LOW-IMPACT HYDROPOWER POWER INSTITUTE CERTIFICATION APPLICATION

PIERCE MILLS HYDROELECTRIC PROJECT
(FERC NO. 2396)

Prepared for:

Green Mountain Power Corporation
Rutland, Vermont

Prepared by:

Kleinschmidt

Pittsfield, Maine
www.KleinschmidtGroup.com

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1.0 FACILITY DESCRIPTION

The Pierce Mills Hydroelectric Project (FERC No. 2396) (Project) is located at river mile (RM) 15.2 on the Passumpsic River (a major tributary of the Connecticut River) in St. Johnsbury, Vermont (Figure 1 and Figure 2). The Project's hydroelectric facilities are owned and operated by the Green Mountain Power Corporation (GMP or Licensee), formerly Central Vermont Public Service Corporation. The Pierce Mills Project is the fifth most downstream of seven dams located on the Passumpsic River (Appendix B).

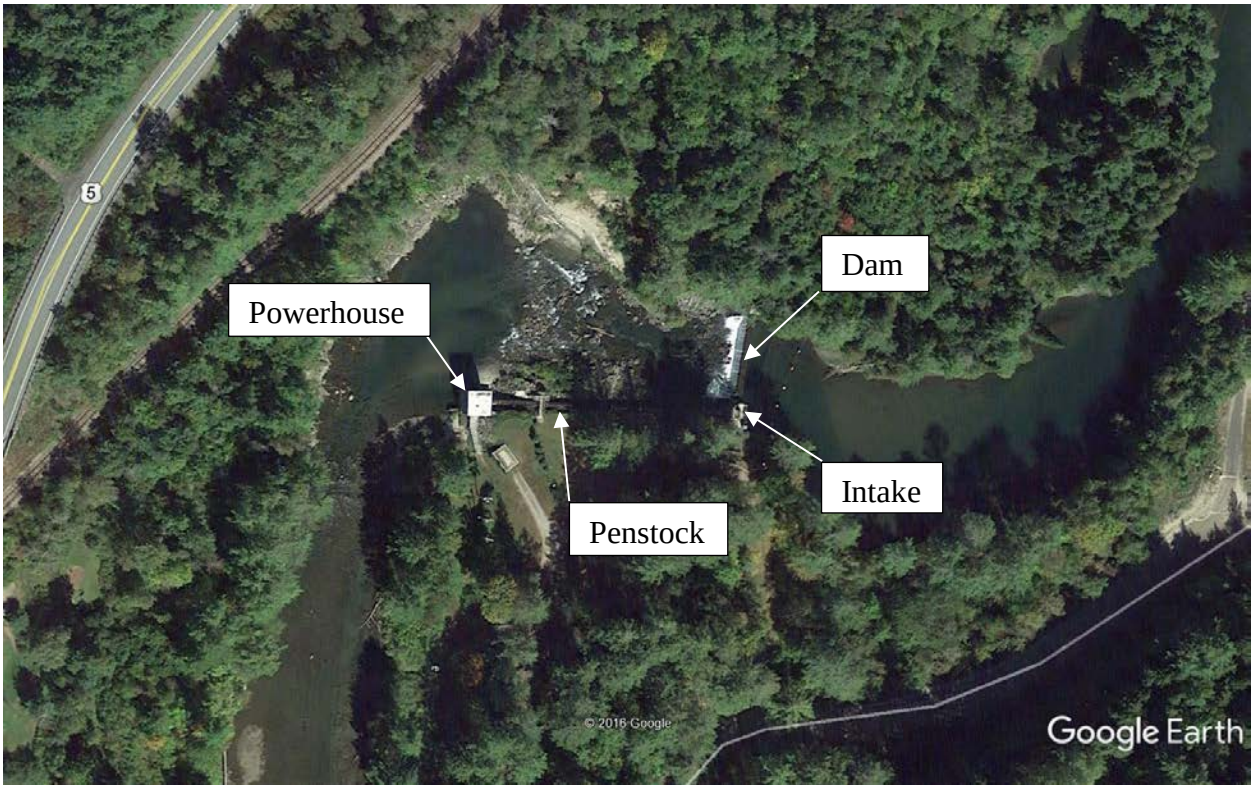


FIGURE 1 PHOTO OF PROJECT/IDENTIFICATION OF PROJECT PARTS

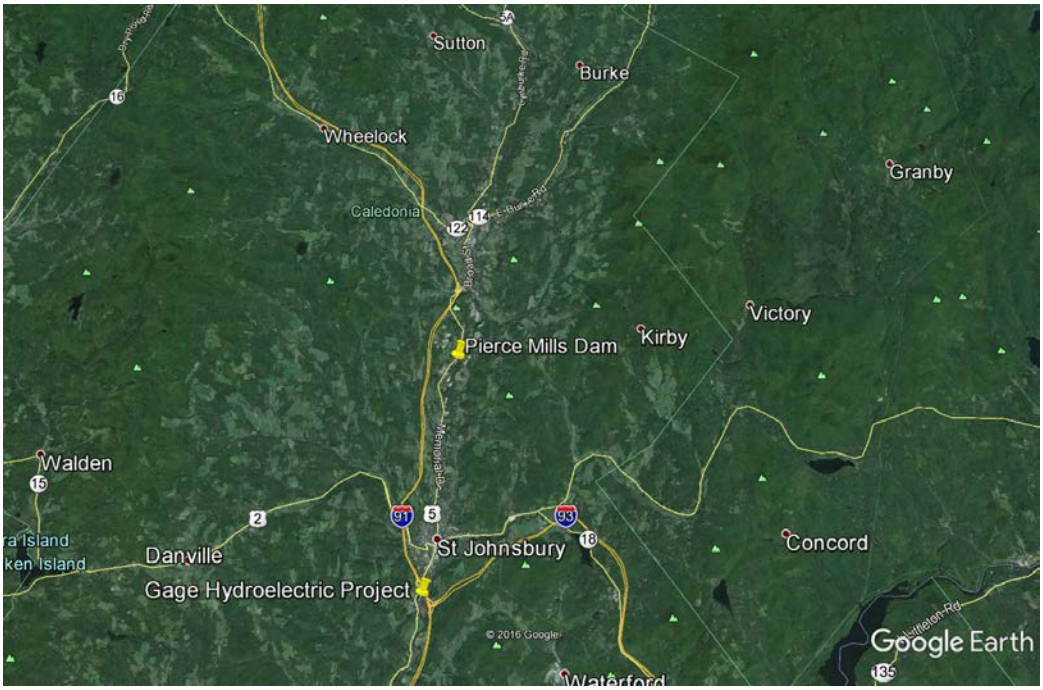


FIGURE 2 GEOGRAPHIC OVERVIEW OF PROJECT LOCATION

The Pierce Mills Project was built in 1917-1919 by the Twin State Gas & Electric Company. The powerhouse was completely destroyed in the flood of 1927, although the concrete dam was largely undamaged. The plant was rebuilt in 1928 utilizing portions of the earlier substructure.

The Project impounds a 24.7-acre reservoir that extends 1.25 miles upstream to the Great Falls Dam (FERC No. 2839) with a water surface elevation at 605.0 feet msl and 24.7 acre-feet of usable storage. The concrete gravity dam is 93-feet-long by 18-feet-high, topped with 18-inch flashboards. A 6-foot-diameter, 246-foot-long penstock conveys flows from the dam to the powerhouse with a drop in elevation of 18-feet. The powerhouse contains one vertical shaft turbine rated at 271 kilowatts (kW). The Project also includes a substation, and a downstream fish passage facility located in the spillway adjacent to the intake. The bypassed reach at the Pierce Mills Project is about 350-feet-long.

The Project operates in a run-of-river mode to preserve water quality, aquatic and riparian habitats, and aesthetic and recreational flows in the Passumpsic River. The Licensee provides a minimum flow of 88 cfs, or inflow, whichever is less, which is passed through the downstream fishway. In addition to the bypassed flows, a continuous veil of water (equating to an additional 7 cfs of flow) is spilled over the flashboards from June 1 through October 31 to enhance aesthetics.

TABLE 1 FACILITY DESCRIPTION INFORMATION FOR PIERCE MILLS HYDROELECTRIC PROJECT (LIHI # 92)

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
Name of the Facility	Facility name (use FERC project name if possible)	Pierce Mills Hydroelectric Project (FERC No. 2396)
Location	River name (USGS proper name)	Passumpsic River
	River basin name	Passumpsic River Basin
	Nearest town, county, and state	Lyndon, Caledonia County, Vermont
	River mile of dam above next major river	15.2
	Geographic latitude	44.4861
	Geographic longitude	-72.0081
Facility Owner	Application contact names (IMPORTANT: you must also complete the Facilities Contact Form):	Jason Liasi – Green Mountain Power Corporation John Greenan – Green Mountain Power Corporation Andy Qua – Kleinschmidt Associates Katie Sellers – Kleinschmidt Associates Please see Section 4.0 for the Facility Contacts Form.
	- Facility owner (individual and company names)	Green Mountain Power Corporation (GMP or Licensee)
	- Operating affiliate (if different from owner)	N/A
	- Representative in LIHI certification	John Greenan, GMP
Regulatory Status	FERC Project Number (e.g., P-xxxxx), issuance and expiration dates	FERC No. 2396. 40-year license issued on December 8, 1994 and expires on November 30, 2034.
	FERC license type or special classification (e.g., "qualified conduit")	Minor Project License
	Water Quality Certificate identifier and issuance date, plus source agency name	A Water Quality Certificate (WQC) was issued by the Vermont Department of Environmental Conservation[1] (DEC) on June 16, 1994.

[1] The Vermont DEC is a branch within the Vermont Agency of Natural Resources.

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
	Hyperlinks to key electronic records on FERC e-library website (e.g., most recent Commission Orders, WQC, ESA documents, etc.)	1994 License: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1719662 1994 WQC: Please see Appendix C (not available online). Transfer of License: http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13064046 Order modifying and approving Study of Recreational Use: http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14058508
Power Plant Character-istics	Date of initial operation (past or future for operational applications)	The Project first started generating power in 1919.
	Total name-plate capacity (MW)	0.25 MW
	Average annual generation (MWh)	1,133.2 MWh. This is the average taken from the annual generation reports from the last five years (2009 – 2015).
	Number, type, and size of turbines, including maximum and minimum hydraulic capacity of each unit	The powerhouse contains one vertical shaft turbine rated at 271 kilowatts (kW). Hydraulic capacity of the single turbine is 90-200 cfs.
	Modes of operation (run-of-river, peaking, pulsing, seasonal storage, etc.)	The Project operates in a run-of-river mode to preserve water quality, aquatic and riparian habitats, and aesthetic and recreational flows in the Passumpsic River. The Licensee provides a minimum flow of 88 cfs, or inflow, whichever is less is passed through the downstream fishway. In addition to the bypassed flows, a continuous veil of water (equating to an additional 7 cfs of flow) is spilled over the flashboards from June 1 through October 31 to enhance aesthetics.
	Dates and types of major equipment upgrades	N/A
	Dates, purpose, and type of any recent operational changes	N/A
	Plans, authorization, and regulatory activities for any facility upgrades	There are no plans at this time for Project upgrades.
Character-istics of Dam,	Date of construction	Originally built in 1917-1919. The powerhouse was completely destroyed in

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
Diversion, or Conduit		the flood of 1927. The plant was rebuilt in 1928.
	Dam height	Maximum height: 18 feet
	Spillway elevation and hydraulic capacity	The spillway crest elevation is located at 603.5 feet msl. The spillway's hydraulic capacity number is not readily available but can be supplied at a later time if required.
	Tailwater elevation	Normal tailwater elevation: 586.7 feet msl.
	Length and type of all penstocks and water conveyance structures between reservoir and powerhouse	A 6-foot-diameter, 246-foot-long penstock conveys flows from the dam to the powerhouse with a drop in elevation of 18-feet.
	Dates and types of major, generation-related infrastructure improvements	No new infrastructure improvements have occurred since the 2012 LIHI submission.
	Designated facility purposes (e.g., power, navigation, flood control, water supply, etc.)	The purpose of this facility is to generate power to be supplied to the local grid.
	Water source	Passumpsic River
	Water discharge location or facility	Passumpsic River
Characte-ristics of Reservoir and Watershed	Gross volume and surface area at full pool	At full pool, the Project has a 24.7-acre reservoir with 24.7 acre-feet of usable storage.
	Maximum water surface elevation (ft. MSL)	The maximum water surface elevation within the impoundment is 605.0 feet msl.
	Maximum and minimum volume and water surface elevations for designated power pool, if available	No power pool present. Run-of-river Project.
	Upstream dam(s) by name, ownership, FERC number (if applicable), and river mile	The Village of Lyndonville owns and operates the Great Falls Hydroelectric Project (FERC No. 2839) located at RM 16.0 and the Vail Hydroelectric Project (FERC No. 3090) located furthest upstream at RM 17.7. See Appendix B for a map of Passumpsic River dam locations.
	Downstream dam(s) by name, ownership, FERC number (if applicable), and river mile	GMP owns and operates four other projects downstream of the Pierce Mills Project: Arnold Falls Hydroelectric Project (FERC No. 2399) at RM 9.5; Gage Hydroelectric Project (FERC No. 2397) located at RM 7.2; Passumpsic Hydroelectric Project (FERC No. 2400) located at RM 5.5; and Barnet Hydroelectric Project (FERC No. 3051,) located downstream of the

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
		Passumpsic Project at RM 0.5, just before the Passumpsic River's confluence with the Connecticut River. See Appendix B for a map of Passumpsic River dam locations.
	Operating agreements with upstream or downstream reservoirs that affect water availability, if any, and facility operation	No operating agreements are in effect with other surrounding facilities.
	Area inside FERC project boundary, where appropriate	The area inside the FERC Project boundary is approximately 27.5 acres.
Hydrologic Setting	Average annual flow at the dam	The 1994 WQC estimates the average annual flow is 450 cfs at the dam. This flow is calculated by using estimates from the three following gaging stations: U.S. Geological Survey (USGS) Gage 01135500 Passumpsic River at Passumpsic, VT; USGS Gage 01133000 East Branch Passumpsic River Near East Haven, VT; and USGS Gage 01135000 Moose River at St. Johnsbury, VT.
	Average monthly flows	Average monthly flows (2010-2015) as measured at USGS Gage 01135500 Passumpsic River at Passumpsic, VT: Jan: 708 cfs Feb: 410 cfs March: 813 cfs April: 2,360 cfs May: 1,480 cfs June: 995 cfs July: 620 cfs Aug: 413 cfs Sept: 421 cfs Oct: 792 cfs Nov: 617 cfs Dec: 832 cfs
	Location and name of relevant stream gauging stations above and below the facility	Flow at the dam is calculated by using estimates from the three following gaging stations: USGS Gage 01135500 Passumpsic River at Passumpsic, VT; USGS Gage 01133000 East Branch Passumpsic River Near East Haven, VT; and USGS Gage 01135000 Moose River at St. Johnsbury, VT.

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
	Watershed area at the dam	The drainage area of the river at the dam is 237 square miles.
Designated Zones of Effect	Number of zones of effect	There are three zones of effect: 1) Impoundment, 2) Bypassed Reach, and 3) Downstream. The Impoundment ZOE inundates approximately 25 acres or approximately 1.2 miles of Passumpsic River upstream of Pierce Mills dam. The impoundment influences the waters stretching from RM 16.0 (upstream Great Falls Dam) to RM 15.2 (Pierce Mills Dam). The Project Bypassed Reach ZOE is approximately 2.5 acres extending from the dam to the end of powerhouse which connects to the tailrace. The Downstream ZOE is approximately 36 acres starting from the Pierce Mills Powerhouse and stretching 2 miles downstream to the Arnold Falls Dam.
	Upstream and downstream locations by river miles	The Impoundment ZOE includes a free-flowing reach of approximately 1.2 miles between the upstream Great Falls Dam (RM 16.0) and the Pierce Mills Dam (RM 15.2). The Bypassed Reach ZOE includes the waters stretching from RM 15.2 to approximately RM 14.24. The Downstream ZOE includes a free-flowing reach of about 2 miles between the project tailrace (RM 14.24) and the Arnold Falls Dam (RM 9.5).
	Type of waterbody (river, impoundment, by-passed reach, etc.)	The waters located within the Impoundment ZOE, Bypassed Reach ZOE, and the Downstream ZOE are classified as Riverine by the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (USFWS 2016).
	Delimiting structures	The Impoundment ZOE includes waters stretching from the upstream Great Falls Dam to the Pierce Mills Dam.

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
		The Bypassed Reach ZOE includes waters stretching from the Pierce Mills Dam 0.66 miles downstream to the tailrace where the powerhouse is located. The Downstream ZOE stretches from the Pierce Mills powerhouse to Arnold Falls Dam.
	Designated uses by state water quality agency	The Passumpsic River is designated as Class B Waters. Designated uses as described in the WQC include public water supply with filtration and disinfection, irrigation and other agricultural uses, swimming, and recreation.
Additional Contact Information	Names, addresses, phone numbers, and e-mail for local state and federal resource agencies	Please see Section 4.0 for the Project Contacts Form
	Names, addresses, phone numbers, and e-mail for local non-governmental stakeholders	Please see Section 4.0 for the Project Contacts Form
Photographs and Maps	Photographs of key features of the facility and each of the designated zones of effect	Please see Appendix A for photographs of key features of the facility and identification of each ZOE.
	Maps, aerial photos, and/or plan view diagrams of facility area and river basin	Please see Appendix B for aerial photos of facility area and river basin.

2.0 STANDARDS MATRICES

2.1 IMPOUNDMENT ZOE

CRITERION		ALTERNATIVE STANDARDS				
		1	*2*	*3*	*4*	*Plus*
A	**Ecological Flow Regimes**	***X***				
B	**Water Quality**		***X***			
C	**Upstream Fish Passage**	***X***				
D	**Downstream Fish Passage**		***X***			
E	**Watershed and Shoreline Protection**	***X***				
F	**Threatened and Endangered Species Protection**		***X***			
G	**Cultural and Historic Resources Protection**		***X***			
H	**Recreational Resources**		***X***			***X***

2.2 BYPASSED REACH ZOE

Criterion		*Alternative Standards*				
		1	*2*	*3*	*4*	*Plus*
A	**Ecological Flow Regimes**		***X***			
B	**Water Quality**		***X***			
C	**Upstream Fish Passage**	***X***				
D	**Downstream Fish Passage**		***X***			
E	**Watershed and Shoreline Protection**	***X***				
F	**Threatened and Endangered Species Protection**		***X***			
G	**Cultural and Historic Resources Protection**		***X***			
H	**Recreational Resources**		***X***			

2.3 DOWNSTREAM ZOE

CRITERION		ALTERNATIVE STANDARDS				
		1	*2*	*3*	*4*	*Plus*
A	**Ecological Flow Regimes**	***X***				
B	**Water Quality**		***X***			
C	**Upstream Fish Passage**	***X***				
D	**Downstream Fish Passage**	***X***				
E	**Watershed and Shoreline Protection**	***X***				
F	**Threatened and Endangered Species Protection**		***X***			
G	**Cultural and Historic Resources Protection**		***X***			
H	**Recreational Resources**		***X***			

3.0 SUPPORTING INFORMATION

3.1 ECOLOGICAL FLOWS STANDARDS: IMPOUNDMENT ZOE

CRITERION	STANDARD	INSTRUCTIONS
A	1	Not Applicable / De Minimis Effect: • Confirm the location of the powerhouse relative to other dam/diversion structures to establish that there are no Bypassed reaches at the facility. • If Run-of-River operation, provide details on how flows, water levels, and operation are monitored to ensure such an operational mode is maintained. • In a conduit project, identify the water source and discharge points for the conduit system within which the hydropower plant is located. • For impoundment zones only, explain how fish and wildlife habitat within the zone is evaluated and managed – ***NOTE:*** this is required information, but it will not be used to determine whether the Ecological Flows criterion has been satisfied. All impoundment zones can apply Criterion A-1 to pass this criterion.

- The Impoundment ZOE does not have a bypassed reach.
- Vermont DEC issued a Project WQC on June 16, 1994 (see Appendix C for a copy of the WQC). As prescribed within WQC Condition B (Article 402 of the 1994 License), the Project operates in a true run-of-river mode where instantaneous flows below the tailrace equal instantaneous inflows to the impoundment at all times. When the facility is not operating, all flows are spilled at the dam.

  In accordance with License Article 404 and WQC Condition E, the Licensee developed a Flow Management Plan (http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1739159) which was approved by FERC on April 10, 1997 (http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10780026). Under the Flow Management Plan, a headpond controller system (HPS) ensures minimum flow is always met or exceeded. The system automatically adjusts the turbine output to maintain the water level at the top of, or spilling over the top of the flashboards. The system reads turbine output and headpond level every 5 minutes and raises or lowers the turbine load to maintain the headpond level in the range of 1.5 to 1.6 feet above the crest (crest elevation is 603.5 feet). If the turbine load is 25 kW or lower and the headpond level drops 1.49 feet, the system unit will shut down automatically, causing all flow to spill over the dam.
- This is not a conduit project.

