

GREAT RIVER HYDRO, LLC

**Bellows Falls Hydroelectric Project
FERC Project No. 1855-045**



AMENDED APPLICATION FOR NEW LICENSE

**Initial Statement and
Exhibits A, B, C, D, F (Public),
G (excluding maps), and H**

December 7, 2020

June 2023 Revision



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Exhibit B: Project Operations and Resource Utilization

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**Amended Final Application for New License for
Major Waterpower Project—Existing Dam**

Bellows Falls Project (FERC No. 1855)

**INITIAL STATEMENT AND
EXHIBIT A: PROJECT DESCRIPTION**

June 2023 Revision

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INITIAL STATEMENT

BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION

Application for License for Major Project—Existing Dam

1. Great River Hydro, LLC (Great River Hydro or Applicant), applies to the Federal Energy Regulatory Commission (Commission or FERC) for a new license for the existing Bellows Falls Hydroelectric Project (Bellows Falls Project or Project) (FERC No. 1855) as described in the attached exhibits. The current license for the Bellows Falls Project was issued on August 3, 1979, with an expiration date of April 30, 2019. By notice dated May 9, 2019, FERC authorized Great River Hydro to continue operation of the Bellows Falls Hydroelectric Project until such time as the Commission acts on its application for a subsequent license.
2. The location of the Project is:

State:	New Hampshire	Vermont
Counties:	Cheshire, Sullivan	Windsor, Windham
Township or Nearby Town:	Walpole	Rockingham
Waterbody:	Connecticut River	

3. The exact name and business address of the Applicant is:

Great River Hydro, LLC
69 Milk Street, Suite 306
Westborough, MA 01581

The name and mailing address of the persons authorized to act as the Applicant's agent for this application are:

John L. Ragonese
FERC License Manager
Great River Hydro, LLC
69 Milk Street, Suite 306
Westborough, MA 01581

Erin O'Dea
Vice President, Legal
Great River Hydro, LLC
69 Milk Street, Suite 306
Westborough, MA 01581

Don Rendall
Interim President and CEO
Great River Hydro, LLC
69 Milk Street, Suite 306
Westborough, MA 01581

4. The Applicant is a Delaware limited liability company and is not claiming preference under Section 7(a) of the Federal Power Act (FPA). See 16 U.S.C. 796.
5. The statutory or regulatory requirements of the States of New Hampshire and Vermont that affect the Project as it exists with respect to bed and banks and the appropriation, diversion, and use of water for power purposes, and with respect to the right to engage in the business of developing, transmitting, and distributing power and in any other business necessary to accomplish the purpose of the license under the FPA, are:
 - Great River Hydro must obtain a water quality certification from the New Hampshire Department of Environmental Services and Section 401 (a)(1) of the Clean Water Act.
 - Great River Hydro must obtain a water quality certification from the Vermont Department of Environmental Conservation and Section 401 (a)(1) of the Clean Water Act.

The steps which the Applicant has taken or plans to take to comply with the regulations cited above are:

- Great River Hydro will submit requests for water quality certification from the two state agencies¹ in accordance with 18 C.F.R. § 5.23(b) within 60 days of FERC's issuance of a notice that the license application is ready for environmental analysis.
6. Great River Hydro owns all of the existing Project facilities. No federally owned or operating facilities are associated with the Project.

¹ By letters dated April 1, 2016, both New Hampshire and Vermont agencies indicated that the Applicant must apply to each state for state-specific water quality certification.

ADDITIONAL INFORMATION REQUIRED BY 18 C.F.R. § 5.18(a)

1. *Identify every person, citizen, association of citizens, domestic corporation, municipality, or state that has or intends to obtain and will maintain any proprietary right necessary to construct, operate or maintain the project:*

Great River Hydro has or intends to obtain and will maintain the proprietary rights necessary to construct, operate, and maintain the Project.

2. *Identify (providing names and mailing addresses):*

- a. *Every county in which any part of the project and any Federal facilities that would be used by the project would be located:*

Sullivan County
14 Main Street
Newport, NH 03773

Windsor County Clerk
12 The Green #101
Woodstock, VT 05091

Cheshire County Administration
33 West Street
Keene, NH 03431

Windham County Clerk
PO Box 207
Newfane, VT 05345

- b. *Every city, town, or similar local political subdivision:*

- (i). *In which any part of the Project, and any Federal facility that would be used by the project, would be located:*

Town of Cornish
488 Town House Rd
Cornish, NH 03745
City of Claremont
58 Opera House Square
Claremont, NH 03743
Town of Charlestown
PO Box 385
Charlestown, NH 03603-0385
Town of Walpole
PO Box 729
Walpole, NH 03608

Town of Windsor
29 Union St.
Windsor, VT 05089
Town of Weathersfield
PO Box 550
Ascutney, VT 05030-0550
Town of Springfield
96 Main St.
Springfield, VT 05156
Town of Rockingham
PO Box 370
Bellows Falls, VT 05101-0370

- (ii). *That has a population of 5,000 or more people and is located within 15 miles of the project dam.*

The cities and towns listed in (b)(i) above are the only ones that meet these criteria (based on 2010 U.S. Census data).

- (iii). *Every irrigation district, drainage district or similar special purpose political subdivision (A) in which any part of the project is located, and any Federal facility that is or is proposed to be used by the project is located, or (B) that owns, operates, maintains, or uses any project facility or any Federal facility that is or is proposed to be used by the project:*

No irrigation or drainage districts meet these criteria.

- (iv). *Every other political subdivision in the general area of the Project that there is reason to believe would likely be interested in, or affected by, the application.*

Great River Hydro is not aware of other political subdivisions in the general area of the Project.

- (v). *All Indian tribes that may be affected by the Project.*

- A. No federally recognized Tribes are located in New Hampshire or Vermont; however, FERC identified the following federally recognized Tribe based in Charlestown, Rhode Island:

Narragansett Indian Tribe
Doug Harris, Deputy Tribal Historic Preservation Officer
4425-A South County Trail
Charlestown, RI 02813

- B. The four Vermont state-recognized Abenaki Tribes, whose traditional lands encompass the Project, are listed below:

- i. Nulhegan Band of the Coosuk Abenaki Nation
Chief Don Stevens
156 Bacon Drive
Shelburne, VT 05482
- ii. Elnu Tribe of the Abenaki
Chief Roger Longtoe Sheehan
5243 VT Route 30
Jamaica, VT 05343

- iii. Koasek Traditional Band of the Koas Abenaki Nation
Co-chiefs Shirley Hook, Amy Hook Therrien, Carrie Gendreau
PO Box 272
Newbury, VT 05051
- iv. Sovereign Abenaki Nation of Missisquoi
Chief Lawrence Moose Lampman
PO Box 133
Swanton, VT 05488

C. Additional Abenaki Tribal groups:

- i. Cowasuck Band – Pennacook/Abenaki People
Sôgmo Paul Pouliot
PO Box 52
840 Suncook Valley Rd
Alton, NH 03809-0052
- ii. Koasek Traditional Band of the Sovereign Abenaki Nation
Chief Paul J. Bunnell
32 Hoit Mill Rd, #202
Weare, NH 03281
- iii. Abenaki Nation of New Hampshire
262 Lancaster Rd.
Whitefield, NH 03598

3. *For a license (other than a license under Section 15 of the Federal Power Act), state that the applicant has made, either at the time of or before filing the application, a good faith effort to give notification by certified mail of the filing of the application to:*

- a. *Every property owner of record of any interest in the property within the bounds of the Project, or in the case of the Project without a specific boundary, each such owner of property which would underlie or be adjacent to any Project works, including any impoundments; and*
- b. *The entities identified in paragraph (2) above, as well as any other federal, state, municipal or other local government agencies that there is reason to believe would likely be interested in or affected by the application.*

Because this is an application for a new license under Section 15 of the FPA, this regulatory provision does not apply.

