

# LOW-IMPACT HYDROPOWER POWER INSTITUTE CERTIFICATION APPLICATION

## SILVER LAKE PROJECT (FERC No. 11478)



*Prepared for:*

**Green Mountain Power Corporation  
Rutland, Vermont**

*Prepared by:*

***Kleinschmidt***

Pittsfield, Maine

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

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### TABLE OF CONTENTS

1.0	FACILITY DESCRIPTION .....	1
2.0	STANDARDS MATRICES .....	14
2.1	IMPOUNDMENT #1 ZOE (SUGAR HILL RESERVOIR) .....	14
2.2	UPSTREAM ZOE (GOSHEN DAM TO DIVERSION DAM) .....	14
2.3	BYPASSED REACH ZOE (DOWNSTREAM OF SUCKER BROOK DIVERSION DAM TO SILVER LAKE POWERHOUSE) .....	14
2.4	IMPOUNDMENT #2 ZOE (SILVER LAKE) .....	15
2.5	DOWNSTREAM ZOE (SILVER LAKE POWERHOUSE TAILRACE TO LAKE DUNMORE).....	15
3.0	SUPPORTING INFORMATION .....	16
3.1	ECOLOGICAL FLOWS STANDARDS.....	16
3.1.1	ECOLOGICAL FLOWS STANDARDS: IMPOUNDMENT #1 ZOE .....	16
3.1.2	ECOLOGICAL FLOWS STANDARDS: UPSTREAM ZOE.....	18
3.1.3	ECOLOGICAL FLOWS STANDARDS: BYPASSED REACH ZOE .....	21
3.1.3.1	FLOW DEVIATION.....	22
3.1.4	ECOLOGICAL FLOWS STANDARDS: IMPOUNDMENT #2 ZOE .....	24
3.1.5	ECOLOGICAL FLOWS STANDARDS: DOWNSTREAM ZOE.....	26
3.2	WATER QUALITY STANDARDS.....	28
3.2.1	WATER QUALITY STANDARDS: IMPOUNDMENT #1 AND UPSTREAM ZOES.....	28
3.2.2	WATER QUALITY STANDARDS: UPSTREAM ZOE.....	32
3.2.2.1	DEVIATION.....	33
3.2.3	WATER QUALITY STANDARDS: BYPASSED REACH, IMPOUNDMENT #2, AND DOWNSTREAM ZOES .....	35
3.3	UPSTREAM FISH PASSAGE STANDARDS .....	38
3.3.1	UPSTREAM FISH PASSAGE STANDARDS: IMPOUNDMENT #1, UPSTREAM, AND IMPOUNDMENT #2 ZOES .....	38
3.3.2	UPSTREAM FISH PASSAGE STANDARDS: BYPASSED REACH ZOE .....	39
3.3.3	UPSTREAM FISH PASSAGE STANDARDS: DOWNSTREAM ZOE.....	42
3.4	DOWNSTREAM FISH PASSAGE AND PROTECTION STANDARDS:.....	44
3.4.1	DOWNSTREAM FISH PASSAGE AND PROTECTION STANDARDS: IMPOUNDMENT #1, UPSTREAM, BYPASSED REACH, IMPOUNDMENT #2 ZOES .....	44
3.4.2	DOWNSTREAM FISH PASSAGE STANDARDS: DOWNSTREAM ZOE.....	46
3.5	SHORELINE AND WATERSHED PROTECTION STANDARDS .....	48
3.5.1	SHORELINE AND WATERSHED PROTECTION STANDARDS: IMPOUNDMENT #1 ZOE.....	48
3.5.2	SHORELINE AND WATERSHED PROTECTION STANDARDS: UPSTREAM ZOE.....	49

3.5.3	SHORELINE AND WATERSHED PROTECTION STANDARDS: BYPASSED REACH ZOE.....	50
3.5.4	SHORELINE AND WATERSHED PROTECTION STANDARDS: IMPOUNDMENT #2 ZOE.....	51
3.5.5	SHORELINE AND WATERSHED PROTECTION STANDARDS: DOWNSTREAM ZOE.....	52
3.6	THREATENED AND ENDANGERED SPECIES STANDARDS.....	53
3.6.1	THREATENED AND ENDANGERED SPECIES STANDARDS: ALL ZOES.....	53
3.7	CULTURAL AND HISTORIC RESOURCES STANDARDS .....	55
3.7.1	CULTURAL AND HISTORIC RESOURCES STANDARDS: ALL ZOES .....	55
3.8	RECREATIONAL RESOURCES STANDARDS.....	56
3.8.1	RECREATIONAL RESOURCES STANDARDS: IMPOUNDMENT #1 ZOE .....	56
3.8.2	RECREATIONAL RESOURCES STANDARDS: UPSTREAM ZOE.....	58
3.8.3	RECREATIONAL RESOURCES STANDARDS: BYPASSED REACH ZOE .....	59
3.8.4	RECREATIONAL RESOURCES STANDARDS: IMPOUNDMENT #2 ZOE .....	60
3.8.5	RECREATIONAL RESOURCES STANDARDS: DOWNSTREAM ZOE .....	61
4.0	CONTACTS FORMS.....	62
5.0	SWORN STATEMENT .....	64
6.0	REFERENCES .....	65

#### **LIST OF TABLES**

TABLE 1	FACILITY DESCRIPTION INFORMATION FOR SILVER LAKE PROJECT (LIHI # 91).....	7
TABLE 2	WATER QUALITY CRITERIA FOR CLASS B COLD WATER FISH HABITAT WATERS.	28
TABLE 3	SUGAR HILL STORAGE RESERVOIR (IMPOUNDMENT #1 ZOE) 2015 WATER QUALITY DATA (SOURCE: IWIS 2018).....	29
TABLE 4	SILVER LAKE (IMPOUNDMENT #2 ZOE) 2018 WATER QUALITY DATA (SOURCE: IWIS 2018).....	36
TABLE 5	VERMONT RTE SPECIES AND IMPORTANT SPECIES WITHIN THE SILVER LAKE HYDROELECTRIC PROJECT’S FOOTPRINT .....	53

#### **LIST OF FIGURES**

FIGURE 1	SILVER LAKE PROJECT LOCATION AND BROAD OVERVIEW OF PROJECT PARTS .....	1
FIGURE 2	GEOGRAPHIC OVERVIEW OF PROJECT LOCATION .....	2
FIGURE 3	HYDRAULIC FLOW THROUGH THE SILVER LAKE PROJECT (BLUE INDICATES STREAM FLOWS, YELLOW INDICATES PENSTOCK FLOWS) .....	4
FIGURE 4	HYDRAULIC FLOW THROUGH THE SILVER LAKE PROJECT (BLUE INDICATES STREAM FLOWS, YELLOW INDICATES PENSTOCK FLOWS) CONT. ....	5
FIGURE 5	TAILRACE, SUCKER BROOK, AND BYPASS ZOE.....	40

## LIST OF APPENDICES

- APPENDIX A PROJECT ZOE, PROJECT AREA PHOTOS, AND DRAWINGS
- APPENDIX B AERIAL PHOTOS OF FACILITY AREA AND RIVER BASIN
- APPENDIX C WATER QUALITY
- APPENDIX D SUCKER BROOK FISH DISTRIBUTION DATA
- APPENDIX E THREATENED AND ENDANGERED SPECIES

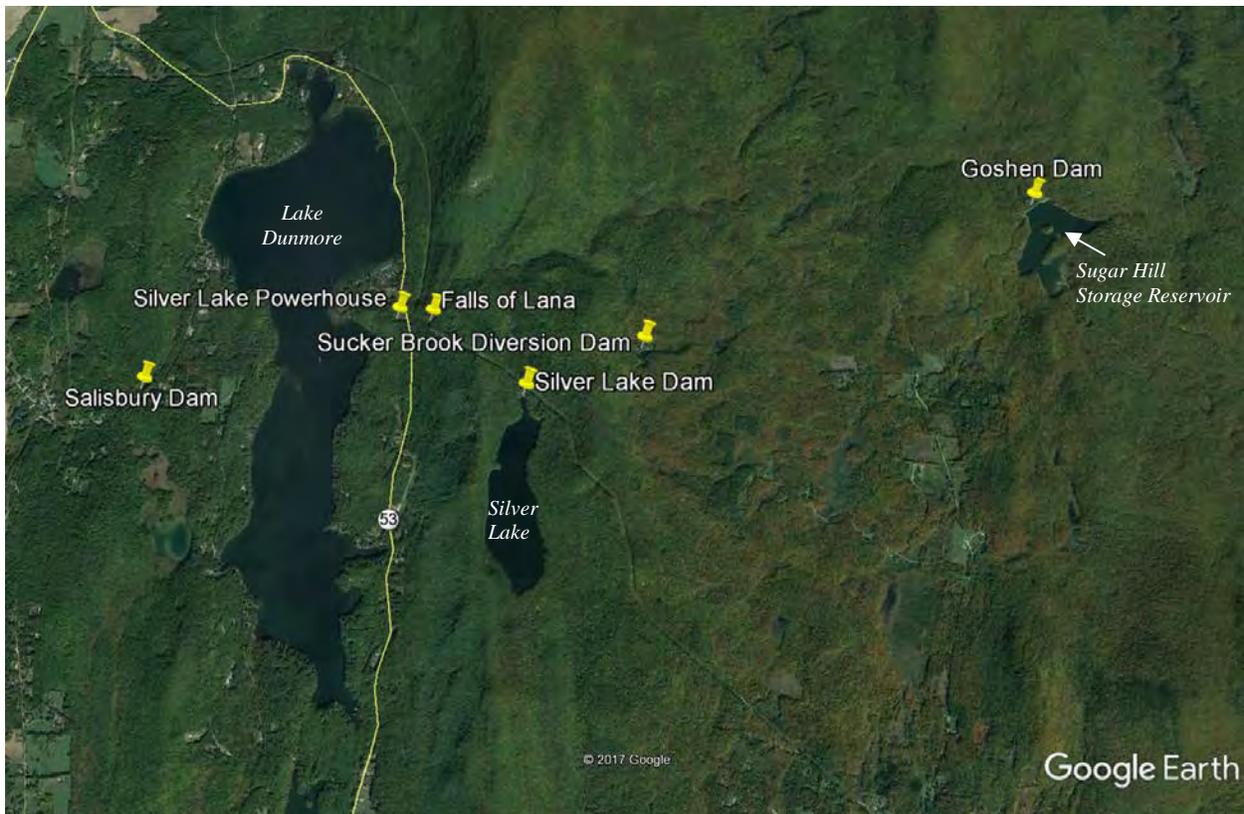
# LOW-IMPACT HYDROPOWER POWER INSTITUTE CERTIFICATION APPLICATION

## SILVER LAKE PROJECT (FERC No. 11478)

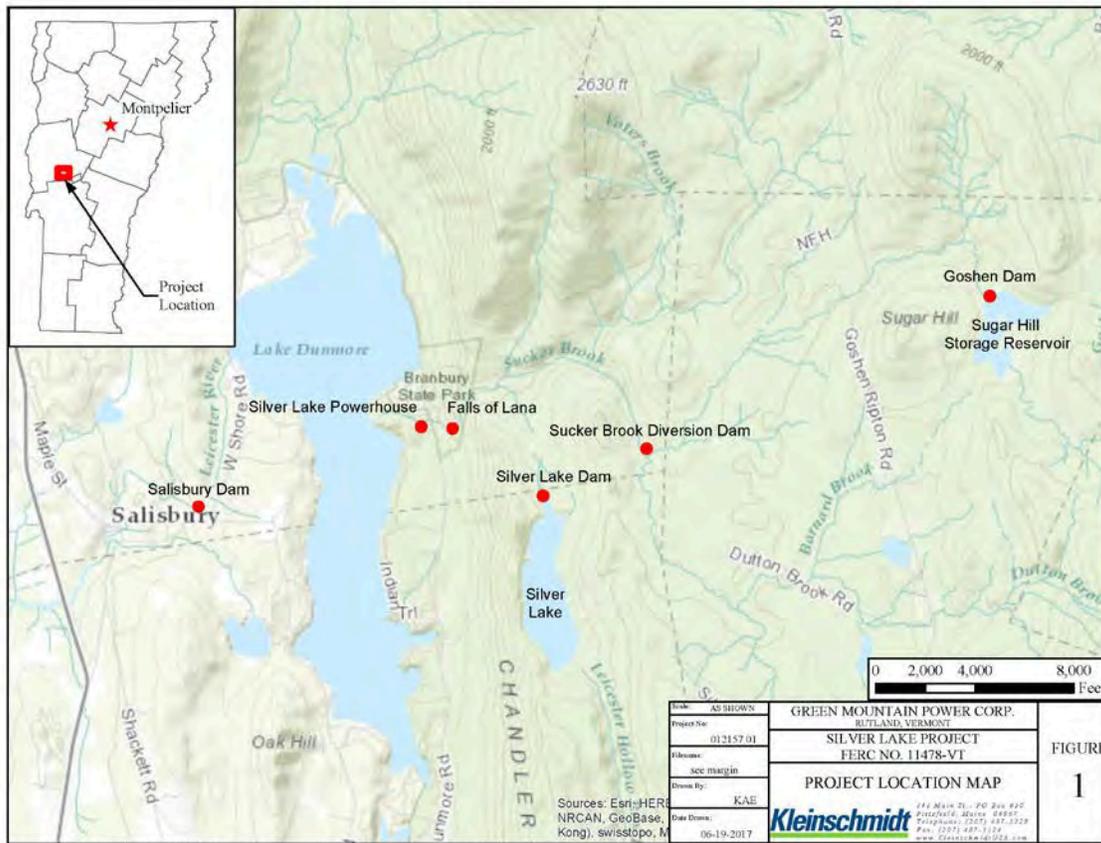
### 1.0 FACILITY DESCRIPTION

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The Silver Lake Hydroelectric Project (FERC No. 11478) (Project) is located at river mile (RM) 0.25 on Sucker Brook in the towns of Goshen, Leicester, and Salisbury, Addison County, 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 Silver Lake Project is the only hydroelectric development on Sucker Brook. Major Project facilities include Sugar Hill Storage Reservoir and Goshen Dam (located at latitude 43.9146, longitude -73.0037); Sucker Brook Diversion Dam (located at latitude 43.9029, longitude -73.0404); Silver Lake Dam (located at latitude 43.8986, longitude -73.0531); and Silver Lake Powerhouse (located at latitude 43.9043, longitude -73.0665). Much of the Project is surrounded by the Green Mountain National Forest.



**FIGURE 1 SILVER LAKE PROJECT LOCATION AND BROAD OVERVIEW OF PROJECT PARTS**



**FIGURE 2 GEOGRAPHIC OVERVIEW OF PROJECT LOCATION**

The Project discharges into Sucker Brook, which empties into Lake Dunmore. Lake Dunmore flows into Leicester River, which flows into Otter Creek. The closest other hydroelectric facility is GMP’s Salisbury Development (non-FERC jurisdictional), which is situated on the Leicester River approximately one mile downstream of the outlet of Lake Dunmore (Figure 1 and Figure 2).

The Silver Lake Project was originally constructed in 1916-1917 and Goshen Dam was built approximately 6 years later, creating the 74-acre Sugar Hill Storage Reservoir. Goshen Dam is a 60-foot high, 680-foot-long earthen dam with a 150-foot-long, two section emergency spillway, that is a combination of mortared rubble and reinforced concrete. The reservoir has a normal water surface elevation of 1,761 – 1,766 feet USGS from April – December with a winter

drawdown<sup>1</sup>. The intake structure is 14-feet wide and has wooden trashracks and a concrete gate. Flow is released from Sugar Hill Storage Reservoir through a 232-foot long, 4-foot square conduit outlet structure equipped with five steel gate valves. Discharge is released into Sucker Brook and it includes a continuous minimum release of 2.5 cfs conservation flow.

Sucker Brook Diversion Dam is located approximately 2.6 miles downstream of Goshen Dam. It impounds a 0.25-acre reservoir that has a normal surface elevation approximately 475 feet lower than Sugar Hill Storage Reservoir. The Diversion Dam includes a 665-foot-long, 38-foot-high earthen section and a 60-foot-long concrete spillway. The dam only impounds water during high flow conditions. The intake structure has a headgate and trashracks. The reservoir discharges into a 7,000-foot-long non-pressurized conduit consisting of a 36-inch diameter corrugated metal section, a 48-inch diameter wood stave section, and a 42-inch diameter concrete section. The conduit discharges into a concrete raceway that extends 380-feet to Silver Lake. Silver Lake is a natural lake, but its surface elevation was raised by the presence of its Dam.

The Silver Lake Dam consists of a 30-foot-high, 257-foot-long buttressed concrete wall with earthfill on both sides with an 18.5-foot-wide concrete section. Silver Lake Dam impounds 110-acres with a normal surface elevation of 1,250 feet USGS.

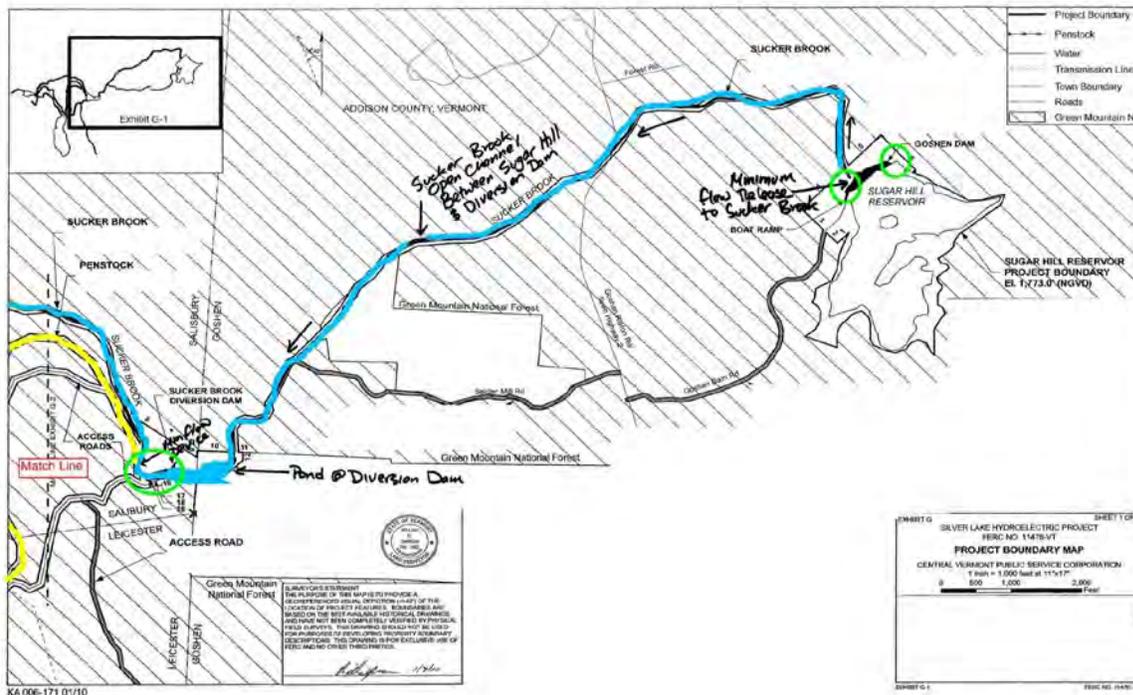
The intake structure at Silver Lake includes a slide gate and steel trashracks. Water moves to a surge tank via a 5,200-foot long penstock consisting of a 48-inch diameter fiberglass section, a 48-inch diameter steel section, and a 36-inch diameter steel section. The penstock sits on the ground surface and is partially covered with earth-fill to provide lateral stability. A 90-foot-high, 15-foot diameter surge tank stands on the south side of the penstock. A 2,400-foot-long welded pipe section of the penstock runs mostly aboveground from the surge tank to the powerhouse, with an approximate 300-foot underground section that crosses under Route 53.

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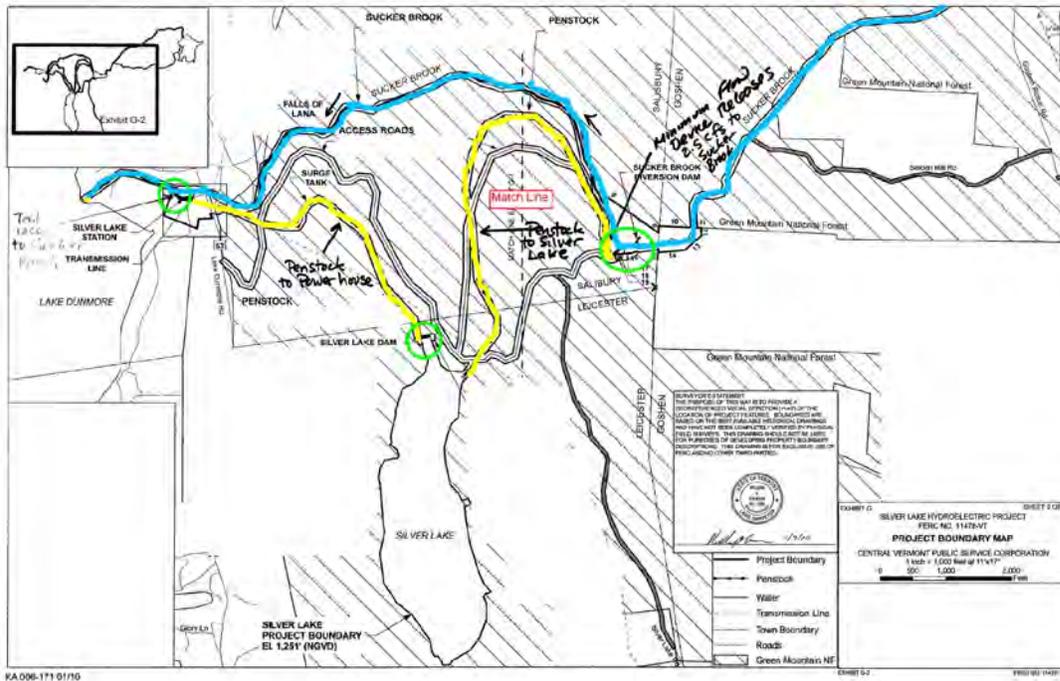
<sup>1</sup> Within the 2010 Operations Plan, GMP formally corrected the record regarding elevations at Sugar Hill Reservoir and Goshen Dam. For operational practicality, the spillway elevation is rounded to 1,771.0 feet; therefore, 1,766.0 feet equals 50 feet local datum, as opposed to 1,765.5 feet as stated in the license. GMP uses 1,766.0 feet as full pond.

The Silver Lake Powerhouse has one 2.2-MW turbine generating unit and discharges into a 450-foot-long tailrace that leads back to Sucker Brook, approximately 450 yards upstream of where the Brook connects to Lake Dunmore. An 11,700-foot long reach of Sucker Brook is bypassed from the Sucker Brook Diversion Dam to the Silver Lake Powerhouse tailrace.

Figure 3 and Figure 4 depicts the Project layout and hydraulic flows through the Project.