- The Project's run-of-river operations create a stable impoundment environment. To protect wetlands and wildlife during occasional impoundment drawdowns greater than 2 feet, the Licensee undergoes agency consultation prior to drawdowns to ensure protection of the upstream resources.
- Project operations data was provided to Vermont DEC on March 29, 2018 for verification of Project run-of-river and Water Quality Certificate compliance (see Appendix C for email exchange).

3.2 ECOLOGICAL FLOWS STANDARDS: BYPASSED REACH ZOE

CRITERION	STANDARD	INSTRUCTIONS
A	2	Agency Recommendation (see Appendix A for definitions): • Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally stringent). • Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is or is not part of a Settlement Agreement. • Explain how the recommendation relates to agency management goals and objectives for fish and wildlife. • Explain how the recommendation provides fish and wildlife protection, mitigation and enhancement (including in-stream flows, ramping and peaking rate conditions, and seasonal and episodic instream flow variations).

- Vermont DEC issued a Project WQC on June 16, 1994 (see Appendix C for a copy of the WQC). In accordance with WQC Condition C (Article 403 of the 1994 License), GMP provides, when flows are available, a minimum instantaneous flow of 88 cfs through the downstream fishway. If the instantaneous inflow falls below the hydraulic capacity of the turbine unit plus this spillage requirement, all flows, except for those needed for downstream fish passage (20 cfs from April 1 – June 15 and September 15 – November 15), are spilled at the dam. Per agreements made during an October 22, 1996 meeting with the Vermont Agency of Natural Resources (VANR), USFWS, and the Licensee and confirmed within the April 10, 1997 FERC Order Modifying and Approving Flow Management Plans (http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=192803), a continuous veil of water (equating to an additional 7 cfs of flow) is spilled over the Project flashboards from June 1 through October 31 to enhance aesthetics.
- The Agency Procedure for Determining Acceptable Minimum Stream Flows (July 14, 1993: http://dec.vermont.gov/content/agency-procedure-determining-acceptable-minimum-stream-flows) provided guidance to the DEC in setting minimum stream flows during Project relicensing. Because the Passumpsic River is heavily dammed and the large majority of its length is under impounded conditions, bypasses represent a disproportionate amount of the high quality habitat for salmonids on the river mainstem. The scientific basis for this agency recommendation is also supported by a 1992-1993 bypassed reach study conducted by the Licensee in consultation with the Vermont Department of Fish and Wildlife and the USFWS. The study evaluated minimum flows needed to support fisheries habitat in the bypassed channel. Within study analysis, it was determined that a minimum flow of 88 cfs or inflow provides adequate habitat conditions for species/life stage (See Appendix C for the WQC).

- The Vermont DEC's management goal for bypasses at Passumpsic River projects is to establish and maintain cold water aquatic habitat, including deep aerated pools that are well circulated and serve as adult fish refugia, steeper gradient areas with high macroinvertebrate production, and fish spawning and nursery areas (Comprehensive River Plan for the Passumpsic River Watershed, Vermont DEC, August 1992: See 1994 WQC for outlined Plan goals).
- The Vermont DEC recommendations provide refugia and enhancement of habitat for local salmonid (brown and rainbow trout) and a variety of non-game fishes.
- Project operations data was provided to Vermont DEC on March 29, 2018 for verification of Project operations and Water Quality Certificate compliance (see Appendix C for email exchange).

3.3 ECOLOGICAL FLOWS STANDARDS: DOWNSTREAM ZOE

CRITERION	STANDARD	INSTRUCTIONS
A	1	Not Applicable / De Minimis Effect: • Confirm the location of the powerhouse relative to other dam/diversion structures to establish that there are no bypassed reaches at the facility. • If Run-of-River operation, provide details on how flows, water levels, and operation are monitored to ensure such an operational mode is maintained. • In a conduit project, identify the water source and discharge points for the conduit system within which the hydropower plant is located. • For impoundment zones only, explain how fish and wildlife habitat within the zone is evaluated and managed – ***NOTE:*** this is required information, but it will not be used to determine whether the Ecological Flows criterion has been satisfied. All impoundment zones can apply Criterion A-1 to pass this criterion.

- The Downstream ZOE does not have a bypassed reach.
- Vermont DEC issued a Project WQC on June 16, 1994 (see Appendix C for a copy of the WQC). As prescribed within WQC Condition B (Article 402 of the 1994 License), the Project operates in a true run-of-river mode where instantaneous flows below the tailrace equal instantaneous inflows to the impoundment at all times. When the facility is not operating, all flows are spilled at the dam. Flows below the Project tailrace are essentially unregulated.

  The only point when downstream flows are regulated is as prescribed under WQC Condition D and License Article 402. Following flashboard repair or replacement or maintenance operations requiring an impoundment drawdown, the instantaneous minimum flow of 118 cfs from June 1 to September 30 is released downstream of the Project as the impoundment is refilled. From October 1 through March 31 and from April 1 through May 31 or when natural inflow to the Project is insufficient to meet these flow passage requirements and fill the impoundment, the impoundment is refilled while releasing 90 percent of the instantaneous inflow downstream.

  In accordance with License Article 404 and WQC Condition E, the Licensee developed a Flow Management Plan (http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1739159) which was approved by FERC on April 10, 1997 (http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10780026). Under the Flow Management Plan, a HPS ensures minimum flow is always met or exceeded. The system automatically adjusts the turbine output to maintain the water level at the top of, or spilling over the top of the flashboards. The system reads turbine output and headpond level every 5 minutes and raises or lowers the turbine load to maintain the headpond level; in the range of 1.5 to 1.6 feet above the crest (crest elevation is 603.5 feet). If the

turbine load is 25 kW or lower and the headpond level drops 1.49 feet, the system unit will shut down automatically, causing all flow to spill over the dam.

- This is not a conduit project.
- Project operations data was provided to Vermont DEC on March 29, 2018 for verification of Project run-of-river and Water Quality Certificate compliance (see Appendix C for email exchange).

3.4 WATER QUALITY STANDARDS: IMPOUNDMENT, BYPASSED REACH, AND DOWNSTREAM ZOES

CRITERION	STANDARD	INSTRUCTIONS
B	2	Agency Recommendation: • If facility is located on a Water Quality Limited river reach, provide an agency letter stating that the facility is not a cause of such limitation. • Provide a copy of the most recent Water Quality Certificate, including the date of issuance. • Identify any other agency recommendations related to water quality and explain their scientific or technical basis. • Describe all compliance activities related to the water quality related agency recommendations for the facility, including on-going monitoring, and how those are integrated into facility operations.

- The Passumpsic River in the Project-affected reach, including the Impoundment, Bypassed Reach, and Downstream ZOEs, is designated by the Water Resources Board as Class B waters. According to the 2016 State of Vermont 303d List of Impaired Waters (http://dec.vermont.gov/sites/dec/files/documents/WSMD_mapp_303d_Part_A_2016_final_complete.pdf), the Project is located entirely within the waste management zone that receives discharge from the Town of St. Johnsbury municipal wastewater treatment facility. Additionally, above the Project is the Lyndonville wastewater treatment facility discharge; the waste management zone for the municipal discharge extends from the upstream limits of the village of Lyndonville to the Great Falls Dam, which is located two miles upstream of Pierce Mills. Because natural river flows are continuously available at the Project, the impact of the Project on concentrations or levels of the following parameters were concluded not to be significant within the 1994 WQC: phosphorous; nitrates; settleable, floating, or suspended solids; oil, grease, and scum; alkalinity; pH; toxics; turbidity; Escherichia coli; color; taste and odor. As described within the 2012 U.S. Environmental Protection Agency Waterbody Quality Assessment Report, the probable cause contributing to this section of the Passumpsic River's impairment for reporting year 2012 is combined sewer overflows (https://ofmpub.epa.gov/waters10/attains_waterbody.control?p_au_id=VT15-01.01&p_cycle=2012).

  A 1991 water quality sampling analysis done by Aquatec, Inc. concludes that the Project under the existing configuration does not violate the minimum water quality standards for dissolved oxygen. Data from the 1991 study was collected from July 16-19. Of the 15 sampling sets for the three-day summer study, only two samples were less than 90% saturation. Aquatec's analysis of reaeration coefficients demonstrated a significant aeration efficient for spillage at the Pierce Mills Dam.

  Vermont DEC email dated December 7, 2016 confirms that the Project's current operations continue to not be a contributing cause of the River's impairment (Appendix C). Project operations data was additionally provided to Vermont DEC on March 29, 2018 for verification of Project Water Quality Certificate compliance (see Appendix C

for email exchange).

- Vermont DEC issued a Project WQC on June 16, 1994 (see Appendix C for a copy of the WQC).

3.5 UPSTREAM FISH PASSAGE STANDARDS

Presently there are no migratory species located within the vicinity of the Project. Resident, non-migratory, managed species found within the Project vicinity include brown trout, brook trout, and rainbow trout. Atlantic salmon were historically stocked within the Passumpsic River under the USFWS Connecticut River Atlantic Salmon Restoration Program. The approximate 40-year stocking program ended in 2012 as poor salmon return rates persisted (Al Jazeera America 2016).

3.5.1 UPSTREAM FISH PASSAGE STANDARDS: IMPOUNDMENT, BYPASSED REACH, AND DOWNSTREAM ZOES

CRITERION	STANDARD	INSTRUCTIONS
C	1	<u>Not Applicable/De Minimis Effect:</u> • The facility does not create a barrier to upstream passage, or • There are no migratory fish in the vicinity of the facility and the facility is nor the cause of extirpation of such species if they had been present historically

- The Project area, including the Impoundment, Bypassed Reach, and Downstream ZOEs, does not create a barrier for migratory upstream fish passage. There is no current federal mandatory prescription for the upstream passage of fish at the Project as License Article 407 and WQC Condition G reserve future authority to order such fishways. There has been no request for upstream fish passage facilities by state or federal agencies to date.

  Upstream passage to the Passumspic River is currently blocked by downstream Connecticut River dams and the East Barnet Dam located at Passumpsic River RM 0.5. Although the Wilder Dam (FERC License No. 1892), located at RM 217 on the Connecticut River provides upstream fish passage, two Connecticut River dams located upstream of the Wilder Dam but downstream of the Passumpsic River outlet, do not provide upstream fish passage.

  The Dodge Falls Dam (also called the East Ryegate Dam) (FERC Exemption No. 8011, LIHI #42) is located approximately 47 miles upstream of the Wilder Dam at Connecticut River RM 264. The Dodge Falls Dam does not currently provide upstream fish passage. The Fifteen Mile Falls Project (FERC License No. 2077, LIHI #39) McIndoes Development is located upstream of the Dodge Falls Dam at Connecticut River RM 268, approximately 5 miles downstream of the Passumpsic River outlet, does not provide upstream fish passage facilities either. As included within the Fifteen Mile Falls Project 2001 WQC, though, the Project will be required to provide upstream fish passage past the McIndoes Dam after 20 Atlantic Salmon migrating upstream reach the downstream Dodge Falls Dam for two consecutive years and the New Hampshire Fish and Game Department, VTFW, USFWS, and Connecticut River Atlantic Salmon Commission determine that upstream passage is justified.

Per reviews of the LIHI Certificates for the Fifteen Mile Falls Project (effective until December 2021) and the Dodge Falls Project (effective until June 2019) and reviews of the Dodge Falls Dam, Fifteen Mile Falls Project, and East Barnet Dam FERC dockets, upstream fish passage is not currently required at these facilities. Upstream fish passage to the Passumpsic River is therefore not available at this time and downstream Connecticut River and Passumpsic River barriers are not expected to be removed throughout the duration of the Passumpsic Project's re-certification term.

See Figure 3 for a map of pertinent Passumpsic and Connecticut River dam locations.

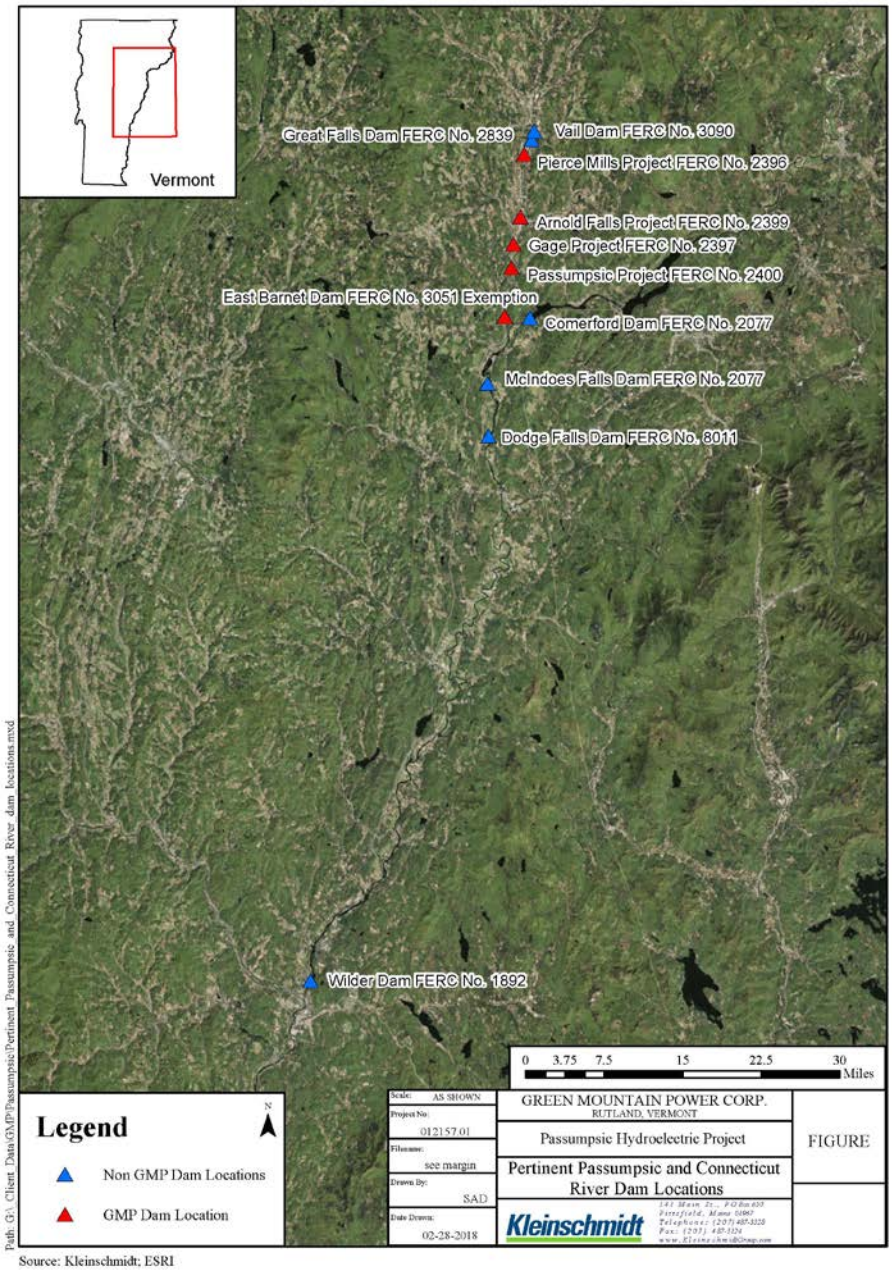


FIGURE 3 PERTINENT PASSUMPSIC AND CONNECTICUT RIVER DAM LOCATIONS.

- Per Vermont Department of Fish and Wildlife email dated March 16, 2017 (Appendix D), the Department commented that American eel passage will not be required at the Project within the next five years. Although the USFWS was contacted for review of fishway compliance and eel passage, no comments have been received (Appendix D).
- Although the Connecticut River Basin once had naturally occurring Atlantic salmon runs, the salmon were extirpated from the river system due to the construction of downstream Connecticut River dams and river pollution (NMFS 1999). In an effort to reintroduce salmon to the river basin, the USFWS and surrounding states including Massachusetts, Vermont, and New Hampshire facilitated a more than 40-year Atlantic salmon stocking program that ended in 2012 due to poor salmon return rates.

3.6 DOWNSTREAM FISH PASSAGE AND PROTECTION STANDARDS

Presently there are no migratory species located within the vicinity of the Project. Resident, non-migratory, managed species found within the Project vicinity include brown trout, brook trout, and rainbow trout. Atlantic salmon were historically stocked within the Passumpsic River under the USFWS Connecticut River Atlantic Salmon Restoration Program. The approximate 40-year stocking program ended in 2012 as poor salmon return rates persisted (Al Jazeera America 2016).

3.6.1 DOWNSTREAM FISH PASSAGE STANDARDS: IMPOUNDMENT ZOE

CRITERION	STANDARD	INSTRUCTIONS
D	2	Agency Recommendation: • Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally stringent). • Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is part of a Settlement Agreement or not. • Describe any provisions for fish passage monitoring or effectiveness determinations that are part of the agency recommendation, and how these are being implemented.

- In accordance with License Article 405 and WQC Condition F, GMP provides permanent downstream fish passage via a transition box in the spillway adjacent to the Project intake. Inflow is controlled by stoplogs installed at the back of the box, which allow the required 88 cfs minimum flow. Fish entering the box drop into a plunge pool. The plunge pool is 6-feet-wide and 13.5-feet-long with an exit weir designed to maintain a minimum depth of 3 feet at 88 cfs. The fishway is operated from April 1 – June 15 and September 15 – November 15. During the remainder of the year, the fishway is still utilized to pass the minimum flow requirement of 88 cfs (fish passage is therefore provided year-round). Recommendations for downstream passage were provided within the Vermont DEC letter dated December 22, 1993 (https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10526668) and Department of Interior (DOI) recommendations for downstream fish passage are included within a December 23, 1993 (http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1635794) letter and later incorporated into the Project license.

  On December 5, 1995, the Licensee submitted Downstream Fish Passage Facility Operation & Maintenance Plan as well as permanent downstream design drawings developed in coordination with USFWS and Vermont DEC (https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=8301125). In an order

dated February 7, 1996, FERC approved of the downstream fish passage facility designs and operations plans (https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10748550). Included within downstream passage design drawings and approved within the February 7, 1998 FERC order, Project trashracks with 1-inch clear bar spacing were approved, and have been installed to prevent salmon from entering into the power canal.

- Under License Article 406, the Licensee conducted a study to monitor the first year of downstream fish passage operation for effectiveness in facilitating efficient and safe passage of downstream migrating Atlantic salmon stocked under the USFWS stocking program (this program has since ended in 2012). The Licensee submitted the study plan to FERC on June 14, 1996 (https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=8384297) which was approved by FERC on September 25, 1996 (http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=141366). Under this plan, developed in consultation with the USFWS and Vermont Division of Fish and Wildlife (VTFW), the Licensee, USFWS, and VTFW would visually inspect the downstream Gage Project (FERC No. 2397) and Passumpsic Project (FERC No. 2400) forebays for the presence of salmon smolts during the period when smolts should be passing downstream. Observations at the Pierce Mills Project was not included within the finalized study plan as the configuration of the Project's fish passage was not expected to be problematic. A November 1997 report on the results of the observations at the Gage Project and Passumpsic Project was issued to the VANR and USFWS. Discussions regarding Passumpsic River downstream fishways have largely concentrated on the Passumpsic Project fishway since this study.

- Approximately 20 years ago, Len Gerardi of VTFW noticed salmon fry within the downstream Gage Project forebay. GMP quickly responded by draining the forebay and releasing fish out the Project bypassed. It was determined that the salmon were entering into the forebay because of a gap that emerged due to deteriorated concrete between the trashracks and forebay. To remedy the situation, GMP installed a steel cover over the concrete gap so to prevent entrance of fish into the forebay. Len Gerardi visited the site after installation of the steel cover and was happy with the status of the forebay. GMP is additionally pursuing intake maintenance and repair work at the Gage Project in 2018. This work will involve concrete resurfacing which will include concrete repairs to the deteriorated concrete gap between the trashracks and the forebay. This long-term seal will further enhance conditions at Gage. VTFW did not express any comments or suggested enhancements for the Pierce Mills Project or the Arnold Falls Project.

  Per VTFW email dated March 16, 2017 (Appendix D), the Department reported that they worked with GMP to improve downstream fish passage at the Gage Project. The Department reported that fish passage had improved after GMP implemented recommendations and did not require further studies. The VTFW additionally commented within the March 16, 2017 email that American eel passage will not be required at the Gage, Pierce Mills, or Arnold Falls Projects within the next five years.

  Although the USFWS was contacted for review of fishway compliance and eel passage, no comments have been received (Appendix D).

- Because of the presence of the USFWS Atlantic salmon stocking program during Project relicensing (program was decommissioned in 2012), stocked Atlantic salmon needed a

way to make an outmigration past the Project. In addition to aiding the Atlantic salmon smolt passage, it was concluded that downstream passage would also benefit resident trout species.

- As stated within the Project License and WQC, the downstream fish passage also benefits resident trout species. GMP provides a downstream fish passage facility that operates year-round and installed a trashrack system with 1-inch clear bar spacing to prevent entrainment. No further protections are required by resource agencies for resident fish passage at the Project.