4. *Public Utility Regulatory Policies Act of 1978 (PURPA) Benefits:*

Great River Hydro is not seeking any PURPA benefits in association with the relicensing of the Project.

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VERIFICATION STATEMENT


This revised application is executed in the:

State of: Vermont,

County of: Windsor,

By Erin O'Dea, whose signature on this 7th day of June, 2023, certifies that she has read the filing and knows its contents, the contents are true as stated, to her best knowledge and belief, and she possesses full power and authority to sign the filing. (18 CFR 385.2005(a)).

Great River Hydro, LLC

By: 

Name: Erin O'Dea

Title: V.P. Legal and General Counsel

Address: 69 Milk Street, Suite 306, Westborough MA 01581

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ACRONYMS AND ABBREVIATIONS

μS/cm	microsiemens per centimeter
1D	one-dimensional
2D	two-dimensional
acre-ft	acre-feet
ACHP	Advisory Council on Historic Preservation
A.D.	Anno Domini
APE	area of potential effects (as pertains to Section 106 of the National Historic Preservation Act)
ASMFC	Atlantic States Marine Fisheries Commission
AWS	area weighted suitability
B.C.	Before Christ
B.P.	Before Present
CCA	claimed capacity audits
C.F.R.	Code of Federal Regulations
cfs	cubic feet per second
cm	centimeter
CRASC	Connecticut River Atlantic Salmon Commission
CSO	combined sewer overflow
CTDEEP	Connecticut Department of Energy and Environmental Protection
CWA	Clean Water Act
°C	degrees Celsius
DA	drainage area
DO	dissolved oxygen
DOI	U.S. Department of the Interior
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
El.	elevation
EO	element occurrence
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act

°F	degrees Fahrenheit
FCA	Forward Capacity Auction
FERC	Federal Energy Regulatory Commission
FirstLight	Power Resources
FLA	Final License Application
FMF	Fifteen Mile Falls Hydroelectric Project
FPA	Federal Power Act
ft	foot or feet
ft/s	feet per second
FWS	U.S. Department of the Interior, Fish and Wildlife Service
GIS	Geographic Information System
Great River Hydro	Great River Hydro, LLC
HI-Z	HI-Z Turb’N
HPMP	Historic Properties Management Plan
IEO	inflow equals outflow
ILP	Integrated Licensing Process
IPANE	Invasive Plant Atlas of New England
ISO-NE	New England Independent System Operator
ISR	Initial Study Report
KOP	key observation point
kV	kilovolt
kVA	kilovolt-ampere
kW	kilowatt
kWh	kilowatt-hour
m ²	square meter
mgd	million gallons per day
mg/L	milligram(s) per liter
mg/m ³	milligrams per cubic meter
mL	milliliter
m.s.l.	mean sea level
MW	megawatt
MWh	megawatt-hour
National Register	National Register of Historic Places

NEIWPC	New England Interstate Water Pollution Control Commission
NEPA	National Environmental Policy Act
NGVD29	National Geodetic Vertical Datum of 1929
NAVD88	North American Vertical Datum of 1988
NHA	New Hampshire Audubon
NHDES	New Hampshire Department of Environmental Services
NHFGD	New Hampshire Fish and Game Department
NHNHB	New Hampshire Natural Heritage Bureau
NHPA	National Historic Preservation Act
NHSHPO	New Hampshire State Historic Preservation Officer
NITHPO	Narragansett Indian Tribal Historic Preservation Officer
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NTU	nephelometric turbidity unit
NWI	National Wetlands Inventory
PAD	Pre-Application Document
PGA	peak ground acceleration
PHABSIM	Physical Habitat Simulation
PIT	passive integrated transponder
PLP	Preliminary Licensing Proposal
PM&E measures	protection, mitigation, and enhancement measures
Projects	Wilder (FERC No. 1892), Bellows Falls (FERC No. 1855), and Vernon (FERC No. 1904) Hydroelectric Projects
PSP	Proposed Study Plan
PURPA	Public Utility Regulatory Policies Act of 1978
REC	Renewable Energy Credit
RPD	reactive power demonstrations
RPM	revolutions per minute
RM	river mile
R.S.A.	New Hampshire Revised Statutes Annotated

RSP	Revised Study Plan
RTE	rare, threatened, or endangered
§	Section of a statute such as 18 C.F.R. § 5.6 (c)
SD1	Scoping Document 1
SD2	Scoping Document 2
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Office
Sound	Long Island Sound
SPD	Study Plan Determination
sq. mi.	square mile(s)
TCP	Traditional Cultural Property
TMDL	total maximum daily load
TransCanada	TransCanada Hydro Northeast Inc.
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USGS	U.S. Geological Survey
USR	Updated Study Report
VAR	volt-ampere-reactive
VANR	Vermont Agency of Natural Resources
VDEC	Vermont Department of Environmental Conservation
VFWD	Vermont Fish & Wildlife Department
VTNHI	Vermont Natural Heritage Inventory
VTSHPO	Vermont State Historic Preservation Officer
VY	Vermont Yankee Nuclear Power Plant
WAP	Wildlife Action Plan
WSE	water surface elevation
WUA	weighted usable area

**Amended Final Application for New License for
Major Waterpower Project—Existing Dam**

Bellows Falls Project (FERC No. 1855)