**FIGURE 3 HYDRAULIC FLOW THROUGH THE SILVER LAKE PROJECT (BLUE INDICATES STREAM FLOWS, YELLOW INDICATES PENSTOCK FLOWS)**



**FIGURE 4 HYDRAULIC FLOW THROUGH THE SILVER LAKE PROJECT (BLUE INDICATES STREAM FLOWS, YELLOW INDICATES PENSTOCK FLOWS) CONT.**

Both Sugar Hill Storage Reservoir and Silver Lake are drawn down in the winter to capture spring runoff. Sugar Hill Storage Reservoir operates between 1,758 feet and 1,766 feet USGS from May 1 through December 31, and then from January 1 through April 30 the Reservoir operates between 1,748 feet and 1,761 feet. Winter drawdown begins on or about January 1 from the target elevation of 1,766 feet USGS, or after headpond ice formation, if later. Silver Lake fluctuates between 1,247.5 feet and 1,245.5 feet USGS from June 1 through November 30, and then the lake level is drawn down to 1,239.5 feet USGS from December 1 through May 31, then refilled by June 1. Sucker Brook Diversion Dam pond is maintained at 1,288 feet USGS year-round. A minimum flow of 2.5 cfs is released year-round into Sucker Brook from Goshen Dam and Sucker Brook Diversion Dam.

**TABLE 1 FACILITY DESCRIPTION INFORMATION FOR SILVER LAKE PROJECT (LIHI # 91)**

<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)	Silver Lake Hydroelectric Project (FERC No. 11478) (Project)																
<i>Location</i>	River name (USGS proper name)	Sucker Brook																
	River basin name	Lower Otter Creek Basin																
	Nearest town, county, and state	Towns of Goshen, Leicester, and Salisbury, Addison County, Vermont																
	River mile of dam above next major river	RM 0.25 miles																
	Geographic latitude	<table border="1"> <thead> <tr> <th>Development</th> <th>Latitude</th> <th>Longitude</th> </tr> </thead> <tbody> <tr> <td>Goshen Dam</td> <td>43.9146</td> <td>-73.0037</td> </tr> <tr> <td>Sucker Brook Diversion Dam</td> <td>43.9029</td> <td>-73.0404</td> </tr> <tr> <td>Silver Lake Dam</td> <td>43.8986</td> <td>-73.0531</td> </tr> <tr> <td>Silver Lake Powerhouse</td> <td>43.9043</td> <td>-73.0665</td> </tr> </tbody> </table>		Development	Latitude	Longitude	Goshen Dam	43.9146	-73.0037	Sucker Brook Diversion Dam	43.9029	-73.0404	Silver Lake Dam	43.8986	-73.0531	Silver Lake Powerhouse	43.9043	-73.0665
		Development	Latitude	Longitude														
		Goshen Dam	43.9146	-73.0037														
Sucker Brook Diversion Dam		43.9029	-73.0404															
Silver Lake Dam		43.8986	-73.0531															
Silver Lake Powerhouse	43.9043	-73.0665																
Geographic longitude	See above.																	
<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  Kayla Easler – Kleinschmidt Associates  Katie Sellers – Kleinschmidt Associates  Green Mountain Power Corporation 2152 Post Road Rutland, VT 05701																
	- 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. 11478. A 40-year License was issued on 2/26/2009, and expires on 1/31/2039.																

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
	FERC license type or special classification (e.g., "qualified conduit")	Major License
	Water Quality Certificate identifier and issuance date, plus source agency name	A Water Quality Certificate (WQC) was issued by Vermont Department of Conservation (DEC), on December 5, 2008 (Appendix C). There are no current amendments to the WQC.
	Hyperlinks to key electronic records on FERC e-library website (e.g., most recent Commission Orders, WQC, ESA documents, etc.)	Environmental Assessment 1997- <a href="https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=3073464">https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=3073464</a>  FERC License 2009 – <a href="https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=11950903">https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=11950903</a>  WQC 2008 - See Appendix C for a copy of the WQC.
<i>Power Plant Characteristics</i>	Date of initial operation (past or future for operational applications)	The Project was developed between 1916-1923 to exploit a small volume of water under a high head for electrical generation.
	Total name-plate capacity (MW)	2.2 MW
	Average annual generation (MWh)	3,993.4 MWh/year. This is the five-year average taken from the 2011 to 2016 annual generation reports filed on FERC e-library.
	Number, type, and size of turbines, including maximum and minimum hydraulic capacity of each unit	The powerhouse contains a single horizontal Pelton wheel turbine with a generator rated at 2.2 MW. The turbine has a hydraulic capacity of approximately 60 cfs.
	Modes of operation (run-of-river, peaking, pulsing, seasonal storage, etc.)	The Project operates as a seasonal storage and peaking facility.
	Dates and types of major equipment upgrades	In 2016, GMP replaced the wooden trashracks at Diversion Dam with new plastic trashracks that maintain the original 4 1/2-inch clear spacing and also replaced the existing walkway ramp with a new steel ramp, installed a new 3-foot-wide steel walkway, and replaced the existing wooden walking deck with a new steel walking deck and support structure. New steel guardrails were additionally replaced around the perimeter of the intake structure. In 2018, the plastic trashracks failed and GMP replaced the racks with steel racks containing the same 4 ½ clear spacing.

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
		In 2016, at Goshen Dam, GMP conducted in-kind repair work to the wooden trashracks and intake area.
	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, but there are plans to armor the Goshen Dam Emergency Spillway, per recommendations from FERC’s 2016 Part 12 Inspection. GMP is currently working with FERC to finalize Emergency Spillway designs and is consulting with resource agencies for permits. Work is planned for 2019-2020.
<i>Characteristics of Dam, Diversion, or Conduit</i>	Date of construction	The Project was originally constructed in 1916-1917 and Goshen Dam was built approximately 6 years later, creating the 74-acre Sugar Hill Storage Reservoir.
	Dam height	Goshen Dam – 60-feet high Sucker Brook Diversion Dam – 38-feet high Silver Lake Dam – 30-feet high
	Spillway elevation and hydraulic capacity	The Goshen Dam can discharge approximately 4,788 cfs through its unregulated spillway at the maximum stage of 1,775.29 feet. The Dam’s crest elevation is located at 1,777 feet msl.  The Sucker Brook Diversion Dam crest is located at 1,306 feet msl.  The Silver Lake Dam can discharge approximately 448 cfs through its unregulated spillway at the maximum stage of 1,258.06 feet. The Dam’s crest elevation is located at 1,251 feet msl.
	Tailwater elevation	Approximately 573 feet
	Length and type of all penstocks and water conveyance structures between reservoir and powerhouse	Goshen Dam into Sucker Brook – 232-foot long, 4-foot square conduit;  Sucker Brook Diversion Dam into Silver Lake – 7,000-foot long non-pressurized conduit, consisting of 36-inch to 48-inch diameter sections;  Silver Lake Dam to Silver Lake Powerhouse – 5,200-foot long, 36-inch to 48-inch diameter penstock.  There is no bypassed reach (section of free-flowing stream) between the Silver Lake Dam and the Silver Lake powerhouse.

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
	Dates and types of major, generation-related infrastructure improvements	No new generation-related 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. The facility also provides seasonal flow regulation.
	Water source	Sucker Brook
	Water discharge location or facility	Sucker Brook
<i>Characteristics of Reservoir and Watershed</i>	Gross volume and surface area at full pool	Sugar Hill Storage Reservoir – 1,200 acre-feet, 74 acres;  Sucker Brook Diversion Dam – minimal, 0.25 acres;  Silver Lake Dam – 3,120 acre-feet, 110 acres.
	Maximum water surface elevation (ft. MSL)	Sugar Hill Storage Reservoir – normal water surface elevation of 1,763 feet USGS, maximum elevation of 1,766 feet USGS, and minimum elevation of 1,758 feet USGS.  Sucker Brook Diversion Dam – normal water surface elevation of 1,288 feet USGS (475 feet below Sugar Hill Reservoir);  Silver Lake Dam – normal water surface elevation of 1,250 feet USGS, maximum elevation of 1,247.5 feet USGS, and minimum elevation of 1,239.5 feet USGS.
	Maximum and minimum volume and water surface elevations for designated power pool, if available	No power pool present.
	Upstream dam(s) by name, ownership, FERC number (if applicable), and river mile	No upstream dams are located on Sucker Brook.
	Downstream dam(s) by name, ownership, FERC number (if applicable), and river mile	The Salisbury Development, owned and operated by GMP, is a non-jurisdictional Project, located one mile downstream of Lake Dunmore’s outlet on Leicester River. See Figures 1 and 2 for a map of Sucker Brook and 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 534 acres.
<i>Hydrologic Setting</i>	Average annual flow at the dam	Within the 1997 FERC Environmental Assessment, it was estimated that the Project has an average annual flow of 13.7 cfs. Maximum and minimum flows at the Project are estimated to be 1,121 cfs (June 30, 1977) and 0.3 cfs (July 27, 1965), respectively.
	Average monthly flows	Average monthly flows from 1980 – 2016 as recorded at the USGS Ayers Brook gage (No. 01142500):  Jan: 45 cfs Feb: 40 cfs Mar: 81 cfs Apr: 161 cfs May: 76 cfs Jun: 47 Jul: 35 Aug: 27 Sept: 20 Oct: 41 Nov: 53 Dec: 56
	Location and name of relevant stream gauging stations above and below the facility	Because no streamflow data exists for this drainage basin, flow regime information for the Project is based on estimated inflow to the Project. Comparisons to USGS flow records from two nearby Vermont gages, representing basins with similar size and drainage characteristics, are used to estimate inflows to the Silver Lake Project. Data from the USGS Ayers Brook gage (No. 01142500) and USGS Lewis Creek Tributary gage (No. 04282700) are prorated to estimate flow at the Project.
	Watershed area at the dam	The Silver Lake Project includes a total drainage area of 10.2 square miles. Most of the Project's drainage area is Sucker Brook (9.6 square miles). The Silver Lake drainage area is 0.6 square miles.
<i>Designated Zones of Effect</i>	Number of zones of effect	There are five zones of effect:  1) Impoundment #1 (Sugar Hill Storage Reservoir),  2) Upstream (Sucker Brook open channel between Goshen Dam and Sucker Brook Diversion Dam),

INFORMATION TYPE	VARIABLE DESCRIPTION	RESPONSE (AND REFERENCE TO FURTHER DETAILS)
		<p>3) Bypassed Reach (Sucker Brook open channel from Sucker Brook Diversion Dam to Silver Lake Powerhouse),</p> <p>4) Impoundment #2 (Silver Lake), and</p> <p>5) Downstream (Silver Lake Powerhouse tailrace to Lake Dunmore)<sup>2</sup>.</p> <p>See Appendix A for a depiction of the Project's ZOE's.</p>
	Upstream and downstream locations by river miles	<p>1) Impoundment #1 (Sugar Hill Storage Reservoir) is located at approximately RM 4.5.</p> <p>2) Upstream (Sucker Brook open channel between Goshen Dam and Diversion Dam) stretches from RM 4.5 to RM 1.9.</p> <p>3) Bypassed Reach (Sucker Brook open channel from Sucker Brook Diversion Dam to Silver Lake Powerhouse) stretches from RM 1.9 to RM 0.25.</p> <p>4) Impoundment #2 (Silver Lake) is not located on Sucker Brook and within Silver Lake.</p> <p>5) Downstream (Silver Lake Powerhouse tailrace to Lake Dunmore) stretches from RM 0.25 to RM 0.</p>
	Type of waterbody (river, impoundment, by-passed reach, etc.)	<p>Impoundment #1 – Lake (L1UBHh)  Upstream– Riverine (R3UBH) and freshwater pond (PUBHx)  Bypassed Reach – Riverine (R3UBH)  Impoundment #2 – Lake (L1UBHh)  Downstream – Riverine (R3UBH)  *USFWS National Wetlands Inventory (USFWS 2017)</p>
	Delimiting structures	<p>1) Impoundment #1 = Sugar Hill Storage Reservoir;</p> <p>2) Upstream = Goshen Dam to Sucker Brook Diversion Dam;</p>

<sup>2</sup> There is no bypassed reach (section of free-flowing stream) between the Silver Lake Dam and the Silver Lake powerhouse

<b>INFORMATION TYPE</b>	<b>VARIABLE DESCRIPTION</b>	<b>RESPONSE (AND REFERENCE TO FURTHER DETAILS)</b>
		3) Bypassed Reach = Sucker Brook Diversion Dam to Silver Lake Powerhouse;  4) Impoundment #2 = Silver Lake;  5) Downstream = Silver Lake Powerhouse to Lake Dunmore.
	Designated uses by state water quality agency	Sucker Brook 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.
<b><i>Additional Contact Information</i></b>	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
<b><i>Photographs and Maps</i></b>	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 designated zone of effect (ZOE), and for project drawings.
	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 #1 ZOE (SUGAR HILL RESERVOIR)

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

### 2.2 UPSTREAM ZOE (GOSHEN DAM TO DIVERSION DAM)

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

### 2.3 BYPASSED REACH ZOE (DOWNSTREAM OF SUCKER BROOK DIVERSION DAM TO SILVER LAKE POWERHOUSE)

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

**2.4 IMPOUNDMENT #2 ZOE (SILVER LAKE)**

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

**2.5 DOWNSTREAM ZOE (SILVER LAKE POWERHOUSE TAILRACE TO LAKE DUNMORE)**

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

### 3.0 SUPPORTING INFORMATION

#### 3.1 ECOLOGICAL FLOWS STANDARDS

##### 3.1.1 ECOLOGICAL FLOWS STANDARDS: IMPOUNDMENT #1 ZOE

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
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> </ul> <p>For impoundment zones only, explain how fish and wildlife habitat within the zone is evaluated and managed – NOTE: this is required information, but it will not be used to determine whether the Ecological Flows criterion has been satisfied. All impoundment zones can apply Criterion A-1 to pass this criterion.</p>

- Vermont DEC issued the Project a WQC on December 5, 2008 (see Appendix C for a copy of the WQC). Goshen Dam is used for flow regulation and enhancement of downstream power production. It does not incorporate generating facilities. Flow releases from Sugar Hill Storage Reservoir are managed primarily to augment flows in Sucker Brook for diversion to Silver Lake under the power generation schedule.

Per WQC Condition B, Sugar Hill Storage Reservoir operates between 1,758 feet and 1,766 feet USGS from May 1 through December 31, and then from January 1 through April 30 the Reservoir operates between 1,748 feet and 1,761 feet. Winter drawdown begins on or about January 1 from the target elevation of 1,766 feet USGS, or after headpond ice formation, if later. Except during the late winter drawdown, the reservoir is operated within a 5-foot band between 1,761 and 1,766 feet USGS.

- Sugar Hill Storage Reservoir is operated as a seasonal storage reservoir in accordance with the rule curve for water surface elevation shown in Figure 2.3-1 of the 2010 Operation Plan<sup>3</sup>. There is a pond level sensor at Goshen Dam which relays data to Silver Lake via telemetry and solar power; the elevation data is then transmitted to the Control Center in Rutland for incorporation into the SCADA system. The Control Center in Rutland and the power production workers (PPW) are in daily contact to determine what adjustments are needed to comply with the rule curve.

<sup>3</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12268988>

Operations personnel travel to the dam as needed to record the elevation and adjust the outlet valves to maintain the elevation in the operating range of the rule curve. PPWs check the release at least twice per week and make adjustments as needed. If the Control Center anticipates dramatic shifts in weather, then proactive changes can be made to the valve settings to allow for more storage, etc.

- As described within the 2010 Operations Plan, the dates depicted in the rule curve were developed based on many years of historical operations data and include consideration of many factors such as: the timing of smelt spawning, available snow pack, and precipitation forecasts. During smelt spawning, enough water must be available in Sugar Hill Storage Reservoir to account for contingencies in the event of little or no springtime precipitation. Available snowpack is also considered when determining the timing of reservoir refill.
- The rule curve operation of Sugar Hill Storage Reservoir reduces annual fluctuations in water levels and improves hibernacula by delaying the onset of the winter drawdown. Such management helps maintain the Reservoir's existing wetland and more fish are able to overwinter in the Reservoir as the volume of the Reservoir does not severely change.
- Project operations data was provided to Vermont DEC on October 30, 2018 for verification of Project Water Quality Certificate compliance (see Appendix C for email exchange).

### 3.1.2 ECOLOGICAL FLOWS STANDARDS: UPSTREAM ZOE

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
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 variation).</li> </ul>

- The Upstream ZOE encompasses the stretch of Sucker Brook that stretches between Goshen Dam and Sucker Brook Diversion Dam. In accordance with Condition B of the WQC (see Appendix C for a copy of the WQC) a minimum flow of 2.5 cfs is maintained within this ZOE.

The Licensee releases a continuous minimum flow of 2.5 cfs at all times from Goshen Dam, even when natural inflows from the 2.6-square-mile contributing watershed decline below the fixed discharge.

GMP maintains the minimum flow of 2.5 cfs to Sucker Brook by manually adjusting the 6-inch pipe through the Goshen Dam outlet. Four turns on the first 6-inch valve provides 2.5 cfs. The maximum combined discharge capacity of the valves is approximately 61 cfs when the reservoir is at 1,766 feet.

When inflows and water levels decline at Sugar Hill Storage Reservoir and GMP releases reservoir inflows instead of the 2.5 cfs conservation flow (e.g., during drought conditions when Sugar Hill Storage Reservoir is eight feet below normal (1758 feet)), GMP will estimate the flow at Diversion Dam by multiplying the Sugar Hill Storage Reservoir release (estimated through the outlet V-notch discharge) by the watershed area proration (9.6:2.6) of four.

- Additionally, in accordance with License Article 404, the Sucker Brook Diversion Dam headpond (lower part of the Upstream ZOE) is maintained at a normal operating level of 1,288-feet msl. Inflows to the Sucker Brook Diversion Dam headpond from Sucker Brook can be controlled from upstream by adjusting the discharge from Sugar Hill Storage Reservoir. These inflows from Goshen Dam, along with natural runoff from Dutton Brook, merge at Sucker Brook Diversion Dam and are conveyed both to Silver Lake via conduit or into Sucker Brook. The elevation behind Sucker Brook Diversion Dam increases as natural inflows from Dutton Brook increase, or in relation to releases from Goshen Dam.

During normal flows, the Sucker Brook Diversion Dam does not impound water. During high flows, the dam impounds an area of up to about 2-acres before spillage occurs. This

occurs about two or three weeks in the spring and during two or three events for one or two days because of rainfall (Response to AIR No. 2, Additional Information Second Set, Silver Lake Project No. 11478, GMP, February 1996<sup>4</sup>).

- Flows within the Upstream ZOE are also influenced by Goshen Dam ramping rates. In accordance with WQC Condition C, the Licensee filed a Ramping Plan with the Commission on February 19, 2010<sup>5</sup>, approved by the Commission on March 15, 2011<sup>6</sup>. Based on a comparative flow analysis at the unregulated USGS gage No. 01142500 – Ayers Brook at Randolph, VT, VANR suggested a 10 cfs/hour change in up-ramping and a 8 cfs/hour change in down-ramping as typical maximum rates of change. GMP PPWs therefore adjust the outflows at Goshen Dam at a maximum rate of change of approximately 10 cfs/hour. GMP up-ramping protocol applies when the elevation of Sugar Hill Storage Reservoir is below 1,765 feet.
- As stated within the Project WQC, fisheries biologists from the Vermont DEC, USFWS, and USFS completed a visual assessment of habitat conditions at flows of 2.5 cfs and 12 cfs in the Fall of 2004 in the reach between Goshen Dam and Sucker Brook Diversion Dam. The flow of 2.5 cfs was generally found to provide some center-channel habitat for young trout but limited adult habitat due to shallowness and lack of cover. The 12 cfs was judged excessive.
- As stated in the WQC, all waters at the Project are designated coldwater fish habitat for the protection and management of fisheries (Standards, Section 3-05. *Fish Habitat Designation*).
  - The dissolved oxygen standard for Class B cold water fish habitat streams is 6 mg/l and 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 to 1.0 degrees F from ambient conditions, or background. The turbidity standard is 10 NTU.
  - Sucker Brook and its tributaries found below 2,500 feet in elevation have been designated by the Vermont Water Resources Board as Class B waters. Class B waters are managed to provide high quality habitat for aquatic biota (Standards, Section 3-04(a) Class B Waters: Management Objectives). Under the Class B criterion for aquatic biota, wildlife and aquatic habitat, the Standards require “[n]o change from the reference condition that would prevent the full support of aquatic biota, wildlife, or aquatic habitat uses. Biological integrity is maintained and all expected functional groups are present in a high-quality habitat. All life-cycle functions, including overwintering and reproductive requirements are maintained and protected.” As the waters at the Project have not been assigned a water management type, the criterion is “no change from background conditions that would have an undue adverse effect on the composition of the aquatic biota, the

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<sup>4</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=8397903>

<sup>5</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12268988>

<sup>6</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12587888>

physical or chemical nature of the substrate or the species composition or propagation of fishes.” (Standards, Section 3-04(B)(4) Water Quality Criteria for Class B Waters: Aquatic Biota, Wildlife and Aquatic Habitat)

- Recommended flows allow for the maintenance of trout habitat within the ZOE.
- Project operations data was provided to Vermont DEC on October 30, 2018 for verification of Project Water Quality Certificate compliance (see Appendix C for email exchange).

### 3.1.3 ECOLOGICAL FLOWS STANDARDS: BYPASSED REACH ZOE

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
A	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 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 variation).</li> </ul>

- Vermont DEC issued the Project a WQC on December 5, 2008 (see Appendix C for a copy of the WQC). The area downstream of the Sucker Brook Diversion Dam operates in accordance with Condition B and F of the WQC. A minimum flow of 2.5 cfs, or instantaneous inflow, if less is released into the Sucker Brook bypass reach.
- As stated within the Project WQC, fisheries biologists from the Vermont DEC, USFWS, and USFS completed a visual assessment of habitat conditions at flows of 2.5 cfs and 12 cfs in the Fall of 2004 in the reach between Goshen Dam and Sucker Brook Diversion Dam. The flow of 2.5 cfs was generally found to provide some center-channel habitat for young trout but limited adult habitat due to shallowness and lack of cover. The 12 cfs was judged excessive.

Additionally, fisheries biologists from Vermont DEC, USFWS, and USFS completed a visual assessment of habitat conditions between Sucker Brook Diversion Dam and the Silver Lake Powerhouse tailrace at flows of 1 cfs, 3 cfs, 5 cfs, and 8 cfs, as measured at the Diversion Dam. A flow of 5 cfs was judged as providing the best habitat conditions and generally provided adequate depth for unimpeded fish movement. The flow provided full circulation of water through the pools, and turbulent reaeration was evident. A flow of 3 cfs was judged to provide a reasonable amount of habitat at some but not all of the sites observed; the wetted width appeared small for the size of the overall channel, but it was marked improvement over 1 cfs. A supplemental assessment was conducted later focusing on flows of 2 and 3 cfs. Habitat conditions were improved at 3 cfs, in comparison to those at 2 cfs. It was concluded that a flow regime that decreases the frequency and duration of lower flows is expected to improve fish survival and growth.