3.7 DOWNSTREAM FISH PASSAGE STANDARDS: BYPASSED REACH ZOE

CRITERION	STANDARD	INSTRUCTIONS
D	2	<u>Agency Recommendation:</u> • Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally stringent). • Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is part of a Settlement Agreement or not. • Describe any provisions for fish passage monitoring or effectiveness determinations that are part of the agency recommendation, and how these are being implemented.

- Downstream fish passage is provided to the bypassed reach via the downstream fishway and its associated plunge pool. See answer to Impoundment ZOE above for further information.

3.8 DOWNSTREAM FISH PASSAGE STANDARDS: DOWNSTREAM ZOE

Presently there are no migratory species located within the vicinity of the Project. Resident, non-migratory, managed species found within the Project vicinity include brown trout, brook trout, and rainbow trout. Atlantic salmon were historically stocked within the Passumpsic River under the USFWS Connecticut River Atlantic Salmon Restoration Program. The approximate 40-year stocking program ended in 2012 as poor salmon return rates persisted (Al Jazeera America 2016).

CRITERION	STANDARD	INSTRUCTIONS
D	1	<u>Not Applicable / De Minimis Effect:</u> • Explain why the facility does not impose a barrier to downstream fish passage in the designated zone, considering both physical obstruction and increased mortality relative to natural downstream movement (e.g., entrainment into hydropower turbines). • For riverine fish populations that are known to move downstream, explain why the facility does not contribute adversely to the sustainability of these populations or to their access to habitat necessary for successful completion of their life cycles. • Document available fish distribution data and the lack of migratory fish species in the vicinity. • If migratory fish species have been extirpated from the area, explain why the facility is or was not the cause of this.

- There are no barriers to downstream fish passage in the Downstream ZOE. Once fish cross past the Impoundment and Bypassed Reach ZOEs with the use of the sluiceway (operated year-round for minimum flows), the fish do not have any further impediments to passage through the Downstream ZOE. Once fish encounter the downstream Arnold Falls Dam, they are then allowed to pass over the dam via the use of another downstream fish passage facility.
- Although the downstream fish passage facility was mainly intended to facilitate downstream passage for stocked Atlantic salmon smolts, the USFWS stocking program for Atlantic salmon ended in 2012. As stated within the Project License and WQC, the downstream fish passage also benefits resident trout species. Downstream passage is currently and primarily provided to local riverine species including brown trout, brook trout, and rainbow trout that are known to utilize downstream passage facilities to access different river areas. By using the downstream fish passage facility, local riverine species are able to access new habitat that may be necessary for them to complete necessary life cycle stages. GMP provides year-round downstream fish passage and installed a trashrack system with 1-inch clear bar spacing. No further protections are required by resource agencies for resident fish passage at the Project.

- As stated in the December 23, 1993 VANR comment letter, (https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10526668), brook, brown, and rainbow trout are all found in the Passumpsic basin. VTFW studies conducted in the early 1970s indicate the Passumpsic River drainage basin contained a higher percentage of brook trout than any other drainage basin studies throughout the state. The Agency stocks the stream from the upstream Vail Dam to the downstream Gage Dam with brown trout and rainbow trout. No further studies on fishes of the Passumpsic River are available for this application.

  The latest data for all monitored upstream migrating species in the downstream Connecticut River is included in the two reports below. There are presently no upstream fish ladders above the above Wilder Dam (FERC No. 1892) located at RM 264 and this is where migratory assessments stop. Opening of the Wilder Dam fish ladder only occurs if triggers are met for returns at downstream dams. Therefore, anadromous fish passage is unlikely to be an issue on the Passumpsic.

  2017:
  https://www.fws.gov/r5crc/pdf/2017_counts/CT_River_Fishway_Count_Rpt_11_07_17.pdf

  2016:

  https://www.fws.gov/r5crc/pdf/CT_River_Fishway_Count_Rpt_12_30_16.pdf

  The latest VANR Passumpsic and Upper Connecticut River Tactical Basin Plan (June 2014) does not note presence of American eel within the Passumpsic River (http://dec.vermont.gov/sites/dec/files/wsm/mapp/docs/mapp_b15-16tbp.pdf). Recent FERC relicensing studies conducted at the downstream Wilder Dam in 2015 (https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14580050) showed that a small number of eels exist within the Connecticut River:

  1. No eels identified at the Wilder Dam during night time upstream passage surveys.
  2. Very low numbers of eels used the upstream fish ladder.
  3. No eels identified within the Wilder impoundment which extends up to Connecticut RM 262.

- Although the Connecticut River Basin once had naturally occurring Atlantic salmon runs, the salmon were extirpated from the river system due to the construction of downstream Connecticut River dams and river pollution (NMFS 1999). In an effort to reintroduce salmon to the river basin, the USFWS and surrounding states including Massachusetts, Vermont, and New Hampshire facilitated a more than 40-year Atlantic salmon stocking program that ended in 2012 due to poor salmon return rates.

3.10 SHORELINE AND WATERSHED PROTECTION STANDARDS: IMPOUNDMENT, BYPASSED REACH, & DOWNSTREAM ZOE

CRITERION	STANDARD	INSTRUCTIONS
E	1	Not Applicable / De Minimis Effect: • If there are no lands with significant ecological value associated with the facility, document and justify this (e.g., describe the land use and land cover within the project boundary). • Document that there have been no Shoreline Management Plans or similar protection requirements for the facility.

- The area surrounding the Impoundment, Bypassed Reach, and Downstream ZOEs consists of mixed industrial, and commercial buildings, rural residential housing and farmland on both sides of the river. Land cover units identified in the vicinity of the Project can be found in Table 2 as identified within the National Land Cover Database, 2011(http://www.mrlc.gov/nlcd11_leg.php):

TABLE 2 PROJECT LAND COVER CLASSIFICATION

CLASS/VALUE	CLASSIFICATION DESCRIPTION
11	Open Water- areas of open water, generally with less than 25% cover of vegetation or soil.
21	Developed, Open Space- areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
22	Developed, Low Intensity- areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% percent of total cover. These areas most commonly include single-family housing units.
23	Developed, Medium Intensity -areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50% to 79% of the total cover. These areas most commonly include single-family housing units.
42	Evergreen Forest- areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species maintain their leaves all year. Canopy is never without green foliage.
43	Mixed Forest- areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75% of total tree cover.
52	Shrub/Scrub- areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.
82	Cultivated Crops -areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20% of total vegetation. This class also includes all land being actively tilled.
90	Woody Wetlands- areas where forest or shrubland vegetation accounts for greater than 20% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

- No shoreland management plans have been required for the Project.

3.11 THREATENED AND ENDANGERED SPECIES STANDARDS: IMPOUNDMENT, BYPASSED REACH, AND DOWNSTREAM ZOES

CRITERION	STANDARD	INSTRUCTIONS
F	2	Finding of No Negative Effects: • Identify all listed species in the facility area based on current data from the appropriate state and federal natural resource management agencies. • Provide documentation of a finding of no negative effect of the facility on any listed species in the area from an appropriate natural resource management agency.

- Based on an official U.S. Fish and Wildlife Service Species List populated on November 30, 2016 (Appendix E), the federally threatened Northern long-eared bat (*Myotis septentrionalis*) may occur within the Project vicinity, including the Impoundment, Bypassed Reach, and Downstream ZOEs. In addition, the bald eagle which was delisted and removed from the federal list of endangered and threatened species in 2007, but still protected under the federal Migratory Bird Treaty Act and Bald and Golden Eagle Act, is considered a potential transient species only. Within the state of Vermont, the Northern long-eared bat and bald eagle are listed as state endangered species. Per Vermont Fish and Wildlife emails dated December 1 & 2, 2016, it was concluded that current Project operations do not negatively impact the state and federally listed northern long-eared bat or the bald eagle (Appendix E).

  The Spikemoss (*Selaginella*) and shining lady's tresses (*Spiranthes lucida*) are listed by the Vermont Natural Heritage Program as "uncommon plants" and were found in the vicinity of the Project. During re-licensing, VANR determined that State listed significant habitats found in the Project vicinity would not be impacted by continued Project operations.

- The 1994 Environmental Assessment notes that the VANR indicated during re-licensing that the continued operation would not adversely affect populations of species inhabiting unique habitat at any of the Passumpsic projects nor the bald eagle which is only a transient in the area (http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=3462266).

3.12 CULTURAL AND HISTORIC RESOURCES STANDARDS: IMPOUNDMENT, BYPASSED REACH, AND DOWNSTREAM ZOES

CRITERION	STANDARD	INSTRUCTIONS
G	2	Approved Plan: • Provide documentation of all approved state, provincial, federal, and recognized tribal plans for the protection, enhancement, and mitigation of impacts to cultural and historic resources affected by the facility. • Document that the facility is in compliance with all such plans.

- License Article 408 requires implementation of the November 3, 1994 "Programmatic Agreement" among FERC, the Advisory Council on Historic Preservation, and the Vermont State Historic Preservation Officer (SHPO) (http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1718491). This Agreement covers multiple GMP hydropower projects located on the Passumpsic River including the Gage Project (FERC No. 2397), Passumpsic Project (FERC No. 2400), and Arnold Falls Project (FERC No. 2399). The Agreement requires the filing of Cultural Resource Management Plans (CRMP) for all four projects as infrastructure at these projects is considered eligible for inclusion in the National Register of Historic Places.

  The CRMP for the Pierce Mills Project was initially submitted to FERC on December 5, 1995 (http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=8297825) and resubmitted on September 22, 1999 (http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=8112794) and approved by FERC on February 28, 2000 (http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10850860).

- The CRMP includes a provision for annual shoreline monitoring. Annual reports associated with surveys of the Project shoreline are submitted to both the FERC and the Vermont SHPO. The below list includes links to the CRMPs submitted from 2012 to present:

  - 2012 Annual CRMP Report
    http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13142360
  - 2013 Annual CRMP Report
    http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13407659
  - 2014 Annual CRMP Report
    http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13704783
  - 2015 Annual CRMP Report
    http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14066571
  - 2016 Annual CRMP Report
    http://elibrary.ferc.gov:1/idmws/file_list.asp?document_id=14519189
  - 2017 Annual CRMP Report

    https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14773159

Within the 2016 and 2017 Annual CRMP Reports, it was recommended that due to the documented lack of potential threats to historic properties, the frequency of monitoring actions be reduced. Instead of conducting annual field inspections to inspect condition of archaeological properties as described in the CRMP, it was recommended that the field inspection schedule be altered to occur once every three years. GMP inquired with the Vermont SHPO about this altered timeline on March 7, 2017 and on April 7, 2017 but has not received feedback (Appendix F). GMP plans to continue conducting Annual CRMP Reports unless it hears differently from Vermont SHPO.

- As stated within the 2013 Environmental Inspection Report (http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13385345), the 2012 Annual CRMP Report concluded that the Project shorelines were stable and that no known or potential archaeological sites are threatened by any erosion events. The 2013 Environmental Inspection Report concluded that the Licensee is in compliance with its requirements in regards to cultural resources.

3.13 RECREATIONAL RESOURCES STANDARDS: IMPOUNDMENT ZOE

CRITERION	STANDARD	INSTRUCTIONS
H	2	Agency Recommendation: • Document any comprehensive resource agency recommendations and enforceable recreation plan that is in place for recreational access or accommodations. • Document that the facility is in compliance with all such recommendations and plans.

- In accordance with License Article 412 and WQC Conditions K and L, GMP developed and maintains recreation facilities including a canoe/kayak take-out and portage trail with associated directional signage in the Impoundment ZOE.
- A Landscape Plan and Recreation Plan was submitted to FERC on June 2, 1995 (http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13992858) and was approved by FERC on August 5, 1995 (http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10676408).

  Additionally, under License Article 413, the Licensee is required to evaluate the recreational uses of all GMP hydropower projects on the Passumpsic River within six months of the 10th and 20th year anniversaries of the license issuance date. On September 7, 2010, the Licensee filed the 10-year study of recreational uses at GMP's licensed hydropower projects located on the Passumpsic River (http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=13845617). FERC approved of this Recreational Use Study on November 23, 2010 (http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=13867773). GMP's 20-year study of recreational uses was submitted to FERC on August 27, 2015 (http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14370875) and approved by FERC on November 30, 2015 (http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14403636).

  All of the facilities proposed in the approved recreation plan for Pierce Mills Project have been installed. Due to the remote location of the Project and excessive vandalism of recreation facilities and Project infrastructure (powerhouse windows, etc.) public parking was moved from a location adjacent to the powerhouse as proposed in the original recreation plan to a parking area and pedestrian access point located on Town Highway #15, approximately ¼-mile north of GMP's maintenance access drive. Within FERC's November 30, 2015 Order, Condition B requested that GMP install new directional and informational signage at the Project, Condition C requested that GMP demarcate the facility's four new parking spaces, and Condition D requested that GMP revise the Project Recreation Plan to property depict the location of the new parking area. GMP letter filed with FERC on November 30, 2016 (Appendix G) includes photographic evidence of final locations of new directional and informational signage as well as the newly installed parking area and demarcated parking spaces. A revised Project Recreation Plan including a revised recreation map was also included within this submittal: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14516332. FERC Order dated March 30, 2017 (https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14539473) approved of the

photographic evidence provided in GMP's November 30, 2016 filing and FERC Order dated April 6, 2017 approved of the Project's Amended Recreation Plan (https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14550759).

In an email dated January 19, 2018, the Vermont DEC confirmed Project compliance with the approved recreation plan (Appendix G).

- Within the 2013 Environmental Inspection Report (http://elibrary.ferc.gov/idmws/file_list.asp) it was concluded that the Project appears to be in compliance with the requirements in regards to recreational resources.

Bonus:

H	PLUS	Bonus Activities: • Document any new public recreational opportunities that have been created on facility lands or waters beyond those required by agencies (e.g., campgrounds, whitewater parks, boating access facilities and trails). • Document that such new recreational opportunities did not create unmitigated impacts to other resources.

- As part of the Pierce Mills Recreation Plan and in accordance with License Article 412, GMP has produced and makes available to the public, the Passumpsic River Canoeing and Recreation Guide. This publication was developed with the cooperation of groups and individuals in the Passumpsic Valley and with assistance from the Vermont Agency of Natural Resources. In 1996, Central Vermont Public Service Corporation (CVPS) published the first edition of the Passumpsic River Canoeing and Recreation Guide. A revision was made to the Guide in 1999, which placed a focus on the seven hydroelectric generating stations along the river's 23-mile mainstem. For the 1999 version, CVPS worked with the recreation section of the Vermont Department of Forests, Parks, and Recreation; the Town of St. Johnsbury; the Passumpsic River Watch; and other interested groups and individuals to develop the Guide which was distributed free of charge throughout the local area and region.

  On August 27, 2015, GMP filed its 20-year study of recreational use of its four hydropower projects on the Passumpsic River pursuant to Article 413 of the Pierce Mills Project license. Within the study, GMP voluntarily committed to updating the Passumpsic River Canoeing and Recreation Guide in consultation with the Vermont Agency of Natural Resources and other area stakeholders. GMP initiated consultation with Vermont Department of Forests, Parks and Recreation, Vermont Department of Environmental Conservation, Vermont Fish and Wildlife Department, Northwoods Stewardship Center, Vermont River Conservancy, and a historian knowledgeable about the history of the river. GMP conducted multiple conference calls and coordinated with the participants in adding new sections and updated information to the Guide. GMP enlisted the services of Vermont River Conservancy to prepare detailed riverway maps, highlighting both the recreational opportunities, as well as the historically significant features of the Passumpsic River. GMP also enlisted the services of Northwoods Stewardship Center and the local historian to develop updated text, and provide additional historical information and photographs for the Guide.

  The resulting revised Guide includes collaboratively developed descriptive text of the boating opportunities and riverway features, photographs and historical images of key

riverway features, detailed river segment maps, and additional information pertaining to the Passumpsic River. The additional information includes descriptions of: regional recreation opportunities, geologic features and common vegetation along the riverway, the history of hydroelectric development on the river, paddling safety considerations, and measures to control the spread of aquatic invasive species. In addition to information about the East Branch of the Passumpsic River, GMP (at the request and with input from the consulted parties) included additional information about the upstream reaches of the west branch of the Passumpsic River as well as a reach of the Moose River tributary.

On June 8, 2017, GMP published an updated Guide which is available electronically at http://www.greenmountainpower.com/wp-content/uploads/2016/12/001-Passump-Rec-Guide_06082017_FINAL-web-print.pdf. In addition, GMP printed 500 color copies of the updated Guide for free distribution to the public. A hardcopy of this publication has been separately mailed to LIHI for review.

GMP's efforts to publish the revised Guide went over and beyond the scope of License Article 412 requirements and also over and beyond the stakeholder consultation scope agreed upon with VANR during 2015 consultations. GMP worked closely with local stakeholders to create a revised Guide that offers in-depth descriptions and explanations to the river's paddlers. GMP worked with Vermont River Conservancy and the North Woods Stewardship Center in not only the creation of the Guide but also supported a Community Meeting held jointly by the Vermont River Conservancy and the North Woods Stewardship Center to allow the public an opportunity to help craft a shared vision for Passumpsic River recreation stewardship and gain community input for Guide updates (see Appendix G for Community Meeting details). The 20-year assessment study did not necessarily require an update to the Guide. GMP could have created a lesser product than what has been published so to meet FERC and agency standards, but instead dedicated substantial effort and time to the Guide update.

Additionally, GMP voluntarily provides guided facility tours to college students or other interest groups as they are desired. On November 16, 2017, GMP provided a tour of the Passumpsic River hydroelectric facilities to four students from Lyndon State College. GMP additionally worked with a Lyndon State College student in October 2017 to provide a tour of the Passumpsic Hydroelectric Project (FERC No. 2400) and coordinated with the student to allow the opportunity to film construction of the Passumpsic downstream fishway for a school assignment. GMP is committed to continuing to allow for these types of "open door" opportunities as they arise.

In an email dated January 19, 2018, the Vermont DEC voiced its support for the Project's qualification for this H-PLUS Standard (Appendix G).

3.14 RECREATIONAL RESOURCES STANDARDS: BYPASSED REACH ZOE

CRITERION	STANDARD	INSTRUCTIONS
H	2	Agency Recommendation: • Document any comprehensive resource agency recommendations and enforceable recreation plan that is in place for recreational access or accommodations. • Document that the facility is in compliance with all such recommendations and plans.

- In accordance with License Article 412 and WQC Conditions K & L, GMP developed and maintains recreation facilities including a parking area for four vehicles, two tent sites for overnight camping by canoeists, two picnic tables, a portage trail with associated directional signage, interpretive signage, restroom facilities, and a wooden stile over the penstock for fishing and access to the river in the Bypassed Reach ZOE.
- The Landscape Plan and Recreation Plan as well as the 10-year and 20-year studies and recently revised Recreation Plan include the Bypassed Reach. See answer to Impoundment ZOE above for further information.

3.15 RECREATIONAL RESOURCES STANDARDS: DOWNSTREAM ZOE

CRITERION	STANDARD	INSTRUCTIONS
H	2	<u>Agency Recommendation:</u> • Document any comprehensive resource agency recommendations and enforceable recreation plan that is in place for recreational access or accommodations. • Document that the facility is in compliance with all such recommendations and plans.

- In accordance with License Article 412 and WQC Conditions K & L, GMP developed and maintains recreation facilities including a portage trail with associated directional signage and a canoe/kayak put-in within the Downstream ZOE.
- The Landscape Plan and Recreation Plan as well as the 10-year and 20-year studies and recently revised Recreation Plan include the Downstream ZOE. See answer to Impoundment ZOE above for further information.

4.0 CONTACTS FORMS

1. All applications for LIHI Certification must include complete contact information to be reviewed.

Project Owner:	
Name and Title	Jason Lisai, Generation Manager
Company	Green Mountain Power Corporation
Phone	(802) 655-8723
Email Address	Jason.Lisai@greenmountainpower.com
Mailing Address	163 Acorn Lane, Colchester, Vermont 05446
Consulting Firm / Agent for LIHI Program (if different from above):	
Name and Title	Andy Qua and Katie Sellers
Company	Kleinschmidt Associates
Phone	207-416-1246; 207-426-1218
Email Address	Andy.Qua@KleinschmidtGroup.com, Katie.Sellers@KleinschmidtGroup.com
Mailing Address	P.O. Box 650, Pittsfield, Maine 04967
Compliance Contact (responsible for LIHI Program requirements):	
Name and Title	John Greenan, Environmental Engineer
Company	Green Mountain Power Corporation
Phone	(802) 770-3213
Email Address	John.Greenan@greenmountainpower.com
Mailing Address	2152 Post Road, Rutland, Vermont 05701
Party responsible for accounts payable:	
Name and Title	John Greenan, Environmental Engineer
Company	Green Mountain Power Company
Phone	(802) 770-3213
Email Address	John.Greenan@greenmountainpower.com ; invoices@greenmountainpower.com
Mailing Address	Accounts Payable Processor, 2152 Post Road, Rutland, Vermont 05701

2. Applicant must identify the most current and relevant state, federal, provincial, and tribal resource agency contacts (copy and repeat the following table as needed).

