LOW-IMPACT HYDROPOWER POWER INSTITUTE CERTIFICATION APPLICATION

PASSUMPSIC HYDROELECTRIC PROJECT
(FERC NO. 2400)

Prepared for:

Green Mountain Power Corporation
Rutland, Vermont

Prepared by:

Kleinschmidt

Pittsfield, Maine
www.KleinschmidtGroup.com

June 2018

LOW-IMPACT HYDROPOWER POWER INSTITUTE CERTIFICATION APPLICATION

PASSUMPSIC HYDROELECTRIC PROJECT
(FERC NO. 2400)

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 FACILITY DESCRIPTION

The Passumpsic Hydroelectric Project (FERC No. 2400) (Project) is located in northeastern Vermont near St. Johnsbury, at river mile (RM) 5.5, on the Passumpsic River (a major tributary to the Connecticut River) (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 Passumpsic Project is the sixth most downstream dam located on the Passumpsic River (Appendix C).

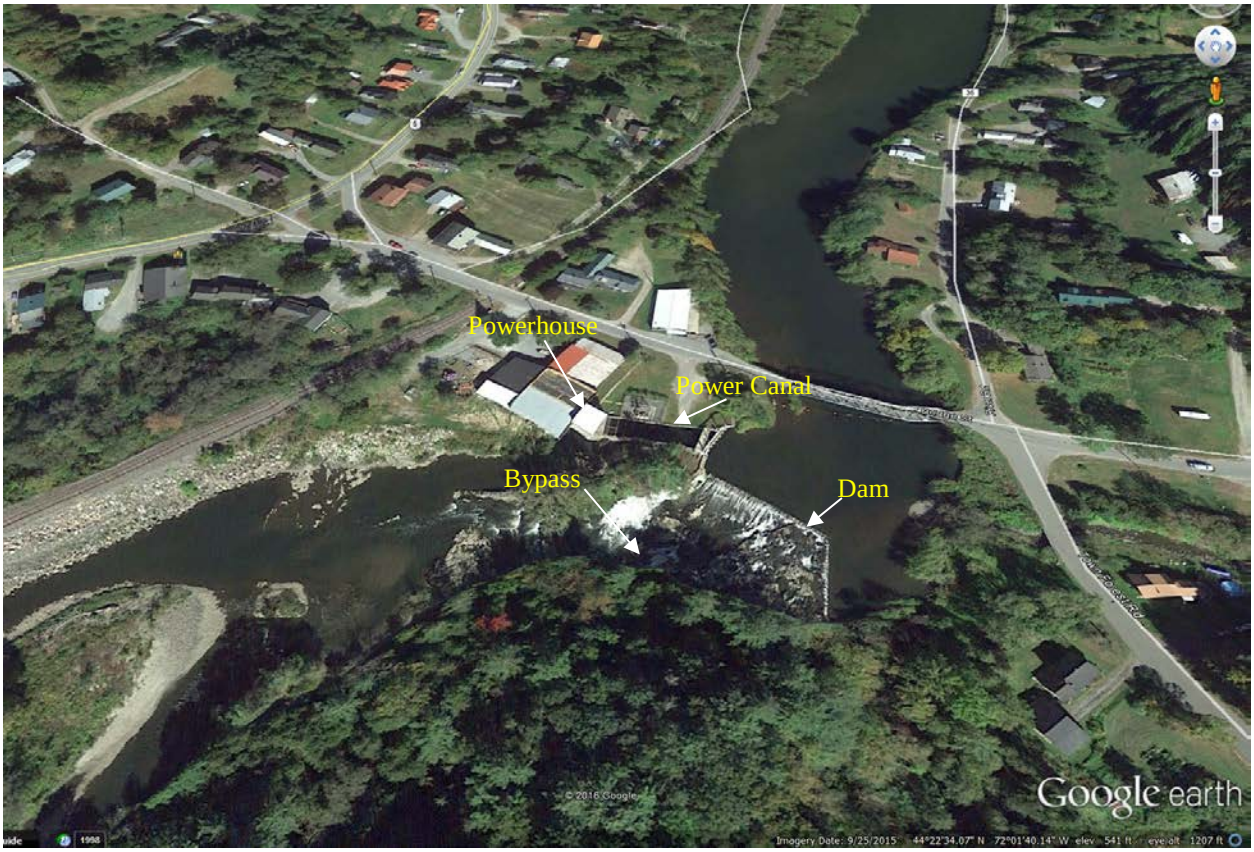

FIGURE 1 PASSUMPSIC HYDROELECTRIC PROJECT OVERVIEW

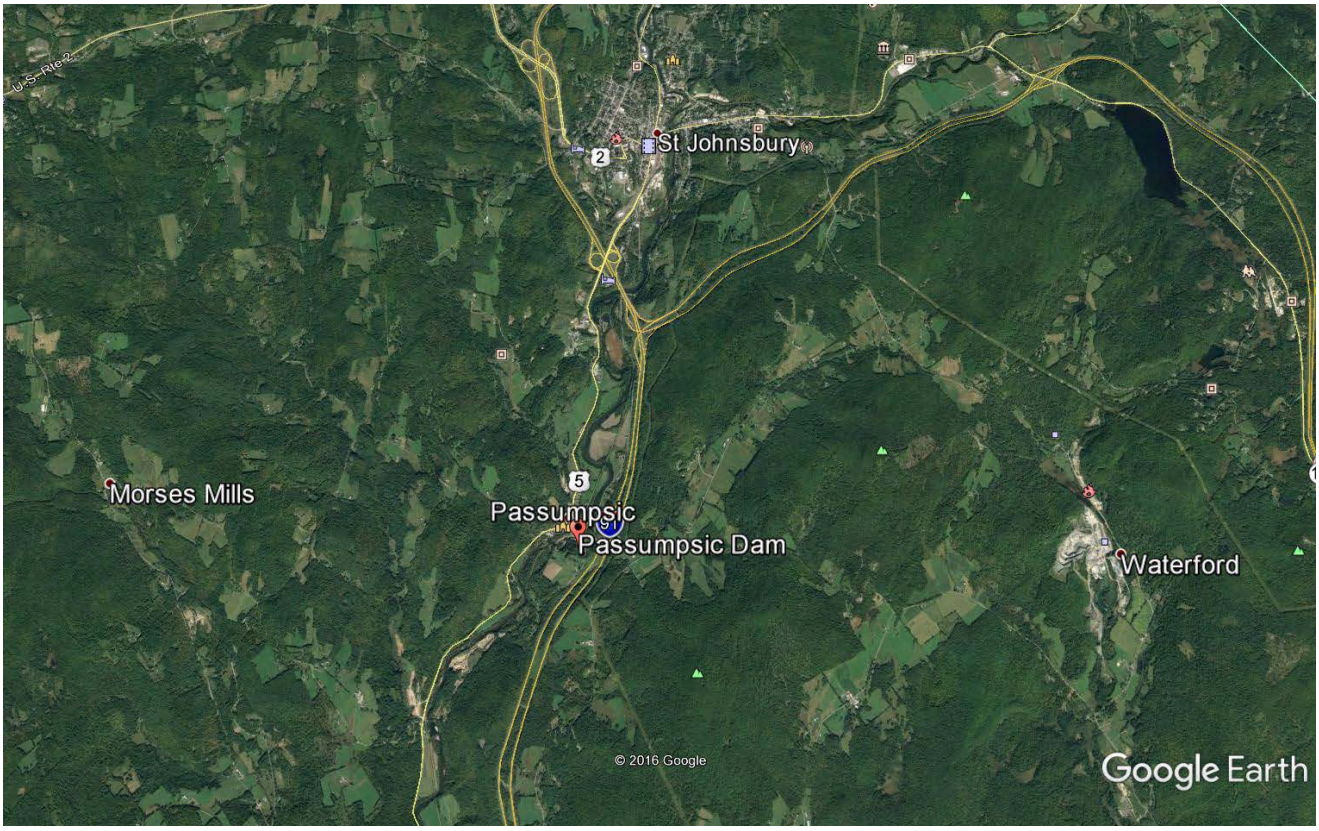

FIGURE 2 GEOGRAPHIC OVERVIEW OF PROJECT LOCATION

The Passumpsic Hydroelectric Project was built in 1905-1906 for the St. Johnsbury Electric Company. The powerhouse was completely destroyed in the flood of 1927 but rebuilt in 1929.

The Project impounds an 18.3-acre reservoir which extends 4,600-feet upstream with a useable storage of 18.4 acre-feet. The Project's concrete gravity dam consists of two sections including a south section 122-feet-long and a north section 126-feet-long, each with a maximum height of 10-feet. Each section has a crest elevation of 519.98-feet msl topped with 1-foot-high flashboards. The dam is equipped with a 27-foot wide headgate structure with two gates.

The power canal is 19 to 22-feet-wide and 87-feet-long with a sluice and a 24-foot-long overflow spillway. The powerhouse contains one vertical shaft turbine rated at 708 kW and a generator rated at 700 kW. A substation is located adjacent to the power canal.

The Passumpsic Project is operated in a run-of-river mode to preserve water quality, aquatic and riparian habitats, and aesthetic and recreational flows in the Passumpsic River. The Project releases into the bypassed reach a minimum flow of 86 cfs, or inflow, whichever is less. From

Oct 2 through May 31 minimum flows are provided through the downstream fishway. Aesthetic flows are provided from June 1 through October 1, and the minimum flow is divided between flows needed for fishway operation and flows needed for aesthetic purposes.

TABLE 1 FACILITY DESCRIPTION INFORMATION FOR PASSUMPSIC HYDROELECTRIC PROJECT (LIHI # 95)

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
Name of the Facility	Facility name (use FERC project name if possible)	Passumpsic Hydroelectric Project (FERC No. 2400)
Location	River name (USGS proper name)	Passumpsic River
	River basin name	Passumpsic River Basin
	Nearest town, county, and state	Town of St. Johnsbury, Caledonia County, Vermont
	River mile of dam above next major river	Located 5.5 river miles above the Passumpsic River's confluence with the Connecticut River
	Geographic latitude	44°22'29.27"N
	Geographic longitude	72° 1'34.19"W
Facility Owner	Application contact names (IMPORTANT: you must also complete the Facilities Contact Form):	Jason Lisai– 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 Project License No. 2400. 40-year license issued on December 8, 1994 and expires on December 8, 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 (P.L. 92-500) was issued by the Vermont Department of Environmental Conservation (DEC)[1] on June 16, 1994.

[1] The Vermont DEC is a branch of the Vermont Agency of Natural Resources (VANR).