EXHIBIT A: PROJECT DESCRIPTION

June 2023 Revision

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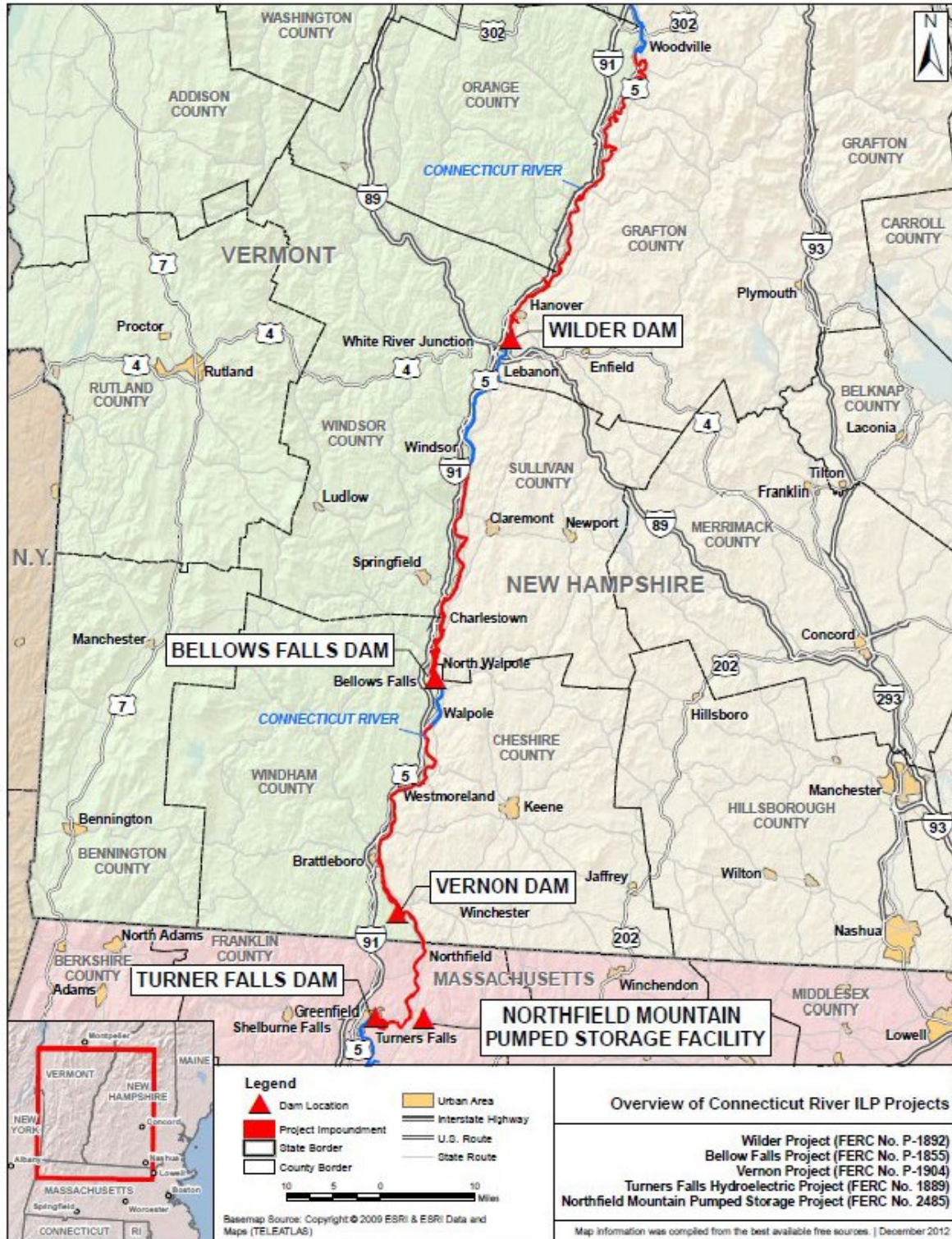
EXHIBIT A: PROJECT DESCRIPTION

Section 5.18(a)(5)(iii) of Title 18 of the Code of Federal Regulations (CFR) refers to Section 4.51 (License for Major Project—Existing Dam) for a description of information that an applicant must include in Exhibit A of its license application. Exhibit A is a description of the Project.

A1 Project Description

The Bellows Falls Project dam, canal, and powerhouse are located on the Connecticut River at river mile (RM) 173.7, about 1 mile upstream of Saxtons River and 3 miles downstream of the Williams River at the upper end of a sharp bend of the Connecticut River at Bellows Falls, Vermont, in the town of Rockingham, Windham County, Vermont, and in the town of Walpole, Cheshire County, New Hampshire. Figure A-1 illustrates the location of the Project in relationship to the other Projects undergoing concurrent relicensing.² The Project is located in the towns of Rockingham, Springfield, Weathersfield, and Windsor, Vermont; and Walpole, Charlestown, Claremont, and Cornish, New Hampshire.

² The five projects are collectively referred to as “the Connecticut River Projects” and include Great River Hydro’s Wilder (FERC No. 1892), Bellows Falls (FERC No. 1855), and Vernon (FERC No. 1904) Projects along with FirstLight’s Turners Falls (FERC NO. 1889) and Northfield Mountain Pumped Storage (FERC No. 2485) Projects.



Source: FERC (2013)

Figure A-1. Project location in relationship to the Connecticut River Projects.

The powerhouse is located downstream of the dam at the end of a power canal that is 1,700 feet (ft) long. Figure A-2 shows the primary Project facilities, which include the dam, spillway, power canal, powerhouse, substation and transformers, a line garage and storage building located near the powerhouse, fish passage facilities as described in Section A1.6, and recreation areas and facilities including three boat launches and picnic areas, a portage, and a visitor center with a fish ladder viewing window (see Exhibit E, Section 3.9, *Recreation Resources and Land Use*). Non-Project facilities located within the Project boundary include two switchyards that contain equipment owned by a regional transmission company.

Great River Hydro holds fee ownership of 835 acres of land in the Project. Of this acreage, 62 acres are used for plant and related facilities; 86 acres for public outdoor recreational use; 60 acres of other shoreline lands in Charlestown, New Hampshire; and the remaining 627 acres currently support local agriculture, farming, and wildlife management.

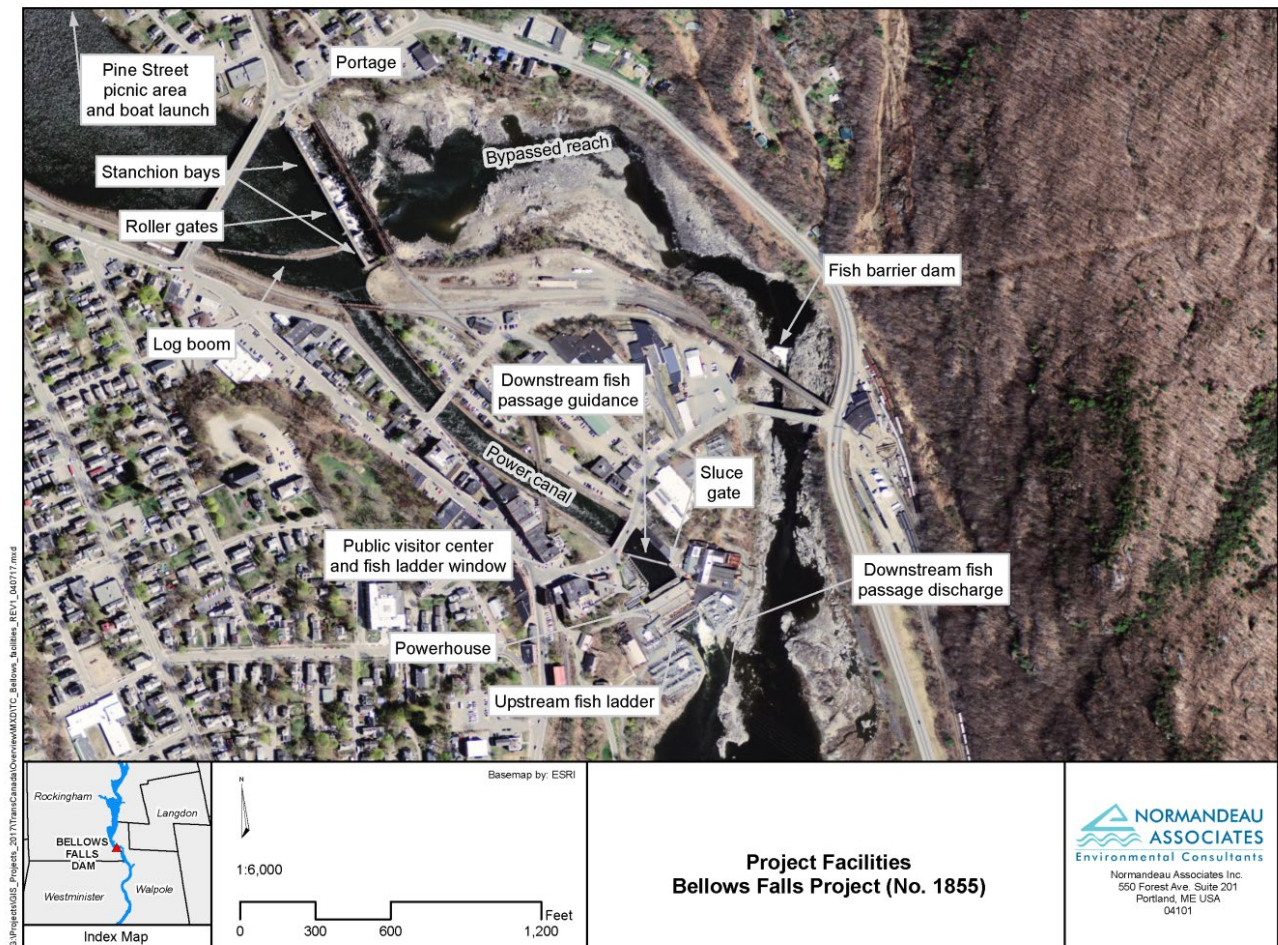


Figure A-2. Primary Project facilities.