Agency Contact (Check area of responsibility: Flows_**X**_, Water Quality _**X**_, Fish/Wildlife Resources __, Watersheds _**X**_, T/E Spp. __, Cultural/Historic Resources __, Recreation _**X**_):	
Agency Name	Vermont Department of Environmental Conservation
Name and Title	Jeff Crocker, Streamflow Protection Coordinator
Phone	802-490-6151
Email address	jeff.crocker@vermont.gov
Mailing Address	Watershed Management Division, Main Building - 2nd Floor, One National Life Drive, Montpelier, VT 05620
Agency Contact (Check area of responsibility: Flows_**X**_, Water Quality _**X**_, Fish/Wildlife Resources __, Watersheds _**X**_, T/E Spp. __, Cultural/Historic Resources __, Recreation _**X**_):	
Agency Name	Vermont Department of Environmental Conservation
Name and Title	Eric Davis, River Ecologist
Phone	802-490-6180
Email address	eric.davis@vermont.gov
Mailing Address	Watershed Management Division, Main Building - 2nd Floor, One National Life Drive, Montpelier, VT 05620

Agency Contact (Check area of responsibility: Flows__, Water Quality __, Fish/Wildlife Resources __, Watersheds __, T/E Spp. __, Cultural/Historic Resources _**X**_, Recreation __):	
Agency Name	Vermont Division for Historic Preservation
Name and Title	Scott Dillon, Survey Archaeologist
Phone	802-272-7358
Email address	scott.dillon@vermont.gov
Mailing Address	One National Life Drive Deane C. Davis Building, 6th Floor Montpelier, VT 05620-0501

Agency Contact (Check area of responsibility: Flows__, Water Quality __, Fish/Wildlife Resources _**X**_, Watersheds __, T/E Spp. _**X**_, Cultural/Historic Resources __, Recreation __):	
Agency Name	U.S. Fish and Wildlife Service
Name and Title	Melissa Grader, Wildlife Biologist
Phone	413-548-8002
Email address	Melissa_Grader@fws.gov
Mailing Address	New England Field Office 70 Commercial Street, Suite 300 Concord, NH 03301

Agency Contact (Check area of responsibility: Flows__, Water Quality __, Fish/Wildlife Resources _**X**_, Watersheds __, T/E Spp. _**X**_, Cultural/Historic Resources __, Recreation __):	
Agency Name	U.S. Fish and Wildlife Service
Name and Title	Brett Towler, Hydraulic Engineer
Phone	413-253-8727
Email address	brett_towler@fws.gov
Mailing Address	300 Westgate Center Drive Hadley, MA 01035

Agency Contact (Check area of responsibility: Flows__, Water Quality __, Fish/Wildlife Resources _**X**_, Watersheds __, T/E Spp. _**X**_, Cultural/Historic Resources __, Recreation __):	
Agency Name	Vermont Division of Fish and Wildlife
Name and Title	Jud Kratzer, Fish and Wildlife Specialist
Phone	802-751-0486
Email address	jud.kratzer@vermont.gov
Mailing Address	1229 Portland St. Suite 201 St. Johnsbury, VT 05819

Agency Contact (Check area of responsibility: Flows__, Water Quality __, Fish/Wildlife Resources _**X**_, Watersheds __, T/E Spp. _**X**_, Cultural/Historic Resources __, Recreation __):	
Agency Name	Vermont Division of Fish and Wildlife
Name and Title	Scott Darling, Wildlife Management Program Manager
Phone	802-786-3862
Email address	scott.darling@vermont.gov
Mailing Address	271 North Main Street Suite 215 Rutland, VT 05701

Agency Contact (Check area of responsibility: Flows__, Water Quality __, Fish/Wildlife Resources _**X**_, Watersheds __, T/E Spp. _**X**_, Cultural/Historic Resources __, Recreation __):	
Agency Name	Vermont Division of Fish and Wildlife
Name and Title	John Buck, Wildlife Biologist, Migratory Birds Biologist
Phone	802-476-0196
Email address	john.buck@vermont.gov
Mailing Address	5 Perry Street Suite 40 Barre, VT 05641

5.0 SWORN STATEMENT

Sworn Statement and Waiver Form

All applications for LIHI Certification must include the following sworn statement before they can be reviewed by LIHI:

SWORN STATEMENT

As an Authorized Representative of Green Mountain Power Corp., the Undersigned attests that the material presented in the Pierce Mills application is true and complete.

The Undersigned acknowledges that the primary goal of the Low Impact Hydropower Institute's Certification Program is public benefit, and that the LIHI Governing Board and its agents are not responsible for financial or other private consequences of its certification decisions.

The undersigned further acknowledges that if certification of the applying facility is issued, the LIHI Certification Mark License Agreement must be executed prior to marketing the electricity product as LIHI Certified.

The undersigned Applicant further agrees to hold the Low Impact Hydropower Institute, the Governing Board and its agents harmless for any decision rendered on this or other applications, from any consequences of disclosing or publishing any submitted certification application materials to the public, or on any other action pursuant to the Low Impact Hydropower Institute's Certification Program.

John C. Greenan

Company Name: Green Mountain Power Corp.

Authorize Representative Name: John C. Greenan Title: Engineer

State of Vermont

County of Rutland

On this, the 22nd day of November, 2017, before me a notary public, the undersigned officer, personally appeared John C. Greenan, known to me to be the person whose name is subscribed to the within instrument, and acknowledged that he executed the same for the purposes therein contained. In witness hereof, I hereunto set my hand and official seal.

Notary Public William J. Jakubowski
My Commission expires: Feb. 10, 2019

LIHI Handbook 2nd Edition – Sworn Statement and Waiver Form

6.0 REFERENCES

Al Jazeera America. 2016. Presumed Dead, Wild Atlantic Salmon Return to the Connecticut River. http://america.aljazeera.com/articles/2016/2/23/presumed-dead-wild-atlantic-salmon-return-to-connecticut-river.html. February 23, 2016.

NMFS. 1999. 1999 Biological report on the status of Atlantic salmon. Available at http://www.nmfs.noaa.gov/pr/pdfs/statusreviews/atlanticsalmon1999.pdf. Accessed November 29, 2017.

USFWS (U.S. Fish and Wildlife Service). 2016. National Wetlands Inventory. https://www.fws.gov/wetlands/Data/Mapper.html. Accessed October 6, 2016.

APPENDIX A

PROJECT ZOE AND PHOTOS

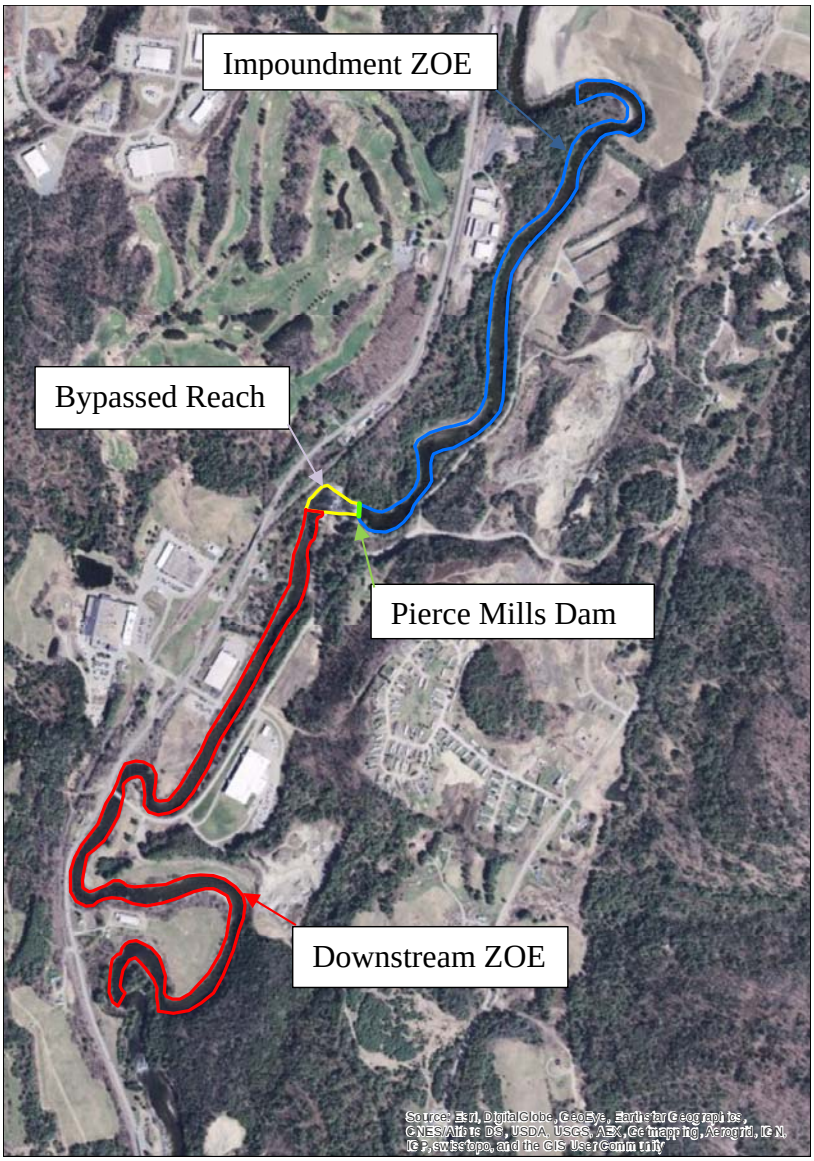


PHOTO 1 OVERVIEW OF PROJECT ZONES OF EFFECT

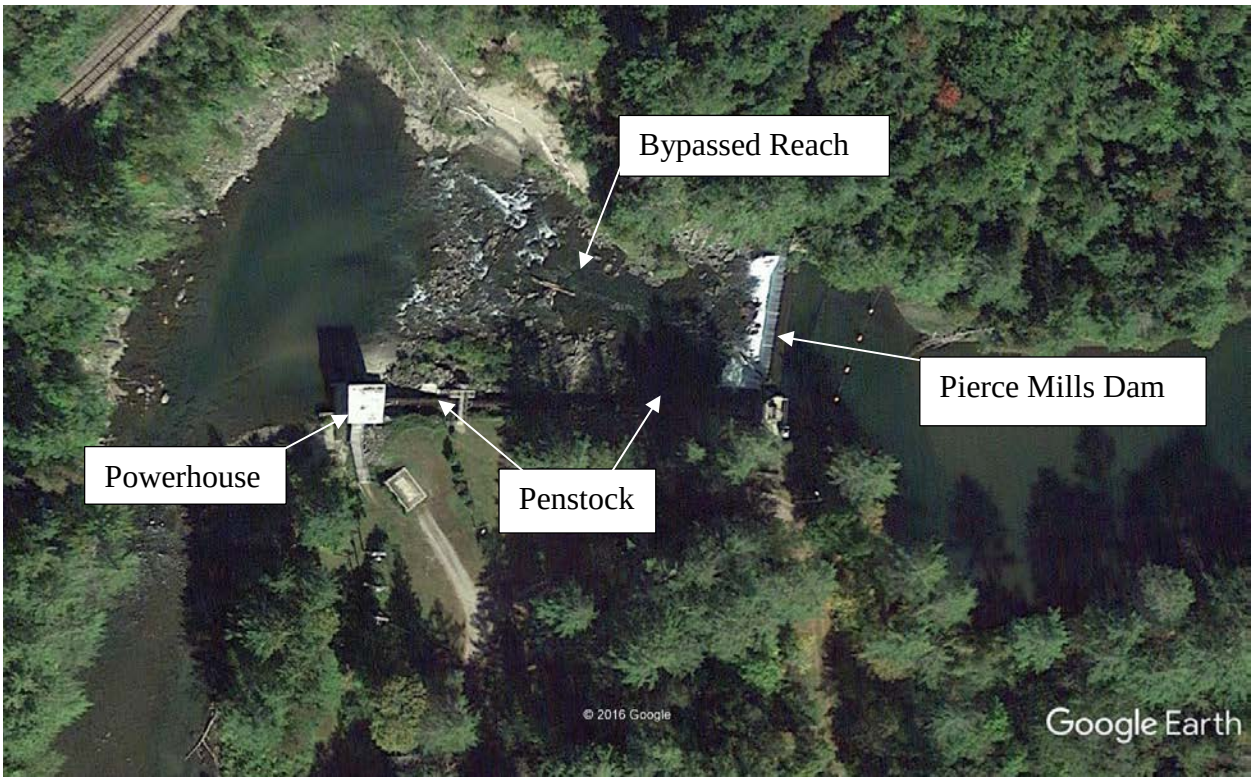


PHOTO 2 OVERVIEW OF PIERCE MILLS HYDROELECTRIC PROJECT

PHOTO 3 PIERCE MILLS DAM VIEW FROM DOWNSTREAM

PHOTO 4 PIERCE MILLS POWERHOUSE

PHOTO 5 **VIEW OF THE DOWNSTREAM FISH PASSAGE FACILITY ADJACENT TO THE INTAKE. THE DOWNSTREAM FISHWAY PROVIDES THE 88 CFS MINIMUM FLOW RELEASE YEAR-ROUND.**

PHOTO 6 **VIEW OF THE DOWNSTREAM FISH PASSAGE FACILITY AS SEEN FROM THE DECK OF THE INTAKE STRUCTURE**

PHOTO 7 **VIEW OF A WARNING SIGN ON THE RIGHT BANK OF THE RIVER ALERTING CANOEISTS OF THE DAM AHEAD AND DIRECTING BOATERS TO THE TAKE-OUT ON THE LEFT BANK**

PHOTO 8 **VIEW OF A WARNING SIGN ON THE LEFT BANK OF THE RIVER ALERTING CANOEISTS OF THE DAM AHEAD AND DENOTING THE CANOE/KAYAK TAKE-OUT**

PHOTO 9 NEW FACILITY PARKING AREA WITH INFORMATIONAL SIGNAGE

PHOTO 10 **VIEW OF A LOCKED SECURITY GATE PROHIBITING VEHICULAR ACCESS TO THE CANOE/KAYAK TAKE-OUT/PUT-IN LOCATION, UPSTREAM OF THE DAM AND INTAKE**

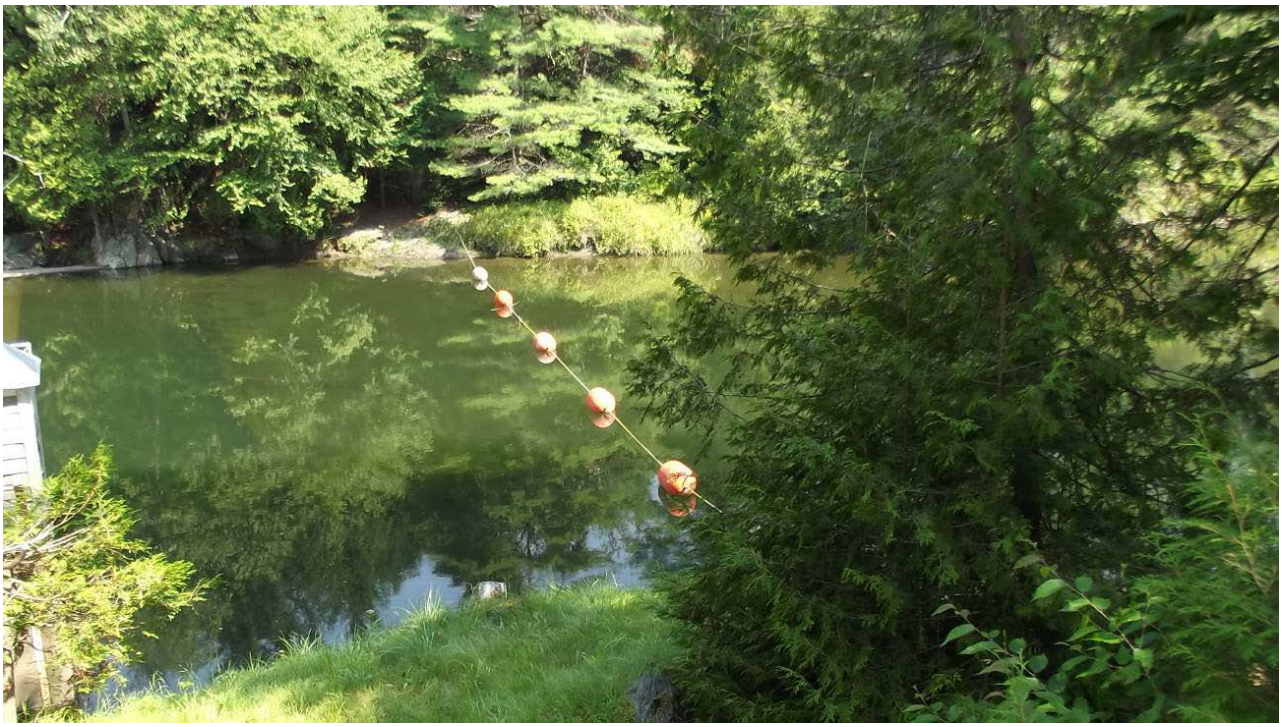


PHOTO 11 VIEW OF THE BOAT RESTRAINING BARRIER INSTALLED ACROSS THE RIVER, UPSTREAM OF THE DAM AND INTAKE

PHOTO 12 **VIEW OF THE LANDSCAPED GROUNDS WITH PLANTINGS TO SCREEN PROJECT STRUCTURES (I.E., POWERHOUSE, PENSTOCK, AND SUBSTATION). NOTE CONCRETE PICNIC TABLE IN SHADED AREA IN THE FOREGROUND.**

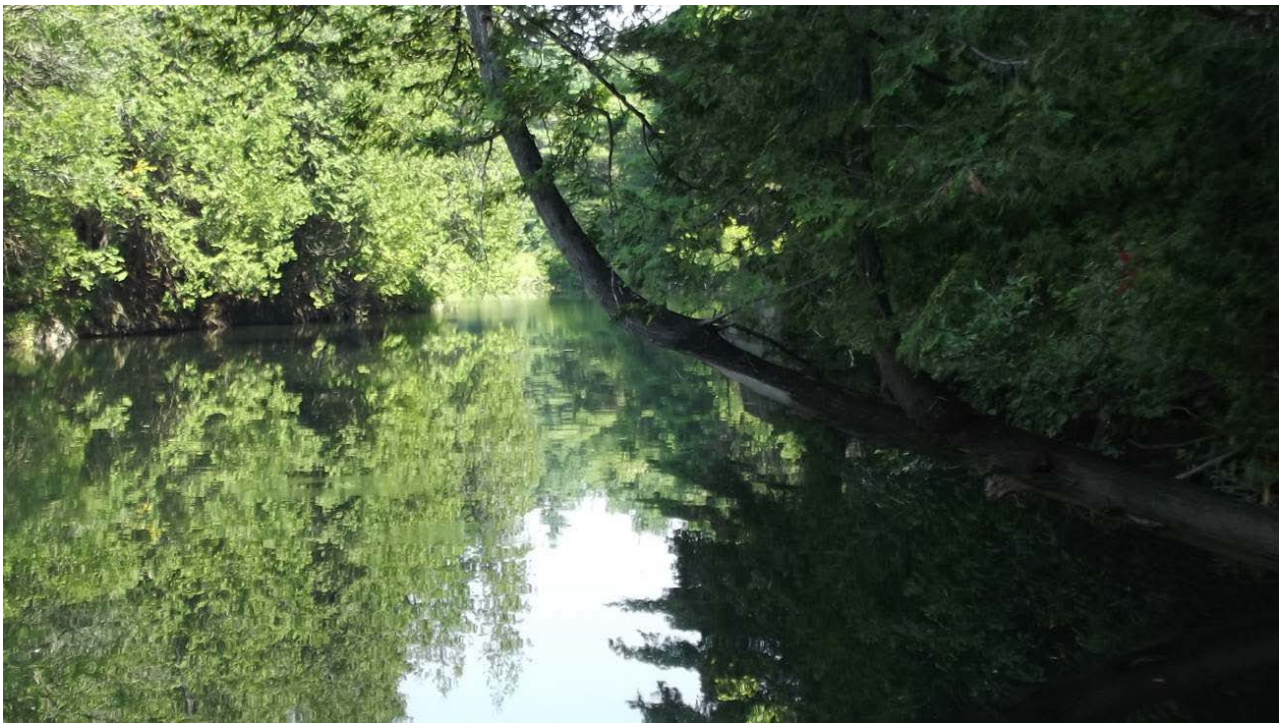


PHOTO 13 VIEW OF THE RIVER FROM THE CANOE/KAYAK TAKE-OUT/PUT-IN LOCATION, UPSTREAM OF THE DAM AND INTAKE

PHOTO 14 VIEW ALONG THE PORTAGE TRAIL. NOTE PORTAGE TRAIL IS WELL-GRADED FROM USE BY CANOEISTS/KAYAKERS AND MAINTENANCE BY GMP PERSONNEL.