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 FERC License: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1719655 1994 Water Quality Certificate – Appendix A 1995 FERC Order Approving Landscape Plan and Recreation Plan: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1743279 1996 FERC Order Approving Downstream Fish Passage Facility: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=82267 1997 FERC Order Approving Flow Management Plan: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=192803 2000 FERC Order Approving Cultural Resource Management Plan: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=2034182 2003 Environmental Inspection Report: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=4105072 2013 Environmental Inspection Report: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14161369 2015 FERC Order Approving Study of Recreational Use http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14403636
Power Plant Character-istics	Date of initial operation (past or future for operational applications)	1929
	Total name-plate capacity (MW)	0.700 MW
	Average annual generation (MWh)	1,998 MWH (2010/2011 – 2014/2015)

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
	Number, type, and size of turbines, including maximum and minimum hydraulic capacity of each unit	One vertical shaft Francis-type turbine rated at 0.708 MW and one General Electric vertical generator rated at 0.700 MW. The Project has a hydraulic range of 195 cfs to 460 cfs.
	Modes of operation (run-of-river, peaking, pulsing, seasonal storage, etc.)	Run-of-River operation with a minimum bypass flow of 86 cfs, or inflow, whichever is less.
	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	The U.S. Fish and Wildlife Service (USFWS) and Vermont Agency of Natural Resources (VANR) have determined that the Project's existing downstream passage facility does not meet present day fish passage standards. GMP is therefore voluntarily replacing the facility with a new downstream bypass structure located at the downstream end of the power canal, adjacent to the existing powerhouse intake. The facility will include a new surface bypass flume and a steel transport pipe. Construction of the new fishway is scheduled for completion by December 31, 2018. A new Revised Project Flow Management Plan and new Revised Downstream Fish Passage Operation & Maintenance Plan will be completed to align with updates related to implementation of the new downstream fish passage facility. Both plans are currently undergoing FERC review.
Character-istics of Dam, Diversion, or Conduit	Date of construction	1929 (partially rebuilt in 1988)
	Dam height	Maximum height: 10-feet-high
	Spillway elevation and hydraulic capacity	The spillway crest elevation is at 519.98 feet mean sea level (msl). The spillway's hydraulic capacity number is not readily available.
	Tailwater elevation	497.0 feet msl.

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
	Length and type of all penstocks and water conveyance structures between reservoir and powerhouse	One 19 to 22-feet-wide, 87-feet-long power canal with a sluice and a 24-foot-long overflow spillway.
	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 an 18.3 acre impoundment with 18.4 acre-feet of useable storage.
	Maximum water surface elevation (ft. MSL)	The maximum water surface elevation within the impoundment is 521.0 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 Gage Hydroelectric Project (FERC No.2397), owned and operated by GMP, is located upstream of the Passumpsic Project at RM 7.2. GMP owns and operates two other projects upstream of the Gage Project: Arnold Falls Hydroelectric Project (FERC No. 2399) at RM 9.5 and the Pierce Mills Hydroelectric Project (FERC No. 2396) located at RM 14.9. 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 C for a map of Passummpsic River Hydroelectric Facilities.
	Downstream dam(s) by name, ownership, FERC number (if applicable), and river mile	The East Barnet Hydroelectric Project (FERC No. 3051) owned and operated by GMP, is located downstream of the Passumpsic Project at RM 0.5, just before the Passumpsic River's confluence with the Connecticut River. See Appendix C for a map of Passummpsic River Hydroelectric Facilities.

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
	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 within the FERC Project boundary is approximately 52 acres.
Hydrologic Setting	Average annual flow at the dam	Average annual flow of 731 cfs at the dam as tabulated within the 1994 WQC and measured at USGS Gage 01135500 Passumpsic River at Passumpsic, VT.
	Average monthly flows	Average monthly flows 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	The USGS Gage 01135500 Passumpsic River at Passumpsic, VT is located downstream of the Project. Drainage area at the gage is 436 square miles. No other USGS gages are located upstream of the Project on the mainstem of the Passumpsic River.
	Watershed area at the dam	428 square miles
Designated Zones of Effect	Number of zones of effect	Three Zones of Effect: Zone 1 Impoundment; Zone 2 Bypass Reach; Zone 3 Downstream
	Upstream and downstream locations by river miles	Zone 1 Impoundment ZOE: RM 5.5 (Passumpsic Dam) – RM 6.37 (head of Passumpsic Project impoundment) Zone 2 Bypass Reach ZOE: RM 5.5 (Passumpsic Dam) – RM 5.57 (end of Passumpsic bypass reach)

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
		Zone 3 Downstream ZOE: RM 5.5 (Passumpsic powerhouse outlet) – RM 0.5 (East Barnet Dam).
	Type of waterbody (river, impoundment, by-passed reach, etc.)	Impoundment ZOE: Impoundment Bypass Reach ZOE: Bypass Reach Downstream ZOE: Riverine/Impoundment
	Delimiting structures	Zone 1 Impoundment ZOE: Passumpsic Dam (RM 5.5) – head of Passumpsic impoundment just past railroad bridge (RM 6.37) Zone 2 Bypass Reach ZOE: Passumpsic Dam (RM 5.5) – end of Passumpsic bypass reach, just before the island located downstream (RM 5.57) Zone 3 Downstream ZOE: Passumpsic powerhouse outlet (RM 5.5) – East Barnet Dam (RM 0.5).
	Designated uses by state water quality agency	Zones 1, 2, &3 are designated as Class B Waters by the Vermont Department of Environmental Conservation. Class B waters are managed by the state to support: Aquatic biota, wildlife & aquatic habitat; Aesthetics; public water supply; irrigation for crops and other agricultural uses; Swimming and other primary contact recreation; Boating, fishing, and other recreational uses.
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 B for photographs of key Project features and identification of each designated zone of effect (ZOE).
	Maps, aerial photos, and/or plan view diagrams of facility area and river basin	Please see Appendix C for aerial photos of facility area and a map of Passumpsic River Hydroelectric Projects.

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 June 16, 1994 (Appendix A). 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.

  In accordance with License Article 404 and WQC Condition E, the Licensee developed a Flow Management Plan (http://elibrary.ferc.gov/idmws/search/intermediate.asp?link_file=yes&doclist=1739159) which was approved 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 the minimum flow is always met or exceeded. The system automatically adjusts the turbine output to maintain the water within 1-inch of the top of, or spilling over the top of, the flashboards. Stoplogs are removed from the stoplog sluice adjacent to the headworks down to elevation 518.21-feet. 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 520.9 to 521.0-feet. The top elevation of the one foot flashboards is 520.98-feet. If the turbine load is 25 kW or lower and the headpond level drops to 520.85 feet, the system unit shuts down automatically, causing all flow to spill over the dam.

  To properly incorporate details for the new downstream fish passage system into the Flow Management Plan, a Revised Flow Management Plan was provided to USFWS and VANR Fish and Wildlife Department (VTFW) on March 29, 2017 and the U.S.

Geological Survey (USGS) on April 4, 2017 for review. GMP received agency commentary from VANR on March 30, 2017 and commentary from USFWS on November 16, 2017. No commentary was received from USGS. Agency comments were incorporated where feasible and the Revised Flow Management Plan was filed with FERC on April 25, 2018[2] for review and approval. The Revised Plan incorporated minor changes only for operation of the new fishway, and did not require any changes to the pre-existing headpond set-point.

- Project operations data was provided to Vermont DEC on June 6, 2018 for verification of Project operations and Water Quality Certificate compliance (see Appendix D for email exchange).
- This is not a conduit project.
- The Project's run-of-river operations create a stable impoundment environment. GMP conducts an annual shoreline survey in accordance with the Project's Cultural Resource Management Plan. The 2016 Shoreline Survey Report states that the Project shoreline remains stable and relatively unchanged from previous inspections[3].

  There are no License or WQC provisions for fish and wildlife habitat management or evaluations within the Project Impoundment ZOE. GMP operates the facility as run-of-river in an effort to keep fish and wildlife habitat healthy in the Project area.

[2] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14897595
[3] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14418931

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 (Appendix A). 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.

  In accordance with WQC Condition C (License Article 403), GMP provides, when flows are available, a minimum instantaneous flow of 86 cfs, or inflow, whichever is less, into the bypass reach to enhance aesthetics and aquatic habitat. If instantaneous inflow falls below the hydraulic capacity of the turbine unit plus this spillage requirement, all flows are spilled at the dam.

  GMP provides aesthetic enhancement flows (a portion of the required 86 cfs minimum flow) from June 1 through October 31. From April 1 to June 15 and September 15 to November 15, the minimum flow is divided between flows through the fishway, flows needed for aesthetic enhancements, and bypass flows. To effectively pass downstream migrating fish, flows through the fishway will be 9 to 25 cfs in order to attract migrating fish to the entrance of the fishway and to ensure safe passage through the fishway.

  To properly incorporate details for the new downstream fish passage system into the Flow Management Plan, a Revised Flow Management Plan was provided to USFWS and VANR Fish and Wildlife on March 29, 2017 and the USGS on April 4, 2017 for review. GMP received agency commentary from VANR on March 30, 2017 and commentary from USFWS on November 16, 2017. No commentary was received from USGS. Agency comments were incorporated where feasible and the Revised Flow Management Plan was filed with FERC on April 25, 2018[4] for review and approval.

- Project operations data was provided to Vermont DEC on June 6, 2018 for verification of Project operations and Water Quality Certificate compliance (see Appendix D for email exchange). In accordance with 2012 LIHI Certification Condition 2, Vermont DEC

[4] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14897595

review of operational data is expected to confirm compliant Project operations or determine protocols needed to ensure proper operations.

- The scientific basis for this agency recommendation is supported by a 1992-1993 bypass reach study conducted by the Licensee in consultation with the VTFW and the USFWS. The study evaluated minimum flows needed to support fisheries habitat in the bypass channel. Within study analysis, it was conservatively determined that a minimum flow of 86 cfs (7Q10 value) provides sufficient habitat for adult salmonids.
- 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.

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 (Appendix A). 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.

  The only point when downstream flows are regulated is as prescribed under WQC Condition D and License Article 402. Following flashboard repair, replacement, or maintenance operations requiring an impoundment drawdown, the impoundment is refilled by reducing downstream flows, but to no less than 214 cfs from June 1 to September 30 and 428 cfs from October 1 to May 31. From April 1 through May 31, or under circumstances during the summer and fall/winter periods when the natural inflow to the Project is insufficient to permit both passage of these minimum flows and refilling of 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/idmws/search/intermediate.asp?link_file=yes&doclist=1739159) which was approved on April 10, 1997 (http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10780026). Under the Flow Management Plan, an HPS ensures the minimum flow is always met or exceeded. The system automatically adjusts the turbine output to maintain the water within 1-inch of the top of, or spilling over the top of, the flashboards. Stoplogs are removed from the stoplog sluice adjacent to the headworks down to elevation 518.21-feet. 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 520.9 to 521.0-feet. The top elevation of the one foot flashboards is 520.98-feet. If the turbine load is 25 kW or lower and the

headpond level drops to 520.85-feet, the system unit will shut down automatically, causing all flow to spill over the dam.

To properly incorporate details for the new downstream fish passage system into the Flow Management Plan, a Revised Flow Management Plan was provided to USFWS and VANR Fish and Wildlife on March 29, 2017 and the USGS on April 4, 2017 for review. GMP received agency commentary from VANR on March 30, 2017 and commentary from USFWS on November 16, 2017. No commentary was received from USGS. Agency comments were incorporated where feasible and the Revised Flow Management Plan was filed with FERC on April 25, 2018[5] for review and approval. The Revised Plan incorporated minor changes only for operation of the new fishway, and did not require any changes to the pre-existing headpond set-point.

- Project operations data was provided to Vermont DEC on June 6, 2018 for verification of Project operations and Water Quality Certificate compliance (see Appendix D for email exchange).
- This is not a conduit project.