A1.1 Impoundment

The Project impoundment extends upstream about 26 miles to Chase Island at Windsor, Vermont, about 1 mile below the Windsor Bridge. The impoundment has a surface area of 2,804 acres, about 74 miles of shoreline, and a total volume of 26,900 acre-feet (acre-ft) at elevation (El.) 291.63³ ft (National Geodetic Vertical Datum of 1929 [NGVD29]) above mean sea level (m.s.l.) at the top of the stanchion boards. The overall operating range of the Project, accounting for both low inflow and most high inflows conditions, is typically between El. 288.63 ft and 291.63 ft, providing about 7,476 acre-ft of storage in the 3-ft range. The storage volume associated with the typical operating range, under non-spill conditions, between El. 289.6 ft and 291.4 ft is 4,642 acre-ft, or 62 percent of the overall usable storage.

A1.2 Dam and Spillway

The dam is a concrete gravity structure extending across the Connecticut River between Rockingham, Vermont, and Walpole, New Hampshire. Virtually all of the dam structure is located in New Hampshire. It is 643 ft long with a maximum height of about 30 ft and is divided by concrete piers into five bays. Two bays contain steel roller-type flood gates, and the three other bays contain stanchion flashboards. A steel bridge runs the length of the dam for access and for operation of flashboards. A 25-ton gantry crane sits atop the bridge (Figure A-3, Table A-1).



Figure A-3. Bellows Falls Dam (from upstream side).

³ All elevations in this exhibit are stated in National Geodetic Vertical Datum of 1929 (NGVD29).

Table A-1. Spillway facilities.

Gate Type	Number	Size (height or width, by length in ft)	Elevation (ft NGVD29)
Roller gates	2	18 x 115	273.63 (crest)
Stanchion bays	2	13 x 121 with flashboards	273.63 (crest)
Stanchion bays	1	13 x 100 with flashboards	278.63 (crest)

A1.3 Power Canal

A power canal connects the impoundment to the powerhouse (Figure A-4). The canal is lined with stone stabilized by a grid of concrete grade beams and walls. The downstream end of the canal is a concrete walled forebay. The canal is 100 ft wide at the top, about 36 ft wide at the bottom, about 29 ft deep, and approximately 1,700 ft long, including the length of the powerhouse forebay.

The canal creates a natural bypassed reach between the dam and the outlet of the powerhouse tailrace (Figure A-2 above). The reach is about 3,500 ft long and receives minimal water from leakage and significant amounts through spill during periods when flows exceed station capacity.



Figure A-4. Bellows Falls power canal (midstream, looking upstream).

A1.4 Powerhouse and Appurtenant Facilities

The powerhouse superstructure is 186 ft by 106 ft by 52 ft and constructed of steel frame and brick (Figure A-5); the substructure is constructed of reinforced concrete excavated into bedrock. The powerhouse contains three turbine generating units (Figure A-6), electrical equipment, a switchboard (used for local station operation in emergency conditions), a machine shop, excitation equipment, emergency generator, air compressor, an overhead crane, offices, storage rooms, battery room, and ancillary equipment. Table A-2 provides turbine and generator specifications.

The maximum hydraulic capacity (calculated as the sum of each individual unit’s maximum discharge capacity) is 11,010 cubic feet per second (cfs) and nameplate generating capacity is 13,600 kilowatts (kW) for each unit, and 40,800 kW in total. Table A-2 provides turbine and generator specifications.

Table A-2. Turbines and generators.

Turbine Units	Nos. 1, 2, and 3
Type	Vertical Francis
Design head (ft)	57
Horsepower rating at design head	18,000
Maximum hydraulic capacity (cfs)	3,670
Minimum hydraulic capacity (cfs)	700
Revolutions per minute (rpm)	85.7
Intake trashrack clear spacing (inches)	4.0
Generators	
Nameplate capacity (kilovolt-ampere [kVA])	17,000
Power factor	0.8
Nameplate capacity (kW)	13,600
Phase/frequency	3/60
Voltage	6,600



Figure A-5. Powerhouse.



Figure A-6. Unit No. 1 (background) and Unit No. 2 (foreground).

The concrete gravity intake is integral with the powerhouse structure with two water passages for each of the three turbine generating units. Water enters directly from the canal intake and into the scroll or wheel cases. The draft tubes, which have a maximum dimension of 20 ft high by 31 ft wide, discharge into the tailrace excavated partly in the bank and partly in the bed of the river (Table A-3). There are no draft tube gates. The scroll cases and draft tubes are formed in the substructure's concrete, which was poured on rock. The water passages for the three turbine generating units have trashracks with 4-inch clear spacing and two head gates that can be used in any one of the three units. One set of head gates, consisting of two gates measuring 25 ft high by 18.5 ft wide, is shared by all three units. The head gates are equipped with an electrically driven hoist that can be moved along a track system to any of the three units as needed. A hydraulic trashrack rake is used to pull river debris away from the unit intakes. It is manually operated and is driven to the trashracks in front of each unit on a set of tracks that are located on top of the forebay intake structure. The rake head is lowered to the bottom of the racks and retracted upward along the rack to remove debris. The debris is conveyed into a trailer for removal. An ice sluice/skimmer gate is located on the east side of the forebay and is 12 ft wide by 10 ft high. The tailrace is about 900 ft long, of which 500 ft are carved from the existing bedrock.

Table A-3. Dimensions and composition of head gates, draft tubes and draft tube gates.

Unit	Type	Dimension	Composition
Units 1-3	Head gates	2 gates per unit 1 set of gates shared by 3 units 25 ft high x 18 ft, 6 inches wide, each	Steel broome type
	Draft tubes	Varies in dimension Maximum = 20 ft high x 31 ft wide	Cast in concrete foundation
	Draft tube gates	None	n/a

A1.5 Electrical Facilities

Project electrical facilities include the generators, 6.6-kilovolt (kV) generator leads that extend approximately 80 ft from the powerhouse to an outdoor switchgear house located in a substation west of the powerhouse, switchgear, bus work, and two step-up transformers located in the substation (Figures A-7 and A-8). These two switchyards and the tie lines from the Project's step-up transformers are located within the Project boundary but are not Project facilities because this equipment is owned and operated by the regional transmission company, New England Power Company, doing business as National Grid.