PHOTO 15 VIEW OF TWO OF THE DIRECTIONAL SIGNS POSTED ALONG THE PORTAGE TRAIL

PHOTO 16 VIEW OF THE SANDY BEACH AREA FOR THE CANOE/KAYAK PUT-IN DOWNSTREAM OF THE POWERHOUSE

PHOTO 17 VIEW OF THE WOODEN PLATFORM OVER THE PENSTOCK FOR FISHING AND ACCESS TO THE RIVER

APPENDIX B

FACILITY AREA RIVER BASIN

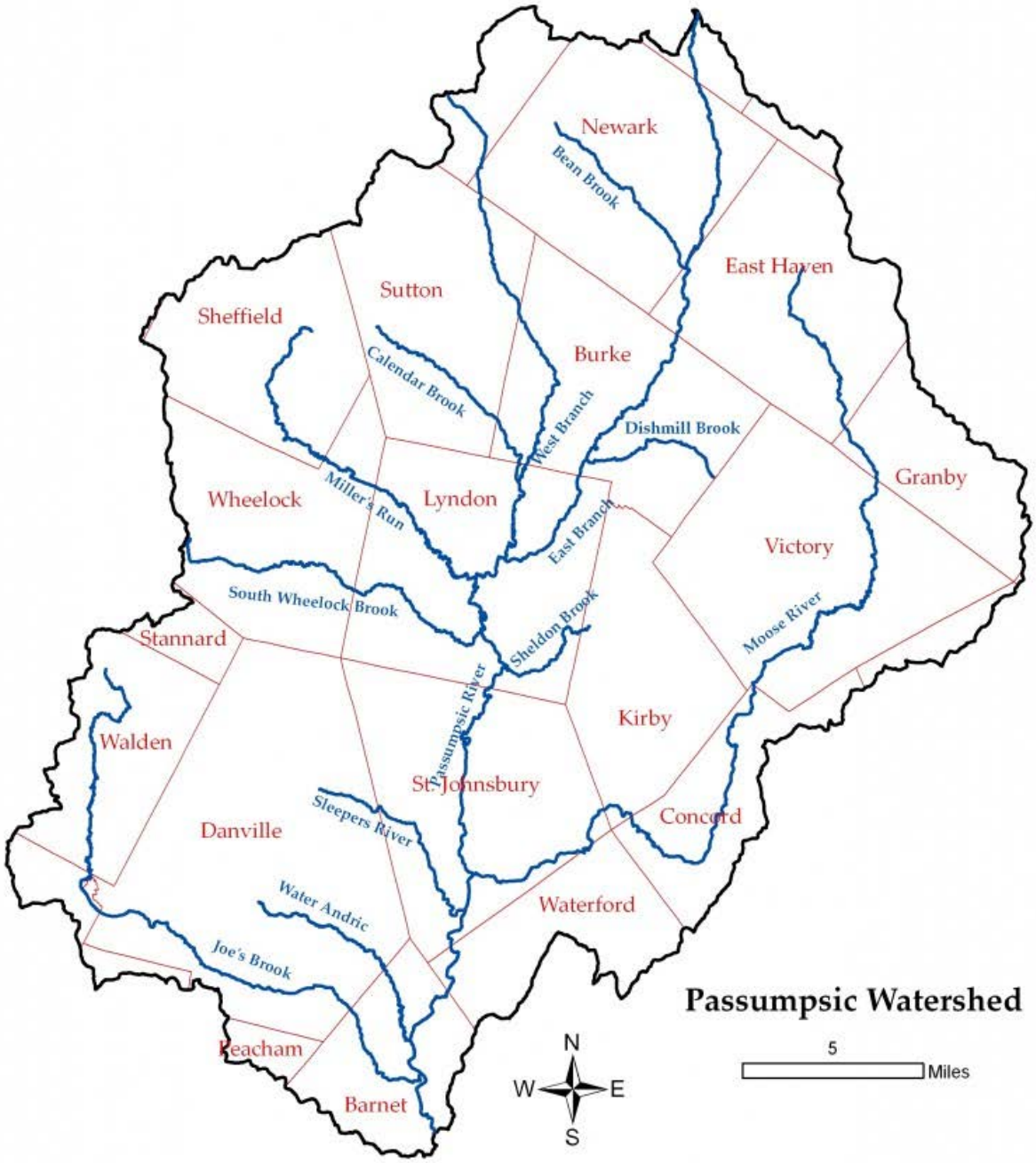


FIGURE 4 PASSUMPSIC RIVER BASIN

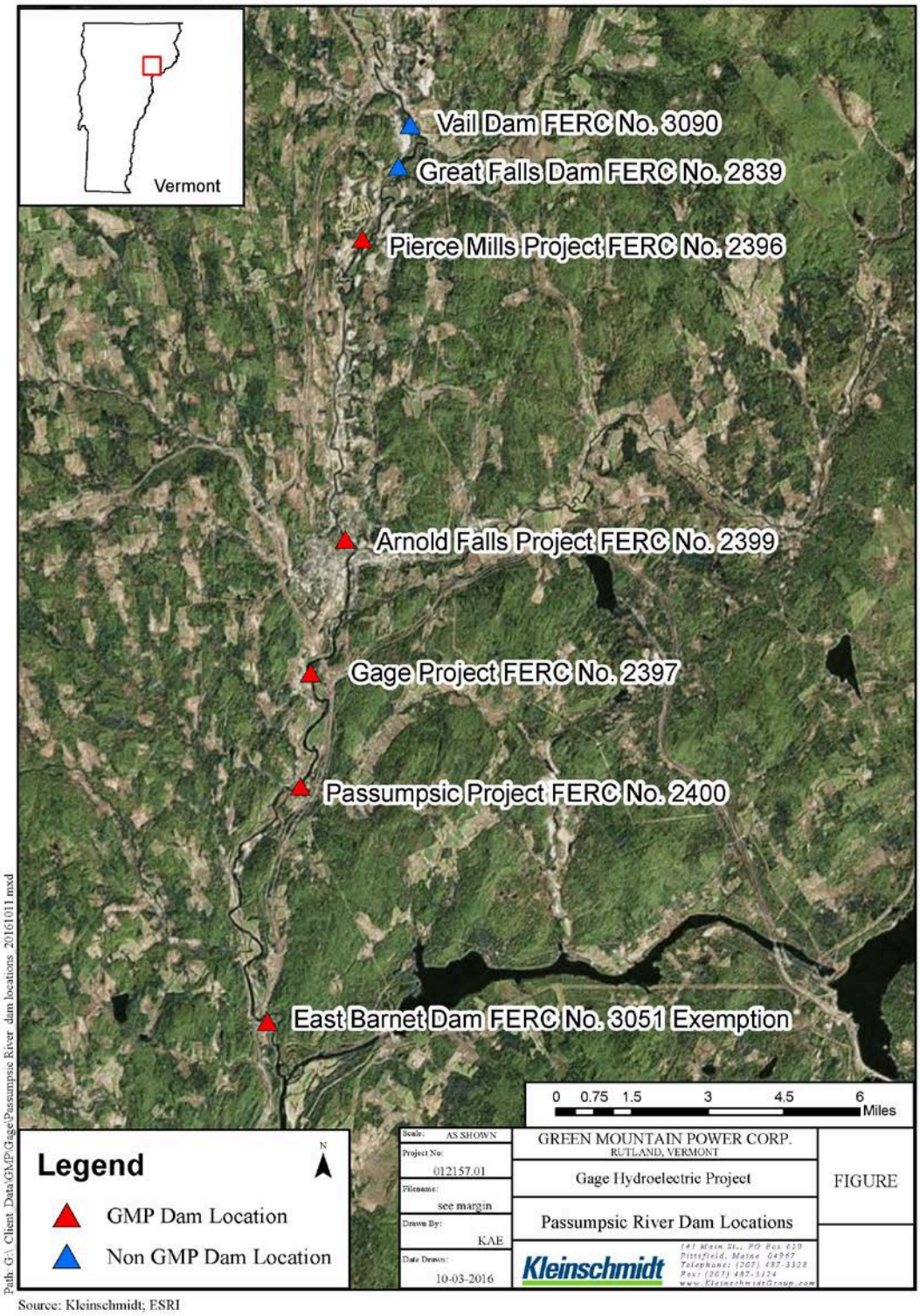


FIGURE 5 PASSUMPSIC RIVER DAM LOCATIONS

APPENDIX C

WATER QUALITY

Water Quality Certification
(P.L. 92-500, Section 401)

In the matter of: Central Vermont Public Service Corporation
77 Grove Street
Rutland, Vermont 05701

APPLICATION FOR PIERCE MILLS
HYDROELECTRIC PROJECT

The Water Quality Division of the Vermont Department of Environmental Conservation (the Department) has reviewed a water quality certification application filed by Central Vermont Public Service Corporation (the applicant) and dated June 21, 1993. This application has been supplemented by a copy of the Federal Energy Regulatory Commission (FERC) license application filed with the FERC on December 31, 1991; an October 1992 certification application; and subsequent submittals from the applicant, including a September 1993 FERC Additional Information Request (AIR) response to FERC. The Department held a public hearing on April 26, 1994 under the rules governing certification and received testimony during the hearing and, as written filings, until May 13, 1994; attached is a copy of the Department's responsiveness summary, which shall be incorporated into this certification as findings by reference. The Department, based on the application and record before it, makes the following findings and conclusions:

I. Background/General Setting

1. The applicant has applied to FERC for relicensure of the Pierce Mills Hydroelectric Project located at river mile 15.2 on the Passumpsic River in the Town of St. Johnsbury, two miles upstream of the village of St. Johnsbury Center.

2. The Passumpsic River drains 507 square miles of area, including the major portion of Caledonia County and minor portions of Essex, Orleans, and Washington Counties. The mainstem of the river begins at the confluence of the West and East branches just north of Lyndonville, and the river flows south to the Connecticut River in Barnet. The West Branch headwater is the south slope of Mt. Pisgah east of Lake Willoughby. The East Branch originates in Brighton, south of Island Pond. The topography of the basin is most rugged in the area of the eastern headwaters and less so in the western portion of the basin. The length of the mainstem is 22.6

miles with an approximate total fall of 230 feet. The average gradient is 13.8 feet per mile from Lyndonville to the river's mouth in the Town of Barnet.

3. Two of the major tributaries of the Passumpsic River, the Moose and Sleepers rivers, enter below the Pierce Mills Project. The applicant operates five projects in succession on the mainstem of the Passumpsic River. Pierce Mills is the most upstream facility of the five. Downriver of the project are the Arnold Falls, Gage, Passumpsic, and East Barnet projects. The Village of Lyndonville operates two facilities upstream of the applicant's projects; these facilities are located at Vail Dam and Great Falls Dam.

4. Half of the river length, or almost ten miles, is impounded from the head of the Vail Project to the Connecticut River. Of the 230-foot drop in the river from Vail to the Connecticut River, 81% is harnessed for electrical generation.

5. The headwaters of the Passumpsic comprise pristine streams that flow through wildland areas that are predominantly woodlands and wetlands with only sparse settlements. The village centers of Lyndonville and St. Johnsbury are located in the central part of the basin, along the mainstem, and are the commercial and industrial centers for village residents and the surrounding rural population. The lower portion of the basin is again rural with small villages such as Passumpsic and East Barnet along the main stem.

6. Prior to the November 3-4, 1927 flood, a hydroelectric plant, which had a 150 KV turbine/generator unit, was operated by Twin State Gas and Electric Company at the project site. After the 1927 flood, the present hydroelectric plant was constructed.

II. Project and Civil Works

7. The existing dam is a concrete gravity structure founded on rock. The rock face of the river channel serves as the right abutment. The intake structure forms the left abutment and is approximately 37 feet long. The spillway section which makes up the dam has a total length of 93 feet. The crest elevation is 603.5 feet. The dam is fitted with 1.5 feet of flashboards. The normal headwater elevation is 605.0 feet (msl), and the normal tailwater elevation is 586.7 feet (msl), providing a gross head of 18 feet.

8. The dam creates an impoundment with a surface area of 24.7 acres; a usable storage of 1,075,000 cubic feet; and a backwater influence of 8,500 feet.

9. Flashboards are always removed by winter ice and normally reinstalled in mid-May. Summer storm events cause flashboard failure, at most, once during the summer. Flashboards fail when surcharged by 1.5 to 2.0 feet of water. Reinstallation is normally scheduled for mid-May.

10. The maximum height of the dam above the foundation is approximately 18 feet. A trash rack with intermediate support beams is located between concrete training walls extending directly upstream from the penstock entrance. A manually operated, 10-foot wide by 10-foot high, bulkhead gate used to close off and dewater the penstock is located directly upstream from the penstock entrance. The penstock connecting the intake structure with the powerhouse is approximately 246 feet long and is supported by concrete cradles founded on rock. The steel constructed penstock is six feet in diameter.

11. The powerhouse contains a single S. Morgan Smith vertical Francis turbine with a 250 kw generating capacity. The average annual generation for the twenty year period through 1990 was 1,610,000 kwh. (applicant's response to FERC AIR No. 9) Except for routine monitoring, inspection and maintenance, the plant operates semi-automatically and unattended. The turbine's wicket gates and runner blades can be adjusted through use of a headwater float or by remote control from the applicant's dispatch center in Rutland.

12. A powerhouse substation is located south and approximately 35 feet upstream from the powerhouse. A 12.5 kv transmission line carries output from the facility to the Bay Street Substation in St. Johnsbury.

III. River Hydrology and Streamflow Regulation

13. The drainage area of the river at the dam is 237 square miles. Gaging stations have been operated by the U.S. Geological Survey on the mainstem below Passumpsic Dam since October 1928; on

the East Branch near East Haven from water years 1940 to 1979; and on the Moose River at St. Johnsbury from water years 1929 to 1984. The drainage area at these gages are 436 square miles, 53.8 square miles, and 128 square miles, respectively. Several of the flow parameters for the project have been estimated by Department staff based on gage data and are shown in the following table. All three gages were used in estimating these parameters. Some of the parameters may be influenced by the artificial flow regulation caused by upstream hydroelectric facilities.

Table 1. Hydrologic Parameters at Project.

Parameter	Value
Mean runoff	460 cfs (26.20 in/yr)
7Q10	61 cfs
95% Exceedance	86 cfs
50% Exceedance	240 cfs
10% Exceedance	895 cfs

14. The hydraulic capacity of the single turbine is 90 to 200 cfs.

15. Present operation of the project is as a daily peaking plant with a headpond drawdown from storage of 1.5 feet. Currently, when water is being placed in storage, the only flow downstream of the powerhouse is leakage and local drainage.

16. The project as described in the application will operate in a true run-of-the-river mode.[1]

17. Routine monitoring, inspection and maintenance will continue as in the past. The plant will operate in a semi-automatic and unattended mode.

---

[1]A true run-of-river project is one which does not operate out of storage and, therefore, does not artificially regulate streamflows below the project's tailrace. Outflow from the project is equal to inflow to the project's impoundment on an instantaneous basis. The flow regime below the project is essentially the river's natural regime, except in special circumstances, such as following the reinstallation of flashboards and project shutdowns. Under those circumstances, a change in storage contents is necessary, and outflow is reduced below inflow for a period.

18. The applicant proposes to maintain a bypass flow of 13 cfs. (Response to AIR No. 3 and pers. com. with John Mullen, February 9, 1994) To provide this flow, the applicant intends to adjust the project headwater sensors so that about 1.0 inch of water will spill at all times over the flashboards. The targeted minimum headwater elevation would be 605.08 feet. (AIR No. 9) The flow sensor will automatically and continually adjust the generator load so that the spillage is prerequisite to generation. As river flows diminish, the flow sensors will reduce generation slowly to keep the required amount of water spilling over the flashboards. As the flow continues to diminish, the flow sensors will remove the unit from the line and all water will spill over the dam.

19. The project automation (SCADA) system has an accuracy of ± 1.0 inch. To provide the applicant's targeted minimum headwater elevation, the SCADA system would have to be set to a level of 2.0 inches above the top of the flashboards, providing a spillage range of 1.0 inch to 3.0 inches. This would result in a variable bypass flow of about 7.5 cfs to 38 cfs, plus leakage.

20. To allow workers access for the reinstallation or repair of flashboards, the impoundment is drawn just below the crest using the plant turbine. When the work is complete, the plant discharge is reduced to refill the impoundment; the applicant proposes to release about half of inflows, or 100 cfs, downstream during the refill period of about four hours. In cases when the inflows are substantially less than 200 cfs, the refill time would become more extended.

21. A release of 100 cfs (0.42 csm) is less than the summer aquatic base flow of 0.5 csm and the spring aquatic base flow of 4.0 csm prescribed by the U.S. Fish and Wildlife Service Flow Recommendation Policy for the New England Area (USF&WS Flow Policy) and the Agency of Natural Resources Interim Procedure for Determining Acceptable Minimum Stream Flows, July 1993 (Agency Flow Procedure). Brook, brown and rainbow trout may spawn in the mainstem of the Passumpsic River below the project. The USF&WS Flow Policy and the Agency Flow Procedure prescribe 1.0 csm for the fall/winter period and 4.0 csm for the spring period to protect spawning and incubation.

22. The applicant has not proposed a method for maintaining bypass flows during flashboard replacement.

23. The project will not be cycled for audits nor for local emergency energy demands.

IV. Bypass

24. The river reach bypassed by the project is approximately 350 feet long. The bypass width varies but is at least 100 feet wide. The bypass contains a pool at the base of the dam connected to a larger pool above the tailrace by a steep-gradient riffle. When flows are sufficient, water that cascades through the riffle becomes highly entrained with air bubbles and then discharges into the lower pool with sufficient energy to provide strong currents. The project tailrace discharges into the lower pool near the pool's outlet. Given the orientation of the tailrace discharge, the existence of a depositional berm located on the upstream side of the tailrace, and the large size of the pool, very little in the way of circulation currents is created by the tailrace discharge.

25. Except for standing water in the pools, the bypass is virtually dewatered for much of the year by the present operating mode of the project, receiving only leakage from the dam and local drainage except during periods when flows spill at the dam. No dam leakage estimates have been made available.

26. The predominant substrate throughout the bypass is ledge, but the deep run section does have areas of sand and gravel substrates. The shallow run section has ledge, rock, boulder and cobble substrate. The riffle section has a moderate gradient and is characterized by small, shallow pocket pools in ledge substrate with scattered rock, boulder and cobble.

V. Standards Designation

27. The Passumpsic River in the project-affected reach is designated by the Water Resources Board as Class B waters. Above the project is the Lyndonville wastewater treatment facility discharge; the waste management zone for the municipal discharge extends from the upstream limits of the village of Lyndonville to the Great Falls Dam, which is located two miles upstream of Pierce Mills.

Below the project, EHV Weidman Industries is permitted for an industrial discharge with an average daily flow of 0.200 mgd.

The Board has designated the entire Passumpsic River as cold water fisheries habitat.

The lengths of waste management zones are being reviewed by the Department and will be reset based on rules to be promulgated by the Water Resources Board. The Agency plans to reset waste management zones for streams at the time discharge permits for treatment facilities located on those streams come up for renewal. The existing discharge permit for the Lyndonville facility is up for renewal in 1997.

28. Waste management zones, although Class B waters, present an increased level of health risk to contact recreational users due to the discharge of treated sanitary wastewater.

29. Class B stream reaches are managed to achieve and maintain a high level of quality compatible with certain beneficial values and uses. Values are high quality habitat for aquatic biota, fish and wildlife and a water quality that consistently exhibits good aesthetic value; uses are public water supply with filtration and disinfection, irrigation and other agricultural uses, swimming, and recreation. (Standards, Section 3-03)

30. The dissolved oxygen standards for cold water streams are 6 mg/l or 70 percent saturation unless higher concentrations are imposed for areas that serve as salmonid spawning or nursery areas important to the establishment or maintenance of the fishery resource. The temperature standard limits increases from background to 1.0°F. (Standards, Section 3-01 (B)) The turbidity standard is 10 ntu. (Standards, Section 3-01 (B)(5))

31. Under the general water quality criteria, all waters, except mixing zones, are managed to achieve, as in-stream conditions, aquatic habitat with "[n]o change from background conditions that would have an undue adverse effect on the composition of the aquatic biota, the physical or chemical nature of the substrate or the species composition or propagation of fishes." (Standards, Section 3-01(B)(5))

32. Section 2-02 Hydrology of the Vermont Water Quality Standards requires that "[the] flow of waters shall not be controlled or substantially influenced by man-made structures or devices in a manner that would result in an undue adverse effect on any existing use, beneficial value or use or result in a level of water quality that does not comply with these rules." The project dam is a man-made structure that artificially regulates streamflow.

VI. Water Quality - Water Chemistry

33. The Town of St. Johnsbury wastewater treatment facility, with a design capacity of 1.6 mgd has the largest discharge on the river. The discharge is about five miles below the project. The wastewater plant is at about 68% of its capacity, based on 1993 records.

34. The application includes a supplemental report for a 1991 water quality sampling and analysis done by Aquatec, Inc.. The report concludes that the project under the proposed configuration will not violate the minimum water quality standards for dissolved oxygen.

    Data for the 1991 study was collected from July 16-19. Of the 15 sampling sets for the three-day summer study, only two samples were less than 90% saturation; substantial algal influence was apparent, however, as two-thirds of the samples collected at Pierce Mills were supersaturated.

