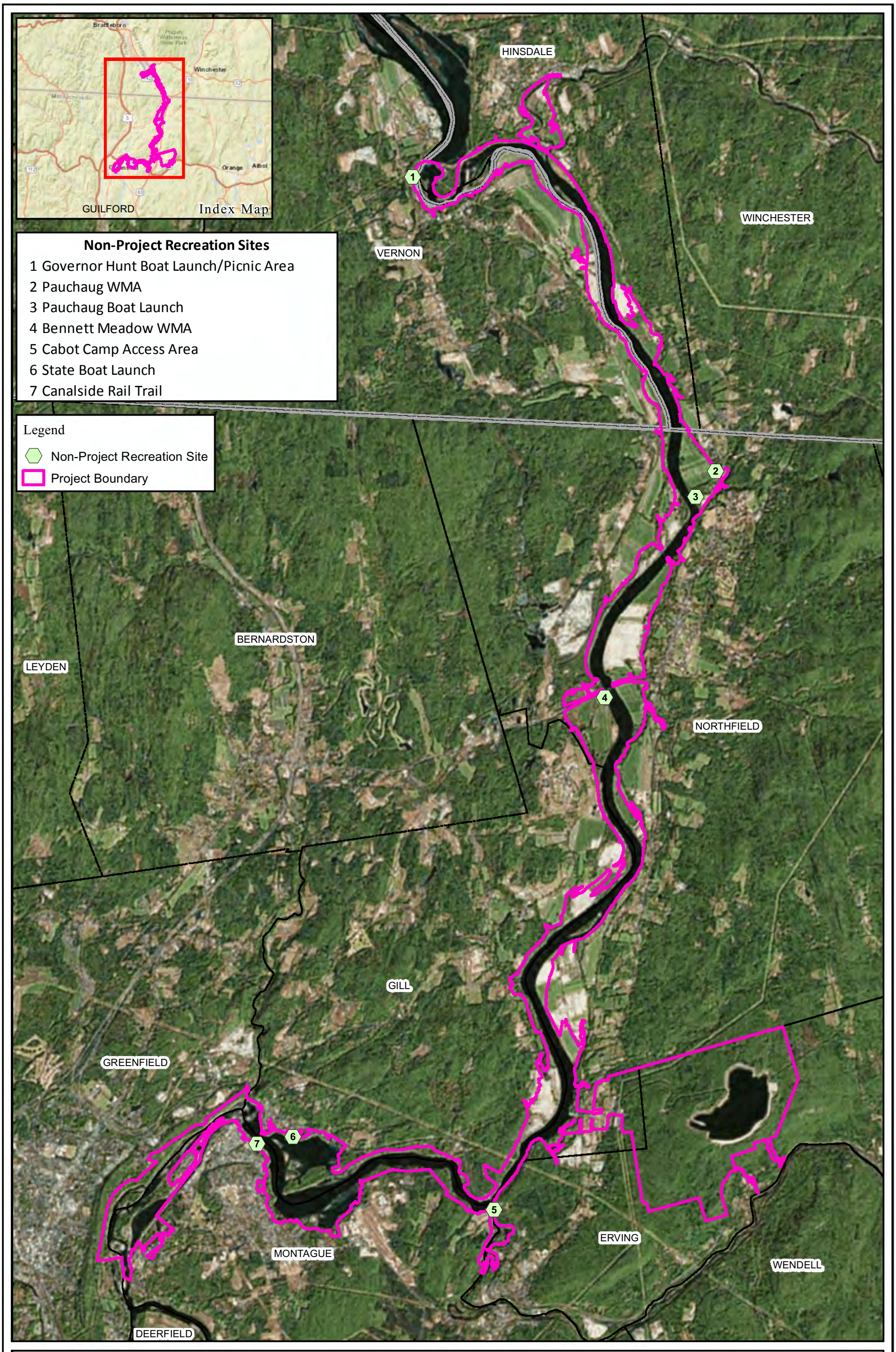
5.7 Canalside Rail Trail

This hard surface trail begins within Unity Park and ends at McClelland Farm Road in northeast Deerfield, MA. The trail is 3.27 miles long, with approximately 1.5 miles within the Project boundary. The portions of trail located within the Project run along the Turners Falls Power Canal in Montague, MA, and along the Connecticut River within Unity Park. The trail is on property currently owned by FirstLight but is leased to and managed by the Massachusetts Department of Conservation and Recreation. The Canalside Rail Trail is open year-round for non-motorized public use, although the trail is not maintained in the winter.

Table 5-1: Summary of Proposed Project and Non-Project Recreation Sites

Recreation Site Name	Existing Project Recreation (Commission-Approved) Site	Existing Non-Project Recreation Site	Proposed Project Recreation Site	Proposed Non-Project Recreation Site
Governor Hunt Boat Launch		✓		✓
Bennett Meadow Wildlife Management Area	✓			✓
Pauchaug Wildlife Management Area		✓		✓
Pauchaug Boat Launch		✓		✓
Cabot Camp Access Area		✓		✓
Munn's Ferry Boat Camping Area	✓		✓	
Boat Tour and Riverview Picnic Area	✓		✓	
Northfield Mountain Trail and Tour Center	✓		✓	
Barton Cove Nature Area and Campground	✓		✓	
Barton Cove Canoe and Kayak Rental Area	✓		✓	
Gatehouse Fishway Viewing Area	✓		✓	
Turners Falls Branch Canal Area	✓		✓	
Cabot Woods Fishing Access	✓		✓	
Turners Falls Canoe Portage	✓		✓	
Poplar Street Access		✓	✓	
State Boat Launch		✓		✓

Recreation Site Name	Existing Project Recreation (Commission-Approved) Site	Existing Non-Project Recreation Site	Proposed Project Recreation Site	Proposed Non-Project Recreation Site
Canalside Trail Bike Path		✓		✓
Station No. 1 Fishing Access		✓		✓



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

Figure 5-1
Non-Project Recreation Sites

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6 MANAGEMENTAND MAINTENANCE MEASURES FOR PROJECT RECREATION SITES

The Licensee will continue to operate and maintain the proposed Project Recreation sites, as well as the new Project Recreation site at Poplar Street. Table 6-1 identifies the amenities at each Project Recreation site that are governed by the management and maintenance measures discussed herein.

6.1 Access Roads and Parking Areas

Access roads and parking areas with paved surfaces will be reviewed prior to the beginning of the summer recreation season and periodically over the course of the operating season. If an issue with the condition of a road or paved surface is noted, a plan to repair the road will be developed and action will be taken. If the road condition is unsafe it will be closed until repairs can be made.

Access roads and parking areas with gravel surfaces will be reviewed prior to the beginning of the summer recreation season and reviewed periodically over the course of the operating season. If an issue with the condition of a road or parking area is noted, a plan to repair the road will be developed and action will be taken. If the road condition is unsafe it will be closed until repairs can be made.

6.2 Boat Docks

Prior to installation, boat docks will be inspected. The inspection will include the access ramp, deck surface, hardware and other components. If a problem is noted, plans to repair or replace the dock will be developed and implemented. Docks will be periodically inspected during the operating season.

6.3 Picnic Areas

Picnic areas will be reviewed prior to the beginning of the summer recreation season to assure that the sites are free of debris. Amenities such as picnic tables, grills, and benches will be reviewed for vandalism and condition prior to opening of the sites. Excess vegetation will be removed as needed. If an issue with the amenities arises, a plan to repair or replace the amenity will be developed and implemented. If recreationists note an issue at a facility, an inspection will occur to determine if actions are needed.

6.4 Campsites

Campsites will be reviewed prior to opening to assure that the sites are free of debris. Amenities such as picnic tables, grills, and fire rings will be reviewed for vandalism and condition prior to opening of the sites. Excess vegetation will be removed as needed. If an issue with the amenities arises, a plan to repair or replace the amenity will be developed and implemented. If recreationists note an issue at a facility, an inspection will occur to determine if actions are needed.

6.5 Restrooms

Project Recreation Sites containing restroom facilities will be inspected prior to opening to assure that they are clean and functioning properly. These facilities will be maintained on a regular basis. Vault toilets and portable restroom facilities will be pumped out as necessary to maintain sanitary conditions. If a problem with the structure or facility is noted it may be closed to execute needed repairs. Restrooms will be inspected on a routine basis and repairs or maintenance will be performed as issues arise.

6.6 Shower Facilities

Shower facilities will inspected prior to opening to assure that they are clean and functioning properly. These facilities will be maintained on a regular basis and will be inspected on a routine basis. Repairs or

maintenance will be performed as issues arise. If a problem with the structure or facility is noted it may be closed to execute needed repairs.

6.7 Signs

All Part 8 and public safety signs at recreation sites will be inspected and repaired prior to the beginning of the summer recreation season. This inspection will include the condition of the sign and a review of presented information to assure that is appropriate and legible. If an issue with the sign is noted or reported the sign will be scheduled for repair or replacement.

6.8 Buildings and Other Structures

Buildings and other structures that are part of the Project Recreation Sites will be maintained and cleaned on a regular basis during the operating season. Structures will be inspected annually and if a structure requires repair, it may be closed until the repairs are complete.

6.9 Trails

The NMTTC trail system will be monitored and reviewed on a routine basis to determine if there is a need for maintenance to the trail tread or drainage, as well as the need for trail clearing or grading. The trail system will be routinely inspected for potential damaged or hazard trees. If an issue is reported or observed, a plan to correct the issue will be developed and implemented. The trail system will be groomed as appropriate during winter months for cross country skiing.

The Barton Cove Nature Trail will be reviewed on a routine basis to determine if there is a need for maintenance to the trail tread or drainage. The trail will also be reviewed to determine the need for trail clearing. The trail will be inspected for potential damaged or hazard trees routinely. If a tree is a safety concern or an issue with the trail is reported, a plan to correct the issue will be developed and implemented.

Informal fishing access trails at Cabot Woods Fishing Access will be reviewed on an annual basis to determine if there are existing safety hazards. If an issue is observed the Licensee will establish a plan to correct the issue and execute the plan.

6.10 Quinnetukut II Riverboat

The QII will be maintained and operated in accordance with Federal (including U.S. Coast Guard), State, and Local, laws and regulations.

Table 6-1: Amenities at Proposed Project Recreation Sites to which Management and Maintenance Measures Apply

Proposed Project Recreation Site	Management and Maintenance Measures									
	Access Roads and Parking Areas	Boat Docks	Picnic Areas	Campsites	Restrooms	Shower Facilities	Signs	Buildings and Other Structures	Trails	Riverboat
Munn's Ferry Boat Camping Recreation Area		✓	✓	✓	✓		✓	✓		
Boat Tour and Riverview Picnic Area	✓	✓	✓		✓		✓	✓		✓
Northfield Mountain Tour and Trail Center	✓		✓		✓		✓	✓	✓	
Barton Cove Nature Area and Campground	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Barton Cove Canoe and Kayak Rental Area	✓		✓				✓	✓		
Gatehouse Fishway Viewing Area	✓		✓		✓		✓	✓		
Turners Falls Branch Canal Area										
Cabot Woods Fishing Access	✓						✓		✓	
Turners Falls Canoe Portage	✓						✓		✓	
Poplar Street Access Area	✓						✓	✓		

7 COSTS AND FEES

7.1 Costs

7.1.1 Capital Costs

The Licensee anticipates that the proposed improvements to the Poplar Street Access will cost approximately $70,000.

7.1.2 Operation and Maintenance Costs

The Licensee will continue to operate and maintain the Project Recreation Sites over the term of the new license. It is anticipated that operating and maintaining these sites will cost an estimated $975,000 (2016 dollars) annually and will increase over the term of the license due to inflation.

7.2 Fees

FERC allows the Licensee to collect fees at Project Recreation Sites to help defray the cost of constructing, operating, and maintaining such facilities. The Licensee currently charges a fee for overnight camping, canoe and kayak rentals, cross country skiing, rides on the QII, and some of the environmental programs. The 2016 fee schedule is provided in Table 7.2-1. These fees are used to offset operating and maintenance costs at the Project Recreation Sites; however, they do not cover all expenses incurred by the Licensee in operating and maintaining the Project Recreation Sites. The Licensee will continue to charge fees for certain amenities or activities. Over the term of the new license, the Licensee may choose to implement reasonable fee changes to offset rising costs in labor and utilities; changes in operation; or to offset the costs of capital recreation investments.

Table 7.2-1: 2016 Project Recreation Site Fees

Project Recreation Site	Amenity/Activity	2016 Fee
Munn's Ferry Boat Camping Recreation Area	Camping - Tent Site	$22/night
	Camping - Adirondack Shelter	$30/night
Northfield Mountain Center	Yurt Rental	$100 plus $100 refundable cleaning/damage deposit
	Visitor Center Auditorium	$150 plus $100 refundable cleaning/damage deposit
	Winter Use Trail Fees	Adult $12/day $10 after 1:30pm Senior $11/day $9 after 1:30pm Junior $8/day $6 after 1:30pm Under 7/over 70 Free
	Ski and Snowshoe Rentals	Adult $18/day $16 after 1:30pm Junior $12/day $10 after 1:30pm Skate skis $24/day $20 after 1:30pm
Riverview Picnic Area	Picnic Pavilion Rental	$200/day plus $100 refundable cleaning/damage deposit
	QII Boat Tour	Adults $12 Seniors $11 Children $6 Groups of 15 or more $10/person Charter $375 Charter and Pavilion Rental $575
Barton Cove Campground	Camping - Tent Site	$22/night
	Camping - Group Site #1	$60/night

Project Recreation Site	Amenity/Activity	2016 Fee
	Camping - Group Site #2	$40/night
Barton Cove Canoe and Kayak	Canoe/Kayak Rental	0-2 hours $25 $40/day

8 SCHEDULE AND REPORTING

8.1 Schedule

The proposed improvements to the Poplar Street Access Site will be completed during the second calendar year following the effective date of the new License.

8.2 Recreation Use Reporting

Monitoring of recreation use at Project facilities will be conducted every six years in accordance with the FERC Form 80 schedule. Information regarding the amount of use and capacity at Project recreation facilities, costs for supporting the facilities and collected fees will be reported on the FERC Form 80 for this Project. This information will be compared to the two previous Form 80s to identify any change in the amount of use at Project recreation facilities.

9 MODIFICATIONS TO RMP

Over the term of the new license, proposed modifications to the RMP will be submitted to the appropriate agencies for review and comment prior to submittal to FERC. If it is determined over the course of the license that additional recreational facilities are to be developed to address increased demand or changing needs, plans will be submitted to FERC for approval prior to construction. These plans will include drawings of the proposed facility, consultation documentation, and a schedule for construction. As-built drawings will be provided after completion of the facility.

10 LITERATURE CITED

FirstLight (2014). Initial Study Report Summary Relicensing Study 3.6.2 Recreation Facilities Inventory and Assessment. Prepared for FirstLight Hydro Generating Company.

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FirstLight. (2015c). Relicensing Study 3.6.4 Assessment of Day Use and Overnight Facilities Associated with Non-Motorized Boats for Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889). Prepared for FirstLight Power Resources. Northfield, MA: FirstLight.

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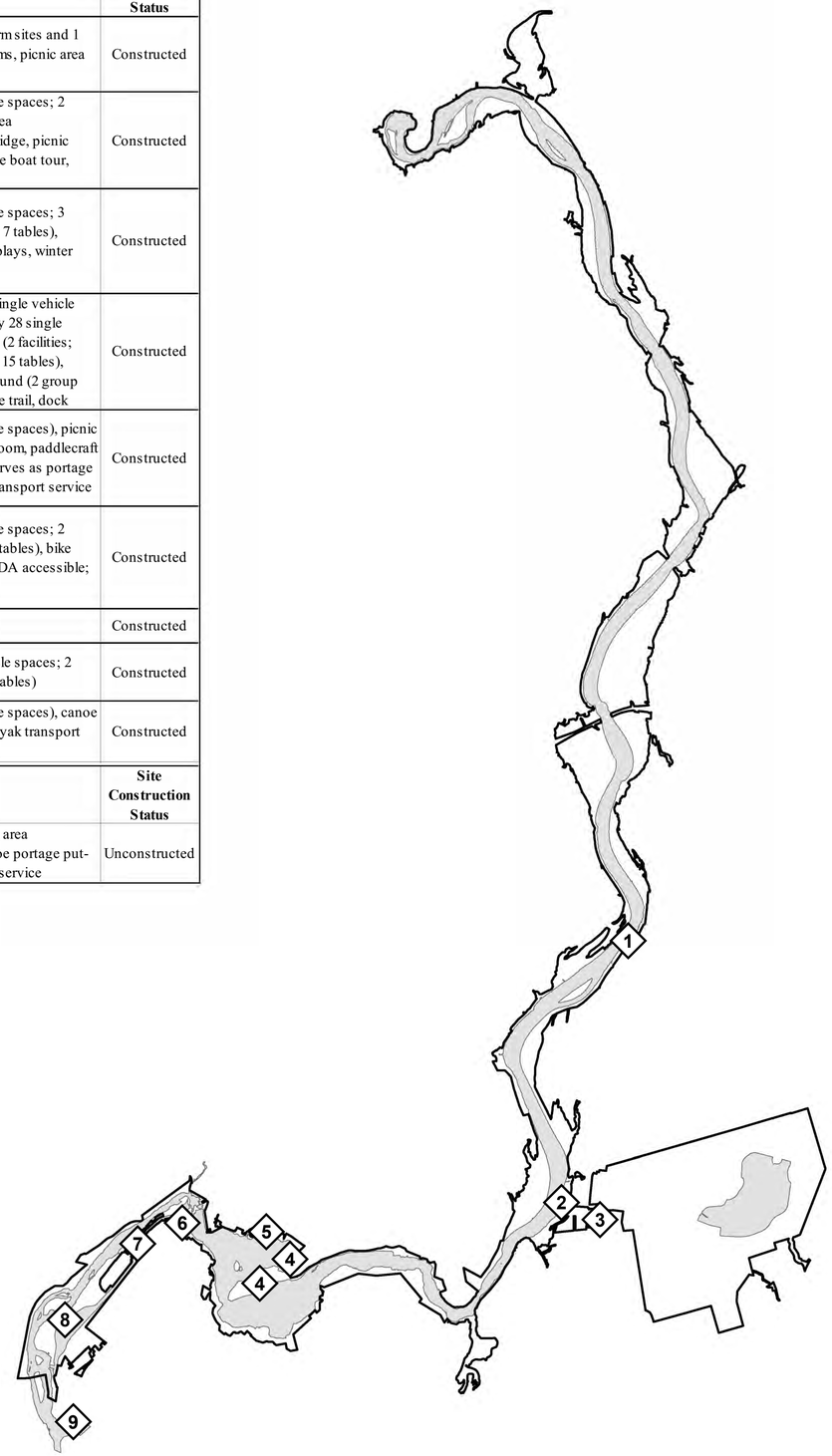
APPENDIX A – PROJECT RECREATION SITE AS-BUILT DRAWINGS

Identification	Drawing Name	Recreation Site Name	Recreation Facilities/Amenities	Site Construction Status
1	R-1	Munn's Ferry Boat Camping Recreation Area	water Access only campsites (4 Tent platform sites and 1 shelter site), pedestrian foot bridge, restrooms, picnic area (1 table), dock	Constructed
2	R-2	Boat Tour and Riverview Picnic Area	parking area (approximately 54 single vehicle spaces; 2 ADA), restroom (ADA compliant), picnic area (approximately 12 tables), pedestrian foot bridge, picnic pavilion (approximately 8 tables), interpretive boat tour, dock	Constructed
3	R-3A & R-3B	Northfield Mountain Tour and Trail Center	parking area (approximately 50 single vehicle spaces; 3 ADA), restroom , picnic area (approximately 7 tables), overlook, visitor center and interpretive displays, winter area, trail system	Constructed
4	R-4	Barton Cove Nature Area and Campground	nature area parking area (approximately 26 single vehicle spaces), campground parking (approximately 28 single vehicle spaces), showers, restroom facilities (2 facilities; ADA compliant), picnic area (approximately 15 tables), overlook, interpretive sign, walk-in campground (2 group sites; 28 campsites, 1 ADA campsite), nature trail, dock	Constructed
5	R-5	Barton Cove Canoe and Kayak Rental Area/Turners Falls Canoe Portage	parking area (approximately 28 single vehicle spaces), picnic area (approximately 6 tables), seasonal restroom, paddlecraft rental service, canoe put-in and take-out (serves as portage take-out), on-call vehicular canoe &kayak transport service	Constructed
6	R-6	Gatehouse Fishway Viewing Area	parking area (approximately 27 single vehicle spaces; 2 ADA spaces) , picnic area (approximately 6 tables), bike rack, trail, fishway viewing visitor center (ADA accessible; restrooms), interpretive sign	Constructed
7	R-7	Turners Falls Branch Canal Area	overlook (approximately 4 benches)	Constructed
8	R-8A & R-8B	Cabot Woods Fishing Access	parking areas (approximately 17 single vehicle spaces; 2 ADA spaces), picnic area (approximately 3 tables)	Constructed
9	R-9A	Poplar Street Access/ Turners Falls Canoe Portage	parking area (approximately 16 single vehicle spaces), canoe portage put-in, on-call vehicular canoe & kayak transport service	Constructed

Identification	Drawing Name	Recreation Site Name	Proposed Facilities	Site Construction Status
9	R-9B	Poplar Street Access/ Turners Falls Canoe Portage	Portage trail metal stairs, canoe slide, parking area (approximately 16 single vehicle spaces), canoe portage put-in, on-call vehicular canoe & kayak transport service	Unconstructed



Legend

- Recreation Sites
- Water Area
- Project Boundary

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

N

FirstLight Hydro Generating Company

PROJECT OVERVIEW

NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

0 2,000 4,000 8,000 12,000 16,000 Feet

EXHIBIT R-0 1 inch = 4,000 feet 1:48,000

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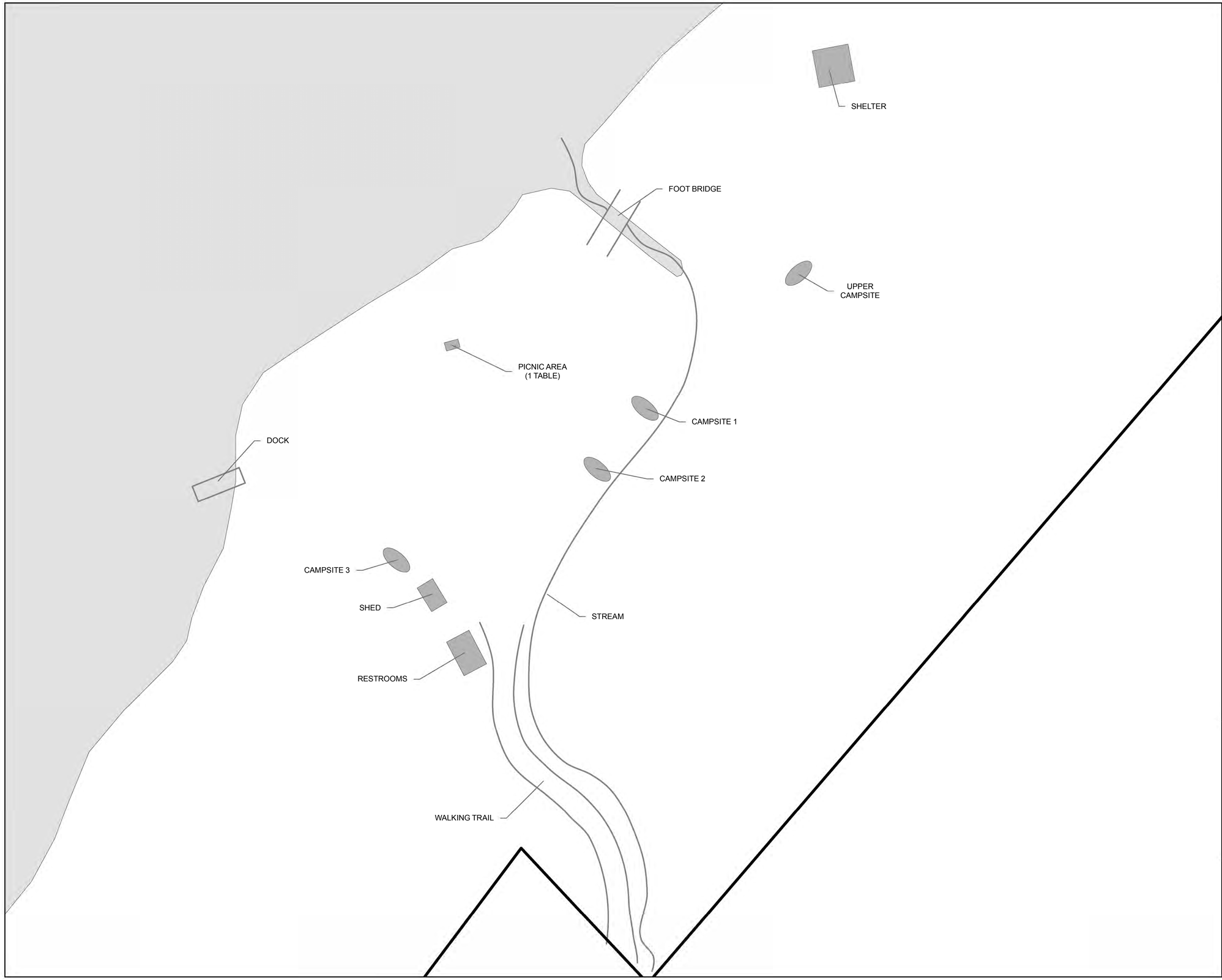
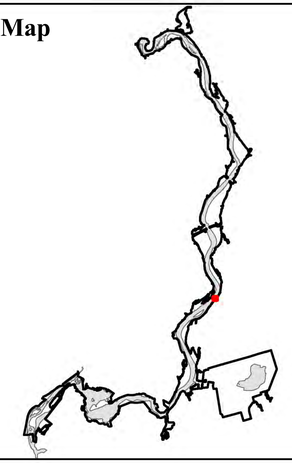


Index Map



Legend

Water

Project Boundary

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

N

FirstLight Hydro Generating Company

MUNN'S FERRY BOAT CAMPING RECREATION AREA

AS-BUILT

NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

0 10 20 40 60 80 Feet

EXHIBIT R-1 1 inch = 20 feet 1:240

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PICNIC PAVILION

OPEN AREA

PARKING AREA

GATE

PINE MEADOW ROAD

FOOT BRIDGE

RESTROOM (ADA)

PICNIC AREA

GATE

WALKING TRAIL

DOCK

PICNIC AREA

PICNIC TABLES

STREAM

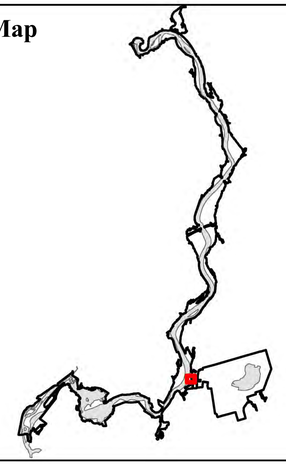
PARKING AREA

FERRY ROAD

GATE

BUILDING

Index Map



Legend

- Amenities Areas
- Water Areas

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

N

FirstLight Hydro Generating Company

BOAT TOUR AND RIVERVIEW PICNIC AREA

AS-BUILT

NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

0 25 50 100 150 200 Feet

EXHIBIT R-2 1 inch = 50 feet 1:600

W:\gis\studies\RMP\maps\22_x_34_RMP_EX_R_2_Riverview_Site_Plan.mxd

PROJECT BOUNDARY

MAINTENANCE ROAD

UPPER RESERVOIR

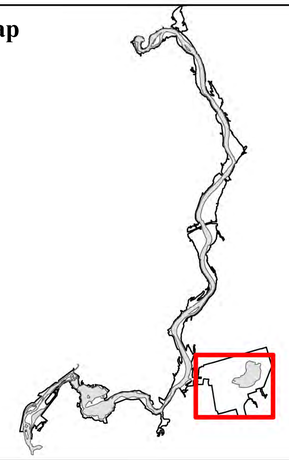
VISITORS CENTER

OVERLOOK

TRAIL SYSTEM

LOCATION APPROXIMATE

Index Map



Legend

- Trail
- Water Area
- Project Boundary

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

N

Note: Winter area consists of the trail system and visitor center.