[5] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14897595

3.4 WATER QUALITY STANDARDS: IMPOUNDMENT, BYPASSED REACH, & 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 is designated by the Water Resources Board as Class B waters. The Project impoundment comprises the lower end of a waste management zone that receives discharge from the St. Johnsbury municipal wastewater treatment facility. 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). This is also confirmed within the 2016 State of Vermont 303(d) List of Impaired Waters (http://dec.vermont.gov/sites/dec/files/documents/WSMD_mapp_303d_Part_A_2016_final_complete.pdf).
- 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, no samples at the Passumpsic Project stations were less than 90% saturation. Aquatec's analysis of reaeration coefficients demonstrated a significant aeration efficient for spillage at the Passumpsic Dam.
- In a January 27, 2017 email from the Vermont DEC, it is confirmed that the Passumpsic River, in the area of the Project, is impaired because of E. Coli found within the St. Johnsbury wastewater treatment plant's passing of combined sewer overflows. Given the Passumpsic Project is a true run-of-river project, the Vermont DEC concludes that the current operations continue to not be a contributing cause of the river's impairment (Appendix D). In addition, Project operations data was provided to Vermont DEC on

June 6, 2018 for verification of Project operations and Water Quality Certificate compliance (see Appendix D for email exchange).

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).

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

Criterion	*Standard*	*Instructions*
C	1	Not Applicable/De Minimis Effect: • 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[6], 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

[6] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=2041

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.

- 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.

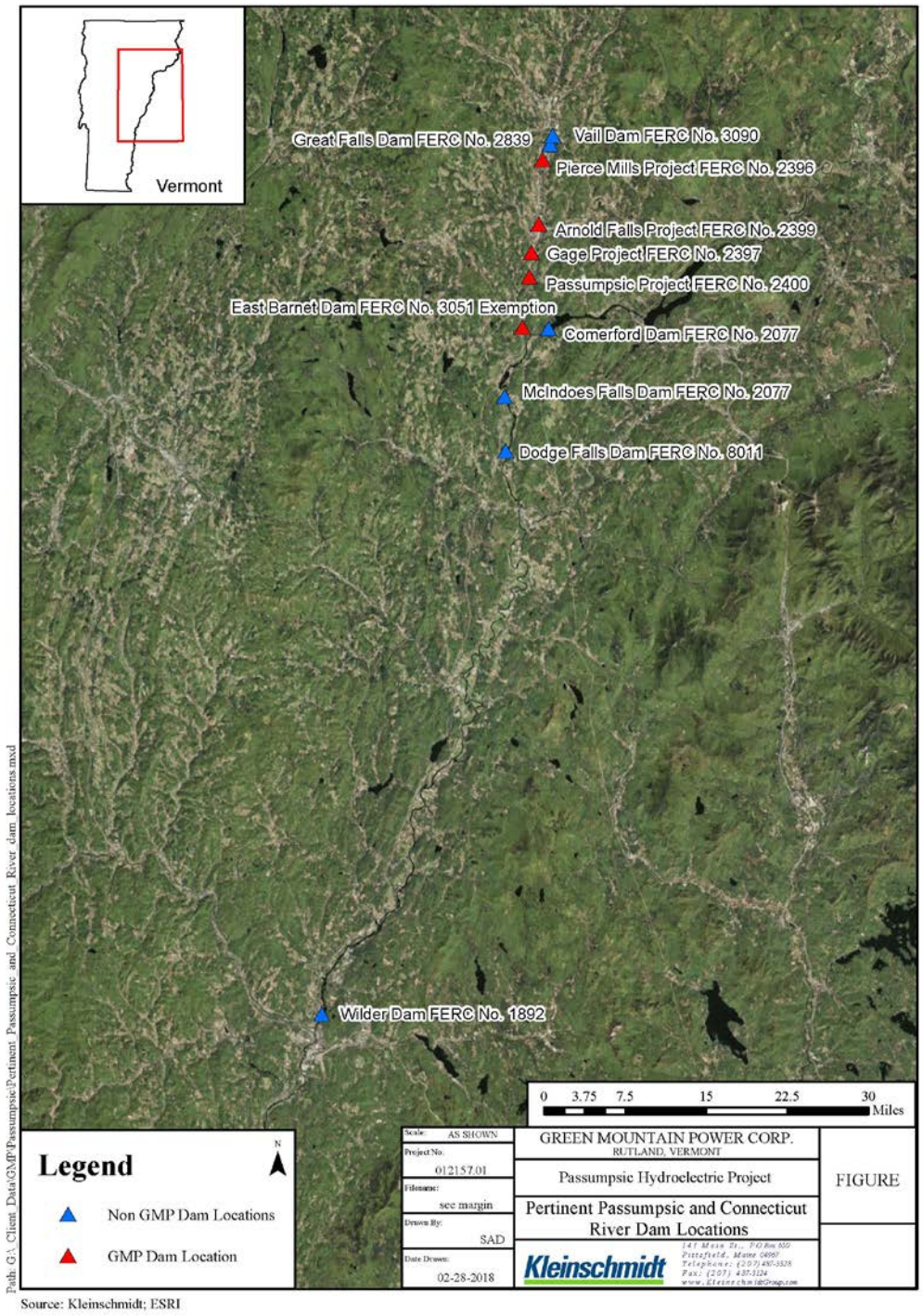

FIGURE 3 PERTINENT PASSUMPSIC AND CONNECTICUT RIVER DAM LOCATIONS

3.7 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).

3.8 DOWNSTREAM FISH PASSAGE STANDARDS: IMPOUNDMENT & BYPASSED REACH ZOES

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 originally provided permanent downstream fish passage via a sluiceway located at the northern end of the spillway, adjacent to the canal headworks. The sluiceway also served as the method for releasing the Project's required minimum flow of 86 cfs into the bypassed reach.

  On December 5, 1995, downstream fish passage drawings and plans were submitted to FERC for approval (https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=8301125). Plans were modified and approved by FERC Order dated February 7, 1996 (https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10748550) and FERC's authorization to proceed with fish passage construction was issued on August 22, 1996 (https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=8236697).

- 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 (http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=115435). Under this plan, developed in consultation with the USFWS and VTFW, the Licensee, USFWS, and

VTFW would visually inspect the downstream Gage Project and Passumpsic Project forebays for the presence of salmon smolts during the period when smolts should be passing downstream. The plans were approved by FERC in the September 25, 1996 Order Modifying and Approving Plan to Monitor Effectiveness of Fish Passage Facilities (http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=141366). A November 1997 report on the results of the observations at the Gage Project and Passumpsic Project was issued to the VTFW and USFWS.

In 2012 CVPS applied for LIHI Certification for the Passumpsic Project. In July 2012 the USFWS ended its program for Atlantic salmon restoration of the Passumpsic River Basin, including the Passumpsic River. Although this program end diminished the importance of downstream fish passage effectiveness testing, LIHI prescribed the following condition within the Project's 2012 Certification:

> Condition (A): LIHI requires demonstration of effective fish passage to be certified as low impact. Downstream passage for Atlantic salmon was the focus for passage at this site; however, recent decision by the USFWS has eliminated restoration efforts for this species in this river system. Past documentation suggests that the agencies determined that the configuration of the passage facility sluiceway may be problematic. Recent communications with USFWS could not confirm the status of this issue at this site, and VDF&W stated that this concern and others may still exist at this site. Also, report issuance on the effectiveness testing at this site nor submission of final reporting on effectiveness testing to FERC could not be confirmed. Therefore, LIHI requires that consultation be re-opened with USFWS and VDF&W to re-assess, if needed, the effectiveness of the passage facilities at Passumpsic. If no additional studies are needed, CVPS shall provide LIHI documentation demonstrating agreement by USFWS and VDF&W with this decision within one month of its issuance. If any additional studies are required, documentation of the agency approved study plan, study schedule and study results shall be provided to LIHI within one month of the finalization of these documents. These documents will demonstrate compliance with this criterion.

In accordance with LIHI's 2012 Certification Condition, GMP re-opened Passumpsic Project downstream fish passage consultation with resource agencies in 2012. Throughout consultation with the USFWS and VTFW, it was determined that additional studies were not required, but that the downstream passage facility did not meet present day fish passage standards and was in need of replacement. Although the fish passage replacement was recommended by agencies, it was not required. Understanding the need to upgrade the passage facility for the success of downstream migrants, GMP voluntarily and proactively consulted with resource agencies in the development and design for a replacement fish passage facility. As a result of consultations, GMP is now in the process of replacing the existing downstream passage facility with a new downstream bypass structure that will be located at the downstream end of the power canal adjacent to the existing powerhouse intake.

The new downstream fish passage facility will include a new surface bypass flume and a steel transport pipe. It will be mounted to the concrete forebay wall downstream of the existing surface sluice, which is located just upstream of the powerhouse trashracks. The new structure will be supported by steel brackets that are attached to the downstream side

of the forbay wall. The new 24-inch diameter transport pipe will run downstream along the existing forebay wall and then discharge into the tailrace downstream of the powerhouse. The original downstream fishway will be abandoned and plugged with stoplogs.

The new facility will have an attraction flow of 9 cfs – 25 cfs to provide safe passage of downstream migrants. This corresponds to 2-5 percent of the maximum station discharge capacity of 460 cfs. As prescribed in License Article 405 and 1994 WQC Condition F, the facility will be operated from April 1 through June 15 and from September 15 through November 15. Stoplogs will be removed from the flume entrance at the start of each operational period. Flow through the fishway will be controlled by the existing surface sluice opening in the concrete forbay wall. The headpond controller system will ensure that the required operating flow is always met or exceeded by automatically adjusting the turbine output to maintain the headpond elevation to within 1-inch of the top of the flashboards, or by spilling over the top of the flashboards.

Revised Downstream Fish Passage Designs were submitted to FERC for review on May 12, 2017[7] and approved by FERC on July 10, 2017[8]. GMP completed on land portions of project work in 2017 and plans to complete the in-water portions of project work during the 2018 construction season. Construction of the new fishway is scheduled for completion by December 31, 2018.

GMP additionally filed a Revised Downstream Fish Passage Operations & Maintenance Plan with FERC on April 25, 2018[9] so to properly incorporate details for the new downstream fishway design. The Revised Plan was prepared in consultation with the USFWS and VTFW.

- Because of the presence of the USFWS Atlantic salmon stocking program during 1994 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.

[7] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14588609
[8] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14644488
[9] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14897595

3.9 DOWNSTREAM FISH PASSAGE STANDARDS: DOWNSTREAM ZOE

Criterion	*Standard*	*Instructions*
D	1	Not Applicable / De Minimis Effect: • 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 over the Passumpsic dam with the use of the downstream fish passage facility and through the bypassed reach, the fish do not have any further impediments to passage through the Downstream ZOE. Once fish encounter the downstream East Barnet dam, they are then allowed to pass over the dam via the use of another downstream fish passage facility.

  The possibility for entrainment within the Passumpsic Project turbine is limited. In fall 2017, as Phase I of the downstream fish passage installation project, the original 2 3/8-inch clear trashrack bars located at the Project intake were removed and replaced with 1-inch spacing fish diversion panels. The lower 5-feet of the intake trashracks were also replaced with new 2 3/8-inch clear bar racks. The revised trashrack configuration was reviewed and approved by the USFWS and VTFW (Please see the Revised Fish Passage Plan filed with FERC on April 25, 2018[10]). Presence of the new fish diversion racks in front of the intake and adjacent to the new downstream fishway is expected to result in limited fish entrainment.

- 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. Downstream passage is currently 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.

