



**Stage II Review for Recertification  
of the Otter Creek Hydroelectric Project  
by the Low Impact Hydropower Institute (LIHI)**

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## I. INTRODUCTION

The owner of the Otter Creek Hydroelectric Project (Project) is Green Mountain Power Corporation (GMPC).<sup>1</sup> The Project is located on Otter Creek in Vermont and comprised of three developments, Proctor at river mile (RM) 64.2, Beldens at RM 23.0 and Huntington Falls at RM 21.0. The original dam construction was completed at Proctor in 1905, at Beldens in 1913 and at Huntington Falls in 1910. The 22.8-MW Project was originally certified as LIHI #128 for the period from January 7, 2016 through January 6, 2021.

The Federal Energy Regulatory Commission (FERC) issued a Project license on October 23, 2014 which expires on October 1, 2054<sup>2</sup>. A Section 401 Water Quality Certificate (WQC)<sup>3</sup> was issued by the Vermont Department of Environmental Conservation (VDEC) on May 30, 2014. No Offer of Settlement or Prescription for Fishways by the US Department of the Interior (USDOI) was filed as part of the FERC license.

The Proctor development's turbine hydraulic capacity and power output was increased in 2015. Units 2, 3, and 4 were replaced with new identical Francis turbine-generators. Each new turbine can pass 82 to 206 cubic feet per second (CFS) and produce up to 1,716 kilowatts (kW) of output. Units 2, 3 and 4 were commissioned on May 14, 2015. Unit 1's turbine runner was replaced and its generator was rewound. The new Francis turbine can pass 95 to 245 CFS, producing up to 2,245 kW of output. Unit 1 was commissioned on June 10, 2015. Unit 5's turbine remained unaltered. The Francis turbine can pass 70 to 325 CFS and produce up to 2,840 kW. The Proctor development's total hydraulic capacity is now 1,188 CFS and its total nameplate capacity is 10,233 kW.

The Beldens development is comprised of three vertical Francis turbines. Turbine capacities and generator outputs have not changed since FERC license issuance. Unit 1's turbine can pass 100 to 330 CFS, producing up to 800 kW of output. Unit 2's turbine can pass 80 to 320 CFS and produce a maximum output of 949 kW. Lastly, Unit 3's turbine can pass 270 to 1,350 CFS and is capable of producing 4,100 kW. The total hydraulic capacity of the development is 2,000 CFS. It possesses a total installed capacity of 5,849 kW.

On September 9, 2017, DuBois and King Incorporated, the engineering firm in charge of the Huntington Falls redevelopment, filed its final construction progress report with FERC<sup>4</sup>. Units 1 and 2 were replaced with new identical vertical Francis turbines. Each turbine can pass 100 to 450 CFS and produce a maximum output of 1,312 kW. Unit 3's turbine remained unaltered. It has the same turbine characteristics as Beldens' Unit 3, capable of passing 270 to 1,350 CFS and producing 4,100 kW of output. The development's total hydraulic capacity is now 2,250 CFS and its total nameplate capacity is 6,725 kW.

As stated in the June 14, 2016 LIHI Certification Review Report, the Project had an average annual generation (AAG) output of 67,258 Megawatt-hours (MWh) from 1998 through 2008. The January 6, 2021 Recertification Application states that from 2014 through 2019, a period when significant turbine reconstruction and associated power outages were required, the Project produced an AAG of 49,117 MWh. Since 2016, the Project's total installed capacity increased to 22,807 kW. It was anticipated the Project's

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<sup>1</sup> GMPC is located at 2154 Post Road, Rutland, Vermont 05701 – John Greenan, 802-770-2195 - [John.Greenan@greenmountainpower.com](mailto:John.Greenan@greenmountainpower.com)

<sup>2</sup> FERC license - <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13664778>

<sup>3</sup> WQC - <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13558226>

<sup>4</sup> <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=14685459>



AAG going forward would increase to approximately 88,400 MWh<sup>5</sup>, corresponding to a plant factor of 44.2%.

On January 7, 2021, LIHI extended the certification term of the Project to May 31, 2021. The LIHI application for recertification was submitted in January 2021 by Kleinschmidt Associates (KA), a consulting firm representing GMPC in this endeavor. KA's contact is Ms. Katie Sellers.<sup>6</sup> The Stage I Recertification Review was completed on January 22, 2021, with findings of no significant shortcomings.

The application states that no material changes have occurred at the Project throughout the current certification period, although redevelopment of Huntington Falls occurred in 2017, as planned and discussed in the prior certification review. Additionally, LIHI released a new, second edition of the LIHI Certification Handbook in March of 2016, based on a revised set of low impact criteria. Therefore, the need for a Stage II recertification review was deemed necessary. On May 21, 2021, LIHI once again extended the certification term of the Project to August 31, 2021. On May 21, 2021, LIHI, posted the application of comments. Comments were to be received on or before 5 pm EST July 20, 2021.

## II. PROJECT GEOGRAPHIC LOCATION

Otter Creek is located in west-central Vermont within Addison and Rutland counties, near the communities of Proctor, New Haven, and Weybridge (See Figure 1). Otter Creek is approximately 100 miles long and flows northeasterly from the headwaters of Emerald Lake to its confluence with Lake Champlain which borders the states of Vermont and New York and drains an area of 1,106 square miles (SQMI). Releases from Lake Champlain flow north into the Richelieu River entering the Canadian Province of Quebec and eventually entering the St. Lawrence River.

The Project includes three developments on Otter Creek comprised of Proctor (43°39'44.97"N, 73°02'01.37"W), Beldens (44°03'07.48"N, 73°10'37.85"W), and Huntington Falls (44°04'14.32"N, 73°11'43.41"W). Proctor is located at river mile (RM) 64.2, Beldens at RM 23.0 and Huntington Falls at RM 21.0.

Six additional dams operate on Otter Creek as shown in Figure 2. Upstream of the Proctor Development the Emerald Lake Dam is located at RM 100, the Ripley Mills Dam is located at RM 72, and the Center Rutland Project (FERC No. 2445) is located at RM 71. In between the Proctor and Beldens Developments, the Middlebury Lower Hydroelectric Project (FERC No. 2737, LIHI #99) is located at RM 24. Downstream of the Huntington Falls Development, the Weybridge Dam (FERC No. 2731, LIHI #98) is located at RM 19.5 and the Vergennes Project (FERC No. 2674, LIHI #134) is located at RM 7.6. The Center Rutland Dam, Middlebury Lower Dam, Weybridge Dam, and Vergennes Dam are also owned and operated by GMPC.

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<sup>5</sup> August 2015 FERC letter - <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13956706>

<sup>6</sup> Ms. Katie Sellers, KA Regulatory Coordinator - PO Box 650, 141 Main Street, Pittsfield, Maine 04967 - (207. 416.1218) - [Katie.Sellers@KleinschmidtGroup.com](mailto:Katie.Sellers@KleinschmidtGroup.com)