35. Aquatec's analysis of reaeration coefficients demonstrated a significant aeration efficiency for spillage at the Pierce Mills Dam. Spillage at Pierce Mills removed 75% of the dissolved oxygen deficit from saturation. (Diurnal Dissolved Oxygen and Temperature Study, Passumpsic River from St. Johnsbury Center to East Barnet, Vermont, July 16-19, 1991, September 1991, page 5)

VII. Water Quality - Aquatic Biota and Habitat

36. Aquatic biota are defined in Standards Section 1-01(B) as "organisms that spend all or part of their life cycle in or on the water." Included, for example, are fish, aquatic insects, amphibians, and some reptiles, such as turtles.

37. Wild and hatchery-origin brook, brown and rainbow trout occur in the Passumpsic basin. Vermont Department of Fish and Wildlife studies conducted in the early 1970's indicate the Passumpsic River drainage basin contained a higher percentage of brook trout than any other drainage basin studied throughout the state. The Department of Fish and Wildlife currently supplements natural populations by stocking one or more of the three species in reaches of the mainstem and tributaries. Also occurring in the Passumpsic basin are sucker and minnow species, sculpins, darters, yellow perch, sunfish species, and brown bullhead. The latter three are mostly found in mainstem impoundments.

Below Project

38. A free-flowing reach of about two miles exists between the project tailrace and the Arnold Falls impoundment.

39. Flows below the tailrace will essentially be unregulated. This proposed flow regime will optimize conditions for fish life downstream of the project powerhouse.

40. Artificial flow regulation below the tailrace is only anticipated to occur during impoundment refilling following flashboard reinstallation. The applicant proposes to release 100 cfs (0.42 csm) during the refill period.

Bypass

41. The Agency's management goal for the bypasses at the Passumpsic River projects is to establish and maintain cold water aquatic habitat, including deep aerated pools that are well circulated and serve as adult fish refugia, steeper gradient areas with high macroinvertebrate production, and fish spawning and nursery areas. (Comprehensive River Plan for the Passumpsic River Watershed, Vermont Department of Environmental Conservation, August 1992) The project bypass provides valuable habitat for juvenile Atlantic salmon, all life stages of resident salmonids (brown and rainbow trout) and a variety of non-game fishes.

42. Adequate flows through the two pools in the bypass would create quality habitat for adult brown and rainbow trout. Bypass flows

are necessary to provide pool currents for both pools. The lower pool provides habitat with deep, well-aerated water, thereby offering fish a refuge from summer water temperature extremes. This may be the only such refugia available to trout between the Arnold Falls and Pierce Mills dams.

43. The riffle reach is valuable as habitat for resident trout species and as nursery habitat for Atlantic salmon. This riffle contains a good variety of cobbles and boulders of varying sizes and appears to be of high quality for salmon rearing. In addition to these habitat roles and the aeration of water entering the lower pool, this riffle can provide habitat for invertebrate production. Since fish are anticipated to utilize the pools as temperature refugia, invertebrate production in the riffle reach may be important as a food source for fish utilizing the bypass.

44. During fall 1992 and summer 1993, the applicant, in consultation with the Agency and the U.S. Fish and Wildlife Service, conducted a study to determine how much habitat is available at alternate minimum bypass flows. The results of this study are presented in the applicant's response to FERC AIR No. 3 (September 1993). The study approach is patterned after the U.S. Fish and Wildlife Service Instream Flow Incremental Methodology, which quantifies physical habitat based on organism preference for certain conditions of stream depth, velocity, substrate, and cover.

45. The bypass, as described in this study, includes three separate habitat types in addition to pools: an approximately 100 foot long and 40 to 80 foot wide section of deep run (represented by study transect 1); an approximately 40 foot long and 45 foot wide section of shallow run (represented by study transect 2); and an approximately 100 foot long and 75 to 140 foot wide section of wide shallow riffle extending to the project tailrace (represented by study transects 3 and 4).

46. The original scope of the AIR No. 3 study was to conduct assessments of habitat for the Atlantic salmon juvenile and rainbow trout adult life stages at target flows of 8 cfs, 35 cfs, 63 cfs, 99 cfs, and 135 cfs.

47. The study transects were selected in September 1992 and initial data collection done in October 1992. By letter dated March 24,

1993, the Agency requested that flows be measured in the bypass using wading measurements where physically possible. Estimation of flow using the weir formula for dam spillage is imprecise and fails to account for leakage, which can be highly significant at dams.

48. The applicant indicated that it would be difficult to measure flows as requested by the Agency due to transect placement; irregular characteristics of the bypass; and the nature of the substrate with its outcrops and boulders. However, the applicant calibrated the weir equation using three flow measurements (71 cfs, 116 cfs, and 140 cfs) and then adjusted its estimates of study flows. The revised estimates are 13, 49, 88, 135, and 171 cfs.

49. Weighted usable area (WUA) was used as the measurement unit to describe the habitat/flow relationships for juvenile salmon and adult rainbow trout. WUA is expressed in units of square feet. The results are shown in the following table, with WUA combined for the three habitat types.

Table 2. Results of habitat study in bypass.

Flow (cfs)	Wetted Area (s.f.)	Habitat (s.f.)	
		Juvenile Salmon	Adult Rainbow Tr.
13	12,720	6,260	4,420
49	16,620	10,950	9,360
88	18,210	13,440	11,920
135	18,760	13,880	12,070
171	19,200	14,260	12,880

50. As shown in the above table, the habitat availability for both target organisms increases substantially when bypass flows are increased from 13 cfs to 88 cfs. In large part, this change is due to enhanced quality of the habitat; while the area of streambed wetted increases by 43%, the total habitat increases by 115% for juvenile salmon and 170% adult rainbow trout.

51. The applicant argues that, although bypass habitat can be substantially enhanced by increased minimum flows, the potential production or support of fish is not warranted by the cost in lost energy production. The applicant estimates that the salmon smolt production capability of the bypass would provide virtually no sea returns to the Connecticut River and that the production capacity for rainbow trout adults are only 13 fish for 49 cfs and 17 fish for 88 cfs. The applicant also states that competition between the trout and salmon would further limit the value of the bypass. Sea returns are low primarily due to the assumed marine mortality of 99.5%.

Impoundment

52. Fisheries habitat that was formerly riverine (lotic) has been transformed into lacustrine habitat due to the impounding of water by the dam. The quality of the impoundment as lacustrine habitat is marginal.

53. Major drawdowns below the dam crest can cause dewatering of the riparian-zone habitat. Fish and other aquatic organisms that use the impoundment would be subject to stranding or freezing when such major drawdowns occur.

Fish passage

54. A Strategic Plan for the Restoration of Atlantic Salmon to the Connecticut River Basin (1982) identified the Passumpsic River as potential non-natal smolt production habitat for stocking consideration at such time as the program's hatchery fry production capacity expanded to meet the needs of non-natal streams. The plan estimates that there are 6,000 units (one unit = 100 sq. yards) of salmon nursery habitat in the Passumpsic basin. However, subsequent to the 1982 restoration plan, the Department of Fish and Wildlife has revised the estimate of available habitat in the Passumpsic basin. The estimated total habitat is about 20,000 units, with about 41% of the habitat above Pierce Mills.

55. The Department of Fish and Wildlife stocked 15,000 age 0+ Atlantic salmon parr in the Moose River between St. Johnsbury to Concord in fall of 1991. The Moose River is a tributary of the Passumpsic River downstream of Pierce Mills and was selected for

salmon stocking because it has excellent physical habitat conditions and because its warmer-than-average temperature regime is very favorable for salmon development. Subsequently, parr have been stocked in both 1992 and 1993, and fry have been stocked in spring 1993 in the Moose River and in the East Branch, which is upstream of Pierce Mills. More extensive basin-wide stocking of fry is planned for spring of 1994.

56. Impingement of trout and salmon may not occur at Pierce Mills; however, the 1 3/4" bar spacing allows fish to pass through the rack and into the turbine. Prevention of entrainment is one of the principal objectives of downstream passage arrangements.

57. The applicant has agreed to provide downstream passage when and if the Passumpsic River becomes an integral part of the salmon restoration effort supported by a detailed plan documenting location of habitat units, an annual release schedule supported by hatchery capability, and a monitoring plan (license application, Page E-46). The restoration plan was last revised in September 1982 and is once again under revision.

58. Upstream fish passage for returning adult salmon is now provided up to the dam at Dodge Falls on the Connecticut River at East Ryegate (Dodge Falls Hydroelectric Project, FERC No. 8011). When a threshold number of returning adult salmon is reached at the now-operational fishway at Wilder Dam, construction of a passage facility (either a fish trap-and-truck facility or a fish ladder) at Dodge Falls will be triggered. Salmon will then have access to the Passumpsic River.

59. Upstream passage facilities are not needed as part of the current restoration plan, as the Passumpsic River is not targeted for natural reproduction of salmon. However, the status of all passage needs may be reviewed as part of the revision of the Strategic Plan or annual program (U.S. Fish and Wildlife Service) reviews. Expansion of and/or changes in the plans for the river may necessitate upstream passage facilities in the future. (U.S. Department of Interior letter to FERC, December 23, 1993)

VIII. Water Quality - Wildlife and Wetlands

60. Vermont Water Quality Standards requires the Agency Secretary to identify and protect existing uses of state waters. Existing uses to be considered include wetland habitats and wildlife that utilize the waterbody.

61. No Class I or Class II wetlands exist within the influence of the dam backwater zone. Institution of a run-of-the-river operating mode will protect any downstream wetlands that may exist and Class III wetlands present in the backwater zone.

62. A 0.7 acre remnant floodplain forest is on the outside of curve of the river on the left (east) bank upstream of the dam. Massive erosion and slumping of an embankment along a nearby town highway has filled in much of this depression and has compromised the floodplain characteristics of the site. The applicant does not anticipate that the proposed project will affect this remaining community. This area was likely inundated during high water events and spring flows, but with the erosional filling, the potential for flooding of the forest area has diminished. (AIR No. 5)

63. Wildlife that use the riparian zone and river will be better supported by the improved operating regime. Typical wildlife would include furbearers such as otter, beaver, muskrat, mink, and deer and birds such as kingfisher, herons, ducks, and osprey.

IX. Water Quality - Rare and Endangered Plants and Animals; Outstanding Natural Communities

64. A 1,000 square foot calcareous river-bank seep is located on the right (north) bank of the river below the dam and opposite the powerhouse. This seep location is outside the normal operation area of the project. Two minor component species, spikemoss (Selaginella apoda) and shining ladys tresses (Spiranthes lucida) occur here. The spikemoss is otherwise unknown from Caledonia County, and the ladys tresses is on the Vermont Heritage Program's watch list. As a natural community type, river-bank seeps such as the one found at the project are rare. With large, well developed seep communities, plant communities found within are generally unique compared to typical river-bank flora. A number of rare or uncommon species can be found at these sites. (Pers. comm. Chris Fichtel, Vermont Natural Heritage Program)

65. The applicant states that since the Pierce Mills project has historically operated in a mode that closely emulated run-of-river operation, the proposed true run-of-river operating mode will not affect this community; and that the site is protected from major river fluctuations for most of the year by the hydroelectric operation. (Response to AIR No. 5)

66. No endangered or threatened plants or animals are known to inhabit the project reach.

X. Water Quality - Shoreline Erosion and Impoundment Desilting

67. Shoreline erosion occurs along the margin of the impoundment at least in part as the result of elevated water levels in the impoundment. (Appendix F, FERC license application) The river banks within the impoundment area generally are stable with the exception of a scar possibly caused by a river meander 0.7 mile north of the Pierce Mills Station. Immediately below the dam on the left (south) bank, an eroded cutbank exists along the river shoreline. The applicant's archeological consultant considers this erosion to be moderate and judges it to be a natural phenomenon, unrelated to project operation. Use of this location as a canoe landing/recreational facility does not appear to be contributing to this erosion according to the consultant. The applicant's proposed operating mode will minimize the potential for new problems to develop in the future.

68. Impoundment desilting can result in significant degradation of water quality if not executed properly. The applicant states that desilting of the project's impoundment has never been required. Development of a desilting plan is, therefore, unnecessary at this time. Should the need to desilt arise in the future, the applicant should seek review by and approval from the Agency. This has been proposed by the applicant.

XI. Recreation and Aesthetics

69. The river in the project vicinity is popular for several recreational uses, including fishing, swimming, picnicking, boating, photography and viewing. (Comprehensive River Plan for the Passumpsic River Watershed and staff observations)

70. Observations by operating personnel indicate the site is used for fishing, primarily below the dam. Occasional picnickers and canoeists are seen during the summer.

71. Vermont Water Quality Standards require the protection of existing water uses, including the use of the water for recreation. The Standards also require the management of the waters of the State to improve and protect water quality in such manner that the beneficial values and uses associated with a water's classification are attained.

72. Beneficial values and uses of Class B waters include water that exhibits good aesthetic value and swimming and recreation. Section 2-02 of the Standards prohibits regulation of river flows in a manner that would result in an undue adverse effect on any existing use, beneficial value or use.

73. The river is a navigable and boatable water of the State.

74. As a result of extensive impounding by utility dams along the length of the Passumpsic River, flatwater boating opportunities are created that enable extension of the boating season well into low water periods when other rivers are not canoeable. Referencing the Appalachian Mountain Club River Guide - New Hampshire/Vermont, 2cd ed., 1989, the Passumpsic River has suffered in the past from industrial pollution and consequent bad press in earlier canoeing guides. It does have an excessive number of dams, but it is an attractive river in a rural area. The dams are easier to deal with at low water.

75. A canoe portage has been constructed at the project site. The take out is located on the left (south) bank upstream of the dam, and the portage uses a drive extension and a newly created path through the woods south of the substation to access the river below the dam.

76. Referencing the applicant's March 1991 Site Assessment concept proposal (Appendix G, license application), a proposed reconfiguration of the access drive and parking area will allow for screening of the substation while accommodating visitors as well as plantings to screen the substation. Proposed plantings will

screen the substation and the penstock to modify the view. In addition to the use of existing on-site plants, plantings will include privet, lilac, and forsythia. A play and picnic area is proposed near the substation for visitors and canoeists. Screened to mitigate impacts from the facility, this site allows for viewing the bypass and access to surrounding wooded areas. A proposed stile will allow access over the penstock to the river's edge.

77. Bank fishing areas will be provided near the portage take-out. Disabled visitors to the project will be enabled access to picnic and parking areas. Grades along walkways will not be in excess of 8% slope.

78. Recent vehicular vandalism (summer 1991) has resulted in the closing of a gate at the head of the project's entrance road. The applicant states that when recreational facilities are developed, the gate will either be moved towards the facilities with parking provided outside the gate, or the gate will be tended by an operator and closed every evening.

79. The adjacent lands and remote location of the project lends itself to an overnight camping area for canoeists. It most likely would be for camping near a put-in and not for an enroute camping site due to the close proximity of the other dams upstream. The applicant does not propose to provide overnight camping at this time, citing limited land ownership and a lack of personnel to administer such a facility.

80. The applicant proposes to develop and maintain its proposed recreational facilities. However, the applicant states that it will remove improved recreational facilities and may restrict open access if vandalism becomes a problem. Arbitrary removal of improved facilities and restriction of public access to the river would impair recreational use and enjoyment of the resource.

81. The project boundary is very limited, encompassing the project civil works, tailrace, dam, and the impoundment flowage.

82. The Pierce Mills project is located in a wooded area secluded from highway noise and development. The site is not readily visible from any public location off the property. The project is in a natural setting interrupted only by the hydroelectric facility. The

dam and powerhouse fit with the character of the area, and the site has been well maintained making it attractive to the visitor. The substation needs landscaping to soften its visual impact, but with care taken not to reduce or eliminate available views of the powerhouse.

83. Spillage over the dam is a key element in the project's aesthetics. Falling water has a strong visual appeal, and without sufficient spillage over the dam the site lacks context and its attractiveness suffers. The amount of spillage needs to be in scale with the size of the project. The applicant conducted a flow demonstration to document on video-cassette tape existing spillage conditions as well as with the proposed one inch spillage.

XII. Existing Uses

84. No existing uses, other than those discussed above, have been identified. Existing uses, as defined in the Standards, are provided special protection under the anti-degradation provisions of the Standards (Section 1-03 (B) Protection of Existing Uses).

XIII. Other Applicable State Laws

Vermont Endangered Species Law (Title 10, Sections 5401 to 5403)

85. The Vermont Endangered Species Law (Title 10, Sections 5401 to 5403) governs activities related to the protection of endangered and threatened species. Generally, a person shall not "take, possess or transport wildlife or plants that are members of an endangered or threatened species." Disturbance of an endangered plant is considered a taking. (Title 10, Section 4001)

86. The applicant states that since the Pierce Mills project has historically operated in a mode that closely emulated run-of-river operation, the proposed true run-of-river operating mode will not affect the calcareous river-bank seep community identified in Finding 64; and that for most of the year the site is protected from major river fluctuations by the hydroelectric operation. (AIR No. 5)

87. No endangered or threatened plants or animals are known to inhabit the project reach.

Agency Regulatory Powers over Fish and Wildlife

88. Under 10 V.S.A. Chapter 103, "[i]t is the policy of the state that the protection, propagation control, management and conservation of fish, wildlife and fur-bearing animals in this state is in the interest of the public welfare, and that safeguarding of this valuable resource for the people of the state requires constant and continual vigilance."

89. The water use as proposed, with the conditions imposed below, will be consistent with this state policy.

XIV. State Comprehensive River Plans

The Agency, pursuant to 10 V.S.A. Chapter 49, is mandated to create plans and policies by which Vermont's water resources are managed and uses of these resources are defined. These plans implement the Agency policy. The Agency must, under Chapter 49 and general principles of administrative law, act, when possible, consistently with these plans and policies.

Hydropower in Vermont, An Assessment of Environmental Problems and Opportunities

90. The Department's publication Hydropower in Vermont, An Assessment of Environmental Problems and Opportunities is a state comprehensive river plan. The hydropower study, which was initiated in 1982, indicated that hydroelectric development has a tremendous impact on Vermont streams. Artificial regulation of natural stream flows and the lack of adequate minimum flows at the sites were found to have reduced to a large extent the success of the state's initiatives to restore the beneficial values and uses for which the affected waters are managed.

Two specific recommendations of the plan are that minimum flow requirements be established for this project in order to improve the downstream fishery, water quality, and aesthetics, and that impoundment water levels be stabilized to protect upstream fisheries resources.

The project as proposed, and with the conditions imposed below, will be in compliance with the plan.

Passumpsic River Watershed Comprehensive River Plan

91. The Agency, with extensive public involvement, has completed a comprehensive river plan for the Passumpsic River Watershed. The plan, entitled Passumpsic River Watershed Comprehensive River Plan (August 1992) defines a balance of river uses and values including state hydropower management goals and actions. The state management goals and actions contained in the plan are derived from state law, written state policies, and the public interest as determined through a three-year public participation process. River basin citizens who participated in the planning process expressed as major issues of concern the restoration of the river's water quality and the fishery.

State hydropower management goals from this report include:

> Goal 1 Continue to use the Passumpsic River, Sleepers River, and Joes Brook for the generation of electricity and permit other legitimate commercial uses of river water but make these uses compatible with other river uses and values.
> Goal 2 Wherever possible, establish and maintain natural river flows to improve and maintain aquatic habitat, water quality, recreation, and aesthetics.
> Goal 3 Establish and maintain minimum flows in the bypass segments of the hydropower facilities to maintain water quality, aesthetic and recreational values, and aquatic habitat, including: deep-aerated pools that are well circulated and serve as adult fish refugia, steeper gradient areas with high macroinvertebrate production, and fish spawning and nursery areas, all of which are limited habitat types, especially in the mostly impounded waters of the Passumpsic River mainstem.
> Goal 4 Maintain riverbank stability and enhance river water clarity, aesthetics, and habitat for fish, wildlife, and other aquatic biota by minimizing river flow and pond height fluctuations.
> Goal 5 Enhance the ability of fish to negotiate passage of hydro dams. Create downstream passage facilities for resident trout species and Atlantic salmon smolts (from both natal and non-natal production). Create upstream passage facilities when sufficient numbers of adult salmon have returned to the Passumpsic River.
> Goal 9 Enhance the Passumpsic River's role in as recreation/tourism based economy, preserve historic and archeological resources, and restore the aesthetics and productivity of local rivers by permitting a continuous vegetation buffer to grow on and near the banks of the river and its tributaries.

> Goal 12 Enhance the desirability to live and conduct business in Lyndonville and St. Johnsbury by conserving and beautifying open spaces along the rivers as accessible recreational, cultural, scenic, and educational amenities in the urban corridor.
> Goal 13 Maintain existing boating runs, for car-top boats and create a Passumpsic River boating trail where boaters can portage around dams and put-in and take-out at hydroelectric facilities on the mainstem river.
> Goal 14 Increase watershed awareness and stewardship and local interest to maintain clean water, safe for swimming and compatible with other existing stream uses and values.

The project as proposed, and with the conditions imposed below, will be in compliance with the plan.