FirstLight Hydro Generating Company

NORTHFIELD MOUNTAIN TOUR AND TRAIL CENTER

AS-BUILT

NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889
SHEET 1 of 2

0 20 40 80 120 160 Feet

EXHIBIT R-3A 1 inch = 500 feet 1:6,000

W:\gis\studies\RMP\maps\22_x_34_RMP_EX_R_3A_Northfield_Mtn_Site_Plan.mxd

ROUTE 63

ROADWAY

GATE

PROJECT BOUNDARY

ASPHALT PARKING AREA

PAVED ADA PARKING

PAVED ADA WALKWAYS

DECK

STAIRS

VISITORS CENTER

YURT

PAVED ADA WALKWAYS

PAVED ADA WALKWAYS

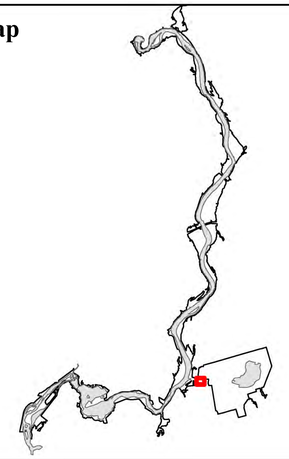
PICNIC TABLES

PICNIC AREA (7 TOTAL)

POND

BUS & HORSE TRAILER PARKING

Index Map



Legend

- Trail
- Water
- Project Boundary

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

N

FirstLight Hydro Generating Company

NORTHFIELD MOUNTAIN TOUR AND TRAIL CENTER

AS-BUILT

NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 2 of 2

0 25 50 100 150 200 Feet

EXHIBIT R-3B 1 inch = 50 feet 1:600

W:\gis\studies\RMP\maps\22_x_34_RMP_EX_R_3B_Northfield_Mtn_Site_Plan.mxd

BARTON COVE

INTERPRETIVE SIGN

NATURE AREA
PARKING AREA

RESTROOM/
SHOWER HOUSE

DOCK

PICNIC TABLES

PICNIC AREA

INFORMAL
LAUNCH

OVERLOOK

GATE

PARKING FOR
CAMPERS

PARKING
AREA

NATURE TRAIL

GATE

RESTROOM

GROUP SITES

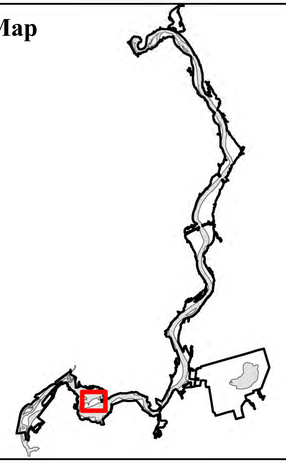
CAMPSITE

RESTROOM

CAMPSITE

CONNECTICUT RIVER

Index Map



Legend

- Water Area
- Project Boundary
- Campsite

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

N

FirstLight Hydro Generating Company

BARTON COVE NATURE AREA AND CAMPGROUND

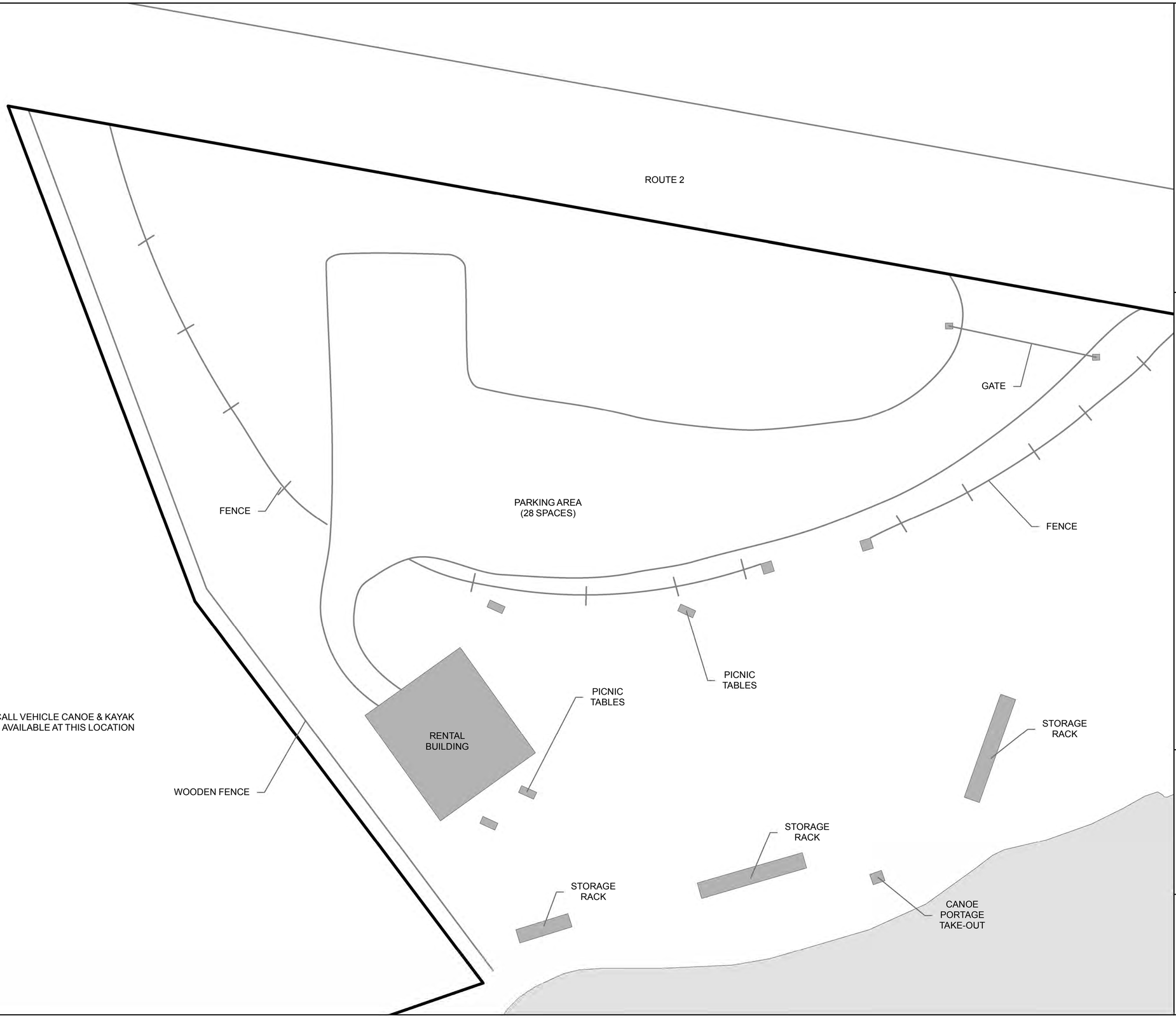
AS-BUILT

NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

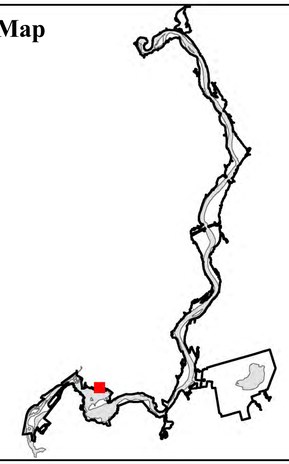
0 75 150 300 450 600 Feet

EXHIBIT R-4 1 inch = 150 feet 1:1,800

W:\gis\studies\RMP\maps\22_x_34_RMP_EX_R_4_Barton_Cove_Campground_Site_Plan.mxd



Index Map



Legend

- Water Area
- Project Boundary

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

N

FirstLight Hydro Generating Company

BARTON COVE CANOE AND KAYAK RENTAL AREA/
TURNERS FALLS CANOE PORTAGE
AS-BUILT

NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

0 5 10 20 30 40 Feet

EXHIBIT R-5 1 inch = 17.448404 feet 1:209

W:\gis\studies\RMP\maps\22_x_34_RMP_EX_R_5_Barton_Cove_Canoe_Kayak_Site_Plan.mxd

FISHWAY

FISHWAY VIEWING BUILDING (ADA AND RESTROOMS)

BIKE RACK

PICNIC TABLES

PARKING AREA (2 ADA SPACES)

BIKE TRAIL

PARKING AREA

AVENUE A

1ST STREET

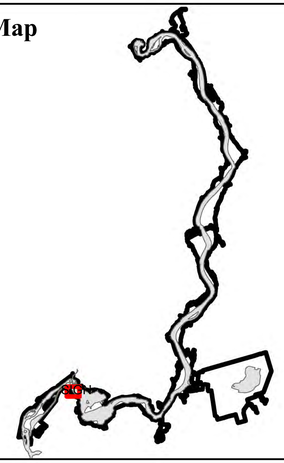
2ND STREET

3ND STREET

L STREET

WILLIAM WAY

Index Map



Legend

Water Ares

Project Boundary

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

N

FirstLight Hydro Generating Company

GATEHOUSE FISHWAY VIEWING AREA

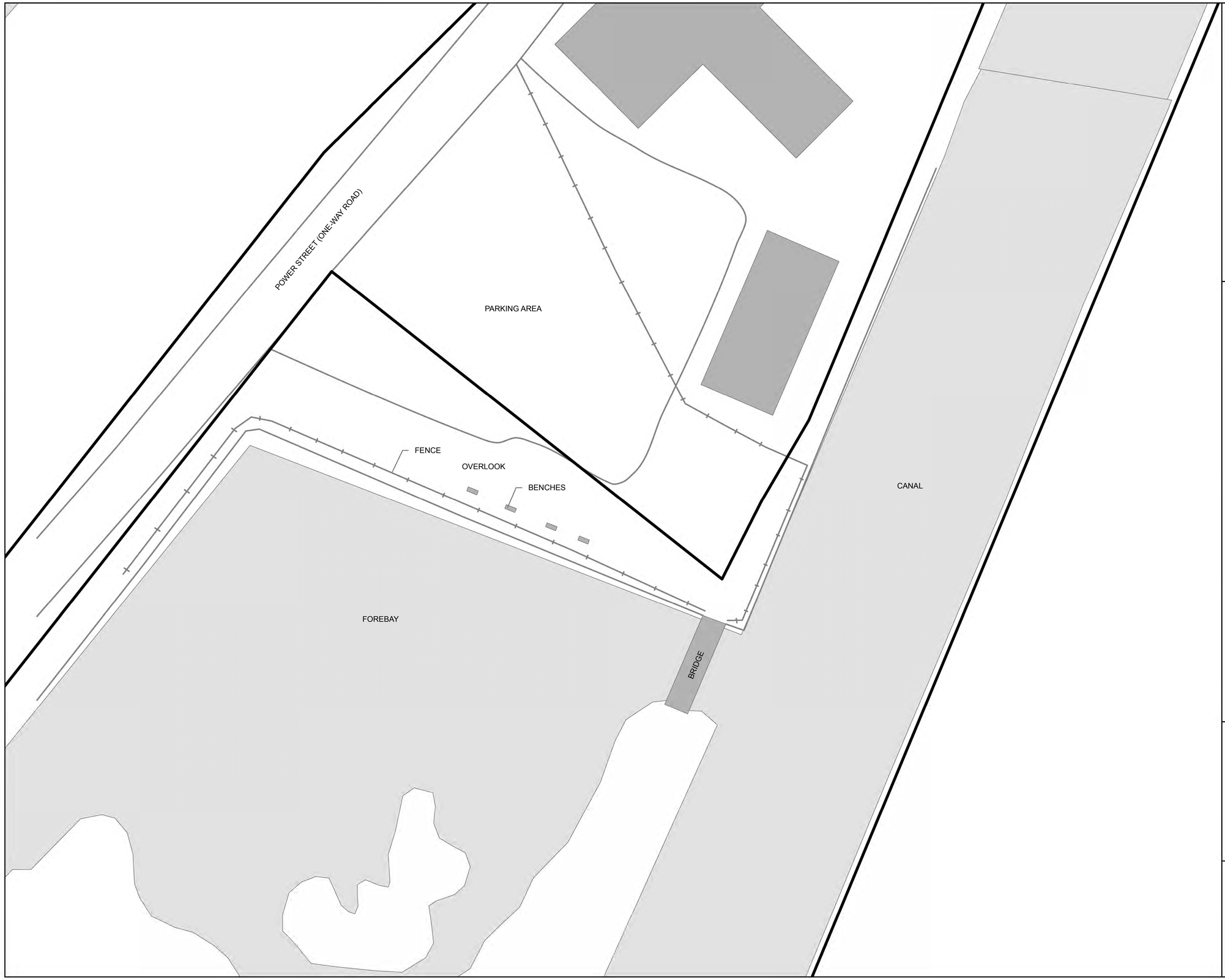
AS-BUILT

NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

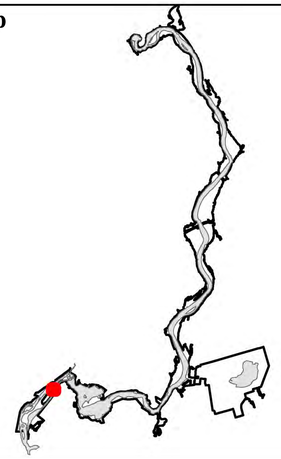
0 40 80 160 240 320 Feet

EXHIBIT R-6 1 inch = 80.506376 feet 1:966

W:\gis\studies\RMP\maps\22_x_34_RMP_EX_R_6_Gatehouse_Fishway_Viewing_Area_Site_Plan.mxd



Index Map



Legend

- Water Area
- Project Boundary

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

N

FirstLight Hydro Generating Company

TURNERS FALLS BRANCH CANAL AREA

AS-BUILT

NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

0 15 30 60 90 120 Feet

EXHIBIT R-7 1 inch = 30 feet 1:360

W:\gis\studies\RMP\maps\22_x_34_RMP_EX_R_7_Branch_Canal_Site_Plan.mxd

15TH STREET

G STREET

GATE

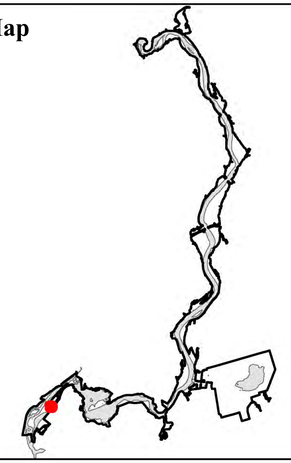
ADA
PARKING
AREA

ASPHALT PARKING

CANAL

LOWER LOT 3,100 FT SOUTH

Index Map



Legend

Water Area

Project Boundary

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

N

FirstLight Hydro Generating Company

CABOT WOODS FISHING ACCESS

AS-BUILT

NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889
SHEET 1 OF 2

0 5 10 20 30 40 Feet

EXHIBIT R-8A 1 inch = 15 feet 1:180

W:\gis\studies\RMP\maps\22_x_34_RMP_EX_R_8A_Cabbot_Woods_Upper_Fishing_Site_Plan.mxd

Connecticut River

UPPER PARKING AREA
3,100 FT NORTH

TRANSMISSION CORRIDOR

PICNIC TABLE

WALKING TRAIL
ENTERANCE

WALKING PATH

PARKING AREA

PICNIC TABLE

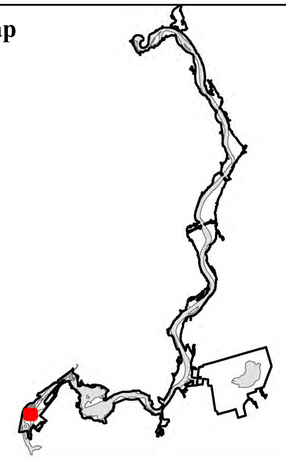
PICNIC TABLE

MIGRATORY WAY

CANAL

FENCE

Index Map



Legend

Water

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

N

FirstLight Hydro Generating Company

CABOT WOODS FISHING ACCESS

AS-BUILT

NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889
SHEET 2 OF 2

0 20 40 80 120 160 Feet

EXHIBIT R-8B 1 inch = 40 feet 1:480

W:\gis\studies\RMP\maps\22_x_34_RMP_EX_R_8B_Cabbot_Woods_Fishing_Site_Plan.mxd

POPLAR STREET

PRIVATE HOME

GATE

GRASSY OPEN SPACE

NOTE: BIKE TRAIL IS NOT ASSOCIATED WITH AS-BUILT REC SITE

COMPACTED GRAVEL PARKING AREA

BIKE TRAIL BRIDGE

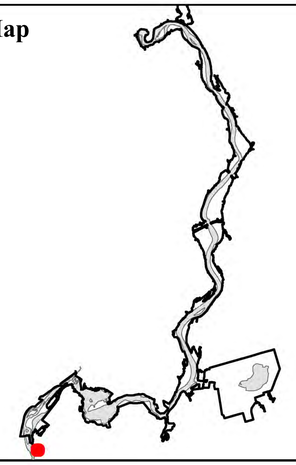
PUT-IN

PRIVATE PROPERTY

NOTE: VEHICULAR PORTAGE IS PROVIDED BY THE LICENSEE TO THIS PUT-IN LOCATION

RIVER

Index Map



Legend

Water Area

Project Boundary

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

N

FirstLight Hydro Generating Company

POPLAR STREET ACCESS SITE/
TURNERS FALLS CANOE PORTAGE
AS-BUILT

NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

0 10 20 40 60 80 Feet

EXHIBIT R-9A 1 inch = 20 feet 1:240

W:\gis\studies\RMP\maps\22_x_34_RMP_EX_R_9A_Poplar_Street_Access_Site_Plan.mxd

POPLAR STREET

PRIVATE HOME

GRASSY OPEN SPACE

GATE

NOTE: BIKE TRAIL IS NOT ASSOCIATED WITH AS-BUILT REC SITE

COMPACTED GRAVEL PARKING AREA

CANOE SLIDE

BIKE TRAIL BRIDGE

PRIVATE PROPERTY

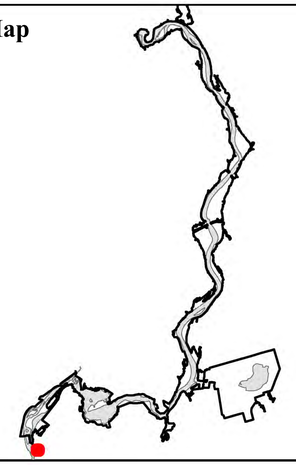
PORTAGE TRAIL METAL STAIRS

NOTE: VEHICULAR PORTAGE IS PROVIDED BY THE LICENSEE TO THIS PUT-IN LOCATION

10' CONCRETE PLANKS

RIVER

Index Map



Legend

Water Area

Project Boundary

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

N

FirstLight Hydro Generating Company

POPLAR STREET ACCESS SITE/
TURNERS FALLS CANOE PORTAGE
CONCEPT DESIGN

NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

0 10 20 40 60 80 Feet

EXHIBIT R-9B 1 inch = 20 feet 1:240

W:\gis\studies\RMP\maps\22_x_34_RMP_EX_R_9B_Poplar_Street_Access_Site_Plan.mxd

Final Application for New License for Major Water Power Project – Existing Dam

Northfield Project

Northfield Mountain Pumped Storage Project (FERC Project Number 2485)
Turners Falls Hydroelectric Project (FERC Project Number 1889)

EXHIBIT G- PROJECT BOUNDARY MAPS

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXHIBIT G – PROJECT BOUNDARY MAPS

The following excerpt from the Code of Federal Regulations (CFR) at 18 CFR § 4.41(h) describes the required content of this Exhibit.

Exhibit G is a map of the project that must conform to the specifications of § 4.39. In addition to the other components of Exhibit G, the applicant must provide the project boundary data in a georeferenced electronic format - such as ArcView shape files, GeoMedia files, MapInfo files, or any similar format. The electronic boundary data must be potentially accurate to ± 40 ft, in order to comply with the National Map Accuracy Standards for maps at a 1:24,000 scale (the scale of the USGS quadrangle maps). The electronic exhibit G data must include a text file describing the map projection used (i.e., UTM, State Plane, Decimal Degrees, etc.), the map datum (i.e., North American 27, North American 83, etc.) and the units of measurement (i.e., feet, meters, miles, etc.). Three sets of the maps must be submitted on CD or other appropriate electronic media. If more than one sheet is used, for the paper maps, the sheets must be numbered consecutively, and each sheet must bear a small insert sketch showing the entire project and indicating that portion of the project depicted on that sheet. Each sheet must contain a minimum of three known reference points. The latitude and longitude coordinates, or state plane coordinates, of each reference point must be shown. If at any time after the application is filed there is any change in the project boundary, the applicant must submit, within 90 days following the completion of project construction, a final Exhibit G showing the extent of such changes. The map must show:

(1) Location of the project and principal features. The map must show the location of the project as a whole with reference to the affected stream or other body of water and, if possible, to a nearby town or any other permanent monuments or objects, such as roads, transmissions lines or other structures, that can be noted on the map and recognized in the field. The map must also show the relative locations and physical interrelationships of the principal project works and other features described under paragraph (b) of this section (Exhibit A).

(2) Project Boundary. The map must show a project boundary enclosing all project works and other features described under paragraph (b) of this section (Exhibit A) that are to be licensed. If accurate survey information is not available at the time the application is filed, the applicant must so state, and a tentative boundary may be submitted. The boundary must enclose only those lands necessary for operation and maintenance of the project and for other project purposes, such as recreation, shoreline control, or protection of environmental resources (see paragraph (f) of this section (Exhibit E)). Existing residential, commercial, or other structures may be included within the boundary only to the extent that underlying lands are needed for project purposes (e.g., for flowage, public recreation, shoreline control, or protection of environmental resources). If the boundary is on land covered by a public survey, ties must be shown on the map at sufficient points to permit accurate platting of the position of the boundary relative to the lines of the public land survey, the best available legal description of the position of the boundary must be provided, including distances and directions from fixed monuments or physical features.

The boundary must be described as follows:

(i) Impoundments.
(A) The boundary around a project impoundment must be described by one of the following:
(1) Contour lines, including the contour elevation (preferred method);
(2) Specified courses and distances (meets and bounds);
(3) If the project lands are covered by a public land survey, lines upon or parallel to the lines of the survey; or
(4) Any combination of the above methods.

(B) The boundary must be located no more than 200 feet (horizontal measurement) from the exterior margin of the reservoir, defined by the normal maximum surface elevation, except where deviations may be necessary in describing the boundary according to the above methods or where additional lands are necessary for project purposes, such as public recreation, shoreline control, or protection of environmental resources.

(ii) Continuous features. The boundary around linear (continuous) project features such as access roads, transmission lines, and conduits may be described by specified distances from center lines or offset lines of survey. The width of such corridors must not exceed 200 feet unless good cause is shown for a greater width. Several sections of a continuous feature may be shown on a single sheet with information showing the sequence of contiguous sections.

(iii) Noncontinuous features.
(A) The boundary around noncontinuous project works such as dams, spillways, and powerhouses must be described by one of the following:

(1) Contour lines;
(2) Specified courses and distances;
(3) If the project lands are covered by a public land survey, lines upon or parallel to the lines of the survey; or
(4) Any combination of the above methods.

(B) The boundary must enclose only those lands that are necessary for safe and efficient operation and maintenance of the project or for other specified project purposes, such as public recreation or protection of environmental resources.

(3) Federal lands. Any public lands and reservations of the United States (Federal lands) [see 16 U.S.C. 796 (1) and (2)] that are within the project boundary, such as lands administered by the U.S. Forest Service, Bureau of Land Management, or National Park Service, or Indian tribal lands, and the boundaries of those Federal lands, must be identified as such on the map by:

(i) Legal subdivisions of a public land survey of the affected area (a protration of identified township and section lines is sufficient for this purpose); and
(ii) The Federal agency, identified by symbol or legend, that maintains or manages each identified subdivision of the public land survey within the project boundary; or
(iii) In the absence of a public land survey, the location of the Federal lands according to the distances and directions from fixed monuments or physical features. When a Federal survey monument or a Federal bench mark will be destroyed or rendered unusable by the construction of project works, at least two permanent, marked witness monuments or bench marks must be established at accessible points. The maps show the location (and elevation, for bench marks) of the survey monument or bench mark which will be destroyed or rendered unusable, as well as of the witness monuments or bench marks. Connecting courses and distances from the witness monuments or bench marks to the original must also be shown.
(iv) The project location must include the most current information pertaining to affected federal lands as described under § 4.81(b)(5).