Based on the stream hydrology and the results of the habitat study below the Sucker Brook Diversion Dam, a conservation flow of 2.5 cfs, was determined appropriate for the reach directly downstream of the Diversion Dam. During the time of relicensing, this flow represented a substantial improvement over previous conditions, which dedicated no flows to this reach.

- In accordance with condition F, the Licensee filed a plan to maintain conservation flows below Sucker Brook Diversion Dam on February 19, 2010<sup>7</sup>. This plan was approved by the Commission on March 15, 2011<sup>8</sup>. To provide the minimum conservation flow of 2.5 cfs (or prorated inflow, if less) below Sucker Brook Diversion Dam, GMP taps the conduit that leads to Silver Lake. A sump with a simple fixed orifice (ie: pipe and gate valve) located 1-foot above the bottom of the sump is used to control the amount of water diverted for the minimum flow release. The sump is located underneath the Sucker Brook Diversion Dam outlet pipe near the downstream toe of the dam.
- Flow recommendations align with agency goals to manage the this reach as a wild brook and brown trout fishery.
  - As stated in the WQC, all waters at the Project are designated coldwater fish habitat for the protection and management of fisheries (Standards, Section 3-05. Fish Habitat Designation). The dissolved oxygen standard for Class B cold water fish habitat streams is 6 mg/l and 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 to 1.0 degrees F from ambient conditions, or background. The turbidity standard is 10 NTU.
  - Sucker Brook and its tributaries found below 2,500 feet in elevation have been designated by the Vermont Water Resources Board as Class B waters. Class B waters are managed to provide high quality habitat for aquatic biota (Standards, Section 3-04(a) Class B Waters: Management Objectives). Under the Class B criterion for aquatic biota, wildlife and aquatic habitat, the Standards require “[n]o change from the reference condition that would prevent the full support of aquatic biota, wildlife, or aquatic habitat uses. Biological integrity is maintained and all expected functional groups are present in a high-quality habitat. All life-cycle functions, including overwintering and reproductive requirements are maintained and protected.” As the waters at the Project have not been assigned a water management type, the criterion is “no 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 3-04(B)(4) Water Quality Criteria for Class B Waters: Aquatic Biota, Wildlife and Aquatic Habitat)
- Recommended flows allow for the maintenance of trout habitat within the ZOE.
- Project operations data was provided to Vermont DEC on October 30, 2018 for verification of Project Water Quality Certificate compliance (see Appendix C for email exchange).

### 3.1.3.1 FLOW DEVIATION

Article 402 of the FERC license requires that the Project be operated in accordance “with the reservoir levels and minimum flow requirements required by condition B of the water quality

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<sup>7</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12268988>

<sup>8</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12587888>

certification”. Condition B of the Vermont Water Quality Certification requires that the Project be operated “in accordance with minimum flow and reservoir level management schedules.” Minimum flows shall be released on a continuous basis and not interrupted”. License Article 402 requires that if flow through the Project deviate from license requirements, the Licensee shall file a report with the Commission as soon as possible, but no later than 10 days after such incident.

As stated within GMP’s letter dated April 17, 2014<sup>9</sup>, Project nonconformance with License Article 402 occurred between Monday April 7 and Wednesday April 10, 2014. During the afternoon of Monday April 7, 2014, GMP personnel made a regularly scheduled weekly check of the Sucker Brook Diversion Dam and discovered that the sand trap was plugged and no flow was being discharged from the 16-inch gate valve into the Sucker Brook bypass. The manhole cover to the sand trap was buried under snow and iced in. Operations staff returned to the Sucker Brook Diversion Dam on the morning of Tuesday April 8 to begin taking measures to unplug the sand trap, and observed that there was flow over Diversion Dam spillway, due to warming temperatures and melting snow increasing stream flow above Diversion Dam. Spillage continued until the minimum flow was restored.

Due to limited vehicular access, the depth of snow and quantity of ice at Diversion Dam, it took operations staff two days to remove accumulated ice and snow by hand in order to remove the manhole cover. PPWs were able to flush the sand trap by agitating the built-up material in the sand trap, then closing and opening the head gate. The surge of water was able to clear the plug and bypass flow through the sluice pipe was restored on April 9, 2014.

On May 29, 2014, FERC responded that the deviation is not considered a violation of the Project license.<sup>10</sup> Rain and corresponding high flows may have caused sediment from the impoundment to plug the sand trap. This coupled with limited access and accumulating snow and ice on the manhole cover made it difficult to open the manhole cover to access the sand trap. Once unplugged, GMP was able to restore the minimum flow.

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<sup>9</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13516911>

<sup>10</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13557007>

### 3.1.4 ECOLOGICAL FLOWS STANDARDS: IMPOUNDMENT #2 ZOE

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
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 – NOTE: this is required information, but it will not be used to determine whether the Ecological Flows criterion has been satisfied. All impoundment zones can apply Criterion A-1 to pass this criterion.</li> </ul>

- There is no bypassed reach (section of free-flowing stream) in this ZOE.
- Vermont DEC issued the Project a WQC on December 5, 2008 (see Appendix C for a copy of the WQC). Silver Lake operates in accordance with Condition B of the WQC. Under normal operating conditions, Silver Lake elevation remains between 1,247.5 feet and 1,245.5 feet (NGVD 29) from June 1 through November 30. GMP then draws down the lake level to an elevation between 1,239.5 and 1,242.5 feet from December 1 through May 31, then refills the lake by June 1.
- Within the WQC it was determined that having relatively stable conditions during the Lake’s recreational use period is important. In general pond elevations would enhance conditions for aquatic species as they are relatively stable.
- Recommendations align with agency goals to manage the Lake as a stocked brook and rainbow trout fishery.
- In accordance with the February 19, 2010 Operations Compliance Plan<sup>11</sup>, the Control Center in Rutland checks the Silver Lake reservoir elevation via SCADA and is in daily contact with PPWs to determine what adjustments are needed to comply with the rule curve. Typically, Silver Lake elevation does not change more than a couple of inches per day or more than one foot per week. When determining the maximum drawdown level of Silver Lake, the timing of the smelt run (early April) and the associated environmental conditions are considered.

Condition E of the Vermont WQC requires special operations during smelt spawning season in the spring. The lower limit of the rule curve corresponds to start of smelt spawning. The initiation of smelt spawning is concurrent with increased run-off due to ice melt, and therefore increased flows available for reservoir storage. GMP operates the

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<sup>11</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12268988>

Silver Lake turbine to keep levels below full pond; if full, operation at reduced capacity during nighttime in accordance with the smelt operations protocols is not possible.

In order to protect smelt spawning in the Silver Lake inlet, there is no decrease in the water elevation of Silver Lake during the smelt spawning and incubation period of March 15 – May 15.

- This is not a conduit Project.
- Project operations data was provided to Vermont DEC on October 30, 2018 for verification of Project Water Quality Certificate compliance (see Appendix C for email exchange).

### 3.1.5 ECOLOGICAL FLOWS STANDARDS: DOWNSTREAM ZOE

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
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 variation).</li> </ul>

- Vermont DEC issued the Project a WQC on December 5, 2008 (see Appendix C for a copy of the WQC). Water is released from the station tailrace in accordance with Condition D of the WQC. In accordance with the February 19, 2010 Operations Compliance Plan<sup>12</sup>, GMP follows a ramping plan for the Silver Lake Station tailrace. GMP implements an incremental ramp down sequence when the Silver Lake unit is being brought off-line. The objective of this down-ramping plan is to govern reductions in the station discharge so to prevent stranding and mortality to downstream aquatic organisms. Upon initiation of shutdown, the PPW ramps down to 75% load and holds for 5 minutes, then decreases generation to the minimum capacity of 50% load (or about 800 kW) and holds for 5 minutes, then proceeds to zero load. This creates a more gradual ramping scenario and reduces stranding potential.

When the Project is shut down, water does not completely drain out of the tailrace due to deposition of bed material in Sucker Brook at the confluence with the tailrace. This hydraulic control allows several inches of water to remain in the tailrace channel when the Project is not operating.

- A ramping study at the Silver Lake Project was performed during the license application phase in November 1994. The study (AIR No. 5, CVPS 1995<sup>13</sup>) evaluated the rate of habitat change in Sucker Brook related to Silver Lake Project operation and was performed in consultation with the Vermont Department of Fish and Wildlife and the U.S. Fish and Wildlife Service. A down ramping proposal was included in the AIR No. 5, as submitted to the VT DEC and USFWS on January 20, 1995. The Licensee ramps down the station in accordance with this proposal when transitioning to shut-down mode. On the rare occasion when there is an unforeseen shutdown, such as an emergency plant trip, the unit goes off-line in less than two minutes and there are no down ramping procedures that can be safely followed.

<sup>12</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12268988>

<sup>13</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12268988>

- During Project relicensing, the Vermont DEC managed this area as a Class B water so there would be no change from the reference condition that would prevent the full support of aquatic biota, wildlife, or aquatic habitat uses.
- The objective of this ZOE down-ramping plan is to govern reductions in the station discharge so to prevent stranding and mortality to downstream aquatic organisms. Specifically, the ramping plan allows for the safe egress to fish from the 450-foot long tailrace after shutdown. Additionally, the three-stage shutdown protocol is designed to minimize stranding potential.
- Project operations data was provided to Vermont DEC on October 30, 2018 for verification of Project Water Quality Certificate compliance (see Appendix C for email exchange).

## 3.2 WATER QUALITY STANDARDS

### 3.2.1 WATER QUALITY STANDARDS: IMPOUNDMENT #1 ZOE

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
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 2016 State of Vermont 303(d) List of Impaired Waters<sup>14</sup> does not identify the waters of the Project, nor waters directly downstream, including Dunmore Lake and Leicester River, as "impaired".
- The Project WQC was issued on December 5, 2008: (see Appendix C for a copy of the WQC). There are no current amendments to the WQC. Impoundment #1 is managed as Class B cold water fish habitat.
- Per review of the Vermont Department of Environmental Conservation Integrated Watershed Information System (IWIS), a water quality monitoring station is located within the northern bay of the Sugar Hill Reservoir (Impoundment #1). The site was most recently surveyed in 2015 and site data is included in Table 3 below. Recorded parameters meet criteria for Vermont Class B cold water fish habitat standards (Table 2).

**TABLE 2 WATER QUALITY CRITERIA FOR CLASS B COLD WATER FISH HABITAT WATERS**

<b>PARAMETER</b>	<b>CRITERIA</b>
Turbidity	≤ 10 NTU as an annual average under dry weather baseflow conditions
Dissolved Oxygen	≥ 6 mg/L or 70 % saturation;
pH	Maintained between 6.5 - 8.5 standard units
NO <sub>3</sub> -N	≤ 5.0 mg/L for lakes, ponds, and reservoirs
Phosphorus	<18 µg/L June through September mean not to be exceeded in the photosynthetic depth zone at a central location in the lake.
Chlorophyll-a	7.0 µg/L June through September mean not to be exceeded in the photosynthetic depth zone at a central location in the lake.
Secchi Disk Depth	2.6 meters June through September mean not to be less at a central location in the lake.

<sup>14</sup> [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)

**TABLE 3 SUGAR HILL STORAGE RESERVOIR (IMPOUNDMENT #1 ZOE) 2015 WATER QUALITY DATA (SOURCE: IWIS 2018)**

VISIT DATE	START TIME	LOCATION NAME	DEPTH (M)	CHLOROPHYLL-A (UG/L)	CONDUCTIVITY (UMHO/CM)	DISSOLVED OXYGEN (MG/L)	PH	SECCI TRANSPARENCY (M)	TEMPERATURE (DEGREE C)	TOTAL CHLORIDE (MG/L)	TOTAL NITROGEN (MG/L)	TOTAL PHOSPHOROUS (UG/L)
5/20/2015	1042	Sugar Hill Reservoir	1	-	-	-	-	-	-	<2	0.52	8.32
5/20/2015	1042	Sugar Hill Reservoir	11	-	-	-	-	-	-	< 2	0.59	9.78
5/20/2015	1042	Sugar Hill Reservoir	-	-	-	-	-	3.37	-	-	-	-
5/20/2015	1056	Sugar Hill Reservoir	0.2	-	23	8.99	6.84	-	17.25	-	-	-
5/20/2015	1100	Sugar Hill Reservoir	1	0.4	23	9	6.81	-	17.27	-	-	-
5/20/2015	1108	Sugar Hill Reservoir	11	0.8	22	9.3	5.91	-	4.8	-	-	-
5/20/2015	1114	Sugar Hill Reservoir	1	0.6	23	8.9	6.78	-	17.25	-	-	-

- In accordance with WQC Condition I, monitoring of dissolved oxygen and temperature conditions downstream of Goshen Dam is required for the first full season after license issuance. The WQC required that prior to the commencement of water quality sampling, a quality control/quality assurance plan be provided to the Commission for review. The Project Quality Assurance and Quality Control Plan for Water Quality Monitoring was submitted to FERC on June 23, 2009<sup>15</sup>. Sampling locations included Sugar Hill Storage Reservoir (Impoundment #1 ZOE) and four locations located immediately downstream of the Goshen Dam in Sucker Brook (Upstream ZOE).

The final Dissolved Oxygen and Temperature Monitoring Report pursuant to License Article 401 and WQC Condition I was filed with FERC on December 1, 2009<sup>16</sup>. As required pursuant to License Article 403, a Reaeration Baffle Plan was also included within the December 1 Report, which included a plan for installing a reaeration baffle at the outflow of the Goshen Dam control structure to enhance water quality conditions. In accordance with the Baffle Plan, GMP installs the reaeration baffle structure on July 1 and removes the structure on September 30, annually.

Per letter dated December 20, 2010, the Licensee followed-up on the VANR/USFWS request to conduct DO and temperature monitoring when drought conditions are encountered during the 2010 field season as described in the approved QA/QC plan. These conditions are defined as when the Licensee is required to match outflows to inflows to the Sugar Hill Storage Reservoir after drawing the reservoir to elevation 8.0 feet below full pool pursuant to the summer operating rule curve. The defined drought conditions were not experienced at the Project during the summer of 2010 and therefore, water quality monitoring was not conducted. CVPS was prepared to conduct the study in the summer of 2011 if conditions warranted and would provide a report to the Commission by December 31, 2011<sup>17</sup>. FERC letter dated March 3, 2011<sup>18</sup> acknowledged receipt and approval of the Licensee’s December 20, 2010 letter. The Licensee again submitted letters on December 1, 2011<sup>19</sup>, April 15, 2014<sup>20</sup>, November 24, 2014<sup>21</sup>, December 1, 2015<sup>22</sup>, July 25, 2017<sup>23</sup>, and December 4, 2017<sup>24</sup> stating that no monitoring was conducted in 2011, 2012, 2013, 2014, 2015, 2016, or 2017 as defined drought conditions were not experienced.

- A request for Vermont DEC Project water quality compliance review was sent on June 14, 2017. On July 14, 2017, Vermont DEC responded with the following and confirmed that the current operations of the Silver Lake project are not a contributing cause to the listing of portions of the Leicester River as priority waters for management action.

“The Agency has reviewed its 2016 list of Priority Surface Waters. Lake Dunmore and the Leicester River is listed on Part E, waters altered by aquatic invasive species, due to

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<sup>15</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12052622>

<sup>16</sup> <https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=12210267>

<sup>17</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12515281>

<sup>18</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12587888>

<sup>19</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12829856>

<sup>20</sup> <https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=13514428>

<sup>21</sup> <https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=13693281>

<sup>22</sup> <https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=14061963>

<sup>23</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14643602>

<sup>24</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14770596>

locally abundant Eurasian Watermilfoil growth. Additionally, the six-mile stretch of the Leicester River downstream of Lake Dunmore is listed on Part F, waters altered by flow regulation, due to artificial flow regulation and possible downstream fish passage problems associated with the Salisbury hydroelectric project.”

A copy of the email correspondence from Vermont DEC is included in Appendix C.

- Project operations data was provided to Vermont DEC on October 30, 2018 for verification of Project Water Quality Certificate compliance (see Appendix C for email exchange).

### 3.2.2 WATER QUALITY STANDARDS: UPSTREAM ZOE

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
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 2016 State of Vermont 303(d) List of Impaired Waters<sup>25</sup> does not identify the waters of the Project, nor waters directly downstream, including Dunmore Lake and Leicester River, as "impaired".
- The Project WQC was issued on December 5, 2008: (see Appendix C for a copy of the WQC). There are no current amendments to the WQC. The Upstream ZOE is managed as Class B cold water fish habitat.
- In accordance with WQC Condition I, monitoring of dissolved oxygen and temperature conditions downstream of Goshen Dam is required for the first full season after license issuance. The WQC required that prior to the commencement of water quality sampling, a quality control/quality assurance plan be provided to the Commission for review. The Project Quality Assurance and Quality Control Plan for Water Quality Monitoring was submitted to FERC on June 23, 2009<sup>26</sup>. Sampling locations included Sugar Hill Storage Reservoir (Impoundment ZOE) and four locations located immediately downstream of the Goshen Dam in Sucker Brook (Upstream ZOE).

The final Dissolved Oxygen and Temperature Monitoring Report pursuant to License Article 401 and WQC Condition I was filed with FERC on December 1, 2009<sup>27</sup>. As required pursuant to License Article 403, a Reaeration Baffle Plan was also included within the December 1 Report, which included a plan for installing a reaeration baffle at the outflow of the Goshen Dam control structure to enhance water quality conditions. In accordance with the Baffle Plan, GMP installs the reaeration baffle structure on July 1 and removes the structure on September 30, annually.

Per letter dated December 20, 2010, the Licensee followed-up on the VANR/USFWS request to conduct DO and temperature monitoring when drought conditions are encountered during the 2010 field season as described in the approved QA/QC plan. These conditions are defined as when the Licensee is required to match outflows to inflows to the Sugar Hill Storage Reservoir after drawing the reservoir to elevation 8.0 feet below full pool pursuant to the

<sup>25</sup> [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)

<sup>26</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12052622>

<sup>27</sup> <https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=12210267>

summer operating rule curve. The defined drought conditions were not experienced at the Project during the summer of 2010 and therefore, water quality monitoring was not conducted. CVPS was prepared to conduct the study in the summer of 2011 if conditions warranted and would provide a report to the Commission by December 31, 2011<sup>28</sup>. FERC letter dated March 3, 2011<sup>29</sup> acknowledged receipt and approval of the Licensee's December 20, 2010 letter. The Licensee again submitted letters on December 1, 2011<sup>30</sup>, April 15, 2014<sup>31</sup>, November 24, 2014<sup>32</sup>, December 1, 2015<sup>33</sup>, July 25, 2017<sup>34</sup>, and December 4, 2017<sup>35</sup> stating that no monitoring was conducted in 2011, 2012, 2013, 2014, 2015, 2016, or 2017 as defined drought conditions were not experienced.

- A request for Vermont DEC Project water quality compliance review was sent on June 14, 2017. On July 14, 2017, Vermont DEC responded with the following and confirmed that the current operations of the Silver Lake project are not a contributing cause to the listing of portions of the Leicester River as priority waters for management action.

“The Agency has reviewed its 2016 list of Priority Surface Waters. Lake Dunmore and the Leicester River is listed on Part E, waters altered by aquatic invasive species, due to locally abundant Eurasian Watermilfoil growth. Additionally, the six-mile stretch of the Leicester River downstream of Lake Dunmore is listed on Part F, waters altered by flow regulation, due to artificial flow regulation and possible downstream fish passage problems associated with the Salisbury hydroelectric project.”

A copy of the email correspondence from Vermont DEC is included in Appendix C.

- Project operations data was provided to Vermont DEC on October 30, 2018 for verification of Project Water Quality Certificate compliance (see Appendix C for email exchange).

### 3.2.2.1 DEVIATION

On August 18, 2016<sup>36</sup> GMP filed a letter with FERC notifying of exploratory dredging at the trashrack of the Sucker Brook Diversion Dam. Included within the filing was an approval letter from Vermont DEC, dated August 12, 2016, approving of the dredging plan as required by Condition N of the WQC. By letter dated September 23, 2016 FERC requested that GMP file a letter stating the status of the Sucker Brook Diversion Dam dredging effort as Article 401 of the License requires the Licensee file specific plans with the Commission for approval. GMP's response filed on October 24, 2016<sup>37</sup> explains that it was not considered that Commission

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<sup>28</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12515281>

<sup>29</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12587888>

<sup>30</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12829856>

<sup>31</sup> <https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=13514428>

<sup>32</sup> <https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=13693281>

<sup>33</sup> <https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=14061963>

<sup>34</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14643602>

<sup>35</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14770596>

<sup>36</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14319953>

<sup>37</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14382263>

approval was necessary, as the Commission had not typically approved maintenance dredging at other GMP facilities. As stated within the October 24, 2016 filing, GMP had begun dredging the sediment in August to obtain measurements of the trashrack, but upon the identification that the turbidity caused by the dredging may affect water quality standards, dredging was ceased and instead divers were used to obtain trashrack measurements.

Given the information and response provided, and the fact that GMP ceased dredging when it was realized that adverse impacts were occurring, FERC's December 8, 2016 letter<sup>38</sup> did not consider this deviation from Article 401 a violation of Project license.

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<sup>38</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14419370>

### 3.2.3 WATER QUALITY STANDARDS: BYPASSED REACH, IMPOUNDMENT #2, AND DOWNSTREAM ZOES

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
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 2016 State of Vermont 303(d) List of Impaired Waters<sup>39</sup> does not identify the waters of the Project, nor waters directly downstream, including Dunmore Lake and Leicester River, as "impaired".
- The Project WQC was issued on December 5, 2008: (see Appendix C for a copy of the WQC). There are no current amendments to the WQC. The Bypassed Rach, Impoundment #2 and the Downstream ZOEs are managed as Class B cold water fish habitat.
- Per review of the IWIS a water quality monitoring station is located within the center of Silver Lake. The site was most recently surveyed in 2018 and site data is included in Table 4 below. Aside from a couple dissolved oxygen recordings at deeper lake depths, recorded parameters meet criteria for Vermont Class B cold water fish habitat standards (Table 2).