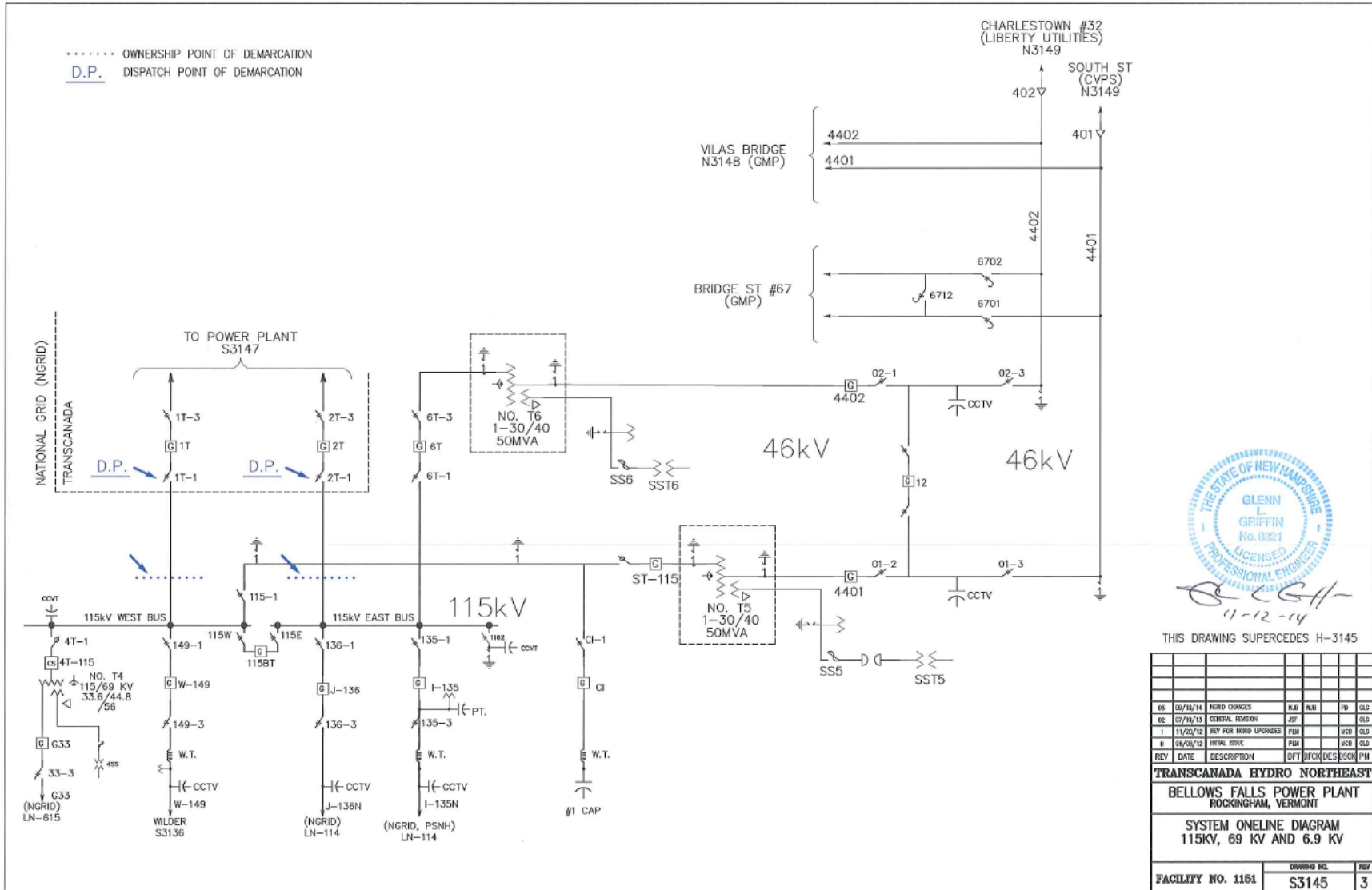


Figure A-7. Transmission interconnection schematic, 115 kV, 69 kV, and 6.9 kV.

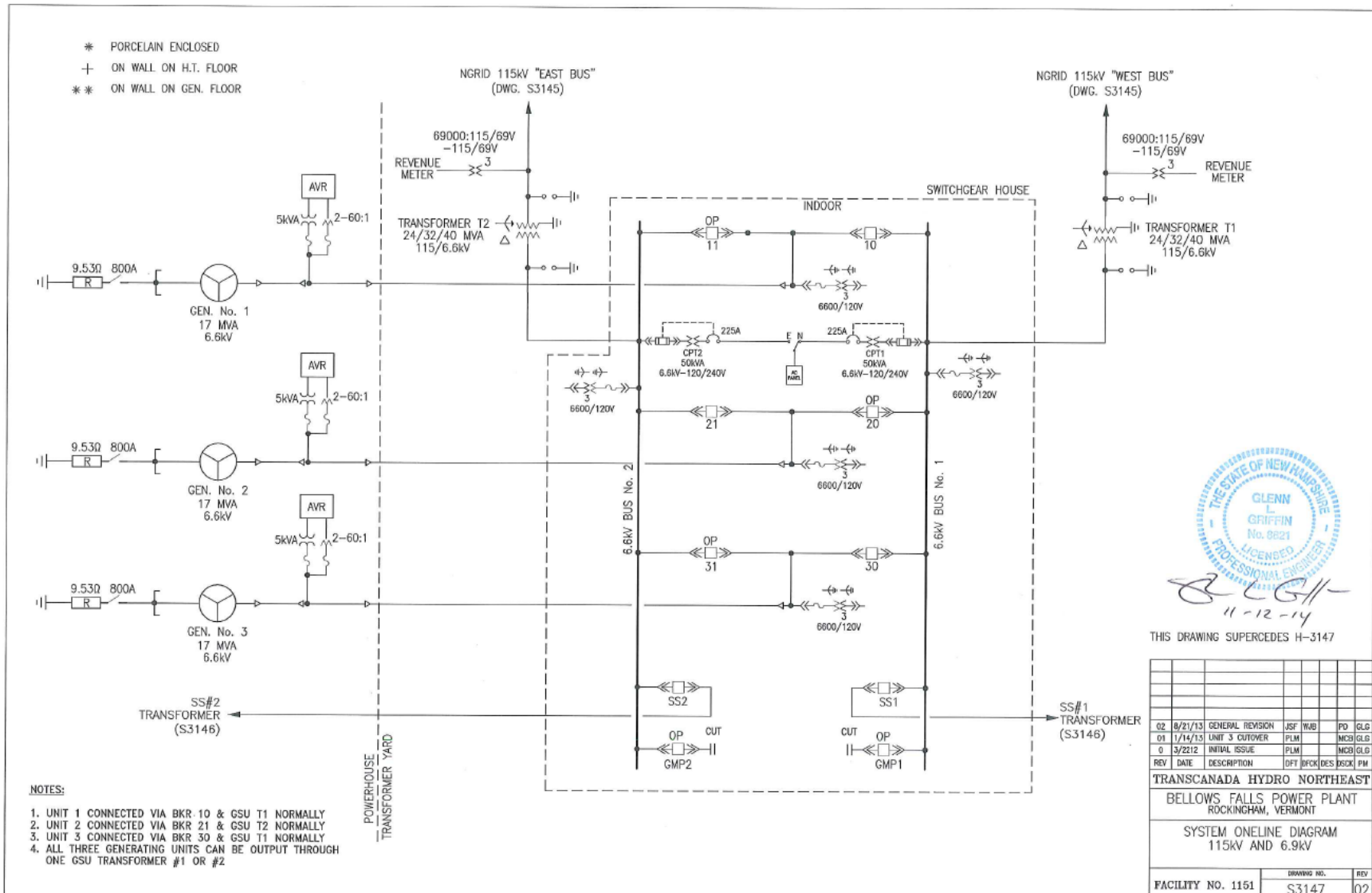


Figure A-8. Transmission interconnection schematic, 115 kV and 6.9 kV.