(4) Non-Federal lands. For those lands within the project boundary not identified under paragraph (h)(3) of this section, the map must identify by legal subdivision:

(i) Lands owned in fee by the applicant and lands that the applicant plans to acquire in fee; and
(ii) Lands over which the applicant has acquired or plans to acquire rights to occupancy and use other than fee title, including rights acquired or to be acquired by easement or lease

1 DETAILED MAPS

Exhibit G provides maps showing the Project boundary enclosing the Turners Falls Development and the Northfield Mountain Pumped Storage Development (collectively referred to as the Northfield Project, or Project) as described in Exhibit A. The maps conform to the requirements of Section 4.41(h) of the Commission's regulations. Maps of the Project Area showing principal Project features and the Project boundary are included.

2 PROJECT BOUNDARY

The Project boundary is shown on the attached Exhibit G maps. FirstLight is proposing two changes to the existing Project boundary. Both the existing and proposed Project boundaries are depicted on the Exhibit G maps.

FirstLight proposes removing the following lands from the Project Boundary:

- Removal of a 20.1 acre parcel of land currently occupied by the United States Geological Survey's (USGS) Silvio Conte Anadromous Fish Laboratory located at One Migratory Way, P.O Box 796, in Turners Falls, MA 01376. The Conte Lab lands are located just north of Cabot Station. (Sheet 1 of 15)
- Removal of an 8.1 acre parcel of land referred to as Fuller Farm located near 169 Millers Falls Road in Northfield, MA. (Sheet 5 of 15)

The Commission's regulations provide that the boundary of a project "must enclose only those lands necessary for operation and maintenance of the project and for other project purposes, such as recreation, shoreline control, or protection of environmental resources" and that "[e]xisting residential, commercial, or other structures may be included within the boundary only to the extent that underlying lands are needed for project purposes." 18 C.F.R. § 4.41(h)(2). The lands occupied by Conte Lab and Fuller Farm do not meet these criteria.

FirstLight's predecessor, the Western Massachusetts Electric Company, sought Commission approval to convey the land currently occupied by Conte Lab to the U.S. Fish and Wildlife Service (USFWS) for construction of a "Northeast Anadromous Fish Research Laboratory" in 1987. When the Commission approved the conveyance in 1988,[1] the purpose of USFWS's Fishery Resources Program responsible for constructing the lab was to "[p]romote and enhance conservation of the Nation's freshwater, anadromous, and intercoastal fishery resources for maximum long-term public benefit."[2] The land and lab were subsequently transferred from USFWS to USGS. Today Conte Lab has been charged with "meeting the need for information about anadromous fish biology and ecology" by performing "research directed towards restoration and protection of anadromous fishes" and has in recent years "expanded its mission to include work on any riverine migratory species."[3]

Thus, Conte Lab is a laboratory structure that performs both regional and national research for public and private entities. Although FirstLight has contracted Conte Lab to conduct research, its presence within the boundary is not necessary for operation and maintenance of the Project. Conte Lab does not serve any Project purpose, and is not necessary to fulfill any license requirements. Rather, it is a non-Project use of lands that should not be included in the Project boundary. The underlying lands similarly are not necessary for Project purposes.

[1] *W. Mass. Elec. Co*., 43 FERC ¶ 62,004 (1988).
[2] *See* Application for Approval of Change in Land Rights, Attachment 5 at 3, Project No. 1889-009 (filed Aug. 31, 1987).
[3] USGS, Conte Anadromous Fish Branch, http://www.lsc.usgs.gov/?q=conte-anadromous-fish-branch.

Fuller Farm also is not needed for Project purposes. FirstLight's predecessor purchased the farm as part of a much larger tract when acquiring land to construct the Northfield Mountain Project. When the Project design was finalized, the farm and land were not necessary for Project purposes, even though they continued to remain in the Project boundary along with the larger tract, some of which contains recreational trails or is used for recreational programming. The 8.1 acre farm property, however, includes residential and agricultural structures, and the underlying lands are not necessary for power generation, recreation, or any other Project purpose. FirstLight's historical structures survey found that the buildings (house, barn, and outbuildings) located on the 8.1 acre parcel are not eligible for listing on the National Register of Historic Places due to lack of historic/architectural significance and lack of integrity.[4] While FirstLight's Phase IA reconnaissance level archaeological survey included the Fuller Farm parcel in its recommendations for Phase IB survey, the parcel is not in a location that is susceptible to erosion or in an area that suggests there are Project-related effects on the property.

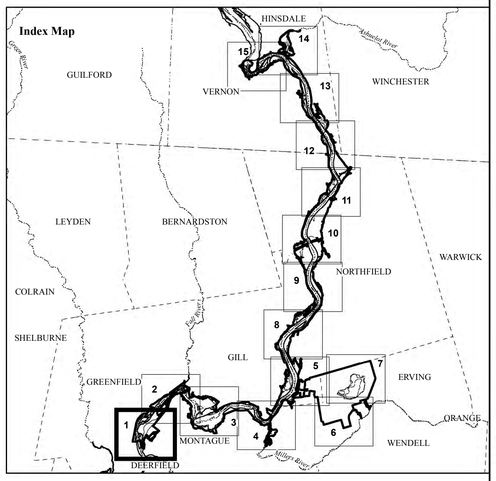
3 FEDERAL LANDS

The USGS's Silvio Conte Anadromous Fish Laboratory is located in the current Project boundary. Its address is One Migratory Way, P.O. Box 796, Turners Falls, MA 01376.

4 NON-FEDERAL LANDS

The attached Exhibit G maps identify lands that FirstLight owns in fee, and lands over which FirstLight has acquired or intends to acquire rights to occupancy and use other than fee title, including by easement or lease.

[4] Historic Architectural Resources Survey & National Register Evaluation at V-35, Project Nos. 2485 and 1889 (filed Jan. 21, 2015).



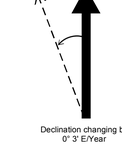
Legend

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

Licensee Ownership

- Own in Fee
- Flowage Easement
- Proposed Area to be Removed From Project Boundary

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



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FirstLight Hydro Generating Company

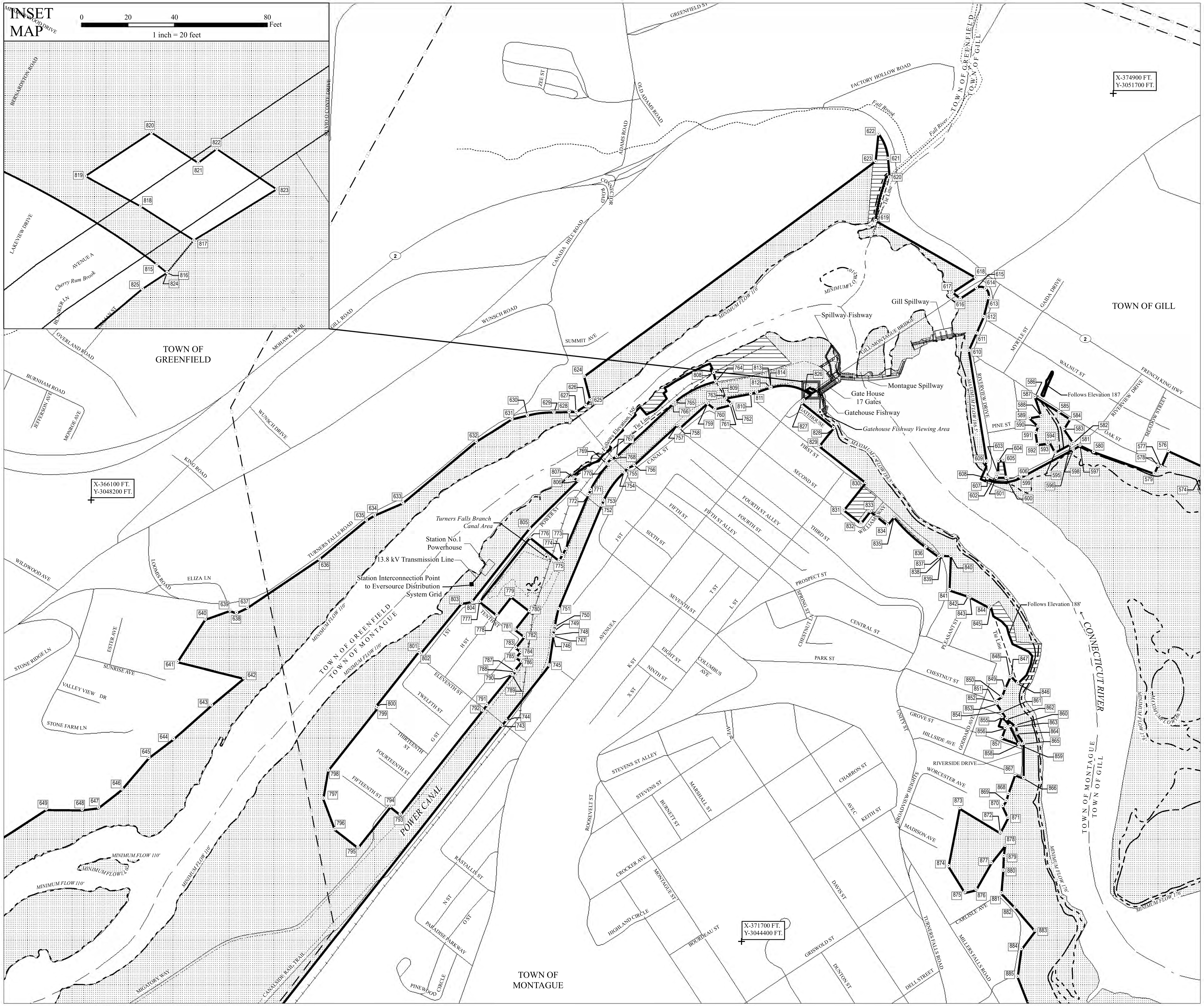
NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485

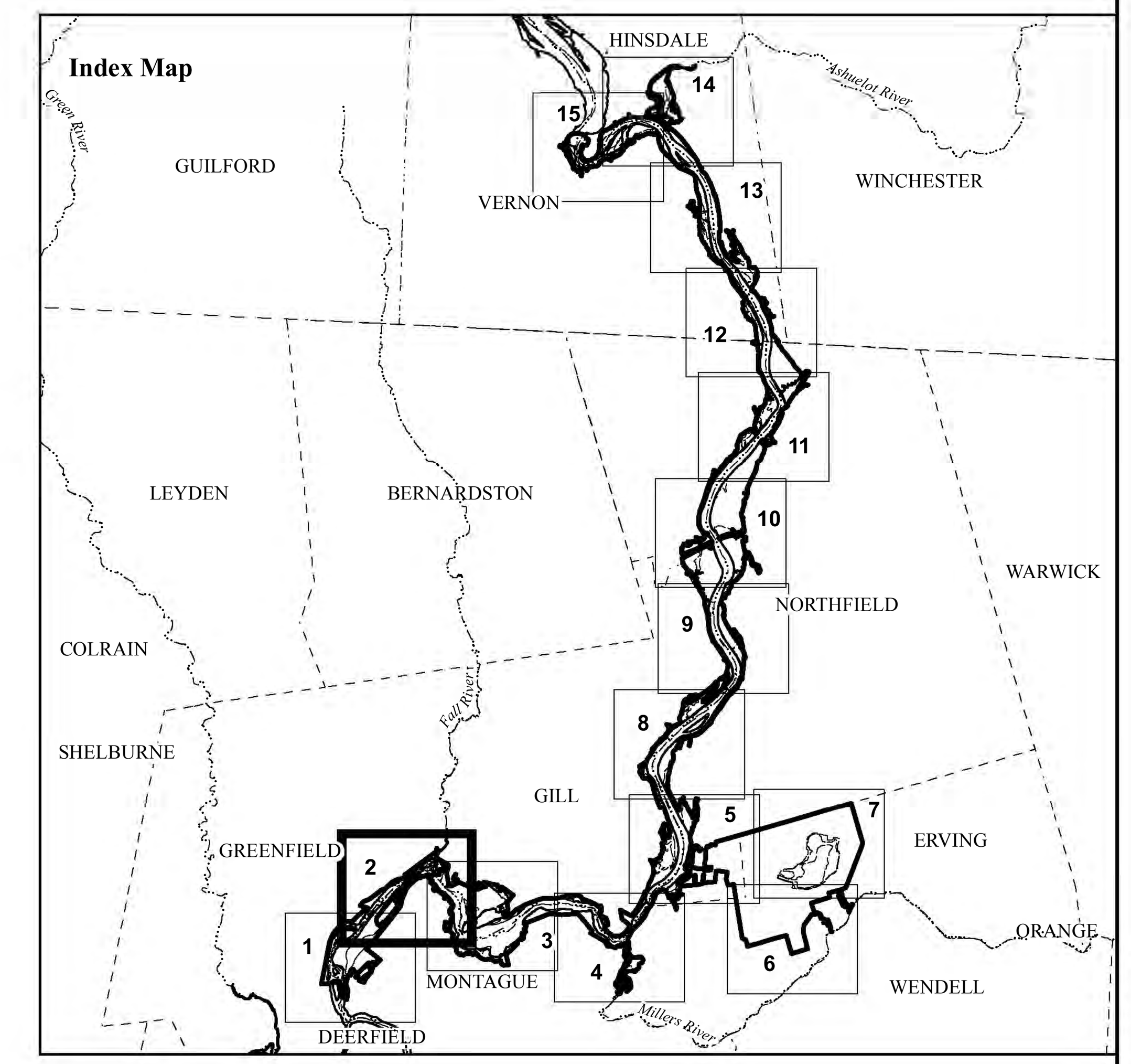
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 1 of 15

0 200 400 800 1,200 1,600 Feet

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





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

Licensee Ownership

- Own in Fee
- Flowage Easement
- Proposed Area to be Removed From Project Boundary

MN 14°12' W

Declination changing by 0° 3' E/Year

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

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

FirstLight Hydro Generating Company

NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485

TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 2 of 15

0 200 400 800 1,200 1,600 Feet

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

Index Map

Legend

	Project Boundary	+	Reference Point
164	Point No. (see Project Boundary Data table for metes and bounds)		Maximum Water Surface Elevation (in feet)
△	Project Recreation Site		Minimum Water Surface Elevation (in feet)
⊡	Project Recreation Site Proposed to be Non-Project Recreation Site		Shoreline
	Town Boundary		Major Creek
			Project Trail

Licensee Ownership

▒	Own in Fee		Railroad
▤	Flowage Easement		Transmission Lines
☒	Proposed Area to be Removed From Project Boundary		Roads

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

MN 14°12' W'

Declination changing by
0° 3' E/Year

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No. 626
ARTHUR F. SICILIANO, JR.
SIGNATURE

FirstLight Hydro Generating Company

NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485

TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 3 of 15

0 200 400 800 1,200 1,600 Feet

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

TOWN OF GILL

TOWN OF MONTAGUE

TOWN OF NORTHFIELD

TOWN OF ERVING

TOWN OF GILL / TOWN OF MONTAGUE

TOWN OF NORTHFIELD / TOWN OF ERVING

TOWN OF GILL / TOWN OF ERVING

CONNECTICUT RIVER

X-387000 FT.
Y-3047200 FT.

X-382900 FT.
Y-3039700 FT.

X-391700 FT.
Y-3039900 FT.

TAYLOR PLACE

CAMP ROAD

HORSERACE VIEW ROAD

FRENCH KING HIGHWAY

MOHAWK TRAIL

DORSEY ROAD

EAST MINERAL ROAD

WEST MINERAL ROAD

WPC ROAD

RIVER ROAD

NORTHFIELD ROAD

JULIANS WAY

GATEWAY DRIVE

MOORE ST

FORREST ST

MECHANIC ST

WEST HIGH ST

MAXIMUM FLOW 196'

MINIMUM FLOW 176'

MAXIMUM FLOW 193.4'

MINIMUM FLOW 193.4'

Tie Line

Follows Elevation 200'

Follows Elevation 197.1'

Follows Elevation 196.1'

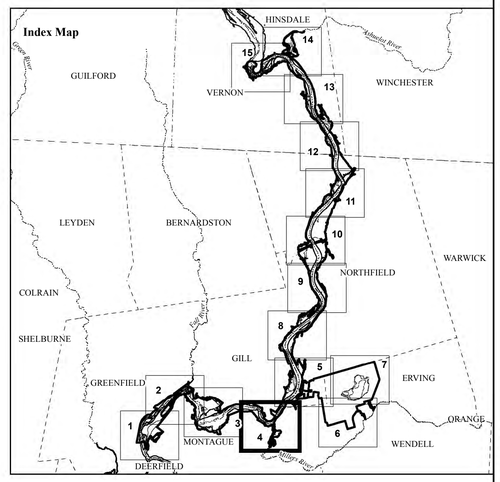
Follows Elevation 197.1'

Follows Elevation 197.1'

Follows Elevation 201.5

Miller's River

Index Map



Legend

- Project Boundary
- Point No. (see Project Boundary Data table for metes and bounds)
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Licensee Ownership

- Own in Fee
- Flowage Easement
- Proposed Area to be Removed From Project Boundary

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 — LICENSED LAND SURVEYOR — No. 626 — ARTHUR F. SCIOTINO, JR.

FirstLight Hydro Generating Company

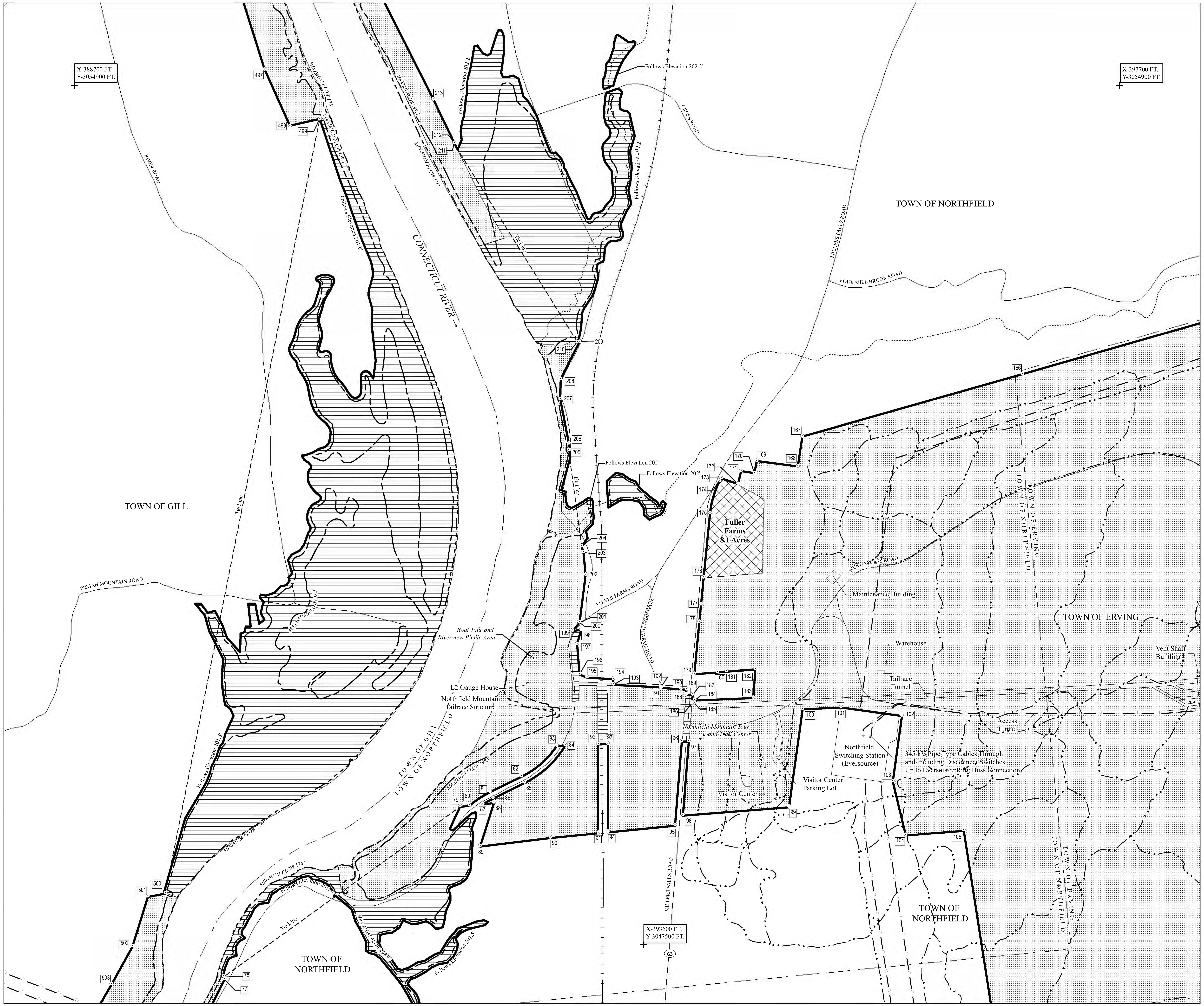
NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485

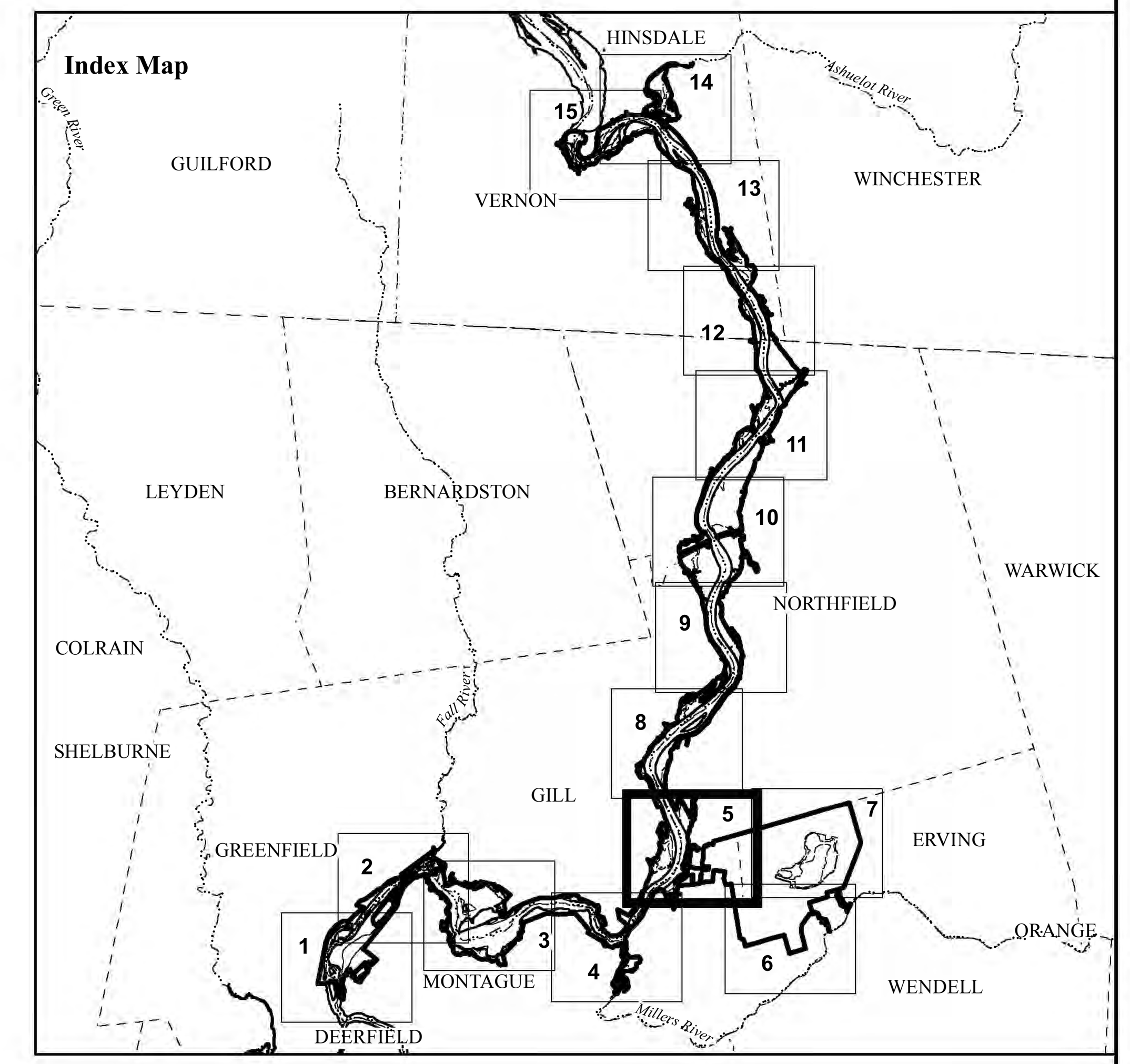
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 4 of 15

0 200 400 800 1,200 1,600 Feet

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





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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

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

FirstLight Hydro Generating Company
NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 5 of 15

0 200 400 800 1,200 1,600 Feet

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

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
- + Reference Point
- Maximum Water Surface Elevation (in feet)
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- Railroad
- Transmission Lines
- Roads

Licensee Ownership

- ▦ Own in Fee
- ▤ Flowage Easement
- ▩ Proposed Area to be Removed From Project Boundary

Coordinate System:
NAD83 State Plane
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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TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 6 of 15