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<sup>39</sup> [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)

**TABLE 4 SILVER LAKE (IMPOUNDMENT #2 ZOE) 2018 WATER QUALITY DATA (SOURCE: IWIS 2018)**

VISIT DATE	START TIME	LOCATION NAME	DEPTH (M)	CHLOROPHYLL-A (UG/L)	CONDUCTIVITY (UMHO/CM)	DISSOLVED OXYGEN (MG/L)	PH	SECCHI TRANSPARENCY (M)	TEMPERATURE (DEGREE C)	TOTAL CHLORIDE (MG/L)	TOTAL NITROGEN (MG/L)	TOTAL PHOSPHOROUS (UG/L)
4/30/2018	1615	Silver Lake	7.6								<0.1	13.9
4/30/2018	1615	Silver Lake	3.2								0.26	17.1
4/30/2018	1615	Silver Lake	5.4								0.29	12.2
4/30/2018	1615	Silver Lake	1							<2	0.3	22.8
4/30/2018	1615	Silver Lake	9.8								0.39	13.2
4/30/2018	1615	Silver Lake	11.7							2.12	1.24	15.5
4/30/2018	1615	Silver Lake	-					3.3				
4/30/2018	1617	Silver Lake	1.03	6.2	27	10.62	7.82		7.68			
4/30/2018	1617	Silver Lake	0.3	2.68	27	10.7	7.84		7.75			
4/30/2018	1618	Silver Lake	1.96	12.47	27.1	10.58	7.77		7.61			
4/30/2018	1619	Silver Lake	2.99	27.11	27.7	10.51	7.74		6.82			
4/30/2018	1619	Silver Lake	3.97	14.27	28	9.56	7.69		5.43			
4/30/2018	1620	Silver Lake	4.99	14.61	28.6	8.65	7.6		5.08			
4/30/2018	1621	Silver Lake	6.02	11.28	29	7.88	7.49		4.96			
4/30/2018	1622	Silver Lake	6.97	13.31	29.8	7.24	7.43		4.72			
4/30/2018	1623	Silver Lake	8.03	13.46	31.2	5.63	7.31		4.62			
4/30/2018	1624	Silver Lake	9.04	11.93	32.5	4.39	7.2		4.49			
4/30/2018	1624	Silver Lake	10.07	12.11	33.4	3.64	7.12		4.48			
4/30/2018	1626	Silver Lake	11.04	9.92	34.4	2.91	7.02		4.48			
4/30/2018	1629	Silver Lake	0.99	7.14	27.1	10.12	7.06		7.65			

- A request for Vermont DEC Project water quality compliance review was sent on June 14, 2017. On July 14, 2017, Vermont DEC responded with the following and confirmed that the current operations of the Silver Lake project are not a contributing cause to the listing of portions of the Leicester River as priority waters for management action.

“The Agency has reviewed its 2016 list of Priority Surface Waters. Lake Dunmore and the Leicester River is listed on Part E, waters altered by aquatic invasive species, due to locally abundant Eurasian Watermilfoil growth. Additionally, the six-mile stretch of the Leicester River downstream of Lake Dunmore is listed on Part F, waters altered by flow regulation, due to artificial flow regulation and possible downstream fish passage problems associated with the Salisbury hydroelectric project.”

A copy of the email correspondence from Vermont DEC is included in Appendix C.

- Project operations data was provided to Vermont DEC on October 30, 2018 for verification of Project Water Quality Certificate compliance (see Appendix C for email exchange).

### 3.3 UPSTREAM FISH PASSAGE STANDARDS

#### 3.3.1 UPSTREAM FISH PASSAGE STANDARDS: IMPOUNDMENT #1, UPSTREAM, AND IMPOUNDMENT #2 ZOES

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
C	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 upstream fish passage in the designated zone.</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>

- No fishway prescription or reservation of authority was filed under Section 18 of the Federal Power Act for the Silver Lake Project.
- There are no current or historical records of anadromous or catadromous species in the Impoundment #1, Upstream, or Impoundment #2 ZOEs. As stated within the Project WQC, the downstream Falls of Lana is a natural impediment to upstream fish movement into these ZOEs (See Figure 1 and Figure 2 for the Falls of Lana location). The Impoundment #1, Upstream, and Impoundment #2 ZOES are therefore not considered to impose barriers on upstream fish passage.

As stated within the Project WQC, the Sucker Brook watershed supports a fish community comprised of cold and warm water fisheries, native and stocked, and several non-game fish species. The Sugar Hill Storage Reservoir (Impoundment #1) is managed by the VANR as a put-and-take brook trout fishery. Other warm water fish species including rock bass, sunfish, and minnows are supported in the Sugar Hill Storage Reservoir. Silver Lake is additionally managed by VANR as a stocked brook and rainbow trout fishery (Impoundment #2). Silver Lake also supports largemouth bass, northern pike, pumpkinseed, sunfish, yellow perch, and rock bass. A description of fishing at Silver Lake Park is additionally included in the following VTFW link: [https://vtstateparks.com/assets/pdf/ReelFun\\_SilverLake.pdf](https://vtstateparks.com/assets/pdf/ReelFun_SilverLake.pdf).

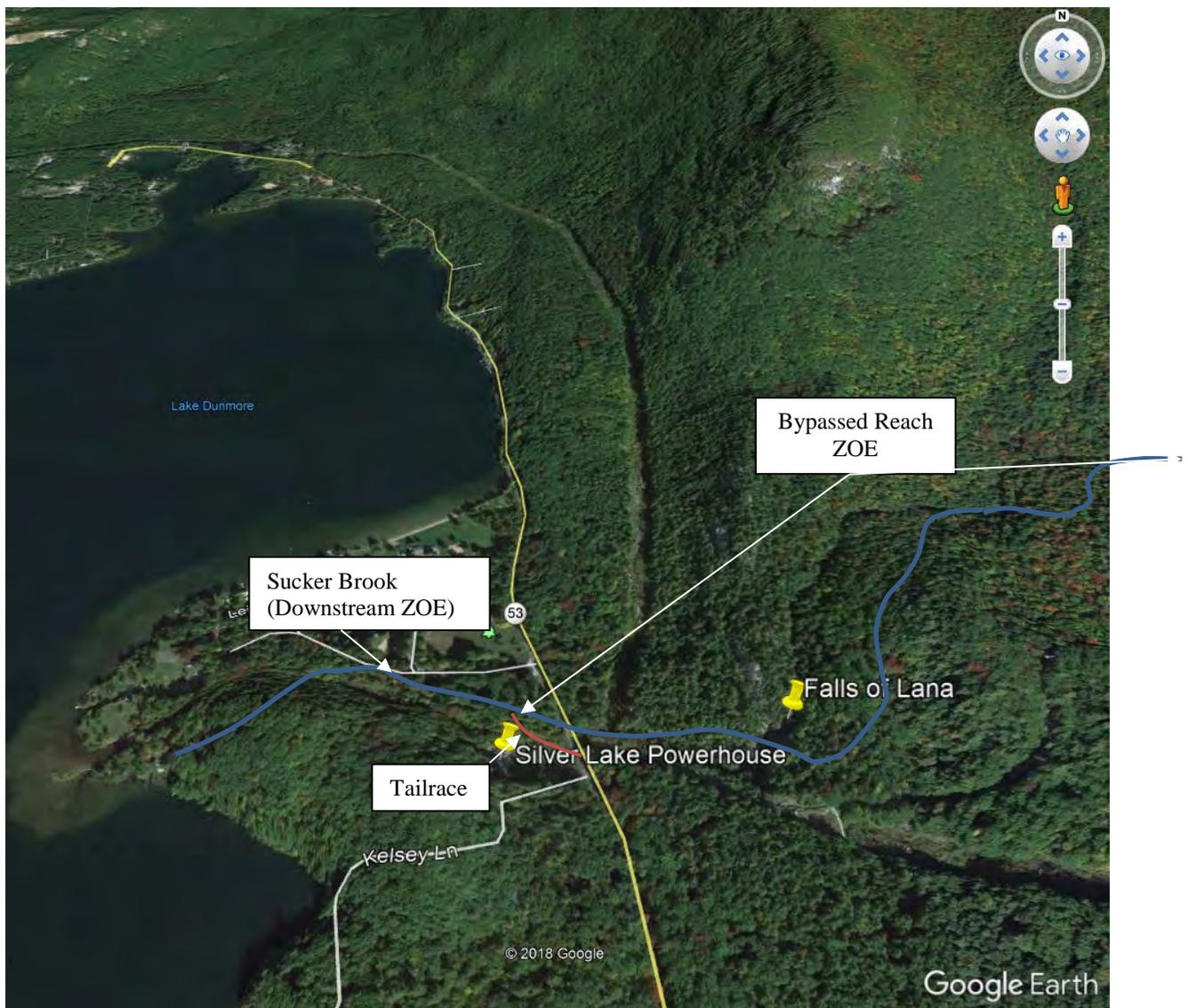
The reach between Goshen Dam and Sucker Brook Diversion Dam (Upstream ZOE) is managed as a wild brook and brown trout fishery. In accordance with data provided by VTFW on May 7, 2018, 3 stations were sampled on Sucker Brook in 1969. A single electrofishing pass was conducted at each station and brook, brown, and rainbow trout were captured at that time. As provided by VTFW, an excel file with the raw data is attached (Code: 329 = brook trout; Code 326 = rainbow trout; and Code 328 = brown trout) (Appendix D). VTFW additionally provided the summary data provided in Federal Aid Reports for the Sucker Brook (Appendix D). On May 17, 2018, the USFS additionally provided Sucker Brook fish population estimate data from 1993 to 2006 (Appendix D). Data was collected from 2 sampling stations, 1 station located upstream of the Impoundment #1 ZOE (upstream of Sugar Hill Reservoir) and 1 station located within the Upstream ZOE (upstream of Diversion Dam) (a map of the sampling locations is included in Appendix D). Salmonid species listed in the data include brook trout and brown trout. Non-salmonid species listed in the data included: slimy sculpin, longnose dace, bluegill, blacknose dace, brown bullhead, and pumpkinseed.

### 3.3.2 UPSTREAM FISH PASSAGE STANDARDS: BYPASSED REACH ZOE

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
C	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 upstream fish passage in the designated zone.</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>

- No fishway prescription or reservation of authority was filed under Section 18 of the Federal Power Act for the Silver Lake Project.
- The Falls of Lana is a natural impediment to upstream fish movement into the majority of the Bypassed Reach ZOE as well as Impoundment #1, Upstream, and Impoundment #2 ZOE's (See Figure 1 and Figure 2 for the Falls of Lana location). The reach below the Falls of Lana includes small portion (approximately 1,000 feet) of the Bypassed Reach ZOE. Within this small portion of the Bypassed Reach ZOE, landlocked salmon from Lake Dunmore may freely access Sucker Brook (salmon have been identified in this area from time to time by GMP PPWs). As stated in the WQC, paragraph 74, "the reach below the Falls of Lana, which is a natural impediment to upstream fish movement, to the project tailrace is accessed by landlocked Atlantic salmon from Lake Dunmore. The salmon utilize Sucker Brook for reproduction and rearing habitat." The landlocked salmon may freely swim up and down this stretch of Sucker Brook up until the Falls of Lana as desired. No Project components within the Bypassed Reach ZOE impede the salmon's access to the Falls of Lana.

Fish are able to access the bottom portion of the Bypassed Reach ZOE because GMP maintains a vertical fish exclusion rack and screen device at the end of the powerhouse tailrace to prevent fish, including landlocked salmon, from ascending the tailrace and migrating up into the powerhouse. The tailrace is an offshoot that flows into Sucker Brook, therefore, fish can pass by the tailrace exclusion racks and continue through Sucker Brook/ the Bypassed Reach ZOE and up to the Falls of Lana. Figure 3 below depicts a close-up view of the tailrace set-up in relation to Sucker Brook and the Bypassed Reach ZOE.



**FIGURE 5 TAILRACE, SUCKER BROOK, AND BYPASS ZOE**

- In accordance with data provided by VTFW on May 7, 2018, 3 stations were sampled on Sucker Brook in 1969. A single electrofishing pass was conducted at each station and brook, brown, and rainbow trout were captured at that time. As provided by VTFW, an excel file with the raw data is attached (Code: 329 = brook trout; Code 326 = rainbow trout; and Code 328 = brown trout) (Appendix D). VTFW additionally provided the summary data provided in Federal Air Reports for the Sucker Brook (Appendix D). On May 17, 2018, the USFS additionally provided Sucker Brook fish population estimate data from 1993 to 2006 (Appendix D). Data was collected from 2 sampling stations, 1 station located upstream of the Impoundment #1 ZOE (upstream of Sugar Hill Reservoir) and 1 station located within the Upstream ZOE (upstream of Diversion Dam) (a map of the sampling locations is included in Appendix D). Salmonid species listed in the data include brook trout and brown trout. Non-salmonid species listed in the data included: slimy sculpin, longnose dace, bluegill, blacknose dace, brown bullhead, and pumpkinseed.

Species such as perch, and pike may additionally find their way into the lower part of the Bypassed Reach from Lake Dunmore. A VTFW description of fishing at the downstream Lake Dunmore is included in the following link: <https://vtstateparks.com/branbury.html>

### 3.3.3 UPSTREAM FISH PASSAGE STANDARDS: DOWNSTREAM ZOE

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
C	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 or is not part of a Settlement Agreement.</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>

- The area stretching from the outlet of the Project tailrace to Sucker Brook’s confluence with Lake Dunmore may be accessed by landlocked Atlantic Salmon from Lake Dunmore (See Figure 3).

In the Spring, this lower reach of Sucker Brook is used by rainbow smelt resident in Lake Dunmore for spawning. Brook and rainbow trout are supported. Juvenile lake trout are also known to move into Sucker Brook from Lake Dunmore.

- In accordance with WQC Condition J, GMP maintains a vertical fish exclusion rack and screen device at the end of the powerhouse tailrace to prevent fish, including landlocked salmon, from ascending the tailrace and migrating up into the powerhouse. Between the presence of the Falls of Lana natural barrier and this manmade barrier to the Project powerhouse, landlocked salmon do not have access to Project components.
- The Lake Dunmore smelt population uses Sucker Brook for reproduction. In accordance with Condition D of the WQC, GMP follows a ramping plan for the Silver Lake Powerhouse tailrace<sup>40</sup>. GMP implements an incremental ramp down sequence when the Silver Lake unit is being brought off-line. The objective of this down-ramping plan is to govern reductions in the station discharge so to prevent stranding and mortality to downstream aquatic organisms. Upon initiation of shutdown, the PPW ramps down to 75% load and holds for 5 minutes, then decreases generation to the minimum capacity of 50% load (or about 800 kW) and holds for 5 minutes, then proceeds to zero load. This creates a more gradual ramping scenario and reduces stranding potential. Specifically, the ramping plan will allow for safe egress to fish from the 450-foot-long tailrace after shutdown.

Additionally, pursuant to the requirements of WQC Condition E, when annual smelt spawning begins in the spring, GMP operates the Silver Lake turbine either in a reduced capacity or no generation at night to allow spawning rainbow smelt to lay eggs in the watered channel. During the daytime, the Project is operated continuously to maintain spawning and incubation habitat in Sucker Brook downstream of the Project tailrace. This mode of operation continues until physical observations are made regarding the hatching of the eggs and the juvenile smelt move out of the spawning area.

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<sup>40</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12268988>

The protocol to monitor smelt spawning in Sucker Brook downstream of the Silver Lake Project includes a visual inspection process to define the beginning and end of the smelt spawning season and a proposed operating procedure to maximize the protection of rainbow smelt during spawning. Beginning on or before March 15th each year, the staff gage is reinstalled at the bridge abutment in the midst of the smelt spawning habitat and several coarse faced bricks are put into the brook in backwater sites where spawning smelt congregate. In addition, a continuous water level and water temperature data logger is installed in the principal smelt spawning area to collect data starting March 15 each year and ending when the hatch is complete.

- A ramping study at the Silver Lake Project was performed during the license application phase in November 1994. The study (AIR No. 5, CVPS1995<sup>41</sup>) evaluated the rate of habitat change in Sucker Brook related to Silver Lake Project operation and was performed in consultation with the Vermont Department of Fish and Wildlife and the U.S. Fish and Wildlife Service.
- In accordance with WQC Condition E, the Licensee files an annual Smelt Spawning Report. The Report includes brook water levels, tailrace flows, smelt observations, Silver Lake water levels, water temperature data, a descriptive characterization of the hydrologic conditions, and any problems encountered. Per Condition E, Smelt Spawning Reports were submitted to the VANR and the Vermont Fish and Wildlife Department on:

July 29, 2010: <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12401849>

August 1, 2011: <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12741960>

August 6, 2012: <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13040972>

July 10, 2013: <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13305213>

July 17, 2014: <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13596065>

July 31, 2015: <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13945926>

August 1, 2016: <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14319953>

July 19, 2017: <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14639303>

July 12, 2018: <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14970366>

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<sup>41</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12268988>

### 3.4 DOWNSTREAM FISH PASSAGE AND PROTECTION STANDARDS:

#### 3.4.1 DOWNSTREAM FISH PASSAGE AND PROTECTION STANDARDS: IMPOUNDMENT #1, UPSTREAM, BYPASSED REACH, IMPOUNDMENT #2 ZOES

The Sucker Brook watershed supports a fish community comprised of cold and warm water fisheries, native and stocked, and several non-game fish species. The Sugar Hill Storage Reservoir (Impoundment #1 ZOE) is managed by the VANR as a put-and-take brook trout fishery. Other fish species including rock bass, sunfish, and minnows are supported in the Sugar Hill Storage Reservoir. Silver Lake (Impoundment #2 ZOE) is additionally managed by VANR as a stocked brook and rainbow trout fishery. The Lake also supports rainbow smelt, yellow perch, and brown trout. The reach between Goshen Dam and Diversion Dam (Upstream ZOE) and from Diversion Dam to the powerhouse (Bypassed Reach ZOE) is managed as a wild brook and brown trout fishery.

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
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>

- No fishway prescription or reservation of authority was filed under Section 18 of the Federal Power Act for the Silver Lake Project.
- The Sugar Hill Storage Reservoir does not provide formal downstream fish passage to the non-migratory, stocked species located in the reservoir. If resident fish were swimming 12-feet below normal pond elevation, they would be able to enter through the Sugar Hill Storage Reservoir trashracks that have 3-inch clear spacing and then through pipes/valves that would bring them to Sucker Brook. This movement is unlikely and uncommon, though, as resident fish such as stocked trout and sunfish would have to be swimming deep in the water column to access this passage. The trashracks at the Sugar Hill Storage Reservoir help to prevent debris from entering into the pipes and the Upstream ZOE; there is no generating unit at Sugar Hill Reservoir.

When flows are provided over the Sucker Brook Diversion Dam spillway, fish are able to pass from Sucker Brook and Dutton Brook and over the spillway and downstream. The

Diversion Dam trashracks have 4 ½-inch clear spacing. The trashracks are used to help prevent debris from entering into the penstock pipes and Silver Lake; there is no generating unit at Diversion Dam.

- The Silver Lake intake trashracks have 2-inch clear bar spacing. In accordance with WQC Condition K (License Article 401), when the trashrack at Silver Lake is replaced, the new trashrack shall be designed with a 1.5-inch or narrower clear bar spacing to minimize fish entrainment. There is no spillage or formal downstream fish passage at Silver Lake Dam provided to the non-migratory, stocked species located within the lake.
- The Sucker Brook watershed supports a fish community comprised of cold and warm water fisheries, native and stocked, and several non-game fish species. The Sugar Hill Storage Reservoir is managed by the VANR as a put-and-take brook trout fishery. Other fish species including rock bass, sunfish, and minnows are supported in the Sugar Hill Storage Reservoir. Silver Lake is additionally managed by VANR as a stocked brook and rainbow trout fishery. The Lake also supports rainbow smelt, yellow perch, and brown trout. The reach between Goshen Dam and Diversion Dam and from Diversion Dam to the powerhouse is managed as a wild brook and brown trout fishery. A description of fishing at Silver Lake Park is included in the following VTFW link below:

Silver Lake Park:

[http://www.vtfishandwildlife.com/fish/fishing\\_opportunities/r\\_e\\_e\\_l\\_f\\_u\\_n\\_-\\_fishing\\_at\\_vermont\\_state\\_parks/silver\\_lake\\_state\\_park/](http://www.vtfishandwildlife.com/fish/fishing_opportunities/r_e_e_l_f_u_n_-_fishing_at_vermont_state_parks/silver_lake_state_park/)

In accordance with data provided by VTFW on May 7, 2018, 3 stations were sampled on Sucker Brook in 1969. A single electrofishing pass was conducted at each station and brook, brown, and rainbow trout were captured at that time. As provided by VTFW, an excel file with the raw data is attached (Code: 329 = brook trout; Code 326 = rainbow trout; and Code 328 = brown trout) (Appendix D). VTFW additionally provided the summary data provided in Federal Air Reports for the Sucker Brook (Appendix D).). On May 17, 2018, the USFS additionally provided Sucker Brook fish population estimate data from 1993 to 2006 (Appendix D). Data was collected from 2 sampling stations, 1 station located upstream of the Impoundment #1 ZOE (upstream of Sugar Hill Reservoir) and 1 station located within the Upstream ZOE (upstream of Diversion Dam) (a map of the sampling locations is included in Appendix D). Salmonid species listed in the data include brook trout and brown trout. Non-salmonid species listed in the data included: slimy sculpin, longnose dace, bluegill, blacknose dace, brown bullhead, and pumpkinseed.

- There are no current or historical records of anadromous or catadromous species in the area. As stated in the Project WQC, the downstream Falls of Lana is a natural impediment to upstream fish movement.

### 3.4.2 DOWNSTREAM FISH PASSAGE STANDARDS: DOWNSTREAM ZOE

The reach below the Falls of Lana, which is a natural impediment to upstream fish movement, to the Sucker Brook’s confluence with Lake Dunmore is accessed by landlocked Atlantic Salmon from Lake Dunmore. In the Spring, the lower reach of Sucker Brook is used by rainbow smelt resident in Lake Dunmore for spawning. Brook and rainbow trout are supported. Juvenile lake trout are also known to move into Sucker Brook from Lake Dunmore.

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
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 WQC Condition J, GMP maintains a vertical fish exclusion rack in the Project tailrace to prevent fish from ascending the tailrace and becoming stranded. This rack additionally allows for fish to pass downstream and into Lake Dunmore.

Also, the approved ramping plan for the powerhouse is implemented to help ensure safe egress to fish from the Project tailrace after unit shutdown. In accordance with Condition D of the WQC, GMP follows a ramping plan for the Silver Lake Station tailrace<sup>42</sup>. GMP implements an incremental ramp down sequence when the Silver Lake unit is being brought off-line. The objective of this down-ramping plan is to govern reductions in the station discharge so to prevent stranding and mortality to downstream aquatic organisms. Upon initiation of shutdown, the PPW ramps down to 75% load and holds for 5 minutes, then decreases generation to the minimum capacity of 50% load (or about 800 kW) and holds for 5 minutes, then proceeds to zero load. This creates a more gradual ramping scenario and reduces stranding potential. Specifically, the ramping plan will allow for safe egress to fish from the 450-foot-long tailrace after shutdown. Additionally, when the Project is shut down, water does not completely drain out of the tailrace due to deposition of bed material in Sucker Brook at the confluence with the tailrace. This allows several inches of water to remain in the tailrace channel when the Project is not operating. The ramp down sequence in addition to the fish exclusion device is designed to allow smaller fish to exit the tailrace channel by swimming downstream through the fish exclusion racks when the unit is shut down. The clear spacing of the fish exclusion racks is 1.5 inches.

<sup>42</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12268988>

Additionally, pursuant to the requirements of WQC Condition E, when annual smelt spawning begins in the spring, GMP operates the Silver Lake turbine either in a reduced capacity or no generation at night to allow spawning rainbow smelt to lay eggs in the watered channel. During the daytime, the project is operated continuously to maintain spawning and incubation habitat in Sucker Brook downstream of the Project tailrace. This mode of operation continues until physical observations are made regarding the hatching of the eggs and the juvenile smelt move out of the spawning area.