- As stated in the December 23, 1993 VANR comment letter, (http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1632958), brook, brown, and rainbow trout are all found in the Passumpsic basin. VDFW studies conducted in the early 1970s indicate the Passumpsic River drainage basin contained a higher percentage

[10] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14897595

of brook trout than any other drainage basin studies throughout the state. The Agency stocks the stream from the upstream Vail Dam to the Gage Dam with brown trout and rainbow trout. For the 2018 fishing season, VANR plans to stock a total of 1,000 2-year-old rainbow and brown trout in the Passumpsic River[11]. 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 217.4 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 River.

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.

[11] https://anrweb.vt.gov/FWD/FW/FishStockingSchedule.aspx

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

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 rural residential housing and farmland. Land cover units, with non-significant ecological value, identified in the vicinity of the Project can be found in Table 2 (based on National Land Cover Database 2011: http://www.mrlc.gov/nlcd11_leg.php).
- No shoreland management plans have been required for the Project.
- The Project's run-of-river operations create a stable impoundment environment. GMP conducts an annual shoreline survey in accordance with the Project's Cultural Resource Management Plan. The 2016 Shoreline Survey Report states that the Project shoreline remains stable and relatively unchanged from previous inspections[12].

TABLE 2 NATIONAL LAND COVER DATABASE LAND COVER CLASSIFICATIONS FOR PASSUMPSIC PROJECT AREA.

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.

[12] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14418931

CLASS/VALUE	CLASSIFICATION DESCRIPTION
41	Deciduous 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 shed foliage simultaneously in response to seasonal change.
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.
81	Pasture/Hay-areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20% of total vegetation.
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.
95	Emergent Herbaceous Wetlands- Areas where perennial herbaceous vegetation accounts for greater than 80% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

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 USFWS List populated on November 2, 2016 (Appendix E), the federally threatened Northern long-eared bat (*Myotis septentrionalis*) may occur within the Project vicinity. In addition, the bald eagle *(Haliaeetus leucocephalus)* which was de-listed 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[13]. Based on run-of-river Project operations, it is unlikely that the Northern long-eared bat and bald eagle would be negatively affected by the Project. January 4, 2017 emails from VANR staff confirm that continued Project operations/planned construction for the downstream fish passage facility will not negatively impact the bald eagle or the northern long eared bat (Appendix E).

  The Project's 1991 WQC also identified the Garber's sedge (*Carex garberi*), a state threatened species[14], below the dam. In accordance to the WQC, approximately 50 fruiting culms of Gerber's sedge were observed within a two to three square yard area located below the dam in sandy pockets on ledges on the left side of the river at the lower end of the bypass. The plants were found in an area that is covered by high water each spring. Within the WQC it was stated that the Licensee does not propose any construction or operational activities at the site that would be incompatible with the protection of the habitat for the Garber's sedge plant. Continued Project run-of-river operations are not expected to negatively affect the Garber's sedge plant.

[13] http://www.vtfishandwildlife.com/common/pages/DisplayFile.aspx?itemId=268519
[14] http://www.vtfishandwildlife.com/common/pages/DisplayFile.aspx?itemId=229829

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), Pierce Mills Project (FERC No. 2396), 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 Passumpsic 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:0/idmws/common/opennat.asp?fileID=13142360
  - 2013 Annual CRMP Report http://elibrary.ferc.gov:0/idmws/common/opennat.asp?fileID=13407659
  - 2014 Annual CRMP Report http://elibrary.ferc.gov:0/idmws/common/opennat.asp?fileID=13704783
  - 2015 Annual CRMP Report https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14066571
  - 2016 Annual CRMP Report https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14418931
  - 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 requested that the Vermont SHPO allow a decrease in monitoring frequency of the project shorelines. 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:0/idmws/common/opennat.asp?fileID=13392861), 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 I and J, GMP developed and maintains recreation facilities including signage (danger signs), boat barrier, canoe/kayak take-out, and canoe/kayak portage trail in the Impoundment ZOE. The 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 21, 1995 (http://elibrary.ferc.gov:0/idmws/common/opennat.asp?fileID=3020631).
- Additionally, under License Article 413 of the upstream Pierce Mills Project License (FERC No. 2396), 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). Per Condition B of the November 30, 2015 Order, GMP has installed a conspicuous sign visible from Bridge Street to clearly indicate that public access is available at the Project from sunrise to sunset. GMP has additionally improved directional signage along the portage path for portage and angler routing. Improvements to the downstream portage path are proposed to occur concurrently with downstream fish passage improvements during the 2018 construction season. GMP expects construction to be complete before December 31, 2018. A GMP letter filed with FERC on November 30, 2016 includes photographic evidence of new signage installed at the facility: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14516332. Per FERC letter dated March 30, 2017, Passumpsic Project signage enhancements were approved and GMP's proposal to file a finalized recreation map after the new portage path is completed was approved (https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14539473). On April 25, 2018 GMP filed a letter with FERC with updates on the Passumpsic Fishway installation schedule, revised fishway and flow plans, and designs for the

portage pathway improvements[15].

- Within the 2013 Environmental Inspection Report (http://elibrary.ferc.gov:0/idmws/common/opennat.asp?fileID=13392861) 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 upstream Pierce Mills Recreation Plan and in accordance with Pierce Mills Project 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.

[15] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14897595

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 Gage Project, Pierce Mills Project, and Arnold Falls Project qualification for this H-PLUS Standard (Appendix G). As this is a basin wide recreation effort, GMP has reason to believe that the Vermont DEC would support the H PLUS qualification for the Passumpsic Project as well.

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 I and J, GMP developed and maintains recreation facilities including an interpretive sign, picnic tables, information sign, parking area, fence, and portage trail, in the Bypassed Reach ZOE. The 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 21, 1995 (http://elibrary.ferc.gov:0/idmws/common/opennat.asp?fileID=3020631).
- Additionally, under License Article 413 of the upstream Pierce Mills Project License (FERC No. 2396), 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). Per Condition B of the November 30, 2015 Order, GMP has installed a conspicuous sign visible from Bridge Street to clearly indicate that public access is available at the Project from sunrise to sunset. GMP has additionally improved directional signage along the portage path for portage and angler routing. Improvements to the downstream portage path are proposed to occur concurrently with fish passage improvements. Improvements to the downstream portage path are proposed to occur concurrently with downstream fish passage improvements during the 2018 construction season. GMP expects construction to be complete before December 31, 2018. A GMP letter filed with FERC on November 30, 2016 includes photographic evidence of new signage installed at the facility: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14516332. Per FERC letter dated March 30, 2017, Passumpsic Project signage enhancements were approved and GMP's proposal to file a finalized recreation map after the new portage path is completed was approved (https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14539473). On April 25, 2018 GMP filed a letter with FERC with updates on the Passumpsic Fishway installation schedule, revised fishway and flow plans, and designs for the

portage pathway improvements.[16]

- Within the 2013 Environmental Inspection Report (http://elibrary.ferc.gov:0/idmws/common/opennat.asp?fileID=13392861) it was concluded that the Project appears to be in compliance with the requirements in regards to recreational resources.

[16] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14897595

3.15 RECREATIONAL RESOURCES STANDARDS: DOWNSTREAM 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 I and J, GMP developed and maintains recreation facilities including a canoe/kayak portage tail, and canoe/kayak put-in in the Downstream ZOE. The 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 21, 1995 (http://elibrary.ferc.gov:0/idmws/common/opennat.asp?fileID=3020631).
- Additionally, under License Article 413 of the upstream Pierce Mills Project License (FERC No. 2396), 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). Per Condition B of the November 30, 2015 Order, GMP has installed a conspicuous sign visible from Bridge Street to clearly indicate that public access is available at the Project from sunrise to sunset. GMP has additionally improved directional signage along the portage path for portage and angler routing. Improvements to the downstream portage path are proposed to occur concurrently with fish passage improvements. Improvements to the downstream portage path are proposed to occur concurrently with downstream fish passage improvements during the 2018 construction season. GMP expects construction to be complete before December 31, 2018. A GMP letter filed with FERC on November 30, 2016 includes photographic evidence of new signage installed at the facility: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14516332. Per FERC letter dated March 30, 2017, Passumpsic Project signage enhancements were approved and GMP's proposal to file a finalized recreation map after the new portage path is completed was approved (https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14539473). On April 25, 2018 GMP filed a letter with FERC with updates on the Passumpsic Fishway installation schedule, revised fishway and flow plans, and designs for the

portage pathway improvements.[17]

- Within the 2013 Environmental Inspection Report (http://elibrary.ferc.gov:0/idmws/common/opennat.asp?fileID=13392861) it was concluded that the Project appears to be in compliance with the requirements in regards to recreational resources.

[17] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14897595

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, Katie Sellers
Company	Kleinschmidt Associates
Phone	207-416-1246; 2017-416-1218
Email Address	Andrew.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	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 _**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

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

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 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.

PLEASE INSERT ONLY FOR PRE-OPERATIONAL CERTIFICATIONS (See Section 4.5.3)**:**

For applications for pre-operational certification of a "new" facility the applicant must also acknowledge that the Institute may suspend or revoke the certification should the impacts of the project, once operational, fail to comply with the certification criteria.

Company Name: Green Mountain Power Corp. (PASSUMPSIC RIVER STATIONS)

Authorize Representative Name: John C. Greenan

Title: Engineer

Authorized Signature: John C. Greenan

Date: 7 MAY 18

LIHI Handbook 2nd Edition - Updated: July 20, 2016 p. 68

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.

APPENDIX A

VERMONT WATER QUALITY CERTIFICATE

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

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

APPLICATION FOR THE PASSUMPSIC 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 the FERC for relicensure of the Passumpsic Hydroelectric Project located at river mile 5.5 on the Passumpsic River in the village of Passumpsic.

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 upstream of the Passumpsic Project. The applicant operates five projects in succession on the mainstem of the Passumpsic River. Upstream of the Passumpsic Project are the Pierce Mills, Arnold Falls, and Gage projects. The East Barnet Project, recently reactivated, is located downstream and is the only dam between Passumpsic Dam and the river's confluence with the Connecticut River. 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 wilderness 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. The site was first developed for hydroelectric generation in 1905. After damage during the 1927 flood, the facilities were repaired and returned to service by the Twin State Gas and Electric Company.

II. Project and Civil Works

7. The dam is founded on rock and consists of two sections defined by a change in alignment. The south section is 122 feet long, and the north section is 126 feet long. The crest elevation is 519.98 feet (msl), and varies in height from two to ten feet above the foundation. The dam is fitted with one foot high hinged flashboard panels on both the north and south crest sections. The normal

headwater elevation is 521.0 feet (msl), and the normal tailwater elevation is 497.0 feet (msl), providing a gross head of 24 feet.

8. The impoundment has a surface area of 18.3 acres, a useable storage capacity of 18 acre-feet, and a backwater influence of 4,500 feet.

9. Flashboards are maintained in place from mid-May through mid-March. The boards fail from winter ice and are normally repaired in mid-May. Debris or a summer storm event can also cause flashboard failure, which normally occurs no more than once a season.

10. The integral intake powerhouse is located at the downstream end of a power canal. Two manually operated timber bulkhead gates control flow to the 87 foot long power canal, which contains an overflow spillway in the outboard wall. This overflow discharges into a channel between the side of the powerhouse and an island which separates the channel from the falls. An inclined trashrack with intermediate support beams is located directly in front of the entrance to the turbine water passage.

11. The powerhouse contains a single James Leffel, vertical shaft, Francis-type turbine coupled to a 700 kw generator. The unit has adjustable wicket gates operated by headwater float control. The average annual generation for the twenty year period through 1990 was 3,869,000 kwh. (applicant's response to FERC AIR No. 9) Except for routine monitoring, inspection, and maintenance, the plant is operated automatically and unattended.