0 200 400 800 1,200 1,600 Feet

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

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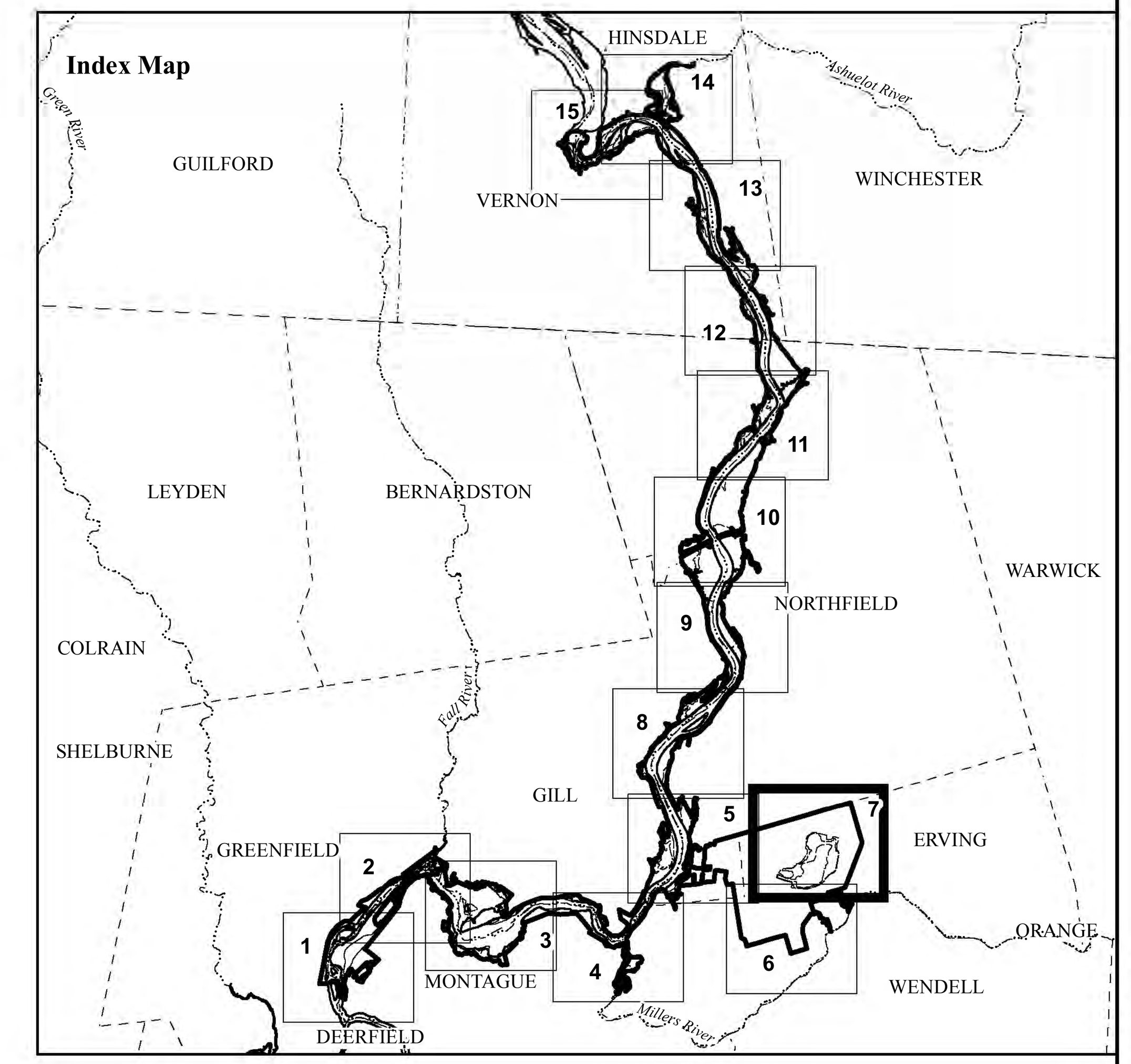

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Massachusetts Mainland Zone (feet)
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Vertical Datum:
NGVD 1929

MN 14°15' W

Declination changing by 0° 3' E/Year

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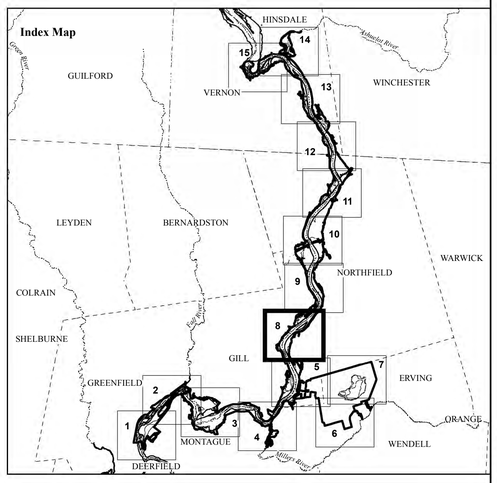
FirstLight Hydro Generating Company
NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 7 of 15

0 200 400 800 1,200 1,600 Feet

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



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Licensee Ownership

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MN 14°14' W

Declination changing by 0° 3' E/Year

Coordinate System:
NAD83 State Plane
Massachusetts Mainland Zone (feet)
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STATE OF NEW HAMPSHIRE LICENSED LAND SURVEYOR NO. 628 ARTHUR E. SCIACCHITANO, JR.

FirstLight Hydro Generating Company

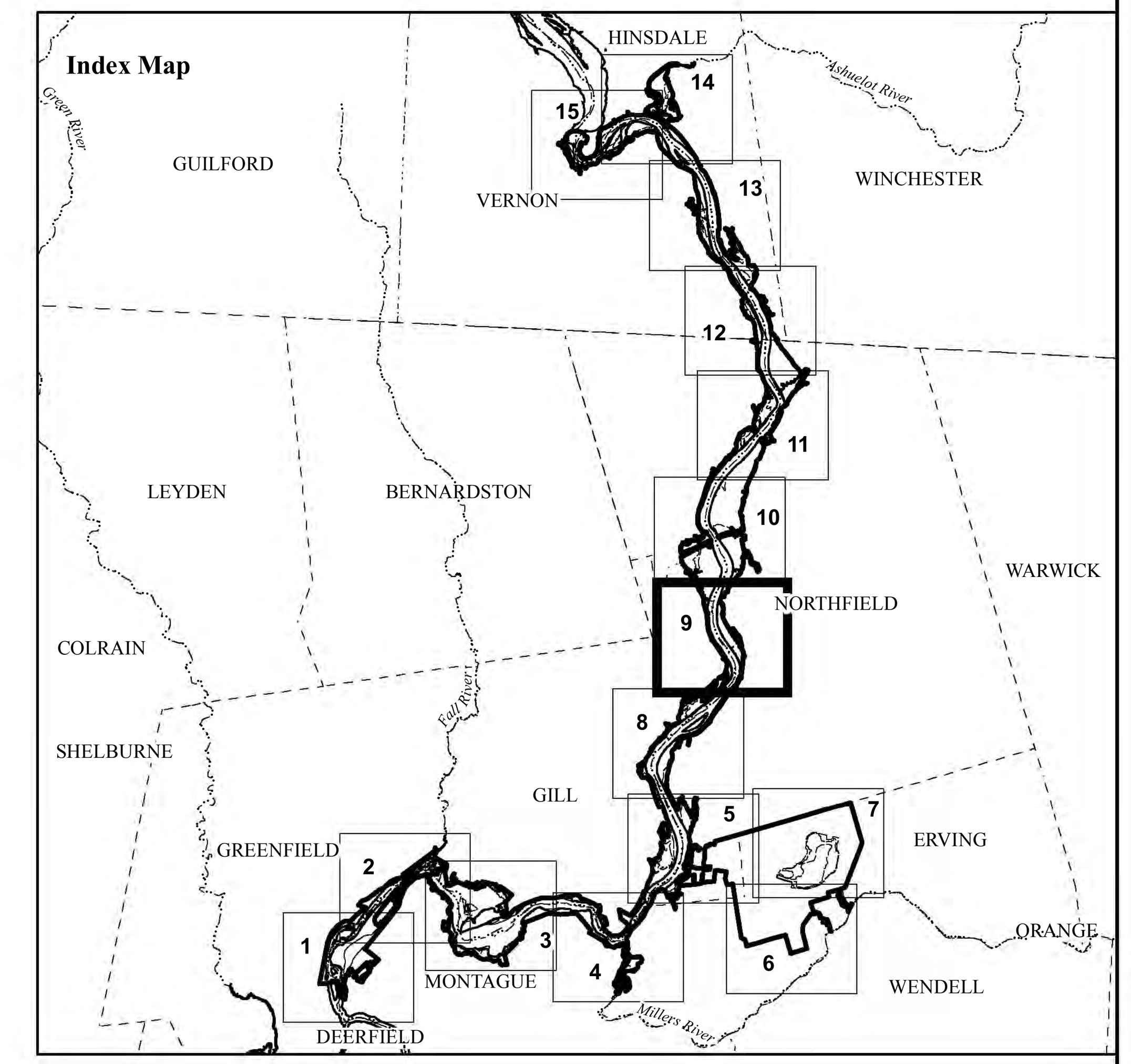
NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485

TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 8 of 15

0 200 400 800 1,200 1,600 Feet

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



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NGVD 1929

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

FirstLight Hydro Generating Company

NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485

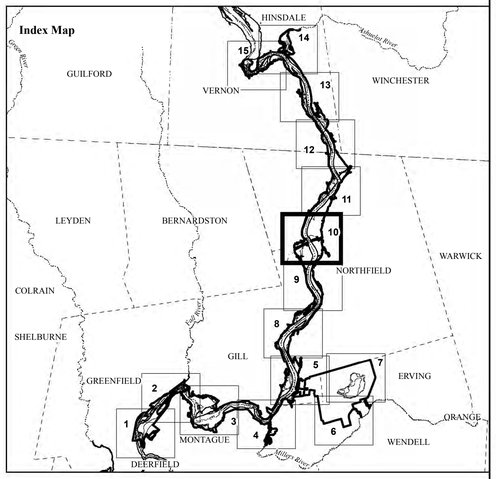
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 9 of 15

0 200 400 800 1,200 1,600 Feet

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

Index Map



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MN 14°16' W

Declination changing by 0° 3' E/Year

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

FirstLight Hydro Generating Company

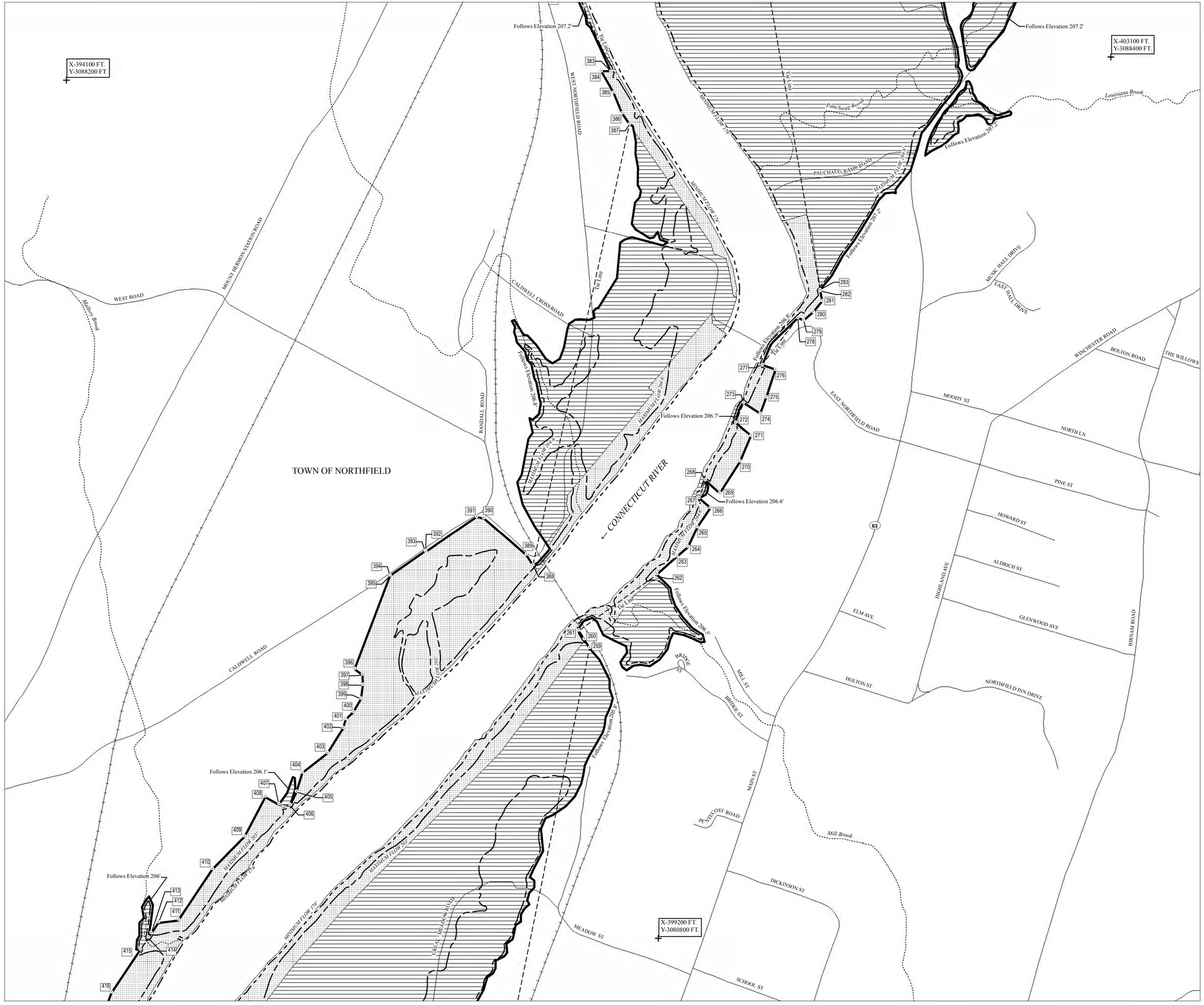
NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485

TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 10 of 15

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-10 1 inch = 400 feet 1:4,800



Legend

- Project Boundary
- Point No. (see Project Boundary Data table for metes and bounds)
- Project Recreation Site
- Project Recreation Site Proposed to be Non-Project Recreation Site
- Town Boundary

Licensee Ownership

- Own in Fee
- Flowage Easement
- Proposed Area to be 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

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

Declination changing by
0° 3' E/Year

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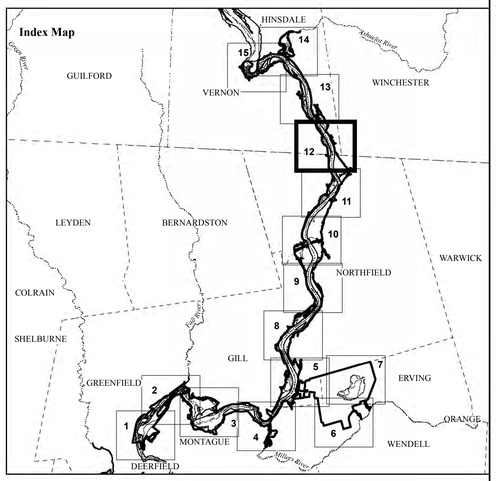
STATE OF NEW HAMPSHIRE LICENSED LAND SURVEYOR
No. 626
ARTHUR F. SICILIANO, JR.
Arthur F. Siciliano
SIGNATURE

FirstLight Hydro Generating Company
NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485
TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 11 of 15

0 200 400 800 1,200 1,600 Feet

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



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

FirstLight Hydro Generating Company

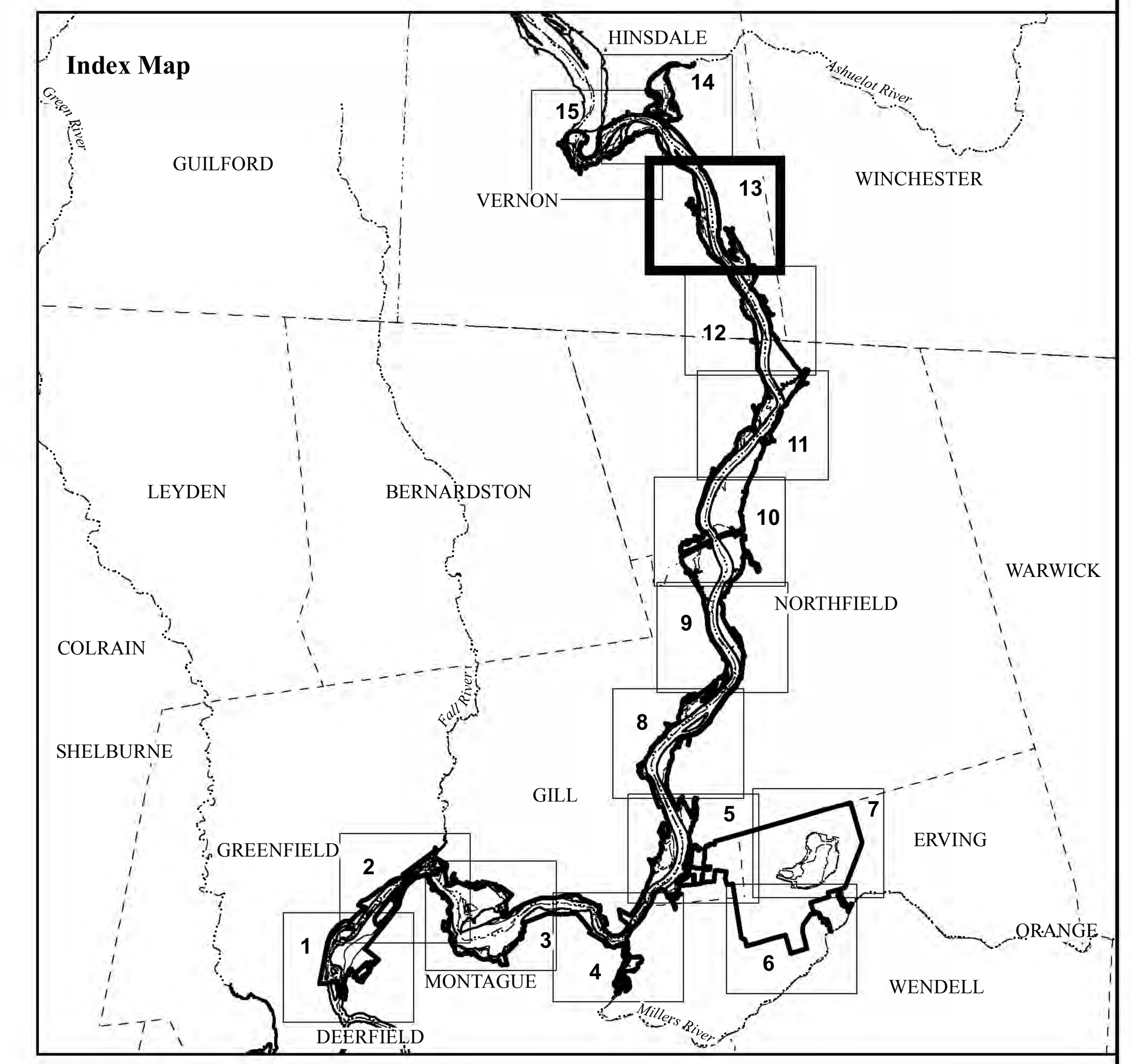
NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485

TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

SHEET 12 of 15

0 200 400 800 1,200 1,600 Feet

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



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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. SICILIANO, JR. SIGNATURE

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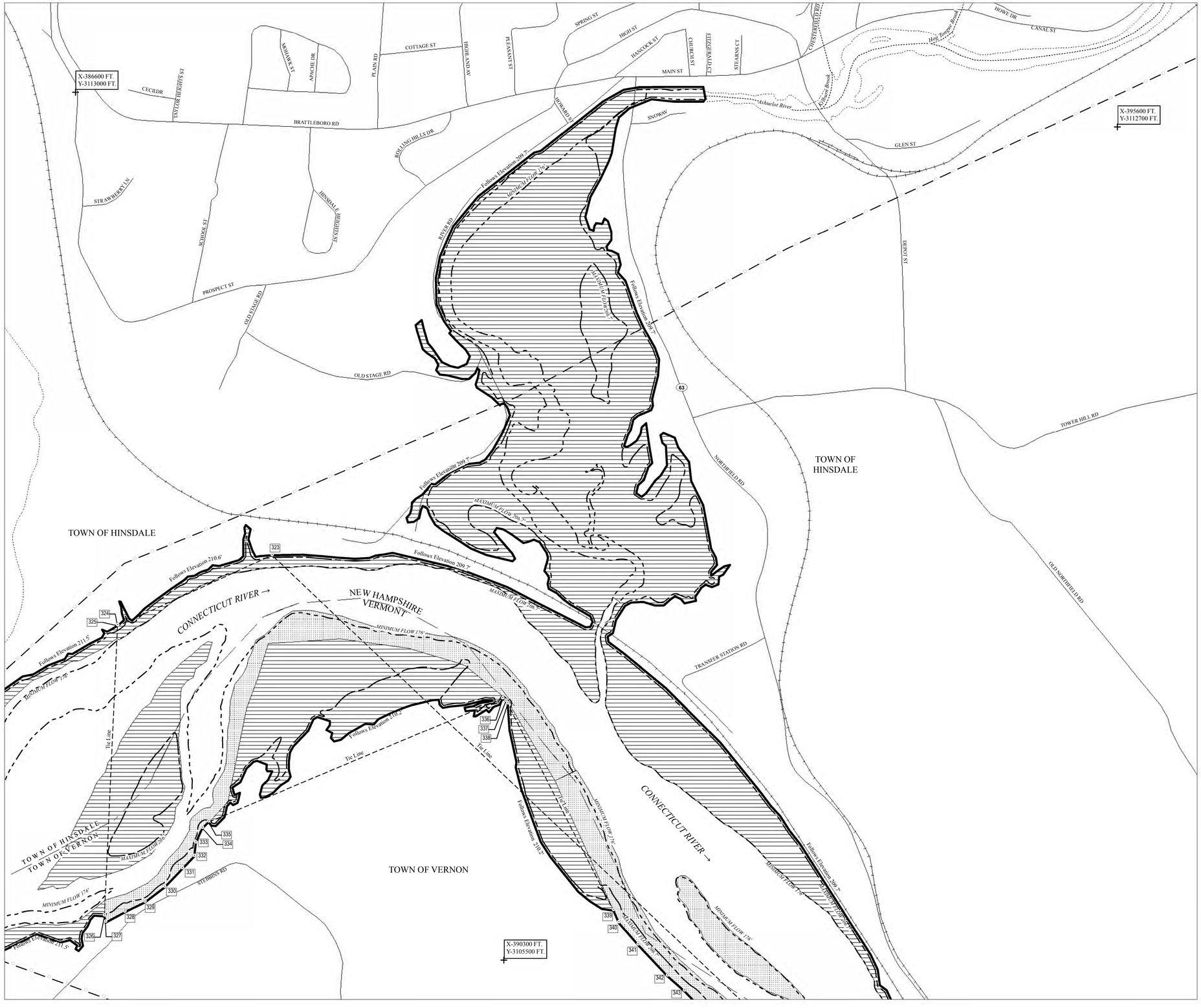
NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT
FERC PROJECT NO. 2485

TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

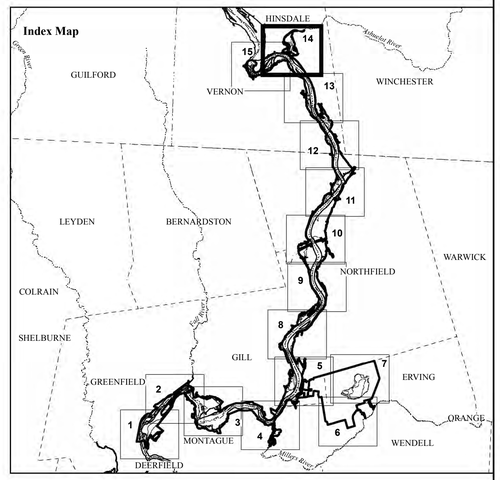
SHEET 13 of 15

0 200 400 800 1,200 1,600 Feet

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



Index Map



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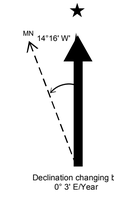

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TURNERS FALLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 1889

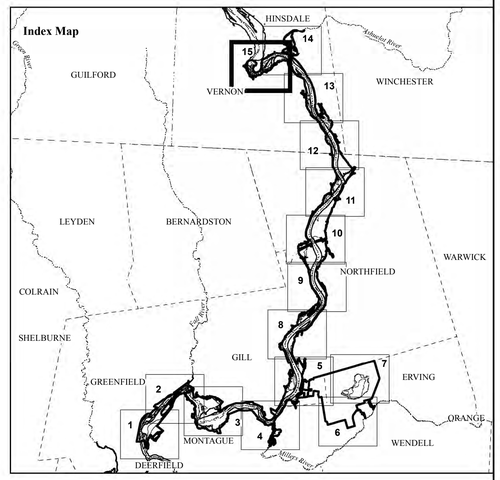
SHEET 14 of 15

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-14 1 inch = 400 feet 1:4,800

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

Index Map



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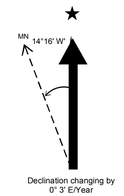

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FERC PROJECT NO. 1889

SHEET 15 of 15

0 200 400 800 1,200 1,600 Feet

EXHIBIT G-15 1 inch = 400 feet 1:4,800

Path: W:\gis\mapping\exhibit_g\mtd

PROJECT BOUNDARY DATA

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
1	3042973.69	375761.20	N 42-26-44 E	231.98	
2	3043144.87	375917.76	S 47-30-41 E	279.68	
3	3042955.96	376124.00	S 42-18-35 W	47.28	
4	3042921.00	376092.18	S 47-44-43 E	415.17	
5	3042641.83	376399.47	S 73-53-26 E	370.70	
6	3042538.98	376755.61	N 68-1-31 E	204.39	
7	3042615.46	376945.15	S 73-18-46 E	125.36	
8	3042579.47	377065.23	S 87-59-56 E	207.16	
9	3042572.24	377272.26	S 40-17-53 E	114.43	
10	3042484.96	377346.27	S 53-36-7 E	141.98	
11	3042400.72	377460.55	N 78-38-35 E	500.00	
12	3042499.18	377950.75	S 11-18-5 E	295.10	
13	3042209.81	378008.58	S 58-39-6 E	225.20	
14	3042092.65	378200.91	N 78-36-47 E	377.92	
15	3042167.27	378571.39	N 14-59-18 W	831.79	
16	3042970.75	378356.26	N 47-2-36 E	1268.33	
17	3043835.05	379284.49	N 42-29-14 W	128.50	
18	3043929.81	379197.70	N 43-33-58 E	449.33	
19	3044255.39	379507.37	S 29-43-23 E	160.00	
20	3044116.44	379586.70	N 47-2-36 E	224.21	
21	3044269.23	379750.79	N 1-54-25 E	418.25	
22	3044687.25	379764.70	N 1-54-25 E	135.45	Tie Line
23	3044822.62	379769.20	N 1-54-25 E	165.65	
24	3044988.18	379774.72	N 1-54-25 E	399.80	Tie Line
25	3045387.75	379788.01	N 1-54-25 E	156.42	
26	3045544.08	379793.22	S 67-7-35 E	195.14	
27	3045468.24	379973.01	N 68-20-8 E	1953.78	
28	3046189.53	381788.75	S 83-58-46 E	980.00	
29	3046086.75	382763.34	N 84-32-37 E	1271.53	
30	3046207.67	384029.09	S 39-53-54 E	701.88	
31	3045669.21	384479.30	S 39-53-58 E	446.94	
32	3045326.34	384765.98	S 39-50-12 E	612.30	
33	3044856.18	385158.22	S 36-25-42 W	208.05	
34	3044688.78	385034.68	S 58-25-15 E	1308.76	
35	3044003.43	386149.63	S 28-47-22 E	451.27	

