

# LOW-IMPACT HYDROPOWER POWER INSTITUTE CERTIFICATION APPLICATION

## GAGE HYDROELECTRIC PROJECT (FERC No. 2397)



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## GAGE HYDROELECTRIC PROJECT (FERC No. 2397)

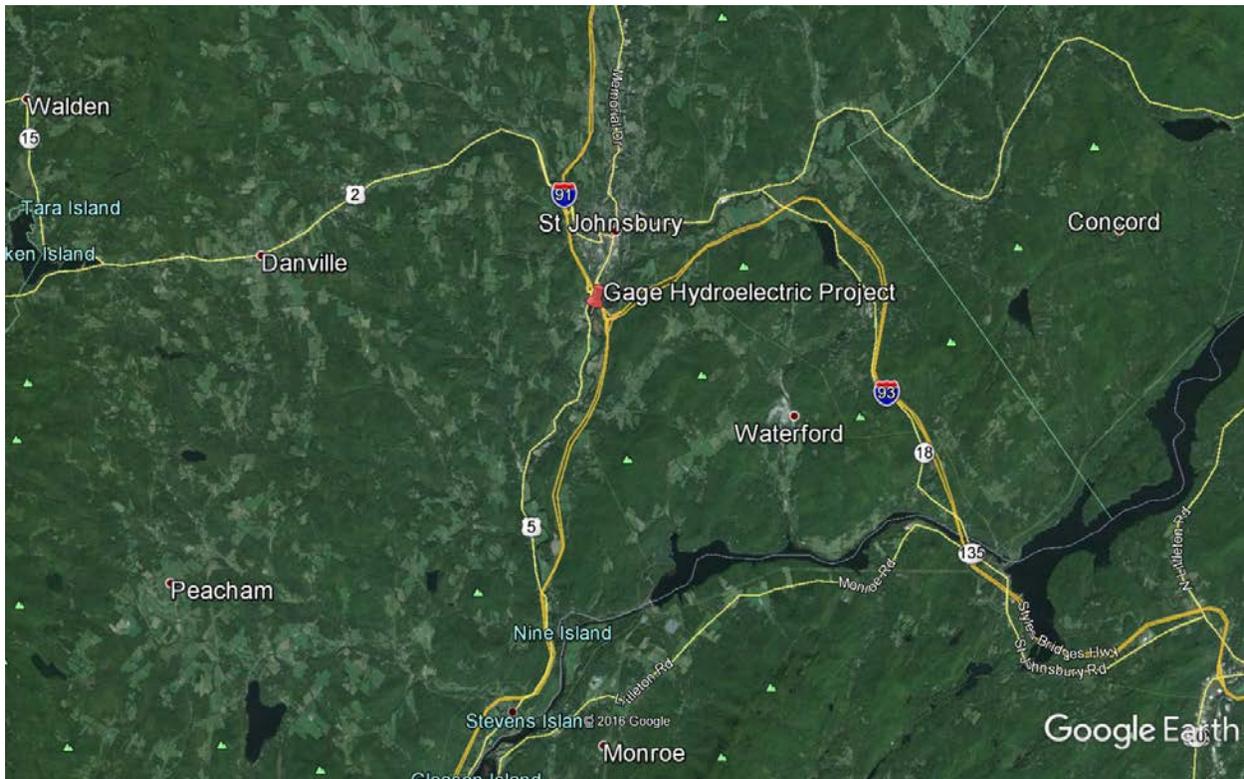
### 1.0 FACILITY DESCRIPTION

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The Gage Hydroelectric Project (FERC No. 2397) (Project) is located at river mile (RM) 7.2 on the Passumpsic River (a major tributary of the Connecticut River) in St. Johnsbury, Vermont (Figure 1 and Figure 2). The Project's hydroelectric facilities are owned and operated by the Green Mountain Power Corporation (GMP or Licensee), formerly Central Vermont Public Service Corporation. The Gage Project is the third most downstream of seven dams located on the Passumpsic River (Appendix B).



**FIGURE 1 GAGE HYDROELECTRIC PROJECT OVERVIEW**



**FIGURE 2 GEOGRAPHIC OVERVIEW OF GAGE HYDROELECTRIC PROJECT LOCATION**

The Gage Project was built in 1919-1920 by the Twin State Gas & Electric Company. The dam was destroyed in the flood of 1927, although the powerhouse was largely undamaged. A concrete dam was later constructed in 1929.

The Project powerhouse is among a limited number of buildings constructed entirely of steel and concrete, without the brick facade typical of 1920's powerhouses. The remains of the first hydroelectric station in St. Johnsbury, reportedly built in 1898, are tied into the north abutment of the Gage dam and support the cableway tower.

On December 8, 1994, the Federal Energy Regulatory Commission (FERC) issued a 40-year license for the Gage Hydroelectric Project. As licensed, the Project consists of: 1) a concrete gravity dam consisting of a) a north section, 176-feet-long by maximum height of 13-feet, with a crest elevation of 534.2 feet msl and topped with 6-foot-high flashboards; b) a center section, 30-foot-long, with a crest elevation 542.1 feet msl; and c) a south section, 43-foot-long by 18-foot-high, with a crest elevation of 538.9 feet msl and a 6-foot-wide sluice and topped with 1-foot-high flashboards; 2) a 51-foot-wide headgate structure with four headgates; 3) a power canal 90-foot-long by 44-foot-wide by 16-foot-deep that conveys flow to the powerhouse via an integral

intake with an inclined trashrack; 4) a powerhouse 27-feet-wide by 60-feet-long housing two vertical shaft turbines rated at 365 kW (Unit 1) and 522 kW (Unit 2) and generators rated at 300 kW (Unit 1) and 400 kW (Unit 2); 5) a substation situated adjacent to the power canal; 6) a 15.2-acre impoundment extending 3,400 feet upstream with a water surface elevation of 539.9 feet msl and 13.8 acre-feet of usable storage; and 7) appurtenant facilities including a downstream fish passage facility consisting of a spillway sluiceway located adjacent to the canal headworks. The bypassed reach at Gage includes a 2-acre plunge pool and about 120-feet of riffle habitat.

The Project operates in a run-of-river mode to preserve water quality, aquatic and riparian habitats, and aesthetic and recreational flows in the Passumpsic River. The Licensee provides a minimum instantaneous flow of 142 cfs from October 1 to May 31 and 82 cfs from June 1 through September 30, or inflow, whichever is less, into the bypassed reach to enhance aquatic habitat. Downstream fish passage is provided through the spillway sluiceway from April 1 – June 15 and September 15 – November 15.

**TABLE 1 FACILITY DESCRIPTION INFORMATION FOR GAGE HYDROELECTRIC PROJECT (LIHI # 94)**

<b>INFORMATION TYPE</b>	<b>VARIABLE DESCRIPTION</b>	<b>RESPONSE (AND REFERENCE TO FURTHER DETAILS)</b>
<i>Name of the Facility</i>	Facility name (use FERC project name if possible)	Gage Hydroelectric Project (FERC No. 2397)
<i>Location</i>	River name (USGS proper name)	Passumpsic River
	River basin name	Passumpsic River Basin
	Nearest town, county, and state	St. Johnsbury, Caledonia County, Vermont
	River mile of dam above next major river	River Mile 7.2
	Geographic latitude	44.3979
	Geographic longitude	-72.0235
<i>Facility Owner</i>	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
<i>Regulatory Status</i>	FERC Project Number (e.g., P-xxxxx), issuance and expiration dates	FERC No. 2397. A 40-year license was issued on December 8, 1994, and expires on November 30, 2034.
	FERC license type or special classification (e.g., "qualified conduit")	Minor Project License
	Water Quality Certificate identifier and issuance date, plus source agency name	A Water Quality Certificate (WQC) was issued by the Vermont Department of Environmental Conservation <sup>1</sup> (Vermont DEC) on June 16, 1994.
	Hyperlinks to key electronic records on FERC e-library website (e.g., most recent Commission Orders, WQC, ESA documents, etc.)	1994 License: <a href="http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1719651">http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1719651</a>

<sup>1</sup> The Vermont DEC is a branch within the Vermont Agency of Natural Resources.

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
		<p>1994 WQC: Please see Appendix C (not available online).</p> <p>Transfer of License to GMP:  <a href="http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14065804">http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14065804</a></p>
<i>Power Plant Characteristics</i>	Date of initial operation (past or future for operational applications)	The Project first started generating power in 1921.
	Total name-plate capacity (MW)	0.7 MW
	Average annual generation (MWh)	2,534.8 MWh. This is the five-year average taken from the 2009 to 2015 annual generation reports.
	Number, type, and size of turbines, including maximum and minimum hydraulic capacity of each unit	The powerhouse contains two vertical shaft turbines rated at 365 kW (Unit 1) and 522 kW (Unit 2) and generators rated at 300 kW (Unit 1) and 400 kW (Unit 2). The Project's hydraulic capacity is 170 cfs to 700 cfs.
	Modes of operation (run-of-river, peaking, pulsing, seasonal storage, etc.)	The Project operates in a run-of-river mode to preserve water quality, aquatic and riparian habitats, and aesthetic and recreational flows in the Passumpsic River. The Licensee provides a minimum instantaneous flow of 142 cfs from October 1 to May 31 and 82 cfs from June 1 through September 30, or inflow, whichever is less, into the bypassed reach to enhance aquatic habitat.
	Dates and types of major equipment upgrades	N/A
	Dates, purpose, and type of any recent operational changes	N/A
	Plans, authorization, and regulatory activities for any facility upgrades	There are no plans at this time for Project upgrades.
<i>Characteristics of Dam, Diversion, or Conduit</i>	Date of construction	The Project was originally built in 1919-1920. The original dam was destroyed in a 1927 flood, but was reconstructed and returned to service in 1929.
	Dam height	Maximum height: 13-feet
	Spillway elevation and hydraulic capacity	The spillway crest elevation at the north section is 534.2 feet msl, the center section is 542.1 msl, and the south section is 538.9 msl. The spillway's hydraulic capacity number is not readily available.

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
	Tailwater elevation	524.9 feet msl
	Length and type of all penstocks and water conveyance structures between reservoir and powerhouse	A power canal 90-feet-long by 44-feet-wide by 16-feet-deep conveys flow to the intake.
	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
<i>Characteristics of Reservoir and Watershed</i>	Gross volume and surface area at full pool	At full pool, the Project has a 15.2-acre reservoir with 13.8 acre-feet of useable storage.
	Maximum water surface elevation (ft. MSL)	The maximum water surface elevation within the reservoir is 539.9 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	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 B for a map of Passumpsic River dam locations.
	Downstream dam(s) by name, ownership, FERC number (if applicable), and river mile	The Passumpsic Hydroelectric Project (FERC No. 2400), owned and operated by GMP, is located at RM 5.5. 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 B for a map of Passumpsic River dam locations.
	Operating agreements with upstream or downstream reservoirs that affect water availability, if any, and facility operation	No operating agreements are in effect with other surrounding facilities.

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
	Area inside FERC project boundary, where appropriate	The area inside the FERC Project boundary is approximately 40.5 acres.
<i>Hydrologic Setting</i>	Average annual flow at the dam	As identified within the 1994 WQC, the average annual flow is 706 cfs at the dam. This is estimated using the downstream U.S. Geological Survey (USGS) Gage 01135500 Passumpsic River at Passumpsic, VT.
	Average monthly flows	Average monthly flows (2010-2015) as measured at USGS Gage 01135500 Passumpsic River at Passumpsic, VT:  Jan: 708 cfs Feb: 410 cfs March: 813 cfs April: 2,360 cfs May: 1,480 cfs June: 995 cfs July: 620 cfs Aug: 413 cfs Sept: 421 cfs Oct: 792 cfs Nov: 617 cfs Dec: 832 cfs
	Location and name of relevant stream gauging stations above and below the facility	The USGS Gage 01135500 Passumpsic River at Passumpsic, VT is located downstream of the Project. No other USGS gages are located upstream of the Project on the Passumpsic River mainstem.
	Watershed area at the dam	The drainage area at the dam is 413 square miles.
<i>Designated Zones of Effect</i>	Number of zones of effect (ZOE)	There are three zones of effect: 1) Impoundment, 2) Bypassed Reach, and 3) Downstream.  The project Impoundment ZOE inundates approximately 32 acres or approximately 3,400-feet of Passumpsic River upstream of the Gage dam. The Impoundment influences the waters stretching from RM 9.5 (upstream Arnold Falls Project) to RM 7.2 (Gage Project) of the Passumpsic River.  The project Bypassed Reach ZOE is approximately 8.5 acres or approximately 912-feet from the dam and reconnects to

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
		<p>the tailwater at the end of the island in this reach.</p> <p>The Downstream ZOE starts at the powerhouse and stretches to the Passumpsic dam approximately 2 miles downstream. The acreage of the downstream ZOE is approximately 32 acres.</p>
	Upstream and downstream locations by river miles	<p>The Impoundment ZOE includes the waters stretching from RM 9.5 to RM 7.2. The Bypassed Reach ZOE includes the waters stretching from RM 7.2 to approximately RM 7.02. The Downstream ZOE includes waters stretching from RM 7.02 to RM 5.5.</p>
	Type of waterbody (river, impoundment, by-passed reach, etc.)	<p>The waters located within the Impoundment ZOE and Bypassed Reach ZOE are classified as Riverine by the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (USFWS 2016). The Downstream ZOE is classified as lake, riverine, and freshwater pond (USFWS 2016).</p>
	Delimiting structures	<p>The Impoundment ZOE includes waters stretching from the upstream Arnold Falls Project to the Gage Dam. The Bypassed Reach ZOE includes waters stretching from the Gage Dam 475 feet downstream to the gravel bar island that connects the land that the powerhouse is built on. The Downstream ZOE stretches from the Gage dam to the downstream Passumpsic dam.</p>
	Designated uses by state water quality agency	<p>The Passumpsic River is designated as Class B Waters. Designated uses as described in the WQC include public water supply with filtration and disinfection, irrigation and other agricultural uses, swimming, and recreation.</p>
<i>Additional Contact Information</i>	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.