The protocol to monitor smelt spawning in Sucker Brook downstream of the Silver Lake project includes a visual inspection process to define the beginning and end of the smelt spawning season and a proposed operating procedure to maximize the protection of rainbow smelt during spawning. Beginning on or before March 15th each year, the staff gage is reinstalled at the bridge abutment in the midst of the smelt spawning habitat and several coarse faced bricks are put into the brook in backwater sites where spawning smelt congregate. In addition, a continuous water level and water temperature data logger is installed in the principal smelt spawning area to collect data starting March 15 each year and ending when the hatch is complete.

- A ramping study at the Silver Lake Project was performed during the license application phase in November 1994. The study (AIR No. 5, CVPS1995<sup>43</sup>) evaluated the rate of habitat change in Sucker Brook related to Silver Lake Project operation and was performed in consultation with the Vermont Department of Fish and Wildlife and the U.S. Fish and Wildlife Service.
- In accordance with WQC Condition E, the Licensee files an annual Smelt Spawning Report. The Report includes brook water levels, tailrace flows, smelt observations, Silver Lake water levels, water temperature data, a descriptive characterization of the hydrologic conditions, and any problems encountered. Per Condition E, Smelt Spawning Reports were submitted to the VANR and the Vermont Fish and Wildlife Department on:

July 29, 2010: <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12401849>

August 1, 2011: <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12741960>

August 6, 2012: <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13040972>

July 10, 2013: <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13305213>

July 17, 2014: <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13596065>

July 31, 2015: <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13945926>

August 1, 2016: <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14319953>

July 19, 2017: <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14639303>

July 12, 2018: <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14970366>

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<sup>43</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12268988>

### 3.5 SHORELINE AND WATERSHED PROTECTION STANDARDS

#### 3.5.1 SHORELINE AND WATERSHED PROTECTION STANDARDS: IMPOUNDMENT #1 ZOE

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
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>

- Based on the WQC, and confirmation from the USFWS National Wetlands Inventory Mapper, a wetland has become established at the south bay where Sucker Brook enters the Sugar Hill Reservoir. The wetland is about 3.5 acres in size and is dominated by low-diversity annual plant species.
- To help mitigate the impact of the winter drawdown on the wetland system and surrounding shoreline, GMP delays the onset of the winter drawdown until the beginning of January. Per Vermont WQC Condition B winter drawdown begins on or about January 1, or after headpond ice formation, if later. See Appendix C for a copy of the WQC.
- A map of the land cover units identified in the vicinity of the Project is found in Appendix B. This data was provided by the National Land Cover Database, 2011 ([http://www.mrlc.gov/nlcd11\\_leg.php](http://www.mrlc.gov/nlcd11_leg.php)).

### 3.5.2 SHORELINE AND WATERSHED PROTECTION STANDARDS: UPSTREAM ZOE

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
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>

- Based on the WQC, and confirmation from the USFWS National Wetlands Inventory Mapper, there is an 1.8-acre emergent wetland directly upstream of the Diversion Dam and other wetlands exist along Sucker Brook but upstream of the influence of the diversion dam.

The diversion dam wetland is occasionally flooded during high flow periods when the dam impounds water.

- In accordance with Vermont WQC Condition B, GMP releases a continuous minimum flow of 2.5 cfs at all times from Goshen Dam, even when natural inflows from the 2.6-square-mile contributing watershed decline below the fixed discharge.

When inflows and water levels decline at Sugar Hill Storage Reservoir and GMP releases reservoir inflows instead of the 2.5 cfs conservation flow (e.g., during drought conditions when Sugar Hill Storage Reservoir is eight feet below normal (1758 feet)), GMP will estimate the flow at Diversion Dam by multiplying the Sugar Hill Storage Reservoir release (estimated through the outlet V-notch discharge) by the watershed area proration (9.6:2.6) of four.

During normal flows, the Sucker Brook Diversion Dam does not impound water. During high flows, the dam impounds an area of up to about 2-acres before spillage occurs. This occurs about two or three weeks in the spring and during two or three events for one or two days because of rainfall (Response to AIR No. 2, Additional Information Second Set, Silver Lake Project No. 11478, GMP, February 1996<sup>44</sup>).

Consistent flows provided from Sugar Hill Reservoir minimize the amount of time the wetland is inundated.

- A map of the land cover units identified in the vicinity of the Project is found in Appendix B. This data was provided by the National Land Cover Database, 2011 ([http://www.mrlc.gov/nlcd11\\_leg.php](http://www.mrlc.gov/nlcd11_leg.php)).

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<sup>44</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=8397903>

### 3.5.3 SHORELINE AND WATERSHED PROTECTION STANDARDS: BYPASSED REACH ZOE

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
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 Bypassed Reach ZOE predominately consists of a mix of deciduous forest, mixed forest, and evergreen forest habitat. Low intensity development and developed open space occurs in a small area at the end of the ZOE.
- Aside from ongoing Project area maintenance, there is no shoreline management plan required for the Bypass Reach ZOE.
- A map of the land cover units identified in the vicinity of the Project is found in Appendix B. This data was provided by the National Land Cover Database, 2011 ([http://www.mrlc.gov/nlcd11\\_leg.php](http://www.mrlc.gov/nlcd11_leg.php)).

### 3.5.4 SHORELINE AND WATERSHED PROTECTION STANDARDS: IMPOUNDMENT #2 ZOE

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
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>

- Silver Lake does not have any notable shoreline habitats, but is an undeveloped area with evergreen forest and deciduous forest habitat. The lake levels are managed, though, so to maintain habitat and provide consistence for recreation at and around the lake. Within a 15-mile radius of the Silver Lake dam, both developed and primitive campsites are available in addition to over 25 trails of various lengths and difficulty ratings maintained by the U.S. Forest Service (USFS). At the northern end of Silver Lake, the USFS also maintains a sand and gravel beach. The lake provides opportunities for canoeists to enjoy the undeveloped nature of the area.
- Silver Lake operates in accordance with Vermont WQC Condition B. Under normal operating conditions, Silver Lake elevation remains between 1,247.5 feet and 1,245.5 feet (NGVD 29) from June 1 through November 30. GMP then draws down the lake level to an elevation between 1,239.5 and 1,242.5 feet from December 1 through May 31, then refills the lake by June 1. Within the WQC it was determined that having relatively stable conditions during the Lake’s recreational use period is important. In general pond elevations would enhance conditions for aquatic species as they are relatively stable.
- A map of the land cover units identified in the vicinity of the Project is found in Appendix B. This data was provided by the National Land Cover Database, 2011 ([http://www.mrlc.gov/nlcd11\\_leg.php](http://www.mrlc.gov/nlcd11_leg.php)).

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

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
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 Downstream ZOE predominately consists of a mix of deciduous forest, mixed forest, and evergreen forest habitat. This Project area is surrounded by lands owned and managed by the USFS and Branbury State Park.
- Aside from ongoing Project area maintenance, there is no shoreline management plan required for the Bypass Reach ZOE.
- A map of the land cover units identified in the vicinity of the Project is found in Appendix B. This data was provided by the National Land Cover Database, 2011 ([http://www.mrlc.gov/nlcd11\\_leg.php](http://www.mrlc.gov/nlcd11_leg.php)).

### 3.6 THREATENED AND ENDANGERED SPECIES STANDARDS

#### 3.6.1 THREATENED AND ENDANGERED SPECIES STANDARDS: ALL ZOES

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
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>

- A Project area species list was obtained using the U.S. Fish and Wildlife Information for Planning and Conservation (IPaC) Trust Resources report generated on April 10, 2017 for the Silver Lake Project (Appendix E). The IPaC report identifies one federally endangered species, the Indiana bat (*Myotis sodalis*) one federally threatened species, the Northern Long-eared Bat (*Myotis septentrionalis*), and the Bald Eagle (*Haliaeetus leucocephalus*) protected by the federal Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The Indiana bat, Northern long-eared bat, and bald eagle are additionally identified as endangered species by the state of Vermont<sup>45</sup>.
- On July 14, 2017, the VANR provided a review of the rare, threatened, and endangered species for the Project area (Appendix E). The VANR identified the following additional threatened and endangered species:

**TABLE 5 VERMONT RTE SPECIES AND IMPORTANT SPECIES WITHIN THE SILVER LAKE HYDROELECTRIC PROJECT’S FOOTPRINT**

<b>Scientific</b>	<b>Common Name</b>	<b>Rank</b>	<b>Status</b>	<b>Notes / comments</b>
<i>Perimyotis subflavus</i>	Tri-colored Bat	S1	E	<i>Documented in vicinity of penstock</i>
<i>Myotis leibii</i>	Eastern Small-footed Bat	S1	T	<i>Documented in vicinity of penstock</i>

VANR states that the Project should minimally affect these species subject to (a) operations in accordance with the conditions specified in its 401 Water Quality Certification, including the continued implementation of smelt spawning flow agreements, (b) continued adherence to tree cutting and maintenance practices affording maximal bat protection (Article 405), and (c) minor modifications to powerline right-of-way maintenance to increase the viability of blue-eyed grass.

- FERC’s 1997 EA concluded that licensing of the Project may affect the Indiana bat through disturbance of summer roosting habitat during the clearing of vegetation for recreational improvements. License Article 405 was therefore included within the Project license to provide tree removal restrictions. In the case that trees must be removed between April 15

<sup>45</sup> <http://www.vtfishandwildlife.com/common/pages/DisplayFile.aspx?itemId=229831>

and September 15, GMP is required to survey for potential roosting trees first, and document this survey with FWS and *FERC* prior to any tree-removing activities. The survey results should note any shagbark hickory, American elm, quaking aspen, black locust, white ash, American beech, birches, eastern hemlock, maples (red, sugar, and silver), cottonwood, oaks, and white pine, as well as any dead, senescent, or severely injured (e.g. lightning-struck) trees that possess bark that springs away from the trunk upon drying (providing niches or crevices for roosting). In accordance with this Article, GMP is to otherwise avoid removing trees (of 10-inch diameter breast height or larger) from April 1 through October 31 of each year.

- USFWS drafted a Recovery Plan in 2007 for the Indiana Bat<sup>46</sup>. Vegetation clearing restrictions under Article 405 of the *FERC* license operate in compliance with general habitat requirements of this Recovery Plan.
- Vermont Fish and Wildlife drafted an October 2010 recovery plan for the bald eagle<sup>47</sup>. The plan includes a bald eagle recovery initiative in the Lake Champlain region, to aid in the establishment of breeding pairs along the Lake, and to set the stage for necessary habitat protection for bald eagles on Lake Champlain. Efforts under this Recovery Plan are undertaken remote from the Silver Lake Project.
- On March 13, 1997, *FERC* staff issued an Environmental Assessment (EA) for the Silver Lake Project. The EA concluded that the licensing of the Silver Lake Project, with staff recommended measures, would not affect threatened and endangered species and their habitat.

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<sup>46</sup> [https://ecos.fws.gov/docs/recovery\\_plan/070416.pdf](https://ecos.fws.gov/docs/recovery_plan/070416.pdf)

<sup>47</sup> <http://www.vtfishandwildlife.com/common/pages/DisplayFile.aspx?itemId=111337>

### 3.7 CULTURAL AND HISTORIC RESOURCES STANDARDS

#### 3.7.1 CULTURAL AND HISTORIC RESOURCES STANDARDS: ALL ZOEES

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
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 406 requires implementation of the "Programmatic Agreement Among FERC, the Advisory Council on Historic Preservation and the Vermont State Historic Preservation Officer (SHPO)" (<https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10110555>). Pursuant to the Programmatic Agreement, the Licensee developed a Historic Properties Management Plan (HPMP). The HPMP was filed on February 25, 2010 (<https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12277859>) and accepted by the Commission on May 3, 2011 (<https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12654334>).
- As stated within the 2015 Environmental Inspection Report (<https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13960132>), GMP is aware of its consultation requirements under Article 406 and is in compliance with requirements related to cultural resources.

### 3.8 RECREATIONAL RESOURCES STANDARDS

#### 3.8.1 RECREATIONAL RESOURCES STANDARDS: IMPOUNDMENT #1 ZOE

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
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>

- License Article 401 and WQC Conditions O and P, require the licensee to file, for Commission approval, Recreation Facility Design Plans within six months of license issuance. On August 26, 2009, the Licensee timely filed recreation facility design plans (<https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12123435>) and on February 25, 2010, filed designs for interpretive displays for the recreation facilities (<https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12279231>). On February 17, 2011, the Commission approved the recreation facilities design drawings (<https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12566378>) with the exception of an accessible fishing access area. On August 22, 2011, the Licensee filed revised design drawings for the accessible fishing area (<https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12739243>) and these drawings were approved by the Commission on September 29, 2011 (<https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12775277>). Recreational facility as-built drawings were filed on September 17, 2012 (<https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13065246>) and approved by the Commission on April 27, 2015 (<https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13854360>).
- Goshen Dam has a boat ramp, parking area with handicapped spaces, handicapped-accessible trail to boat ramp, fishing access landing (handicapped-accessible), trailer turn around, and directional and interpretative signage.
- The Project is surrounded by the Green Mountain National Forest and lands are generally open to the public year-round. The Green Mountain National Forest offers the following recreation activities: Backpacking, day hiking, non-motorized boating, horseback riding, fishing, picnicking, skiing/snowboarding, snowmobiling, swimming, cross country skiing/snowshoeing.
- The Licensee has added Part 8 information to the signage at the recreation access areas as indicated in the 2015 environmental inspection follow-up letter<sup>48</sup>.

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<sup>48</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13960132>

- The licensee filed the Form 80 reports for Sugar Hill Storage Reservoir and Sucker Brook Diversion Dam and on April 2, 2015 (<https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13826446>) and Silver Lake Development on June 9, 2015, as required (<https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13898939>).
- An updated Public Safety Plan for the Project was filed on May 17, 2011 (<https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12662890>) and accepted by the Commission on June 24, 2011 (<https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12691196>). Safety signage features have been installed in accordance with the plan, and are in good condition.

### 3.8.2 RECREATIONAL RESOURCES STANDARDS: UPSTREAM ZOE

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
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>

- See Impoundment ZOE for resource agency recommendations and evidence of Project compliance with recommendations.
- Interpretative signage is located at Sucker Brook Diversion Dam.
- The Project is surrounded by the Green Mountain National Forest and lands are generally open to the public year-round. The Green Mountain National Forest offers the following recreation activities: Backpacking, day hiking, non-motorized boating, horseback riding, fishing, picnicking, skiing/snowboarding, snowmobiling, swimming, cross country skiing/snowshoeing.

### 3.8.3 RECREATIONAL RESOURCES STANDARDS: BYPASSED REACH ZOE

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
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>

- See Impoundment ZOE for resource agency recommendations and evidence of Project compliance with recommendations.
- A foot trail along and beneath the penstock leads to an overlook area with viewpoints of the Falls of Lana. There is interpretative signage on the penstock by the Falls of Lana.
- The Project is surrounded by the Green Mountain National Forest and lands are generally open to the public year-round. The Green Mountain National Forest offers the following recreation activities: Backpacking, day hiking, non-motorized boating, horseback riding, fishing, picnicking, skiing/snowboarding, snowmobiling, swimming, cross country skiing/snowshoeing.

### 3.8.4 RECREATIONAL RESOURCES STANDARDS: IMPOUNDMENT #2 ZOE

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
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>

- See Impoundment ZOE for resource agency recommendations and evidence of Project compliance with recommendations.
- Silver Lake has interpretative signage.
- The Project is surrounded by the Green Mountain National Forest and lands are generally open to the public year-round. The Green Mountain National Forest offers the following recreation activities: Backpacking, day hiking, non-motorized boating, horseback riding, fishing, picnicking, skiing/snowboarding, snowmobiling, swimming, cross country skiing/snowshoeing.

### 3.8.5 RECREATIONAL RESOURCES STANDARDS: DOWNSTREAM ZOE

<i>Criterion</i>	<i>Standard</i>	<i>Instructions</i>
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>

- See Impoundment ZOE for resource agency recommendations and evidence of Project compliance with recommendations.
- There are no specific Project recreation items located within the Downstream ZOE as the Downstream ZOE is included within the lands of Branbury State Park. The State Park offers the following recreation activities: camping, hiking, swimming, boating, fishing, picnicking, mountain biking, nature programs, volleyball.

## 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.Lisai@greenmountainpower.com">Jason.Lisai@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, Kayla Easler, Katie Sellers
Company	Kleinschmidt Associates
Phone	207-416-1246; 207-416-1271; 207-416-1218
Email Address	<a href="mailto:Andy.Qua@KleinschmidtGroup.com">Andy.Qua@KleinschmidtGroup.com</a> , <a href="mailto:Kayla.Easler@kleinschmidtgroup.com">Kayla.Easler@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) 770-3213
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 <input checked="" type="checkbox"/> , Water Quality <input checked="" type="checkbox"/> , Fish/Wildlife Resources <input type="checkbox"/> , Watersheds <input checked="" type="checkbox"/> , T/E Spp. <input type="checkbox"/> , Cultural/Historic Resources <input type="checkbox"/> , Recreation <input 114="" 277="" 422"="" 882="" checked="" data-label="Table" type="checkbox/&gt;):&lt;/td&gt; &lt;/tr&gt; &lt;tr&gt; &lt;td&gt;Agency Name&lt;/td&gt; &lt;td&gt;Vermont Department of Environmental Conservation&lt;/td&gt; &lt;/tr&gt; &lt;tr&gt; &lt;td&gt;Name and Title&lt;/td&gt; &lt;td&gt;Eric Davis, River Ecologist&lt;/td&gt; &lt;/tr&gt; &lt;tr&gt; &lt;td&gt;Phone&lt;/td&gt; &lt;td&gt;802-490-6180&lt;/td&gt; &lt;/tr&gt; &lt;tr&gt; &lt;td&gt;Email address&lt;/td&gt; &lt;td&gt;eric.davis@vermont.gov&lt;/td&gt; &lt;/tr&gt; &lt;tr&gt; &lt;td&gt;Mailing Address&lt;/td&gt; &lt;td&gt;Watershed Management Division, Main Building - 2&lt;sup&gt;nd&lt;/sup&gt; Floor, One National Life Drive, Montpelier, VT 05620&lt;/td&gt; &lt;/tr&gt; &lt;/table&gt; &lt;/div&gt; &lt;div data-bbox="/> <table border="1"> <tr> <td colspan="2"><b>Agency Contact</b> (Check area of responsibility: Flows <input type="checkbox"/>, Water Quality <input type="checkbox"/>, Fish/Wildlife Resources <input checked="" type="checkbox"/>, Watersheds <input type="checkbox"/>, T/E Spp. <input type="checkbox">, Cultural/Historic Resources <input type="checkbox"/>, Recreation <input type="checkbox"/>):</input></td> </tr> <tr> <td>Agency Name</td> <td>Vermont Division of Fish and Wildlife</td> </tr> <tr> <td>Name and Title</td> <td>Bob Popp, Department Botanist</td> </tr> <tr> <td>Phone</td> <td>(802) 476-0127</td> </tr> <tr> <td>Email address</td> <td>bob.popp@vermont.gov</td> </tr> <tr> <td>Mailing Address</td> <td>5 Perry St. Suite 40 Barre, VT. 05641</td> </tr> </table>		<b>Agency Contact</b> (Check area of responsibility: Flows <input type="checkbox"/> , Water Quality <input type="checkbox"/> , Fish/Wildlife Resources <input checked="" type="checkbox"/> , Watersheds <input type="checkbox"/> , T/E Spp. <input type="checkbox">, Cultural/Historic Resources <input type="checkbox"/>, Recreation <input type="checkbox"/>):</input>		Agency Name	Vermont Division of Fish and Wildlife	Name and Title	Bob Popp, Department Botanist	Phone	(802) 476-0127	Email address	bob.popp@vermont.gov	Mailing Address	5 Perry St. Suite 40 Barre, VT. 05641
<b>Agency Contact</b> (Check area of responsibility: Flows <input type="checkbox"/> , Water Quality <input type="checkbox"/> , Fish/Wildlife Resources <input checked="" type="checkbox"/> , Watersheds <input type="checkbox"/> , T/E Spp. <input type="checkbox">, Cultural/Historic Resources <input type="checkbox"/>, Recreation <input type="checkbox"/>):</input>													
Agency Name	Vermont Division of Fish and Wildlife												
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Phone	(802) 476-0127												
Email address	bob.popp@vermont.gov												
Mailing Address	5 Perry St. Suite 40 Barre, VT. 05641												

<b>Agency Contact</b> (Check area of responsibility: Flows <input type="checkbox"/> , Water Quality <input type="checkbox"/> , Fish/Wildlife Resources <input checked="" type="checkbox"/> , Watersheds <input type="checkbox"/> , T/E Spp. <input type="checkbox"/> , Cultural/Historic Resources <input type="checkbox"/> , Recreation <input type="checkbox"/> ):	
Agency Name	Vermont Division of Fish and Wildlife
Name and Title	Peter McHugh, Streamflow Protection Biologist
Phone	(802) 622-4305
Email address	Peter.mchugh@vermont.gov
Mailing Address	One national Life Drive, Davis 2 Montpelier, VT 05620

<b>Agency Contact</b> (Check area of responsibility: Flows <input type="checkbox"/> , Water Quality <input type="checkbox"/> , Fish/Wildlife Resources <input checked="" type="checkbox"/> , Watersheds <input type="checkbox"/> , T/E Spp. <input type="checkbox"/> , Cultural/Historic Resources <input type="checkbox"/> , Recreation <input type="checkbox"/> ):	
Agency Name	Vermont Division of Fish and Wildlife
Name and Title	Timothy Appleton, Wildlife Biologist
Phone	(802) 476-0198
Email address	Tim.appleton@vermont.gov
Mailing Address	5 Perry St. Suite 40 Barre, VT. 05641

## 5.0 SWORN STATEMENT

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### Sworn Statement and Waiver Form

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

#### SWORN STATEMENT

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

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

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

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

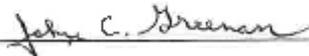
**PLEASE INSERT ONLY FOR PRE-OPERATIONAL CERTIFICATIONS (See Section 4.5.3):**

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

Company Name: Green Mountain Power Corporation (Silver Lake Hydroelectric Project)

Authorize Representative Name: John Greenan, P.E.