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
36	3043607.95	386366.96	N 34-53-59 E	244.84	
37	3043808.76	386507.04	S 41-24-47 E	132.00	
38	3043709.76	386594.36	S 41-24-47 E	51.00	Tie Line
39	3043671.52	386628.09	S 41-24-47 E	133.07	
40	3043571.72	386716.12	S 77-33-5 E	292.58	
41	3043508.65	387001.82	N 49-44-55 E	173.68	
42	3043620.88	387134.37	N 85-15-17 E	306.12	
43	3043646.20	387439.43	N 37-3-58 E	77.25	
44	3043707.84	387485.99	N 6-30-17 W	44.46	
45	3043752.02	387480.96	N 79-15-45 E	133.13	
46	3043776.82	387611.75	S 24-22-40 E	184.00	
47	3043609.23	387687.70	S 74-9-30 E	73.10	
48	3043589.28	387758.02	S 7-26-57 W	341.51	
49	3043250.65	387713.75	S 86-33-38 E	52.73	
50	3043247.49	387766.39	S 86-33-29 E	3.00	
51	3043247.31	387769.38	N 25-55-54 E	557.51	Tie Line
52	3043748.68	388013.17	N 77-2-32 E	11.20	
53	3043751.19	388024.09	N 28-36-0 E	53.40	
54	3043798.08	388049.65	N 13-27-0 E	60.55	
55	3043856.97	388063.73	N 7-21-0 W	43.40	
56	3043900.01	388058.18	N 20-59-0 W	66.41	
57	3043962.02	388034.40	N 30-16-50 W	71.06	
58	3044023.38	387998.57	N 13-38-40 W	105.12	
59	3044125.53	387973.77	N 6-35-10 E	44.81	
60	3044170.05	387978.91	N 22-22-56 E	203.04	Tie Line
61	3044357.79	388056.22	N 32-15-12 E	62.86	
62	3044410.95	388089.76	N 20-2-15 E	108.28	
63	3044512.67	388126.86	N 25-33-24 E	92.73	
64	3044596.33	388166.87	N 31-37-10 E	107.49	
65	3044687.86	388223.22	N 24-2-44 E	94.26	
66	3044773.94	388261.62	N 36-5-25 E	109.84	
67	3044862.70	388326.33	N 44-29-7 E	500.21	
68	3045219.57	388676.83	N 41-18-51 E	196.16	
69	3045366.91	388806.33	N 39-23-8 E	798.93	
70	3045984.39	389313.26	N 28-52-29 E	202.37	
71	3046161.60	389410.98	N 23-37-10 E	294.77	

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
72	3046431.68	389529.08	N 31-38-50 E	103.98	
73	3046520.20	389583.64	N 31-54-35 E	226.68	
74	3046712.62	389703.45	N 84-15-22 E	12.08	
75	3046713.83	389715.47	N 33-3-0 E	245.06	
76	3046919.24	389849.12	N 26-35-0 E	327.70	
77	3047212.29	389995.76	N 24-55-45 W	24.44	
78	3047234.46	389985.46	N 54-17-5 E	2508.86	Tie Line
79	3048699.03	392022.43	N 83-47-0 E	79.89	
80	3048707.68	392101.85	N 56-41-39 E	211.97	Radius 830; Arc Length 212.55; Side R
81	3048824.08	392279.00	N 64-1-50 E	303.96	
82	3048957.18	392552.26	N 48-54-35 E	401.72	Radius 770; Arc Length 406.42; Side L
83	3049221.21	392855.02	N 88-3-59 E	72.57	
84	3049223.66	392927.55	S 47-26-48 W	473.80	Radius 830; Arc Length 480.48; Side R
85	3048903.24	392578.53	S 64-1-50 W	303.96	
86	3048770.14	392305.27	S 60-17-23 W	100.48	Radius 770; Arc Length 100.55; Side L
87	3048720.34	392218.00	N 83-47-0 E	96.28	
88	3048730.76	392313.71	S 17-30-0 W	392.30	
89	3048356.62	392195.75	N 83-3-0 E	608.23	
90	3048430.23	392799.50	N 84-20-0 E	414.73	
91	3048471.18	393212.20	N 0-6-40 W	762.20	
92	3049233.37	393210.72	N 88-4-38 E	82.54	
93	3049236.14	393293.21	S 0-6-40 E	756.79	
94	3048479.36	393294.68	N 84-20-0 E	581.15	
95	3048536.75	393872.99	N 4-37-2 E	723.17	
96	3049257.57	393931.19	N 88-4-38 E	60.39	
97	3049259.60	393991.55	S 4-37-2 W	638.20	
98	3048623.47	393940.18	N 85-31-50 E	916.14	
99	3048694.87	394853.52	N 8-0-0 E	850.00	
100	3049536.59	394971.81	N 87-11-0 E	330.00	
101	3049552.81	395301.41	S 82-0-0 E	530.00	
102	3049479.06	395826.24	S 8-0-0 W	570.41	
103	3048914.20	395746.86	S 13-35-50 E	475.58	
104	3048451.96	395858.67	N 85-17-10 E	501.32	

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
105	3048493.16	396358.29	S 8-53-47 E	4295.70	
106	3044249.18	397022.65	N 85-25-3 E	13.49	
107	3044250.26	397036.09	S 60-53-0 E	241.86	
108	3044132.57	397247.39	S 34-15-0 E	151.14	
109	3044007.65	397332.45	S 16-44-0 E	134.90	
110	3043878.46	397371.29	S 21-1-0 E	91.55	
111	3043793.00	397404.13	S 13-3-0 E	157.56	
112	3043639.51	397439.70	N 74-37-20 E	25.00	
113	3043646.14	397463.81	N 74-37-20 E	952.02	
114	3043898.61	398381.73	N 74-37-20 E	857.75	
115	3044126.07	399208.76	N 74-37-20 E	475.00	
116	3044252.04	399666.75	N 74-37-20 E	450.00	
117	3044371.37	400100.63	N 74-37-20 E	396.54	
118	3044476.53	400482.97	S 16-35-37 E	1480.92	
119	3043057.30	400905.90	N 74-8-40 E	1344.65	
120	3043424.69	402199.37	N 15-14-20 W	1326.95	
121	3044704.97	401850.58	N 3-28-5 E	545.74	
122	3045249.70	401883.59	N 35-0-40 E	1086.20	
123	3046139.34	402506.76	S 79-56-8 E	236.85	
124	3046097.96	402739.96	N 14-53-4 W	211.43	
125	3046302.29	402685.65	S 52-30-35 E	1165.28	Tie Line
126	3045593.08	403610.25	S 57-42-35 W	191.98	
127	3045490.53	403447.96	S 69-16-5 E	78.65	
128	3045462.68	403521.51	S 86-21-25 E	200.00	
129	3045449.98	403721.11	S 14-46-45 E	177.97	
130	3045277.90	403766.51	N 87-24-44 E	90.00	
131	3045281.96	403856.42	N 66-44-45 E	54.10	
132	3045303.32	403906.12	S 18-46-49 E	574.61	Tie Line
133	3044759.31	404091.11	N 64-39-59 E	41.38	
134	3044777.02	404128.51	N 18-54-0 W	573.01	Tie Line
135	3045319.13	403942.90	N 66-44-57 E	5.86	
136	3045321.44	403948.29	N 21-16-8 W	446.13	
137	3045737.18	403786.45	S 50-59-25 W	185.05	
138	3045620.70	403642.67	N 52-9-17 W	1238.20	Tie Line
139	3046380.36	402664.90	N 14-53-4 W	661.53	
140	3047019.68	402494.97	N 71-33-7 E	1519.10	

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
141	3047500.41	403935.98	N 16-13-40 W	328.52	
142	3047815.83	403844.17	N 73-20-20 E	792.64	
143	3048043.10	404603.52	S 28-37-11 E	1604.35	Tie Line
144	3046634.79	405372.00	S 15-39-40 E	113.91	
145	3046525.11	405402.75	S 15-39-40 E	72.49	
146	3046455.31	405422.32	S 15-39-40 E	111.44	
147	3046348.01	405452.40	S 15-39-40 E	30.00	
148	3046319.12	405460.50	N 25-45-37 E	645.06	Tie Line
149	3046900.08	405740.84	N 55-55-50 W	70.00	
150	3046939.29	405682.86	N 55-55-49 W	20.00	
151	3046950.49	405666.29	S 34-4-10 W	170.00	
152	3046809.67	405571.06	N 71-12-35 W	289.67	
153	3046902.97	405296.83	N 15-39-40 W	65.83	
154	3046966.36	405279.06	N 20-11-58 W	1227.57	Tie Line
155	3048118.42	404855.18	N 73-20-21 E	74.22	
156	3048139.70	404926.28	N 67-39-8 E	299.98	
157	3048253.76	405203.73	N 21-10-34 E	3738.71	
158	3051740.00	406554.23	N 16-33-10 W	3323.48	
159	3054925.71	405607.36	S 73-5-0 W	102.39	
160	3054895.92	405509.40	S 73-20-5 W	581.97	
161	3054729.01	404951.89	S 73-26-15 W	234.77	
162	3054662.09	404726.86	N 14-49-51 W	21.65	
163	3054683.02	404721.32	S 73-46-9 W	1394.60	
164	3054293.20	403382.32	S 73-46-23 W	1410.84	
165	3053898.94	402027.71	S 73-59-32 W	5371.89	
166	3052417.51	396864.20	S 74-14-2 W	1969.94	
167	3051882.24	394968.40	S 8-37-6 W	260.03	
168	3051625.15	394929.43	N 82-37-38 W	356.35	
169	3051670.87	394576.03	S 11-14-16 W	105.29	
170	3051567.60	394555.52	N 81-21-57 W	115.10	
171	3051584.88	394441.72	S 13-35-45 W	114.54	
172	3051473.55	394414.80	N 71-23-50 W	153.43	
173	3051522.49	394269.38	S 27-52-31 W	24.14	
174	3051501.15	394258.10	S 16-45-22 W	291.14	Radius 754.84; Arc Length 292.98; Side L
175	3051222.37	394174.17	S 5-38-13 W	555.93	

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
176	3050669.13	394119.57	S 5-38-13 W	233.82	
177	3050436.45	394096.60	S 5-26-49 W	149.41	
178	3050287.71	394082.42	S 5-26-49 W	450.00	
179	3049839.75	394039.71	N 85-44-46 E	200.00	
180	3049854.58	394239.16	N 85-44-47 E	74.66	
181	3049860.12	394313.61	N 85-40-20 E	250.54	
182	3049879.03	394563.43	S 3-51-53 W	245.88	
183	3049633.71	394546.86	S 87-35-23 W	504.52	
184	3049612.49	394042.80	S 4-48-9 W	22.00	
185	3049590.57	394040.95	S 87-35-23 W	22.00	
186	3049589.64	394018.97	N 4-48-8 E	71.54	
187	3049660.93	394024.96	S 88-4-38 W	57.79	
188	3049658.99	393967.21	N 5-34-1 E	46.03	
189	3049704.80	393971.67	N 84-25-58 W	49.06	
190	3049709.56	393922.84	N 86-13-50 W	170.47	
191	3049720.77	393752.74	N 25-51-49 W	6.04	
192	3049726.20	393750.11	N 87-4-8 W	408.94	
193	3049747.11	393341.71	N 0-6-40 W	49.57	
194	3049796.68	393341.61	N 87-4-8 W	226.97	
195	3049808.28	393114.94	N 66-2-59 W	70.00	
196	3049836.70	393050.97	N 4-39-35 W	260.22	
197	3050096.05	393029.83	N 15-29-16 E	128.05	
198	3050219.45	393064.02	S 83-23-20 W	73.66	
199	3050210.97	392990.85	N 40-10-3 E	93.20	
200	3050282.19	393050.96	N 45-35-39 E	0.47	
201	3050282.52	393051.30	N 7-17-6 E	412.78	
202	3050691.97	393103.64	N 5-31-41 W	194.77	
203	3050885.83	393084.87	N 17-6-32 W	53.65	
204	3050937.11	393069.09	N 7-45-35 W	837.33	Tie Line
205	3051766.76	392956.03	N 2-40-21 E	55.57	
206	3051822.27	392958.62	N 10-55-38 W	389.60	
207	3052204.80	392884.76	N 1-2-22 E	171.10	
208	3052375.87	392887.86	N 27-1-22 E	362.20	
209	3052698.53	393052.42	S 80-55-1 W	20.60	
210	3052695.28	393032.08	N 31-56-0 W	1946.69	Tie Line
211	3054405.92	391973.10	S 26-34-39 E	65.50	

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
212	3054405.92	391973.10	N 25-42-38 W	419.00	
213	3054783.43	391791.33	N 26-46-40 W	1313.32	
214	3055955.89	391199.63	N 24-41-40 W	124.80	
215	3056069.28	391147.49	N 14-7-0 E	3884.37	Tie Line
216	3059836.32	392094.83	N 63-5-20 E	167.00	
217	3059911.91	392243.74	N 63-5-20 E	81.80	Tie Line
218	3059948.93	392316.69	N 63-5-21 E	22.00	
219	3059958.89	392336.30	N 67-50-20 E	611.40	
220	3060189.52	392902.53	N 77-15-21 E	16.30	
221	3060193.12	392918.43	N 77-15-19 E	79.20	Tie Line
222	3060210.59	392995.67	N 77-15-19 E	406.69	
223	3060300.31	393392.34	N 56-9-1 E	422.17	
224	3060535.47	393742.94	N 46-40-1 E	1060.43	
225	3061263.18	394514.26	N 30-22-1 E	93.35	
226	3061343.72	394561.45	N 30-22-1 E	26.69	Tie Line
227	3061366.75	394574.94	N 30-22-1 E	118.06	
228	3061468.61	394634.62	N 29-48-1 E	507.20	
229	3061908.74	394886.68	N 35-36-19 E	565.67	
230	3062368.66	395216.01	N 35-36-19 E	169.00	Tie Line
231	3062506.06	395314.40	N 35-36-19 E	149.54	
232	3062627.65	395401.46	N 34-8-15 E	734.73	
233	3063235.78	395813.76	N 36-49-15 E	391.05	
234	3063548.82	396048.12	N 36-50-34 E	72.20	
235	3063606.60	396091.41	S 43-10-38 E	79.94	
236	3063548.30	396146.11	N 40-45-11 E	121.77	
237	3063640.55	396225.60	N 40-45-11 E	260.00	
238	3063837.51	396395.32	N 40-45-11 E	347.08	
239	3064100.43	396621.89	N 27-8-11 E	612.05	
240	3064645.11	396901.04	N 48-30-40 E	119.94	
241	3064724.56	396990.89	N 6-34-40 E	105.55	
242	3064829.42	397002.98	N 7-18-40 E	699.65	
243	3065523.38	397092.00	N 0-46-20 W	175.00	
244	3065698.36	397089.64	N 18-40-16 W	5405.25	Tie Line
245	3070819.08	395359.20	N 14-23-47 E	83.21	
246	3070899.68	395379.89	N 28-33-47 E	127.88	
247	3071011.99	395441.03	N 19-5-47 E	116.16	

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
248	3071121.76	395479.03	N 19-39-8 E	4713.71	Tie Line
249	3075560.88	397064.24	N 84-52-57 E	242.50	
250	3075582.52	397305.77	N 1-33-57 E	322.37	
251	3075904.76	397314.57	S 67-0-34 W	75.38	
252	3075875.32	397245.18	N 86-25-33 W	51.80	
253	3075878.55	397193.48	N 86-25-33 W	548.20	Tie Line
254	3075912.72	396646.36	N 79-36-2 W	74.30	Tie Line
255	3075926.13	396573.28	N 79-36-2 W	136.80	
256	3075950.82	396438.73	N 65-51-29 E	806.11	Tie Line
257	3076280.52	397174.32	S 86-25-34 E	1.40	
258	3076280.44	397175.71	N 11-30-46 E	7173.61	Tie Line
259	3083309.67	398607.37	N 31-43-29 W	86.99	
260	3083383.67	398561.63	N 32-19-12 W	91.15	
261	3083460.69	398512.89	N 54-20-10 E	830.44	Tie Line
262	3083944.87	399187.57	N 48-12-22 E	232.60	
263	3084099.89	399360.98	N 49-16-22 E	125.91	
264	3084182.04	399456.40	N 25-14-17 E	186.83	
265	3084351.03	399536.06	N 34-1-17 E	202.12	
266	3084518.56	399649.14	N 49-3-43 W	129.60	
267	3084603.47	399551.24	N 19-38-24 E	161.53	Tie Line
268	3084755.60	399605.53	S 48-9-2 E	166.40	
269	3084644.59	399729.48	N 32-52-58 E	324.29	
270	3084916.92	399905.54	N 22-45-58 E	241.57	
271	3085139.67	399999.02	N 49-32-2 W	173.30	
272	3085252.14	399867.17	N 21-48-19 E	183.66	Tie Line
273	3085422.66	399935.39	S 57-10-48 E	170.80	
274	3085330.09	400078.93	N 20-3-12 E	149.91	
275	3085470.91	400130.33	N 18-21-12 E	249.84	
276	3085708.04	400208.99	N 69-45-40 W	121.13	
277	3085749.94	400095.34	N 37-8-43 E	508.06	Tie Line
278	3086154.91	400402.12	S 67-40-40 E	55.20	
279	3086133.95	400453.18	N 48-16-34 E	110.01	
280	3086207.17	400535.29	N 40-2-34 E	121.70	
281	3086300.34	400613.58	N 12-29-48 W	88.00	
282	3086386.25	400594.54	N 8-43-49 W	10.60	
283	3086396.73	400592.93	N 9-44-3 W	5011.06	Tie Line

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
284	3091335.59	399745.64	S 86-53-0 E	172.25	
285	3091326.23	399917.63	N 26-25-28 W	21.78	
286	3091345.73	399907.94	N 41-7-0 W	154.89	
287	3091462.42	399806.08	N 38-14-40 W	151.57	
288	3091581.46	399712.26	N 38-59-50 W	192.95	
289	3091731.41	399590.84	N 36-20-1 W	65.79	
290	3091784.41	399551.86	N 42-5-30 W	144.43	
291	3091891.58	399455.05	S 64-17-57 W	111.99	
292	3091843.02	399354.14	N 6-19-28 W	464.02	Tie Line
293	3092304.21	399303.02	N 59-39-57 E	67.25	
294	3092338.17	399361.06	N 11-27-33 W	181.17	
295	3092515.73	399325.06	N 15-2-33 W	94.09	
296	3092606.59	399300.64	N 15-16-33 W	186.18	
297	3092786.19	399251.59	N 15-1-33 W	136.13	
298	3092917.67	399216.30	N 21-54-33 W	197.19	
299	3093100.61	399142.72	N 16-28-33 W	202.19	
300	3093294.50	399085.37	N 26-44-33 W	137.33	
301	3093417.14	399023.58	N 26-18-3 W	1439.16	Tie Line
302	3094707.30	398385.90	N 19-51-20 W	17.53	
303	3094723.79	398379.95	N 35-16-23 W	272.04	
304	3094945.88	398222.85	N 33-33-23 W	163.02	
305	3095081.73	398132.74	N 35-58-23 W	188.03	
306	3095233.90	398022.29	N 41-22-23 W	133.02	
307	3095333.72	397934.37	S 47-49-19 W	44.00	
308	3095304.17	397901.76	N 38-18-13 W	3612.42	Tie Line
309	3098138.92	395662.68	N 68-38-0 E	121.00	
310	3098183.00	395775.36	N 31-5-25 W	552.96	
311	3098656.53	395489.81	N 11-57-25 W	546.86	
312	3099191.51	395376.51	S 70-48-36 W	127.50	
313	3099149.60	395256.10	N 3-30-19 W	896.79	Tie Line
314	3100044.71	395201.26	N 71-52-36 E	102.79	
315	3100076.69	395298.95	N 2-11-25 W	466.88	
316	3100543.23	395281.11	N 4-37-25 W	453.88	
317	3100995.63	395244.52	N 3-53-25 W	435.86	
318	3101430.49	395214.94	N 11-29-24 W	164.92	
319	3101592.10	395182.09	N 10-49-24 W	793.00	

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
320	3102371.00	395033.18	N 15-53-24 W	493.00	
321	3102845.16	394898.20	S 81-40-36 W	92.50	
322	3102831.77	394806.67	N 46-30-12 W	8971.20	Tie Line
323	3109006.70	388298.86	S 65-25-19 W	1466.52	Tie Line
324	3108396.71	386965.23	N 30-32-41 W	2.00	
325	3108398.44	386964.22	S 2-35-23 W	2510.02	Tie Line
326	3105890.97	386850.82	S 9-42-22 E	56.22	
327	3105835.55	386860.30	N 61-42-18 E	189.83	
328	3105925.54	387027.44	N 64-16-18 E	191.82	
329	3106008.81	387200.25	N 52-52-18 E	213.80	
330	3106137.86	387370.70	N 43-54-18 E	223.79	
331	3106299.10	387525.89	N 43-43-18 E	145.87	
332	3106404.52	387626.71	N 6-50-18 E	118.89	
333	3106522.57	387640.86	N 24-0-18 E	137.87	
334	3106648.51	387696.95	N 44-30-18 E	77.17	
335	3106703.55	387751.04	N 67-14-44 E	2754.08	Tie Line
336	3107768.81	390290.74	S 53-14-44 E	36.00	
337	3107747.27	390319.58	S 31-16-42 E	27.00	
338	3107724.19	390333.60	S 27-7-43 E	2006.99	Tie Line
339	3105938.01	391248.77	S 23-6-12 E	113.97	
340	3105833.18	391293.49	S 40-58-54 E	254.95	
341	3105640.71	391460.69	S 43-27-54 E	369.92	
342	3105372.23	391715.16	S 48-37-54 E	195.96	
343	3105242.72	391862.22	S 43-50-54 E	158.97	
344	3105128.07	391972.35	S 35-52-54 E	179.96	
345	3104982.27	392077.83	S 67-52-54 E	226.95	
346	3104896.82	392288.07	S 68-27-54 E	489.21	
347	3104717.25	392743.13	S 68-27-54 E	29.80	Tie Line
348	3104706.31	392770.85	S 68-27-53 E	25.80	
349	3104696.84	392794.85	S 60-17-54 E	449.91	
350	3104473.92	393185.64	S 29-2-54 E	244.30	
351	3104260.35	393304.26	S 14-16-24 E	6758.54	Tie Line
352	3097710.47	394970.60	S 34-59-52 E	21.30	
353	3097693.02	394982.81	S 37-57-3 E	6.00	
354	3097688.29	394986.50	S 37-57-0 E	25.50	Tie Line
355	3097668.18	395002.18	S 37-57-0 E	143.01	

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
356	3097555.41	395090.13	S 76-13-0 E	330.39	
357	3097476.70	395411.00	S 52-37-0 E	130.15	
358	3097397.68	395514.42	S 24-8-0 E	102.52	
359	3097304.12	395556.34	S 35-50-0 E	93.11	
360	3097228.64	395610.85	S 18-27-0 E	222.26	
361	3097017.80	395681.19	S 57-49-0 E	180.21	
362	3096921.82	395833.71	S 49-23-0 E	236.28	
363	3096768.01	396013.06	S 10-8-0 E	351.42	
364	3096422.07	396074.89	S 20-33-0 E	272.32	
365	3096167.08	396170.49	S 25-24-0 E	306.36	
366	3095890.34	396301.90	S 36-43-0 E	246.29	
367	3095692.92	396449.14	S 38-53-26 E	471.25	
368	3095326.13	396745.01	N 78-2-35 E	42.73	
369	3095334.98	396786.81	S 32-30-26 E	520.33	
370	3094896.18	397066.44	N 17-34-30 E	64.71	
371	3094957.87	397085.98	N 42-55-0 E	104.00	
372	3095034.04	397156.80	S 13-46-51 E	4781.01	Tie Line
373	3090390.70	398295.71	S 15-31-13 W	103.27	
374	3090291.20	398268.08	S 1-55-47 E	187.07	
375	3090104.24	398274.38	S 3-45-25 E	257.41	
376	3089847.38	398291.25	S 3-51-49 W	202.80	
377	3089645.05	398277.58	S 8-26-49 W	162.52	
378	3089484.29	398253.71	S 0-0-49 W	216.00	
379	3089268.29	398253.66	S 11-50-11 E	191.71	
380	3089080.66	398292.99	S 23-14-55 E	182.45	
381	3088913.03	398365.01	S 88-17-22 E	134.50	
382	3088909.01	398499.44	S 24-47-58 E	694.75	Tie Line
383	3088278.34	398790.85	N 89-10-22 W	83.00	
384	3088279.54	398707.86	S 30-5-22 E	209.61	
385	3088098.18	398812.95	S 22-21-22 E	193.82	
386	3087918.93	398886.68	S 34-15-22 E	115.00	
387	3087823.88	398951.41	S 12-20-51 W	3888.58	Tie Line
388	3084025.27	398119.91	N 33-9-14 W	106.00	
389	3084114.02	398061.94	N 49-14-14 W	481.76	
390	3084428.57	397697.05	N 79-25-21 W	64.78	
391	3084440.46	397633.37	S 55-32-52 W	529.94	