12. The powerhouse substation is located north and adjacent to the power canal. A 12.5 kv transmission line carries output from the facility to the Bay Street Substation located in St. Johnsbury.

III. River Hydrology and Streamflow Regulation

13. The drainage area at the dam is 428 square miles. A gaging station has been operated by the U.S. Geological Survey below Passumpsic Dam since October 1928. The drainage area at the gage is 436 square miles. Several of the flow parameters for the project have been estimated using the gage data and are shown in the following

table. Some of the parameters may be influenced by the artificial flow regulation caused by upstream hydroelectric projects.

Table 1. Hydrologic Parameters at Project.

Parameter	Value
Mean runoff	731 cfs (23.20 in/yr)
7Q10	86 cfs
95% Exceedance	128 cfs
50% Exceedance	398 cfs
10% Exceedance	1670 cfs

14. The project hydraulic capacity is 195 cfs to 460 cfs.

15. Present operation of the project is as a daily peaking plant with headpond drawdown from storage of one foot. Currently, when there is no spillage at the dam and when the powerhouse is shut down, 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.

18. The applicant originally proposed to maintain a continuous spillage of 1.0 inch of water over the 248-foot dam crest. Using a standard weir equation, the applicant had estimated this flow to be about 20 cfs. Upon the completion of FERC AIR No. 3 bypass habitat study, the applicant proposed to increase the spillage to 0.1 feet, or 26 cfs. The corresponding target minimum headpond elevation would be 521.08 feet.

---

[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.

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 automated (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 fixed level one inch above the target headpond elevation, or 0.18 foot above the top of the flashboards. It is important to note that this would result in a variable bypass flow of about 26 cfs to 114 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 230 cfs, downstream during the refill period which would last for about one hour. In cases when the inflows are substantially less than 230 cfs, the refill time would become more extended.

21. Flashboard leakage would not be sealed until after the impoundment refills. However, no provision is made for maintaining the proposed bypass flow during flashboard replacement.

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

IV. Bypass

23. The project bypasses 350 feet of river. The upper third consists of a cascade over bedrock. The lower two-thirds consists of deep pool-like runs over a substrate of very irregular bedrock, boulders, cobble, and some gravel. There is a pronounced gravel bar on the north side of the bypass at the base of the falls.

24. The bypass is virtually dewatered for much of the year by the present operating mode of the project, receiving only leakage from

the dam. No leakage estimates from the dam have not been made available.

V. Standards Designation

25. The Passumpsic River in the project-affected reach is designated by the Water Resources Board as Class B waters. The project impoundment comprises the lower end of a waste management zone that receives the discharge from the St. Johnsbury municipal wastewater treatment facility. The Water Resources 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.

26. 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)

27. 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.

28. The dissolved oxygen standards for cold water habitat 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 3-03(B))

29. 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))

30. Section 2-02 Hydrology of the Vermont Water Quality Standards requires that "[t]he 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

31. The application presents data from limited water quality sampling done by the applicant in 1986 and 1988. Subsequent to these sampling periods, the Town of St. Johnsbury upgraded its wastewater treatment facility from primary to secondary. The earlier data cannot, therefore, be used in assessing the project's impact on river's dissolved oxygen regime.

32. The Town of St. Johnsbury wastewater treatment facility, with a design capacity of 1.6 mgd has the largest discharge on the river and is an important influence on the river's dissolved oxygen regime. Based on 1993 records, the facility is at 68% of its design capacity.

33. The application includes a supplemental report for the 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, no samples at the Passumpsic Project stations were less than 90% saturation; however, substantial algal influence was apparent. All samples in the impoundment just upstream of the dam were at or above saturation. Algal respiration will become an important influence on dissolved oxygen levels as the St. Johnsbury wastewater plant loading increases in the future.

34. Aquatec's analysis of reaeration coefficients demonstrated a significant aeration efficiency for spillage at the Passumpsic Dam. According to Aquatec's study report, 60% of a dissolved oxygen

deficit is eliminated through spillage and bypass-reach reaeration. (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

35. 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.

36. 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

37. A free-flowing reach of about three miles exists between the project tailrace and the East Barnet Hydroelectric Project impoundment. Joes Brook enters the river in this reach.

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

39. Artificial flow regulation below the tailrace is anticipated to occur during impoundment refilling following flashboard reinstallation. The applicant proposes to release 230 cfs (0.54 csm) or half of inflows during the refill period.

Bypass

40. 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 resident adult resident salmonids (brown and rainbow trout) and limited habitat for juvenile Atlantic salmon and the other life stages of resident salmonids and a variety of non-game fishes.

41. The project bypass will continue to be subject to artificial flow regulation. It contains excellent habitat ("pocket water") for adult salmonids. Cover and velocity refuges, in the form of large substrate objects and pockets of deep water, are abundant. (Memorandum from Leonard Gerardi, District Fisheries Biologist, to Department, October 21, 1991)

42. With sufficient flows, the Passumpsic bypass also constitutes an area of macroinvertebrate production. Aquatic insects are a primary food source for fish and an important component of the food chain.

43. 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 original scope of the study was to conduct assessments of habitat for the rainbow trout adult life stage at study plan target flows of 20 cfs, 55 cfs, 90 cfs, 150 cfs, and 211 cfs. The actual flows assessed were determined to be 26 cfs, 74 cfs, 110 cfs, 165 cfs, and 211 cfs.

44. By letter dated March 24, 1993 the Agency requested that flows be measured in the bypass using wading measurements where physically possible and that the head on the dam be monitored but not be used as the exclusive means of estimating flow. Estimation of flow using the weir formula is imprecise and fails to account for leakage.

45. The applicant claims that it was not possible to measure flows as requested by the Agency due to the irregular characteristics of the bypass, the nature of the substrate with its ledge and large boulders, and the lack of opportunity to measure laminar flow regardless of where a transect is located. No attempt made to calibrate the weir equation coefficient.

46. The habitat/flow relationship for the rainbow trout adult life stage was qualitatively described by estimating the cell-width-weighted mean habitat suitability index for each of the two transects at each of the study flows. The areal extent of available habitat was not quantified. The results are contained in the following table.

Table 2. Results of habitat study in bypass.

Flow (cfs)	Rainbow Tr. Adult Habitat HSI	
	Transect 1	Transect 2
26	0.48	0.56
74	0.57	0.60
110	0.76	0.71
165	0.81	0.78
211	0.80	0.35

47. Over the range of flows from 26 cfs to 165 cfs, wetted width increased only 8% (Transect 1) and 12% (Transect 2). The values shown in Table 2 could be adjusted by the ratios of wetted width to the wetted width at the lowest flow, 26 cfs, in order to provide more quantitative representations of habitat, but the relatively small change in wetted widths do not warrant such an adjustment in this case.

48. Based on the weighted average HSI available for each transect at each of the target flows, a flow of 165 cfs provides the best habitat conditions in the bypass, displaying improvements of 69% (Transect 1) and 39% (Transect 2) over the 26 cfs. Table 3 displays the percentage of rainbow trout habitat lost in reducing bypass flows below 165 cfs. A flow of 86 cfs (7Q10) is included, using an interpolation of the data in Table 2.

Table 3. Habitat loss from reducing flows below 165 cfs.

Flow (cfs)	Percentage of habitat lost	
	Transect 1	Transect 2
26	41	28
74	30	23
86	22	18
110	6	9

Impoundment

49. Fisheries habitat in the project impoundment area 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 as depths are shallow relative to lakes and ponds and retention times short.

50. Flashboard loss and 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 drawdowns occur.

Fish Passage

51. A Strategic Plan for the Restoration of Atlantic Salmon to the Connecticut River Basin (1982) identifies the Passumpsic River as potential non-natal smolt production habitat for stocking consideration at such time in the future that the program's hatchery fry production capacity expands 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. 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 97% of the habitat above Passumpsic Dam.

52. 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 an upstream tributary of the Passumpsic River and was selected for salmon stocking

because it has excellent physical habitat conditions and because its warmer than average temperature regime is likely to be 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. Passage is an existing need at the Passumpsic Project and the Gage Project and will be needed for outmigration in 1995 at Arnold Falls and Pierce Mills as well.

53. 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-48). The restoration plan was last revised in September 1982 and is once again under revision. For the life of the project, any passage facilities at Passumpsic Dam should be provided and operated consistent with the most current restoration plan.

54. 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.

55. Upstream passage facilities are currently not needed as part of the restoration plan, as the Passumpsic River is not currently 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 (USF&WS) reviews. Expansion of and/or changes in the plans for the river may necessitate upstream passage facilities in the future. (USF&WS December 23, 1993 comment letter to FERC)

56. Resident populations of trout occur both above and below Passumpsic Dam and would benefit from fish passage facilities that would help accommodate their movements within the river system.

VIII. Water Quality - Wildlife and Wetlands

57. 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.

58. 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.

59. 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

60. A population of Garber's sedge (Carex garberi) is located below the dam in sandy pockets on ledges on the left (south) side of the river at the lower end of the bypass. Garber's sedge is on the Vermont threatened species list. The species is found in moderate abundance and about 50 fruiting culms were observed in June 1991. The population covers a relatively small area of two or three square yards. The plants are in an area that is covered by high water each spring. The applicant does not propose any construction or operational activities at the site that would be incompatible with the protection of the habitat for the Garber's sedge plant.

X. Water Quality - Shoreline Erosion and Impoundment Desilting

61. The impounded reach of the Passumpsic River above the project dam forms a meander pattern as the river cuts through flat, broad floodplain deposits. The river is actively eroding its banks in this reach. There are many locations where the riverbanks show fresh, unvegetated scars with trees toppling into the river.

62. The applicant retained a geotechnical engineer to evaluate the streambank erosion in the impounded reach. The consultant was of

the opinion that the erosion is a natural process not accelerated by the project.

63. Impoundment desilting can result in significant degradation of water quality if not executed properly. Desilting has never been required at this project according to the applicant. Development of a desilting plan is, therefore, unnecessary at this time. The applicant proposes to consult with the Agency should a need to desilt arise in the future.

XI. Water Quality - Recreation and Aesthetics

64. 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)

65. 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 is attained.

66. 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.

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

68. 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. Access to the river is limited, however. The applicant's lands have always been open to such recreational endeavors.

69. One of the most limiting factors to boating the river is the lack of provisions for portaging the applicant's dam. The dam impairs boating on a navigable river. Recreation is a designated use for the Passumpsic River. Where designated uses have been impaired or

eliminated, all reasonable steps should be taken to restore such uses.

70. The Appalachian Mountain Club publication River Guide - New Hampshire/Vermont, 2cd ed., 1989 describes canoeing the river in the project area. According to the guide, the river is quickwater from below Gage Station to the Passumpsic Dam. "An easy portage starts under the bridge, then through the power station parking lot. In the next 2½ miles there are four ledges. The first one, under the railraod bridge within sight of the dam, is the most difficult and can be lined if desired. The others are easily run. The third is immediately below the confluence on the right where the Water Andric drops over a scenic waterfall framed by the arch of a railroad bridge. This section of the river is very lovely."

71. Referencing the applicant's March 1991 Site Assessment concept proposal (Appendix G, License application), portage facilities are depicted on river right, with a put in off of the railroad right-of-way. However, the siting has not yet been finalized.