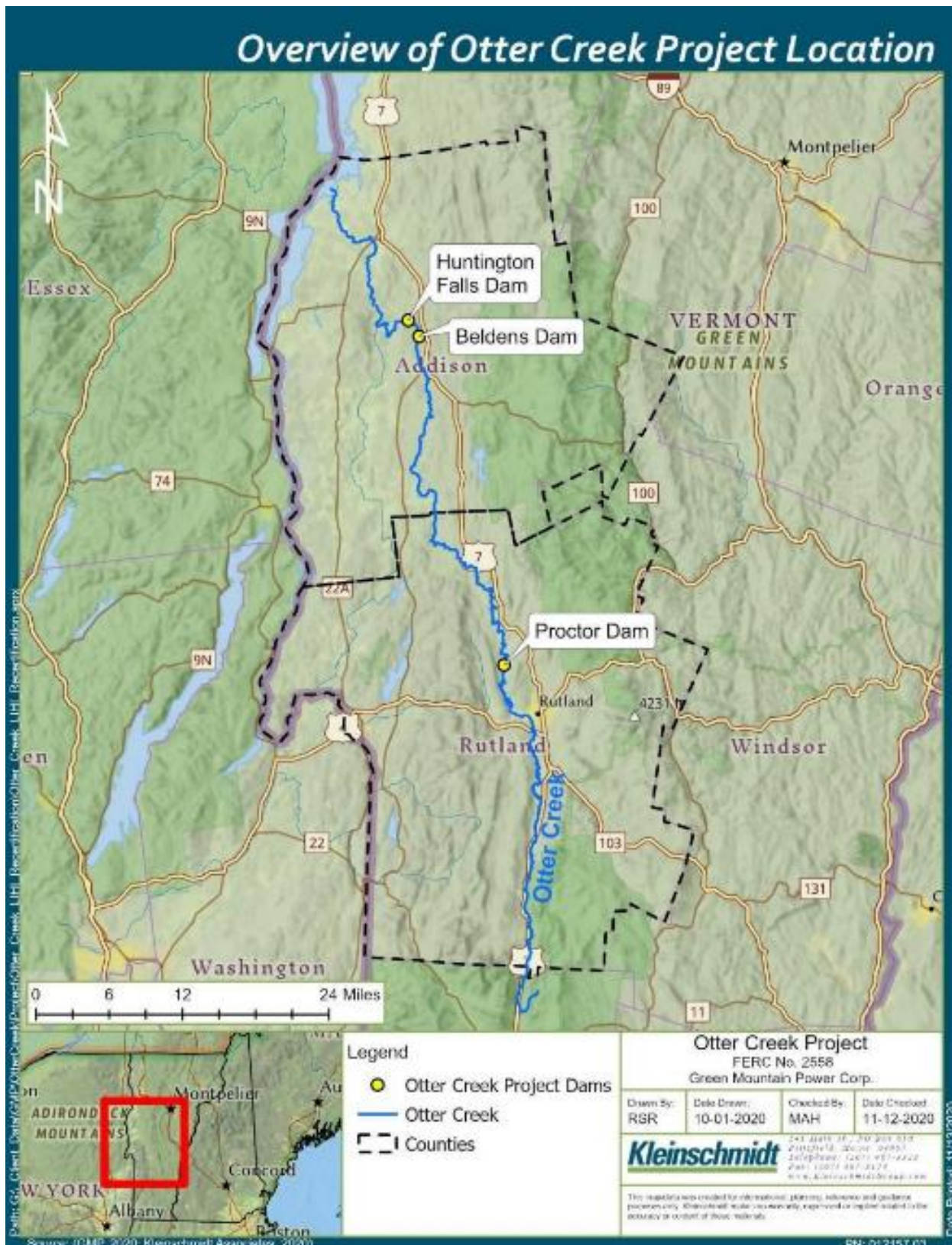


Figure 1. Project Location

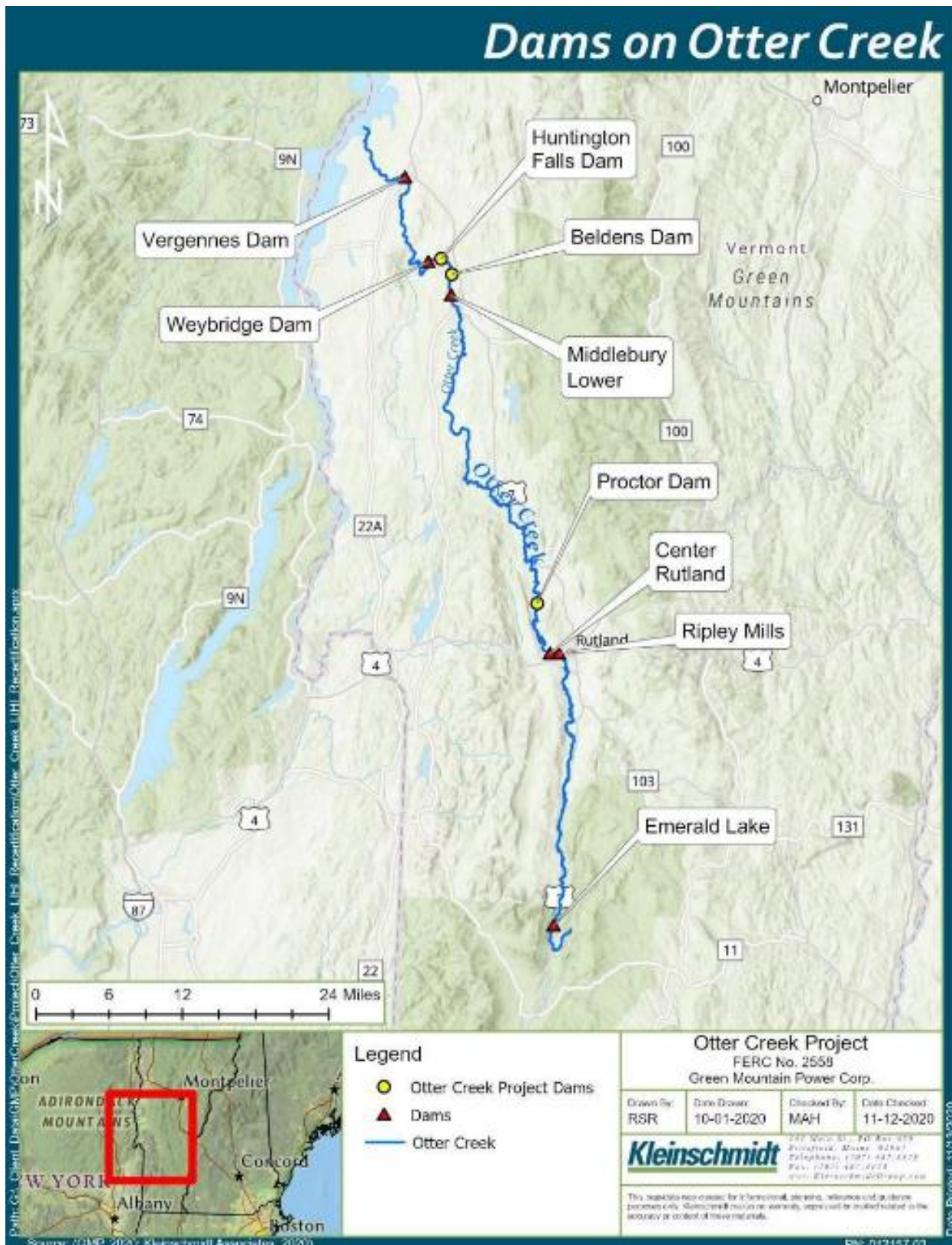


Figure 2. Dams on Otter Creek



The Proctor, Beldens and Huntington Falls developments have drainage areas of 395, 632.5 and 752 SQMI, respectively. Three US Geological Survey (USGS) gages located in the vicinity of the developments are used to estimate available inflow at these developments:

1. USGS gage 04282000 on Otter Creek at Rutland, Vermont (GAGE1). This gage has a contributing drainage area of 307 SQMI (AREA1) and contains daily average flows from May 31, 1928 to present day. GAGE1 is used to estimate available inflows at the Proctor development;
2. USGS gage 04282500 on Otter Creek at Middlebury, Vermont (GAGE2). This gage has a contributing drainage area of 628 SQMI (AREA2) and contains daily average flows from April 1, 1903 to present day. GAGE2 is used to estimate available inflows at the Beldens development;
3. USGS gage 04282525 on the New Haven River at Brooksville near Middlebury, Vermont (GAGE3). This gage has a contributing drainage area of 115 SQMI (AREA3) and contains daily average flows from March 1, 1990 to present day. GAGE3 along with GAGE2 is used to estimate available inflows at the Huntington Falls development.

The application only specified inflows from these USGS gages for calendar years 2010-2019. The Proctor, Beldens and Huntington Falls average annual flows (AAF) was reported as 670, 1,049, and 1,247 CFS, respectively.

However, at a minimum, inflows for each of the developments are typically estimated by multiplying the gage flows by the ratio of the drainage area at each development over the drainage area at the gage (DAR). For consistency in comparing results at each development, the period of record (POR) selected was from March 1, 1990 to present day<sup>7</sup>.

Improvement in estimating development inflows can be accomplished by performing a drainage area regression analysis (DRRA) whenever multiple gages are available. This DRRA finds the best exponent (EXP) to apply to the DAR such that estimated flows at one USGS gage are most accurately estimated by flows at other USGS gages. This DRRA analysis was performed on a monthly basis. The approach selects the EXP which results in the lowest standard error when comparing inflows using equation:

$GAGEat2 = GAGEat1 * DAR^{EXP}$  where:

- GAGEat2 is flows at gage location 2;
- GAGEat1 is flows at gage location 1;
- DAR = drainage area at GAGEat2 divided by drainage area at GAGEat1;
- EXP = exponent that results in the lowest standard error based on differences in estimated flows at gage location 2 using the equation above versus recorded flows at gage location 2.

POR inflows for the Proctor development were estimated by adjusting the inflows at GAGE1 by a multiplier. Given that the drainage area at Proctor is 395 SQMI, this multiplier or DAR is (395/307) or 1.2866. The regression analysis was performed to estimate flows at GAGE1 from flows at GAGE2. The resulting monthly exponents were 0.8805, 0.8597, 0.8585, 0.7791, 0.9314, 0.9297, 0.9706, 0.9116, 0.8917, 0.7880, 0.8283 and 0.8378. Once applied to the DAR, the resulting January through December multipliers are 1.248, 1.242, 1.242, 1.217, 1.265, 1.264, 1.277, 1.258, 1.252, 1.220, 1.232 and 1.235.

The resulting annual exponent is 0.8560. The resulting annual multiplier is 1.246 and the overall standard error is 0.27%, indicating the regression analysis is an accurate approach in estimating GAGE1 flows from GAGE2 flows. Given that the Proctor Development is located between these gages, it is highly probable that

<sup>7</sup> Present day at the time of my analysis was May 23, 2021.



its basin hydrologic characteristics are similar and therefore this same exponent will improve the estimate of its inflows.

Based on this approach, the minimum daily flow of 48 CFS occurred on August 3, 1999. The maximum daily flow of 16,987 CFS occurred on August 29, 2011 and the average daily flow is 756 CFS (1.91 CFS per SQMI). The corresponding January through December flows in CFS are:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
761	635	1,045	1,687	992	628	463	391	279	581	721	845

Flow duration analyses indicate a daily flow of 165 CFS is exceeded about 90% of the time annually, a daily flow of 522 CFS is exceeded about 50% of the time annually, a daily flow of 1,592 CFS is exceeded about 10% of the time annually and a daily flow of 3,817 CFS is exceeded about 1% of the time annually.

Flow frequency analyses indicate the 10-year daily flow is about 7,860 CFS, the 50-year daily flow is about 11,814 CFS, and the 100-year daily flow is 13,864 CFS, while the 7Q10<sup>8</sup> flow is 69 CFS.

POR inflows for the Beldens Development were estimated by adjusting the inflows at GAGE2 by a multiplier. Given that the drainage area at Beldens is 632.5 SQMI, this multiplier or DAR is (632.5/628) or 1.007.

Based on this approach, the minimum daily flow of 87 CFS occurred on September 9, 2002. The maximum daily flow of 6,536 CFS occurred on April 19, 1994 and the average daily flow is 1,161 CFS (1.84 CFS per SQMI). The corresponding January through December flows in CFS are:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1,221	942	1,538	2,501	1,616	993	771	613	470	818	1,124	1,258

Flow duration analyses indicate a daily flow of 275 CFS is exceeded about 90% of the time annually, a daily flow of 833 CFS is exceeded about 50% of the time annually, a daily flow of 2,444 CFS is exceeded about 10% of the time annually and a daily flow of 4,153 CFS is exceeded about 1% of the time annually.

Flow frequency analyses indicate the 10-year daily flow is about 5,549 CFS, the 50-year daily flow is about 7,128 CFS, and the 100-year daily flow is 7,820 CFS, while the 7Q10 flow is 121 CFS.

POR inflows for the Huntington Falls Development were estimated by adding the inflows at GAGE2 with the inflows at GAGE3 adjusted by a multiplier. Given that the drainage area at Huntington Falls is 752 SQMI, this multiplier or DAR is (752-628)/115 or 1.0783. The regression analysis was performed to estimate flows at GAGE3 from flows at GAGE2. The resulting monthly exponents were 1.0193, 1.0240, 0.9896, 0.9832, 0.9857, 0.9345, 0.9824, 0.9351, 0.9604, 0.8932, 0.9658 and 0.9869. Once applied to the DAR, the resulting January through December multipliers are 1.042, 1.041, 1.040, 1.038, 1.039, 1.036, 1.038, 1.037, 1.038, 1.035, 1.038 and 1.039.

The resulting annual exponent is 0.9728. The resulting multiplier is 1.038 and the overall standard error is 0.74%, indicating the regression analysis resulting exponent is an accurate approach in estimating GAGE3 flows from GAGE2 flows. Given that the Huntington Falls development is located between these gages, it is

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<sup>8</sup> 7Q10 flow is the daily seven day rolling average flow that is exceeded 90% of the time annually. There is only a 10% chance that a seven day rolling average flow less than this value will occur in a given year.



highly probable that its basin hydrologic characteristics are similar and therefore this same exponent will improve the estimate of its inflows.

Based on this approach, the minimum daily flow of 100 CFS occurred on September 9, 2002. The maximum daily flow of 10,652 CFS occurred on June 27, 1998 and the average daily flow is 1,396 CFS (1.86 CFS per SQMI). The corresponding January through December flows are:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1,448	1,115	1,852	2,991	1,928	1,208	921	745	566	1,034	1,352	1,503

Flow duration analyses indicate a daily flow of 340 CFS is exceeded about 90% of the time annually, a daily flow of 990 CFS is exceeded about 50% of the time annually, a daily flow of 2,925 CFS is exceeded about 10% of the time annually and a daily flow of 5,135 CFS is exceeded about 1% of the time annually.

Flow frequency analyses indicate the 10-year daily flow is about 8,152 CFS, the 50-year daily flow is about 10,636 CFS, and the 100-year daily flow is 11,733 CFS, while the 7Q10 flow is 146 CFS.

### III. PROJECT SITE CHARACTERISTICS

The Otter Creek Project consists of three hydroelectric developments, Proctor, Beldens, and Huntington Falls, located at (RM) 64.2 (Proctor), RM 23.0 (Beldens), and RM 21.0 (Huntington Falls), listed from upstream to downstream. There is one non-Project associated dam (Middlebury Lower Dam) located between the Proctor and Beldens Developments. The Huntington Falls Development is directly downstream of Beldens.