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
392	3084140.66	397196.39	N 35-13-29 W	8.25	
393	3084147.40	397191.63	S 54-54-2 W	369.49	
394	3083934.94	396889.34	S 20-48-6 W	14.76	
395	3083934.94	396889.34	S 20-48-5 W	861.10	
396	3083129.97	396583.55	S 54-1-35 E	84.59	
397	3083080.28	396652.01	S 1-15-58 E	89.91	
398	3082990.40	396653.99	S 7-56-25 W	117.37	
399	3082874.15	396637.78	S 29-59-25 W	132.76	
400	3082759.17	396571.42	S 46-7-25 W	90.38	
401	3082696.52	396506.28	S 15-21-25 W	79.75	
402	3082619.62	396485.16	S 32-0-25 W	253.60	
403	3082404.57	396350.75	S 52-9-25 W	276.43	
404	3082234.98	396132.45	S 16-51-25 W	171.36	
405	3082070.99	396082.77	S 25-58-25 W	127.01	
406	3081956.81	396027.14	N 85-48-37 W	97.54	Tie Line
407	3081963.94	395929.87	N 60-50-35 W	131.86	
408	3082028.18	395814.71	S 27-40-1 W	387.49	
409	3081684.99	395634.80	S 44-42-25 W	395.39	
410	3081403.98	395356.65	S 33-42-25 W	524.79	
411	3080967.42	395065.43	S 82-54-13 W	174.08	
412	3080945.91	394892.69	S 33-46-17 W	114.53	
413	3080850.71	394829.02	S 33-46-18 W	43.43	
414	3080814.60	394804.88	S 33-46-17 W	125.00	Tie Line
415	3080710.70	394735.40	S 33-46-17 W	446.25	
416	3080339.75	394487.34	S 19-53-39 W	756.67	
417	3079628.24	394229.87	S 17-15-35 W	993.22	
418	3078679.75	393935.19	S 18-18-5 W	114.29	
419	3078571.24	393899.31	S 18-18-5 W	380.23	
420	3078210.24	393779.91	S 22-26-5 W	299.71	
421	3077933.22	393665.54	S 5-45-5 W	176.83	
422	3077757.28	393647.82	S 14-55-5 W	155.85	
423	3077606.68	393607.70	S 7-30-5 W	251.75	
424	3077357.09	393574.84	S 1-57-55 W	147.86	
425	3077209.32	393569.77	S 1-27-5 W	187.82	
426	3077021.56	393565.01	S 12-49-55 E	275.73	
427	3076752.72	393626.25	S 24-49-55 E	239.76	

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
428	3076535.13	393726.94	S 22-19-55 E	73.93	
429	3076466.74	393755.03	S 48-26-55 E	137.86	
430	3076375.30	393858.20	N 41-10-4 E	19.98	
431	3076390.34	393871.35	S 13-54-54 E	136.19	
432	3076258.15	393904.11	S 49-23-54 E	95.85	
433	3076195.77	393976.88	S 71-29-58 E	179.50	
434	3076138.82	394147.10	N 49-57-42 E	90.00	
435	3076196.72	394216.01	S 40-20-18 E	60.00	
436	3076150.98	394254.84	S 24-11-40 E	6.30	
437	3076145.24	394257.43	S 1-6-39 W	5723.32	Tie Line
438	3070423.04	394146.54	S 7-56-50 W	108.60	
439	3070315.49	394131.53	S 14-44-2 E	331.99	
440	3069994.42	394215.96	S 30-22-36 E	247.36	
441	3069781.02	394341.05	S 16-55-10 W	228.96	
442	3069561.97	394274.42	S 10-2-51 E	153.20	
443	3069411.12	394301.15	S 3-52-37 E	193.08	
444	3069218.48	394314.20	S 7-19-45 E	160.70	
445	3069059.10	394334.71	S 4-21-38 E	175.89	
446	3068883.72	394348.08	S 9-5-49 E	189.48	
447	3068696.62	394378.04	S 16-40-58 E	451.01	
448	3068264.60	394507.52	S 20-57-0 E	341.58	
449	3067945.61	394629.65	S 36-25-0 E	88.02	
450	3067874.78	394681.90	S 36-25-0 E	83.55	Tie Line
451	3067807.54	394731.50	S 36-25-0 E	32.30	
452	3067781.55	394750.68	S 23-17-0 E	186.98	
453	3067609.80	394824.59	S 34-23-0 E	103.03	
454	3067524.77	394882.77	S 34-15-45 E	1200.03	
455	3066533.00	395558.37	S 30-12-34 E	360.62	
456	3066221.36	395739.82	S 30-12-34 E	30.20	Tie Line
457	3066195.27	395755.02	S 30-12-35 E	23.30	
458	3066175.13	395766.74	S 22-49-34 E	340.06	
459	3065861.71	395898.67	S 3-0-3 E	1044.49	Tie Line
460	3064818.66	395953.36	S 23-31-26 W	57.10	
461	3064766.30	395930.57	S 40-0-26 W	635.34	
462	3064279.66	395522.13	S 63-20-39 E	24.29	
463	3064268.76	395543.83	S 63-20-39 E	153.71	

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
464	3064199.80	395681.21	S 44-27-52 W	1193.60	Tie Line
465	3063347.94	394845.15	N 35-0-34 W	135.54	
466	3063458.96	394767.39	S 51-48-26 W	780.93	
467	3062976.10	394153.64	S 52-32-24 W	16.00	
468	3062966.37	394140.94	S 50-47-3 W	2662.56	Tie Line
469	3061282.97	392078.11	S 44-29-15 W	115.58	
470	3061200.52	391997.12	S 71-54-11 W	163.06	
471	3061149.87	391842.13	S 61-24-15 W	330.13	
472	3060991.85	391552.27	S 55-52-15 W	60.13	
473	3060958.12	391502.50	S 46-43-52 W	340.28	Tie Line
474	3060724.88	391254.73	S 34-9-14 W	57.20	
475	3060677.55	391222.62	S 37-14-15 W	280.11	
476	3060454.54	391053.12	S 35-21-15 W	130.05	
477	3060348.47	390977.87	S 29-3-15 W	150.06	
478	3060217.30	390905.00	S 58-23-15 W	146.06	
479	3060140.74	390780.62	S 35-3-15 W	190.07	
480	3059985.14	390671.45	S 47-21-16 W	43.92	
481	3059955.39	390639.15	S 47-21-15 W	66.70	Tie Line
482	3059910.20	390590.09	S 47-21-15 W	74.45	
483	3059859.77	390535.33	S 46-46-15 W	163.06	
484	3059748.08	390416.52	S 49-1-15 W	184.07	
485	3059627.37	390277.56	S 40-23-15 W	270.10	
486	3059421.64	390102.55	S 43-43-15 W	280.11	
487	3059219.20	389908.96	S 23-8-15 W	130.05	
488	3059099.61	389857.86	S 46-36-45 E	110.50	
489	3059023.71	389938.16	S 27-10-7 W	1806.19	Tie Line
490	3057416.81	389113.46	S 86-46-16 W	94.35	
491	3057411.49	389019.26	S 86-32-41 W	98.85	
492	3057405.53	388920.59	S 28-5-19 E	554.28	
493	3056916.54	389181.57	N 89-50-41 E	392.42	
494	3056917.61	389573.98	S 44-9-19 E	440.15	
495	3056601.83	389880.60	S 14-45-19 E	666.32	
496	3055957.49	390050.31	S 17-27-19 E	961.18	
497	3055040.58	390338.63	S 24-15-19 E	533.81	
498	3054553.90	390557.92	N 77-4-28 E	263.82	
499	3054612.91	390815.05	S 11-17-32 W	6793.49	Tie Line

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
500	3047950.98	389484.88	S 79-34-12 W	152.80	
501	3047923.31	389334.61	S 17-16-12 W	449.50	
502	3047494.08	389201.17	S 28-56-12 W	373.32	
503	3047167.37	389020.55	S 29-59-56 W	357.13	
504	3046858.08	388841.99	S 23-58-7 W	287.42	
505	3046595.45	388725.24	S 36-32-14 W	738.03	
506	3046002.46	388285.87	N 61-21-35 W	1040.13	
507	3046500.99	387373.01	S 10-56-24 E	742.50	
508	3045772.00	387513.92	S 51-5-4 E	425.66	
509	3045504.61	387845.12	S 51-5-4 E	389.64	
510	3045259.86	388148.28	S 88-39-33 W	1995.70	Tie Line
511	3045213.14	386153.15	N 67-46-9 E	90.96	
512	3045247.55	386237.35	N 67-46-9 E	211.10	
513	3045327.42	386432.76	N 12-47-0 W	90.76	
514	3045415.93	386412.67	N 18-58-49 W	461.08	Radius 1672.965; Arc Length 462.556; Side R
515	3045851.94	386262.71	N 68-19-10 W	465.01	
516	3046023.72	385830.59	N 6-15-35 E	645.08	
517	3046664.95	385900.92	N 26-20-57 W	176.20	
518	3046822.84	385822.72	S 74-3-25 W	218.92	
519	3046762.71	385612.22	N 56-15-33 W	155.89	
520	3046849.29	385482.59	N 27-59-33 W	112.65	
521	3046948.76	385429.72	N 71-1-33 W	108.46	
522	3046984.02	385327.15	N 83-33-33 W	72.40	
523	3046992.15	385255.21	N 67-7-33 W	59.42	
524	3047015.24	385200.46	S 66-11-27 W	81.39	
525	3046982.38	385126.00	N 71-14-33 W	65.66	
526	3047003.50	385063.83	N 3-45-33 W	98.27	
527	3047101.56	385057.38	N 68-20-33 W	744.71	
528	3047376.39	384365.25	N 31-57-33 W	179.96	
529	3047529.07	384270.00	N 66-57-33 W	332.20	
530	3047659.08	383964.30	S 74-22-27 W	344.14	
531	3047566.38	383632.88	S 86-57-28 W	57.02	
532	3047563.36	383575.94	N 80-19-33 W	196.53	
533	3047596.38	383382.21	N 67-56-33 W	122.74	
534	3047642.47	383268.45	S 62-38-27 W	83.69	

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
535	3047604.01	383194.13	S 71-29-27 W	274.83	
536	3047516.76	382933.52	N 83-14-33 W	96.77	
537	3047528.15	382837.42	S 74-7-27 W	230.89	
538	3047464.98	382615.34	S 78-21-27 W	266.64	
539	3047411.17	382354.19	S 82-21-27 W	105.86	
540	3047397.09	382249.27	S 89-13-0 W	216.78	
541	3047394.13	382032.51	S 89-31-10 W	374.00	
542	3047390.98	381658.53	N 83-47-50 W	209.10	
543	3047413.57	381450.66	N 87-37-9 W	176.30	
544	3047420.90	381274.51	S 72-49-48 W	433.00	
545	3047293.07	380860.81	S 68-49-27 W	499.94	
546	3047112.47	380394.64	S 70-1-45 W	565.88	
547	3046919.19	379862.80	S 53-58-9 W	263.55	
548	3046764.17	379649.67	S 62-10-47 W	271.36	
549	3046637.52	379409.68	S 63-21-50 W	280.41	
550	3046511.80	379159.03	S 48-28-50 W	594.61	
551	3046117.65	378713.84	S 71-43-0 W	154.38	
552	3046069.22	378567.25	S 5-54-14 E	25.95	
553	3046043.41	378569.92	S 77-37-41 W	360.47	
554	3045966.17	378217.83	N 22-50-24 W	322.96	
555	3046263.80	378092.46	N 67-35-4 E	191.74	
556	3046336.92	378269.71	N 71-49-4 E	269.17	
557	3046420.91	378525.44	N 6-3-30 W	64.00	
558	3046484.56	378518.69	N 4-48-30 W	256.55	
559	3046740.20	378497.18	N 4-48-30 W	365.87	
560	3047104.78	378466.51	N 45-24-20 E	161.94	
561	3047218.48	378581.82	N 29-16-0 E	191.73	
562	3047385.73	378675.55	N 46-18-0 E	213.40	
563	3047533.17	378829.83	N 42-33-0 E	172.53	
564	3047660.27	378946.50	N 56-41-14 W	97.27	Radius 1240; Arc Length 97.29; Side R
565	3047713.69	378865.21	N 54-26-22 W	768.14	
566	3048160.40	378240.33	N 59-9-57 W	286.28	Radius 1737.21; Arc Length 286.6; Side L
567	3048307.13	377994.52	S 28-51-9 W	292.64	
568	3048050.81	377853.31	S 28-51-8 W	27.00	
569	3048027.16	377840.28	N 54-36-59 W	935.32	Tie Line

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
570	3048568.75	377077.72	N 79-53-25 W	518.89	
571	3048659.82	376566.89	S 20-40-12 E	191.69	
572	3048480.47	376634.56	S 37-3-2 E	173.27	
573	3048342.19	376738.96	N 87-32-13 W	1097.25	Tie Line
574	3048389.33	375642.73	N 30-6-30 E	104.60	
575	3048479.82	375695.20	N 65-33-50 W	351.87	
576	3048625.38	375374.85	S 23-25-50 W	150.08	
577	3048487.67	375315.18	N 65-34-50 W	32.24	
578	3048501.00	375285.82	S 24-25-11 W	77.28	
579	3048430.63	375253.87	N 70-13-20 W	553.76	
580	3048618.00	374732.78	N 64-18-22 W	130.01	
581	3048674.37	374615.63	N 70-35-46 W	64.18	Tie Line
582	3048695.69	374555.10	N 33-18-33 W	143.04	
583	3048815.23	374476.54	N 32-28-46 E	100.00	
584	3048899.59	374530.24	N 57-31-14 W	112.44	
585	3048959.97	374435.39	N 58-3-58 W	247.11	
586	3049090.67	374225.68	N 66-5-23 E	65.77	Tie Line
587	3049090.67	374225.68	S 18-46-0 E	172.83	
588	3048927.03	374281.28	S 80-18-16 W	104.13	
589	3048909.49	374178.64	S 46-26-18 E	103.45	
590	3048838.20	374253.60	S 22-44-13 W	59.81	
591	3048783.04	374230.49	S 9-1-41 E	105.50	
592	3048678.85	374247.04	N 82-31-6 E	87.46	
593	3048690.24	374333.76	N 61-52-44 E	21.00	
594	3048700.14	374352.28	S 28-7-16 E	100.00	
595	3048611.94	374399.41	N 61-52-44 E	150.00	
596	3048682.64	374531.70	N 60-50-17 E	26.79	Radius 737.44; Arc Length 26.79; Side L
597	3048674.37	374615.63	S 59-19-31 W	70.17	Radius 787.44; Arc Length 70.19; Side R
598	3048638.57	374555.28	S 61-52-44 W	512.00	
599	3048397.25	374103.73	S 89-26-19 W	125.13	Tie Line
600	3048396.02	373978.61	N 89-56-11 W	84.70	
601	3048396.11	373893.91	N 3-30-6 E	30.43	
602	3048426.48	373895.77	N 67-13-10 E	14.58	
603	3048432.13	373909.21	N 1-10-4 E	107.00	
604	3048539.11	373911.39	N 80-56-32 E	43.28	

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
605	3048545.92	373954.13	S 9-16-27 E	151.89	
606	3048397.25	374103.73	S 88-36-11 W	286.32	Radius 318.35; Arc Length 296.973; Side R
607	3048390.26	373817.50	N 2-44-17 W	5.00	
608	3048395.26	373817.26	N 2-44-16 W	140.20	Tie Line
609	3048535.30	373810.56	N 9-3-33 W	967.56	
610	3049490.78	373658.20	N 23-43-20 E	163.41	
611	3049640.38	373723.94	N 23-44-40 E	152.47	
612	3049779.95	373785.33	N 14-11-20 E	168.57	
613	3049943.38	373826.65	N 17-35-24 W	84.26	Radius 80; Arc Length 88.74; Side L
614	3050023.70	373801.19	N 86-24-10 W	78.30	Radius 65; Arc Length 84.03; Side L
615	3050028.61	373723.04	S 56-33-44 W	168.10	
616	3049935.98	373582.77	N 49-41-8 W	82.96	
617	3049989.65	373519.51	N 56-33-44 E	232.60	
618	3050117.82	373713.61	N 60-21-28 W	986.58	
619	3050605.75	372856.15	N 17-38-21 E	393.49	Tie Line
620	3050980.74	372975.38	N 4-54-48 W	162.28	
621	3051142.42	372961.48	N 21-17-52 W	225.67	Radius 400; Arc Length 228.77; Side L
622	3051352.67	372879.51	S 5-56-55 W	238.07	
623	3051115.89	372854.84	S 53-36-52 W	3116.61	
624	3049267.05	370345.89	S 14-41-28 E	210.37	
625	3049063.56	370399.24	S 39-27-41 W	63.48	
626	3049014.55	370358.89	S 58-3-0 W	97.83	
627	3048962.78	370275.89	S 88-34-37 W	59.59	
628	3048961.30	370216.32	S 89-5-52 W	130.07	
629	3048959.25	370086.28	S 83-1-45 W	231.43	Radius 800; Arc Length 232.24; Side L
630	3048931.17	369856.57	S 76-17-52 W	137.07	
631	3048898.70	369723.40	S 57-43-52 W	362.38	
632	3048705.22	369416.99	S 50-6-52 W	824.54	
633	3048176.48	368784.32	S 66-31-4 W	265.92	
634	3048070.51	368540.42	S 58-43-52 W	82.08	
635	3048027.91	368470.27	S 50-21-52 W	524.72	
636	3047693.19	368066.18	S 56-6-52 W	747.31	

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
637	3047276.53	367445.81	S 64-37-52 W	104.02	
638	3047231.96	367351.82	N 69-51-0 W	58.71	
639	3047252.19	367296.70	S 70-28-14 W	226.30	
640	3047176.53	367083.43	S 33-4-13 W	436.52	
641	3046810.73	366845.24	S 76-10-47 E	588.07	
642	3046670.26	367416.28	S 50-11-11 W	364.16	
643	3046437.09	367136.56	S 48-18-13 W	437.95	
644	3046145.77	366809.56	S 52-38-13 W	266.14	
645	3045984.26	366598.03	S 40-28-13 W	354.99	
646	3045714.20	366367.63	S 52-10-13 W	257.47	
647	3045556.29	366164.28	S 83-3-13 W	141.50	
648	3045539.17	366023.82	N 89-26-47 W	309.72	
649	3045542.16	365714.12	S 56-58-13 W	605.13	
650	3045212.32	365206.79	S 42-35-39 W	310.86	
651	3044983.47	364996.41	S 44-20-39 W	185.03	
652	3044851.15	364867.08	S 38-17-30 W	233.65	
653	3044667.76	364722.30	S 26-39-7 W	374.12	
654	3044333.39	364554.49	S 22-2-7 W	444.70	
655	3043921.18	364387.65	S 10-36-7 W	458.10	
656	3043470.90	364303.37	S 10-36-7 W	662.85	
657	3042819.36	364181.43	S 11-12-7 W	495.84	
658	3042332.97	364085.11	S 11-12-7 W	1721.49	
659	3040644.28	363750.70	N 88-7-20 E	485.62	
660	3040660.20	364236.05	N 88-7-14 E	83.93	
661	3040662.96	364319.94	S 78-36-14 W	+/-931	
662	3040845.23	365232.60	S 8-10-10 E	714.72	
663	3040137.77	365334.17	S 2-30-57 E	494.40	Radius 1974.459; Arc Length 495.701; Side R
664	3039643.85	365355.88	S 62-8-53 E	292.23	
665	3039507.33	365614.25	S 61-34-3 E	173.00	
666	3039424.96	365766.38	N 6-47-57 E	763.30	
667	3040182.89	365856.74	N 83-12-2 W	57.00	
668	3040189.63	365800.14	N 6-47-57 E	67.00	
669	3040256.16	365808.07	N 18-23-54 W	244.20	
670	3040487.88	365731.00	N 16-31-54 W	156.40	
671	3040637.81	365686.49	N 6-14-34 W	145.10	

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
672	3040782.05	365670.71	N 80-23-6 E	95.00	
673	3040797.92	365764.38	N 11-46-6 E	371.60	
674	3041161.71	365840.16	N 11-1-6 E	180.00	
675	3041338.39	365874.56	S 78-10-54 E	170.96	
676	3041303.38	366041.90	N 23-19-10 E	558.79	Radius 2844.94; Arc Length 559.692; Side R
677	3041816.52	366263.09	S 32-44-28 E	62.24	
678	3041764.17	366296.75	S 38-33-20 E	143.00	
679	3041652.34	366385.88	S 38-22-22 E	142.47	
680	3041540.65	366474.32	S 38-25-24 E	68.98	
681	3041486.61	366517.19	S 51-57-0 W	99.69	
682	3041425.17	366438.69	S 38-16-34 E	207.21	
683	3041262.50	366567.04	S 51-46-23 W	123.39	
684	3041186.15	366470.11	S 38-37-0 E	35.56	
685	3041158.37	366492.31	N 51-25-28 E	90.83	
686	3041215.01	366563.32	S 37-48-3 E	28.59	
687	3041192.42	366580.84	N 51-27-29 E	50.58	
688	3041223.93	366620.40	N 51-31-0 E	82.61	
689	3041275.34	366685.06	N 38-5-34 W	110.08	
690	3041361.97	366617.15	N 38-31-17 W	71.63	
691	3041418.01	366572.54	N 45-59-48 E	213.71	
692	3041566.48	366726.26	N 46-5-18 E	60.43	
693	3041608.39	366769.79	N 46-1-3 E	477.39	
694	3041939.91	367113.29	N 46-1-3 E	60.35	
695	3041981.82	367156.72	N 46-1-3 E	485.80	
696	3042319.18	367506.27	S 26-56-0 E	285.94	
697	3042064.26	367635.78	S 52-32-26 W	126.52	
698	3041987.31	367535.36	S 30-13-59 E	284.86	
699	3041741.20	367678.79	S 14-3-1 E	100.43	Tie Line
700	3041642.56	367703.35	S 46-14-4 E	26.90	
701	3041623.95	367722.77	S 41-34-13 W	340.22	
702	3041373.31	367500.49	S 37-45-42 W	269.68	Radius 1951.33; Arc Length 269.897; Side L
703	3041160.11	367335.35	S 32-54-36 W	60.56	Radius 1951.33; Arc Length 60.558; Side L
704	3041109.27	367302.45	S 26-13-38 W	393.97	Radius 1951.33; Arc Length 394.645; Side L

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
705	3040755.86	367128.35	N 65-28-12 W	98.97	
706	3040796.95	367038.31	N 70-34-53 W	186.00	
707	3040858.79	366862.89	N 22-16-7 E	55.60	
708	3040910.24	366883.96	N 49-7-53 W	33.00	
709	3040931.83	366859.01	S 52-0-7 W	79.99	
710	3040882.59	366795.97	N 69-57-12 W	33.12	
711	3040893.94	366764.86	N 48-29-39 E	142.85	Radius 960.004; Arc Length 142.982; Side R
712	3040988.61	366871.84	N 52-45-40 E	377.21	
713	3041216.87	367172.14	S 44-13-45 E	51.31	
714	3041180.11	367207.93	S 51-52-30 E	107.81	
715	3041113.55	367292.74	S 66-14-5 E	10.63	
716	3041160.11	367335.36	N 66-14-7 W	12.19	
717	3041165.02	367324.20	N 51-52-30 W	96.23	
718	3041224.43	367248.50	N 44-13-46 W	40.50	
719	3041253.45	367220.25	N 52-45-39 E	170.39	
720	3041356.56	367355.90	N 59-9-17 E	91.89	
721	3041403.68	367434.79	N 48-20-49 E	359.43	
722	3041741.20	367678.79	N 43-45-56 E	44.85	
723	3041773.59	367709.81	N 44-18-26 E	133.23	
724	3041868.93	367802.87	N 21-55-6 W	137.60	
725	3041996.58	367751.51	N 42-39-41 E	40.24	
726	3042026.17	367778.78	N 43-59-14 E	65.00	
727	3042072.94	367823.92	N 45-19-23 W	186.44	
728	3042204.02	367691.34	N 42-27-8 E	66.01	
729	3042252.73	367735.90	N 42-21-38 E	162.85	
730	3042373.06	367845.62	S 47-38-40 E	186.69	
731	3042247.29	367983.58	S 42-21-21 W	20.00	
732	3042232.51	367970.11	S 46-40-14 E	131.79	
733	3042142.08	368065.97	N 43-45-56 E	230.06	
734	3042308.22	368225.10	N 46-11-38 W	128.00	
735	3042396.82	368132.73	N 43-43-10 E	80.49	
736	3042455.00	368188.36	N 46-11-39 W	24.00	
737	3042471.61	368171.04	N 43-43-10 E	104.83	
738	3042547.37	368243.49	S 46-28-51 E	152.15	
739	3042442.61	368353.82	N 43-45-56 E	106.56	

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
740	3042519.56	368427.52	N 51-39-38 W	1302.13	
741	3043327.28	367406.20	N 51-39-37 W	66.00	
742	3043368.22	367354.43	N 38-14-23 E	3684.96	
743	3046262.50	369635.19	N 38-14-23 E	59.89	
744	3046309.54	369672.26	N 38-14-23 E	600.18	
745	3046780.94	370043.74	N 8-27-26 E	254.34	
746	3047032.51	370081.14	N 51-44-34 W	13.60	
747	3047040.93	370070.46	N 38-15-40 E	2.40	
748	3047042.82	370071.95	N 22-46-26 E	42.90	
749	3047082.37	370088.55	N 8-27-26 E	36.00	
750	3047117.98	370093.85	N 11-25-26 E	151.40	Radius 1469.173; Arc Length 151.467; Side R
751	3047266.38	370123.83	N 22-39-26 E	965.35	
752	3048157.23	370495.69	N 23-3-45 E	47.69	
753	3048201.11	370514.37	N 35-44-44 E	295.97	Radius 750.113; Arc Length 297.924; Side R
754	3048441.33	370687.26	N 40-33-17 E	50.70	
755	3048479.85	370720.23	N 66-7-26 E	61.87	
756	3048504.89	370776.80	N 47-9-26 E	505.00	
757	3048848.29	371147.07	S 42-50-34 E	33.60	
758	3048823.65	371169.92	N 48-17-26 E	318.60	
759	3049035.63	371407.76	S 51-44-34 E	81.10	
760	3048985.42	371471.44	N 75-29-26 E	138.10	
761	3049020.02	371605.13	N 38-15-26 E	20.00	
762	3049035.72	371617.52	N 51-44-36 W	66.89	
763	3049077.14	371564.99	N 30-39-12 W	169.31	Tie Line
764	3049222.79	371478.67	S 63-23-7 W	393.95	Radius 840.255; Arc Length 397.65; Side L
765	3049046.30	371126.47	S 43-21-2 W	24.80	
766	3049028.27	371109.44	S 47-9-35 W	661.90	
767	3048578.20	370624.12	S 66-21-20 W	50.58	
768	3048557.92	370577.78	S 45-9-12 W	54.88	
769	3048519.22	370538.87	S 50-58-9 E	15.00	
770	3048509.77	370550.53	S 34-22-51 W	265.12	Radius 854.357; Arc Length 266.195; Side L
771	3048290.97	370400.82	S 24-2-31 W	47.47	
772	3048247.61	370381.48	S 22-42-37 W	502.52	