1988 Vermont Recreation Plan

92. The 1988 Vermont Recreation Plan (Department of Forests, Parks and Recreation), through extensive public involvement, identified water resources and access as top priority issues. The planning process disclosed that, while Vermonters and visitors focus much of their recreational activities on surface waters, growing loss of public visual and recreational access to those waters causes substantial concern to the users. The plan projects that access is "likely to become the critical river recreational issue of the 1990s." The need for development of portage trails and canoe access sites is cited as among the major issues relative to canoe trails in Vermont.

93. The Water Resources and Access Policy is:

> It is the policy of the State of Vermont to protect the quality of the rivers, streams, lakes, and ponds with scenic, recreational, and natural values and to increase efforts and programs that strive to balance competing uses. It is also the policy of the State of Vermont to provide improved public access through the acquisition and development of sites that meet the needs for a variety of water-based recreational opportunities.

94. Enhancement of access, and improved flow management would be compatible with this policy and balance competing uses of the river for recreation and hydropower. Nonassurance of access would exacerbate a critical state recreational problem.

95. Another priority issue identified in the Recreation Plan is the loss or mismanagement of scenic resources. The plan notes "[few] recreational activities in Vermont would be the same without the

visual resources of the landscape," and that protection of those resources is "necessary if the state is to remain a desirable place to live, work, and visit."

96. The Scenic Resources Protection and Enhancement Policy is:

> It is the policy of the State of Vermont to initiate and support programs that identify, enhance, plan for, and protect the scenic character and charm of Vermont.

97. Landscaping, provision of dam spillage, and maintenance of bypass and downstream flows will protect the scenic characteristics of the shoreline area and river.

Vermont Comprehensive Energy Plan

98. Pursuant to Executive Order No. 79 (1989), the Department of Public Service produced the Vermont Comprehensive Energy Plan, January 1991. This plan sets out an integrated strategy for controlling energy use and developing sources of energy. Several goals of the plan are to reduce global warming gases and acid rain precursors by 15% by the year 2000 through modified energy usage; to reduce by 20% by the year 2000 the per capita consumption of energy generated using non-renewable energy sources; and to maintain the affordability of energy.

99. Prescription of an appropriate minimum flow for the bypass is important to project economics. The applicant's response to AIR No. 11 (September 1993) provides the energy output losses for a range of minimum bypass flows from 8 to 135 cfs. A continuous special release of 13 cfs would reduce project output by about 70 mwh, or 4% of the average annual energy output, for the 30-year term of the federal license; a special release of 88 cfs year round, would result in about a 460 mwh, or 29%, reduction in output.

100. The loss of electrical power production associated with mitigation needed to meet water quality standards will have a negligible effect on overall power availability and rates.

The expected regional power surplus from the New England and New York power pools is 13,389 megawatts for winter 2002-2003. Because the facility would be operated in a base-load fashion (run-of-the-river), no operating reserve (storage function) is available. The applicant has large amounts of base-load power at its disposal.

(testimony of Robert Howland, Central Vermont Power's Manager of Power Supply, before the State Public Service Board in Docket No. 5171)

101. Continued availability of electricity generated by this renewable source, with proper environmental constraints in place, is consistent with the State energy plan.

XV. Analysis

Operations

Impoundment

102. The conversion of Pierce Mills to a run-of-the-river station will result in a more stable impoundment. Occasional loss or removal of flashboards will cause a lowering of the impoundment by 1.5 feet, but should not significantly impair the upstream aquatic biota in this riverine impoundment. Major drawdowns for construction or repair would have to be reviewed case specifically to insure protection of the upstream resource.

Bypassed reach

103. The Agency Procedure for Determining Acceptable Minimum Stream Flows (July 14, 1993) provides guidance to the Department in setting minimum stream flows at hydroelectric projects. With regard to project bypasses, the procedure states:

> Bypasses shall be analysed case-by-case. Generally, the Agency shall recommend bypass flows of at least 7Q10 in order to protect aquatic habitat and maintain dissolved oxygen concentration in the bypass and below the project. In assessing values, consideration shall be given to the length of the bypass; wildlife and fish habitat potential; the aesthetic and recreational values; the relative supply of the bypass resource values in the project area; the public demand for these resources; and any additional impacts of such flows upon citizens of the State of Vermont. Bypass flows shall be at least sufficient to maintain dissolved oxygen standards and wastewater assimilative capacity. Where there are exceptional values in need of restoration or protection, the general procedure shall be followed. In most cases, a portion or all of the bypass flows must be spilled over the crest of the dam to reoxygenate water, provide aquatic habitat at the base of the dam and assure aesthetics are maintained.

104. The applicant proposes to maintain a 13 cfs bypass release, which is only 21% of the 7Q10 drought flow condition (61 cfs, or 0.26 csm) at the project. This will have limited value for reaeration as it represents only a small fraction of the total flow of the river during operation. However, the project will be spilling all inflows during the period of greatest concern, providing full reaeration potential. The project's low-end capacity is 90 cfs, which with the applicant's proposed operating mode would require about 0.41 csm in order to operate.

105. There is no present need for a special bypass-flow release to meet dissolved oxygen standards downstream. However, algal respiration will become an important influence on dissolved oxygen levels as the St. Johnsbury wastewater plant loading increases in the future. Use of the dam spillage as a point source of reaeration may become necessary at some point in the future to maintain dissolved oxygen standards as wastewater loadings become more significant. However, the spillage required to serve aquatic habitat needs in the bypass is in excess of 7Q10, and will preclude the need to monitor water quality to assure that dissolved oxygen standards are met.

106. The Passumpsic River is heavily dammed and the large majority of its length is under impounded conditions. The bypasses represent a disproportionate amount of the high quality habitat for salmonids on the river mainstem. The Department considers the maintenance of habitat values within the bypasses as very important. The applicant's proposed bypass flow of 13 cfs would cause an undue adverse effect on the composition of the aquatic biota and the species composition and propagation of fish, and would not support Agency management goals for this reach.

107. A spillage flow in the bypass reach of 88 cfs, or instantaneous inflow, if less, would be sufficient to provide valuable habitat for juvenile Atlantic salmon, all life stages of resident salmonids (brown and rainbow trout) and for a variety of non-games fishes and provide habitat for macroinvertebrates.

108. Based on the video assessment completed by the applicant, the proposed spillage of 17 cfs (one inch) would be adequate to support good aesthetic value, a Class B management objective.

Higher flows as required for habitat support would further enhance conditions.

Below Project

109. The conversion of the project to a true run-of-river facility is expected to improve water quality below the project, as downstream flows will no longer be subject to artificial drought conditions and concomitant poor water quality. The project as proposed and with Department conditions below related to bypass flows and impoundment refilling will meet dissolved oxygen and temperature standards and the anti-degradation provisions of the water quality regulations.

110. Because natural river flows will be continuously available downstream, the impact of the project on concentrations or levels of the following parameters will not be significant:

Phosphorus
Nitrates
Settleable, floating or suspended solids
Oil, grease, and scum
Alkalinity
pH
Toxics
Turbidity
Escherichia coli
Color
Taste and odor

Flashboard Replacement

111. During special events when water must be placed in storage, the applicant proposes to release 100 cfs (0.42 csm) below the project. The USF&WS Flow Policy and the Agency Flow Procedure prescribe certain minimum flows for the perpetuation of indigenous fish species. The base flows are 4.0 csm for spring spawning and incubation, 1.0 for fall/winter spawning and incubation, and 0.5 csm for the remaining period and for cases where there is no use for spawning and incubation. When instantaneous inflows are less than these values, the inflow must be passed on an instantaneous basis. At the Pierce Mills Project,

these aquatic base flows are 948 cfs (4.0 csm), 237 cfs (1.0 csm), and 118 cfs (0.5 csm). Reduction of flows substantially below these minimums for the purpose of refilling the impoundment may imperil fish below the project. Mainstem spawning in the spring and fall is believed to occur downstream.

112. A continuous release of the U.S. Fish and Wildlife Service aquatic base flows or 90% of inflows, depending on inflow circumstances, will adequately protect downstream fish and other aquatic organisms during the occasional refill periods. During the fall, winter and spring periods, the aquatic base flows are higher than project capacity; flashboard replacement will only be possible during lower inflows. The 90% requirement would apply during these periods. For the summer period, the 90% requirement would apply to inflow conditions less than the 118 cfs standard.

Fish Passage

113. Operational passage facilities will be needed for outmigration in 1995 at Pierce Mills. Passage facilities should include structures or devices to safely convey fish downstream of the dam and may include screening to minimize entrainment and impingement and a conveyance conduit.

114. Adequate flows to operate these facilities will also be required. Passage facilities will also benefit resident trout species. Standard design for downstream passage facilities utilize operating flows equivalent to 2% of the plant hydraulic capacity, or the flow through a 3x2 foot rectangular weir, whichever is greater. For this project, the flow need would equate to about 20 to 25 cfs. It will be necessary to operate these facilities continuously during the periods April 1 through June 15 and September 15 through November 15. These periods are subject to adjustment based on knowledge gained about migration periods for salmon in the Connecticut River basin.

115. Changes to the salmon restoration plan may require the provision of upstream passage facilities within the term of the new license, although such facilities are not envisioned in the existing plan. The U.S. Fish and Wildlife Service has reserved a general passage prescription right under Section 18 of the Federal Power Act. (U.S. Department of Interior letter to FERC, December 23, 1993)

116. Any passage facilities at Pierce Mills Dam must be provided and operated consistent with the most current restoration plan.

Recreation

117. The existing portage and access, with the improvements proposed by the applicant will provide support of the recreation management objectives for Class B waters, as well as the use of the river at the project for fishing, boating, and other existing uses.

ACTION OF THE DEPARTMENT

Based on its review of the applicant's proposal and the above findings, the Department concludes that there is reasonable assurance that operation of this project as proposed by the applicant and in accordance with the following conditions will not cause a violation of Vermont Water Quality Standards and will be in compliance with sections 301, 302, 303, 306, and 307 of the Federal Clean Water Act, P.L. 92-500, as amended, and other appropriate requirements of state law:

A. The applicant shall operate and maintain this project as set forth in the findings of fact and conclusions above and these conditions.

B. Except as allowed in Condition D below, the facility shall be operated in a true run-of-the-river mode where instantaneous flows below the tailrace shall equal instantaneous inflow to the impoundment at all times. When the facility is not operating, all flows shall be spilled at the dam.

   The applicant shall, within 90 days of issuance of this certification, furnish a description, hydraulic design calculations, and plans for the measure to be used to maintain true run-of-river flows below the project tailrace.

C. When available from inflow, a minimum instantaneous flow of 88 cfs shall be released at the dam at all times. If the instantaneous inflow falls below the hydraulic capacity of the turbine unit plus this spillage requirement, all flows shall be spilled at the dam. Within 90 days of the issuance of this certification, the applicant shall furnish a description, hydraulic design calculations, and plans for the measure to be used to pass this minimum flow. The filing shall address conditions with and without flashboards in place, including conditions when the impoundment is drawn for flashboard replacement and subsequent refilling.

D. Following the reinstallation of flashboards or an approved special maintenance operation necessitating a drawdown, the impoundment shall be refilled by reducing downstream flows, but to no less than 118 cfs from June 1 to September 30. During the periods October 1 to March 31 and April 1 to May 31 or under circumstances during the summer period when the natural inflow to the project is insufficient to permit both passage of 118 cfs and refilling of the impoundment, the impoundment shall be refilled while releasing 90% of instantaneous inflow downstream at all times.

E. The applicant shall file for review and approval, within 90 days of the issuance of this certification, a plan for monitoring instantaneous flow releases at the project, both in the bypass and below the tailrace. Following approval of the monitoring plan, the applicant shall then measure instantaneous flows and provide records of discharges at the project on a regular basis as per specifications of the Department. Upon receiving a written request from the applicant, the Department may waive, all or in part, this requirement for flow monitoring at this project provided the applicant satisfactorily demonstrates that the required flow will be discharged at all times.

F. Within six months of the issuance date of the license, the applicant shall submit a plan for downstream fish passage to the Department of Fish and Wildlife for review and written approval. Downstream passage shall be provided April 1 - June 15 and September 15 - November 15 and shall be functional with and without flashboards in place, with the period subject to adjustment by the Department based on knowledge gained about migration periods for migratory salmonids. The approved plan shall be fully implemented within two years of license issuance and shall include provisions to:

1. minimize passage of fish into the generating unit(s);

2. minimize impingement of fish on trashracks or on devices or structures used to prevent entrainment; and

3. convey fish safely and effectively downstream of the project, including flows as necessary to operate conveyance facilities.

The plan shall include an implementation/construction schedule and a proposal for an interim fish bypass method for use until permanent facilities are completed; the interim method shall be utilized beginning with the spring 1995 passage period. The U.S. Fish and Wildlife Service and the Department of Fish and Wildlife shall be consulted during plan development. The plan shall include an erosion control and water management plan designed to assure compliance with water quality standards during construction

G. Within two years of a written request by the Agency, the applicant shall provide for upstream fish passage, subject to plan approval by the Department of Fish and Wildlife. The U.S. Fish and Wildlife Service and

the Department of Fish and Wildlife shall be consulted during plan development. The plan shall include an erosion control and water management plan designed to assure compliance with water quality standards during construction.

H. The applicant shall provide the Department with a copy of the turbine rating curves, accurately depicting the flow/production relationship, for the record within one year of the issuance of this certification.

I. Within 90 days of the issuance of this certification, the applicant shall submit a plan for proper disposal of debris associated with project operation, including trashrack debris, for written approval by the Department. The plan shall include the method used for flashboard construction, including materials used and means of sealing to prevent leakage. The plan shall be designed to prevent or minimize the discharge of debris or trash downstream.

J. Any proposals for project maintenance or repair work involving the river, including desilting of the dam impoundment, impoundment drawdowns to facilitate repair/maintenance work, and tailrace dredging, shall be filed with the Department for prior review and approval.

K. The applicant shall maintain the portage in good, useable condition.

L. The applicant shall allow continued public access to the river for utilization of the public resources, subject to reasonable safety and liability limitations. Any proposed limitations of access to State waters to be imposed by the applicant shall first be subject to written approval by the Department.

M. The applicant shall allow the Department to inspect the project area at any time to monitor compliance with certification conditions.

N. A copy of this certification shall be prominently posted within the facility.

O. Any change to the project that would have a significant or material effect on the findings, conclusions, or conditions of this certification, including project operation, must be submitted to the Department for prior review and written approval.

P. The Department may request, at any time, that FERC reopen the license to consider modifications to the license necessary to assure compliance with Vermont Water Quality Standards.

/s/
Barbara Ripley
Secretary
Agency of Natural Resources

Dated at Waterbury, Vermont this 16th day of June, 1994.

cc: distribution list

From:	Davis, Eric
To:	Katie Sellers
Subject:	RE: Pierce Mills Hydroelectric Project - Review for LIHI Re-Certification
Date:	Wednesday, December 07, 2016 4:03:35 PM
Attachments:	image002.png

Hi Katie,

I've reviewed our listings for the Passumpsic River in the vicinity of the Pierce Mills project. While it is at the top of the impaired reach, the impairment and cause of the impairment are the same as the downstream Passumpsic projects.

The Passumpsic River from Tremont Street in St. Johnsbury and downstream of the Pierce Mills project are listed on Vermont's 303 (d) List of Impaired Waters: Part A – Impaired Surface Waters in need of a TMDL. The pollutant causing the impairment is E. Coli due to the St. Johnsbury wastewater treatment plant passing combined sewer overflows.

I can confirm that the current operations of the Pierce Mills project continue to not be a contributing cause of the river's impairment.

Eric

Eric Davis, *River Ecologist*

1 National Life Drive, Main 2
Montpelier, VT 05620-3522
802-490-6180 / eric.davis@vermont.gov
http://www.watershedmanagement.vt.gov/rivers
(Please note my new e-mail address, effective July 27, 2015)

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION
RIVERS PROGRAM

See what we're up to on our Blog, Flow.

From: Katie Sellers [mailto:Katie.Sellers@KleinschmidtGroup.com]
Sent: Wednesday, November 30, 2016 3:49 PM
To: Davis, Eric <Eric.Davis@vermont.gov>
Subject: Pierce Mills Hydroelectric Project - Review for LIHI Re-Certification

Hi Eric,
I am working on another LIHI re-certification application for Green Mountain Power: Pierce Mills Hydroelectric Project (FERC No. 2396) located on the Passumpsic River.

The LIHI application asks that we gain your feedback on the following water quality information:

The Passumpsic River in the project reach is designated by the Water Resources Board as Class B

waters. Review of the 2014 Clean Water Act Section 303(d) List of Impaired Waters issued by the Vermont Agency of Natural Resources, Division of Water Quality identified the portion of the Passumpsic River from the Pierce Mills Project (upstream of Pierce Mills) through a five-mile stretch downstream of the Passumpsic Project as "impaired". As described within the 2012 U.S. Environmental Protection Agency Waterbody Quality Assessment Report, the probable cause contributing to the this section of the Passumpsic River's impairment for reporting year 2012 is combined sewer overflows. The Town of St. Johnsbury wastewater treatment facility is located about five files below the Project and has a design capacity of 1.6 mgd; the largest discharge on the river. Above the Project is the Lyndonville wastewater treatment facility discharge; the waste management zone for the municipal discharge extends from the upstream limits of the village of Lyndonville to the Great Falls Dam, which is located two miles upstream of Pierce Mills

Could you please confirm, to your best abilities, that the Project's current operations continue to not be a contributing cause to the river's water quality limitations?

When you have a moment to review, could you please provide us with your feedback on this topic?

Thank you!

Katie

Katie Sellers
Regulatory Coordinator
Kleinschmidt
Office: 207-416-1218
www.KleinschmidtGroup.com

From:	Katie Sellers
To:	"Davis, Eric"
Cc:	Andy Qua; "Greenan, John"
Subject:	Pierce Mills, Arnold Falls, Gage Projects - Operations Data Submissions for LIHI
Date:	Thursday, March 29, 2018 11:36:00 AM
Attachments:	Estimated Plant Curves_Gage, Arnold Falls, Pierce Mills.pdf

This message contains attachments delivered via ShareFile.

- 2015-2016 Arnold Falls Operations Data_FINAL.xlsx (26.5 MB)
- 2015-2016 Gage Operations Data_FINAL.xlsx (24.5 MB)
- 2015-2016 Pierce Mills Operations Data_FINAL.xlsx (28.3 MB)

Download the attachments by clicking here.

Hi Eric,

In response to your request for additional information regarding Low Impact Hydropower Institute (LIHI) Certification review for the Pierce Mills Hydroelectric Project (FERC No. 2396), Arnold Falls Hydroelectric Project (FERC No. 2399), and Gage Hydroelectric Project (FERC No. 2397), Kleinschmidt, on behalf of Green Mountain Power Corporation, herein provides one year (2015-2016) of operations data for each project.

The attached 2015-2016 data depicts project generation, headpond level, river flow, and flashboard data to display operations occurring at the Pierce Mills Project, Arnold Falls Project, and Gage Project. As depicted in attachment cover pages, flow data was either obtained or prorated from USGS gage 01135500 – Passumpsic River at Passumpsic, VT. Strict run-of-river operations are represented well across data sets. Fluctuations in headpond levels shown correlate to changes in river flow and are generally not products of operations. For example, an incident of low pond level that occurred at the Gage Project in February 2016 was a product of an extreme high flow event and the net result of losing all flashboards at once.

In addition, please find theoretical turbine rating curves attached for each project. These theoretical curves were developed using a combination of the attached operations data and standard factory information on individual turbines. These theoretical curves have an accuracy range of approximately +5% to -10%.

Please note that the attached operational data is considered provisional by GMP, but has been vetted with operations staff to identify any likely causes of anomalies. Should you have any questions upon review, please do not hesitate to make contact with John Greenan or myself, as GMP staff are available to provide background information or further explanation as needed.

Thank you,
Katie

*To access ShareFile documents, select the “clicking here” link, fill in your name, email, and organization name when prompted (no passwords required). You will then be allowed to download the documents.

Katie E. Sellers, M.S.
Regulatory Coordinator
Kleinschmidt
Office: 207-416-1218
www.KleinschmidtGroup.com
*Providing **practical** solutions for **complex** problems affecting energy, water, and the environment*

APPENDIX D

FISH PASSAGE

From:	Katie Sellers
To:	"Towler, Brett"; "Grader, Melissa"
Cc:	"Greenan, John (John.Greenan@greenmountainpower.com)"; "Chaloux, Frank"; "Kirn, Rich"; "Davis, Eric"; "Kratzer, Jud"
Subject:	RE: Fish Passage Reviews for Gage, Arnold Falls, Pierce Mills - LIHI
Date:	Thursday, May 25, 2017 11:32:00 AM
Attachments:	image005.png

Hi Brett – Want to follow-up on this LIHI review for Gage, Arnold Falls, and Pierce Mills facilities. I have also looped Melissa in on this chain as I understand now that she is the preferred contact for LIHI reviews (if she hasn't already been looped into this).

Please let us know if you have any questions regarding USFWS feedback.