The Project's primary features include three dams, five intake structures, five powerhouses, seven penstocks, three tailraces, and four bypassed reaches.

#### A. Proctor

The Proctor Development includes the impoundment, dam, bypass reach, two penstocks, powerhouse, substation, tailrace and an access bridge (See Figure 3). The impoundment extends 6.0 miles upstream of the dam and has an average depth of 6.6 feet and 12.2 miles of shoreline. The substrate of the impoundment is generally comprised of silt substrate with little to no vegetation.



Figure 3. Proctor Development



The dam is located at river mile (RM) 64.2, was built in 1905 and consists of a 128-foot-long, 13-foot-high masonry and concrete capped dam installed with a 3-foot-high inflatable flashboard system (Photo A-1). The dam impounds a reservoir with a surface area of 95 acres and a usable storage capacity of 275 acre feet (ACFT) at a normal maximum water surface elevation of 469.5 feet above mean sea level (FTMSL).



*Photo A-1 - Proctor Dam*

Powerhouse flows initially pass from the reservoir through a 17-foot-deep by 45-foot-wide by 115-foot-long gated forebay intake structure that contains trashracks with 1-inch clear bar spacing (Photos A-2 and A-3).



*Photo A-2 - Proctor Intake – View of Initial Entrance (Boat Barrier and Dam to the Right)*



*Photo A-2 - Proctor Intake – View from Bridge Looking at Downstream Trashracks*

Two steel penstocks (Photo A-4) convey water from the forebay to the powerhouse:

- A 9-foot-diameter penstock that extends 354 feet from the dam to a surge tank and continues as an 8-foot-diameter penstock for an additional 96 feet from the surge tank to the powerhouse; and
- A 7-foot-diameter, 500-foot-long penstock that extends directly from the dam to the powerhouse.



*Photo A-3 - Proctor Penstocks*



The bypass reach, known as Sutherland Falls, is 680 feet long and drops approximately 100 feet in elevation (Photo A-5).



*Photo A-5 – Proctor Bypass Reach*

The development also includes a 1,200-foot-long access road and a 265-foot-long bridge located 760 feet downstream from the powerhouse that is used to access the powerhouse (Photo A-6).



*Photo A-6 – Proctor Access Bridge*



The 33-foot by 100-foot concrete masonry powerhouse (Photo A-7) contains four Francis turbine/generator units (Photo A-8).



*Photo A-7 – Proctor Powerhouses*



*Photo A-8 - Proctor Generators*

Unit 1 is rated at 2,245 kW with a turbine hydraulic capacity ranging from 95 to 245 CFS. Units 2 through 4 are rated at 1,715 kW, 1,719 kW, and 1,714 kW, respectively. All three turbines have a turbine hydraulic capacity ranging from 82 to 206 CFS.



An attached 28-foot by 48-foot steel structure (Photo A-7) contains an additional 2,840 kW vertical Francis turbine/generator unit with a turbine hydraulic capacity ranging from 130 to 325 CFS. Overall, the development's total hydraulic capacity is 1,188 CFS with a total authorized installed capacity of 10,233 kW.

The tailrace below the powerhouse extends 240 feet downstream. Power output is transmitted through two banks of 0.48/4.16 kV single-phase transformers and a 0.48/43.8 kV, three-winding transformer, and appurtenant facilities.

## **B. Beldens**

The Beldens Development is downstream of the Proctor Development located at RM 23 in Beldens, Vermont. Approximately 82 acres are included within the development boundary. Facilities within the boundary include the impoundment, two dams, two powerhouses, two intakes, two penstocks, two bypass reaches and the tailrace (See Figure 4).

The impoundment (Photo B-1), following a contour elevation of 286.5 FTMSL, extends approximately 1.8 miles upstream of the dam. The impoundment has a surface area of 22 acres and a usable storage capacity of 253 ACFT at a normal maximum water surface elevation of 283 FTMSL. The impoundment has approximately 4.2 miles of shoreline and the dominate substrate is silt, with little to no aquatic vegetation. The Project boundary also extends approximately 550 feet downstream of the dam.



Figure 4. Beldens Development



*Photo B-1 – Beldens Impoundment*

The concrete dam was built in 1913 in two sections on either side of a ledge/bedrock island. Both dam sections are equipped with 2.5-foot wooden flashboards. The east dam is about 24 feet high by 57 feet long that flows into a 150-foot-long bypass reach that extends to the tailrace (Photo B-2).



*Photo B-2 - Beldens East Dam*



The west dam is approximately 15 feet high and 56 feet long (Photo B-3) that flows into a 450-foot-long bypass reach which extends to the tailrace.



*Photo B-3 - Beldens West Dam*

The Beldens Development has two intake structures equipped with trash racks (Photo B-4). One intake adjacent to East Dam is 79 feet long with a 40-foot-long and 13-foot-high trash rack comprised of vertical bars and 3-inch clear spacing. The second intake adjacent to the West Dam is 35 feet long with a trash rack 26 feet wide by 13 feet high with 1.125-inch clear spacing.



*Photo B-4 – View of Beldens Intakes, Penstocks and Powerhouses*

Two steel penstocks convey water from the intake structures to two separate powerhouses. The first penstock is steel and begins at 12 feet in diameter then bifurcates into two 10-foot-diameter sections approximately 30 feet long leading to the original powerhouse, designated as Powerhouse 1. The other concrete penstock is 12 feet in diameter and 45 feet long leading to a newer powerhouse, designated as Powerhouse 2.

Powerhouse 1 is a 40-foot by 44-foot concrete and masonry structure housing two horizontal Francis turbine/generators. Unit 1 is rated at 800 kW and has a turbine hydraulic capacity ranging from 100 to 330 CFS. Unit 2 is rated at 949 kW and has a turbine hydraulic capacity ranging from 80 to 320 CFS. Powerhouse 2 is a 40-foot by 75-foot concrete structure housing a 4,100 kW horizontal Kaplan turbine generator unit with a turbine hydraulic capacity ranging from 270 to 1,350 CFS. Overall, the development has a total hydraulic capacity of 2,000 CFS and a total authorized installed capacity of 5.849 MW. Power output is transmitted through a 2.4/46 kV step-up transformer bank.

The Beldens tailrace is about 550 feet long before its confluence with the downstream Huntington Falls impoundment (Photo B-5).



*Photo B-5 - Beldens Tailrace below East Dam*

## **C. Huntington Falls**

The Huntington Falls Development is two miles downstream of the Beldens Dam and located at RM 21 in Weybridge, Vermont. Approximately 74 acres are included within the Development boundary. Facilities within the boundary include the impoundment, dam, bypass reach, two powerhouses, two intakes, three penstocks, and the tailrace (See Figure 5).

The impoundment extends 1.3 miles upstream from the dam following the contour elevation of 230 FTMSL with the shoreline generally comprised of silt with little to no vegetation. The impoundment encompasses 23 acres with a usable storage capacity of 234.16 ACFT at a normal maximum water surface elevation of 217.8 FTMSL (Photo C-1).

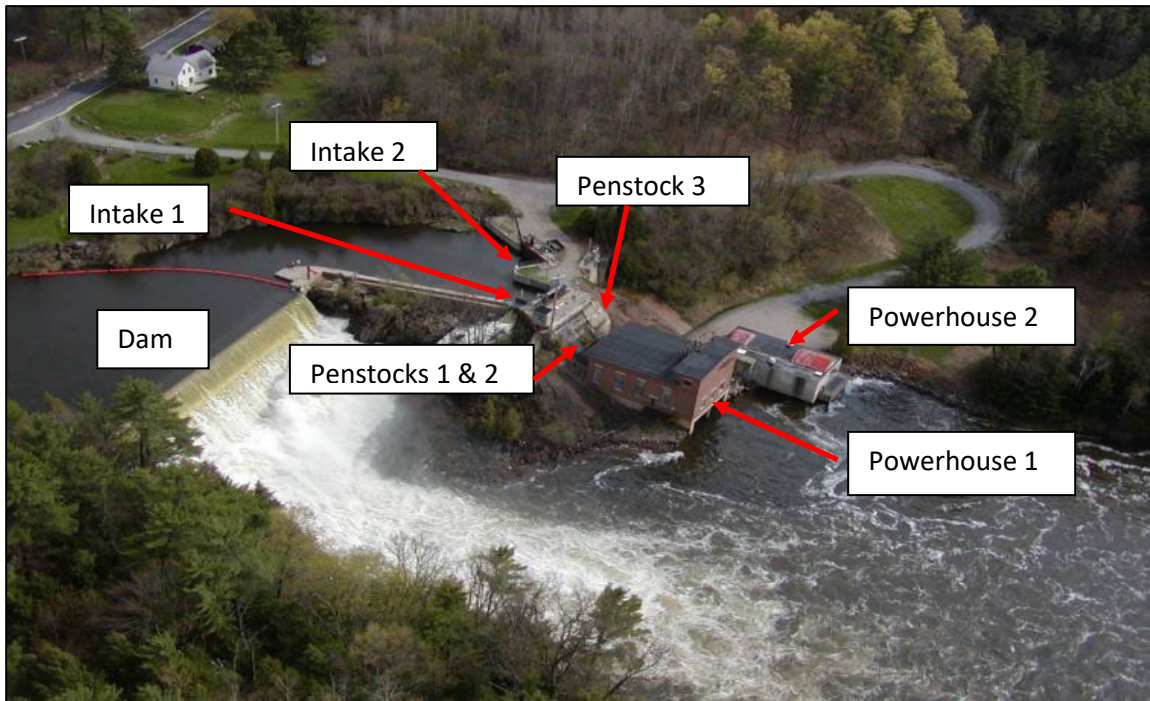


Figure 5. Huntington Falls Development



*Photo C-1 - Huntington Falls Impoundment*

The dam, built in 1910, is 187 feet long with a maximum height of about 31 feet, topped with a 2.5-foot inflatable flashboard system (Photo C-2). The bypass below the dam is relatively short in length, approximately 250 feet.



*Photo C-2 – Huntington Falls Intakes, Penstocks and Powerhouses*

The Development has two intakes. Intake 1 is a 40-foot-wide by 20-foot-high intake with 13-foot-high by 26-foot-wide trashracks with bar spacing of 1.125 inches. Water is passed into two 10-foot-diameter steel penstocks, each approximately 30 feet long, leading to Powerhouse 1.

Intake 2 is 38 feet high by 40 feet wide with 16-foot-high by 30-foot-wide trashracks with 2.0-inch clear bar spacing. Water is passed into a single 12-foot-diameter by 75-foot-long concrete penstock, leading to the newer Powerhouse 2.

Powerhouse 1 is brick masonry, measuring 42 feet by 60 feet, housing two identical horizontal Francis turbine/generating units that were redeveloped in 2017. Each unit has an installed capacity of 1,312 kW with a turbine hydraulic capacity ranging from 100 to 450 CFS. Powerhouse 2 measures 40 feet by 75 feet, housing a single 4,100 kW horizontal Kaplan turbine/generator with a turbine hydraulic capacity ranging from 270 to 1,350 CFS. Overall, the Development has a total hydraulic capacity of 2,250 CFS and a total authorized installed capacity of 6,725 kW. Power output is transmitted through a 2.4/46 kV step-up transformer bank.