72. A small picnic/day-use area is to be developed between the dam and the bridge on the right (west) side of the river will allow visitors to view the river and head of the falls. Improved parking is planned for the existing parking area next to the substation. Landscaping is proposed to enhance the visual appearance of the entrance to the facility.

73. Bank fishing will be provided near the portage take-out location. Disabled visitors to the project will be enabled access to the parking facilities only. Grades within the parking area are not in excess of 8% slope.

74. The applicant proposes to develop and maintain its proposed recreational facilities. However, it states that it will remove improved recreational facilities and may restrict open access if vandalism becomes a problem.

75. The project boundary is very limited, encompassing the project civil works, tailrace, dam, and the impoundment flowage. A path for river access exists over this land and provides the only route for reaching the falls area, but is not within the project boundary.

76. The Passumpsic powerhouse and project lands are attractive river-related features in the Passumpsic village area.

77. Spillage over the dam is important to the appearance of the site and will contribute to the public recreational enjoyment. Falling water has a strong visual appeal, and without sufficient spillage over the dam the site would context and its attractiveness would suffer. 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

78. 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)

79. 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." (Title 10, Section 5403(a)) Disturbance of a endangered or threatened species is considered a taking. (Title 10, Section 4001)

80. The applicant does not propose any construction or operational activities at the site that would be incompatible with the protection of the habitat for the Garber's sedge plant.

Agency Regulatory Powers over Fish and Wildlife

81. 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."

82. 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

83. The Department 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.

Passumpsic River Watershed Comprehensive River Plan

84. 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

85. 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.

86. 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.

87. Enhancement of access, provision of a portage, and improved flow management would be compatible with this policy and balance competing uses of the river for recreation and hydropower. Nonassurance of access or failure to provide a convenient portage trail would exacerbate a critical state recreational problem.

88. 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."

89. 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.

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

Vermont Comprehensive Energy Plan

91. 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.

92. Prescription of an appropriate minimum flow for the bypass is important to project economics. The response to AIR No. 8 (September 1993) provides the energy output losses for a range of minimum bypass flows from 20 to 211 cfs. A continuous special release of 26 cfs would reduce project output by about 210 mwh, or 5% of the average annual energy output, for the 30-year term of the federal license; a special release of 110 cfs year round, would result in about a 860 mwh, or a 22%, reduction in output.

93. 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)

94. 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

95. The conversion of the Passumpsic Project 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. As the flashboards are only one foot in height, significant impacts on the upstream habitat and water quality is not expected.

96. Major drawdowns for construction or repair would have to be reviewed case specifically to insure protection of the upstream resource.

Bypassed reach

97. 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.

98. The applicant proposes to maintain a 26 cfs bypass release during the summer period; 26 cfs is only 30% of the 7Q10 drought flow condition (86 cfs, or 0.20 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 195 cfs, which with the applicant's proposed operating mode would require about 0.52 csm in order to operate.

99. 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.

100. 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 minimum bypass flow of 26 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.

101. A spillage flow in the bypass reach of 86 cfs would be sufficient to provide a moderate level of habitat for adult salmonids; about 80% of the habitat achieved at the optimum flow of 165 cfs would remain. When flows recede below 281 cfs, or 0.66 cfs (86 cfs plus 195 cfs, the minimum station hydraulic capacity), all flows would be discharged into the bypass.

102. Based on the video assessment completed by the applicant, the proposed spillage flow of 26 cfs 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

103. 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.

104. 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

105. During special events when water must be placed in storage, the applicant proposes to release 230 cfs (0.54 csm) or half of inflows 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 Passumpsic Project, these aquatic base flows are 1712 cfs (4.0 csm), 428 cfs (1.0 csm), and 214 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.

106. 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 spring period, the aquatic base flow is substantially higher than project capacity; flashboard replacement will only be possible during lower inflows. The 90% requirement would apply during this period. For the summer and fall/winter periods, the 90% requirement would apply to inflow conditions less than the 214 cfs and 428 cfs standards, respectively.

Fish Passage

107. Because of past stocking, operational passage facilities for outmigration is a present need at Passumpsic Dam. 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.

108. 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.

109. 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)

110. Any passage facilities at Passumpsic Dam must be provided and operated consistent with the most current restoration plan.

Streambank erosion

111. The applicant's proposed operating mode will reduce the potential for erosion problems to develop in the future.

Recreation

112. Provision of a portage and continued 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.

113. Although the applicant proposes to develop and maintain its proposed recreational facilities, it states that it may restrict open access if vandalism becomes a problem. Arbitrary restriction of public access to the river would impair recreational use and enjoyment of the resource.

114. The applicant's spillage proposal of 26 cfs is satisfactory for aesthetics.

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 86 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.

   The applicant shall file for review and approval, within 90 days of the issuance of this certificate, 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 the flashboards in place, including conditions when the impoundment is being 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 214 cfs from June 1 to September 30 and 428 from October 1 to May 31. During the period April 1 to May 31 or under

circumstances during the summer and fall/winter periods when the natural inflow to the project is insufficient to permit both passage of these minimum flows 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 certificate, a plan for monitoring impoundment levels and 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 impoundment levels and 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 monitoring provided the applicant satisfactorily demonstrates that the required flows 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 no later than six months from license issuance. 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 certificate.

I. The applicant shall provide a canoe portage around Passumpsic Dam by October 1, 1995. The applicant shall consult with the Recreation Section of the Department of Forests, Parks and Recreation and the Department of Environmental Conservation in the planning, siting, and design of the portage. Design and maintenance plans for the portage shall be filed with the Department of Environmental Conservation and the Department of Forests, Parks and Recreation for review and approval before construction of the portage.

J. The applicant shall allow continued public access to the project area for utilization of 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.

K. 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.

L. 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.

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

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.