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
<i>Photographs and Maps</i>	Photographs of key features of the facility and each of the designated zones of effect	Please see Appendix A for photographs of key features of the facility and identification of each ZOE.
	Maps, aerial photos, and/or plan view diagrams of facility area and river basin	Please see Appendix B for aerial photos of facility area and river basin.

## 2.0 STANDARDS MATRICES

### 2.1 IMPOUNDMENT ZOE

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

### 2.2 BYPASSED REACH ZOE

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

### 2.3 DOWNSTREAM ZOE

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

### 3.0 SUPPORTING INFORMATION

#### 3.1 ECOLOGICAL FLOWS STANDARDS: IMPOUNDMENT ZOE

CRITERION	STANDARD	INSTRUCTIONS
A	1	<p><u>Not Applicable / De Minimis Effect:</u></p> <ul style="list-style-type: none"> <li>• Confirm the location of the powerhouse relative to other dam/diversion structures to establish that there are no bypassed reaches at the facility.</li> <li>• If Run-of-River operation, provide details on how flows, water levels, and operation are monitored to ensure such an operational mode is maintained.</li> <li>• In a conduit project, identify the water source and discharge points for the conduit system within which the hydropower plant is located.</li> <li>• For impoundment zones only, explain how fish and wildlife habitat within the zone is evaluated and managed – <b>NOTE:</b> 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.</li> </ul>

- The Impoundment ZOE does not have a bypassed reach.
- Vermont DEC issued a Project WQC on June 16, 1994 (see Appendix C for a copy of the WQC). As prescribed within WQC Condition B (Article 403 of the 1994 License), the Project operates in a true run-of-river mode where instantaneous flows below the tailrace equal instantaneous inflows to the impoundment at all times. When the facility is not operating, all flows are spilled at the dam.

In accordance with License Article 406 and WQC Condition F, the Licensee developed a Flow Management Plan

([http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=1739159](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1739159)) which was approved by FERC on April 10, 1997

([http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=192803](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=192803)). Under the Flow Management Plan, a headpond controller system (HPS) ensures minimum flow is always met or exceeded. The system automatically adjusts the turbine output to maintain the water within 1.5 inches of the top of, or spilling over the top of the flashboards. The system reads turbine output and headpond level every 5 minutes and raises or lowers the turbine load to maintain the headpond level; in the range of 539.75 feet msl to 539.9 feet msl (height of the flashboards). If the turbine load is 25 kW or lower and the headpond level drops to 539.7 feet, the system unit will shut down automatically, causing all flow to spill over the dam.

- This is not a conduit project.
- The Project’s run-of-river operations create a stable impoundment environment. To protect wetlands and wildlife during occasional impoundment drawdowns greater than 2 feet, the Licensee undergoes agency consultation prior to drawdowns to ensure protection of the upstream resources.

- Project operations data was provided to Vermont DEC on March 29, 2018 for verification of Project run-of-river and Water Quality Certificate compliance (see Appendix C for email exchange).

### 3.2 ECOLOGICAL FLOWS STANDARDS: BYPASSED REACH ZOE

CRITERION	STANDARD	INSTRUCTIONS
A	2	<p><u>Agency Recommendation (see Appendix A for definitions):</u></p> <ul style="list-style-type: none"> <li>• 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).</li> <li>• 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.</li> <li>• Explain how the recommendation relates to agency management goals and objectives for fish and wildlife.</li> <li>• 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).</li> </ul>

- In accordance with WQC Condition C (Article 405 of 1994 License), GMP provides, when flows are available, a minimum instantaneous flow of 142 cfs from Oct 1 to May 31 and 82 cfs from June 1 through September 30 in the bypassed reach. Flows are released in part through the downstream fish passage facility and controlled with the use of stop logs. If instantaneous inflow falls below the minimum hydraulic capacity of the turbine unit plus this spillage requirement, all flows are spilled at the dam.
- The Agency Procedure for Determining Acceptable Minimum Stream Flows (July 14, 1993: <http://dec.vermont.gov/content/agency-procedure-determining-acceptable-minimum-stream-flows>) provided guidance to the Vermont DEC in setting minimum stream flows during Project relicensing. Because the Passumpsic River is heavily dammed and the large majority of its length is under impounded conditions, bypasses represent a disproportionate amount of the high-quality habitat for salmonids on the river mainstem. A minimum flow of 142 cfs during the fall/winter spawning and incubation period for brown trout (October 1 – May 31) provides high quality habitat for this species/life stage.

The scientific basis for this agency recommendation is also supported by a 1992-1993 bypass reach study conducted by the Licensee in consultation with the Vermont Department of Fish and Wildlife (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 142 cfs or inflow during the fall/winter spawning and incubation period for brown trout provides adequate habitat conditions for this species/life stage. At other times of the year, a minimum flow of 82 cfs or inflow is adequate. This flow is equal to the 7Q10 value, which is necessary at a minimum to maintain adequate water quality and circulation within the large bypass pool (See December 23, 1993 Vermont DEC comments for study results: [http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=1635361](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1635361)).

- 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).
- Vermont DEC recommendations provide refugia and enhancement of habitat for local salmonid species including the brown trout.
- Project operations data was provided to Vermont DEC on March 29, 2018 for verification of Project operations and Water Quality Certificate compliance (see Appendix C for email exchange).

### 3.3 ECOLOGICAL FLOWS STANDARDS: DOWNSTREAM ZOE

CRITERION	STANDARD	INSTRUCTIONS
A	1	<p><u>Not Applicable / De Minimis Effect:</u></p> <ul style="list-style-type: none"> <li>• Confirm the location of the powerhouse relative to other dam/diversion structures to establish that there are no bypassed reaches at the facility.</li> <li>• If Run-of-River operation, provide details on how flows, water levels, and operation are monitored to ensure such an operational mode is maintained.</li> <li>• In a conduit project, identify the water source and discharge points for the conduit system within which the hydropower plant is located.</li> <li>• For impoundment zones only, explain how fish and wildlife habitat within the zone is evaluated and managed – <b>NOTE:</b> 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.</li> </ul>

- The Downstream ZOE does not have a bypassed reach.
- Vermont DEC issued a Project WQC on June 16, 1994 (see Appendix C for a copy of the WQC). As prescribed within WQC Condition B (Article 403 of the 1994 License), the Project operates in a true run-of-river mode where instantaneous flows below the tailrace equal instantaneous inflows to the impoundment at all times. When the facility is not operating, all flows are spilled at the dam. As referenced in the WQC, flows below the tailrace are essentially unregulated. This flow regime optimizes conditions for fish life downstream of the Project powerhouse.
- In accordance with License Article 406 and WQC Condition F, the Licensee developed a Flow Management Plan ([http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=1739159](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1739159)) which was approved by FERC on April 10, 1997 ([http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=192803](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=192803)). Under the Flow Management Plan, a HPS ensures minimum flow is always met or exceeded. The system automatically adjusts the turbine output to maintain the water within 1.5 inches of the top of, or spilling over the top of the flashboards. The system reads turbine output and headpond level every 5 minutes and raises or lowers the turbine load to maintain the headpond level; in the range of 539.75 feet msl to 539.9 feet msl (height of the flashboards). If the turbine load is 25 kW or lower and the headpond level drops to 539.7 feet, the system unit will shut down automatically, causing all flow to spill over the dam.
- This is not a conduit project.
- Project operations data was provided to Vermont DEC on March 29, 2018 for verification of Project run-of-river and Water Quality Certificate compliance (see Appendix C for email exchange).

### 3.4 WATER QUALITY STANDARDS: IMPOUNDMENT, BYPASSED REACH, AND DOWNSTREAM ZONES

CRITERION	STANDARD	INSTRUCTIONS
B	2	<p><u>Agency Recommendation:</u></p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• Provide a copy of the most recent Water Quality Certificate, including the date of issuance.</li> <li>• Identify any other agency recommendations related to water quality and explain their scientific or technical basis.</li> <li>• 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.</li> </ul>

- The Passumpsic River, in the Project-affected reach, including the Impoundment, Bypassed Reach, and Downstream ZONES, is designated by the Vermont Water Resources Board as Class B waters. According to the 2016 Vermont 303d List of Impaired Waters ([http://dec.vermont.gov/sites/dec/files/documents/WSMD\\_mapp\\_303d\\_Part\\_A\\_2016\\_final\\_complete.pdf](http://dec.vermont.gov/sites/dec/files/documents/WSMD_mapp_303d_Part_A_2016_final_complete.pdf)), the Project is located entirely within the waste management zone that receives the discharge from the Town of 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.

Per email dated November 17, 2016, the Vermont DEC confirms that the current operations of the Gage Project continue to not be a contributing cause of the River's impairment (Appendix C). Project operations data was additionally provided to Vermont DEC on March 29, 2018 for verification of Project Water Quality Certificate compliance (see Appendix C for email exchange).

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

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

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

CRITERION	STANDARD	INSTRUCTIONS
C	1	<u>Not Applicable/De Minimis Effect:</u> <ul style="list-style-type: none"> <li>• The facility does not create a barrier to upstream passage, or</li> <li>• 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</li> </ul>

- 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 409 and WQC Condition J reserve future authority to order such fishways. There has been no request for upstream fish passage facilities by state or federal agencies to date.

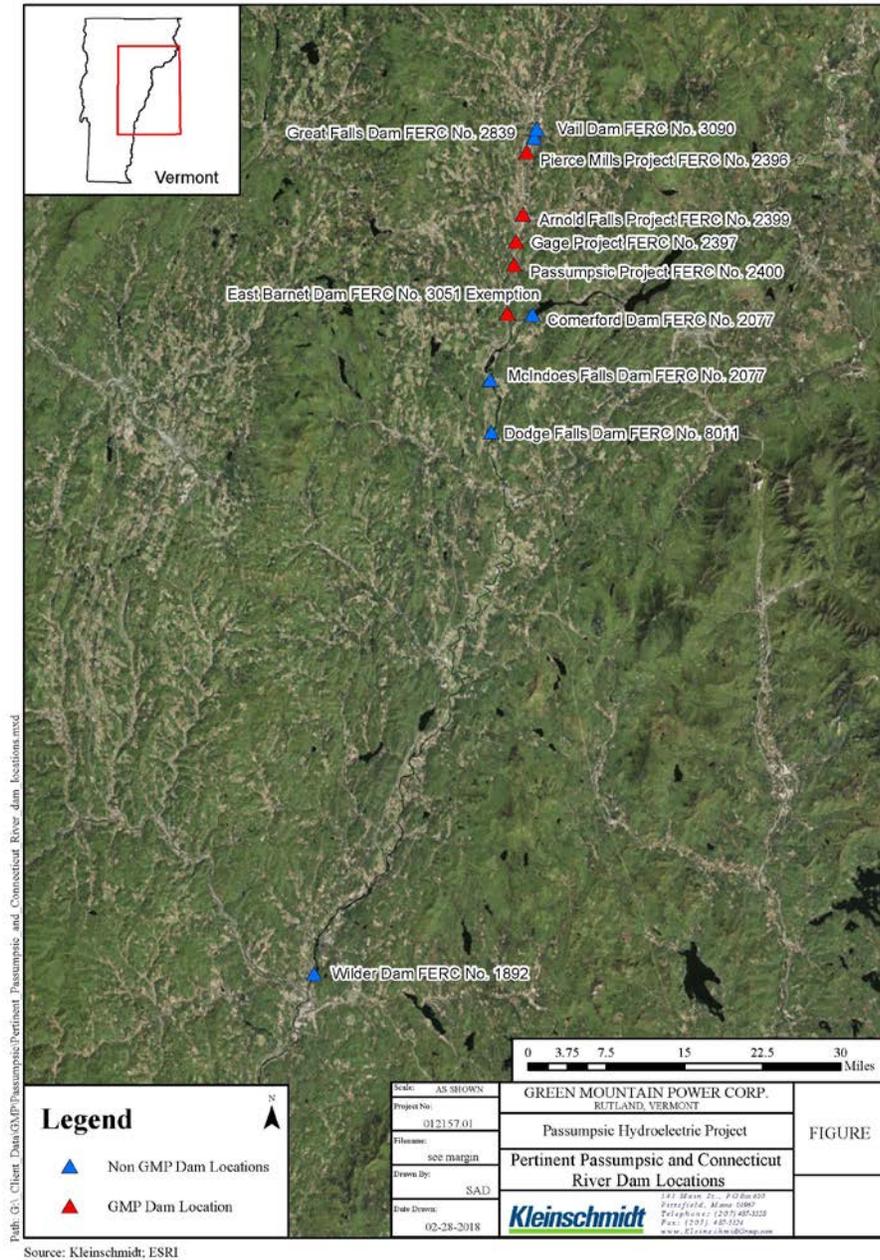
Upstream passage to the Passumpsic River is currently blocked by downstream Connecticut River dams and the East Barnet Dam located at Passumpsic River RM 0.5. Although the Wilder Dam (FERC License No. 1892), located at RM 217 on the Connecticut River provides upstream fish passage, two Connecticut River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

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

Per reviews of the LIHI Certificates for the Fifteen Mile Falls Project (effective until December 2021) and the Dodge Falls Project (effective until June 2019) and reviews of the Dodge Falls Dam, Fifteen Mile Falls Project, and East Barnet Dam FERC dockets,

upstream fish passage is not currently required at these facilities. Upstream fish passage to the Passumpsic River is therefore not available at this time and downstream Connecticut River and Passumpsic River barriers are not expected to be removed throughout the duration of the Passumpsic Project’s re-certification term.