The Development's tailrace is about 500 feet long before its confluence with the downstream impoundment.



#### IV. ZONES OF EFFECT (ZOE)s

The Project has a total of nine ZOE's defined from upstream to downstream on Otter Creek. ZOE's at the Proctor, Beldens and Huntington Falls Developments are shown in Figure 6, Figure 7, and Figure 8, respectively.

ZOE's 1 through 9 are:

- ZOE 1 is the Proctor impoundment, RM 70.2 to 64.2;
- ZOE 2 is the Proctor bypass reach, RM 64.2 to 64.13;
- ZOE 3 is the Proctor tailrace, RM 64.13 to RM 64.1;
- ZOE 4 is the Beldens impoundment, RM 23.0 to 21.2;
- ZOE 5 is the Beldens bypass reach, RM 21.2 to 21.1;
- ZOE 6 is the Beldens tailrace, RM 21.1 to RM 21.0;
- ZOE 7 is the Huntington Falls impoundment, RM 21.0 to 19.7;
- ZOE 8 is the Huntington Falls bypass reach, RM 19.7 to 19.65;
- ZOE 9 is the Huntington Falls tailrace, RM 19.65 to RM 19.6.

The alternative standards selected to satisfy the LIHI certification criteria in each of these ZOE's are identified in Table 1. As part of my review process, I checked and agreed with their selection.

**Table 1: Zones of Effect**

<i><b>CRITERION and STANDARD SELECTED</b></i>								
<b>Zone Number and Zone Name</b>	<i><b>A</b></i>	<i><b>B</b></i>	<i><b>C</b></i>	<i><b>D</b></i>	<i><b>E</b></i>	<i><b>F</b></i>	<i><b>G</b></i>	<i><b>H</b></i>
	Ecological Flows	Water Quality	Upstream Fish Passage	Downstream Fish Passage	Shoreline and Watershed Protection	Threatened and Endangered Species	Cultural and Historic Resources	Recreational Resources
1. Proctor Impoundment	2	2	1	1	1	2	2	2
2. Proctor Bypassed Reach	2	2	1	1	1	2	2	2
3. Proctor Downstream	2	2	1	1	1	2	2	2
4. Beldens Impoundment	2	2	1	1	1	2	2	2
5. Beldens Bypassed Reach	2	2	1	1	1	2	2	2
6. Beldens Downstream	2	2	1	1	1	2	2	2
7. Huntington Falls Impoundment	2	2	1	1	1	2	2	2
8. Huntington Falls Bypassed Reach	2	2	1	1	1	2	2	2
9. Huntington Falls Downstream	2	2	1	1	1	2	2	2