Barbara Ripley
Secretary
Agency of Natural Resources

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

cc: distribution list

jeff\c:\wp51\files\hydrodam\passump\pass\401\6f_passu.401

APPENDIX B

KEY PROJECT FEATURES AND PROJECT ZONES OF EFFECT

PHOTO 1 PASSUMPSIC DAM

PHOTO 2 **FISH DIVERSION RACKS AT HEAD OF POWER CANAL (NOW LOCATED IN FRONT OF THE INTAKE)**

PHOTO 3 POWER CANAL AND POWERHOUSE

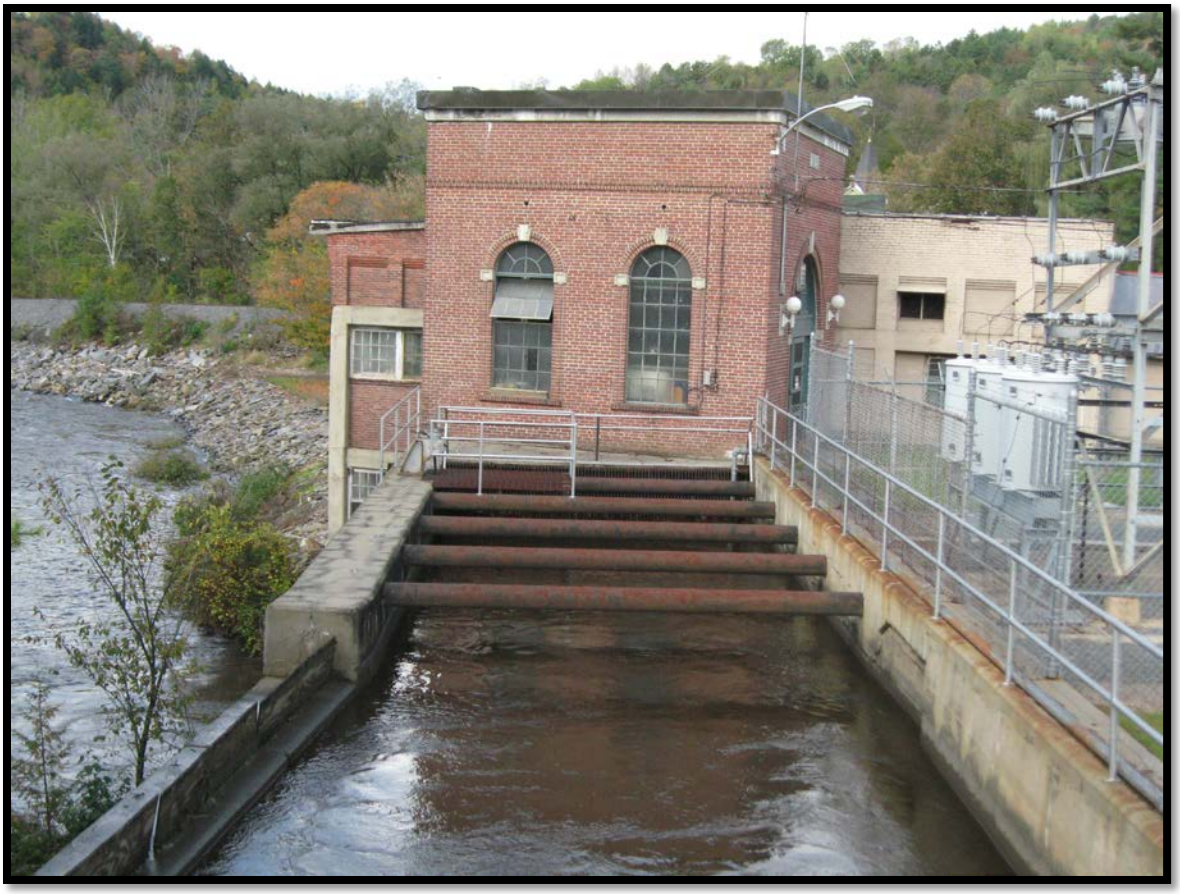

PHOTO 4 POWER CANAL, POWERHOUSE, AND TAILRACE

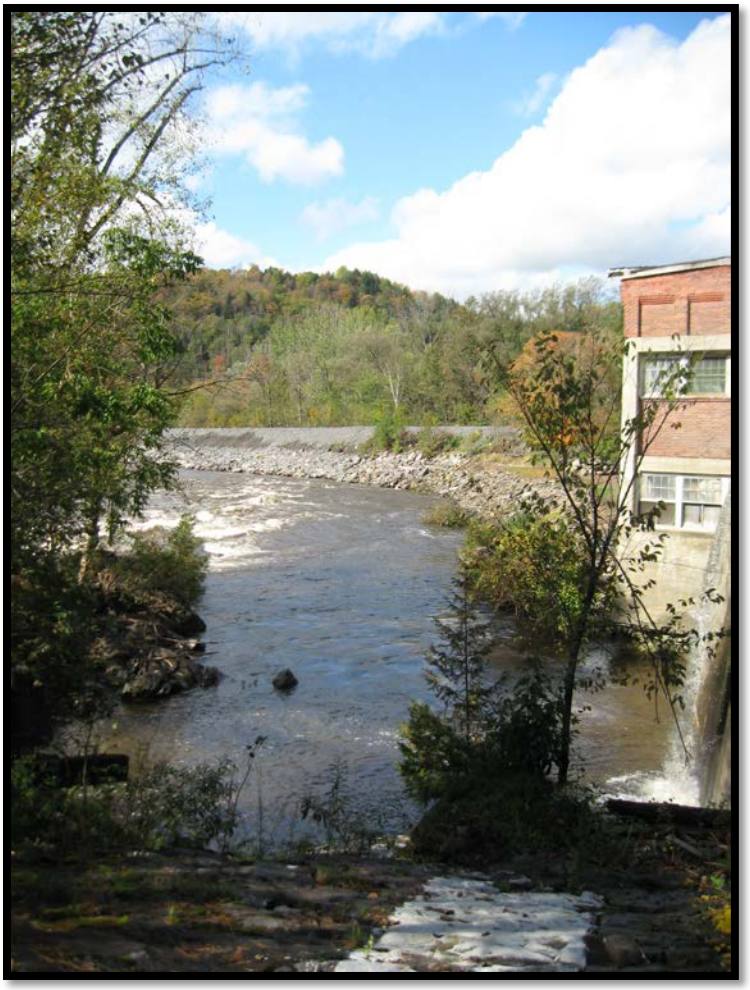

PHOTO 5 TAILRACE

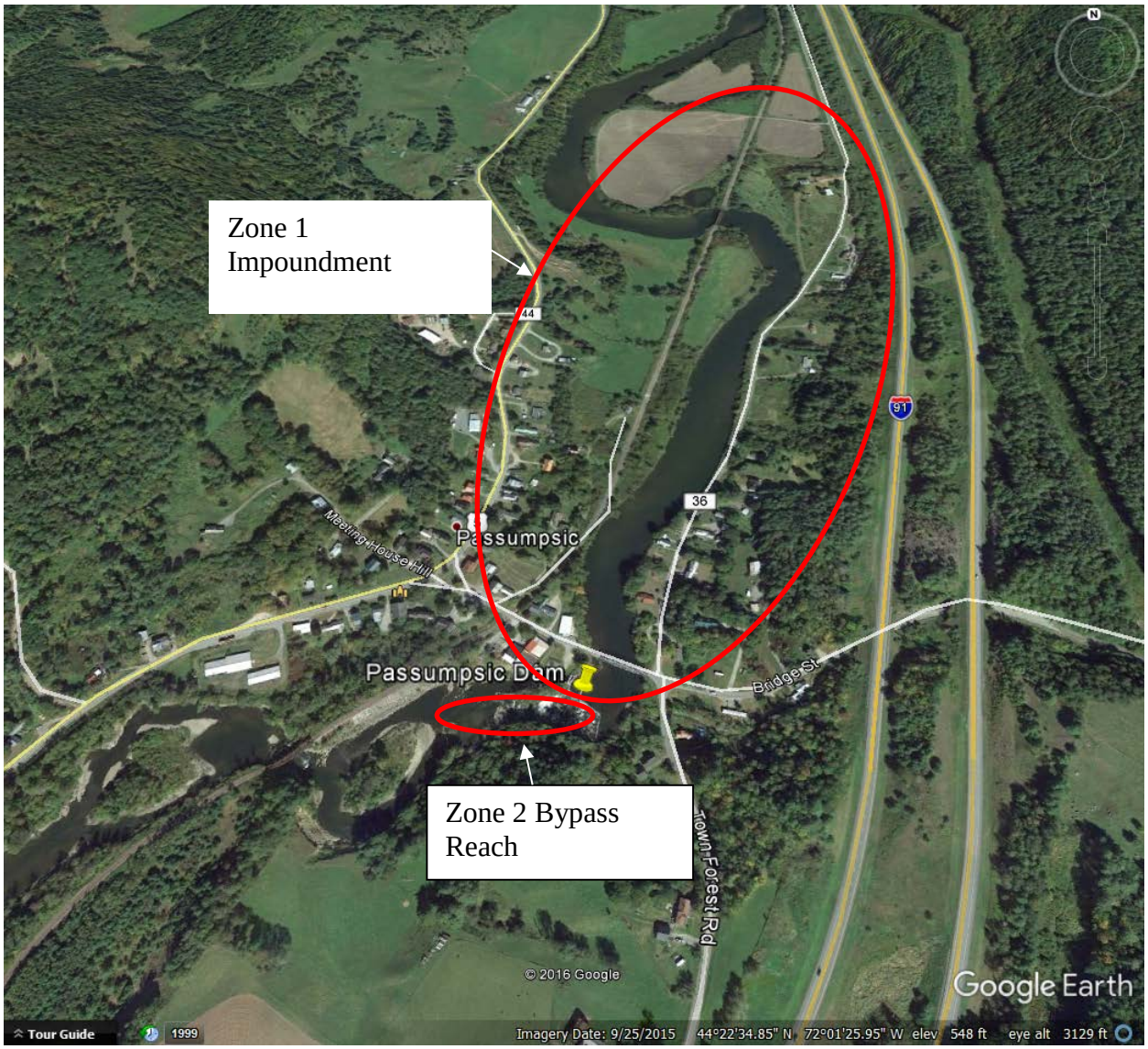

PHOTO 6 ZONES OF EFFECT: ZONE 1 IMPOUNDMENT AND ZONE 2 BYPASS REACH

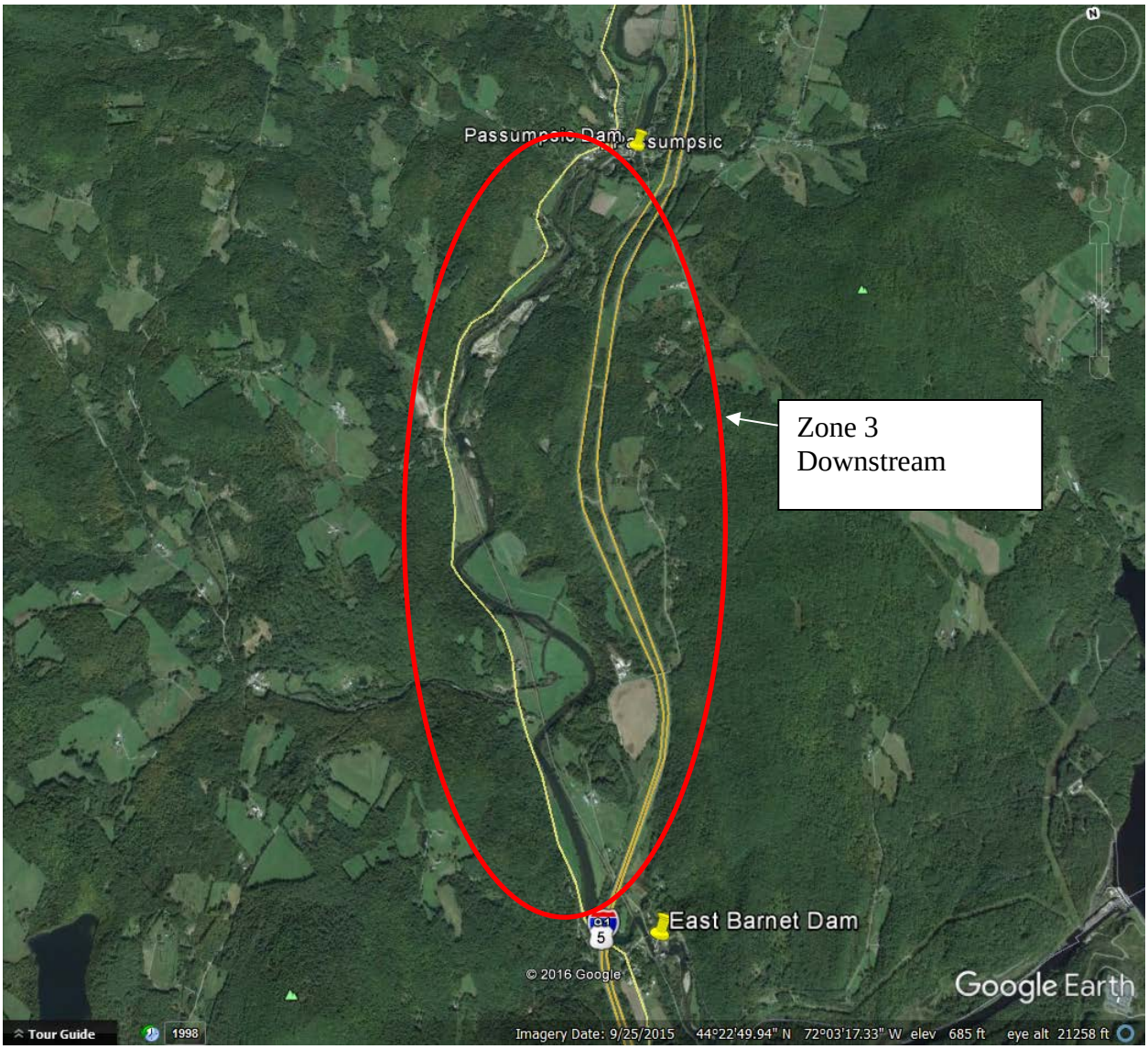

PHOTO 7 ZONE OF EFFECT: ZONE 3 DOWNSTREAM

APPENDIX C

AERIAL PHOTOS OF FACILITY AREA AND PROJECT DRAWINGS

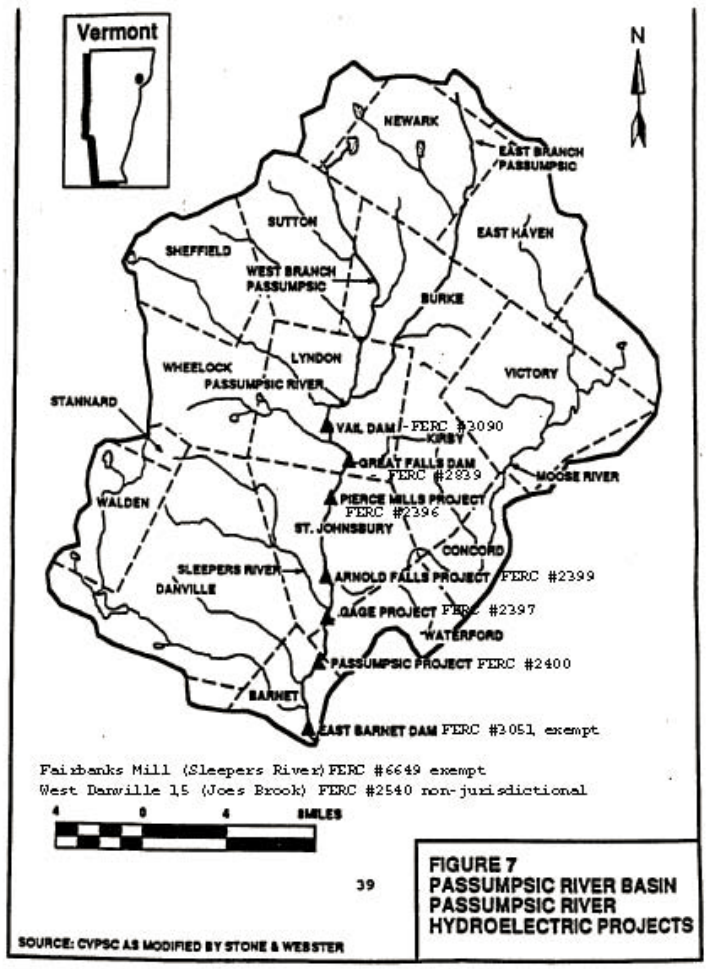

FIGURE 4 PASSUMPSIC RIVER BASIN

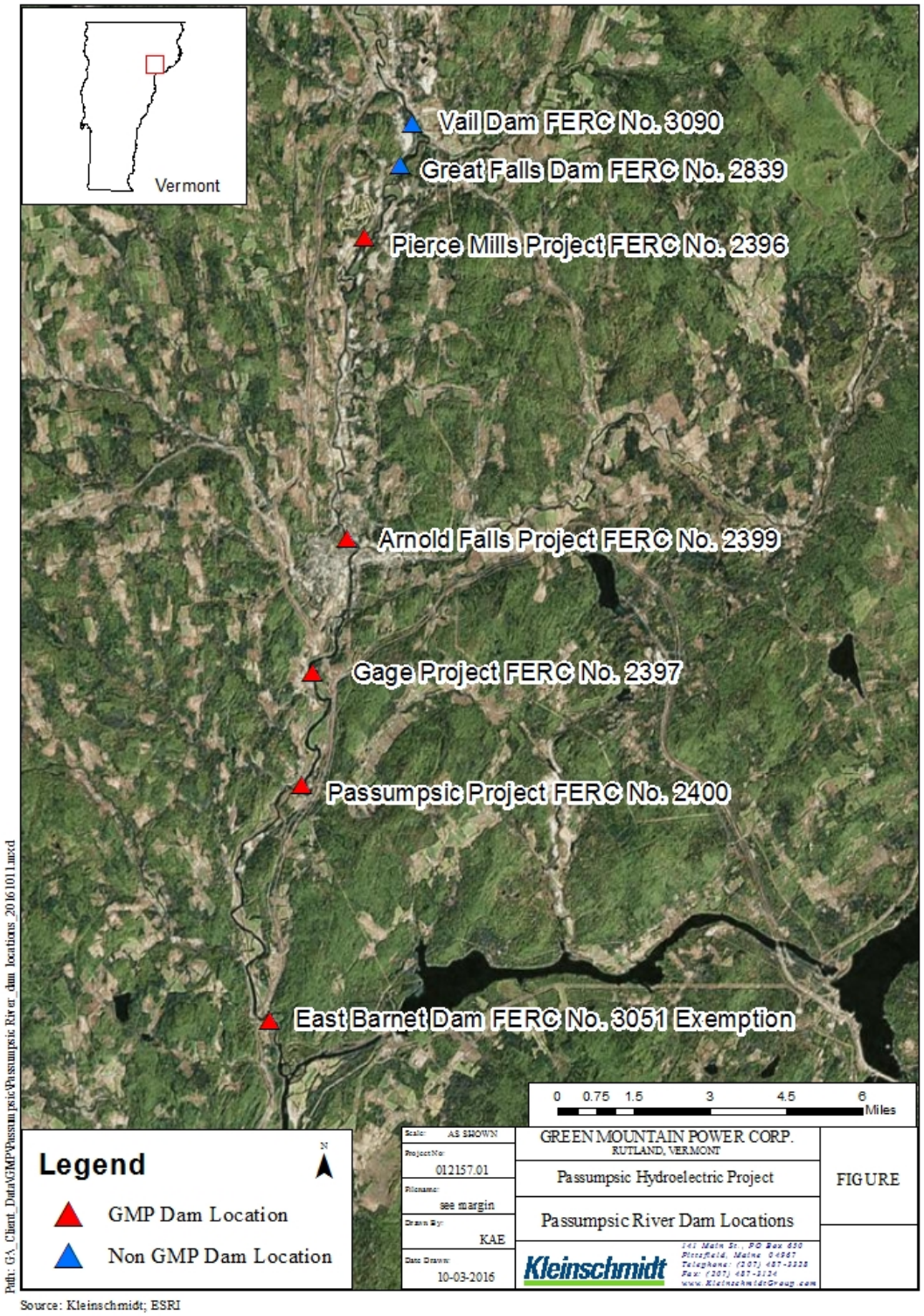

FIGURE 5 PASSUMPSIC RIVER HYDROELECTRIC FACILITY LOCATIONS

APPENDIX D

WATER QUALITY

From:	Davis, Eric
To:	Katie Sellers
Cc:	Kayla Easler
Subject:	RE: Passumpsic Hydroelectric Project - Review for LIHI Re-Certification
Date:	Friday, January 27, 2017 9:23:49 AM
Attachments:	image002.png

Good morning Katie,

Your description of the waters affected by the Passumpsic project is accurate. I can confirm that Passumpsic River in the area of the project is 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.

Given the Passumpsic project is a true run-of-river project, the current operations of the Passumpsic 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, January 04, 2017 11:09 AM
To: Davis, Eric <Eric.Davis@vermont.gov>
Cc: Kayla Easler <Kayla.Easler@KleinschmidtGroup.com>
Subject: Passumpsic Hydroelectric Project - Review for LIHI Re-Certification

HI Eric, I am working on another LIHI re-certification application for Green Mountain Power: Passumpsic Hydroelectric Project (FERC No. 2400) 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-affected reach is designated by the Water Resources Board as Class B waters. The Project impoundment comprises the lower end of a waste management zone that receives discharge from the St. Johnsbury municipal wastewater treatment facility. 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). This is also confirmed within the 2016 State of Vermont 303(d) List of Impaired Waters (http://dec.vermont.gov/sites/dec/files/documents/WSMD_mapp_303d_Part_A_2016_final_complete.pdf).

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?

Thank you and happy new year!
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: Passumpsic Project - Operations Data for LIHI Application
Date: Wednesday, June 06, 2018 9:11:00 AM
Attachments: Passumpsic 1999 Turbine Rating Curve.pdf

This message contains attachments delivered via ShareFile.

- 2015-2016 Passumpsic Operations Data_FINAL.xlsx (21.2 MB)

Download the attachments by clicking here.

Morning Eric,
Kleinschmidt, on behalf of GMP, herein provides one-year (2015-2016) of Passumpsic Hydroelectric Project (FERC No. 2400) operations data for review. This operations data is being supplied to the Vermont Department of Environmental Conservation (VDEC) for verification of Project compliance with the VDEC Water Quality Certificate conditions, as requested for Low Impact Hydropower Institute certification application review.

The attached 2015-2016 data depicts project generation, headpond level, river flow, and flashboard data to display operations occurring at the Passumpsic Project. As depicted in the attachment cover pages, flow data was obtained from USGS gage 01135500 – Passumpsic River at Passumpsic, VT. Strict run-of-river operations are represented well across the dataset. Fluctuations in headpond levels shown correlate to changes in river flow and are generally not products of operations.

In addition, please find a 1999 turbine rating curve for the Passumpsic Plant.

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 or myself, as GMP staff are available to provide background information or further explanation as needed.

Thank you for your ongoing help with GMP's LIHI applications,
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 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-0189 November 02, 2016
Event Code: 05E1NE00-2017-E-00233
Project Name: Passumpsic Hydroelectric Project FERC No. 2400

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: Passumpsic Hydroelectric Project FERC No. 2400

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-0189
Event Code: 05E1NE00-2017-E-00233

Project Type: DAM

Project Name: Passumpsic Hydroelectric Project FERC No. 2400
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
Subject:	RE: Passumpsic Hydroelectric Project - Review for LIHI Re-Certification
Date:	Wednesday, January 04, 2017 2:33:29 PM
Attachments:	image002.png

Thanks Katie, that helps.