Title: Environmental Engineer

Authorized Signature: 

Date: 5 NOV 2018

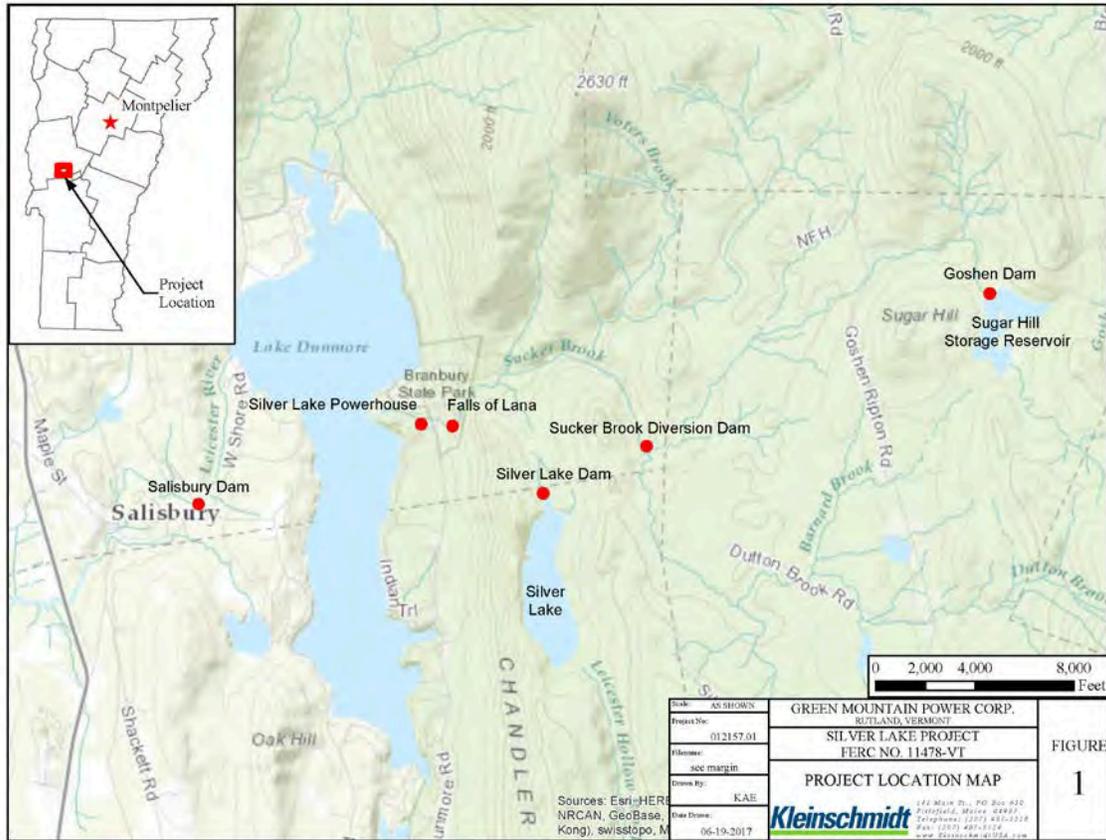
## 6.0 REFERENCES

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- USFWS (U.S. Fish and Wildlife Service). 2017. National Wetlands Inventory. <https://www.fws.gov/wetlands/Data/Mapper.html>. Accessed April 10, 2017.
- U.S. Fish and Wildlife Service (USFWS). 2015. Fisheries Research. Restoring River-Run Landlocked Atlantic Salmon to Lake Champlain. July 8, 2015. [Online] URL: <http://www.fws.gov/lcfwro/projects/research-salmon.html> Accessed April 10, 2017.
- Vermont Integrated Watershed Information System (IWIS). 2018. Site Search. Available online: <https://anrweb.vt.gov/DEC/IWIS/> [Accessed October 30, 2018].

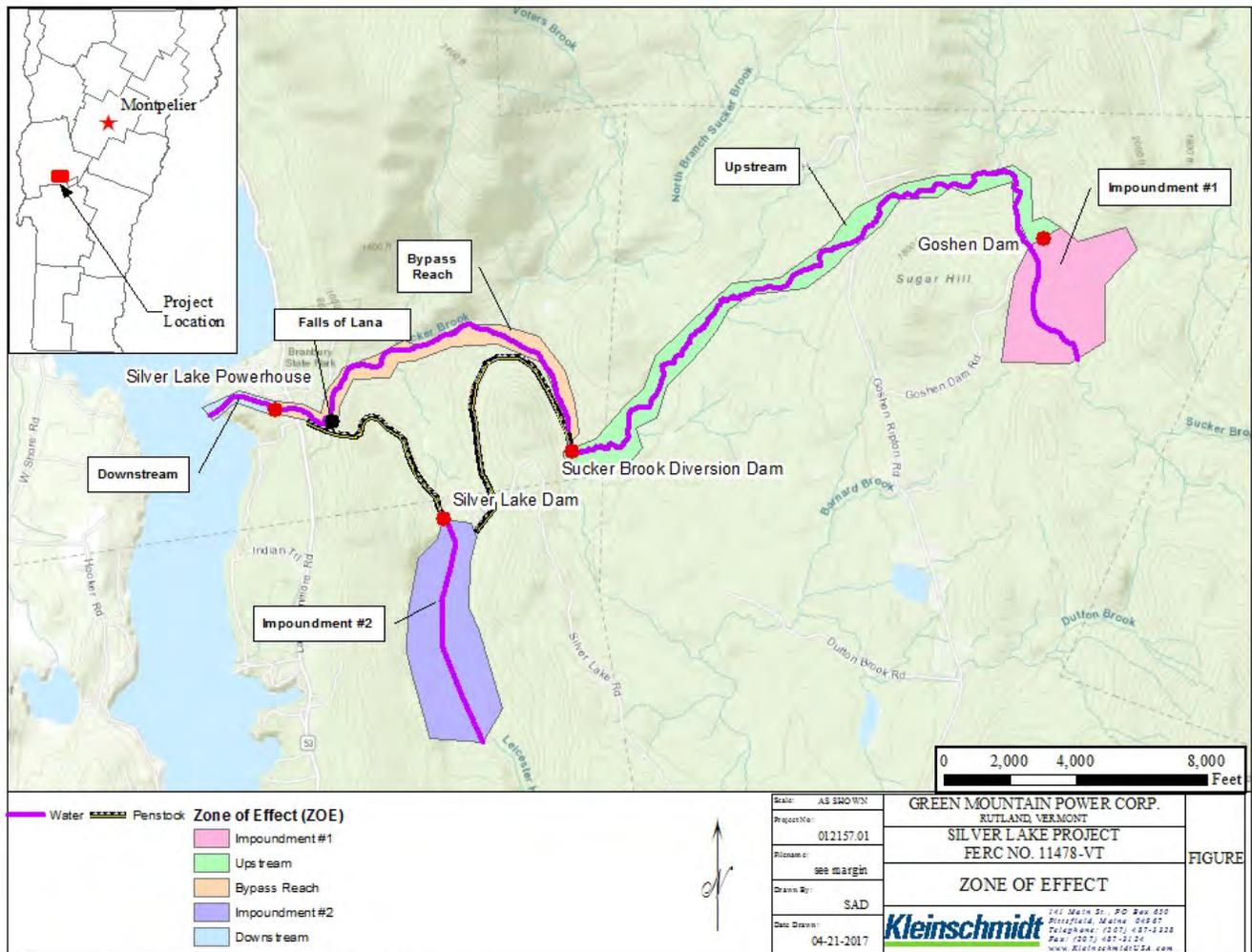
## **APPENDIX A**

### **PROJECT ZOE, PROJECT AREA PHOTOS, AND DRAWINGS**



Path: G:\Client\_Data\GMP\Silver Lake\_MXD\Silver Lake Project Location Map\_KAE.mxd

**FIGURE 1**      **GEOGRAPHIC OVERVIEW OF PROJECT LOCATION**



Path: G:\\_Client\_Data\GMP\Silver Lake\MXD\Silver Lake\_Zone\_of\_effect\_SAD.mxd

**FIGURE 2 ZONES OF EFFECT**



**PHOTO 1      GOSHEN DAM (SUGAR HILL STORAGE RESERVOIR TO RIGHT)**



**PHOTO 2      SUGAR HILL STORAGE RESERVOIR**



**PHOTO 3      GOSHEN DAM EMERGENCY SPILLWAY (VIEW UPSTREAM)**



**PHOTO 4      SUGAR HILL STORAGE RESERVOIR BOAT RAMP AND FISHING ACCESS LANDING**



**PHOTO 5      SUGAR HILL STORAGE RESERVOIR BOAT RAMP AND FISHING ACCESS**



**PHOTO 6**      **INFORMATIONAL SIGN AT SUGAR HILL STORAGE RESERVOIR**



**PHOTO 7** INTERPRETATIVE SIGN AT SUGAR HILL STORAGE RESERVOIR WITH PART 8 INFORMATION



**PHOTO 8      SUCKER BROOK DIVERSION DAM INTERPRETATIVE SIGN**



**PHOTO 9      SUCKER BROOK DIVERSION DAM AND INTAKE STRUCTURE PRIOR TO 2017  
ENHANCEMENT WORK (VIEW DOWNSTREAM)**



**PHOTO 10 SUCKER BROOK DIVERSION DAM IMPOUNDMENT AND INTAKE PRIOR TO 2017 ENHANCEMENT WORK (VIEW UPSTREAM)**



**PHOTO 11      SUCKER BROOK DIVERSION DAM DOWNSTREAM RELEASE STRUCTURE**



**PHOTO 12 SILVER LAKE INTERPRETATIVE SIGN WITH PART 8 INFORMATION**



**PHOTO 13 SILVER LAKE GAGE**



**PHOTO 14 SILVER LAKE PENSTOCK INTERPRETATIVE SIGN WITH PART 8 INFORMATION**



**PHOTO 15**    **SILVER LAKE DAM AND SILVER LAKE**



**PHOTO 16     SILVER LAKE POWERHOUSE AND SUBSTATION**



**PHOTO 17     SILVER LAKE POWERHOUSE TURBINE/GENERATOR AND INTERIOR**



**PHOTO 18     SILVER LAKE POWERHOUSE INTERIOR CONT.**



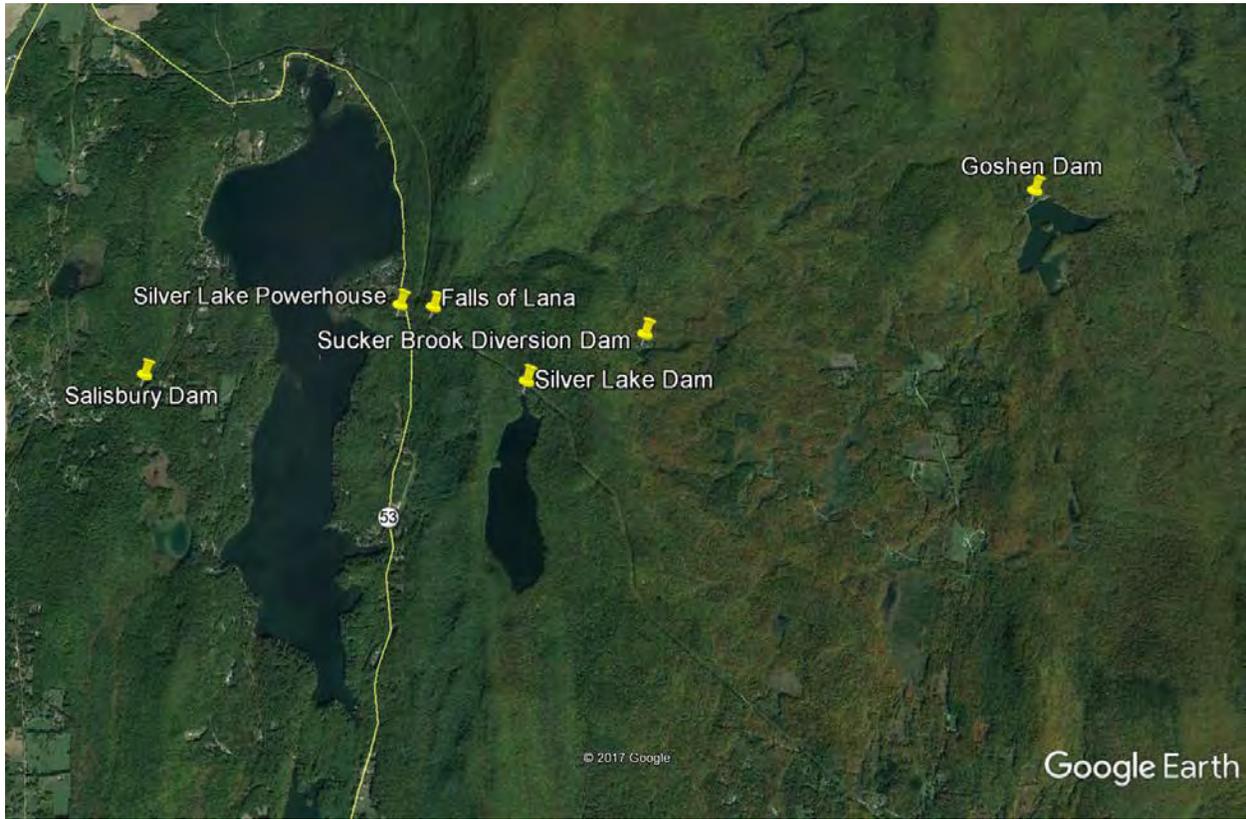
**PHOTO 19     SILVER LAKE POWERHOUSE AND TAILRACE**



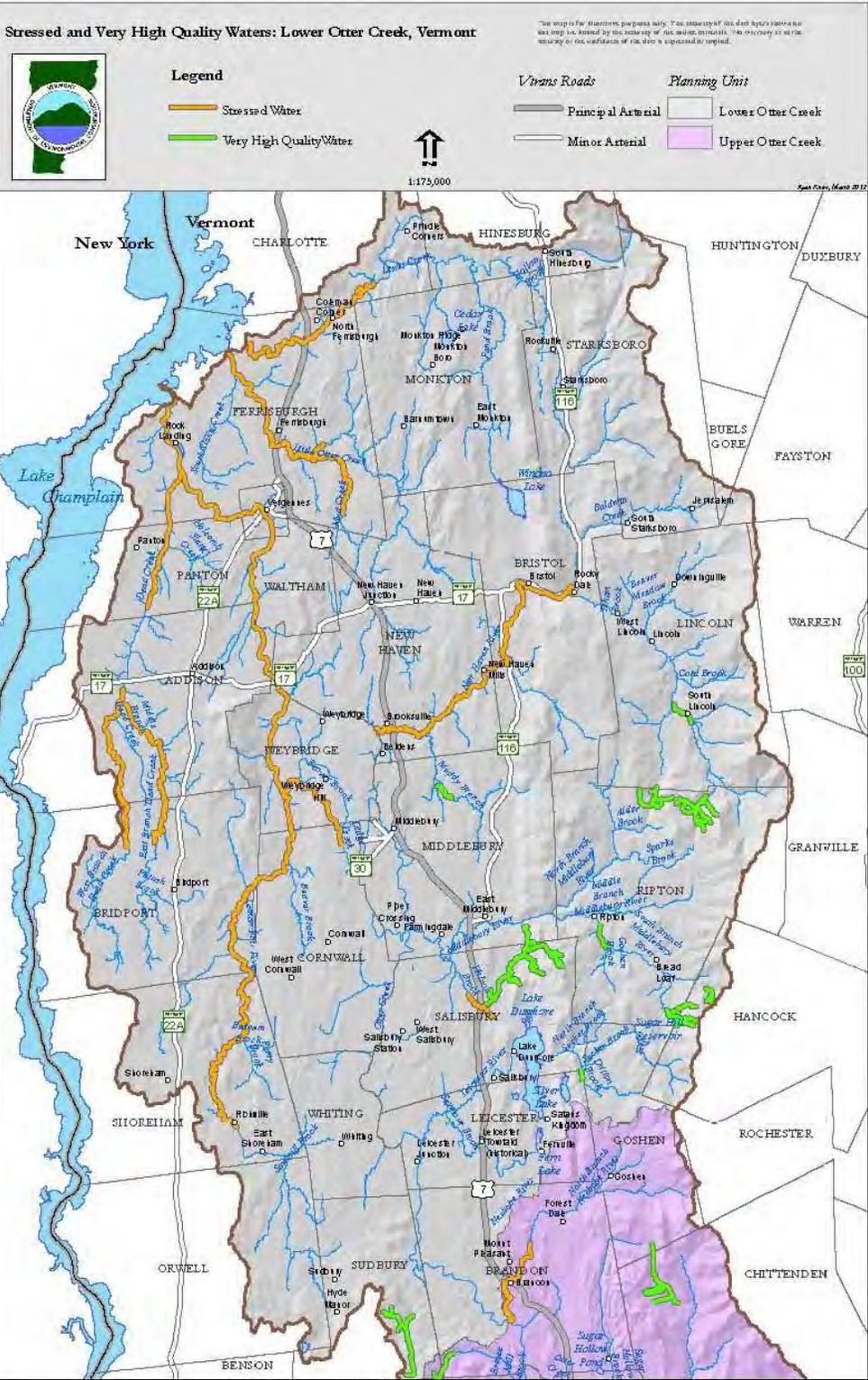
**PHOTO 20** SILVER LAKE POWERHOUSE TAILRACE MONITORING EQUIPMENT AT OUTFALL INTO LAKE DUNMORE

## **APPENDIX B**

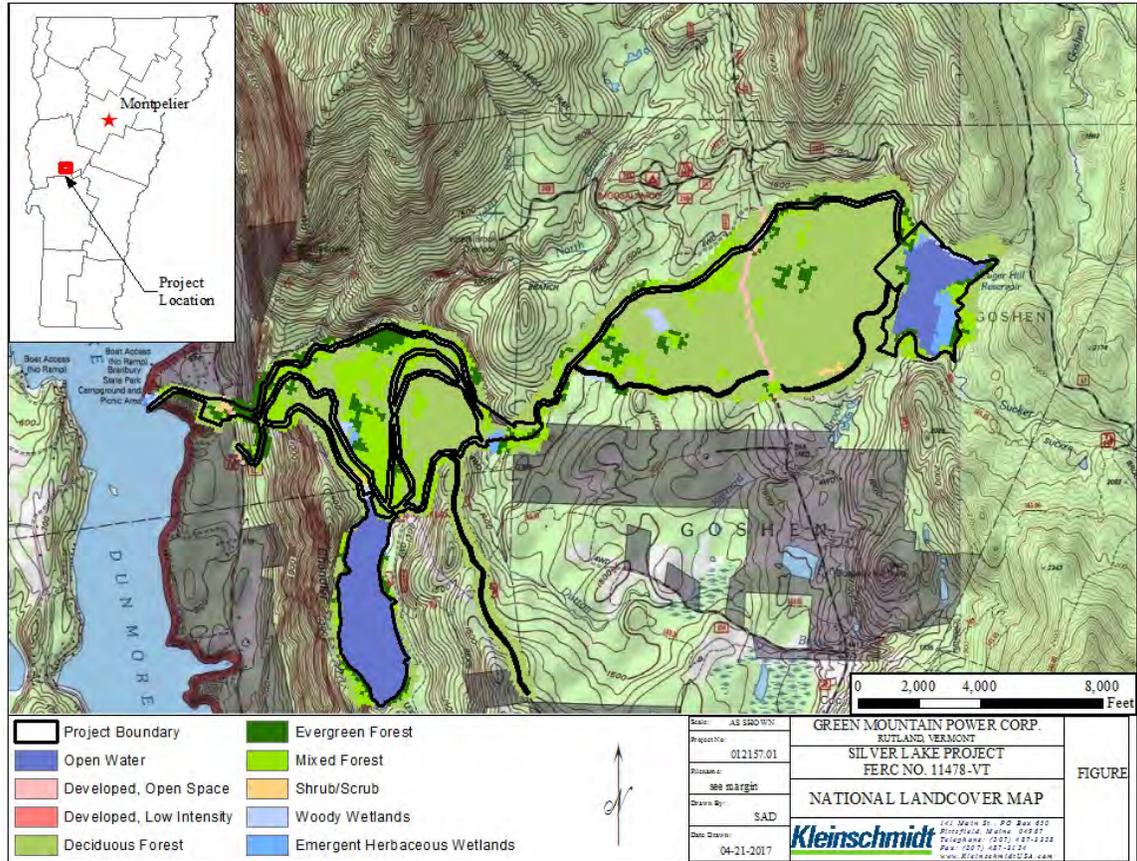
### **AERIAL PHOTOS OF FACILITY AREA AND RIVER BASIN**



**FIGURE 1 SILVER LAKE PROJECT LOCATION**



**FIGURE 2 LOWER OTTER CREEK BASIN**



Path: G:\Client\_Data\GMP\Silver Lake\_MXD\Silver Lake\_working\_SAD.mxd

**FIGURE 3 NATIONAL LANDCOVER MAP**

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

**Water Quality Certification**  
**(33 U.S.C. §1341)**

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

**APPLICATION FOR SILVER LAKE HYDROELECTRIC PROJECT**

The Vermont Department of Environmental Conservation (the Department) has reviewed a water quality certification application dated December 7, 2007 and filed by the Central Vermont Public Service Corporation (CVPS or the applicant) for the Silver Lake Hydroelectric Project. The supporting documentation for the application includes applicant's Federal Energy Regulatory Commission (FERC) initial license application, filed with FERC under a cover letter dated May 6, 1994 and amended by letter dated April 18, 1995, and two FERC Additional Information Request (AIR) responses, dated February 1995 and February 1996.

The current application is subject to review under the Vermont Water Quality Standards adopted by the Water Resources Board on January 25, 2006 (Standards). Standards became effective on February 9, 2006 (Standards, Section 1-01. *Applicability and Definitions*).

The Department held a public hearing on November 24, 2008 under the rules governing certification and received testimony during the hearing and, as written filings, until November 25, 2008.

The Department, based on the application and record before it, makes the following findings and conclusions.

**Findings**

**I. Background and General Setting**

1. By order dated September 29, 1988, FERC issued a finding of jurisdiction under the Federal Power Act for the Silver Lake Hydroelectric Project and ordered the applicant to file a license application within 18 months. The applicant appealed the federal decision, which was upheld on subsequent review. The applicant filed its application for an initial license on May 6, 1994.
2. The Silver Lake Hydroelectric Project is comprised of the Sugar Hill Reservoir on Sucker Brook in the town of Goshen; a downstream diversion dam that shunts water to Silver Lake; the dam and penstock headworks on Silver Lake in the town of Leicester; and the powerhouse located adjacent to Vermont Route 53 in the town of Salisbury. The powerhouse discharges back into Sucker Brook approximately 450 yards upstream of where it enters Lake Dunmore. The diversion dam, penstock and surge tank, and the powerhouse were constructed by the Hortonia Power Company in 1916-17. Recognizing the need for a storage reservoir to provide

more reliable generation, the Hortonia Power Company acquired more lands and constructed Goshen Dam in 1922-23, creating Sugar Hill Reservoir. The applicant subsequently acquired the assets of the Hortonia Power Company, and in 1932-33 raised the dam from 40 feet to 60 feet and lengthened it from 450 feet to 855 feet.

3. The project, much of which is located within the Green Mountain National Forest, utilizes water draining from a land area of 10.2 square miles, including the 9.6 square miles of drainage upstream of the diversion dam and the 0.6 square mile of drainage that flows into Silver Lake itself. Of the 9.6 square miles of drainage area above the diversion dam, a total of 4.5 square miles is in the Dutton Brook tributary watershed.
4. Sucker Brook is the main tributary of Lake Dunmore, comprising 13.5 square miles of the lake's total 20.4 square mile watershed. Lake Dunmore is the source of the Leicester River, a tributary of Otter Creek. The applicant also manages the outlet of Lake Dunmore as part of its unlicensed Salisbury Project.