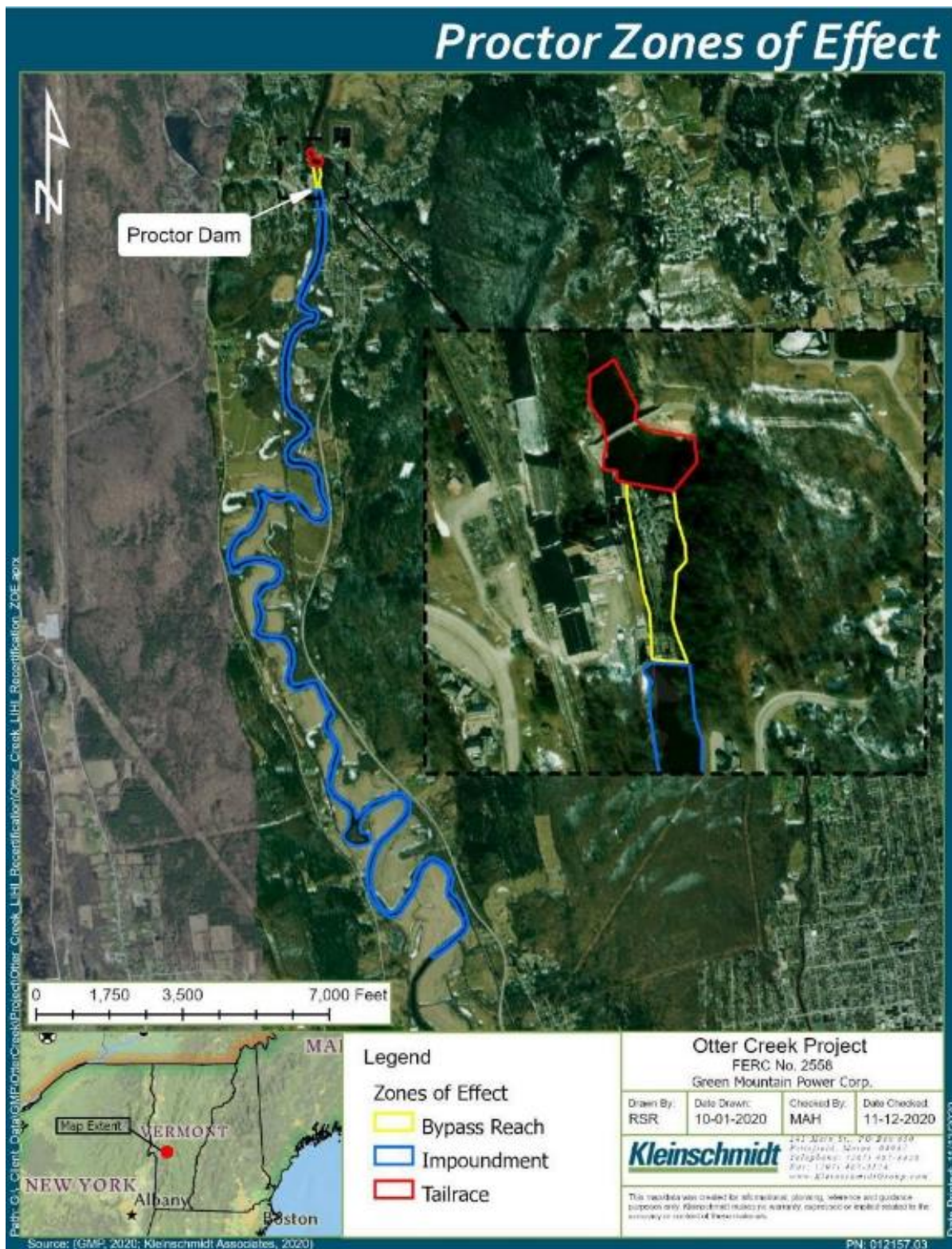


Figure 6. Proctor ZOE

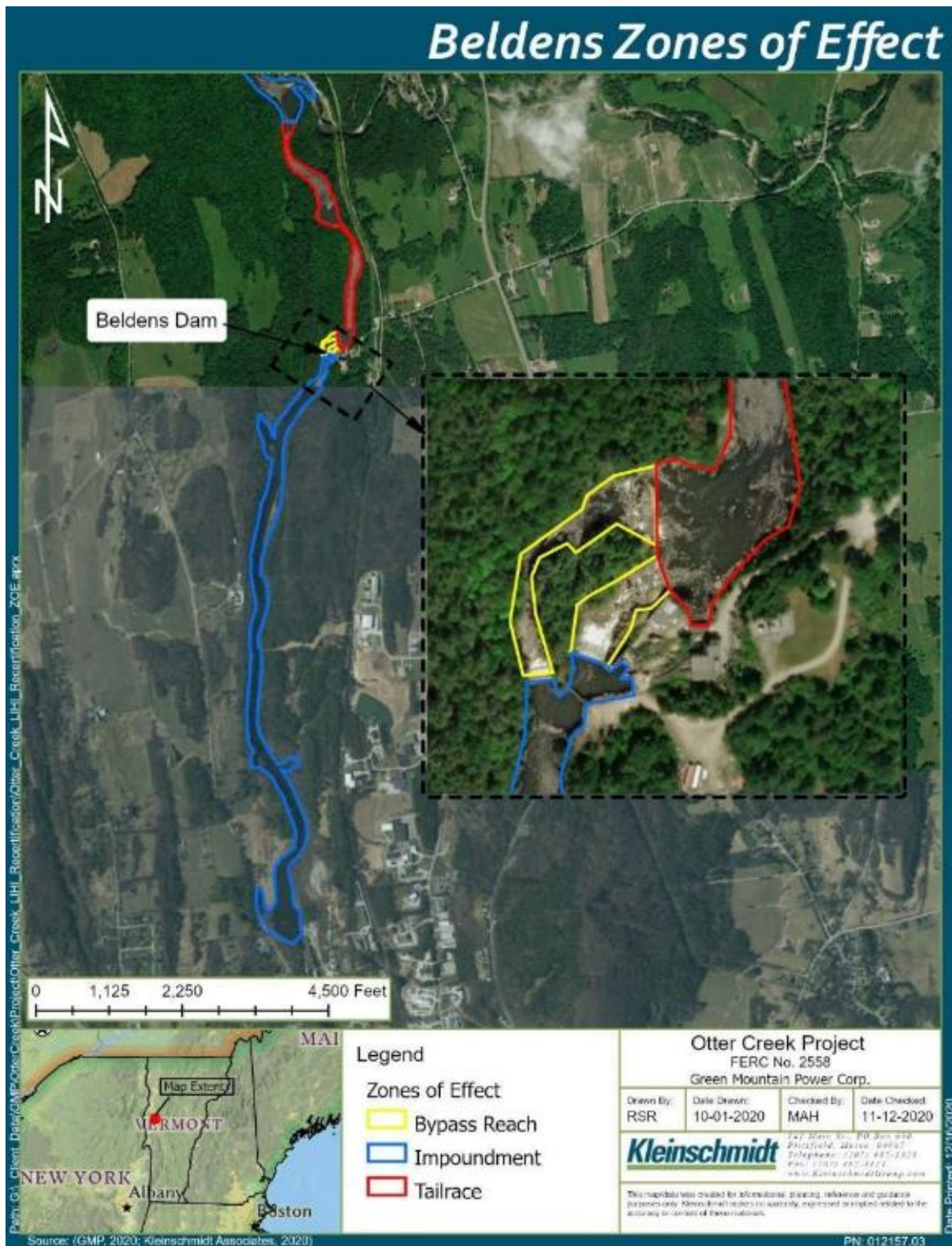


Figure 7. Belden ZOE's

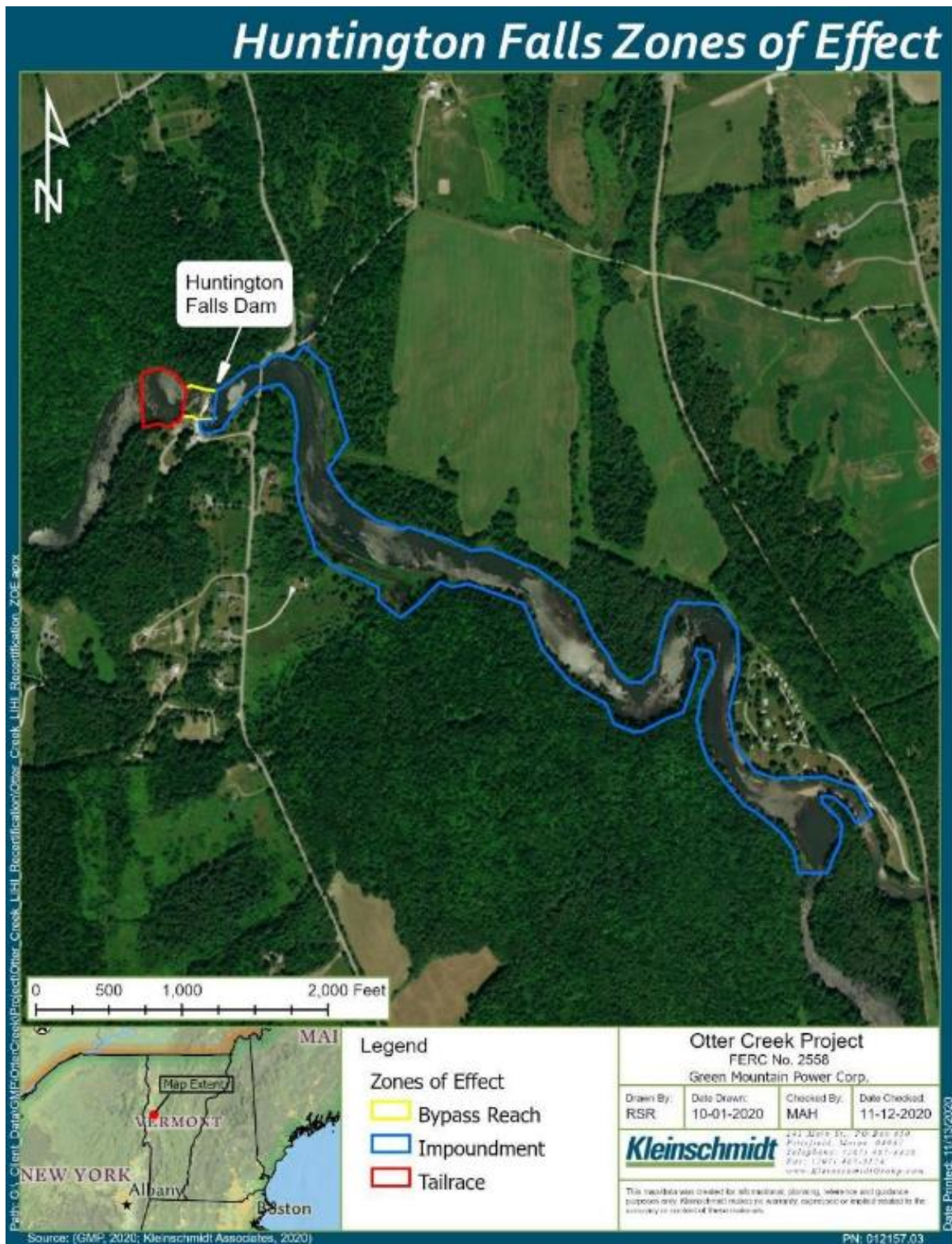


Figure 8. Huntington Falls ZOE



## V. REGULATORY AND COMPLIANCE STATUS

The original license for the Project was issued on February 23, 1976, with an effective date of April 1, 1962, terminating on December 31, 1993. On October 15, 1981, the Commission extended the license term by 18 years.

On March 31, 2010, the licensee, Vermont Marble Power Division of Omya Inc. (VMPD) filed a relicense application. On November 23, 2010, the FERC issued an order approving the transfer of the existing license from VMPD to Central Vermont Public Service Corporation (CVPSC) <sup>9</sup>.

On May 2, 2011, the FERC accepted the relicense application for filing, soliciting motions to intervene and protests, indicating the application was ready for environmental analysis, and soliciting comments, recommendations, preliminary terms and conditions, and preliminary fishway prescriptions<sup>10</sup>.

On August 1, 2011, CVPSC amended the pending relicense application, proposing physical improvements and operational changes to the Project<sup>11</sup>. The proposed changes included, among other things, realignment of the intake at the Proctor Development and removal of inoperable generating equipment from the Proctor powerhouse. In response on May 14, 2012, the FERC issued a public notice of the acceptance of the amended relicense application<sup>12</sup>.

The Project license expired on March 31, 2012 and annual licenses were granted in 2012 and 2013. On September 13, 2012, the FERC issued an order approving the transfer of the license from CVPSC to GMPC<sup>13</sup>. Rather than waiting for authorization under a relicense, in March 2013, GMPC asked for authorization under its annual license to undertake some of the work proposed in the amendment application, including the realignment of the intake at the Proctor Development and removal of inoperable generating equipment from the Proctor powerhouse. This request was approved by the FERC in an order issued on June 20, 2013<sup>14</sup>.

A Draft Environmental Assessment (DEA) was prepared by FERC and issued on December 21, 2012, analyzing the impacts of the proposed Project. The Vermont Agency of Natural Resources (VANR), GMPC, and the Vermont State Historic Preservation Officer (SHPO) filed comments on the DEA. On July 26, 2013, the FERC issued a final environmental assessment (FEA), on which no comments were filed<sup>15</sup>.

On October 23, 2014, the Project was issued a new 40-year FERC License<sup>16</sup>. On November 10, 2015, the FERC issued a letter requesting GMPC to file a temporary license amendment for the Project to address interim bypass conservation flows at the Huntington Falls Development<sup>17</sup>.

GMPC submitted to FERC an Application for Temporary Amendment of License on December 15, 2015 to address this interim flow<sup>18</sup>. On January 21, 2016, FERC issued notice of acceptance of the temporary

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<sup>9</sup> License transfer to CVPSC - <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=12493382>.

<sup>10</sup> Relicense application acceptance - <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=12653503>.

<sup>11</sup> Amended license application - <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=12722837>.

<sup>12</sup> Amended license acceptance - <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=12952704>.

<sup>13</sup> License transfer to GMPC - <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13064046>.

<sup>14</sup> FERC approval of Proctor construction - <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13303124>.

<sup>15</sup> FEA - <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13315251>.

<sup>16</sup> License - <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=13664778>

<sup>17</sup> FERC request for TAL - <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14041759>.

<sup>18</sup> GMPC submittal of TAL - <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14072612>.



amended license application<sup>19</sup>. On January 29, 2016, the Bureau of Indian Affairs (BIA) commented that the Project is located in an area of historic interest to the Saint Regis Mohawk Tribe (SRMT) and they should be consulted on potential Project impacts to their cultural sites<sup>20</sup>. On May 10, 2016, the FERC issued a Temporarily Amended License<sup>21</sup> to GMPC that required GMPC to immediately increase the minimum flow from 15 CFS to 66 CFS.

## A. Licensing Requirements

The FERC license includes a number of requirements intended to restore, protect, and enhance natural resources and improve public access and recreation. The FERC license contains seven articles:

- Article 401 – GMPC must file a Flow Management and Monitoring Plan (FMMP) and a Debris Disposal Plan (DDP) within 6 months and a Recreational Plan (RP) within one year after license issuance.
- Article 402 – GMPC must file a Spill Prevention Control and Countermeasures Plan (SPCCP) within 6 months after license issuance.
- Article 403 – At least 90 days before the start of any facility upgrades at the Huntington Falls Development, GMPC must file with the FERC detailed design drawings of the proposed trashrack to reduce debris loading and ice buildup at the turbine-generator unit 3 intake.
- Article 404 – At least 90 days before the start of any land disturbing, land clearing, or facility upgrade activities, GMPC must file with the FERC a terrestrial monitoring and management plan (TMMP).
- Article 405 – The RP in Article 401 must show the as-built drawings of the Proctor Development's tailrace parking.
- Article 406 – GMPC must file a Programmatic Agreement (PA) and Historic Properties Management Plan (HPMP).
- Article 407 – Establishes land conveyance rules and rights of the Project owner.

## B. Compliance Issues

The current 5-year LIHI Certification for the Project was issued without any conditional requirements. There have been no major compliance issues and only a few “extension of time” requests by GMPC over the last 5 years.

The following is a compliance summary since the last LIHI Certification period:

- GMPC filed an Application for Temporary Amendment of the License on December 15, 2015 to reduce flows<sup>22</sup>;
- Construction of the Huntington Falls gate in the power canal was needed to release the higher minimum bypass flow of 66 CFS. GMPC requested to modify the license to allow only 48 CFS over the spillway during this construction period since 66 CFS was not feasible.
- An Order to Temporarily Amend the License was issued by FERC on May 10, 2016<sup>23</sup>.

<sup>19</sup> FERC accepts GMPC submittal - <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14124070>.

<sup>20</sup> SRMT – Mr. Arnold Printup - 412 State Route 37, Akwesasne, NY 13655.

<sup>21</sup> FERC issued TAL - <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14244637>

<sup>22</sup> <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=14072230>

<sup>23</sup> <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=14244594>



- GMPC requested to cancel the Order modifying the bypass conversion flow on April 10, 2017 after construction was complete<sup>24</sup>.
- FERC granted the Expiration of Temporary Minimum Flow Amendment on May 23, 2017<sup>25</sup>. The filing on April 10, 2017 did not comply with the filing schedule mandated in the May 10, 2016 Order. However, no disciplinary action was taken.

## VI. LIHI PUBLIC COMMENTS

The LIHI application for recertification was submitted in January 2021 and the Stage I Recertification Review was completed on January 22, 2021, with findings of no significant shortcomings but a request for supplemental information. On May 21, 2021, LIHI posted the application for the 60-day public comment period which closed on July 20, 2021.

### A. Comment Letters

On May 21, 2021, LIHI filed notice via their email list that the public comment period for the application had been opened. The notice stated, *"LIHI is seeking comment on this application. Comments that are directly tied to specific LIHI criteria (flows, water quality, fish passage, etc.) will be most helpful, but all comments will be considered. Comments may be submitted to the Institute by e-mail at [comments@lowimpacthydro.org](mailto:comments@lowimpacthydro.org) with "Otter Creek Project Comments" in the subject line, or by mail addressed to the Low Impact Hydropower Institute, 329 Massachusetts Avenue, Suite 6, Lexington, MA 02420. Comments must be received at the Institute on or before 5 pm Eastern time on July 20, 2021 to be considered. All comments will be posted to the web site and the applicant will have an opportunity to respond. Any response will also be posted. The project description and complete application can be found [HERE](#)<sup>26</sup>."* No comments were received.

### B. Agency Correspondence

On May 21, 2021, LIHI<sup>27</sup> emailed contacts<sup>28</sup> listed in the LIHI application as knowledgeable about the Project stating, *"You may have already received this notice if you are on the Low Impact Hydropower Institute ([www.lowimpacthydro.org](http://www.lowimpacthydro.org)) email list. However, you were also identified as an agency contact on the LIHI recertification application recently submitted by Green Mountain Power for the Otter Creek Hydroelectric Project on Otter Creek. The application reviewer, Gary Franc (copied here), may be in contact with you if he has questions about these projects or wishes to clarify any aspects of the LIHI applications. You may also provide comments directly to LIHI as indicated below. More information about the projects and their application can be found in the link below. If you would like to receive additional notices about these projects or other hydroelectric projects in your region applying for LIHI certification, please sign up for our mailing list at <https://lowimpacthydro.org/join-our-list/>."*

No agencies or stakeholders responded. Given that the application and supplement provided all supporting documentation and no other apparent issues were uncovered, I did not reach out to any agencies.