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



**FIGURE 3 PERTINENT PASSUMPSIC AND CONNECTICUT RIVER DAM LOCATIONS.**

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

### 3.6 DOWNSTREAM FISH PASSAGE STANDARDS: IMPOUNDMENT ZOE

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

CRITERION	STANDARD	INSTRUCTIONS
D	2	<p><u>Agency Recommendation:</u></p> <ul style="list-style-type: none"> <li>• 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).</li> <li>• 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.</li> <li>• Describe any provisions for fish passage monitoring or effectiveness determinations that are part of the agency recommendation, and how these are being implemented.</li> </ul>

- In accordance with License Article 407 and WQC Condition I, GMP provides permanent downstream fish passage via the sluiceway at the right abutment of the south dam which also provides the minimum flow release. The facility provides a continuous flow of 20-25 cfs from April 1 – June 15 and from September 15 – November 15. Fish enter the sluiceway through a three-foot-wide concrete chute, which ends at a three-foot-deep plunge pool that discharges to the bypass channel. Recommendations for downstream passage were provided within the Vermont DEC letter dated December 23, 1993 ([http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=1635361](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1635361)) and Department of Interior (DOI) recommendations for downstream fish passage are included within a December 23, 1993 letter ([http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=1635794](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1635794)) and later incorporated into the Project license.

On December 5, 1995, the Licensee submitted Downstream Fish Passage Facility Operation & Maintenance Plan as well as permanent downstream design drawings developed in coordination with USFWS and Vermont DEC ([http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=69346](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=69346)). In an order dated February 7, 1998 FERC approved of the downstream fish passage facility designs and operations plans ([http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=82267](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=82267)). FERC authorization to construct the downstream facility was granted on August 22, 1996 ([http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=147875](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=147875)). Included within

downstream passage design drawings and approved within the February 7, 1998 FERC order, Project trashracks with 1-inch clear bar spacing were approved, and have been installed upstream of the canal headgates to prevent previously stocked salmon from entering into the power canal.

- Under License Article 408, 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](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=115435)) which was approved by FERC on September 25, 1996 ([http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=141366](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=141366)). Under this plan, developed in consultation with the USFWS and the VTFW, the Licensee, USFWS, and the VTFW would visually inspect the Gage Project and the downstream Passumpsic Project (FERC No. 2400) forebays for the presence of salmon smolts during the period when smolts should be passing downstream. A November 1997 report on the results of the observations at the Gage Project and Passumpsic Project was issued to the Vermont Agency of Natural Resources (VANR) and USFWS. Discussions regarding Passumpsic River downstream fishways have largely concentrated on the Passumpsic Project fishway since this study.
- Approximately 20 years ago, Len Gerardi of VTFW noticed salmon fry within the Gage Project forebay. GMP quickly responded by draining the forebay and releasing fish out the Project bypassed. It was determined that the salmon were entering into the forebay because of a gap that emerged due to deteriorated concrete between the trashracks and forebay. To remedy the situation, GMP installed a steel cover over the concrete gap so to prevent entrance of fish into the forebay. Len Gerardi visited the site after installation of the steel cover and was happy with the status of the forebay. GMP is additionally pursuing intake maintenance and repair work at the Gage Project in 2018. This work will involve concrete resurfacing which will include concrete repairs to the deteriorated concrete gap between the trashracks and the forebay. This long-term seal will further enhance conditions at Gage.

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

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

- Because of the presence of the USFWS Atlantic salmon stocking program during Project relicensing (program was decommissioned in 2012), stocked Atlantic salmon needed a way to make an outmigration past the Project. In addition to aiding the Atlantic salmon smolt passage, it was concluded that downstream passage would also benefit resident trout species.

- As stated within the Project License and WQC, the downstream fish passage also benefits resident trout species. Aside from providing a downstream fish passage facility and installing a trashrack system with 1-inch clear bar spacing to prevent entrainment, no further protections are required by resource agencies for resident fish passage at the Project.

### 3.7 DOWNSTREAM FISH PASSAGE STANDARDS: BYPASSED REACH

CRITERION	STANDARD	INSTRUCTIONS
D	2	<p><u>Agency Recommendation:</u></p> <ul style="list-style-type: none"> <li>• 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).</li> <li>• 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.</li> <li>• Describe any provisions for fish passage monitoring or effectiveness determinations that are part of the agency recommendation, and how these are being implemented.</li> </ul>

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

### 3.8 DOWNSTREAM FISH PASSAGE STANDARDS: DOWNSTREAM ZOE

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

CRITERION	STANDARD	INSTRUCTIONS
D	1	<p><u>Not Applicable / De Minimis Effect:</u></p> <ul style="list-style-type: none"> <li>• 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).</li> <li>• 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.</li> <li>• Document available fish distribution data and the lack of migratory fish species in the vicinity.</li> <li>• If migratory fish species have been extirpated from the area, explain why the facility is or was not the cause of this.</li> </ul>

- There are no barriers to downstream fish passage in the Downstream ZOE. Once fish cross past the Impoundment and Bypassed Reach ZOE's with the use of the sluiceway (operated year-round for minimum flows), the fish do not have any further impediments to passage through the Downstream ZOE. Once fish encounter the downstream Passumpsic Dam, they are then allowed to pass over the dam via the use of another downstream fish passage facility.
- Although the downstream fish passage facility was mainly intended to facilitate downstream passage for stocked Atlantic salmon smolts, the USFWS stocking program for Atlantic salmon ended in 2012. As stated within the Project License and WQC, the downstream fish passage also benefits 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. Aside from providing a downstream fish passage facility and installing a trashrack system with 1-inch clear bar spacing, no further protections are required by resource agencies for resident fish passage at the Project.

- As stated in the December 23, 1993 VANR comment letter, ([http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=1632958](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1632958)), brook, brown, and rainbow trout are all found in the Passumpsic basin. VTFW studies conducted in the early 1970s indicate the Passumpsic River drainage basin contained a higher percentage of brook trout than any other drainage basin studies throughout the state. The Agency stocks the stream from the upstream Vail Dam to the Gage Dam with brown trout and rainbow trout. No further studies on fishes of the Passumpsic River are available for this application.

The latest data for all monitored upstream migrating species in the downstream Connecticut River is included in the two reports below. There are presently no upstream fish ladders above the above Wilder Dam (FERC No. 1892) located at RM 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](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](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](http://dec.vermont.gov/sites/dec/files/wsm/mapp/docs/mapp_b15-16tbp.pdf)). Recent FERC relicensing studies conducted at the downstream Wilder Dam in 2015 (<https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14580050>) showed that a small number of eels exist within the Connecticut River:

- 1) No eels identified at the Wilder Dam during night time upstream passage surveys.
  - 2) Very low numbers of eels used the upstream fish ladder.
  - 3) No eels identified within the Wilder impoundment which extends up to Connecticut RM 262.
- Although the Connecticut River Basin once had naturally occurring Atlantic salmon runs, the salmon were extirpated from the river system due to the construction of downstream Connecticut River dams and river pollution (NMFS 1999). In an effort to reintroduce salmon to the river basin, the USFWS and surrounding states including Massachusetts, Vermont, and New Hampshire facilitated a more than 40-year Atlantic salmon stocking program that ended in 2012 due to poor salmon return rates.

**3.9 SHORELINE AND WATERSHED PROTECTION STANDARDS: IMPOUNDMENT & BYPASSED REACH**

CRITERION	STANDARD	INSTRUCTIONS
E	1	<p><u>Not Applicable / De Minimis Effect:</u></p> <ul style="list-style-type: none"> <li>• 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).</li> <li>• Document that there have been no Shoreline Management Plans or similar protection requirements for the facility.</li> </ul>

- The area surrounding the Impoundment and Bypassed Reach ZOE consists of mixed industrial, and commercial buildings on the river right and rural residential housing and farmland on the river left. 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](http://www.mrlc.gov/nlcd11_leg.php)).

**TABLE 2 PROJECT LAND COVER CLASSIFICATION**

<b>CLASS/VALUE</b>	<b>CLASSIFICATION DESCRIPTION</b>
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.
31	Barren Land (Rock/Sand/Clay) - areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.
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.
52	Shrub/Scrub- areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.
71	Grassland/Herbaceous- areas dominated by gramanoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.

CLASS/VALUE	CLASSIFICATION DESCRIPTION
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.

- No shoreland management plans have been required for the Project. Although the Vermont DEC WQC included Condition H to monitor shoreline erosion every three years, Condition H was not included within the Project License as it was rendered unnecessary by inclusion of License Article 404, which mandates the drawdown limitation as specified in WQC Condition D.

### 3.10 SHORELINE AND WATERSHED PROTECTION STANDARDS: DOWNSTREAM ZOE

CRITERION	STANDARD	INSTRUCTIONS
E	2	<p><u>Agency Recommendation:</u></p> <ul style="list-style-type: none"> <li>• Provide copies or links to any agency recommendations or management plans that are in effect related to protection, mitigation, or enhancement of shoreline surrounding the facility (e.g., Shoreline Management Plans).</li> <li>• Provide documentation that indicates the facility is in full compliance with any agency recommendations or management plans that are in effect.</li> </ul>

- During Project relicensing it was identified that erosion was occurring below the tailrace, on the far side of the plunge pool. Due to erosion concerns, License Article 402 requires the Licensee to submit a geotechnical analysis of the tailwater pool shoreline and to develop a plan if remediation is warranted. Article 402 was influenced by Conditions H of the WQC (not incorporated into the Project license) and the Vermont DEC comment letter dated December 23, 1993 ([http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=1635361](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1635361)) as well as the Project's 1991 relicensing application.

On June 7, 1995, the Licensee filed an Erosion and Sediment Control Plan with FERC and on October 16, 1995 FERC issued an Order Approving Erosion Control Plan ([http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=1747709](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1747709)). Within the Erosion and Control Plan, the Licensee identified that normal flows against the beach shoreline are not causing erosion, any erosion of the beach in high water condition would involve movement of material previously deposited by the stream, and the slumping at the toe of the main slope is probably caused to some extent by fluctuation in pore pressure in the soil during periods of sudden drawdown caused by receding floodwater. To discourage further slumping along the toe of the main slope, the Licensee implemented rip-rap protection along the toe of the slope just east of the canoe access path.

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

CRITERION	STANDARD	INSTRUCTIONS
F	2	<p><u>Finding of No Negative Effects:</u></p> <ul style="list-style-type: none"> <li>• Identify all listed species in the facility area based on current data from the appropriate state and federal natural resource management agencies.</li> <li>• 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.</li> </ul>

- Based on an official USFWS list populated on September 30, 2016 (Appendix E), the federally threatened Northern long-eared bat (*Myotis septentrionalis*) may occur within the Project Vicinity. In addition, the bald eagle which was de-listed and removed from the federal list of endangered and threatened species in 2007, is considered a potential transient species only. Within the state of Vermont, the Northern long-eared bat and bald eagle continue to be listed as state endangered species.
  - State listed Fish and Wildlife:
    - <http://www.vtfishandwildlife.com/common/pages/DisplayFile.aspx?itemId=268519>

Per emails dated October 19 and 21, 2016, the Vermont Fish and Wildlife Department confirmed that continued Project operations do not negatively affect the northern long-eared bat or the bald eagle (Appendix E).
- The 1994 Environmental Assessment notes that the VANR indicated during re-licensing that the continued operation would not adversely affect populations of species inhabiting unique habitat at any of the Passumpsic projects nor the bald eagle which is only a transient in the area (Letter acknowledging Environmental Assessment available for review and provided statement of no adverse effects <http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10736668>).

### 3.12 CULTURAL AND HISTORIC RESOURCES STANDARDS: IMPOUNDMENT, BYPASSED REACH, AND DOWNSTREAM ZOE'S

CRITERION	STANDARD	INSTRUCTIONS
G	2	<p><u>Approved Plan:</u></p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• Document that the facility is in compliance with all such plans.</li> </ul>

- License Article 410 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](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, Passumpsic Project (FERC No. 2400), 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 Gage Project was initially submitted to FERC on December 5, 1995 ([http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=69878](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=69878)) and resubmitted on September 24, 1999 ([http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=1992509](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1992509)) and approved by FERC on February 28, 2000 ([http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=2034182](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=2034182)).
- 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/file\\_list.asp?document\\_id=14077904](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14077904)
  - 2013 Annual CRMP Report  
[http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=14167093](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14167093)
  - 2014 Annual CRMP Report  
[http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=14278079](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14278079)
  - 2015 Annual CRMP  
<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 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/file\\_list.asp?document\\_id=14160090](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14160090)), 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	<p><u>Agency Recommendation:</u></p> <ul style="list-style-type: none"> <li>• Document any comprehensive resource agency recommendations and enforceable recreation plan that is in place for recreational access or accommodations.</li> <li>• Document that the facility is in compliance with all such recommendations and plans.</li> </ul>

- In accordance with License Article 413 and WQC Condition N, GMP developed and maintains recreation facilities including a public picnic area, interpretative signage, and directional and warning signage, as well as a canoe/kayak portage route with a corresponding take-out in the Impoundment ZOE.
- The Recreation Plan was submitted to FERC on June 2, 1995 ([http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=1739056](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1739056)) and approved by FERC on October 31, 1995 ([http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=1748690](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1748690)).
- Under 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 10<sup>th</sup> and 20<sup>th</sup> 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](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](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](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](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14403636)). Per Condition E of the November 30, 2015 order, GMP has relocated the Project’s interpretative sign to the east bank of the Passumpsic River so to comply with the as-written Gage Project Recreation Plan. A GMP letter filed with FERC on November 30, 2016 includes photographic evidence of the final location of the interpretative sign: [http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=14516332](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14516332). FERC Order dated March 30, 2017, approved of GMP’s relocation of the interpretative sign, but requested that GMP submit an amended Gage Recreation Plan by March 30, 2018 so to incorporate added parking and recreation improvements at the Project powerhouse as described in the November 30, 2016 filing: <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14539473>. GMP filed the revised recreation plan, developed in consultation with the Vermont DEC and the Town of St. Johnsbury on March 29, 2018: [http://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=20180329-5235](http://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20180329-5235).
- Within the 2013 Environmental Inspection Report ([http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=14160090](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14160090)) it was concluded

that the Project appears to be in compliance with requirements in regards to recreational resources.