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, January 04, 2017 2:23 PM
To: Buck, John <John.Buck@vermont.gov>; Kratzer, Jud <Jud.Kratzer@vermont.gov>; Darling, Scott <Scott.Darling@vermont.gov>
Cc: Kayla Easler <Kayla.Easler@KleinschmidtGroup.com>
Subject: RE: Passumpsic Hydroelectric Project - Review for LIHI Re-Certification

Thanks John. I have attached a google earth snippet of the Project location for your reference.

We will be starting the permit process for this project shortly (USACE Permit and Vermont Water Quality Certificate Approval needed) and will take appropriate steps should eagles appear in the area.

Thank you,
Katie

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

From: Buck, John [mailto:John.Buck@vermont.gov]
Sent: Wednesday, January 04, 2017 1:22 PM
To: Katie Sellers <Katie.Sellers@KleinschmidtGroup.com>; Kratzer, Jud <Jud.Kratzer@vermont.gov>; Darling, Scott <Scott.Darling@vermont.gov>
Cc: Kayla Easler <Kayla.Easler@KleinschmidtGroup.com>
Subject: RE: Passumpsic Hydroelectric Project - Review for LIHI Re-Certification

Hi Katie,
Would you please send a location map? Bald Eagle is probably the only listed bird species in the area and there is likely not a nest close enough to the project to be affected. But Just to reiterate, should there be one that we haven't discovered or an eagle pair decides to build one prior to construction, then all necessary steps, including construction postponement, must be taken to prevent disturbance.
Thank you,
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, January 04, 2017 11:24 AM
To: Kratzer, Jud <Jud.Kratzer@vermont.gov>; Darling, Scott <Scott.Darling@vermont.gov>; Buck, John <John.Buck@vermont.gov>
Cc: Kayla Easler <Kayla.Easler@KleinschmidtGroup.com>
Subject: Passumpsic Hydroelectric Project - Review for LIHI Re-Certification

Hi Jud, Scott, and John,

I am working on another LIHI re-certification application for Green Mountain Power: Passumpsic Hydroelectric Project (FERC No. 2400) a run-of-river project located on the Passumpsic River.

Upon reviewing the USFWS IPAC Report and FERC's 1994 EA 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 the list to confirm that the Project continues to not negatively impact any of the currently listed species that may occur within the Project area?

Species List:
Northern long-eared bat
Bald eagle
Garber's sedge

Upcoming changes at the project will involve construction of a new downstream fish passage facility that will be attached via brackets to the Project's existing power canal. At this time the construction does not involve the removal of trees or vegetation. Construction is scheduled to begin in spring/summer 2017.

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:	Katie Sellers
To:	"Darling, Scott"
Cc:	Kayla Easler
Subject:	RE: Passumpsic Hydroelectric Project - Review for LIHI Re-Certification
Date:	Wednesday, January 04, 2017 4:41:00 PM
Attachments:	image002.png

Thanks Scott for providing the review and feedback.

Best,
Katie

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

From: Darling, Scott [mailto:Scott.Darling@vermont.gov]
Sent: Wednesday, January 04, 2017 4:38 PM
To: Katie Sellers <Katie.Sellers@KleinschmidtGroup.com>
Subject: RE: Passumpsic Hydroelectric Project - Review for LIHI Re-Certification

Katie:
Thanks for providing the details we need to assess potential impacts to the northern long-eared bat. Because no trees will be cut for the project, there will be no impacts to this state and federally listed species.

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, January 04, 2017 11:24 AM
To: Kratzer, Jud <Jud.Kratzer@vermont.gov>; Darling, Scott <Scott.Darling@vermont.gov>; Buck, John <John.Buck@vermont.gov>
Cc: Kayla Easler <Kayla.Easler@KleinschmidtGroup.com>
Subject: Passumpsic Hydroelectric Project - Review for LIHI Re-Certification

Hi Jud, Scott, and John,

I am working on another LIHI re-certification application for Green Mountain Power: Passumpsic Hydroelectric Project (FERC No. 2400) a run-of-river project located on the Passumpsic River.

Upon reviewing the USFWS IPAC Report and FERC's 1994 EA 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 the list to confirm that the Project continues to not negatively impact any of the currently listed species that may occur within the Project area?

Species List:
Northern long-eared bat
Bald eagle
Garber's sedge

Upcoming changes at the project will involve construction of a new downstream fish passage facility that will be attached via brackets to the Project's existing power canal. At this time the construction does not involve the removal of trees or vegetation. Construction is scheduled to begin in spring/summer 2017.

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


Kleinschmidt
50
1968-2018

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:	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

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