## II. Project and Civil Works

### Goshen Dam (Sugar Hill Reservoir) - Sucker Brook

5. Goshen Dam, situated about three miles northeast of Silver Lake and 4.5 miles upstream of Lake Dunmore, is an earth fill structure with a crest elevation of 1777 feet msl<sup>1</sup>. The reservoir is oriented north-south, with the dam at the northerly end. An uncontrolled emergency spillway, 150 feet long and set about six feet below the dam crest, is located on the eastern end of the dam.<sup>2</sup>
6. The dam outlet is located near mid-dam. At the entrance is a wooden trashrack, with 3-inch clear spacing, and a concrete gate, which is inclined at a 30° angle from the vertical and normally maintained in the open position. The outlet is a 4-foot square, 232-foot long reinforced concrete conduit with an inlet invert of 1720 feet msl. Discharges through the conduit are controlled by a nest of five gate valves of varying sizes; these valves are manually adjusted and have a total capacity of about 70 cfs at full pond. At the lower end of the conduit is a baffled outlet structure designed to dissipate energy, prevent winter freezing, and provide reeration.
7. At the time of the original application, the reservoir was normally maintained within a range of elevation 1763 to 1766 feet msl during the summer. This is about 5 to 8 feet below the emergency spillway crest. At that elevation, the reservoir has an average surface area of about 61 acres. In recent years, an additional two feet of storage (elevation 1761 to 1763 feet msl) has

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<sup>1</sup> Crest elevation based on letter from Harriet King, Esq., representing CVPS, to Jeffrey Cueto, Department, November 21, 2008.

<sup>2</sup> The Agency had previously noted discrepancies in the elevations used at Goshen Dam. CVPS, by letter dated December 4, 1998, provided the Agency with the results of a survey done in 1995, the results of which were used to correct the elevations for the emergency spillway crest (previously 1768 feet msl, corrected to 1770.7 feet msl north and 1770.9 feet msl south and the reservoir stage marks on the headgate chain gage (55 foot stage = 1770.5 feet msl).

been utilized for hydroelectric generation (telecommunication between the Agency and CVPS, October 16, 2008). The reservoir morphological information is summarized in the following table.

**Table 1. Sugar Hill Reservoir Morphological Information**

Reservoir Elevation (feet msl)	Approx. Maximum Depth (ft.)	Surface Area (acres)	Storage Volume (acre-feet)
1770.8 emergency spillway crest	55	70	1,520
1766 normal high summer operating level	50	64	1,200
1761 normal low summer operating level	45	59	900
1758  proposed maximum drawdown to provide conservation flows	42	55	750
1753	37	38	520
1743	27	20	200
1732 historic operating rule max. winter low	16	4	40
1720 outlet invert	4	0+	0+

Note: Estimates made by staff based on Figure E-2, *Bathymetric Map of Sugar Hill Reservoir*, license application, vol. I, and storage table provided by CVPS, August 10, 1995; values differ somewhat from those used in the license application. Elevations have been corrected (+3 feet) based on the 1995 survey; estimates of areas and volumes may be slightly off since the bathymetric map was from 1957 and may or may not have used a correct vertical control. The approximate maximum depth corresponds to the reservoir stage markings on the headgate chain gage (Stage 55 feet = 1770.5 feet msl).

8. Goshen Dam is used for flow regulation and enhancement of downstream power production. It does not incorporate generating facilities.

### **Diversion Dam - Sucker Brook**

9. The Sucker Brook diversion dam is located 2.5 miles downstream of Goshen Dam. Sucker Brook and Dutton Brook presently join just upstream of the dam and are diverted via a 42-inch diameter conduit to Silver Lake. Dutton Brook was apparently channelized to divert it to Sucker Brook upstream of the intake; the remnant natural channel of Dutton Brook continues downstream of the diversion dam. The diversion dam conduit discharges into a stepped concrete flume about 460 feet in length and located at the northeast shore of Silver Lake.
10. The dam has an east-west orientation, with the impoundment on the south side. It is an earth fill structure, 725 feet in length with a 60-foot concrete spillway section on the east end. The concrete spillway is a 1- to 2-foot cap on bedrock, with a crest elevation of 1306 feet msl. The intake for the diversion conduit is located on the west end of the structure; flows into the conduit can be regulated using a 3 foot by 4 foot timber headgate. The gate is normally used only to shut down flows to the conduit for maintenance purposes. The intake is served by a trashrack with 4-inch clear spacing between bars.
11. During normal flows, the dam does not impound water. The stream is about 18 feet below the spillway crest on the upstream side of the structure. During high flows, the dam impounds an area of up to about two acres before spillage occurs. This occurs for about two or three weeks in the spring and during two or three events for one or two days as a result of rainfall (Response to AIR No. 2, *Additional Information Second Set, Silver Lake Project No. 11478*, CVPS, February 1996).

### **Silver Lake Dam - Unnamed tributary of Sucker Brook**

12. Silver Lake is a natural lake with a water level raised by the project dam. The lake is approximately one mile long and is 1,500 feet wide at its widest point. The lake provides the source of water for generation at a gross operating head of 676 feet.
13. The dam on Silver Lake is a buttressed concrete wall with earth fill on either side. It has a maximum height of about 30 feet. The dam has a total length of 284 feet, including the 8-foot unregulated spillway and the 18-foot intake structure. The spillway crest elevation is set at 1251 feet msl, or eight feet below the dam crest; the applicant historically maintained the lake level at a maximum pool elevation of 1250 feet msl, or one foot below the spillway crest. To reduce shoreline erosion potential, the applicant recently reduced its maximum operating level to 1247.5 feet msl from April 1 through December 31.
14. The penstock intake extends into the lake about 35 feet upstream from the dam's gatehouse (Engineering Drawing: *Silver Lake Excavation of Leaf Matter and Headgate Repair, August - September 1997*, CVPS, from 1962 base plan). The entrance contains a trashrack with 1.75-inch clear spacing between the bars, and a second trashrack is set inside of the outlet structure. The outlet structure includes a headgate that is electrically operated with local controls or remotely closed from the applicant's control center in Rutland. The outlet also includes a low-level wastegate.
15. A 5,221-foot penstock connects the lake to the powerhouse. It begins as a partially buried 48-inch diameter fiberglass pipe extending approximately 2,681 feet, and connects to a buried 48-

inch diameter welded steel pipe which extends about 140 feet to a surge tank. At the surge tank, the penstock transitions to a 36-inch welded steel pipe and extends approximately 2,400 feet to the powerhouse. (Letter from Harriet King, Esq., representing CVPS, to Jeffrey Cueto, Department, November 21, 2008)

16. At the former normal maximum pond level (one foot below the spillway crest), the lake has a surface area of 110 acres and a gross storage volume estimated to be 3,120 acre-feet. The useable storage volume for generation was 1,550 acre-feet. The lake's morphological information is summarized in the following table.

**Table 2. Silver Lake Morphological Information**

Lake Elevation (feet msl)	Surface Area (acres)	Storage Volume (acre-feet)
1259 dam crest		4,800
1250 former normal pond	110	3,120
1247.5 current normal pond		
1239.5 normal max. drawdown		

17. The project's one-story powerhouse contains a single horizontal Pelton wheel turbine with a generator rated at 2,200 kW and a hydraulic capacity of approximately 60 cfs. The net head at the powerhouse is estimated at 645 feet, reflecting a loss of 31 feet from the static head. The powerhouse discharges into a 450-foot long tailrace channel. At the lower end of the channel before it enters Sucker Brook, a sloped rack was installed in August 1992 to prevent fish from entering when the channel is carrying generation flows and then becoming stranded in the tailrace when the station shuts down.
18. The plant produces an average annual output of 6,150,100 kWh based on the 20-year record ending in 2007. (Letter from Harriet King, Esq., representing CVPS, to Jeffrey Cueto, Department, November 21, 2008)

### III. River Hydrology and Streamflow Regulation

19. The Silver Lake Project is designed to capture the majority of annual runoff from a 10.2 square mile total drainage—the 9.6 square miles of Sucker Brook watershed above the diversion dam combined at Silver Lake with the lake's direct drainage of 0.6 square mile. Both Sugar Hill Reservoir and Silver Lake are drawn in the winter to accommodate spring runoff. This reduces the loss of water to the system enabling the applicant to more reliably generate electricity throughout the year.

20. Use of flow for generation follows a weekly demand cycle providing peak power generation; the station does not normally operate on weekends. Typical operation is from 7:00 a.m. through 3:00 p.m. Early week operation may be extended over one or two days in order to reduce operator expenses. (Response to AIR No. 11, February 1995)
21. Flow releases from Sugar Hill Reservoir are managed primarily to augment flows in Sucker Brook for diversion to Silver Lake under the power generation schedule in place at the time; the applicant maintains a continuous conservation flow below the dam at all times. No flows are maintained in the natural stream channels below the diversion dam and below Silver Lake. The reach below the diversion dam contains flow frequently enough that the natural channel is well defined; 3,200 feet downstream of the dam, the first large tributary, the North Branch, enters Sucker Brook. The natural channel below Silver Lake dam only receives local drainage and a small amount of gate leakage at the dam; the channel is poorly defined as a result. A leakage flow of 0.25 cfs was measured in October 1994 (Response to AIR No. 4, *Additional Information, Silver Lake Project No. 11478*, CVPS, February 1995). Silver Lake is 3,600 feet upstream of Sucker Brook.
22. There is no recorded flow data for Sucker Brook. To complete analyses related to project licensing, the applicant transposed data from a U.S. Geological Survey gaging station on Ayers Brook in Randolph.

### **Sugar Hill Reservoir**

23. Sugar Hill Reservoir, which is on Sucker Brook, captures runoff from 2.6 square miles of the brook's watershed. For seasonal storage, Sugar Hill Reservoir is normally drawn about 27 feet beginning in September ending in March. The completion of the drawdown is timed to assure capture of spring runoff. The maximum drawdown level is set based on the water content of the snowpack and consequently can vary by about ten feet (total drawdown between 24 and 34 feet). Refill is complete by June. (*Application for Initial License for Major Water Power Project - 5 Megawatts or Less - Silver Lake Hydroelectric Project*, May 1994, Volume I, p. A-8 and Fig. 1)
24. Releases of up to 70 cfs from Sugar Hill Reservoir are managed using the five gate valves at the outlet. Valve settings can remain unchanged for weeks at a time. Care is taken to prevent a surcharge of the spillway even if it necessitates a release of water that is not needed for downstream generation at the time. Data provided for calendar year 1989 suggests that discharges in excess of about 17 cfs are relatively uncommon; there was a one-week release of about 31 cfs in early May of that year (*Application for Initial License for Major Water Power Project - 5 Megawatts or Less - Silver Lake Hydroelectric Project*, May 1994, Volume I, Fig. 1a, p. A-10)<sup>1</sup>.

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<sup>1</sup>Response to AIR No. 6 (*Additional Information Second Set, Silver Lake Project No. 11478*, CVPS, February 1996) provides a data set from 1985 through 1994 that is consistent with this finding; however, the May 1989 flow recorded in that data set is 23.3 cfs instead of 31 cfs. In 1987, there were 2-day releases of 68 cfs in April and June, with all five valves full open.

25. In response to AIR No. 6 (*Additional Information Second Set, Silver Lake Project No. 11478, CVPS, February 1996*), CVPS provided ten years of operating records, 1985-94, for Sugar Hill Reservoir. The records show the daily settings on the five valves (2-6" valves, 2-8" valves, and one 10" valve) and corresponding total outflow estimates. The reservoir levels are not provided. Although the reservoir elevations are highly variable, the estimated valve discharges are shown as fixed values instead of estimated based on a functional relationship to reservoir elevation. The maximum annual daily releases varied substantially, based on CVPS's estimates, between 17 cfs in January 1991 and November 1992 and 68 cfs in April and June 1987.
26. Operations personnel normally travel to the dam once a week and adjust the outflow as necessary to maintain consistency with the rule curves (stages shown; stage of zero = 1715.5 feet msl):

June – August	48.5 feet ±1.5 feet (recently modified to 47.5 feet ±2.5 feet)
September – December	Decreasing to 42.5 feet ±1.5 feet
January – February	Decreasing to 21 feet ±5 feet depending on snowpack
March – May	Increasing to summer level

Typically, the reservoir level does not change more than one foot in a week. Spring is the exception when levels can decline two feet per week before runoff and rise as much as 20 feet in a week. (Response to AIR No. 1, *Additional Information, Silver Lake Project No. 11478, CVPS, February 1995*)

27. The license application indicates that the applicant voluntarily releases a continuous minimum flow, estimated as 2.5 cfs, at all times from Goshen Dam, even when natural inflows from the 2.6 square mile contributing watershed decline below the fixed discharge. The 1989 data supplied by the applicant indicated that the reservoir was drawn as much as six feet to maintain 2.5-3.0 cfs below the dam during what was a relatively wet summer.
28. To provide the continuous minimum flow below Goshen Dam, CVPS previously maintained one 6-inch valve open four full turns. CVPS recently changed its practice to reducing the valve opening to two full turns when the reservoir drops to elevation 1761 feet msl. There is no record as to how the valve discharge was originally estimated. On October 24 and November 11, 2008, the applicant's consultant measured flows below the valve house with a 6-inch valve open four turns (reservoir at elevation 1765.9 feet msl). The discharge measurements averaged about 2.5 cfs, confirming the prior estimate. A V-notch weir was installed at the same time to enable the operator to adjust any valve or combination of valves to release the 2.5 cfs discharge at any reservoir elevation.

**Applicant proposal for relicensing:**

29. The applicant provided the Department with a proposed operating rule curve for the reservoir during a field evaluation of ecological impacts on June 3, 2002. The applicant proposes, as described above, to maintain the same maximum normal summer pool at Stage 50 feet

(elevation 1765.5 feet msl), but to increase the maximum summer drawdown to five feet from the current three feet. Under the 2002 rule curve, the winter drawdown would start much later, around the beginning of February, rather than beginning in fall as early as September; by letter dated November 21, 2008, CVPS provided a new rule curve with the start of the winter drawdown shifted to January 1 (Letter from Harriet King, Esq., representing CVPS, to Jeffrey Cueto, Department, November 21, 2008). The maximum limit of the winter drawdown would be raised to Stage 32 feet (elevation 1747.5 feet msl), with the annual maximum varying between stages 32 feet and 42 feet. Under the new rule curve, the maximum drawdown is expected to be reached about the same time, around late February or early March, but the subsequent spring recovery from snowmelt runoff would be a bit earlier than historic conditions, mid-April instead of sometime in May.

30. A conservation flow of 2.5 cfs will be provided year around. The flow would be guaranteed from storage. During the summer period, up to an additional three feet of drawdown would be used to guarantee the flow (down to Stage 42 feet).

#### **Sucker Brook diversion dam**

31. Except for extreme high flows, all water from Dutton Brook and Sucker Brook is diverted to Silver Lake via the pipe conduit. According to the applicant's response to AIR No. 4, there is no leakage discharged to the natural downstream channel under normal conditions (*Additional Information, Silver Lake Project No. 11478, CVPS, February 1995*).

#### **Applicant proposal for relicensing:**

32. To provide spillage at the diversion dam, the applicant originally proposed to install flashboards on the spillway crest, up to 3.0 feet in height and to create an impoundment behind the flashboards by covering the lower portion of the intake trashracks with plywood to raise the pond level from its current elevation of 1288 feet msl to 1309 feet msl. Water will not be impounded at the diversion dam. Instead the diversion conduit will be tapped a short distance below the dam to discharge into the left channel.
33. The applicant proposes to maintain a minimum flow of 2.5 cfs in Sucker Brook below the diversion dam as long as the guaranteed flows are being released at Goshen Dam. When inflows and water levels decline at Sugar Hill Reservoir and CVPS is releasing reservoir inflows instead of the 2.5 cfs guaranteed flow, CVPS will estimate the flow at the diversion dam by multiplying the reservoir release by four, the watershed area proportion (9.6:2.6). If the resulting estimate is less than 2.5 cfs, the conduit tap discharge will be adjusted to divert all flows into the bypass reach below the diversion dam.

#### **Silver Lake**

34. The lake receives flows from its natural 0.6 square mile watershed, supplemented by the Sucker Brook diversion.
35. Silver Lake is normally held relatively stable during the summer and fall recreational period, and then drawn about 7.5 feet from January through March. It rapidly fills during spring runoff.

Sugar Hill Reservoir controls about a quarter of the watershed contributing flow to Silver Lake. Occasionally, the lake is not completely refilled until late June.

36. The Rutland control center personnel monitor lake levels remotely and determine the hydroelectric station operating schedule considering established lake level operating rules. Historically, the rules were as follows:

June	Elevation 1246 – 1249 feet msl
July – August	Elevation 1247 – 1249 feet msl
September – December	Elevation 1246 – 1249 feet msl
January – March	Decreasing to 1241 feet +/- 1.5 feet depending on snowpack
April – May	Increasing to summer level

Typically, the lake level does not change more than one foot in a week. The hydraulic capacity of the diversion conduit and the penstock limit maximum water level increases to less than one foot per day.

Starting in 1995, CVPS modified the summer operation in order to control shoreline erosion problems experienced at the U.S. Forest Service beach at the north end of the lake. The normal maximum pool was reduced to elevation 1247.5 feet msl. The lake is now maintained between 1245.0 feet and 1247.5 feet msl from June through December.

(Response to AIR No. 1, *Additional Information, Silver Lake Project No. 11478*, CVPS, February 1995)

37. All discharges from the lake are controlled through the penstock at a fixed rate of 60 cfs for generation. Since the discharge is at a fixed rate and inflows vary, the lake level fluctuates slightly during the summer; however, the applicant balances generation and inflows to maintain a relatively stable lake level for recreational use. The applicant provided turbine rating curves in response to AIR No. 10 (*Additional Information Second Set, Silver Lake Project No. 11478*, CVPS, February 1996).

**Applicant proposal for relicensing:**

38. The applicant proposes to continue its current operating regime at Silver Lake, except the operating range for the period June through December would be reduced to 2.0 feet, with 1247.5 feet msl remaining as the normal maximum lake level.

**Sucker Brook below the powerhouse tailrace**

39. Because generation from Silver Lake is not continuous and is at a high fixed discharge, instream flows vary substantially depending on whether or not the station is on line. The changes in flow are rapid. The change in flow is made more substantial by the fact that the project removes

about three quarters of the natural streamflow from Sucker Brook before it reaches the lower reach.

**Applicant proposal for relicensing:**

40. During the spring, the hydroelectric station would be operated using a special protocol to prevent dewatering of smelt eggs. The applicant also proposes to employ ramping year around when transitioning from generation to storage.

**IV. Standards Designation**

41. The applicable 2006 Vermont Water Quality Standards (Standards) were promulgated by the Vermont Water Resources Board pursuant to 10 V.S.A., Chapter 47, Water Pollution Control. Section 1252 of the chapter provides for the classification of State waters as either Class A or Class B and authorizes the adoption of standards of water quality to achieve the purpose of classification.
42. Sucker Brook and its tributaries found below 2500 feet in elevation have been designated by the Vermont Water Resources Board as Class B waters. The Water Resources Board has also designated all waterbodies in the drainage as cold water fish habitat.
43. Class B waters 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 3-04(A) *Class B Waters: Management Objectives*)
44. All waters at the Project are designated coldwater fish habitat for the protection and management of fisheries. (Standards, Section 3-05. *Fish Habitat Designation*)
45. The dissolved oxygen standard for cold water fish habitat streams is 6 mg/l and 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. (Standards, Section 3-04(B)(2) *Water Quality Criteria for Class B waters: Dissolved Oxygen*) The temperature standard limits increases to 1.0 deg F from ambient conditions, or background. (Standards, Section 3-01(B)(1) *General Criteria: Temperature*) The turbidity standard is 10 NTU. (Standards, Section 3-04(B)(1) *Water Quality Criteria for Class B waters: Turbidity*)
46. Under the Class B criterion for aquatic biota, wildlife and aquatic habitat, the Standards require “[n]o change from the reference condition that would prevent the full support of aquatic biota, wildlife, or aquatic habitat uses. Biological integrity is maintained and all expected functional groups are present in a high quality habitat. All life-cycle functions, including overwintering and reproductive requirements are maintained and protected.” As the waters at the Project have not been assigned a water management type, the criterion is “no 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 3-04(B)(4) *Water Quality Criteria for Class B Waters: Aquatic Biota, Wildlife and Aquatic Habitat*)

47. The Hydrology Policy requires that “[t]he proper management of water resources now and for the future requires careful consideration of the interruption of the natural flow regime and the fluctuation of water levels resulting from the construction of new, and the operation of existing, dams, diversions, and other control structures.” (Standards, Section 1-02(E)(1) *General Policy: Hydrology Policy*) For Class B waters, “[a]ny change from the natural flow regime shall provide for maintenance of flow characteristics that ensure the full support of uses and comply with the applicable water quality criteria.” (Standards, Section 3-01(C)(1) *Hydrology Criteria: Streamflow Protection*)
48. The Anti-Degradation Policy provides for protection of existing uses and high quality waters. (Standards, Section 1-03. *Anti-Degradation Policy*) Based on the analysis and conditions set forth below, the Department finds that there will be no new or increased activity that will significantly affect water quality, but rather the proposed operation will improve water quality in the overall project area. Therefore, no additional analysis pursuant to Section 1-03 is warranted.

**Present status:**

49. On March 1, 2007, the USEPA approved a list of waters considered to be impaired based on water quality monitoring efforts. The list was submitted by the Department under Section 303(d) of the Federal Clean Water Act. The quarter-mile segment below Goshen Dam was listed as impaired for aquatic life support due to low dissolved oxygen concentrations caused by a hypolimnetic withdrawal from the reservoir. The updated list of waters approved by USEPA on September 24, 2008 does not list the segment below Goshen Dam.
50. The Department also issued a six-part list, *List of Priority Surface Waters Outside the Scope of the Clean Water Act Section 303(d)* in 2008. Part F lists those surface waters where water quality or habitat is being impacted by flow regulation. All project affected waters are listed as not in full support of aquatic life due to the Project’s flow regulation. The stream below Silver Lake and the 2.5 miles of Sucker Brook below Goshen Dam are listed as in non-support for all uses due to flow regulation.

**Water Chemistry**

51. The watershed of Sucker Brook is predominantly forested with very sparse residential development that is located in the upper portion of the Dutton Brook watershed south of Sugar Hill Reservoir. Water quality threats are, therefore, limited.
52. The Department has identified two major issues related to physical/chemical water quality: the influence of reservoir stratification on the dissolved oxygen regime of Sucker Brook and the influence of artificial low flows on the brook’s dissolved oxygen and temperature regimes.