**Bonus:**

H	PLUS	<p><u>Bonus Activities:</u></p> <ul style="list-style-type: none"> <li>• 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).</li> <li>• Document that such new recreational opportunities did not create unmitigated impacts to other resources.</li> </ul>
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As part of the 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.

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](http://www.greenmountainpower.com/wp-content/uploads/2016/12/001-Passump-Rec-Guide_06082017_FINAL-web-print.pdf). In addition, GMP printed 500 color copies of the updated Guide for free distribution to the public. A hardcopy of this publication has been separately mailed to LIHI for review.

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

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

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

**3.14 RECREATIONAL RESOURCES STANDARDS: BYPASSED REACH ZOE**

CRITERION	STANDARD	INSTRUCTIONS
H	2	<u>Agency Recommendation:</u> <ul style="list-style-type: none"> <li>• Document any comprehensive resource agency recommendations and enforceable recreation plan that is in place for recreational access or accommodations.</li> <li>• Document that the facility is in compliance with all such recommendations and plans.</li> </ul>

- In accordance with License Article 413 and WQC Condition N, GMP developed and maintains a canoe/kayak portage route and public parking area for two vehicles within the Bypassed Reach ZOE.
- The Recreation Plan as well as the 10-year and 20-year studies include the Bypassed Reach ZOE. See answer to Impoundment ZOE above for further information.

**3.15 RECREATIONAL RESOURCES STANDARDS: DOWNSTREAM ZOE**

CRITERION	STANDARD	INSTRUCTIONS
H	2	<u>Agency Recommendation:</u> <ul style="list-style-type: none"> <li>• Document any comprehensive resource agency recommendations and enforceable recreation plan that is in place for recreational access or accommodations.</li> <li>• Document that the facility is in compliance with all such recommendations and plans.</li> </ul>

- In accordance with License Article 413 and WQC Condition N, GMP developed and maintains directional and warning signage and a canoe/kayak portage route with a corresponding put-in in the Downstream ZOE.
- The Recreation Plan as well as the 10-year and 20-year studies include the Downstream ZOE. See answer to Impoundment ZOE above for further information.

## 4.0 CONTACTS FORMS

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

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

<b>Agency Contact</b> (Check area of responsibility: Flows <u>  X  </u> , Water Quality <u>  X  </u> , Fish/Wildlife Resources <u>  </u> , Watersheds <u>  X  </u> , T/E Spp. <u>  </u> , Cultural/Historic Resources <u>  </u> , Recreation <u>  X  </u> ):	
Agency Name	Vermont Department of Environmental Conservation
Name and Title	Jeff Crocker, Streamflow Protection Coordinator
Phone	802-490-6151
Email address	<a href="mailto:jeff.crocker@vermont.gov">jeff.crocker@vermont.gov</a>
Mailing Address	Watershed Management Division, Main Building - 2 <sup>nd</sup> Floor, One National Life Drive, Montpelier, VT 05620

<b>Agency Contact</b> (Check area of responsibility: Flows <u>X</u> , Water Quality <u>X</u> , Fish/Wildlife Resources __, Watersheds <u>X</u> , T/E Spp. __, Cultural/Historic Resources __, Recreation <u>X</u> ):	
Agency Name	Vermont Department of Environmental Conservation
Name and Title	Eric Davis, River Ecologist
Phone	802-490-6180
Email address	<a href="mailto:eric.davis@vermont.gov">eric.davis@vermont.gov</a>
Mailing Address	Watershed Management Division, Main Building - 2 <sup>nd</sup> Floor, One National Life Drive, Montpelier, VT 05620

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

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

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

<b>Agency Contact</b> (Check area of responsibility: Flows __, Water Quality __, Fish/Wildlife Resources <u>X</u> , Watersheds __, T/E Spp. <u>X</u> , Cultural/Historic Resources __, Recreation __):	
Agency Name	Vermont Division of Fish and Wildlife
Name and Title	Jud Kratzer, Fisheries Biologist
Phone	802-751-0486
Email address	<a href="mailto:jud.kratzer@vermont.gov">jud.kratzer@vermont.gov</a>
Mailing Address	1229 Portland St. Suite 201 St. Johnsbury, VT 05819

<b>Agency Contact</b> (Check area of responsibility: Flows __, Water Quality __, Fish/Wildlife Resources	
--	--

<u>  X  </u> , Watersheds <u>    </u> , T/E Spp. <u>  X  </u> , Cultural/Historic Resources <u>    </u> , Recreation <u>    </u> ):	
Agency Name	Vermont Division of Fish and Wildlife
Name and Title	Scott Darling, Wildlife Management Program Manager
Phone	802-786-3862
Email address	<a href="mailto:scott.darling@vermont.gov">scott.darling@vermont.gov</a>
Mailing Address	271 North Main Street Suite 215 Rutland, VT 05701

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

## 5.0 SWORN STATEMENT

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### Sworn Statement and Waiver Form

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

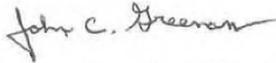
#### SWORN STATEMENT

As an Authorized Representative of Green Mountain Power Corp., the Undersigned attests that the material presented in the Gage 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.



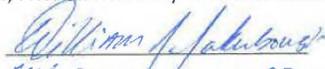
Company Name: Green Mountain Power Corp.

Authorize Representative Name: John C. Greenan Title: Engineer

State of Vermont

County of Rutland

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

Notary Public   
MY COMMISSION EXPIRES: FEB 10, 2019



LIHI Handbook 2<sup>nd</sup> Edition – Sworn Statement and Waiver Form

## 6.0 REFERENCES

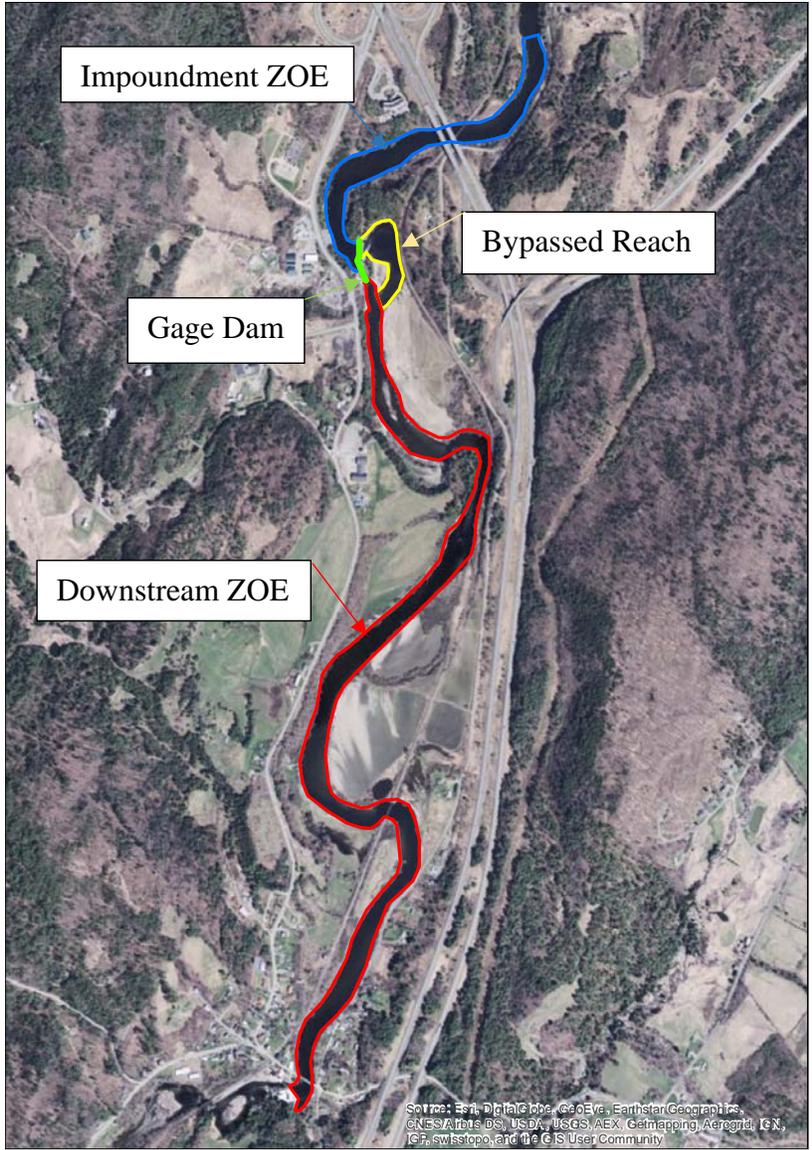
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Al Jazeera America. 2016. Presumed Dead, Wild Atlantic Salmon Return to the Connecticut River. <http://america.aljazeera.com/articles/2016/2/23/presumed-dead-wild-atlantic-salmon-return-to-connecticut-river.html>. February 23, 2016.

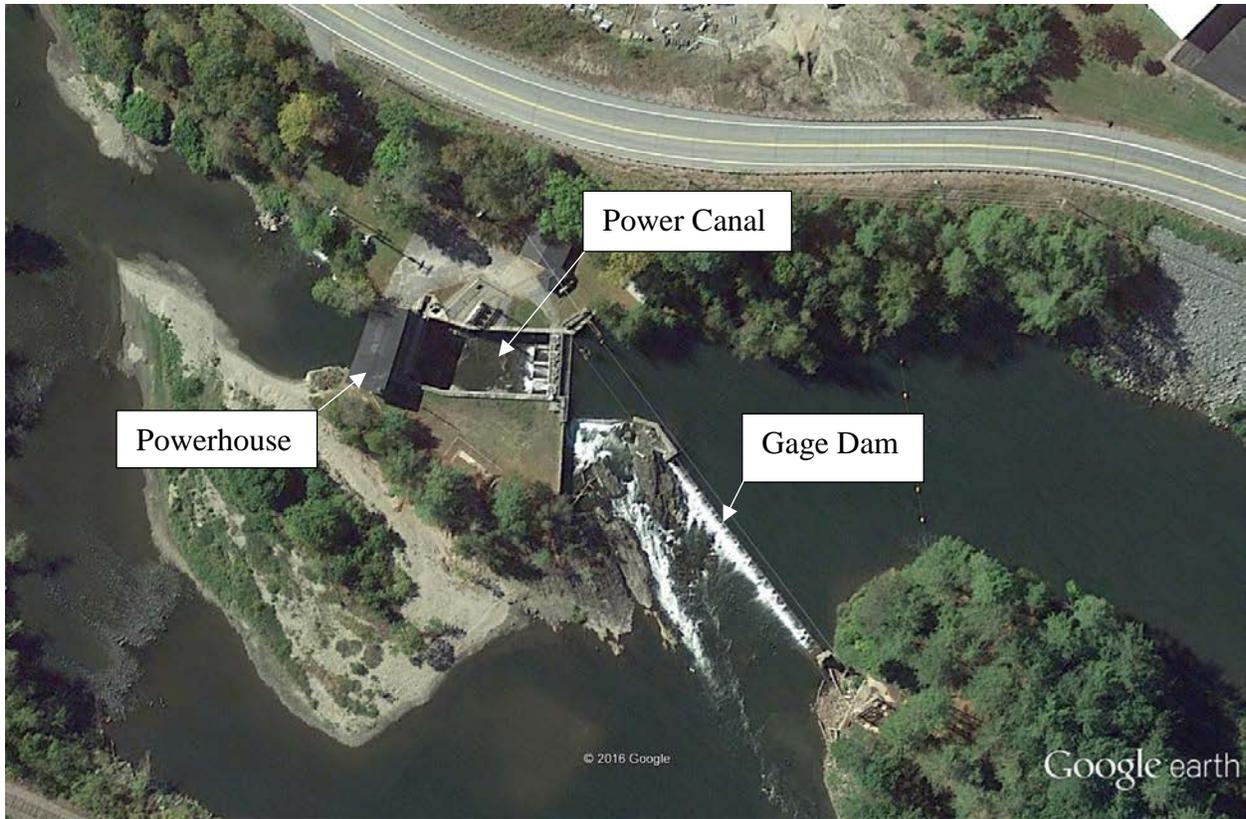
NMFS. 1999. 1999 Biological report on the status of Atlantic salmon. Available at <http://www.nmfs.noaa.gov/pr/pdfs/statusreviews/atlanticsalmon1999.pdf>. Accessed November 29, 2017.

USFWS (U.S. Fish and Wildlife Service). 2016. National Wetlands Inventory. <https://www.fws.gov/wetlands/Data/Mapper.html>. Accessed October 4, 2016.