A1.6 Fish Passage Facilities

A1.6.1 Upstream Passage Facilities

The upstream fish passage system consists of a conventional vertical-slotted weir fish ladder at the powerhouse and an upstream concrete barrier dam in the bypassed reach (Figure A-9). The barrier dam prevents upstream migrating fish from being attracted by spillway discharge into the reach and later becoming trapped in isolated pools after spill ends. The barrier is located just upstream of the Boston and Maine Railroad Bridge. The fish ladder is a 920-ft-long, reinforced concrete structure with accessory electrical, mechanical, and pneumatic equipment that is designed to provide passage for migrating Atlantic Salmon past the dam by way of the forebay and canal, a vertical distance of about 60 ft. Upstream migrating fish are attracted to the tailrace channel by flow from the turbines. Once in the tailrace area, fish are attracted to the main entrance weir at the east end of the powerhouse.

Attraction water is provided by the upper three weirs containing slide gates, which open and close depending on the forebay water surface elevation (WSE) to maintain the required fish ladder flow. A skimmer gate/sluceway is located in the forebay and is used for additional fish ladder attraction water. Water from this channel enters two diffuser openings at the fish ladder entrance. Fish enter the 8-ft-wide fish ladder entrance channel and "climb" to the forebay by swimming through a series of 67 slots and cascading pools with each succeeding weir spaced 8 ft apart and 12 inches higher than the last. After passing 34 pools, the fish enter a level turning section and pass through another 10 pools to the counting/trapping area. There, fish are guided by flow and crowder screens, travel through a 3-ft-wide flume, and pass an underwater viewing window where they may be observed and counted. From the counting/trapping area, fish continue to climb through an additional 22 pools to the ladder's 8-ft-wide exit channel into the forebay and canal. The exit channel (i.e., the last pool) includes a motor-driven head gate, widely spaced trashracks (sufficient to pass adult salmon), and slots for wooden stop logs. The last three weirs contain adjustable weir gates that can be lowered (opened) to provide a nearly constant 25 cfs fish ladder flow when the forebay WSE drops through its 3-ft operating range.

The fish ladder visitor center is located adjacent to the upper two pools and exit channel. The building's basement serves as a public viewing gallery with two underwater windows. The upper floor provides informational displays on hydro generation, recreation, archaeology, and anadromous fish restoration and has a picture window view of the fish ladder to the south (downstream). The Connecticut River Atlantic Salmon Commission (CRASC) provides an annual *Fish Passage Notification Schedule*, which sets the dates for upstream passage for all dams on the Connecticut River. Typically, the upstream fish ladder operates from May 15 through July 15 and in fall from September 15 through November 15 for Atlantic Salmon; however, in recent years, fish ladder operation has been suspended because of low salmon returns and abandonment of the program by the U.S. Department of the Interior, Fish and Wildlife Service (FWS) and the states.



Figure A-9. Upstream fish passage facilities.

A1.6.2 Downstream Passage Facilities

As of February 11, 2016, CRASC no longer requires downstream passage operations at Bellows Falls for Atlantic Salmon smolts (see Exhibit E, Section 3.6, *Fish and Aquatic Resources*). CRASC's annual *Fish Passage Notification Schedule* had set the dates for downstream passage for all dams on the Connecticut River. Downstream passage flows were provided for adult Atlantic Salmon from October 15 to December 31 if 50 or more adults were documented as having passed upstream. Downstream passage was provided by the forebay sluiceway/skimmer gate with fish being guided to the gate by a solid, partial depth diversion boom

across the canal. A small auxiliary gate located on the east side of the powerhouse was opened to direct fish that may get under the diversion boom to the sluiceway. The gate is motorized and operated locally as needed to pass river debris and ice.

A2 Lands of the United States

No lands of the United States are located within or adjacent to the Project boundary.

A3 Proposed Modifications and Enhancements

Proposed new facilities include a new 680kW minimum flow turbine generator, an affiliated control house and electrical interconnect equipment to local distribution utility in Vermont. The minimum flow unit will recover a portion of the lost energy, resulting from the 300 cfs provided below the dam into the bypassed reach under the Proposed Project Operation described in Exhibit B, Section 1.3 and Appendix A. Figure A-10 shows the location of the new proposed minimum flow unit on the dam.

The turbine generator will be housed in a concrete intake structure connected to the downstream face of the spillway Stanchion Bay #1. The concrete intake structure is approximately 33' wide by 33' long and open to the headpond creating a small forebay for the minimum flow unit. The forebay has a floor that is level with the concrete crest of the dam at elevation 278.6 above msl; one half is concrete, and the other half is a floor screen that serves as a horizontal trash rack above the vertically aligned turbine generator. The trash rack measures approximately 14.4' wide by 30.9' long with 2-inch clear spacing between bars. The average velocity through the entire rack is calculated to be 0.97 feet per second (fps). The average velocity through the rack in an area measuring 11.3' wide by 20.4' long concentrated around the unit itself is approximately 1.88 fps. The average velocity of the flow through the modified portion of the Stanchion Bay #1 which conveys water to the forebay is less than 0.71 fps. The above calculations are based on a turbine flow of 300 cfs.

The length of the concrete intake structure along the spillway face is approximately 33 feet or 26.9% of the 120 foot total length of Stanchion Bay #1, reducing the pre-minimum flow unit maximum discharge capacity of 18,600 cfs potentially by approximately 5011 cfs. However, the design of the concrete intake structure will include three new spill conveyance structures, comprised of a 25-foot wide vertical crest gate, a 14-foot wide downward opening, bottom-hinge crest gate and 14-foot wide bay of removable stoplogs with a combined capacity of 5476 cfs, thus increasing the spill capacity of the existing dam by 465 cfs in addition to generation flow through the minimum flow unit itself. See Figure A-11 for a plan view of the intake structure, new gates, control room and the unit location. See Figures A-12 and A-13 for Section drawings as indicated on the plan view.

The turbine will utilize adjustable-pitch wicket gates to allow ramping of output power for smooth grid interconnection. An existing auxiliary steel bulkhead used to

repair and maintain stanchion sections of the dam will continue to function as a means of blocking flow to the intake structure and turbine for construction inspection, service, or repair.

The turbine will utilize an elbow draft tube (horizontal outlet) with steel liner supplied by Natel, rather than a straight (vertical) conical draft tube. The elbow draft tube better integrates to the existing conditions.