<sup>24</sup> <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=14554678>

<sup>25</sup> <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=14594674>

<sup>26</sup> <https://lowimpacthydro.org/lihi-certificate-128-otter-creek-project-vt/>

<sup>27</sup> Maryalice Fischer – LIHI Certification Program Director - [mfischer@lowimpacthydro.org](mailto:mfischer@lowimpacthydro.org) - 603-664-5097 office - 603-931-9119 cell

<sup>28</sup> [Eric.Davis@vermont.gov](mailto:Eric.Davis@vermont.gov), [Jeff.Crocker@vermont.gov](mailto:Jeff.Crocker@vermont.gov), [Betsy.Simard@vermont.gov](mailto:Betsy.Simard@vermont.gov), [Bob.Popp@vermont.gov](mailto:Bob.Popp@vermont.gov), [elizabeth.peebles@vermont.gov](mailto:elizabeth.peebles@vermont.gov), [scott.dillon@vermont.gov](mailto:scott.dillon@vermont.gov), [melissa\\_grader@fws.gov](mailto:melissa_grader@fws.gov)



## VII. DETAILED CRITERIA REVIEW

This section contains my recertification review of the Project with regard to the LIHI Certification criteria. As part of my review, I conducted a FERC e-library search to verify claims in the recertification application. My review concentrated on the period since the initial certification of the Project on July 13, 2016, for FERC docket number P-2558.

### A. Ecological Flows

The goal of this criterion is to support habitat and other conditions that are suitable for healthy fish and wildlife resources in riverine reaches that are affected by the facility's operation. The application states the Project satisfies the LIHI flows criterion in all ZOE's by meeting alternative standard A-2.

The license includes conditions for each of the Project's developments:

- The Proctor Development operates in a true run-of-river (TROR) mode or a modified run-of-river (MROR) mode. GMPC maintains the impoundment water surface elevation at or near the top of the inflatable flashboards (469.5 FTMSL) while providing a continuous bypass minimum flow of 60 CFS which was determined based on a bypass reach instream flow study that showed the short, 680-foot long reach would be wetted year-round. Aquatic habitat is limited to a single pool area used as a fish refuge for fish that pass downstream over the dam. The rest of the reach consists of steep gradient with natural bedrock falls and cascades and therefore upstream passage is not possible. The minimum flow was determined to greatly enhance the pool habitat at that flow level. The Development's operation varies throughout the year:
  - From May 1 through June 30, Proctor operates in a TROR mode whenever inflows are <400 CFS. This occurs about 25% of the time. Once inflows exceed 400 CFS, the MROR mode is adopted. The impoundment is allowed to fluctuate between 469.5 FTMSL and 468.0 FTMSL by allowing the average outflow to be up to 1.5 times greater than the average inflow over a 24 hour period. This occurs about 75% of the time;
  - From July 1 through July 15, Proctor operates in a TROR mode whenever inflows are <200 CFS. This occurs about 29% of the time. Whenever inflows range from 200 CFS to 399 CFS, the MROR mode is adopted. The impoundment is allowed to fluctuate between 469.5 FTMSL and 468.0 FTMSL by allowing the average outflow to be up to 1.5 times greater than the average inflow over a 24 hour period. This occurs about 31% of the time. Once inflows exceed 399 CFS, the impoundment is allowed to fluctuate between 469.5 FTMSL and 468.0 FTMSL by allowing the average outflow to be up to 2.0 times greater than the average inflow over a 24 hour period. This occurs about 40% of the time;
  - From July 16 through April 30, Proctor operates in a TROR mode whenever inflows are <200 CFS. This occurs about 17% of the time. Whenever inflows range from 200 CFS to 399 CFS, the MROR mode is adopted. The impoundment is allowed to fluctuate between 469.5 FTMSL to 468.0 FTMSL by allowing the average outflow to be up to 2.5 times greater than the average inflow over a 24 hour period. This occurs about 30% of the time. Once inflows exceed 399 CFS, the impoundment is allowed to fluctuate between 469.5 FTMSL and 468.0 FTMSL by allowing the average outflow to be up to 3.0 times greater than the average inflow over a 24 hour period. This occurs about 53% of the time.



- The Beldens Development operates in a TROR mode with an impoundment target elevation of 283.0 FTMSL. A continuous bypass minimum flow of 35 CFS is provided, with 10 CFS spilled over the east dam by maintaining 2.0 inches of water above the top of the flashboards; and 25 CFS spilled over the west dam from a combination of 2 inches of spill over the flashboards and the passing of flow through either an 18-inch by 31-inch weir cutout in top of the flashboards or a 12-inch by 32-inch cutout lower in the flashboard section. The bypass reach is dominated by bedrock pools and gorge habitat and provides little aquatic habitat other than over short periods in two pools for fish that pass over the dam. These flows were determined based on a combination of water quality and flow velocity measurements that provide suitable habitat conditions for the target species. When flashboards are not in place, the impoundment level is maintained 3.25 inches above the crest of both dams to ensure that the minimum conservation flow is achieved.
- The Huntington Falls Development operates in a TROR mode with an impoundment target elevation of 217.8 FTMSL while providing a minimum flow of 66 CFS. Increasing the conservation flow from the previously licensed 15 CFS to 66 CFS was based on an instream flow study which showed optimized habitat in the bypassed reach and suitable edge velocities for the target species. Due to the physical characteristics of the ledge outcropping at the base of the dam, flows released on the southern end of the dam enter the bypass which helps achieve the intended velocity conditions. However, since the latest turbine redevelopment, flows less than minimum hydraulic capacity of 100 CFS are spilled over the dam crest and into the bypassed reach.

Project compliance is monitored and enforced with the implementation of the FMMP. After being granted an extension of time, GMPC submitted the FMMP to FERC on July 21, 2015<sup>29</sup>. By email sent July 21, 2015, Jeff Crocker, River Biologist with VDEC stated that the FMMP reflects the recommendations of the agency and that it had no further comments. In an October 21, 2015 filing, the USFWS stated it would defer to VDEC for reviewing the plan<sup>30</sup>. On May 10, 2016, FERC issued an approval of this FMMP<sup>31</sup>.

The FMMP includes procedures for reporting to VDEC deviations from prescribed operating conditions within 10 days of their occurrence. In reporting deviations, GMPC will include an explanation of the cause, severity, duration, observations of environmental impacts from the time of the incident and propose steps to be taken to prevent a recurrence. The plan must be revised if requested by VDEC. Primary requirements of the FMMP are:

- At the Proctor Development:
  - The USGS gage 04282000 data is used to calculate daily inflow for the day and to determine the criteria under which it needs to operate the overall Project;
  - GMPC uses an automated valve to release the required bypass flow of 60 CFS. The valve adjusts to release the required flow depending upon reservoir elevation. Also, during refill following a reservoir drawdown, 90 percent of inflow is released and the remaining 10 percent is held in the reservoir while maintaining the required conservation bypass flow at all times.
- At the Beldens development:
  - GMPC provides the bypass flow of 10 CFS at the east dam via spill over the flashboards and 25 CFS at the west dam by using spill as well as a notch and an orifice in the flashboards.

<sup>29</sup> GMPC submittal of FMMP - <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13937302>

<sup>30</sup> <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14020535>

<sup>31</sup> FERC approval of FMMP - <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14244632>



When flashboards are not in place, GMPC maintains the reservoir at an elevation to release the bypass flow through spill over the dam crest. This approach requires detailed monitoring of the pond level to ensure proper release of minimum flow. GMPC is also required to consult with VDEC to interrupt the bypass flow to allow for safe replacement of flashboards.

- At the Huntington Falls development:
  - The bypass flow of 66 CFS is released through a gate installed in 2016;
  - The FMMP also requires that GMPC use a programmable logic controller (PLC) to measure and record reservoir elevation, gate settings, turbine discharge, and flow measured at the upstream USGS gage on an hourly basis. The PLC is capable of operating the gates to maintain minimum flow release compliance.

A review of the FERC docket and the LIHI application confirms that GMPC has been in compliance with minimum flow releases and pond fluctuation compliance issues related to the Project, and therefore, this LIHI criterion is satisfied.

## B. Water Quality

The goal of this criterion is to ensure water quality is protected in water bodies directly affected by facility operations, including downstream reaches, bypassed reaches, and impoundments above dams and diversions. The application states the Project satisfies the LIHI flows criterion in all ZOE's by meeting alternative standard B-2.

The Project is in compliance with the WQC issued on May 30, 2014. The VDEC certified that the operation and maintenance of the Project will not cause a violation of Vermont Water Quality Standards and is in compliance with sections 301, 302, 303, 306, and 307 of the Federal Clean Water<sup>32</sup>.

In Vermont's 2018 List of Impaired Waters<sup>33</sup>, three sections of Otter Creek outside of the Project area have been identified as not meeting water quality standards pursuant to Section 303(d) of the Clean Water Act:

- Downstream of the Project in the Lake Champlain section of the river in Ferrisburgh, VT, Otter Creek is classified as impaired due to elevated levels of PCBs in lake trout;
- In lower Otter Creek below the Vergennes Wastewater Treatment Facility and downstream of the Project, Otter Creek is classified as impaired because of E. Coli presence.
- The reach of Otter Creek in the vicinity of the Rutland Wastewater Treatment Facility and upstream of the Project is listed as impaired water because of E. Coli presence.

To help prevent introduction of hazardous material into Project waters, GMPC filed a SPCCP<sup>34</sup> which was approved by the FERC on February 5, 2015<sup>35</sup>. This plan is designed to minimize the potential for hazardous materials spills and ensure that procedures are in place to minimize the extent and adverse effects of hazardous materials spills that occur during construction activities and ongoing operation and maintenance of the Project.

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<sup>32</sup> Page 34 of the May 30, 2014 WQC.

<sup>33</sup> <https://www.epa.gov/sites/production/files/2019-02/documents/2018-vt-303d-list-report.pdf>

<sup>34</sup> <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=14277813>

<sup>35</sup> <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=13765111>



In accordance with license Article 404, GMP filed a TMMP<sup>36</sup> with FERC in April 2016. This plan is to re-vegetate areas disturbed by construction activities authorized under the license, prevent the spread of invasive plants, and protect federally protected wildlife species and their respective habitats within the Project area. The TMMP was approved by FERC on May 25, 2016<sup>37</sup>.

As identified by VDEC, Otter Creek is classified as a Class B waterway. Class B waters are managed for high quality but may have minimal, minor, or moderate change to aquatic biota or habitat. Designated uses for Vermont Class B waters include: aquatic biota, wildlife and aquatic habitat; swimming and other primary contact recreation; boating, fishing, and other recreation uses; water supply; and agricultural uses.

Surface waters impounded by hydroelectric dams and downstream of the facilities are classified as class B (2). Common water quality issues related to hydroelectric facilities are due to flow modifications. The Project does not contribute to the impaired waters occurring within Otter Creek. None of the Project's developments are identified as causing water quality issues as cited in the 2019 Otter Creek Basin Tactical Plan<sup>38</sup>.