**APPENDIX A**  
**PROJECT ZOE AND PHOTOS**



**PHOTO 1      OVERVIEW OF PROJECT ZONES OF EFFECT**



**PHOTO 2      OVERVIEW OF GAGE HYDROELECTRIC PROJECT**



**PHOTO 3** GAGE DAM VIEW OF THE SOUTH DAM (IN BACKGROUND) AND THE NORTH DAM (IN FOREGROUND) WITH HINGED FLASHBOARDS, SEPARATED BY A ROCK OUTCROPPING



**PHOTO 4      GAGE POWERHOUSE**



**PHOTO 5**      **VIEW OF THE INTAKE WITH ONE-INCH, CLEAR-SPACED TRASHRACKS. NOTE SLUICeway FOR DOWNSTREAM FISH PASSAGE AND MINIMUM FLOW RELEASE (ARROW).**



**PHOTO 6**      **VIEW OF THE SLUICEWAY AT THE RIGHT ABUTMENT OF THE SOUTH DAM  
DISCHARGING THE MINIMUM FLOW RELEASE**



**PHOTO 7**      **VIEW OF THE WARNING SIGN ON THE RIGHT BANK ALERTING CANOEISTS/KAYAKERS OF THE DAMS AHEAD AND DIRECTING BOATERS TO THE CANOE/KAYAK TAKE-OUT POINT ON THE LEFT BANK**



**PHOTO 8      VIEW OF THE BOAT RESTRAINING BARRIER UPSTREAM OF THE DAMS**

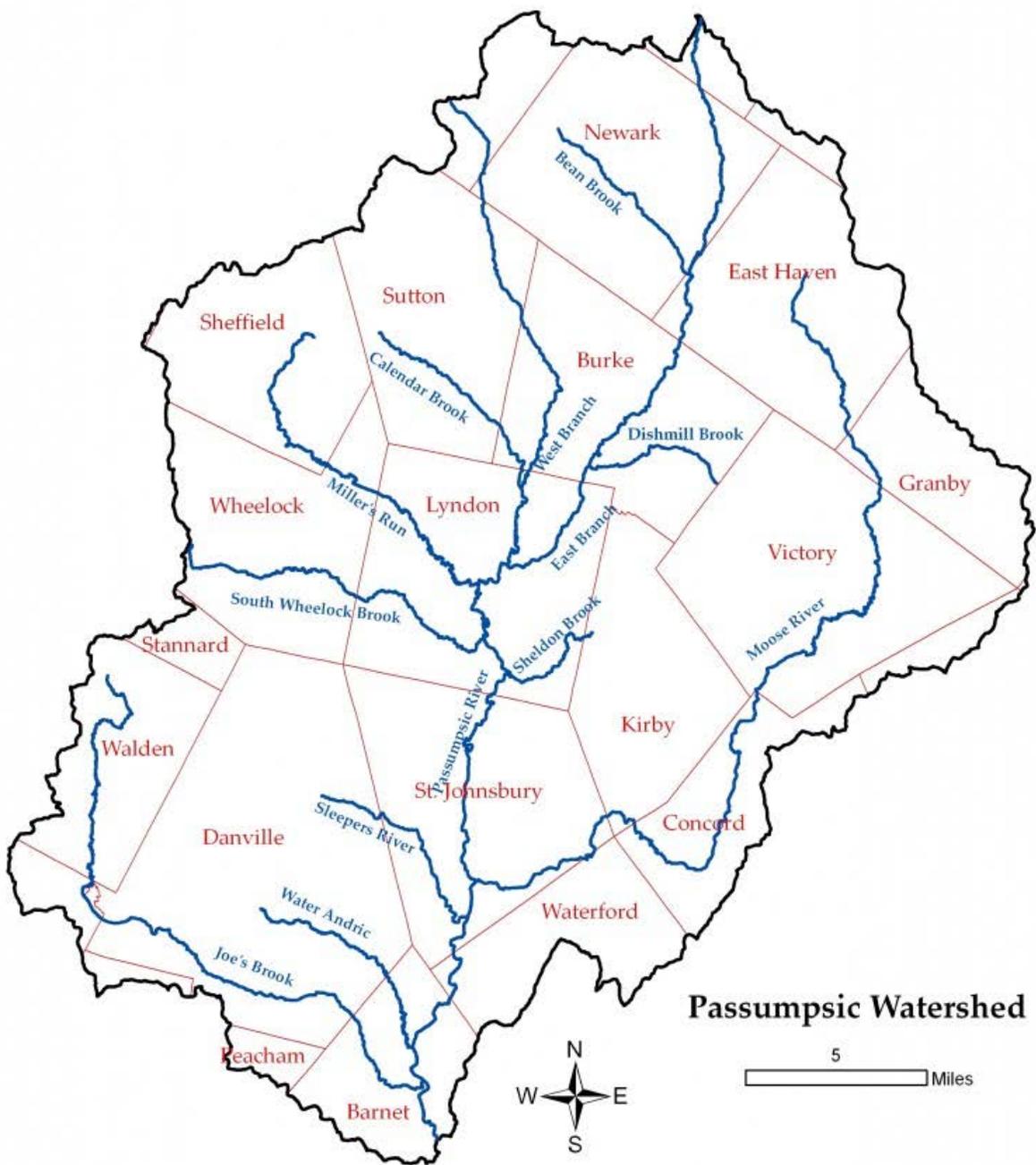


**PHOTO 9**      **VIEW OF THE DIRECTIONAL SIGN ALONG CANOE/KAYAK PORTAGE TRAIL THROUGH THE WOODS**

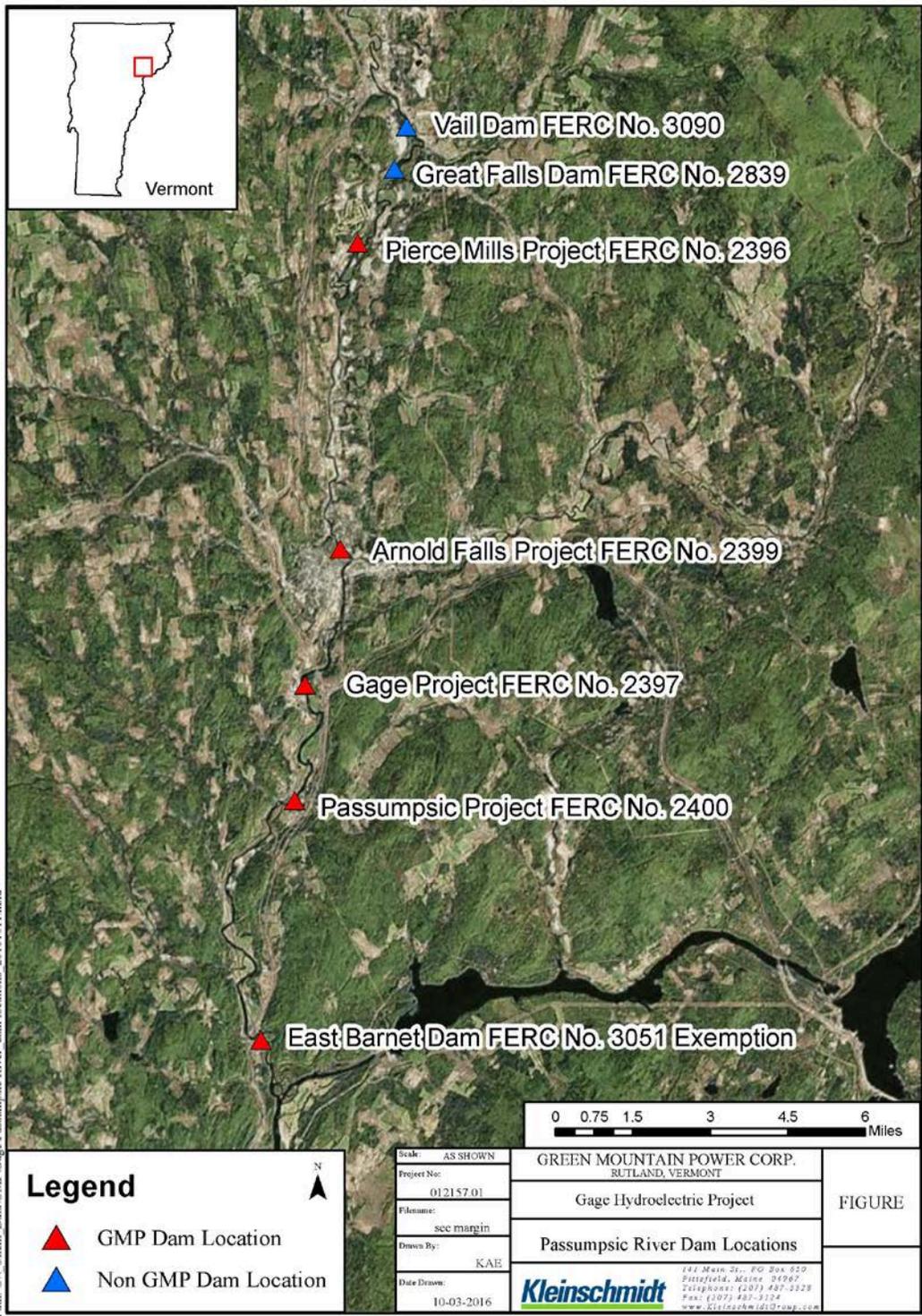


**PHOTO 10**    **VIEW OF THE ONE CONCRETE PICNIC TABLE AT THE PICNIC AREA JUST UPLAND FROM THE CANOE/KAYAK TAKE-OUT LOCATION**

**APPENDIX B**  
**FACILITY AREA RIVER BASIN**



**FIGURE 4 PASSUMPSIC RIVER BASIN**



Path: G:\Client\Data\GMP\Gage\Passumpic River dam locations\_20161011.mxd

Source: Kleinschmidt; ESRI

**FIGURE 5 PASSUMPSIC RIVER DAM LOCATIONS**

**APPENDIX C**  
**WATER QUALITY**

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 GAGE  
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 Gage Hydroelectric Project located at river mile 7.2 on the Passumpsic River about 2.2 miles south of the village of St. Johnsbury.
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 Gage Project. The applicant operates five projects in succession on the mainstem of the Passumpsic River. Upstream of the Gage Dam are the Pierce Mills and Arnold Falls projects. Downstream of Gage Dam are the Passumpsic and the East Barnet projects, the latter having been recently reactivated. 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 1921. Six years later the facilities were destroyed during the 1927 flood and were rebuilt and returned to service in 1929.

## II. Project and Civil Works

7. The dam is founded on rock and consists of three sections. The north section is approximately 176 feet long, and the crest, elevation 534.2 feet (msl), varies in height from 3 to 13 feet above the foundation. The center section is approximately 30 feet long and constructed on a ledge island. This section is essentially a concrete cap with a crest elevation of 542.1 feet (msl). The south dam is approximately 43 feet long, and the crest of this section is set at

elevation 538.9 feet (msl). The normal headwater elevation is 539.9 feet (msl), and the normal tailwater elevation is 524.9 feet (msl), providing 15 feet of gross head.

8. The dam is fitted with flashboards on both the north and south sections. The six foot high flashboards placed on the north section of the dam are hinged and can be dropped during flood periods to increase spillway capacity. A cable way is provided for this purpose. The flashboards on the south section of the dam are one foot high and fail during flood periods.
9. The impoundment has a surface area of 15.2 acres, a useable storage capacity of 15 acre-feet, and a backwater influence of 3,500 feet.
10. A stoplog-controlled trash/ice sluice, six feet wide and located adjacent to the face of the headgate structure, is included in the south section of the dam.
11. A headgate structure serves as the entrance to a power canal. It is approximately 51 feet wide and contains four head gates. Each head gate is approximately 10 feet wide and is manually operated. The head gate structure serves to reduce the amount of trash entering the power canal and also provides the means for dewatering the power canal for inspection and/or repair. The power canal connects the reservoir to the intake of the powerhouse. It is approximately 44 feet wide, 90 feet long, and 16 feet deep.
12. The intake structure is coupled to the powerhouse. An inclined trashrack structure is located directly upstream from the entrances to the turbine water passages. Gate slots are provided at the upstream entrances of the turbine water passages for placement of a bulkhead to close off and dewater the turbine passage.
13. The powerhouse contains two S. Morgan Smith vertical shaft, Francis-type turbines. The units are coupled to 300 kw and 400 kw generators and have adjustable wicket gates operated by headwater float control. The average annual generation for the twenty year period through 1990 was 2,766,000 kwh. (applicant's response to FERC AIR No. 9) Except for routine monitoring, inspection and maintenance, the plant is operated automatically and unattended.

14. The powerhouse substation is located 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

15. The drainage area at the dam is 413 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 facilities.

Table 1. Hydrologic Parameters at Project.

Parameter	Value
Mean runoff	706 cfs (23.20 in/yr)
7Q10	82 cfs
95% Exceedance	123 cfs
50% Exceedance	385 cfs
10% Exceedance	1610 cfs

16. The project hydraulic capacity is 170 cfs to 700 cfs.
17. 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 the powerhouse is shut down, the only flow downstream of the powerhouse is leakage and local drainage.
18. The project as described in the application will operate in a true run-of-the-river mode.<sup>1</sup>

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<sup>1</sup>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.

19. Routine monitoring, inspection and maintenance will continue as in the past. The plant will operate in a semi-automatic and unattended mode.
20. Originally, CVPSC proposed a minimum bypass flow release of 17 cfs year round. The applicant now proposes to maintain a bypass flow of 32 cfs during the brown trout spawning/incubation period of October 1 through May 1 and a continuous release of 17 cfs the remainder of the year. (applicant's response to FERC AIR No. 3) The applicant would provide the 32 cfs by adjusting the project headwater sensors to spill 4.0 inches of water over the shorter right (south) spillway (crest elevation of 538.9 feet), and spill 2.7 inches to provide the 17 cfs. The one foot of flashboards across this spillway section would be removed and no longer used. Corresponding targeted minimum headwater elevations would be 539.2 feet and 539.1 feet. (AIR No. 14)

The flow sensor will automatically and continually adjust the two generator loads so that the spillage is prerequisite to generation. When river flows diminish, the level sensors will reduce load on one unit slowly to keep the required amount of water spilling over the south spillway. As the flow continues to diminish, the flow sensors will remove a unit from the line. A similar sequencing operation will happen with the second unit to a point when all water will spill over the dam crest.

21. The project automation (SCADA) system has an accuracy of  $\pm 1.0$  inch. To provide the applicant's targeted minimum headwater elevations, the SCADA system would have to be set to a fixed level 5.0 inches to provide the 32 cfs and 3.7 to provide the 17 cfs over the south spillway. The two-inch range on the SCADA system will create a variable bypass flow condition above these minimums.
22. Periodic storm events require the lowering of the six foot flashboards to protect against upstream flooding. During the winter, ice movement causes the panels to collapse; this occurs twice on the average during this period. The flashboards are normally maintained in place during January and February. The applicant

breaks ice loose in February in preparation for the intentional lowering during spring runoff. According to the license application, anywhere from 8 to all 48 panels are lowered two or three times each March and April, and perhaps once in May. The applicant's response to FERC AIR No. 12 indicates that the boards are lowered for three weeks during the March - April period. Seldom are the boards manipulated from June through December.