Best
Katie

Katie E. Sellers, M.S.
Regulatory Coordinator
Kleinschmidt
Office: 207-416-1218
www.KleinschmidtGroup.com
*Providing **practical** solutions for **complex** problems affecting energy, water, and the environment*

From: Katie Sellers
Sent: Friday, April 14, 2017 4:45 PM
To: 'Kratzer, Jud' <Jud.Kratzer@vermont.gov>; Towler, Brett <brett_towler@fws.gov>
Cc: Greenan, John (John.Greenan@greenmountainpower.com) <John.Greenan@greenmountainpower.com>; Chaloux, Frank <Frank.Chaloux@greenmountainpower.com>; Kirn, Rich <Rich.Kirn@vermont.gov>; Davis, Eric <Eric.Davis@vermont.gov>
Subject: RE: Fish Passage Reviews for Gage, Arnold Falls, Pierce Mills - LIHI

Hi Jud – Thank you for all of the research that went into providing this feedback – much appreciated.

Best,
Katie

Katie E. Sellers, M.S.
Regulatory Coordinator
Kleinschmidt
Office: 207-416-1218
www.KleinschmidtGroup.com
*Providing **practical** solutions for **complex** problems affecting energy, water, and the environment*

From: Kratzer, Jud [mailto:Jud.Kratzer@vermont.gov]
Sent: Thursday, March 16, 2017 10:41 AM
To: Katie Sellers <Katie.Sellers@KleinschmidtGroup.com>; Towler, Brett <brett_towler@fws.gov>
Cc: Greenan, John (John.Greenan@greenmountainpower.com) <John.Greenan@greenmountainpower.com>; Chaloux, Frank <Frank.Chaloux@greenmountainpower.com>; Kirn, Rich <Rich.Kirn@vermont.gov>; Davis, Eric <Eric.Davis@vermont.gov>
Subject: RE: Fish Passage Reviews for Gage, Arnold Falls, Pierce Mills - LIHI

Hello Katie,

I felt a bit inadequate to address your latest inquiry, so I spoke to retired fisheries biologist, Len Gerardi. Regarding the effectiveness of downstream fish passage at these three projects, Len said that it was never evaluated for Atlantic salmon smolts or resident species. He did mention that there had been some problems with downstream passage at the Gage Dam. He worked with GMP (CVPS at the time, I believe) to address this issue, and the situation apparently improved.

Len had little information for me regarding compliance and suggested that I contact Eric Davis and Jeff Crocker (VTDEC). They didn't have any information either, so they reached out to USFWS. I have not met Brett, but perhaps he will be your best source of information on compliance.

American eel passage would not be required at these three dams within the next five years.

Thanks,
Jud

VERMONT
Jud Kratzer
Fisheries Biologist
Vermont Fish and Wildlife Department
374 Emerson Falls Rd., Suite 4
St. Johnsbury, VT 05819
[phone] 802-751-0486
[website] www.vermontfishandwildlife.com

From: Katie Sellers [mailto:Katie.Sellers@KleinschmidtGroup.com]
Sent: Wednesday, March 08, 2017 7:58 AM
To: Towler, Brett <brett_towler@fws.gov>; Kratzer, Jud <Jud.Kratzer@vermont.gov>
Cc: Greenan, John (John.Greenan@greenmountainpower.com) <John.Greenan@greenmountainpower.com>; Chaloux, Frank <Frank.Chaloux@greenmountainpower.com>
Subject: Fish Passage Reviews for Gage, Arnold Falls, Pierce Mills - LIHI

Good Morning Jud and Brett,

As I know you are well aware of Jud, GMP is currently consulting with the Low Impact Hydropower Institute (LIHI) for re-certification of the Pierce Mills Project (FERC No. 2396), Arnold Falls Project (FERC No. 2399), and Gage Project (FERC No. 2397). LIHI has taken an initial review of the certification applications submitted for these projects and has asked that we further consult with both of you on the topic of fish passage.

Per LIHI recommendations, we are hoping that you might be able to provide input on the following two items: a) confirm effectiveness and compliance of downstream fish passage facilities located at Pierce Mills, Arnold Falls, and Gage; and b) confirm that American eel passage will not be required at Pierce Mills, Arnold Falls, or Gage during the next LIHI Certification term (approximate next 5-years).

Do let us know if you have any follow-up questions regarding these reviews.

Thank you,
Katie

Katie Sellers
Regulatory Coordinator
Kleinschmidt
Office: 207-416-1218
www.KleinschmidtGroup.com

APPENDIX E

THREATENED AND ENDANGERED SPECIES

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 COMMERCIAL STREET, SUITE 300
CONCORD, NH 03301
PHONE: (603)223-2541 FAX: (603)223-0104
URL: www.fws.gov/newengland

Consultation Code: 05E1NE00-2017-SLI-0027 October 06, 2016
Event Code: 05E1NE00-2017-E-00033
Project Name: Pierce Mills Hydroelectric Project

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Pierce Mills Hydroelectric Project

Official Species List

Provided by:

New England Ecological Services Field Office
70 COMMERCIAL STREET, SUITE 300
CONCORD, NH 03301
(603) 223-2541
http://www.fws.gov/newengland

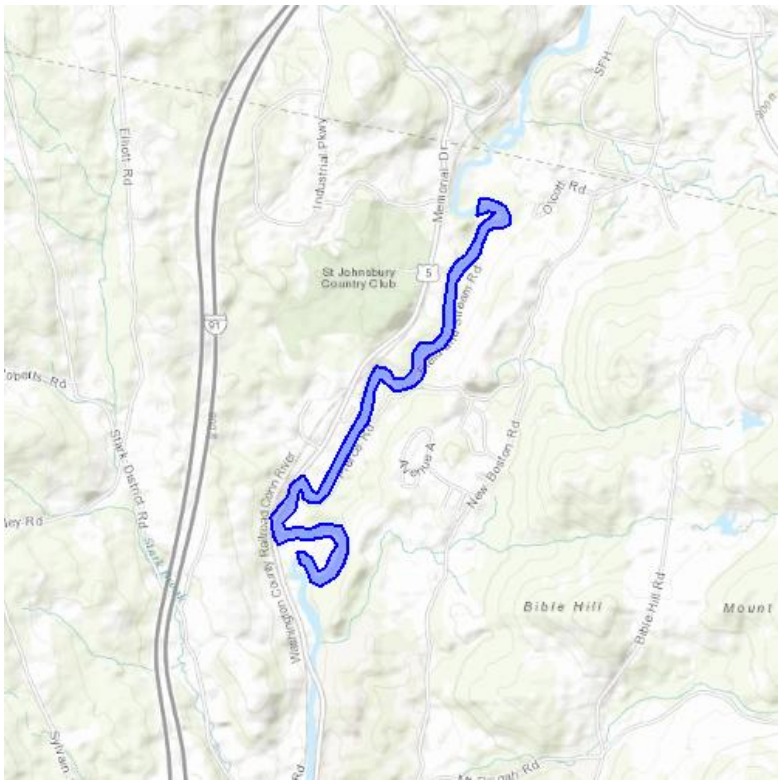
Consultation Code: 05E1NE00-2017-SLI-0027
Event Code: 05E1NE00-2017-E-00033

Project Type: DAM

Project Name: Pierce Mills Hydroelectric Project
Project Description: LIHI re-certification

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

Project Location Map:



Project Coordinates: The coordinates are too numerous to display here.

Project Counties: Caledonia, VT

Endangered Species Act Species List

There are a total of 1 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Mammals	Status	Has Critical Habitat	Condition(s)
Northern long-eared Bat *(Myotis septentrionalis)* Population: Wherever found	Threatened		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

From:	Buck, John
To:	Katie Sellers; Kratzer, Jud
Cc:	Darling, Scott
Subject:	RE: Pierce Mills Dam - Species Review for LIHI Application
Date:	Thursday, December 01, 2016 2:39:18 PM
Attachments:	image002.png

Hello Katie,
With run of river and no cutting the only restriction I could foresee is if an eagle pair decided to build or attempt to build a nest in close proximity to the dam prior to construction. We will be monitoring for them so you would have plenty of advance notice should nest construction actually happen.
Thanks,
John

John M. Buck, Wildlife Biologist

Nongame Bird Project Leader
Vermont Fish and Wildlife Department
5 Perry St., Suite 40
Barre, Vermont 05641

john.buck@Vermont.gov
Desk-802-476-0196
Office-802-476-0199

From: Katie Sellers [mailto:Katie.Sellers@KleinschmidtGroup.com]
Sent: Wednesday, November 30, 2016 4:25 PM
To: Kratzer, Jud <Jud.Kratzer@vermont.gov>
Cc: Darling, Scott <Scott.Darling@vermont.gov>; Buck, John <John.Buck@vermont.gov>
Subject: Pierce Mills Dam - Species Review for LIHI Application

Hi Jud, Scott, and John,
I have another LIHI application in need of threatened and endangered species review. This is for the Pierce Mills Project (FERC No. 2396) a run-of-river project located on the Passumpsic River.

Upon reviewing the USFWS IPAC Report and FERC's 1994 Environmental Assessment for this Project, I developed a list of potential threatened and endangered species that may occur within this project area. Could you a) review the below species list to make sure it is accurate and/or suggest updates as appropriate; and b) review this list to confirm that the Project continues to not negatively affect any of the currently listed species that may occur within the Project area?

Species List:
Northern Long-eared Bat (state endangered)
Bald Eagle (state endangered)

No changes to the project or tree cutting are planned at this time. Do let me know if you have any follow-up questions.

Thank you!
Katie

Katie Sellers
Regulatory Coordinator
Kleinschmidt
Office: 207-416-1218
www.KleinschmidtGroup.com

From: Darling, Scott
To: Katie Sellers
Subject: RE: Pierce Mills Dam - Species Review for LIHI Application
Date: Friday, December 02, 2016 10:10:59 AM
Attachments: image002.png

Katie:
Given that no trees will be cut for this project, there are no impacts to the state and federally listed northern long-eared bat.

Scott

Scott R. Darling, CWB
Wildlife Management Program Manager
Vermont Fish and Wildlife Department
271 North Main Street
Rutland, VT 05701
Office: 802-786-3862
scott.darling@vermont.gov

From: Katie Sellers [mailto:Katie.Sellers@KleinschmidtGroup.com]
Sent: Wednesday, November 30, 2016 4:25 PM
To: Kratzer, Jud <Jud.Kratzer@vermont.gov>
Cc: Darling, Scott <Scott.Darling@vermont.gov>; Buck, John <John.Buck@vermont.gov>
Subject: Pierce Mills Dam - Species Review for LIHI Application

Hi Jud, Scott, and John,
I have another LIHI application in need of threatened and endangered species review. This is for the Pierce Mills Project (FERC No. 2396) a run-of-river project located on the Passumpsic River.

Upon reviewing the USFWS IPAC Report and FERC's 1994 Environmental Assessment for this Project, I developed a list of potential threatened and endangered species that may occur within this project area. Could you a) review the below species list to make sure it is accurate and/or suggest updates as appropriate; and b) review this list to confirm that the Project continues to not negatively affect any of the currently listed species that may occur within the Project area?

Species List:
Northern Long-eared Bat (state endangered)
Bald Eagle (state endangered)

No changes to the project or tree cutting are planned at this time. Do let me know if you have any follow-up questions.

Thank you!
Katie

Katie Sellers
Regulatory Coordinator
Kleinschmidt
Office: 207-416-1218
www.KleinschmidtGroup.com

APPENDIX F

CULTURAL RESOURCES

From:	Greenan, John
To:	Katie Sellers; Dillon, Scott
Cc:	Chaloux, Frank
Subject:	RE: Passumpsic Projects - Annual CRMP Report Question
Date:	Friday, April 07, 2017 11:57:31 AM
Attachments:	image002.png

HI Scott-

I hope all is well. Any chance you can take a look our Passumpsic CRMP request soon? Thanks.

John G

From: Katie Sellers [mailto:Katie.Sellers@KleinschmidtGroup.com]
Sent: Tuesday, March 07, 2017 7:15 PM
To: Dillon, Scott
Cc: Greenan, John; Chaloux, Frank
Subject: Passumpsic Projects - Annual CRMP Report Question

Hi Scott – Hope all is well.

Want to touch base with you in regards to the Annual CRMP Report for the Passumpsic Hydroelectric Projects (Pierce Mills Project (FERC No. 2396); Arnold Falls Project (FERC No. 2399); Gage Project (FERC No. 2397); Passumpsic Project (FERC No. 2400)).

We are currently consulting with the Low Impact Hydropower Institute (LIHI) for re-Certifications of the above noted Passumpsic Projects. Per review of our initial application submissions LIHI has inquired, after reading through Annual CRMP Reports, to see if the altered 3-year CRMP Reporting timeline, as recommended by Charity Baker in the last several years of Reports, will be implemented within the next 5-years (LIHI certification term). The 2016 CRMP Report is attached for your reference.

I understand that this recommendation has not been specifically discussed beyond Annual Report submissions, therefore, I believe it would make sense to review not only for the fulfillment of LIHI application requirements but to also understand future expectations for these Reports.

Any thoughts you have on this topic would be much appreciated. Also, if you would like to set-up a call to discuss in further detail do let us know.

Thank you,
Katie

Katie Sellers
Regulatory Coordinator
Kleinschmidt
Office: 207-416-1218
www.KleinschmidtGroup.com

APPENDIX G

RECREATION

From: Katie Sellers
To: Kayla Easler
Subject: FW: FERC Acceptance for Filing in P-2396-010, et al.:
Date: Saturday, March 11, 2017 8:21:37 AM

Pierce Mills Recreation Letter acceptance for filing.

-----Original Message-----
From: Teta Jungels
Sent: Wednesday, November 30, 2016 2:33 PM
To: Katie Sellers <Katie.Sellers@KleinschmidtGroup.com>; Andy Qua <Andy.Qua@KleinschmidtGroup.com>
Subject: FW: FERC Acceptance for Filing in P-2396-010, et al.:

-----Original Message-----
From: eFiling@ferc.gov [mailto:eFiling@ferc.gov]
Sent: Wednesday, November 30, 2016 2:25 PM
To: Teta Jungels <Teta.Jungels@KleinschmidtGroup.com>; efilingacceptance@ferc.gov
Subject: FERC Acceptance for Filing in P-2396-010, et al.:

Acceptance for Filing

The FERC Office of the Secretary has accepted the following electronic submission for filing (Acceptance for filing does not constitute approval of any application or self-certifying notice):

-Accession No.: 201611305238
-Docket(s) No.: P-2396-010, et al.:
-Filed By: Green Mountain Power Corporation -Signed By: Teta Jungels -Filing Type: Project Operations Compliance Report -Filing Desc: Report / Form of Green Mountain Power Corporation under P-2396-010, et. al.. Passumpsic River Hydro Projects
-Submission Date/Time: 11/30/2016 1:17:02 PM -Filed Date: 11/30/2016 1:17:02 PM

Your submission is now part of the record for the above Docket(s) and available in FERC's eLibrary system at:

http://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20161130-5238

If you would like to receive e-mail notification when additional documents are added to the above docket(s), you can eSubscribe by docket at:

https://ferconline.ferc.gov/eSubscription.aspx

Thank you again for using the FERC Electronic Filing System. If you need to contact us for any reason:

E-Mail: ferconlinesupport@ferc.gov mailto:ferconlinesupport@ferc.gov (do not send filings to this address) Voice Mail: 866-208-3676.

From:	Greenan, John
To:	Katie Sellers
Subject:	FW: Passumpic River Recreational Assessment - Community Meeting
Date:	Tuesday, November 21, 2017 9:40:08 AM

From: noah.pollock@gmail.com [mailto:noah.pollock@gmail.com] **On Behalf Of** Noah Pollock
Sent: Friday, April 29, 2016 10:39 AM
Subject: Passumpic River Recreational Assessment - Community Meeting

Dear friends,

Please join us to learn about an emerging initiative to improve recreational opportunities along the Passumpsic River. The meeting is scheduled for Wednesday, May 25th, from 7:00 to 8:30 P.M, at the Fairbanks Museum and Planetarium in St. Johnsbury.

In collaboration with the NorthWoods Stewardship Center, our goals are to foster improved stewardship of access areas, create an updated map and guide for visitors, and, with partners, promote flood resiliency and riparian lands conservation.

At the meeting, you with have a chance to:

- See the results of an inventory and assessment of current and potential river access points and portage trails, and provide input into site conditions and stewardship opportunities
- Brainstorm priority projects that will improve water-based recreational opportunities while promoting flood resiliency and ecological restoration.
- Help craft a shared vision to guide this work going forward.

Light refreshments will be provided. RSVPs appreciated. Please share this invite to others. Hope you can join us on the 25th!

Sincerely,

--
-Noah Pollock
Project Manager, Vermont River Conservancy
(802) 540-0319 (direct)
(802) 229-0820 (VRC office)
29 Main St, Montpelier VT 05602
noah@vermontriverconservancy.org
www.vermontriverconservancy.org

From:	Davis, Eric
To:	Katie Sellers; Greenan, John
Cc:	Andy Qua; Chaloux, Frank; Crocker, Jeff
Subject:	Passumpsic Projects: LIHI Recreation Criterion
Date:	Friday, January 19, 2018 11:03:32 AM

Good afternoon John and Katie,

From prior conversations, I understand that Kleinschmidt is assisting Green Mountain Power is preparing an application to LIHI for re-certification of three hydroelectric projects, specifically the Pierce Mills (P-2396), Arnold Falls (P-2399), and Gage (P-2397) stations. The Agency has not yet conducted a full review of the compliance of the projects with certification conditions and LIHI criteria, but as a result of past consultation, the Agency can assess the recreation criterion, as it may be helpful in preparation of the application.

The applicable LIHI recreation criterion for these projects are H-2, which states, "if there are comprehensive resource agency recommendations for recreational access or accommodation (including recreational flow releases) on record, or there is an enforceable recreation plan in place, the Facility demonstrates that it is in compliance…". Further, facilities may meet the H-PLUS criterion if, "the Facility has created significant new public recreational opportunities in the area of the Facility beyond any otherwise required by agencies…"

H-2 Criterion

Article 413 of the License for Pierce Mills project required the Licensee to conduct a study of recreational use of all the Licensee's hydropower projects on the Passumpsic River on the tenth and twentieth anniversary of the license. This article specifically required: 1) recreation use data, by activity; 2) a discussion of the adequacy of recreation facilities at each project site to satisfy recreation demand; 3) a description of the methodology used to collect all study data; 4) if there is a need for additional facilities, Licensee's proposals to provide for them. As part of the twenty year study, the Licensee facilitated a site visit to each facility for interested stakeholders to assess the recreation facilities. The Agency participated in these visits, assessed the facilities in the context of the required recreation plans, and made recommendations for improvements. The Licensee agreed to make recreational improvements at each project, including improvements to access areas and portage trails. The recreational study and improvements were approved by FERC on November 30, 2015. Given the Agency consultation during this process, the Agency can confirm compliance with the approved recreation plans for the projects.

H-PLUS Criterion

Article 412 of the Pierce Mills License required GMP to produce and make available to the public, the Passumpsic River Canoeing and Recreation Guide. While the creation of the guide was originally required by the License, the Licensee has gone above and beyond the license requirement by continuing to update the guide throughout the license term to ensure the public can both enjoy recreational opportunities at the facilities and throughout the Passumpsic River watershed. In 1999, in collaboration with recreation section of the Vermont Department of Forests, Parks, and

Recreation, the Town of St. Johnsbury, the Passumpsic River Watch, and other interested groups and individuals, the Licensee revised the guide to focus on the seven hydroelectric generating stations along the river's 23-mile mainstem, which was subsequently distributed free of charge through the region. As part of the aforementioned twenty year study, the Licensee voluntarily agreed to again update the guide. As part of this update, GMP initiated consultation with interested stakeholders and enlisted the Vermont River Conservancy, the Northwood Stewardship Center, and a local historian to prepare new, detailed riverway maps, identify recreational and historic features, and update text and photographs. In addition to project affected area, the updated guide includes information about the East Branch of the Passumpsic River, the west branch of the Passumpsic River as well as a reach of the Moose River tributary. This was a significant update that highlighted new recreational opportunities. Both in the voluntary and comprehensive nature of the revision and , as well as the geographic expansion that includes recreational opportunities throughout the watershed, GMP went beyond the scope of Pierce Mills' License Article 412 to ensure the public can not only enjoy recreational opportunities in the area of the facilities or the affected river reach, but also additional opportunities throughout the watershed. In light of the Licensee's efforts to support recreational access and enjoyment in the watershed, the Agency would support qualification for the H-PLUS criterion.

Please note that the applicability of this review is limited to criterion H. Once the Agency has the opportunity to conduct a full review, the Agency intends to draft a letter summarizing its findings, including a recommendation on re-certification.

Thank you,
Eric

Eric Davis, *River Ecologist*

1 National Life Drive, Main 2
Montpelier, VT 05620-3522
802-490-6180 / eric.davis@vermont.gov
http://www.watershedmanagement.vt.gov/rivers
(Please note my new e-mail address, effective July 27, 2015)

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION
RIVERS PROGRAM

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