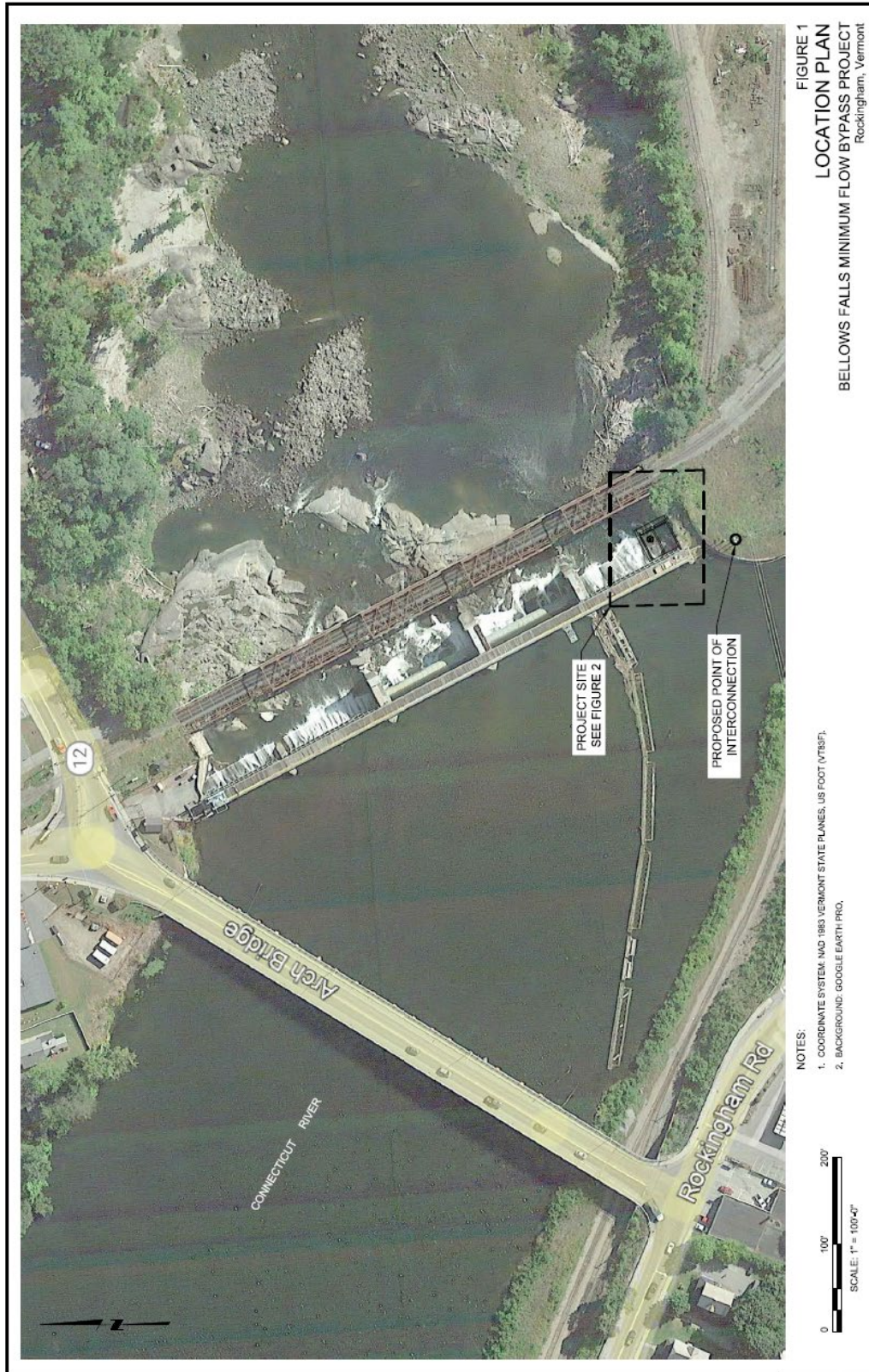


Figure A-10 Location of Proposed Minimum Flow Unit

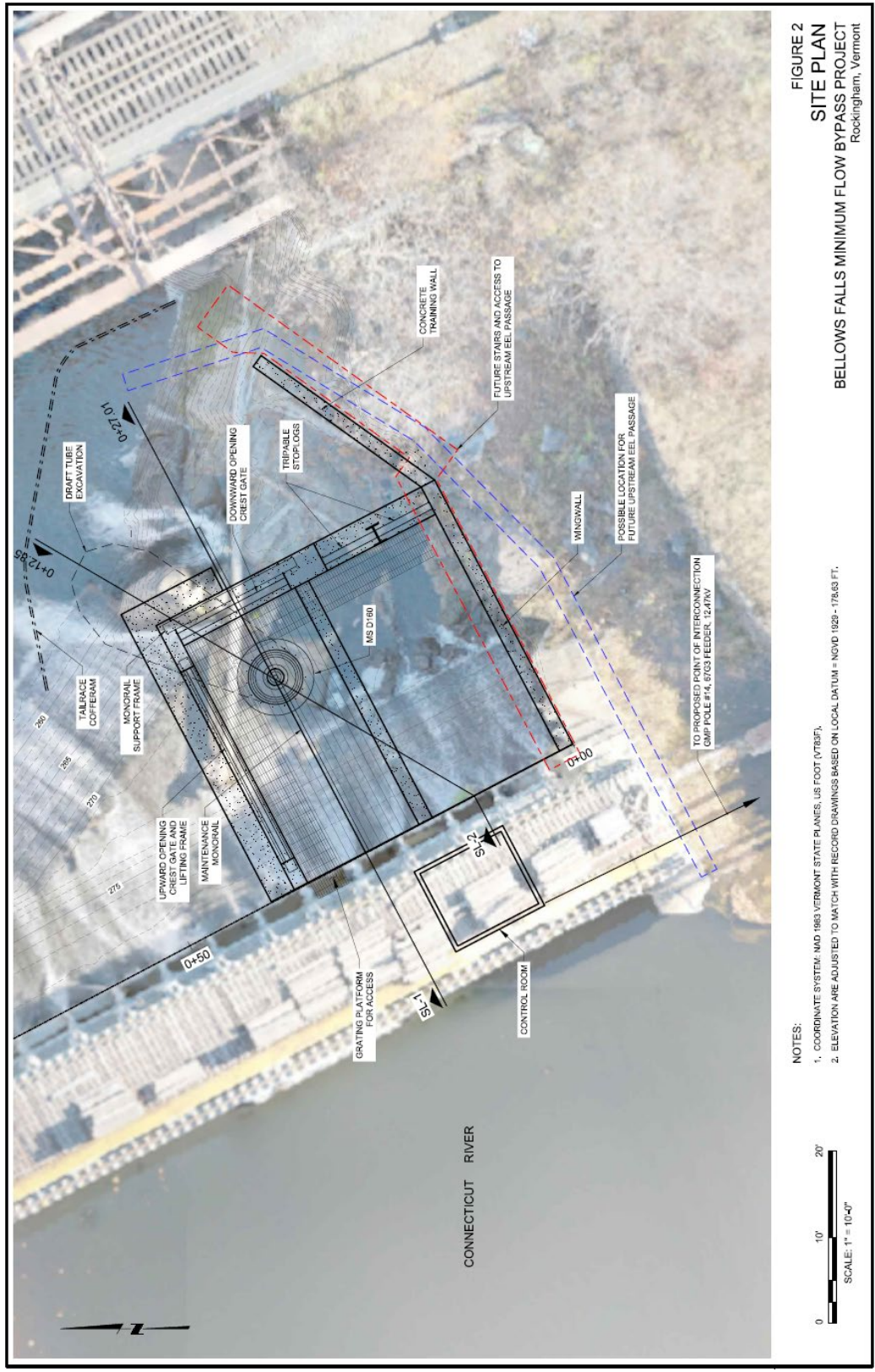


Figure A-11 Plan view of the intake, gates, control house and turbine

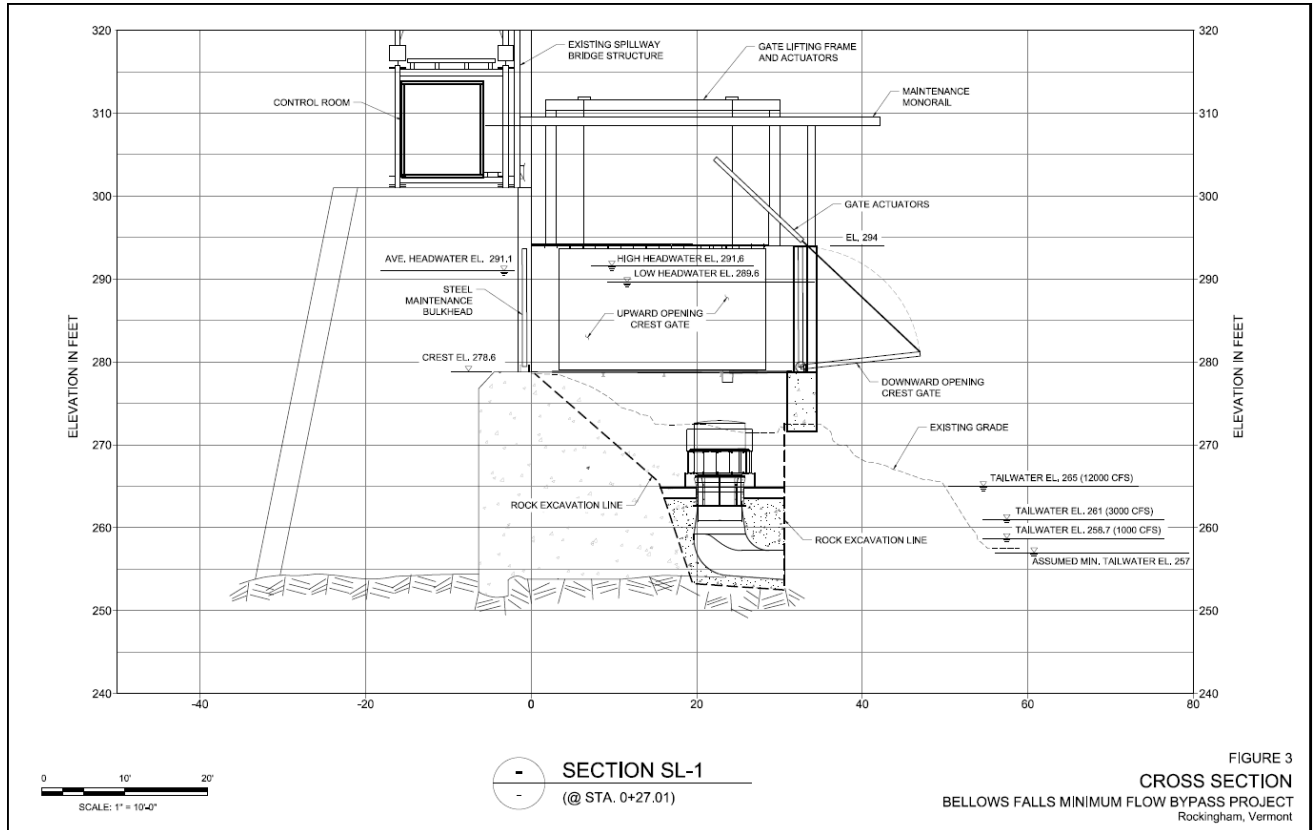


Figure A-12 Section (SL-1) view of the intake, gates, control house and turbine

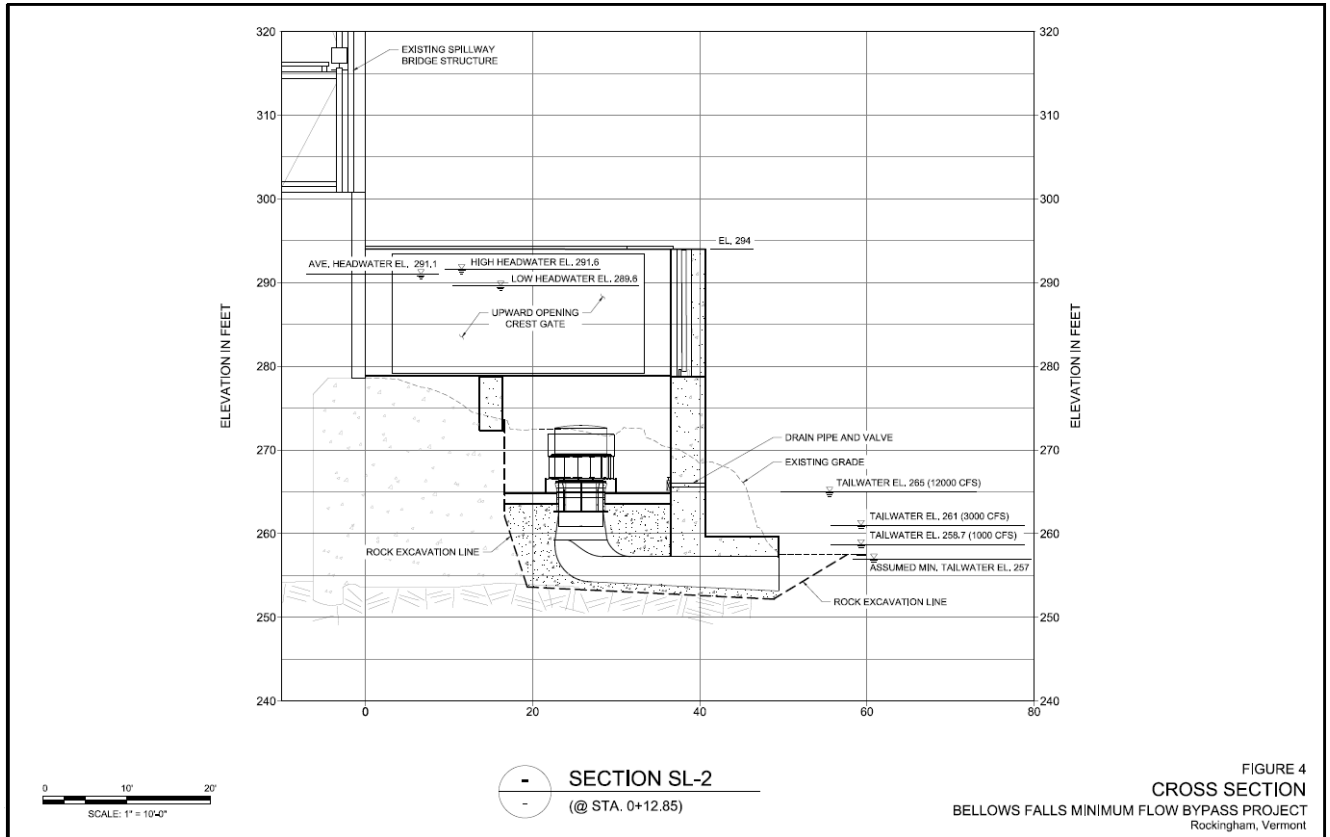


Figure A-13 Section (SL-2) view of the intake, gates, control house and turbine

A4 Literature Cited

FERC (Federal Energy Regulatory Commission). 2013. Scoping document 2 for the Wilder (FERC No. 1892-026), Bellows Falls (FERC No. 1855-045), Vernon (FERC No. 1904-073), and Turners Falls (FERC No. 1889-081) hydroelectric projects, and the Northfield Mountain Pumped Storage Project (FERC No. 2485-063). Federal Energy Regulatory Commission, Washington, DC. April 15, 2013.

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