23. Boards are typically reset when the water recedes to a 2 to 4 foot crest over the downed boards. In order to refill the impoundment, the applicant proposes to cut back the plant discharge to about half of capacity, or 350 cfs. Some water would continue to spill over the crest while the flashboards are propped. However, no provision is made for maintaining the proposed bypass flow during flashboard replacement.
24. A release of 350 cfs (0.85 csm) is well above the summer aquatic base flow of 0.5 csm prescribed by the U.S. Fish and Wildlife Service Flow Recommendation Policy for the New England Area (USF&WS Flow Policy) and the Agency of Natural Resources Interim Procedure for Determining Acceptable Minimum Stream Flows, July 1993 (Agency Flow Procedure). Brook, brown and rainbow trout may spawn in the mainstem of the Passumpsic River below the project. The USF&WS Flow Policy and the Agency Flow Procedure prescribe 1.0 csm for the fall/winter period and 4.0 csm for the spring period to protect spawning and incubation.
25. The project will not be cycled for audits nor for emergency energy demands.

#### IV. Bypass

26. The application describes the 450 foot bypass as a one-acre plunge pool and a 200 foot run that is influenced by backwater from the tailrace during project operation.
27. Under the present operating mode of the project, only leakage flows from the dam are maintained in the bypass under low and average flow conditions. No leakage estimates have been made available.

## V. Standards Designation

28. The Passumpsic River in the project-affected reach is designated by the Water Resources Board as Class B waters. The project is entirely located within the waste management zone that receives the discharge from the Town of St. Johnsbury municipal wastewater treatment facility. The Board has also 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.

29. Class B stream reaches are managed to achieve and maintain a high level of quality compatible with certain beneficial values and uses. Values are high quality habitat for aquatic biota, fish and wildlife and a water quality that consistently exhibits good aesthetic value; uses are public water supply with filtration and disinfection, irrigation and other agricultural uses, swimming, and recreation. (Standards, Section 3-03)
30. 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.
31. 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))
32. 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))

33. 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

34. 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.
35. 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.
36. The application includes a supplemental report for 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 study, no samples at Gage station were less than 90% saturation; 12 out of 15 of the samples collected in the impoundment just upstream of the dam were at or above saturation. The generally supersaturated conditions demonstrate substantial algal activity, which will become a very important influence on dissolved oxygen levels as the St. Johnsbury wastewater plant loading increases in the future.

37. The Aquatec study's analysis of reaeration coefficients demonstrated a significant aeration efficiency for spillage at the Gage Dam. Spillage at Gage removed 75% of the dissolved oxygen deficit from saturation. The dissolved oxygen sag for the wastewater discharge is in the Gage impoundment. (Diurnal Dissolved Oxygen and

Temperature Study, Passumpsic River from St. Johnsbury Center to East Barnet, Vermont, July 16-19, 1991, September 1991, page 5)

**VI. Water Quality - Aquatic Biota and Habitat**

38. 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.
39. 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**

40. A free-flowing reach of about one mile exists between the project tailrace and the Passumpsic Project impoundment.
41. Flows below the tailrace will essentially be unregulated. This proposed flow regime will optimize conditions for fish life downstream of the project powerhouse.
42. Artificial flow regulation below the tailrace is only anticipated to occur during impoundment refilling following flashboard reinstallation. The applicant proposes to release 350 cfs (0.85 csm) during the refill period.

**Bypass**

43. The Agency's management goal for the bypasses at the Passumpsic River projects is to establish and maintain cold water aquatic habitat, including deep aerated pools that are well circulated and

serve as adult fish refugia, steeper gradient areas with high macroinvertebrate production, and fish spawning and nursery areas (Comprehensive River Plan for the Passumpsic River Watershed, Vermont Department of Environmental Conservation, August 1992). The project bypass provides valuable habitat for juvenile Atlantic salmon, all life stages of resident salmonids (brown and rainbow trout) and a variety of non-game fishes.

44. The large plunge pool, with a depth of up to 27 feet, is important as adult fish holding habitat and was mentioned by anglers during the Agency comprehensive river planning process as a very popular fishing hole. Consultants working for the applicant found young-of-the-year brown trout in the riffle/run section downstream of the pool. This more riverine portion of the bypass has value as nursery and possibly spawning habitat.
45. During fall 1992 and summer 1993, the applicant, in consultation with the Agency and the U.S. Fish and Wildlife Service, conducted a study to determine how much habitat is available at alternate minimum bypass flows. The results of this study are presented in the applicant's response to FERC AIR No. 3 (September 1993). The study approach is patterned after the U.S. Fish and Wildlife Service Instream Flow Incremental Methodology, which quantifies physical habitat based on organism preference for certain conditions of stream depth, velocity, substrate, and cover.
46. The bypass, as described in this study, includes three separate habitat types: a large deep (up to 27 feet) pool at the base of the dam; an approximately 90-foot long and 100-foot wide, deep to moderate depth riffle, including the transition at the lower end of the deep pool; and an approximately 160 foot long and 200 foot wide shallow run that extends to the project tailrace.
47. The area to be assessed in the applicant's study under AIR No. 3 was the 250 foot long riffle/run reach. Substrate in the riffle and run sections was categorized as embedded cobble and gravel. The Agency identified the riffle portion as providing brown trout/spawning incubation habitat.
48. The scope of the AIR No. 3 study was to conduct assessments of habitat for the brown trout spawning and incubation life stage

(Transect 1 in the riffle section) and the brown trout juvenile life stage (at both Transect 1 and Transect 2, which was located in the run section) at target flows of 17 cfs, 50 cfs, 83 cfs, 144 cfs, and 207 cfs. During the study, the applicant's consultant judged that the inclusion of additional target flows under low river flow conditions would be desirable, and measurements were obtained at flows of 32 cfs and 116 cfs.

49. A hydraulic constriction downstream of the project causes a backwater influence into the bypass channel when there is a discharge from the powerhouse. This influence goes as far upstream as the large pool below the dam even with the lowest turbine wicket gate settings studied and affected depth and velocity measurements in the bypass.
50. Unfortunately, the backwater influence reduced the utility of the habitat study. The station release was varied for observations of the target bypass flows. For the smallest bypass discharge, the backwater caused the greatest increase in depth, and the effect was reversed at the high flow. Ideally, a family of habitat curves would have been generated, each curve representing the relationship for a fixed station discharge.
51. Weighted usable area (WUA) was used as the measurement unit to describe the habitat/flow relationships for brown trout spawning and incubation and juvenile life stages. WUA is expressed in units of square feet. The results are contained in the following table.

**Table 2. Results of habitat study in bypass.**

Flow (cfs)	Brown Tr. Habitat (s.I.)	
	Spawning & Inc. Transect 1	Juvenile Tr. 1 and 2
14	0	20,710
32	2,480	21,480
55	3,260	21,820
76	3,670	20,440
116	4,170	19,430
142	5,050	24,560
210	5,170	24,360

Note: Wetted area estimates are inconsistent for the range of flows. The area is about 9,000 sq. feet for the riffle section and 18,000 sq. feet for the run section. The wetted areas do not change substantially.

52. The five lowest study flows were measured under total river flow conditions of 120-200 cfs. The remaining two were under total flow conditions estimated as 470 cfs. The study report indicates that the data for 55 cfs is suspect.
53. The spawning and incubation habitat availability appears to increase substantially when bypass flows are increased over the range from 32 cfs to 142 cfs. The improvement is primarily due to enhanced quality of the habitat, as the wetted area changes only slightly. According to the computer output for the habitat model, depth and velocity conditions are generally optimized at the study flows of 142 cfs and 210 cfs; twice the habitat is available at those flows compared to 32 cfs. At the higher flows, the total WUA is about half of the total wetted area because of the low substrate suitability index (0.2).
54. Juvenile habitat does not vary substantially for the flow conditions studied. It comprises roughly 80% of the total wetted area.

### **Impoundment**

55. Fisheries habitat that was formerly riverine (lotic) has been transformed into lacustrine habitat due to the impounding of water by the dam. The quality of the impoundment as lacustrine habitat is marginal.
56. Major drawdowns occur at the project due to the flashboard height, causing the dewatering of the riparian-zone habitat. Fish and other aquatic organisms that use the impoundment are subject to stranding or freezing when such drawdowns occur.

### **Fish Passage**

57. 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 square yards) of salmon nursery habitat exist 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 about 96% of the habitat above Gage.
58. 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 Gage Project.
59. 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.

60. 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.
61. 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)
62. Resident populations of trout occur both above and below Gage Dam and would benefit from fish passage facilities that would help accommodate their movements within the river system. The confluences of two large tributaries, the Sleepers River and the Moose River, are located between Arnold Falls and Gage Dam.

#### **VIII. Water Quality - Wildlife and Wetlands**

63. 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.
64. No Class I or Class II wetlands exist within the influence of the dam backwater zone.

65. Two small Class III wetlands are associated with east side of the Passumpsic River directly upstream of the dam. The northern wetland, described by the applicant as a small backwater marsh, is a combination of forested, emergent, and open water wetland, while the southern wetland is primarily emergent and open water. These wetlands, which are on the project lands, provide significant functions.
66. The small backwater marsh is located about 900 feet upstream from the dam on the south (left) bank of the river. It is 0.8 of an acre in size with fringe cattail and overhanging woody cover. The mix of aquatic vegetation, and abundance of amphibians, crustaceans, mollusks, and other macroinvertebrates make the site a valuable feeding area for both birds and mammals. Muskrat, beaver, raccoon, mink and otter have been seen using the area. The wetland provides diversity and richness to the project area (Response to AIR No. 8, September 1993).
67. A true run-of-river operation will, in part, eliminate several environmental concerns associated with impoundment water level fluctuations, including wildlife. However, the loss of flashboards and their anticipatory lowering prior to flood events remains a serious concern, especially considering their height. Lowering the pond elevation would have a detrimental effect on fish and wildlife residing in the pond or using the upstream wetland during critical seasons of the year, such as times of fish spawning and incubation, waterfowl nesting, and periods of hibernation of reptiles and amphibians.
68. Regarding wetland vegetation, flashboard loss could result in the dewatering of root stocks. Winter drawdowns expose rootstocks of perennial plant species in the drawdown zone to freezing conditions which prevent the further establishment of certain species. Winter drawdowns can also cause "freeze-outs" of hibernating amphibians and wintering aquatic furbearers and drawdowns during the spring and early summer can cause loss of cover and increased predation of young waterfowl broods.
69. Reduction of the frequency and duration of flashboard collapse and resultant lowering of impoundment levels, particularly during the winter months of December through March, would increase the

functional value of impoundment wetlands, especially for wildlife habitat, shoreline stabilization, and food chain production.

70. A constant year round water level will protect the wetland and the wildlife that utilize the water body. Institution of a run-of-the-river operating mode will protect wetlands present in the backwater zone and any downstream wetlands that may exist.
71. 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**

72. Two potentially significant habitats are found at Gage station: a floodplain community on the left (south) bank just below the railroad trestle, and a ledge and sand community to the east of the powerhouse. In both environments, non-native plants form a conspicuous part of the plant community.
73. The floodplain forest has developed under conditions created by the dam and its impoundment and should continue to be sustained without significant changes, according to the applicant. The applicant contends that existing conditions such as high spring flows will continue to be the dominant factors shaping species composition and development of the ledge and sand community and that the proposed operation should have little discernable impact.
74. No endangered or threatened plants or animals are known to inhabit the project reach.

**X. Water Quality - Shoreline Erosion and Impoundment Desilting**

75. The upper portion of the impounded reach of the Passumpsic River above the project dam and below the Sleepers River confluence forms a meander pattern in the floodplain alluvial deposits to the west of the river channel. The river then enters a more incised S-curved reach of eroding lacustrine deposits. The river cuts into a

glacial ice-contact deposit immediately upstream of the dam along where U.S. Route 5 borders the river.

76. The applicant retained a geotechnical engineer to evaluate the streambank erosion in the project area.
77. The consultant partially attributed erosion occurring below the tailrace, on the far side of the plunge pool, along the Canadian Pacific Railroad embankment to project operation. The consultant recommended riprapping to protect against further erosion. In response to FERC AIR No. 13, the consultant resurveyed this site in June 1993 and found that the reported erosion along the railroad embankment was not of concern since the exposed boulders previously observed were apparently part of a rock fill which extended well below the water surface.
78. The same consultant observed evidence of long-term erosion that was occurring along the northerly shoreline of the tailwater pool upstream of the railroad embankment. The applicant has proposed a preliminary erosion control plan for this site to include the use of conventional dumped riprap and/or gabion baskets. The problem may in part be caused by high flow releases from flashboard failure.
79. The consultant also noted severe erosion and slope failure in the ice-contact reach upstream of the dam. His opinion is that the problem is caused by toe failure; however, he does not attribute the toe failure in full or part to project operation. Toe destabilization can be exacerbated by changing pore pressures in soils as water levels are cycled. Failure of this particular bank can affect the highway.
80. Areas of significant shoreline erosion in the impoundment are the west streambank adjacent to U.S. Route 5 directly upstream of the dam and the west bank closer to the head of the impoundment upstream of the railroad trestle. Historical operation has resulted in occasional drawdowns of six feet or greater. Drawdowns of this magnitude can contribute to shoreline erosion.
81. Impoundment desilting can result in significant degradation of water quality if not executed properly. The applicant has not disclosed

any desilting problems at this project in the past and proposes to consult with the Agency prior to any future desilting activity.

#### **XI. Water Quality - Recreation and Aesthetics**

82. 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)
83. Observations by operating personnel indicate that usage by fishermen is on the order of two visits per day during the late spring through early fall. Fishing is done almost exclusively below the dam. An occasional picnicker is seen during the summer.
84. 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.
85. 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.
86. The river is a navigable and boatable water of the State.
87. As a result of extensive impounding by utility dams along the length of the Passumpsic River, flatwater boating opportunities are created that enable extension of the boating season well into low water periods when other rivers are not canoeable. Referencing the Appalachian Mountain Club River Guide - New Hampshire/Vermont, 2cd ed., 1989, the Passumpsic River has suffered in the past from industrial pollution and consequent bad press in earlier canoeing guides. It does have an excessive number of dams, but it is an attractive river in a rural area. The dams are easier to deal with at low water.