The VDEC has concluded that the presence of E.coli is caused by periodic and reoccurring overflows at wastewater treatment plant pump stations located in Vergennes and Rutland and the presence of PCBs in lake trout is caused by atmospheric deposition.

A review of the FERC docket indicates the Project has been operated in accordance with its water quality requirements and does not adversely impact water quality. Therefore, this LIHI criterion is satisfied.

## C. Upstream Fish Passage

The goal of this criterion is to ensure safe, timely and effective upstream passage of migratory fish so that the migratory species can successfully complete their life cycles and maintain healthy populations in areas affected by the Project's facilities. The application states the Project satisfies the LIHI upstream fish passage criterion in all ZOE's by meeting alternative standard C-1.

No natural populations of anadromous or catadromous fish have historically occurred within Otter Creek. As stated in the WQC, fish species requiring extensive migratory corridors currently are not present in Otter Creek. Historically, the Vermont Department of Fish and Wildlife (VDFW) stocked steelhead trout and Atlantic salmon in the middle reaches of Otter Creek near the Huntington Falls and Beldens developments. However, stocking efforts have been discontinued.

Upstream fish migration in the vicinity of the Project is limited due to the dams and the natural stream morphology at each of the developments. A natural set of falls below Huntington Falls at Vergennes prevents upstream fish migration from Lake Champlain, thus adfluvial fish are not likely a historic component of the freshwater fish assemblage in the Project area. In addition, Sutherland Falls, at the Proctor bypass reach, also prevents upstream fish migration. Therefore, no prescriptions for fishways were filed as part of the license. However, by Condition E of the WQC, VDFW reserves the right to require development of passage facilities in the future. If the status of Otter Creek fish populations or fisheries management objectives change, GMPC may need to provide upstream passage. Since the implementation

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<sup>36</sup> <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=14200917>

<sup>37</sup> <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=14256091>

<sup>38</sup> [https://dec.vermont.gov/sites/dec/files/wsm/mapp/docs/B3\\_TBP\\_FINAL\\_ARA.pdf](https://dec.vermont.gov/sites/dec/files/wsm/mapp/docs/B3_TBP_FINAL_ARA.pdf)



of the license in 2014, GMPC has not been notified of changes in fisheries management objectives for Otter Creek.

Fishes directly documented within the Otter Creek Wildlife Management Area<sup>39</sup> (located upstream of the Project) include: Brown Trout, Brook Trout, Rainbow Trout, Blacknose Dace, Longnose Dace, Bluntnose Minnow, Fathead Minnow and Spottail Shiner. In 2020, 5,500 Rainbow Trout, 2,215 Brown Trout and 250 Brook Trout were stocked throughout Otter Creek.

A review of the FERC docket and the LIHI application confirms that GMPC has been in compliance with upstream fish passage and protection issues related to the Project; and therefore, this LIHI criterion is satisfied.

## **D. Downstream Fish Passage**

The goal of this criterion is to ensure safe, timely and effective downstream passage of migratory fish, and for riverine fish that the facility minimizes loss of fish from reservoirs and upstream river reaches affected by facility operations. Migratory species can successfully complete their life cycles and maintain healthy populations in areas affected by the facility. The application states the Project satisfies the LIHI downstream fish passage criterion in all ZOE's by meeting alternative standard D-1.

As noted above, no fishway prescriptions or reservations of authority were filed as part of the FERC 2014 License. There are no natural or historical populations of anadromous or catadromous fish species that occur within Otter Creek.

While downstream fish passage facilities at the Project would benefit a limited number of resident fish species, these facilities are not deemed necessary at present. Since the Lake Champlain migratory salmonid program has been discontinued in Otter Creek, passage is no longer needed for adfluvial salmonids. Since trout are not abundant in Otter Creek, it is unlikely that significant numbers will seek to move past the dams. Warm-water fish species are more prevalent and in general, move within river systems to a lesser extent than trout. Some fish may pass downstream during spill and the bypass minimum flows ensure there is sufficient habitat for fish that hold in the bypass reach pools.

The Project is in compliance with resource agency recommendations for fish entrainment protection. Project structures are designed to discourage fish entrainment. The intake at Proctor Development is equipped with a 57-foot-wide by 13.5-foot-high full depth trashrack with 1-inch clear spacing situated at a 45 degree angle to the river flow.

There are two sets of trashracks at the Beldens Development. One trashrack is approximately 40 feet long and 13 feet high with 3-inch clear spacing and the other approximately 26 feet wide by 13 feet high with 1.125-inch clear spacing.

The Huntington Falls Development has two intakes and two sets of trashracks. The first trashrack is approximately 30 feet wide and 16 feet high with 2-inch clear spacing positioned 45 degrees to river flow. The second trashrack structure is approximately 26 feet wide and 13 feet high with 1.125-inch clear spacing.

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<sup>39</sup> <https://vtfishandwildlife.com/sites/fishandwildlife/files/documents/Where%20to%20Hunt/Rutland%20District/Otter%20Creek%20WMA.pdf>



My review found that throughout the current LIHI certification, no issues pertaining to downstream fish passage were found. Therefore, this LIHI criterion is satisfied.

## **E. Shoreline and Watershed Protection**

The shoreline and watershed protection criterion is designed to ensure that sufficient action has been taken to protect, mitigate or enhance environmental conditions of soils, vegetation, and ecosystem functions on shoreline and watershed lands associated with the facility. The application states the shoreline and watershed protection criterion in all ZOE's is satisfied by meeting alternative standard E-1.

There is no buffer zone for conservation purposes dedicated to the protection of fish and wildlife habitat, water quality, aesthetics and/or low-impact recreation, nor has GMPC established an approved watershed enhancement fund. Additionally, no shoreland buffer or watershed protection plan has been established through settlement agreements or ever recommended for the Project as part of FERC licensing.

However, the Project was required to develop a TMMP in license Article 404. The purpose of this plan is to re-vegetate areas disturbed by authorized construction activities, prevent the spread of invasive plants, and protect federally-protected wildlife species and their representative habitats within the Project area.

On February 5, 2015<sup>40</sup>, the FERC granted a waiver of Article 404's requirement to file a TMMP for the approved redevelopment of the Proctor Development. The waiver was granted since GMPC was working on the redevelopment prior to the issuance of the FERC License. GMPC agreed to develop a TMMP prior to the commencement of any future improvements that may occur at the Beldens or Huntington Falls. On April 12, 2016<sup>41</sup>, GMPC submitted its Final TMMP to FERC and on May 25, 2016<sup>42</sup>, FERC issued its approval of the plan.

The Proctor Development is located in a deciduous and hardwood mixed forest, interspersed with wetlands and agricultural lands. The impoundment is bordered by corn fields, pumpkin patches, cattle pastures, and fragmented forested areas. Approximately 45 percent of the Proctor Development's shoreline is agricultural lands. The shoreline is generally steep and surrounded by forested areas. There are no wetlands directly adjacent to the dam or powerhouse but there are wetlands located just outside of the development boundary northeast of the dam.

The Vermont Natural Resources Atlas (VNRA) was used to identify ecologically significant lands within or in proximity to the Proctor Development's boundaries. No vernal pools were identified in close proximity to the Proctor Development or vicinity. Class II Wetlands were identified in all ZOE's but are not expected to be impacted since the development operates in a MROR mode.

The Beldens Development is located within mixed hardwood, coniferous stands, deciduous scrub-shrub habitat, small wetlands, agricultural lands, and residential areas. Generally, the shoreline is steep and over 70 percent of the shoreline is forested. There are no wetlands directly adjacent to the dam or powerhouse.

The VNRA was used to identify ecologically significant lands within or in proximity to the Beldens Development's boundaries. The Otter Creek Gorge Land Trust is the only conservation land nearby and no vernal pools were identified near the Development. Class II wetlands were identified along some sections

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<sup>40</sup> <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13765411>

<sup>41</sup> <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14200920>

<sup>42</sup> <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14256205>



of the impoundment and directly upstream of the dam. It is not expected the Development will impact these wetlands since it operates as TROR.

The Huntington Falls Development is located within mixed hardwood, coniferous stands, deciduous scrub-shrub habitat, small wetlands, agricultural lands, and residential areas. Generally, the shoreline is steep and over 65 percent of the shoreline is forested. There are no wetlands directly adjacent to the dam or powerhouse, but forested wetlands are located within the Development boundary just southeast of the dam.

The VNRA was used to identify ecologically significant lands within or in proximity to the development boundary. Class II wetlands were identified near the tailrace. It is not expected the development will impact these wetlands since it operates as TROR.

No issues related to watershed protection have been found. Since the Project is in compliance with watershed protection aspects of its license and certification criteria, this LIHI criterion is satisfied.

## **F. Threatened and Endangered Species Protection**

The threatened and endangered species protection criterion is designed to ensure that the facility does not negatively impact state or federally-listed threatened or endangered species. The application states the LIHI threatened and endangered species criterion is satisfied in all ZOE by meeting alternative standard F-2.

The TMMP protects federally protected wildlife species and their respective wildlife habitats within the Project area and contains provisions to re-vegetate disturbed areas and prevent the spread of invasive plants. Also, given the MROR operation of the Project and the issuance of the FMMP, minimal effects on local habitat of state-listed mussels are anticipated.

Federally-listed endangered and threatened species within the Project's ZOEs were identified in the USFWS Information for Planning and Consultation (IPaC) report in November and December 2020 and provided as Appendix B in the recertification application.

One federally-listed endangered species, the Indiana bat and one federally-listed threatened species, the Northern long-eared bat, may be found within the Project's vicinity. Both species of bats are also considered endangered by the State of Vermont. During Project surveys in 2008 for endangered, threatened, and rare species conducted by VMPD, no Indiana bats were observed but suitable floodplain and upland forest habitat, attractive to the Indiana bat, occurs adjacent to Otter Creek. It is possible these bats feed within the Project boundary, though no critical habitat is contained within the Project boundary for either species. TROR to MROR operation of the Project is not anticipated to negatively impact either of the bats that may transiently utilize the area.

Migratory birds within the Projects' ZOEs were identified as present in the IPaC report:

- The Proctor Development potentially has nine migratory birds:
  - Bald Eagle;
  - Black-billed Cuckoo;
  - Bobolink;
  - Canada Warbler;
  - Evening Grosbeak;



- Lesser Yellowlegs;
- Prairie Warbler;
- Rusty Blackbird, and;
- Wood Thrush
- The Beldens Development potentially has twelve migratory birds:
  - Bald Eagle;
  - Black-billed Cuckoo;
  - Bobolink;
  - Buff-breasted Sandpiper;
  - Canada Warbler;
  - Eastern Whippoor-will;
  - Golden Eagle;
  - Golden-winged Warbler;
  - Lesser Yellowlegs;
  - Semipalmated Sandpiper;
  - Snowy Owl, and;
  - Wood Thrush
- The Huntington Falls Development potentially has six migratory birds:
  - Bald Eagle;
  - Bobolink;
  - Eastern Whippoor-will;
  - Lesser Yellowlegs;
  - Snowy Owl, and;
  - Wood Thrush

There are seventeen native freshwater mussels found in Vermont, of which nine may occur within the Otter Creek Watershed, including Creek heelsplitter, Eastern elliptio, Eastern floater, Eastern lampmussel, Triangle floater, Fluted-shell, Pink heelsplitter, Black sandshell and Giant floater.