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
773	3047784.05	370187.48	S 30-18-37 W	60.50	
774	3047731.82	370156.95	S 26-53-55 W	56.70	
775	3047681.26	370131.29	N 51-45-8 W	321.66	
776	3047880.38	369878.68	S 38-14-52 W	700.50	
777	3047330.25	369445.04	S 51-45-6 E	190.25	
778	3047212.47	369594.45	N 37-52-15 E	200.00	
779	3047370.35	369717.22	S 52-7-44 E	199.10	
780	3047248.13	369874.39	S 37-52-16 W	200.00	
781	3047090.25	369751.62	S 50-59-42 E	101.42	
782	3047026.42	369830.43	S 38-16-29 W	120.04	
783	3046932.18	369756.07	S 51-43-38 E	54.62	
784	3046898.35	369798.95	S 38-16-23 W	64.00	
785	3046848.11	369759.31	S 54-56-53 E	58.69	
786	3046814.40	369807.36	S 38-4-49 W	100.10	
787	3046735.61	369745.62	S 51-42-24 E	10.00	
788	3046729.41	369753.47	S 38-17-39 W	40.00	
789	3046698.02	369728.68	N 51-42-24 W	10.00	
790	3046704.22	369720.83	S 38-58-4 W	340.08	
791	3046439.81	369506.97	S 38-17-39 W	59.89	
792	3046392.80	369469.86	S 38-17-39 W	1139.99	
793	3045498.09	368763.42	N 51-41-43 W	109.63	
794	3045566.04	368677.39	S 38-16-9 W	449.00	
795	3045213.53	368399.31	N 51-43-51 W	252.90	
796	3045370.16	368200.76	N 20-49-6 W	283.53	
797	3045635.17	368099.99	N 10-2-10 E	246.90	
798	3045878.30	368143.01	N 38-19-10 E	681.44	
799	3046412.93	368565.52	N 51-40-50 W	20.00	
800	3046425.33	368549.83	N 38-19-10 E	599.92	
801	3046896.01	368921.80	S 51-40-50 E	20.00	
802	3046883.61	368937.49	N 39-19-9 E	554.01	
803	3047312.21	369288.53	N 79-9-27 E	91.94	
804	3047329.50	369378.82	N 38-14-52 E	799.37	
805	3047957.28	369873.67	N 45-22-17 E	588.17	
806	3048370.48	370292.25	N 51-38-47 W	43.95	
807	3048397.75	370257.78	N 53-10-5 E	1502.79	Tie Line
808	3049298.64	371460.59	S 13-24-26 E	77.97	

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
809	3049077.14	371564.99	N 79-18-39 E	217.60	
810	3049117.50	371778.81	N 75-21-8 E	54.00	Radius 391.06; Arc Length 54.04; Side L
811	3049131.16	371831.06	N 71-23-39 E	120.05	
812	3049169.46	371944.83	N 72-0-31 E	8.66	Radius 451.043; Arc Length 8.66; Side R
813	3049172.14	371953.07	S 17-20-50 E	1.00	
814	3049171.18	371953.37	S 80-8-20 E	342.05	Radius 374.06; Arc Length 355.25; Side R
815	3049112.61	372290.36	S 50-42-56 E	5.57	
816	3049109.08	372294.67	N 39-33-30 E	18.17	Tie Line
817	3049123.09	372306.24	N 57-31-23 W	27.09	Radius 392.06; Arc Length ; Side R
818	3049137.64	372283.38	N 61-28-54 W	27.09	Radius 392.06; Arc Length ; Side R
819	3049150.57	372259.58	N 56-33-43 E	34.00	
820	3049169.31	372287.95	S 57-4-25 E	24.00	
821	3049156.26	372308.10	N 53-17-5 E	10.00	
822	3049162.24	372316.11	S 56-8-51 E	31.00	
823	3049144.97	372341.86	S 58-26-18 W	41.80	
824	3049109.08	372294.67	S 56-33-46 W	12.76	
825	3049102.05	372284.02	S 50-12-15 W	63.62	
826	3049061.33	372235.14	S 38-14-45 W	27.03	
827	3049040.10	372218.40	S 51-47-12 E	350.00	
828	3048823.60	372493.40	S 38-14-45 W	200.00	
829	3048666.53	372369.60	S 51-47-12 E	508.41	
830	3048352.03	372769.06	S 38-28-20 W	300.55	
831	3048116.73	372582.08	S 51-47-12 E	185.93	
832	3048001.72	372728.17	N 38-23-20 E	132.00	
833	3048105.18	372810.14	S 51-29-36 E	189.33	
834	3047987.31	372958.30	N 38-18-24 E	88.82	
835	3048057.00	373013.35	S 46-24-40 E	375.99	Radius 1492.69; Arc Length 376.99; Side L
836	3047797.77	373285.68	S 53-38-47 E	142.46	
837	3047713.33	373400.42	N 80-8-39 E	30.11	Radius 28.536; Arc Length 31.715; Side L
838	3047718.48	373430.08	N 64-5-10 W	16.23	
839	3047725.57	373415.48	S 88-27-13 E	87.82	

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
840	3047723.21	373503.27	S 2-28-0 W	294.75	
841	3047428.73	373490.59	S 71-19-40 E	168.80	
842	3047374.69	373650.50	S 63-31-0 E	18.00	
843	3047366.66	373666.61	S 62-7-30 E	190.15	
844	3047277.76	373834.70	N 43-39-30 E	17.22	
845	3047290.22	373846.58	S 19-10-53 E	702.37	Tie Line
846	3046626.85	374077.36	N 41-15-14 W	79.51	
847	3046686.63	374024.93	S 54-19-3 W	15.79	
848	3046677.42	374012.11	S 24-31-27 W	106.28	
849	3046580.72	373967.99	S 21-35-0 W	73.22	
850	3046512.64	373941.06	S 54-36-40 W	68.97	
851	3046472.70	373884.83	S 70-23-9 E	19.51	
852	3046466.15	373903.21	S 19-53-21 W	15.00	
853	3046452.04	373898.11	S 32-56-42 E	82.46	
854	3046382.84	373942.95	S 1-49-30 W	46.49	Tie Line
855	3046336.37	373941.47	S 19-37-39 W	78.64	
856	3046241.93	373971.49	N 70-8-59 W	60.00	
857	3046155.27	373940.59	N 19-37-39 E	92.00	
858	3046101.83	374088.63	N 70-9-0 W	157.40	
859	3046101.83	374088.63	N 25-59-42 W	174.15	
860	3046258.36	374012.30	N 42-14-23 W	105.37	Radius 261.5; Arc Length 106.1; Side L
861	3046382.84	373942.95	S 32-7-5 E	75.83	
862	3046318.62	373983.27	S 52-49-0 E	102.13	
863	3046256.90	374064.64	S 7-21-59 E	62.44	
864	3046194.97	374072.64	S 33-10-59 E	105.13	
865	3046106.99	374130.18	S 0-2-17 W	295.74	
866	3045811.25	374129.99	N 70-20-15 W	80.00	
867	3045838.17	374054.65	S 19-39-45 W	173.53	
868	3045674.76	373996.27	S 15-51-52 W	61.44	
869	3045615.66	373979.47	S 34-4-40 W	56.15	
870	3045569.15	373948.01	S 25-0-24 E	110.00	
871	3045469.46	373994.51	S 27-23-36 W	144.00	
872	3045341.61	373928.26	N 58-58-50 W	407.95	
873	3045551.83	373578.65	S 10-49-13 W	508.90	
874	3045051.98	373483.12	S 31-51-47 E	264.25	

Point No.	NAD83 Massachusetts State Plane		Direction	Distance (feet)	Description
	North (ft)	East (ft)			
875	3044827.56	373622.62	N 77-10-55 E	98.54	
876	3044849.42	373718.70	N 29-48-25 E	264.08	
877	3045078.56	373849.97	N 38-28-55 E	192.53	
878	3045229.28	373969.77	S 7-34-25 W	91.21	
879	3045138.86	373957.75	S 1-38-25 W	123.67	
880	3045015.24	373954.21	S 4-54-25 W	197.44	
881	3044818.53	373937.32	S 44-28-5 E	170.34	
882	3044696.97	374056.65	S 40-46-5 E	263.46	
883	3044497.44	374228.69	S 37-3-58 W	197.94	
884	3044339.49	374109.39	S 7-31-59 W	239.82	
885	3044101.74	374077.95	S 21-24-0 E	250.35	
886	3043868.66	374169.30	S 27-6-30 E	254.33	
887	3043642.27	374285.19	S 42-53-0 E	248.18	
888	3043460.42	374454.08	S 4-4-0 W	251.88	
889	3043209.18	374436.22	S 47-45-42 E	356.10	
890	3042969.80	374699.86	N 42-26-9 E	100.03	
891	3043043.63	374767.35	S 47-45-42 E	140.00	
892	3042949.52	374871.00	S 67-22-13 E	148.36	
893	3042892.44	375007.94	N 42-16-47 E	253.36	
894	3043079.89	375178.38	N 82-13-22 E	85.95	
895	3043091.52	375263.54	S 47-47-7 E	62.82	
896	3043049.32	375310.07	S 85-23-51 E	123.83	
897	3043039.38	375433.50	N 54-57-28 E	120.08	
898	3043108.33	375531.81	N 75-27-28 E	66.00	
899	3043124.90	375595.69	S 47-35-0 E	224.19	

Final Application for New License for Major Water Power Project – Existing Dam

Northfield Project

Northfield Mountain Pumped Storage Project (FERC Project Number 2485)
Turners Falls Hydroelectric Project (FERC Project Number 1889)

EXHIBIT H- PLANS AND ABILITY OF APPLICANT TO OPERATE THE PROJECT

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EXHIBIT H – PLAN AND ABILITY OF APPLICANT TO OPERATE THE PROJECT

The following excerpt from the Code of Federal Regulations (CFR) at 18 CFR § 4.51 (e) describes the required content of this Exhibit.

The following excerpt from the Code of Federal Regulations (CFR) at 18 CFR § 5.18(c) describes the required content of this Exhibit.

(i) Information to be supplied by all applicants. All Applicants for a new license under this part must file the following information with the Commission:

(A) A discussion of the plans and ability of the applicant to operate and maintain the project in a manner most likely to provide efficient and reliable electric service, including efforts and plans to:

(1) Increase capacity or generation at the project;

(2) Coordinate the operation of the project with any upstream or downstream water resource projects; and

(3) Coordinate the operation of the project with the applicant's or other electrical systems to minimize the cost of production.

(B) A discussion of the need of the applicant over the short and long term for the electricity generated by the project, including:

(1) The reasonable costs and reasonable availability of alternative sources of power that would be needed by the applicant or its customers, including wholesale customers, if the applicant is not granted a license for the project;

(2) A discussion of the increase in fuel, capital, and any other costs that would be incurred by the applicant or its customers to purchase or generate power necessary to replace the output of the licensed project, if the applicant is not granted a license for the project;

(3) The effect of each alternative source of power on:

(i) The applicant's customers, including wholesale customers;

(ii) The applicant's operating and load characteristics; and

(iii) The communities served or to be served, including any reallocation of costs associated with the transfer of a license from the existing licensee.

(C) The following data showing need and the reasonable cost and availability of alternative sources of power:

(1) The average annual cost of the power produced by the project, including the basis for that calculation;

(2) The projected resources required by the applicant to meet the applicant's capacity and energy requirements over the short and long term including:

(i) Energy and capacity resources, including the contributions from the applicant's generation, purchases, and load modification measures (such as conservation, if considered as a resource), as separate components of the total resources required;

(ii) A resource analysis, including a statement of system reserve margins to be maintained for energy and capacity;

(iii) If load management measures are not viewed as resources, the effects of such measures on the projected capacity and energy requirements indicated separately;

(iv) For alternative sources of power, including generation of additional power at existing facilities, restarting deactivated units, the purchase of power off-system, the construction or purchase and operation of a new power plant, and load management measures such as conservation: The total annual cost of each alternative source of power to replace project power; the basis for the determination of projected annual cost; and a discussion of the relative merits of each alternative, including the issues of the period of availability and

dependability of purchased power, average life of alternatives, relative equivalent availability of generating alternatives, and relative impacts on the applicant's power system reliability and other system operating characteristics; and the effect on the direct providers (and their immediate customers) of alternate sources of power.

(D) If an applicant uses power for its own industrial facility and related operations, the effect of obtaining or losing electricity from the project on the operation and efficiency of such facility or related operations, its workers, and the relate community.

(E) If an applicant is an Indian tribe applying for a license for a project located on the tribal reservation, a statement of the need of such Indian tribe for electricity generated by the project to foster the purposes of the reservation.

(F) A comparison of the impact on the operations and planning of the applicant's transmission system of receiving or not receiving the project license, including:

(1) An analysis of the effects of any resulting redistribution of power flows on line loading (with respect to applicable thermal, voltage, or stability limits), line losses, and necessary new construction of transmission facilities or upgrading of existing facilities, together with the cost impact of these effects;

(2) An analysis of the advantages that the applicant's transmission system would provide in the distribution of the project's power; and

(3) Detailed single-line diagrams, including existing system facilities identified by name and circuit number, that show system transmission elements in relation to the project and other principal interconnected system elements. Power flow and loss data that represent system operating conditions may be appended if applicants believe such data would be useful to show that the operating impacts described would be beneficial.

(G) If the applicant has plans to modify existing project facilities or operations, a statement of the need for, or usefulness of, the modifications, including at least a reconnaissance-level study of the effect and projected costs of the proposed plans and any alternate plans, which in conjunction with other developments in the area would conform with a comprehensive plan for improving or developing the waterway and for other beneficial public uses as defined in Section 10(a)(1) of the Federal Power Act.

(H) If the applicant has no plans to modify existing project facilities or operations, at least a reconnaissance level study to show that the project facilities or operations in conjunction with other developments in the area would conform with a comprehensive plan for improving or developing the waterway and for other beneficial public uses as defined in Section 10(a)(1) of the Federal Power Act.

(I) A statement describing the applicant's financial and personnel resources to meet its obligations under a new license, including specific information to demonstrate that the applicant's personnel are adequate in number and training to operate and maintain the project in accordance with the provisions of the license.

(J) If an applicant proposes to expand the project to encompass additional lands, a statement that the applicant has notified, by certified mail, property owners on the additional lands to be encompassed by the project and governmental agencies and subdivisions likely to be interested in or affected by the proposed expansion.

(K) The applicant's electricity consumption efficiency improvement program, as defined under Section 10(a)(2)(C) of the Federal Power Act, including:

(1) A statement of the applicant's record of encouraging or assisting its customers to conserve electricity and a description of its plans and capabilities for promoting electricity conservation by its customers; and

(2) A statement describing the compliance of the applicant's energy conservation programs with any applicable regulatory requirements.

(L) The names and mailing addresses of every Indian tribe with land on which any part of the proposed project would be located or which the applicant reasonably believes would otherwise be affected by the proposed project.

(ii) Information to be provided by an applicant licensee. An existing licensee that applies for a new license must provide:

(A) The information specified in paragraph (c)(1) of this section.

(B) A statement of measures taken or planned by the licensee to ensure safe management, operation, and maintenance of the project, including:

(1) A description of existing and planned operation of the project during flood conditions;

(2) A discussion of any warning devices used to ensure downstream public safety;

(3) A discussion of any proposed changes to the operation of the project or downstream development that might affect the existing Emergency Action Plan, as described in subpart C of part 12 of this chapter, on file with the Commission;

(4) A description of existing and planned monitoring devices to detect structural movement or stress, seepage, uplift, equipment failure, or water conduit failure, including a description of the maintenance and monitoring programs used or planned in conjunction with the devices; and

(5) A discussion of the project's employee safety and public safety record, including the number of lost-time accidents involving employees and the record of injury or death to the public within the project boundary.

(C) A description of the current operation of the project, including any constraints that might affect the manner in which the project is operated.

(D) A discussion of the history of the project and record of programs to upgrade the operation and maintenance of the project.

(E) A summary of any generation lost at the project over the last five years because of unscheduled outages, including the cause, duration, and corrective action taken.

(F) A discussion of the licensee's record of compliance with the terms and conditions of the existing license, including a list of all incidents of noncompliance, their disposition, and any documentation relating to each incident.

(G) A discussion of any actions taken by the existing licensee related to the project which affects the public.

(H) A summary of the ownership and operating expenses that would be reduced if the project license were transferred from the existing licensee.

(I) A statement of annual fees paid under part I of the Federal Power Act for the use of any Federal or Indian lands included within the project boundary.

1 INFORMATION TO BE SUPPLIED BY ALL APPLICANTS

The Federal Power Act (FPA) requires applicants for a new license to provide certain information, including information about the applicant's record as the current licensee of the Project. Pursuant to 18 C.F.R. Section 5.18(c), this information is provided in this Exhibit. 18 C.F.R. Section 16.10(a) requires all applicants for a new license to provide certain information such as the need for Project power and the examination of alternative sources; plans to modify an existing Project; an applicant's ability to operate and maintain the Project; and the applicant's electrical efficiency programs. This information is included in Section 1.0 of this Exhibit. Pursuant to 18 C.F.R. Section 16.10(b) 5.18(c)(1)(ii), Section 2.0 contains information to be provided by an applicant who is the existing licensee for a Project and discusses FirstLight's safe management, operation, and maintenance of the Turners Falls Project (now Development) and Northfield Mountain Pumped Storage Project (now Development); operational history and programs to upgrade Project operation and maintenance; compliance with the current licenses; and actions related to the Project that affect the public.

The Turners Falls Development and Northfield Mountain Pumped Storage Development are collectively referenced herein as the Project.

1.1 Efficient and Reliable Electric Service

1.1.1 Increase in Capacity or Generation

At the Northfield Mountain Pumped Storage Development, there are four pump-turbines. Units 2, 3, and 4 underwent efficiency improvements with the replacement of the turbine runner, and rewind of the motor generator[1]. A new runner was installed in Unit 1 in 2004, and the rewind was completed in February 2016. No further modifications are proposed. At the Turners Falls Development, the six Cabot units underwent modifications in the early-to-mid 2000's. There are currently no plans to modify the existing units at Station No. 1.

At this time, FirstLight has no plans to increase capacity of the Project. FirstLight expects to maintain the efficient use of the water to maximize the generation output and provide the region a reliable and sound source of generation.

1.1.2 Coordination with any Upstream or Downstream Water Resource Projects

Headwater Benefits- Connecticut River Mainstem Storage Reservoirs

Inflows to the Turners Falls Impoundment (TFI) are largely controlled by operations at several upstream dams on the Connecticut River. More specifically, five upstream dams operate as seasonal storage reservoirs, where water elevations are typically lowered in the fall and winter, and refilled with the spring freshet. The seasonal operation and re-regulation of discharges from these dams provide benefits to downstream hydropower facilities by curtailing high flows in the spring and increasing low flows in the summer. These dams and storage volumes, in upstream to downstream order, include the following:

- First Connecticut Lake, 3.33 billion ft^3
- Second Connecticut Lake, 506 million ft^3
- Lake Francis, 4.326 billion ft^3
- Moore Reservoir, and 4.97 billion ft^3
- Comerford Reservoir. 1.279 billion ft^3

[1] On August 17, 2011, and supplemented on January 17, 2012, February 14, 2012, and February 24, 2012, FirstLight filed an amendment application to revise the authorized installed capacity of Northfield Mountain. FERC issued an order amending the license and revising annual changes on March 23, 2012.

Pursuant to a 1993 Headwater Benefit Agreement among predecessor companies and TransCanada, FirstLight pays an annual headwater benefit fee to TransCanada for the seasonal operation of its storage reservoirs (primarily driven by Moore Reservoir), which provides an incremental increase in generation at the Turners Falls Development. The Northfield Mountain Pumped Storage Development does not pay or receive any benefit as its operation is independent of seasonal river flows; a pumped-storage project cycles the flow between the TFI and Upper Reservoir. However, its operation is dependent on maintaining a continuous flow regime below the Vernon Hydroelectric Project.

Headwater Benefits- United States Army Corps of Engineer Storage Projects in Connecticut River Basin

In 1998, FERC issued its order on Headwater Benefits in the Connecticut River Basin. The order notes that because of energy gains at the Turners Falls Hydroelectric Development due to seasonal operation of the United States Corps of Engineers' Union Village, North Hartland, North Springfield, Ball Mountain, Townsend, Otter Brook, Surry Mountain, Tully and Birch Hill headwater storage projects, FirstLight pays an annual headwater benefit fee.

Headwater Benefits- Mascoma River Basin Storage Reservoirs

Pursuant to a 1990 Agreement among predecessor companies and the New Hampshire Water Resources Council, FirstLight pays headwater benefits for the seasonal operation of storage reservoirs located in the Mascoma River Watershed, which provides an incremental increase in generation at the Turners Falls Development. The Mascoma River empties into the Connecticut River near Lebanon, NH.

Other

In addition to the seasonal storage reservoirs, the next three projects (operated by TransCanada) above Turners Falls Dam - namely Vernon, Bellows Falls, and Wilder[2] - operate as peaking hydropower facilities, whereby flows can fluctuate on an hourly basis. Like Turners Falls Dam, the minimum flow required at Vernon Dam is equivalent to 0.2 cfs per square mile of drainage area or 1,250 cfs. The Vernon Hydroelectric Project has a station hydraulic capacity of 17,130 cfs[3] and when operating at full capacity, it exceeds the full hydraulic capacity of the Turners Falls Development of 15,938 cfs, not accounting for incremental inflow from the 897 mi^2 between the two dams. The magnitude and timing of discharges from the Vernon Hydroelectric Project are critical to the operation of the Turners Falls Development and Northfield Mountain Pumped Storage Development.

Article 304[4] of the Vernon Hydroelectric Project FERC license requires TransCanada to coordinate project operations with FirstLight. A letter Agreement amending the original 1993 Headwater Benefit Agreement was filed with FERC on June 20, 2003. The Agreement requires TransCanada to provide FirstLight by 8:00 am each day, with its estimate of total discharge (cfs-hours) expected the next day at the Vernon Hydroelectric Project. When TransCanada receives the hourly dispatch schedule for the next day from the ISO-New England (ISO-NE), it faxes or emails the schedule for Vernon discharges to FirstLight between 1:30 pm and 2:00 pm. There is no current requirement, however, for TransCanada to provide an hourly dispatch schedule the day ahead. If any subsequent dispatch schedules are received during the day showing changes in the projected hourly release schedules, the revised schedule for Vernon is faxed or emailed to FirstLight. Not having reliable and timely estimates of Vernon's hourly

[2] The Vernon Hydroelectric Project (FERC No. 1904), Bellows Hydroelectric Project (FERC No. 1855) and Wilder Hydroelectric Project (FERC No. 1892) are owned and operated by TransCanada.
[3] FERC Order Amending License and Revising Annual Charges, Project No. 1904-042, July 28, 2006.
[4] Article 304 was added to the license in 1992 (59 FERC ¶62,267) and generally requires the Licensee of Project No. 1904 (Vernon Hydroelectric Project) to develop and file with the Commission a coordination agreement with the licensee of certain downstream facilities in the event that the regional central dispatch system was ever discontinued. The dispatching of these hydropower projects under that system was discontinued several years ago in connection with the restructuring of the New England power markets.

release schedule the day ahead prevents FirstLight from the most efficient management of the TFI for power production.

1.1.3 Coordination of Operations with Electrical Systems

FirstLight coordinates operation of the Project with other electrical systems through its participation in the markets operated by ISO-NE.

1.2 Need for Project Electricity

1.2.1 Cost and Availability of Alternative Sources of Power

FirstLight is not a utility with retail load obligations. If power from the Project were not available for sale into the markets operated by ISO-NE, the services the Turners Falls Development and Northfield Mountain Pumped Storage Development provide to the grid, including peaking generation, capacity, reserve, ancillary services, locational forward reserve market and real-time reserves and regulation, would need to be provided from other, existing generation sources or from new generation sources to the system operator.

1.2.2 Increase in Costs if FirstLight is not Granted a License

Costs to the market of replacing services that the Project provides would include reduced efficiency of other generation sources as they would need to modify operations to meet peak daily demand, operating reserve requirements and system ramp needs. Because of the grid stability provided by peaking hydroelectric production, true costs associated with not relicensing the Project are not easily determined.

1.2.3 Effects of Alternative Sources of Power

Effects on Customers

The primary purpose of the Project is to supply energy, capacity, regulation and other ancillary services to the ISO-NE, a regional transmission organization that coordinates the movement of wholesale electricity in Maine, New Hampshire, Vermont, Massachusetts, Connecticut and Rhode Island. The Turners Falls Development generally provides a small amount of electricity from minimum flow releases when power demand is low.

The Northfield Mountain Pumped Storage Development provides important energy, operating reserves and operational flexibility to ISO-New England (ISO-NE) system operation. The fact that ISO-NE, as part of its daily operational planning processes, can rely on the Northfield Mountain Pumped Storage Development to supply these operational flexibilities from a certain fuel supply is of high value to ISO-NE and the New England region. In many periods, this significant supply of operational flexibility has avoided the commitment of many other less flexible resources to provide for a more efficient system dispatch. This peak load ability provides rapid response power resources to the grid to assure reliable operation and prevent regional blackouts.