88. The River Guide recommends portaging the dam on river left, although no formal portage has been provided by the applicant.
89. According to the River Guide, the river is quickwater from the dam to the Passumpsic Project two miles downstream.
90. 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.
91. Referencing the applicant's March 1991 Site Assessment concept proposal (Appendix G, License application), a portage route was proposed on the east (left) bank of the river accessible by canoe only (Site A); this portage was subsequently developed in 1992. The applicant also proposes a picnic area for an area known as the Pine Woods (Site B). As there are no provisions for formal access across the nearby railroad right of way, this site would be used by canoeists only.
92. The applicant does not plan on providing parking for recreationalists or non-canoeist day-use facilities because of project size, availability of land, and poor road access. In addition to the right-of-way crossing problem on the east side of the river, the applicant contends that access to the project from U.S. Route 5 on the west side is hazardous.
93. Access to the station is presently open to the public but not encouraged due to the hazardous intersection of the access road and U.S. Route 5. The entry road typically remains open and limited parking is available. However, should vandalism become a problem, the applicant intends to restrict access.
94. The remote project lands on the east bank are suited to the development of an overnight camping area for canoeists. The Northern Vermont Canoe Cruisers concur that this would be a good site for river-based camping. The Agency in an October 15, 1991 letter to the applicant recommended that this be included as an enhancement in the future. Providing such facilities when warranted

by recreational demand is critical if high quality recreation experiences are to continue in the state.

95. The spillage of water over the dam is a major element in the project's aesthetics. Falling water has a strong visual appeal, and without sufficient spillage over the dam the site lacks context and its attractiveness suffers. The amount of spillage needs to be in scale with the size of the project. The applicant conducted a flow demonstration to document on video-cassette tape existing spillage conditions as well as a 3-inch spillage (the applicant's original proposal) across the right spillway.
96. Spillage will only be provided over the shorter south spillway. The applicant indicates that spillage over, or the intentional leakage through, the six foot flashboards will not be provided. The Agency landscape architect has advised that the minimum flow proposal by the applicant is acceptable for aesthetics; however, that a means of providing sheet flow of water over the north spillway is needed in order to mask the unappealing appearance of the dry dam.
97. The applicant uses sheet plastic to seal the project flashboards. The plastic is unsightly in place and even more objectionable when washed downstream.

## **XII. Existing Uses**

98. 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)

99. 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)

100. No species protected by this law have been identified at the project.

Agency Regulatory Powers over Fish and Wildlife

101. 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."
102. 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

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

At Gage Station, the plan recommends that minimum flow requirements be established for this project in order to improve the

bypass and downstream fishery, water quality, and aesthetics, and that impoundment water levels be stabilized to protect upstream fisheries resources.

#### Passumpsic River Watershed Comprehensive River Plan

104. 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

105. 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.

#### 106. 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.

107. 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.

108. 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."
109. 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.
110. 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

111. 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.
112. Prescription of an appropriate minimum flow for the bypass is important to project economics. The applicant's response to AIR No. 9 (September 1993) provides the energy output losses for a range of minimum bypass flows from 17 to 207 cfs. The special releases proposed by the applicant would reduce project output by about 113 mwh, or 4% of the average annual energy output, for the 30-year term of the federal license; the special releases recommended by the Agency would result in roughly a 600 mwh, or 22%, reduction in output.
113. 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)

114. 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*

115. The conversion of Gage to a run-of-the-river station will result in a more stable impoundment. However, occasional lowering of the flashboards will cause a lowering of the impoundment by up to six feet. To protect the wetland ecology, wildlife, and the aquatic habitat in the reach influenced by the project backwater, impoundment levels should be managed such that deviations in excess of minus two feet from the normal operating level are eliminated. Reasonable alternatives for controlling or preventing major drawdowns, such as the installation of a crest gate, should be investigated. Without such controls, extensive aquatic habitat would be dewatered causing an undue adverse effect.
116. Major drawdowns for construction or repair would have to be reviewed case specifically to insure protection of the upstream resource.

#### *Bypassed reach*

117. 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.

118. The applicant proposes to maintain a 17 cfs bypass release during the summer period; 17 cfs is only 21% of the 7Q10 drought flow condition (82 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 170 cfs, which with the applicant's proposed operating mode would require about 0.45 csm in order to operate.
119. 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, as discussed below, will preclude the need to monitor water quality to assure that dissolved oxygen standards are met.
120. The Passumpsic River is heavily dammed and the large majority of its length is under impounded conditions. The bypasses represent a disproportionate amount of the high quality habitat for salmonids on the river mainstem. The Department considers the maintenance of

habitat values within the bypasses as very important. The applicant's proposed bypass flow regime 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.

121. A spillage flow in the bypass reach of 82 cfs (7Q10) would be sufficient to maintain adequate water quality and circulation within the large bypass pool, which serves as an important refuge for numerous fish. When flows recede below 252 cfs, or 0.61 cfs (82 cfs plus 170 cfs, the minimum station hydraulic capacity), all flows would flow through the bypass.
122. A minimum flow of 142 cfs during the fall/winter spawning and incubation period for brown trout (October 1 - May 31) would provide high quality habitat for this species/life stage.
123. Based on the video assessment completed by the applicant, the proposed spillage regime 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*

124. 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.
125. 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*

126. During special events when water must be placed in storage, the applicant proposes to release 350 cfs (0.85 csm) below the project. The USF&WS Flow Policy and the Agency Flow Procedure prescribe certain minimum flows for the perpetuation of indigenous fish species. The base flows are 4.0 csm for spring spawning and incubation, 1.0 for fall/winter spawning and incubation, and 0.5 csm for the remaining period and for cases where there is no use for spawning and incubation. When instantaneous inflows are less than these values, the inflow must be passed on an instantaneous basis. At the Gage Project, these aquatic base flows are 1652 cfs (4.0 csm), 413 cfs (1.0 csm), and 206 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.
127. 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 206 cfs and 413 cfs standards, respectively.

**Fish Passage**

128. Because of past stocking, operational passage facilities for outmigration is a present need at Gage. 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.

129. 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.
130. 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)
131. Any passage facilities at Gage Dam must be provided and operated consistent with the most current restoration plan.

#### **Streambank erosion**

132. The applicant's proposed operating mode will reduce the potential for new erosion problems to develop in the future. Installation of a crest gate or rubber dam system may reduce problems caused by flashboard failure.
133. Uncorrected erosion problems that are attributable to historic project operation will likely remain unstable. The applicant should develop a specific mitigation plan for the erosion areas identified by its geotechnical engineer and perform the necessary corrective measures. Otherwise, continued erosion may cause soil loss that would violate turbidity standards and contribute sediment to the river that may have an undue adverse effect on aquatic habitat.

### Recreation

134. The portage and access, with the improvements proposed by the applicant will provide support of the recreation management objectives for Class B waters, as well as the use of the river at the project for fishing, boating, and other existing uses.
135. 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.
136. The applicant's spillage proposal of 20 cfs is satisfactory for aesthetics. The greater spillage proposed for the period of October 1 - May 1 would provide additional enhancement. If feasible, a portion of the flow should be spilled over the main spillway to provide a veil of water.
137. The applicant should cease using plastic for sealing flashboard leakage. The plastic degrades river aesthetics and recreational use and, when lost downstream, violates standards for settleable or floating solids.

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 E 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 142 cfs from October 1 through May 31 and 82 cfs from June 1 through September 30 shall be released at the dam at all times. If the instantaneous inflow falls below the hydraulic capacity of the turbine unit plus this spillage requirement, all flows shall be spilled at the dam.

Within 90 days of the issuance of this certification, the applicant shall furnish a description, hydraulic design calculations, and plans for the measure to be used to pass these minimum flows. The filing shall address conditions during flashboard replacement and impoundment refilling. If technically feasible, the measure shall include spillage of a portion of the flow over the main spillway.

- D. The applicant shall fully investigate alternatives that would enable it to manage impoundment levels such that drawdowns in excess of 2.0 feet, as caused by flashboard management, from the normal

operating level are eliminated or significantly reduced. An investigation report shall be filed with the Department within six months of issuance of this certification and shall include an implementation schedule for construction of a feasible alternative, subject to Department review and approval.

- E. 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 206 cfs from June 1 to September 30 and 413 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.
- F. The applicant shall file for review and approval, within 90 days of the issuance of this certificate, a plan for monitoring instantaneous flow releases at the project, both in the bypass and below the tailrace. Following approval of the monitoring plan, the applicant shall then measure instantaneous flows and provide records of discharges at the project on a regular basis as per specifications of the Department. Upon receiving a written request from the applicant, the Department may waive the requirement for flow monitoring at this project provided the applicant satisfactorily demonstrates that the required flow will be discharged at all times.
- G. The applicant shall file for review and approval, within 180 days of the issuance of this certification, a remediation plan and schedule for correcting erosion that has been attributed to past project operation (ref. Finding 78). The Department may waive this requirement if the applicant files an updated geotechnical analysis of the reach showing that such remediation is unnecessary due to the existence of bedrock.
- H. Unless a means of controlling major drawdowns is implemented, the applicant shall monitor shoreline erosion during the life of the project. The applicant shall report to the Department the results of a survey of erosion every three years during the life of the project. If problems arise measures shall be taken by the applicant, subject

to Department approval, to stabilize shorelines so as to prevent discharge of sediment to State waters.

I. 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.

J. 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.

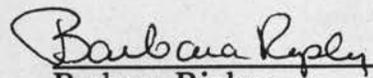
K. The applicant shall provide the Department with a copy of the turbine rating curves, accurately depicting the flow/production

relationship, for the record within one year of the issuance of this certificate.

- L. 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. The applicant shall cease using plastic sheeting for control of flashboard leakage and utilize an alternative that meets standards.
- M. 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.
- N. By October 1, 1994, the applicant shall file maintenance plans for the existing portage with the Department of Environmental Conservation and the Department of Forests, Parks and Recreation for review and approval. The Department may require reasonable modifications to the portage at any time and as necessary to facilitate use or protect wildlife use of nearby wetlands.
- O. The applicant shall allow 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.
- P. The applicant shall allow the Department to inspect the project area at any time to monitor compliance with certification conditions.
- Q. A copy of this certification shall be prominently posted within the facility.
- R. 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.

- S. 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 16 day of June, 1994.

cc: distribution list

jeff\c:\wp51\files\hydrodam\passump\gage\401\6f\_gage.401

**From:** [Davis, Eric](#)  
**To:** [Katie Sellers](#); [Crocker, Jeff](#)  
**Cc:** [Andy Qua](#); [Kayla Easler](#)  
**Subject:** RE: Gage Hydroelectric Project - Review for LIHI Certification Application  
**Date:** Thursday, November 17, 2016 9:18:10 AM  
**Attachments:** [image002.png](#)

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Hi Katie,

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

I can confirm that the current operations of the Gage 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](mailto:eric.davis@vermont.gov)  
<http://www.watershedmanagement.vt.gov/rivers>  
(Please note my new e-mail address, effective July 27, 2015)



See what we're up to on our [Blog](#). [Flow](#).

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**From:** Katie Sellers [mailto:[Katie.Sellers@KleinschmidtGroup.com](mailto:Katie.Sellers@KleinschmidtGroup.com)]  
**Sent:** Thursday, October 13, 2016 12:00 PM  
**To:** Davis, Eric <[Eric.Davis@vermont.gov](mailto:Eric.Davis@vermont.gov)>; Crocker, Jeff <[Jeff.Crocker@vermont.gov](mailto:Jeff.Crocker@vermont.gov)>  
**Cc:** Andy Qua <[Andy.Qua@KleinschmidtGroup.com](mailto:Andy.Qua@KleinschmidtGroup.com)>; Kayla Easler <[Kayla.Easler@KleinschmidtGroup.com](mailto:Kayla.Easler@KleinschmidtGroup.com)>  
**Subject:** Gage Hydroelectric Project - Review for LIHI Certification Application

Hi Jeff and Eric,

We are working on a number of Low Impact Hydropower Institute (LIHI) re-certifications for Green Mountain Power. The first of which is for the Gage Hydroelectric Project (FERC No. 2397) located on the Passumpsic River.

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

*The Gage Project is located within the Passumpsic River Class B waterway. The Project is entirely located within the waste management zone that receives the discharge from the Town of St. Johnsbury municipal wastewater treatment facility. During the Project's 1994 licensing process it was concluded that the Project's impact on the River's water quality parameters were not significant. Could you please confirm, to your best abilities, that the Project's current operations continue to not be a contributing cause of the river's water quality limitations?*

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

Thank you!

Katie

**Katie Sellers**

**Regulatory Coordinator**

***Kleinschmidt***

Office: 207-416-1218

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

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This message contains attachments delivered via [ShareFile](#).

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

Download the attachments by [clicking here](#).

Hi Eric,

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

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

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

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

Thank you,  
Katie

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

Katie E. Sellers, M.S.  
Regulatory Coordinator

***Kleinschmidt***

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**APPENDIX D**  
**FISH PASSAGE**

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

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

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

Best  
Katie

**Katie E. Sellers, M.S.**  
**Regulatory Coordinator**

The logo for Kleinschmidt, featuring the word "Kleinschmidt" in a bold, blue, sans-serif font with a green underline.

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---

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

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

Best,  
Katie

**Katie E. Sellers, M.S.**  
**Regulatory Coordinator**

The logo for Kleinschmidt, featuring the word "Kleinschmidt" in a bold, blue, sans-serif font with a green underline.