The Giant Floater is state-listed as threatened and the Creek heelsplitter is considered rare. None of these species of mussels are considered federally threatened or endangered. There are also three state-listed endangered freshwater mussel species known to occur in the Project vicinity: fluted-shell, pink heelsplitter and black sandshell.

The fluted-shell and the giant floater are reported in the Project vicinity between Weybridge and Middlebury, and thus may occur in the Project area of the Beldens and Huntington Falls developments. Black sandshell mussels and pink heelsplitters are reported for Otter Creek, but only in the lower watershed, below the first set of barrier falls and have not been reported in the vicinity of the Project.

There are two amphibian species that are listed as rare in Vermont that may occur within the Project vicinity, the Four-toed Salamander and the Mudpuppy. In the WQC, the VDEC stated it is not anticipated that the Project will impact these species.

Additionally, there are five rare vascular plants species that occur within the Project vicinity: Water Sedge, Loose Sedge, Stiff Gentian, Slender Pondweed and Small Dropseed. It is not anticipated that the Project will impact these species with continued implementation of the TMMP.



GMPC developed its FMMP in consultation with the resource agencies which reduces the Project's potential adverse effects on mussels within impoundments when drawdowns and refill are required. During any drawdown and refill operation at all of the developments, 90 percent of the Project inflow would be released immediately downstream of the powerhouse tailraces while using the remaining 10 percent to refill impoundments within a timely manner.

No issues related to threatened and endangered species protection have been found. Since the Project is in compliance with threatened and endangered species protection aspects of its license and certification criteria, this LIHI criterion is satisfied.

## G. Cultural and Historical Resource Protection

The cultural and historic resource protection criterion is designed to ensure that the facility does not unnecessarily impact cultural and historic resources associated with the facility's lands and waters, including resources important to local indigenous populations. The application states the LIHI cultural and historic resources criterion in all ZOE is satisfied by meeting alternative standard G-2.

On February 15, 2013<sup>43</sup>, GMPC submitted the final draft of its Historic Properties Management Plan (HPMP) to FERC. On March 15, 2013<sup>44</sup>, the Vermont Division for Historic Preservation (SHPO) submitted their concurrence with the Project's HPMP. On March 18, 2013<sup>45</sup>, the final HPMP was submitted to FERC.

On May 29, 2013<sup>46</sup>, FERC issued a Memorandum of Agreement (MOA) between the FERC and the SHPO pertaining to the removal of powerhouse equipment and rehabilitation of the Proctor intake structure. On July 12, 2013<sup>47</sup>, GMPC submitted its final historic documentation regarding the upgrades to the SHPO in accordance with MOA. Within the Project's Area of Potential Effect (APE) a Phase I survey was conducted in archaeologically sensitive areas in 2010, followed by Phase II surveys in 2011 and 2012.

On June 12, 2014<sup>48</sup>, FERC forwarded to GMPC an executed Programmatic Agreement (PA) for the Project that was signed and fully executed by the SHPO as of December 30, 2013.

The Proctor Development:

- Is eligible for listing in the National Register of Historic Places under Criterion A as it is the first and largest of the three developments;
- Is eligible under Criterion C because the powerhouse is faced in marble, which is rare in hydroelectric powerhouses;
- There were five archeological sensitive areas surveyed in 2010 and 2011. Some areas were unable to be surveyed because landowner permission was not granted:
  - Site VT-RU-604 was identified as an archeological site from the Late Archaic Period and eligible for the National Register;
  - The Phase II survey also identified the previously unrecorded archaeological site VT-RU-627 which is from the Late Woodland Period and is eligible for the National Register.

<sup>43</sup> <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13183425>

<sup>44</sup> <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13206323>

<sup>45</sup> <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13206628>

<sup>46</sup> <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13268108>

<sup>47</sup> <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13304931>

<sup>48</sup> <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13570071>



## The Beldens Development:

- Is eligible for listing in the National Register under Criterion A due to its association with VMPD and Criterion C for difficult site planning, engineering, and design;
- Phase I survey work identified six archaeological sites and one historic Euro-American site within the APE. Five of these sites are archaeological sites ranging from the Late Archaic to Woodland period and eligible for the National Register. One of the archaeological sites was not eligible for the National Register.

## The Huntington Falls Development:

- Is eligible for listing in the National Register under Criterion A due to its association with VMPD and Criterion C for difficult site planning, engineering, and design;
- Seven archaeological sites and two historic Euro-American sites were identified within the development APE during the Phase I survey. Six archaeological sites were determined to be eligible for the National Register during Phase II surveys. These sites range from the Late Archaic and Woodland Periods. The remaining archaeological site and both of the historical sites were not eligible for the National Register.

GMPC's continued implementation of the HPMP ensures compliance with historic and cultural resource standards. In accordance with the HPMP, GMPC annually monitors the Project's historical sites. The monitoring plan includes stipulations to address and mitigate any adverse effects identified to historic properties not already subject to specific mitigation plans, or to mitigate adverse effects identified to archaeologically sensitive areas within the Project. If problems exist, GMPC must provide recommended actions including procedures to implement additional site identification, evaluation and development of mitigation plans as appropriate to address the identified adverse effects.

Additionally, operating in TROR and MROR mode maintains conditions within the impoundments and downstream areas of Otter Creek.

GMPC is in compliance with all requirements regarding cultural resource protection, mitigation or enhancement. Therefore, the Project passes this criterion.

## H. Recreational Resources

The goal of this criterion is to ensure that recreation activities on lands and waters controlled by the facility are accommodated and that the facility provides recreational access to its associated land and waters without fee or charge. The application states the LIHI recreation criterion in all ZOE's is satisfied by meeting alternative standard H-2.

Per the FERC license, GMPC needed to develop a RP. The RP was due for filing with FERC on October 28, 2015, within one year of license issuance. On October 23, 2015<sup>49</sup>, GMPC filed a request for time extension until February 20, 2016 for filing the plan in order to complete evaluating property ownership issues associated with a proposed canoe/kayak take-out at the Proctor Development. On February 28, 2016<sup>50</sup>, GMPC requested another time extension until June 1, 2016 for filing the plan, to allow more time for the Town of Proctor's review and approval process for the take-out design and finalization of the easement.

<sup>49</sup> <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14022421>

<sup>50</sup> <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14149144>



The FERC granted this time extension on March 17, 2016<sup>51</sup>. On May 31, 2016<sup>52</sup>, GMPC submitted the RP to FERC.

On June 21, 2016<sup>53</sup>, FERC requested that GMPC provide additional information regarding the proposed RP. On July 21, 2016, GMPC submitted additional information<sup>54</sup> and on September 8, 2016, FERC approved the RP<sup>55</sup>.

On October 25, 2016, GMPC requested an extension of time to complete construction of recreation facilities required by the RP<sup>56</sup>. On June 16, 2017<sup>57</sup>, GMPC submitted a request to amend the RP because despite persistent efforts to gain town approval to improve the portage take-out, the Town of Proctor select board, on January 23, 2017, unanimously denied approval of an easement to allow GMPC to do so. GMP specifically requested removal of this take-out from the RP.

On January 4, 2018<sup>58</sup>, GMPC submitted revised Exhibit G's and As-Built Drawings for the recreation facilities. On January 16, 2018<sup>59</sup>, FERC approved the request to amend the RP including removal of the take-out.

The RP describes the following recreation improvements/additions:

- installation of a gravel parking area for two to three vehicles at the Proctor Development's tailwater access site;
- installation of directional signage at the Proctor and Beldens developments;
- installation of interpretative signage at the Proctor Development's tailrace access area.

The recreational facilities currently associated with the Project are free to the public and provide shoreline angling access, canoe and kayak access, parking and picnic facilities, and opportunities for sightseeing at all three developments. Six sites provide water access (generally the ingress and egress of canoe portages around the dams), while two are exclusively used for picnicking. Each of the three developments provides parking and signage.

The Proctor Development has no formal public recreation facilities. The impoundment can be accessed at the St. Dominic's Catholic Church parking lot, which serves as the egress for hand-carry, non-motorized watercraft. Access to the Proctor tailrace is available via an unpaved road adjacent to the former Town of Proctor wastewater treatment facility site. Sutherland Falls, which is part of the Proctor bypassed reach, can be viewed from the downstream access area.

The downstream access area also provides opportunities for shoreline angling and hand-carry access for non-motorized watercraft. The top of Sutherland Falls and Proctor dam are visible from behind the parking area that serves the Marble Museum. There also is a park/picnic area adjacent to the entrance to the Marble Museum that is unrelated to the Development.

The Beldens Development offers formal public recreation opportunities for boating, angling, picnicking,

<sup>51</sup> <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14247933>

<sup>52</sup> <http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14262826>

<sup>53</sup> <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=14280211>

<sup>54</sup> <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=14313372>

<sup>55</sup> <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=14349219>

<sup>56</sup> <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=14382523>

<sup>57</sup> <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=14617092>

<sup>58</sup> <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=14790683>

<sup>59</sup> <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=14798087>



hiking, biking, and sightseeing. Downstream of the dam, GMPC provides a portage trail, put-in, and viewing platform, which provides access to the tailrace and Otter Creek Gorge, and offers views of Otter Creek, the Project works, and the bypassed reach.

The site provides a staircase and wooden platform for sightseeing and a trail for downstream hand-carry boating and shoreline angling access. The portage trail launch is located just above the boat barrier. A trail around Middlebury traverses the impoundment across the Don and Peggy Arnold Swinging Bridge from the Otter Creek Gorge Preserve, which connects to the island separating the two sections of Beldens Dam. The bridge offers trail connection and views of the impoundment, Beldens Dam, the Project works, bypassed reach, and tailrace. Hiking and biking trails crisscross the two sections of the Otter Creek Gorge Preserve on both sides of the impoundment and are accessible from a parking area adjacent to the Beldens Development. There is also a picnic area with grills and concrete picnic tables that are ADA compliant. The picnic area provides parking for approximately six vehicles.

The Huntington Falls Development provides both formal and informal public access opportunities for boating, angling, and picnicking. The impoundment access is a canoe take-out located upstream of the Morgan Horse Farm Road adjacent to the bridge. This informal site provides a small trail/hand-carry boat launch path to the impoundment and informal road-side parking. This site serves as the egress for the canoe portage trail which wraps around the Project facilities providing access to the tailrace. The trail follows the dam access road and terminates at a hand-carry launch just downstream of the powerhouse. Shoreline angling is also available at the downstream access. The Development also includes an overlook/picnic area. The picnic area provides several concrete picnic tables and parking for approximately three vehicles.

The Project is currently in compliance with all FERC requirements related to recreational use and allows access to the reservoirs and downstream reaches without fees or charges. Throughout the current LIHI certification, my review found no issues pertaining to recreational resources compliance. Therefore, the Project passes this LIHI criterion.

## VIII. RECOMMENDATION

A review of the certification application and supporting documentation, and a search of the FERC docket shows that the Project continues to satisfy the LIHI criteria as discussed in the sections above. I recommend that the Project be recertified for a five (5) year term with no conditions.

**Gary M. Franc**



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