Storage provides other important reliability benefits to the system. These include helping to manage light load, or excess generation conditions during off peak periods and the ability to respond very quickly to energy and operating reserve activation needs on the power system during any time of the day or year. The value of the Northfield Mountain Project was demonstrated following the August 14, 2003 major blackout in the New York ISO (NY-ISO) grid. On August 15, ISO-NE parted all electrical ties to the New York electrical system to prevent the blackout from spreading further. When it was time to rejoin the two power grids, ISO-NE requested the connection be made at the Northfield Mountain Project. This facility was selected because:

- it is located at the junction of three 345 kV lines;

- it has a major tie line with the NY-ISO;
- the transmission company switchyard located at Northfield Mountain had the equipment necessary to synchronize the two electric grids, and
- the Northfield Mountain Project generators were large enough to make changes in both frequency and voltage.

Once the lines were energized, final adjustments were made by having the Northfield Mountain Project reduce generation to allow for a smooth synchronization of the two systems. The interconnection of the two systems allowed NY-ISO to begin restoration of the north portion of the NY power grid.

The Project provides an important source of electricity during times of peak demand and fast start and fast ramping capability to manage system ramping needs. In order to replace this important service, ISO-NE would need to modify its management of energy production. Alternative sources of power may need to throttle their production levels, which could reduce their overall efficiency.

Effects on the Applicant's Operating and Load Characteristics

Replacing the Turners Falls Development or Northfield Mountain Pumped Storage Development with an alternative facility would result in a change of the system load characteristics by reducing the available offline fast start reserve, peak generation and generation ramping and price responsive demand (pumps). The Turners Falls Development provides ISO-NE with peaking energy, capacity, reserve and ancillary services. The Northfield Mountain Pumped Storage Development provides ISO-NE with peaking energy, capacity, locational forward reserves and real-time reserves, ancillary and regulation services. The above services are beneficial to the reliability and efficiency of the ISO-NE electric grid. Both developments also provide ISO-NE with the ability to bring units to the electric grid quickly in support of a grid disturbance such as a loss of a major unit or other change of load occurrence.

Effects on Communities Served

If FirstLight were not to receive a new license and the Project was taken over by the Federal Government or decommissioned, there would be a significant loss of tax revenues. In 2014, the Project contributed approximately $26.7 million in federal, state and local taxes. The governmental entities affected by this loss in revenue would ultimately have to seek a reduction in expenses or an increase in other sources of revenue.

Additionally, loss of the license may result in a less reliable and efficient energy grid with the absence of the Project. Also, it is likely that many of the Project's recreation facilities would no longer be available to the community.

1.3 Need for Project Power, Reasonable Cost and Availability of Alternative Sources of Power

1.3.1 Average Annual Cost of Power

The average annual cost of the power produced by the Project includes capital costs, operating costs, and costs associated with Project relicensing, including proposed Protection Mitigation and Enhancement (PM&E) measures. As described in Exhibit D, FirstLight has performed an analysis of the costs of producing Project power.

1.3.2 Projected Resources Required to Meet Capacity and Energy Requirements

The Turners Falls Development provides ISO-NE with peaking energy, capacity, reserve and ancillary services. The Northfield Mountain Pumped Storage Development provides ISO-NE with peaking energy, capacity, locational forward reserve market and real-time reserves, ancillary and regulation services.

1.3.3 Resource Analysis and System Reserve Margins

Both the Turners Falls Development and Northfield Mountain Pumped Storage Development operate to produce to peak power and thus are well-suited to meet energy demands as both developments typical operation dictates that it produces power during periods of high demand or periods of high energy ramping needs.

1.3.4 Load Management Measures

Load management is conducted by the ISO-NE, wherein the energy needs on short-term basis are coordinated.

1.4 Use of Power for Applicant-Owned Industrial Facility

FirstLight does not directly use power generated by the Project to operate its own industrial facilities.

1.5 Need for Power if Applicant is an Indian Tribe

FirstLight is not an Indian tribe applying for a project on a tribal reservation; therefore, this section is not applicable.

1.6 Effect of Operations and Planning of the Applicant's Transmission System of Receiving or not Receiving the License

1.6.1 Effects of Power Flow Redistribution

The Applicant does not own or operate a transmission system. However, if FirstLight were not to receive a new license for the Project, ISO-NE would lose a resource that is valuable to its system. For example, on September 2, 2010 ISO-NE was unable to recover a source loss and restore balance over the AC electrical ties with New York within the fifteen minutes required by North American Electric Reliability Corporation reliability standards following a system disturbance. With Northfield Mountain Pumped Storage Development available,[5] this likely would not have occurred.[6]

1.6.2 Advantages of the Applicant's Transmission System

The Applicant does not own or operate a transmission system.

1.6.3 Project Single-Line Diagram

Single-line diagrams for Station No. 1 and Cabot which comprise the Turners Falls Development are shown in Figure 1.6.3-1 and 1.6.3-2, respectively. The single-line diagram for the Northfield Mountain Pumped Storage Development is shown in Figure 1.6.3-3.

[5] The Northfield Mountain Project was out of operation from May 1 to November 17, 2010.
[6] This event was reported at the November 17, 2010 NEPOOL Reliability Committee. ISO New England, Inc., September 2, 2010 DCS Event (Nov. 17, 2010), *available at* http://www.iso-ne.com/static-assets/documents/committees/comm_wkgrps/relblty_comm/relblty/mtrls/2010/nov172010/090210_dcs_event.ppt.

1.7 Plans to Modify Existing Project Facilities

At this time, FirstLight has no plans to modify the generation facilities associated with the Project.

1.8 Conformance with a Comprehensive Plan for the Waterway

The Project will be operated under the terms and conditions of a license issued by the Commission, which will be based on the Commission's determination of the license terms and conditions which are best suited to comprehensive development of the waterway. The cumulative environmental impacts of the Project in the context of the Connecticut River Basin are addressed in Exhibit E.

1.9 Financial and Personnel Resources

1.9.1 Financial Resources

FirstLight's parent company, GDF Suez, is one of the world's largest electric utilities. Thus, it has the financial resources to operate the Project during the term of the new license.

1.9.2 Personnel Resources

FirstLight employs approximately 65 full-time people that provide the support needed to operate and maintain the Turners Falls Development and Northfield Mountain Pumped Storage Development. On-site staff are fully qualified to handle all aspects of the operation and maintenance of the Project. Each development is fully equipped to allow staff to perform virtually all routine maintenance functions. All personnel receiving training commensurate with their responsibilities in an ongoing effort to improve their ability to operate the Project in the safest and most efficient manner possible.

In addition to FirstLight employees, FirstLight also contracts with local outside entities to provide maintenance support for the Project.

1.10 Project Expansion Notification

FirstLight currently has no plans to expand the Project to encompass additional lands; therefore notification is not applicable. As described in Exhibit B, FirstLight proposes to increase the useable storage of the Upper Reservoir from 1004.5 feet to 920 feet year-round, for an 84.5 foot drawdown. FirstLight expects to maintain the efficient use of the water to maximize the generation output and provide the region a reliable and sound source of generation.

1.11 Electricity Consumption Efficiency Improvement Program

1.11.1 Customer Energy Efficiency Program

Not applicable. FirstLight does not have load asset customers except wholesale entities.

1.11.2 Compliance of Energy Conservation Programs with Regulatory Requirements

Not applicable.

1.12 Indian Names and Mailing Address

There are no Indian Tribes with lands occupied by the Project or which would otherwise be affected by the relicensing. Nevertheless, FirstLight has included the Narragansett Indian Tribe, Stockbridge-Munsee Band of Mohican Indians, Mashpee Wampanoag Indian Tribe, Wampanoag Tribe of Gay Head (Aquinnah), Nullhegan Abenaki Tribe, Koasek Traditional Band Abenaki Nation, Abenaki Nation of

Missisquoi, Elnu Abenaki Tribe, and the Nolumbeka Project Inc. in the distribution of this license application. Addresses are included in the Additional Information (beginning of the Final License Application).

2 INFORMATION TO BE SUPPLIED BY APPLICANTS THAT ARE EXISTING LICENSEES

2.1 Measures Planned to Ensure Safe Management, Operation and Maintenance of the Project

2.1.1 Existing and Planned Operation of the Project during Flooding

This information is detailed in Exhibit B of this License Application.

2.1.2 Downstream Warning Devices

FirstLight is in compliance with all Emergency Action Plan (EAP) requirements and has systems in place to notify emergency response teams and homeowners downstream in the unlikely event of a dam breach scenario. The Turners Falls and Northfield Mountain Pumped Storage Developments are monitored from the Northfield Control Room, which is staffed with full-time operators 24 hours/day 365 days/year.

2.1.3 Operational Changes that Might Affect the Emergency Action Plan

No operational changes are proposed that might affect the existing EAP at the Turners Falls and Northfield Mountain Pumped Storage Developments. Each development's EAP is reviewed and tested annually, and updated as required. There are no known or planned changes to either developments' plant operations that would affect the EAP.

FirstLight has sought and received temporary amendments from FERC to utilize more of the Upper Reservoir Storage Capacity by increasing its operating limits from 1000.5 to 938 feet, msl to 1004.5 to 920 ft, msl. As part of this process, FirstLight completed revised Dam Breach Analyses using the as-built condition to store water to elevation 1004.5 msl. The dam breach analysis and inundation mapping were filed and approved by FERC to permit use of the additional storage capacity.

2.1.4 Existing and Planned Monitoring Devices

Both the Turners Falls Hydroelectric Development and the Northfield Mountain Pumped Storage Development have Surveillance and Monitoring Plans (SMP) filed with FERC. The purpose of the SMP is to describe the existing SMP Program for the Project, relate the instrumentation and monitoring to the Potential Failure Mode Analysis (and any identified Potential Failure Modes), and relate the instrumentation and monitoring to design assumptions for the project structures. A separate Dam Safety Surveillance and Monitoring Report (DSSMR) is prepared annually to present data and interpretation for observations and measurements recorded to date, and recommend improvements or changes to the program as appropriate. Since both Developments are subject to 5-year inspections under Part 12D of the FERC regulations, updates to the SMP will be prepared and submitted as needed to the FERC. The SMP is reviewed with the FERC engineer during the annual operation inspection of the Project and reviewed by the Independent Consultant during the 5-year inspection.

2.1.5 Employee Safety and Public Safety Record

FirstLight manages the developments consistent with its long-standing commitment to employee safety. This commitment begins with compliance with applicable local, state, and Federal regulations regarding the safe operation of industrial and electrical facilities. As FirstLight operates the Project's generation facilities, this commitment is implemented primarily through a rigorous safety program adopted by FirstLight. Detailed inspection and maintenance programs ensure employee safety relative to operating

equipment and facilities. The safety program involves employee training sessions, as well as making safety information available to employees. For the 2011 thru 2015 period, there were no lost time incidents at either Development involving FirstLight employees.

FirstLight places a high priority on public safety at both Developments. FirstLight maintains public safety measures (lighting, signage, markers, audible warnings, fencing, etc.) consistent with plans filed with the FERC's New York Regional Office (NYRO). In accordance with 18 CFR 12.10, FirstLight files public safety incident reports with the NYRO.

2.2 Current Operations

Operation of the Project is described in Exhibit B.

2.3 Project History

A complete Project history can be found in Exhibit C of this License Application

2.4 Generation Losses over Previous Five Years

There have been several unscheduled outages at the Turners Falls and Northfield Mountain Pumped Storage Developments during the five-year period of time from 2010-2014 (Table 2.4-1). The table includes outages lasting 24 hours or more at Cabot, Station No. 1 and Northfield.

2.5 Compliance with Terms and Conditions of Existing License

FirstLight has never been found to be in non-compliance with the terms and conditions of the current licenses. Over the term of the current licenses, the Developments have been subject to FERC's standard operational and environmental inspections. Any compliance-related issues noted during the inspections have been promptly addressed by FirstLight.

2.6 Action Affecting the Public

As a major presence in the region, FirstLight plays a prominent role in ensuring the efficient, productive use of water for hydroelectric generation and recreation. The Project also provides electricity that contributes to the stability of the regional power system. This alone significantly affects the general public by providing a low-cost and renewable-energy source to FirstLight's wholesale customers and contributing to the balance of regional power supply and demand.

In addition to operating the Project for hydroelectric generation, FirstLight also manages the Project to provide additional benefits to the local community, natural resources, recreation and the region at large.

Visitors frequent the Project year-round to enjoy the many recreational opportunities available, including boating, fishing, hiking, hunting, and camping. The Project also supports other day-use and overnight-use activities such as wildlife viewing and picnicking. In addition to the benefits that FirstLight provides to the area's natural resources and the recreating public, the Project contributes to the public benefit through the employment of fulltime and seasonal staff.

2.7 Ownership and Operating Expense Reductions if the Project License was Transferred

If the Project license were transferred to another entity, FirstLight's cost of operating and maintaining the Project (see Exhibit D) would be eliminated.

2.8 Annual Fees for Federal or Indian Lands

FirstLight does not pay annual charges for Federal or Indian tribal reservation lands.

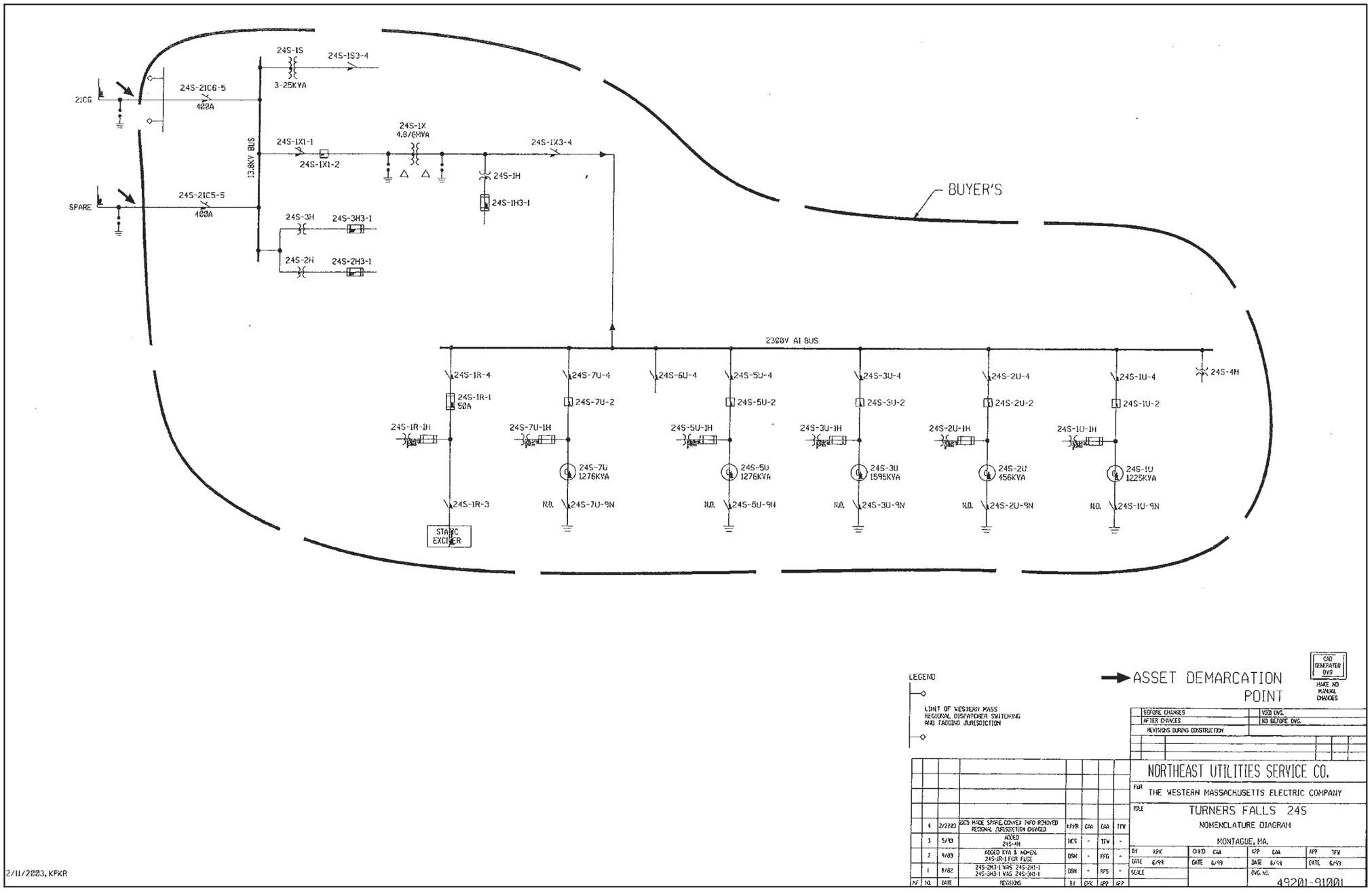

Figure 1.6.3-1: Station No. 1 Single Line Electrical Diagram

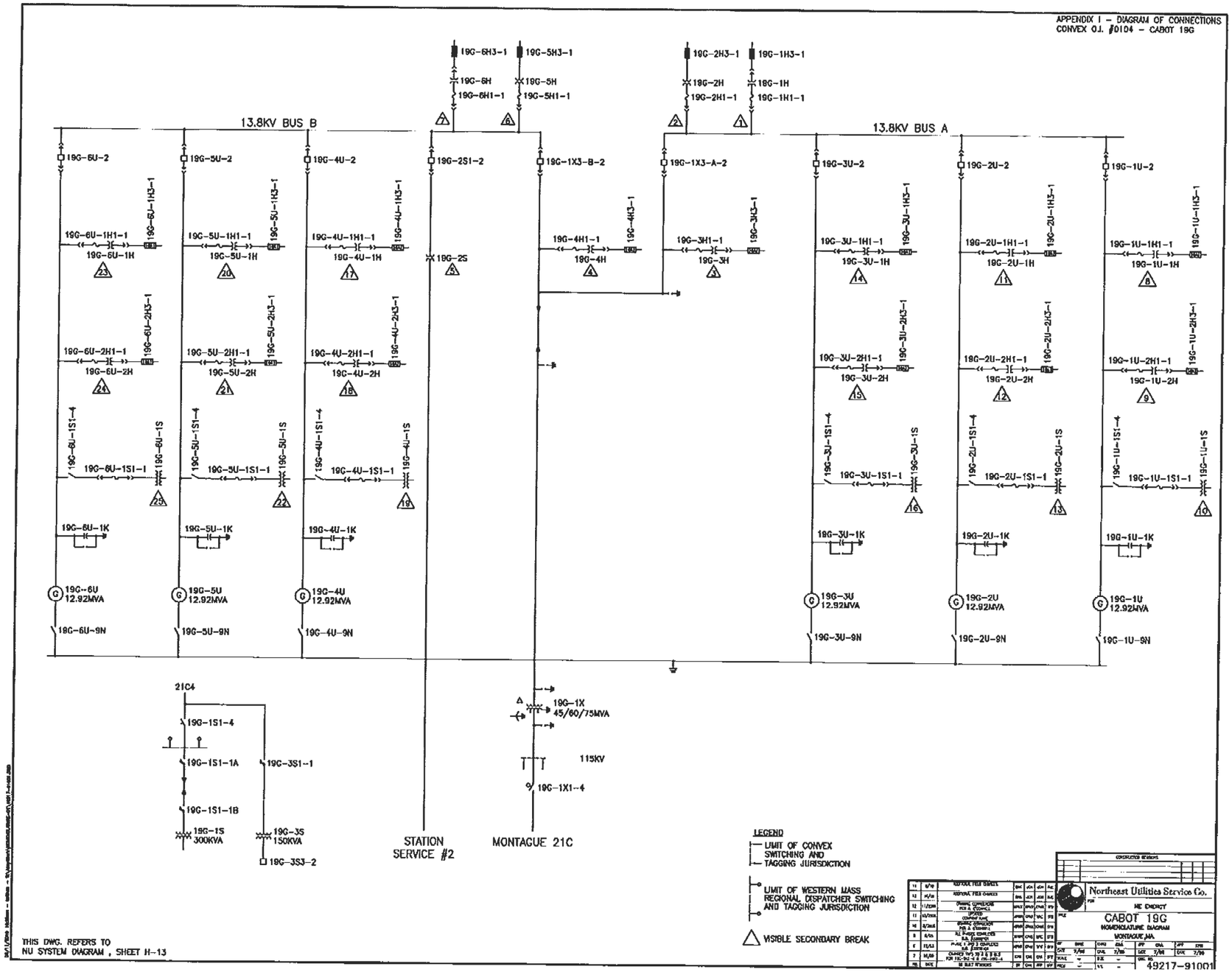

Figure 1.6.3-2: Cabot Station Single Line Electrical Diagram

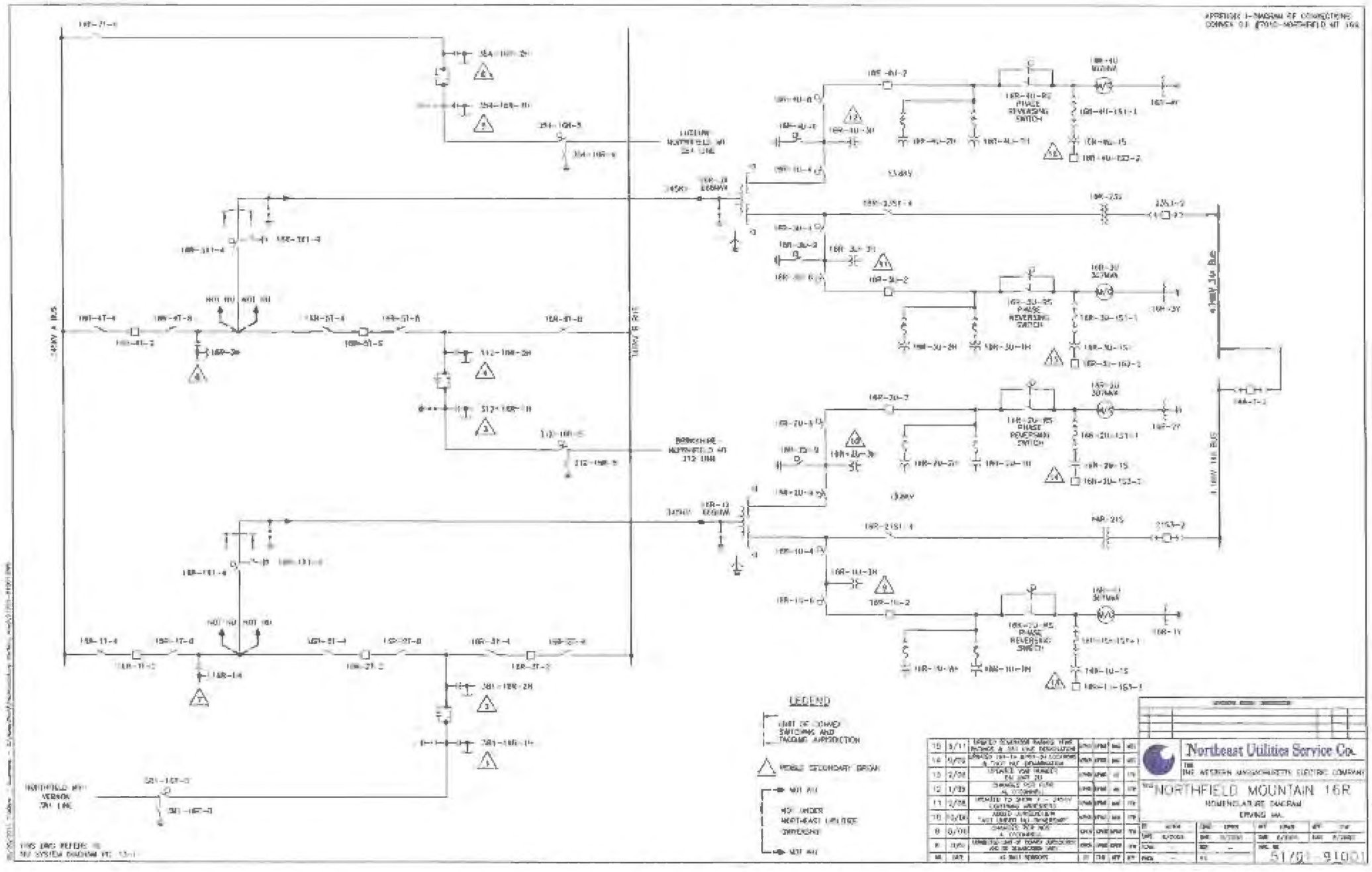

Figure 1.6.3-3: Northfield Mountain Pumped Storage Development Single Line Electrical Diagram

Table 2.4-1: Unscheduled Outages at the Turners Falls Development and Northfield Mountain Pumped Storage Development 2010-2014

Turners Falls Development: Cabot

Date	Description
6/10/2011	Cabot Unit 1: Exciter breaker issue
8/28/2011	Cabot Unit 4, and 6: Excessive Vibration due to High Tailwater (Hurricane Irene)
10/30/2011	Cabot Unit 1: Base excitor breaker issue
10/4/2014	Cabot Unit 1: Governor Problem
10/4/2014	Cabot Unit 3: Penstock Gunite Repair

Turners Falls Development: Station No. 1

Date	Description
1/1/2010	Station No. 1 Unit 2: Loss of excitation relay- moved to Unit 7
7/22/2011	Station No. 1 Unit 2: Governor issue
9/18/2011	Station No. 1 Unit 2: Governor pumping unit issue
10/31/2011	Station No. 1 Unit 2: Used RPM meter on Unit 1
10/31/2011	Station No. 1 Unit 1: Bad RPM meter
8/17/2012	Station No. 1 Unit 2: Loss of field relay failed
8/24/2012	Station No. 1 Unit 1: Inspection of Draft Tubes
2/8/2013	Station No. 1 Unit 7: Batteries bad on governor
9/11/2013	Station No. 1 Units 1, 2, 3, 5, 7 : High humidity caused condensation build up on the stator and rotor, grounding unit

Northfield Mountain Pumped Storage Development

Year	Description
5/23/2010	Northfield Unit 1, 2, 3, 4: Upper Reservoir Unwatering
12/6/2010	Northfield Unit 2: Gate seal inspection
1/7/2012	Northfield Unit 4: Check on depression air issue
5/3/2012	Northfield Unit 1: Unit tripped due to overheated turbine bearing
8/27/2012	Northfield Unit 3: Upper guide heat exchanger leaking water

Document Content(s)