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---

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

Hello Katie,

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

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

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

Thanks,  
Jud



---

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

---

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

Good Morning Jud and Brett,

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

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

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

Thank you,  
Katie

Katie Sellers

Regulatory Coordinator

***Kleinschmidt***

Office: 207-416-1218

[www.KleinschmidtGroup.com](http://www.KleinschmidtGroup.com)



**APPENDIX E**  
**THREATENED AND ENDANGERED SPECIES**



## United States Department of the Interior



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

Consultation Code: 05E1NE00-2016-SLI-2326

September 30, 2016

Event Code: 05E1NE00-2016-E-03243

Project Name: Gage Hydroelectric Project FERC No. 2397

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](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: Gage Hydroelectric Project FERC No. 2397

## 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:** 05E1NE00-2016-SLI-2326

**Event Code:** 05E1NE00-2016-E-03243

**Project Type:** DAM

**Project Name:** Gage Hydroelectric Project FERC No. 2397

**Project Description:** Project review for LIHI re-certification

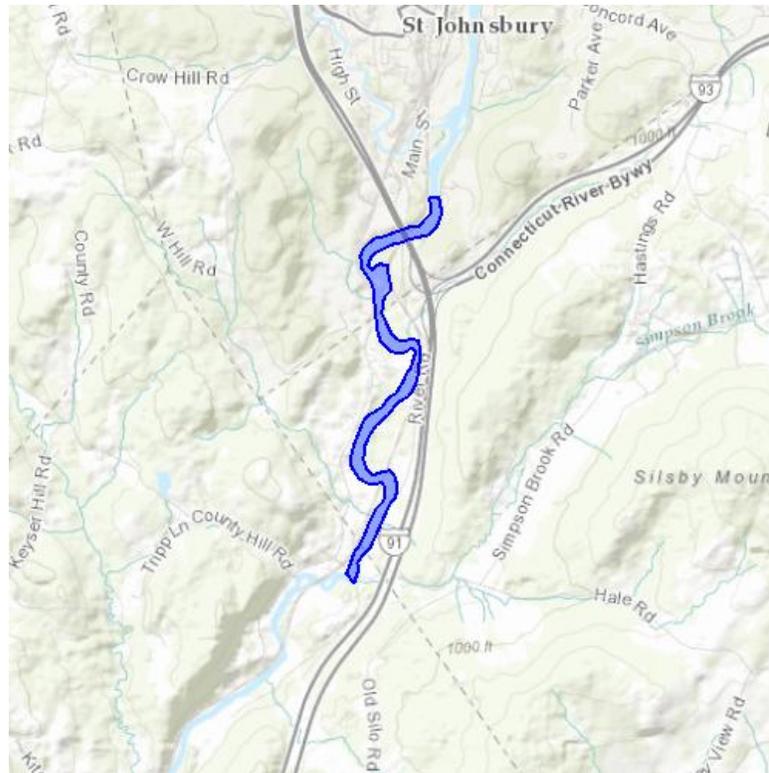
**Please Note:** The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your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



United States Department of Interior  
Fish and Wildlife Service

Project name: Gage Hydroelectric Project FERC No. 2397

### Project Location Map:



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

**Project Counties:** Caledonia, VT



United States Department of Interior  
Fish and Wildlife Service

Project name: Gage Hydroelectric Project FERC No. 2397

## 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 ( <i>Myotis septentrionalis</i> ) Population: Wherever found	Threatened		



United States Department of Interior  
Fish and Wildlife Service

Project name: Gage Hydroelectric Project FERC No. 2397

## **Critical habitats that lie within your project area**

There are no critical habitats within your project area.

**From:** [Darling, Scott](#)  
**To:** [Kratzer, Jud](#); [Katie Sellers](#)  
**Cc:** [Buck, John](#)  
**Subject:** RE: Gage Hydroelectric Project - Review for LIHI Certification Application  
**Date:** Wednesday, October 19, 2016 10:47:47 AM  
**Attachments:** [image002.png](#)

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Katie:

Given no trees are being felled for these projects, there will be no impacts to northern long-eared bats.

Scott Darling

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](mailto:scott.darling@vermont.gov)

---

**From:** Kratzer, Jud  
**Sent:** Wednesday, October 19, 2016 9:57 AM  
**To:** Darling, Scott <[Scott.Darling@vermont.gov](mailto:Scott.Darling@vermont.gov)>  
**Cc:** Buck, John <[John.Buck@vermont.gov](mailto:John.Buck@vermont.gov)>  
**Subject:** RE: Gage Hydroelectric Project - Review for LIHI Certification Application

Scott,

I passed your question on to Katie. You can see her response below.

Yesterday, she sent another email asking the exact same questions for the Arnold Falls Dam which is about 1 mile upstream of the Gage Dam, right in the middle of St. Johnsbury. In case it helps, the coordinates of the two dams are:

Gage: 44.39816, -72.02323  
Arnold Falls: 44.42480, -72.01362

Thanks,  
Jud

Katie's response:

Hi Jud, No tree clearing. Nothing is changing at all with the projects and they will continue to operate and exist as they currently are right now.

Thank you!  
Katie

Katie Sellers  
Regulatory Coordinator  
**Kleinschmidt**  
Office: 207-416-1218  
[www.KleinschmidtGroup.com](http://www.KleinschmidtGroup.com)



**From:** Kratzer, Jud [<mailto:Jud.Kratzer@vermont.gov>]  
**Sent:** Wednesday, October 19, 2016 8:57 AM  
**To:** Katie Sellers <[Katie.Sellers@KleinschmidtGroup.com](mailto:Katie.Sellers@KleinschmidtGroup.com)>  
**Subject:** RE: Arnold Falls Hydroelectric Project- Review for LIHI Certification Application

Hello Katie,

Our bat biologist asked if any tree clearing would be necessary. This question would apply to both dams.

Thanks,  
Jud

---

**From:** Darling, Scott  
**Sent:** Tuesday, October 18, 2016 8:53 AM  
**To:** Kratzer, Jud <[Jud.Kratzer@vermont.gov](mailto:Jud.Kratzer@vermont.gov)>  
**Subject:** RE: Gage Hydroelectric Project - Review for LIHI Certification Application

Jud:  
Can we assume no tree cutting is needed?

Scott

---

**From:** Kratzer, Jud

**Sent:** Thursday, October 13, 2016 4:08 PM

**To:** Darling, Scott <[Scott.Darling@vermont.gov](mailto:Scott.Darling@vermont.gov)>; Buck, John <[John.Buck@vermont.gov](mailto:John.Buck@vermont.gov)>

**Subject:** FW: Gage Hydroelectric Project - Review for LIHI Certification Application

Gentlemen,

Please see the question below from Kleinschmidt. The Gage Dam is on the Passumpsic River just downstream of St. Johnsbury Village. I can't imagine how the continued operation of a small hydro dam could affect bats or eagles, but you guys are the experts. Let me know if you need any more details on the location, the dam, operations, etc.

Thanks,  
Jud

---

**From:** Emerson, Peter

**Sent:** Thursday, October 13, 2016 2:02 PM

**To:** Kratzer, Jud <[Jud.Kratzer@vermont.gov](mailto:Jud.Kratzer@vermont.gov)>

**Subject:** FW: Gage Hydroelectric Project - Review for LIHI Certification Application

Jud,

I think this is yours.

Pete

Note: My email changed to [Peter.emerson@vermont.gov](mailto:Peter.emerson@vermont.gov) on August 1, 2015.

Pete Emerson  
Fisheries Biologist  
1229 Portland Street, Suite 201  
St. Johnsbury, VT 05819  
(802) 751-0485  
[Peter.emerson@vermont.gov](mailto:Peter.emerson@vermont.gov)

---

**From:** Katie Sellers [<mailto:Katie.Sellers@KleinschmidtGroup.com>]

**Sent:** Thursday, October 13, 2016 1:52 PM

**To:** Emerson, Peter <[Peter.Emerson@vermont.gov](mailto:Peter.Emerson@vermont.gov)>

**Cc:** Andy Qua <[Andy.Qua@KleinschmidtGroup.com](mailto:Andy.Qua@KleinschmidtGroup.com)>; Kayla Easler <[Kayla.Easler@KleinschmidtGroup.com](mailto:Kayla.Easler@KleinschmidtGroup.com)>

**Subject:** Gage Hydroelectric Project - Review for LIHI Certification Application

Good Afternoon Peter,

Kleinschmidt Associates is working with Green Mountain Power on a number of Low Impact Hydropower Institute (LIHI) re-certifications for a group of hydroelectric projects previously certified

by LIHI in 2012. The first of which is for the Gage Hydroelectric Project (FERC No. 2397) located on the Passumpsic River.

Within the LIHI re-certification application we are required to gain the following feedback from the Vermont Division of Fish and Wildlife:

*The 1994 Environmental Assessment notes that the continued operation of the Gage Project would not adversely affect populations of species inhabiting unique habitat within the Passumpsic River. Currently now it is identified that the federally threatened and state endangered northern long-eared bat and state endangered bald eagle may have presence within the project area. Can you please confirm that the Project's continued run of river operations do not negatively affect these species that may have transient occurrence within the project area?*

If you (or another appropriate contact) could please provide us with feedback on this topic at your earliest convenience it would be much appreciated.

Thank you!  
Katie Sellers

Katie Sellers  
Regulatory Coordinator

**Kleinschmidt**

Office: 207-416-1218

[www.KleinschmidtGroup.com](http://www.KleinschmidtGroup.com)



**From:** [Kratzer, Jud](#)  
**To:** [Katie Sellers](#)  
**Subject:** FW: Gage Hydroelectric Project - Review for LIHI Certification Application  
**Date:** Friday, October 21, 2016 12:35:18 PM  
**Attachments:** [image002.png](#)

---

Katie,

See below for bald eagles...

---

**From:** Buck, John  
**Sent:** Thursday, October 20, 2016 4:15 PM  
**To:** Kratzer, Jud <Jud.Kratzer@vermont.gov>; Darling, Scott <Scott.Darling@vermont.gov>  
**Subject:** RE: Gage Hydroelectric Project - Review for LIHI Certification Application

Jud,

The continued operation of these two dams is unlikely to cause negative impacts to Bald Eagle recovery in the Passumpsic River drainage.

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](mailto:john.buck@Vermont.gov)

Desk-802-476-0196

Office-802-476-0199

---

**From:** Kratzer, Jud  
**Sent:** Thursday, October 13, 2016 4:08 PM  
**To:** Darling, Scott <[Scott.Darling@vermont.gov](mailto:Scott.Darling@vermont.gov)>; Buck, John <[John.Buck@vermont.gov](mailto:John.Buck@vermont.gov)>  
**Subject:** FW: Gage Hydroelectric Project - Review for LIHI Certification Application

Gentlemen,

Please see the question below from Kleinschmidt. The Gage Dam is on the Passumpsic River just downstream of St. Johnsbury Village. I can't imagine how the continued operation of a small hydro dam could affect bats or eagles, but you guys are the experts. Let me know if you need any more details on the location, the dam, operations, etc.

Thanks,

Jud

---

**From:** Emerson, Peter

**Sent:** Thursday, October 13, 2016 2:02 PM  
**To:** Kratzer, Jud <[Jud.Kratzer@vermont.gov](mailto:Jud.Kratzer@vermont.gov)>  
**Subject:** FW: Gage Hydroelectric Project - Review for LIHI Certification Application

Jud,

I think this is yours.

Pete

Note: My email changed to [Peter.emerson@vermont.gov](mailto:Peter.emerson@vermont.gov) on August 1, 2015.

Pete Emerson  
Fisheries Biologist  
1229 Portland Street, Suite 201  
St. Johnsbury, VT 05819  
(802) 751-0485  
[Peter.emerson@vermont.gov](mailto:Peter.emerson@vermont.gov)

---

**From:** Katie Sellers [<mailto:Katie.Sellers@KleinschmidtGroup.com>]  
**Sent:** Thursday, October 13, 2016 1:52 PM  
**To:** Emerson, Peter <[Peter.Emerson@vermont.gov](mailto:Peter.Emerson@vermont.gov)>  
**Cc:** Andy Qua <[Andy.Qua@KleinschmidtGroup.com](mailto:Andy.Qua@KleinschmidtGroup.com)>; Kayla Easler <[Kayla.Easler@KleinschmidtGroup.com](mailto:Kayla.Easler@KleinschmidtGroup.com)>  
**Subject:** Gage Hydroelectric Project - Review for LIHI Certification Application

Good Afternoon Peter,

Kleinschmidt Associates is working with Green Mountain Power on a number of Low Impact Hydropower Institute (LIHI) re-certifications for a group of hydroelectric projects previously certified by LIHI in 2012. The first of which is for the Gage Hydroelectric Project (FERC No. 2397) located on the Passumpsic River.

Within the LIHI re-certification application we are required to gain the following feedback from the Vermont Division of Fish and Wildlife:

*The 1994 Environmental Assessment notes that the continued operation of the Gage Project would not adversely affect populations of species inhabiting unique habitat within the Passumpsic River. Currently now it is identified that the federally threatened and state endangered northern long-eared bat and state endangered bald eagle may have presence within the project area. Can you please confirm that the Project's continued run of river operations do not negatively affect these species that may have transient occurrence within the project area?*

If you (or another appropriate contact) could please provide us with feedback on this topic at your earliest convenience it would be much appreciated.

Thank you!  
Katie Sellers

Katie Sellers  
Regulatory Coordinator

**Kleinschmidt**

Office: 207-416-1218

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**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](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  
  
Office: 207-416-1218  
[www.KleinschmidtGroup.com](http://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 Passumpic 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 will 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](tel:8025400319) (direct)

[\(802\) 229-0820](tel:8022290820) (VRC office)

29 Main St, Montpelier VT 05602

[noah@vermontriverconservancy.org](mailto:noah@vermontriverconservancy.org)

[www.vermontriverconservancy.org](http://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](mailto:eric.davis@vermont.gov)  
<http://www.watershedmanagement.vt.gov/rivers>  
*(Please note my new e-mail address, effective July 27, 2015)*



See what we're up to on our [Blog, Flow](#).