**Impact of lake/reservoir stratification on downstream water quality:**

53. Thermal stratification of reservoirs and lakes during the summer can create oxygen-depleted conditions in their deeper zones. Unlike natural lakes, water from some reservoirs and lakes with artificial outlets is often discharged from low-level outlets instead of the lake surface, passing the low dissolved oxygen conditions downstream.
54. Sampling efforts were undertaken by the applicant in the summers of 1991 and 1992 within Sugar Hill Reservoir; directly downstream of Goshen Dam and at distances downstream of 200 feet, 400 feet, 600 feet, and 5,000 feet (at the bridge crossing of Forest Road #32); at the discharge point of the diversion conduit into Silver Lake; at the tailrace discharge of the powerhouse; and in Sucker Brook just upstream of tailrace confluence and 1/4 mile below the tailwater confluence.

***Sugar Hill Reservoir***

55. Dissolved oxygen profiles completed on July 16, 1991 display stratification characteristics. Near the reservoir outlet, the lowermost ten feet of water was measured at less than 20% oxygen saturation (*Application for Initial License for Major Water Power Project - 5 Megawatts or Less - Silver Lake Hydroelectric Project*, May 1994, Volume I, p. E1-16). The license application does not contain the specific data set discussed in the narrative, so it is not clear precisely what the spatial location of the sampling data is relative to the outlet. According to Exhibit F, sheets 1 and 2 of the license application, the deepest area of the reservoir bed is at about elevation 1714 feet msl, assuming the area has not been filled by sedimentation, and the outlet intake is between elevation 1717 and 1721 feet msl. It is, therefore, reasonable to assume that the outlet entrains oxygen-depleted water.
56. The baffle system at the discharge end of the outlet raises the dissolved oxygen concentration of the water. Data was collected from mid-July through August 1992 to supplement data collected on June 14 and July 26, 1991 data in evaluating how effective the baffle system is in protecting downstream water quality. Sampling completed on August 28, 1992 included several sampling stations in the 600-foot segment below the Goshen Dam outlet to examine recovery due to reaeration by the natural stream channel. The baffle system was generally able to bring the water close to or above minimum dissolved oxygen standards of 6 mg/l and 70% saturation. The lowest dissolved oxygen concentration of 5.5 mg/l (59% saturation at 15.6 deg C) was recorded on July 26, 1991. The recovery sampling completed on August 28, 1992 indicated that the baffle system brought the dissolved oxygen level up to 5.8 mg/l and 62% saturation and that full standards were achieved within 400 feet of the outlet (6.7 mg/l and 71% saturation); saturation was attained by the time Forest Road #32 was reached 5,000 feet downstream. Reaeration rates immediately below the dam are somewhat limited by the relatively shallow gradient of Sucker Brook through this reach.
57. In its response to AIR No. 9 (*Additional Information Second Set, Silver Lake Project No. 11478, CVPS, February 1996*), the applicant proposes to conduct a post-licensing water quality study to determine if stratification problems persist after the new reservoir water level management rule is implemented. If a dissolved oxygen problem does occur, a reaeration baffle would be installed and tested to determine if dissolved oxygen standards can be met using the baffle.

### ***Silver Lake***

58. Sampling completed on July 16, 1991 exhibited a thermocline beginning at a depth of 14 feet. The total depth sounded was 75 feet. Below the 14-foot depth, the temperature ranged from 6 to 13 deg C and the percent saturation from 71 to 100%. The sampling station location was not provided. The penstock intake is at a depth of about 13 to 21 feet, relative to elevation 1250 feet msl, the normal summer pool (Engineering Drawing: *Silver Lake Excavation of Leaf Matter and Headgate Repair, August -September 1997*, CVPS, from 1962 base plan). This is at a substantially shallower depth than the condition existing at Sugar Hill Reservoir, reducing the risk of entrainment of anoxic water.
59. Although substandard conditions due to stratification have not been identified in Silver Lake, the available sampling is limited to the single day's data. The data collected at the station tailrace, however, display relatively high temperatures and dissolved oxygen concentrations, suggesting that there is no hypolimnetic discharge of oxygen depleted water.
60. The data indicates that the tailrace discharge causes a significant increase in the water temperature of Sucker Brook. The tailrace station varied in temperature from 17.1 to 25.2 deg C, while the upstream Sucker Brook water temperature varied from 11.0 to 18.4 deg C. The effective change in brook temperature from above to below the tailrace was 4.1 to 6.7 deg C. This probably reflects the higher water temperatures in the upper zone of Silver Lake and possibly some frictional heating of the water as it moves through the penstock. As the sampling was completed under pre-dawn conditions, radiant heating of the exposed penstock would not be a factor, although some conductive heat transfer may be occurring.

### **Impact of artificial low flows on stream temperatures:**

61. Under current conditions, leakage flow conditions at the diversion dam create isolated pools of water in the reach between the dam and the North Branch. It is likely that water temperatures approach air temperatures under such conditions, further reducing the brook's capability to support fish and other aquatic organisms. Below Goshen Dam, the low-level release of cold water at a continuous higher rate does not result in a comparable issue above the diversion dam. No water quality monitoring was completed below the diversion dam, given that flows are to be restored to this reach and flow and temperature conditions substantially improved.

## **V. Aquatic Biota and Habitat**

62. Class B waters are managed to provide high quality habitat for aquatic biota (Standards, Section 3-04(A) *Class B Waters: Management Objectives*). Aquatic biota are defined as "organisms that spend all or part of their life cycle in or on the water." (Standards, Section 1-01(B) *Definitions*) Included, for example, are fish, aquatic insects, amphibians and some reptiles, such as turtles.
63. The Sucker Brook watershed supports a fish community comprised of cold and warmwater fisheries, native and stocked, and several non-game fish species.

### **Sugar Hill Reservoir**

64. Sugar Hill Reservoir is managed by the Agency as a put-and-take brook trout fishery. Annual stocking rates between 1991 and 1995 varied from 1,800 to 4,500 brook trout per year (letter from David R. Callum, District Fisheries Biologist, Vermont Department of Fish and Wildlife to Bruce M. Peacock, CVPS, September 9, 1994). In 2008, 1,800 brook trout were stocked. The historic winter drawdown regime has precluded management for a winter holdover of trout and natural reproduction. Reducing the extent of the winter drawdown should improve survival and winter holdover of trout.
65. Other fish species, such as rock bass, sunfish species, and minnows, are presently supported in Sugar Hill Reservoir. Severe drawdowns are also believed to have significantly limited aquatic vegetation production and detrimentally affected these warmwater fish species. Aquatic vegetation provides many fish with spawning habitat and protection from predation and enhances production of fish prey items. Reducing the winter drawdown should improve survival of fish and other aquatic life in the reservoir.
66. The reservoir is on the Priority Waters list as not supporting aquatic life. The Department attributes this to water level fluctuations. The reservoir substrate would support a good littoral zone community of plants, macroinvertebrates, and fish, but the exposure limits plant growth and year around utilization by macroinvertebrates and fish. Based on a survey by the Department in 2002, the biological indices for both the main reservoir and the south bay are significantly lower than those for reference waterbodies in its category (small, low alkalinity lakes) (*An Evaluation of Sugar Hill Reservoir's Macroinvertebrate Community Integrity*, Vermont Department of Environmental Conservation, December 16, 2002).
67. Fish stocked in Sugar Hill Reservoir and fish that may move into Sugar Hill Reservoir from the upper watershed of Sucker Brook for overwintering habitat are exposed to mortality due to stranding and predation caused by the winter drawdown. The fish population of the watershed above Sugar Hill Reservoir includes brook and brown trout and sculpins. Under the historic operating rule, the maximum annual winter drawdown to as low as 1729 feet msl resulted in a net remaining storage volume as small as 40 acre-feet; relative to the current summer maximum operating level, up to 97% of the reservoir volume was drained during the winter.

### **Silver Lake**

68. Silver Lake is currently managed by the Agency as a stocked brook and rainbow trout fishery. Under the Agency's trout management plan (*The Vermont Management Plan for Brook, Brown and Rainbow Trout*, September 1993), brook and rainbow trout have been stocked at annual rates of 1,000 and 500 fish, respectively, since 1995 (letter from David R. Callum, District Fisheries Biologist, Vermont Department of Fish and Wildlife to Bruce M. Peacock, CVPS, September 9, 1994). In 2008, 1,100 rainbow trout and 1,000 brook trout were stocked. In addition, 12,000 fingerling brook trout were stocked. The lake also supports rainbow smelt, yellow perch, and brown trout. The smelt population is self-sustaining, using the inlet stream and possibly the lake shoreline for spawning. There is some natural reproduction of brook and rainbow trout as well.

69. In order to protect smelt spawning in the Silver Lake inlet, there should be no decrease in the water elevation in Silver Lake during the smelt spawning and incubation period of March 15 through May 15. The seasonal drawdown will typically be completed by late March and the summer level of the reservoir restored by the end of April. Timing will, of course, vary with spring runoff conditions in each year.

#### **Sucker Brook - Goshen Dam to diversion dam**

70. The reach between Goshen Dam and the diversion dam is managed as a wild brook and brown trout fishery. The U.S. Forest Service has done fish population work in several streams in the project area. Based on information available at the time of the license application, Sucker Brook below Goshen Dam has a relatively low standing crop of trout when compared to similar area streams. The reason for this condition has not been determined; however, flow regulation and lack of spawning gravels due to the reservoir's effect on bedload transport have been identified as possible factors.
71. Fisheries biologists from the Agency, the U.S. Fish and Wildlife Service, and the U.S. Forest Service completed a visual assessment of habitat conditions at flows of 2.5 cfs and 12 cfs in Fall 1994. The flow of 2.5 cfs was generally found to provide some center-channel habitat for young trout but limited adult habitat due to shallowness and a lack of cover. The flow of 12 cfs was judged excessive.
72. Flow fluctuations caused by operation of the valve system to augment downstream flows by up to about 70 cfs may disrupt downstream habitat and cause mortality.

#### **Sucker Brook - diversion dam to powerhouse tailrace**

73. Lack of flow below the diversion dam has eliminated coldwater fisheries management opportunities in the 3,200 foot affected reach down to the North Branch. The North Branch, a perennial stream, contributes some flow to Sucker Brook, providing partial restoration of aquatic habitat. The brook flows about 0.8 mile from the mouth of the North Branch to the Falls of Lana, then another 0.4 mile to the project tailrace.
74. Evaluation of the upper portion of this reach by Agency biologists indicates that the brook, with restored flows, has excellent potential to support healthy, self-sustaining populations of brook and brown trout. The reach below the Falls of Lana, which is a natural impediment to upstream fish movement, to the project tailrace is accessed by landlocked Atlantic salmon from Lake Dunmore. The salmon utilize Sucker Brook for reproduction and rearing habitat.
75. Fisheries biologists from the Agency, the U.S. Fish and Wildlife Service, and the U.S. Forest Service completed a visual assessment of habitat conditions at flows of 1 cfs, 3 cfs, 5 cfs, and 8 cfs, as measured at the dam. A flow of 5 cfs was judged as providing the best habitat conditions and generally provided adequate depth for unimpeded fish movement. The flow provided full circulation of water through the pools, and turbulent reaeration was evident. A flow of 3 cfs was judged to provide a reasonable amount of habitat at some but not all of the sites observed; the wetted width appeared small for the size of the overall channel, but it was a marked improvement over 1 cfs. A supplemental assessment was conducted later focusing on flows of 2 and 3 cfs. Habitat conditions were improved at 3 cfs, in comparison to those at 2 cfs. A flow

regime that decreases the frequency and duration of lower flows is expected to improve fish survival and growth.

#### **Sucker Brook - below-tailrace reach**

76. In the spring, the lower reach of Sucker Brook is used by rainbow smelt resident in Lake Dunmore for spawning. Brook and rainbow trout are supported. Juvenile lake trout are also known to move into Sucker Brook from Lake Dunmore to utilize the brook during the spring and fall.
77. The brook is the primary smelt stream for Lake Dunmore and is critical to sustaining its smelt population. The period of smelt spawning and incubation varies for year to year based on climatic conditions, but normally occur sometime between March 15 and May 15. Smelt spawn at night along stream margins. The stream wetted width maintained during smelt spawning and incubation is, therefore, important. Depending on water temperature, the eggs incubate 10 to 30 days.
78. Presently, the project's regulation of flows impairs fisheries and invertebrate habitat in the lower segment of the brook. Since the project operates in a peaking mode, both minimum and maximum flows downstream of the project are aquatic habitat issues, as are the effects of spatial shifts in suitable habitat and the effects of a frequently fluctuating flow regime.
79. The visual assessment of flows continued in this reach for flows of 1 cfs, 3 cfs, 5 cfs, and 8 cfs, as measured at the diversion dam. Flows contributed by the intervening drainage were not measured. The biologists judged a flow of 5 cfs as providing similar habitat conditions to those observed above the Falls of Lana at that same flow. A flow of 3 cfs was judged to provide a reasonable amount of habitat in most but not all sites. Wetted width and habitat was judged to be markedly better at 3 cfs when compared to 1 cfs.
80. The applicant proposed a ramping plan in its response to AIR No. 5 (*Additional Information, Silver Lake Project No. 11478*, CVPS, February 1995). Currently, the station goes from full load to no release over a two-minute period. The applicant proposes to change the rate to stepping down in three, 5-minute intervals. The Agency has recommended that the maximum change in flow over each of the two first steps be specified as no greater than 20 cfs (letter from Jeffrey R. Cueto, Agency to FERC, April 19, 1996).
81. At the time of the license application, the applicant voluntarily operated the powerhouse 24 hours a day during smelt spawning after notification that the smelt run has begun. This 24-hour operation is theoretically effective because the smelt eggs deposited at night are still covered with water on succeeding days and nights until egg hatching occurs. However, the notification system may not have been sufficient to assure that the operation protects the full spawning and incubation period from when the smelt enter the brook until egg incubation is complete. The system relied on an informal arrangement with the Agency District Fisheries Biologist, who subsequently retired. Even with this cooperative arrangement, the specific beginning and end of the smelt period was not always identified.
82. To assure consistent protection of smelt reproduction, the Agency recommended that CVPS consider bracketing the spawning and incubation period using the dates of March 15 to May 15

(letter from Jeffrey R. Cueto, Agency to FERC, April 19, 1996). CVPS responded that, in a dry spring, plant operations could not be maintained during the full period without excessive use of storage in Silver Lake. In a letter dated June 15, 1995 to the Agency and repeated in the response to AIR No. 5, the applicant proposed an alternative operating protocol for the station during the smelt spawning season. This procedure would involve either one of two approaches: 1) 24 hours per day operation similar to the past protocol or 2) operation during the daytime only. The applicant proposed to maintain this protocol for the five weeks after ice out on Lake Dunmore.

83. The Agency accepted the applicant's proposal for 24-hour operation or daytime-only operation during the duration of the spawning and incubation period, given that sustaining artificially high flows may conflict with water level management objectives at Silver Lake. The ice-out trigger and use of a five week period was not accepted, however, because the spawning run can begin before ice out and because five weeks is too short to consistently cover both the spawning run and the incubation period.
84. In 1998, CVPS proposed and started operating under an alternate protocol, outlined in *Monitoring of Smelt Spawning in Sucker Brook to Develop an Operating Protocol for Silver Lake Station, Salisbury, Vermont* (August 24, 1998). Under the protocol, a staff gage has been installed on a nearby bridge, and both water levels and evidence of smelt spawning are monitored beginning the last full week of March. When eggs are first identified, the applicant reduces or suspends nighttime generation in order to force spawning to areas that will not be susceptible to dewatering. Daytime generation is used to control lake storage. CVPS has indicated that this protocol is feasible as it can operate the station over a range of flows from 28 to 63 cfs, although best gate is about 60 cfs (telecommunication between Roderick Wentworth, Vermont Department of Fish and Wildlife and Michael Scarzello, CVPS, November 10, 2005)
85. Based on CVPS data from 1998 to 2004, egg deposition has been observed as early as April 2 and 95% of the hatching has been as late as May 15. The spawning and incubation period has varied in length from 27 to 42 days, averaging 33 days. Older records have shown spawning runs beginning as early as March 8.
86. The Department of Fish and Wildlife supports continued use of the current protocol with several suggested modifications: 1) begin monitoring for smelt use earlier, on March 15; 2) specify the start and end of the night time period for reduced or no generation (suggested sunset to sunrise as tabulated in the Vermont digest of hunting and fishing laws; and 3) installation of water level and water temperature dataloggers in the principal smelt spawning area and comprehensive data reporting to allow refinement of the protocol over time. (Memorandum from Roderick Wentworth, Vermont Department of Fish and Wildlife to Jeffrey Cueto, Department, January 10, 2006)

## VII. Wildlife and Wetlands

87. **Sugar Hill Reservoir.** Under current conditions a wetland has become established at the south bay where Sucker Brook enters the reservoir. The wetland is about 3.5 acres in size and is dominated by low-diversity annual plant species.

88. The extensive drawdowns at Sugar Hill Reservoir, both during the winter and during the growing season, are a major factor in preventing the establishment of beneficial wetland plant communities that would otherwise become established along the shoreline margins, including the shallower bay where Sucker Brook enters the reservoir.
89. Existing winter drawdowns adversely affect overwintering of some aquatic mammals and reptiles and amphibians which seasonally use the shallow mud areas. Current operation leaves animals vulnerable to freezing and predation as the water level decreases through the fall/winter period. Given the current operating regime, it is unlikely that reptiles or amphibians successfully overwinter in Sugar Hill Reservoir. To help mitigate the impact of the winter drawdown, CVPS proposes to delay the onset of the winter drawdown until the beginning of January. Historically, it started as early as September.
90. **Sucker Brook - Goshen Dam to diversion dam.** A 1.8 acre emergent wetland is present directly upstream of the diversion dam and other wetlands exist along Sucker Brook but upstream of the influence of the diversion dam. The diversion dam wetland is occasionally flooded during high flow periods when the dam impounds water and the water level rises six feet before spilling over the dam; this typically occurs each year for 2 to 3 weeks during spring runoff and 2 or 3 times for a day or two as a result of heavy rainfall events (Response to AIR No. 2, *Additional Information Second Set, Silver Lake Project No. 11478*, CVPS, February 1996). The wetland is mapped on the National Wetland Inventory and is, therefore, a Class Two wetland under the Vermont Wetland Rules. CVPS's modified its original proposal, which would have resulted in permanent inundation of the wetland.
91. This wetland provides at least the following functions: surface water quality protection, erosion control through binding and stabilizing the soils, and wildlife and migratory bird habitat. The wetland is in good condition.
92. **Silver Lake.** No wetlands were identified in association with Silver Lake.

### VIII. Rare and Endangered Species and Outstanding Natural Communities

93. The Vermont Endangered Species Law (10 V.S.A. §§5401 to 5403) governs activities related to the protection of endangered and threatened species.
94. Two federally listed threatened or endangered species are known to occur in the project area, those being occasional transient specimens of the endangered bald eagle (*Haliaeetus leucocephalus*) and Peregrine falcon (*Falco peregrinus anatum*). Peregrine falcons historically nested in the ledges east of Silver Lake, in an area just outside project boundaries. (Letter from Gordon E. Beckett, U.S. Fish and Wildlife Service to Tina L. Jones, Kleinschmidt Associates, August 29, 1991).
95. The Falls of Lana is the only waterfall or gorge in the state known to have the species *Potentilla tridentata*, the three-toothed cinquefoil. (*The Waterfalls, Cascades and Gorges of Vermont*, Jenkins and Zika, Vermont Agency of Natural Resources, 1985).

## **IX. Shoreline Erosion**

96. In October 1994, Knight Consulting Engineers, Inc. and the applicant conducted a shoreline inspection of both Sugar Hill Reservoir and Silver Lake by boat. (Response to AIR No. 1, *Additional Information, Silver Lake Project No. 11478*, CVPS, February 1995).
97. Erosion was reported at the Sucker Brook entrance to Sugar Hill Reservoir, probably as a result of beaver activity, and at the boat launch/access road, which contained large gullies caused by surface erosion. No significant shoreline erosion problems were identified.
98. Silver Lake's western shoreline is mostly composed of exposed bedrock and boulders and cobbles, exhibiting no significant erosion problems. Along the eastern shoreline, four areas were noted as suffering from erosion, with at three of the areas experiencing erosion at least in part as a result of wave action during periods of high water.
99. At the beach area between the flume inlet and the dam at the northern end of Silver Lake, wave action causes erosion of the silty sand soils at the toe of a steep slope leading up to a grassed picnic area. Birch trees were found to be leaning nearly horizontally over the beach. The applicant's engineering consultant recommended lowering the maximum lake level three feet in order to reduce the erosion.
100. Consistent with the recommendation made by its consultant, the applicant has lowered the maximum operating level of Silver Lake to reduce shoreline erosion potential. The U.S. Forest Service, which manages the north end recreational area, had indicated that it would hire a consultant to address remediation needs and control of recreational access to reduce erosion caused by foot traffic; the status of this proposed action is unknown.

## **X. Recreational Use**

101. The project area has a high value for recreation due to its fairly remote nature and its association with the Green Mountain National Forest. The project area is popular for many recreational uses, including angling, swimming, sunbathing, boating, picnicking, camping, photography, viewing and trail uses (hiking, horseback riding, bicycling, skiing and snowmobiling). In 1996, the applicant transferred approximately 1,210 acres surrounding and including Sugar Hill Reservoir to the U.S. Forest Service. Ownership was retained for 25 acres, including the dam, parking area, and access.
102. Within a 15-mile radius of the Silver Lake dam, both developed and primitive campsites are available in addition to the over 25 trails of various lengths and difficulty ratings maintained by the U.S. Forest Service. A primitive campground is maintained by the U.S. Forest Service at Silver Lake, consisting of 16 tent sites with picnic tables and fire rings. The Silver Lake area averaged a use of 6,360 recreationalists (1,040 campers) annually during the summers of 1990-93. The highest use month is October with 3,400 users.
103. At the northern end of Silver Lake, the U.S. Forest Service maintains a sand and gravel beach. The lake provides opportunities for canoeists to enjoy the undeveloped nature of the area.

104. The Silver Lake Recreational Area is zoned for non-vehicular use and is roughly 0.6 mile from the trail head at Green Mountain National Forest Road 27. The area can also be accessed by foot from Vermont Route 53 via the Silver Lake Trail, an approximately 1.6 mile hike. The trail leads to the Falls of Lana Picnic Area.
105. CVPS proposed several improvements at the project: upgrading the scenic overlook at the Falls of Lana in consultation with the U.S. Forest Service; improving the access road and boat ramp at Sugar Hill Reservoir, including directional signage; and installing interpretive signage throughout the Project area in consultation with the U.S. Forest Service.

### **XI. Aesthetics**

106. The limited access, forested condition, and public land ownership enhance the aesthetic values of the project area. The three primary resources are Silver Lake, Sugar Hill Reservoir, and Sucker Brook. A particularly important and heavily used feature on Sucker Brook is the Falls of Lana. In the Agency study *The Waterfalls, Cascades and Gorges of Vermont* (Jenkins and Zika, Vermont Agency of Natural Resources, 1985), the Falls were rated of high importance due to their moderately wild and secluded character.
107. A special aesthetics flow study, including videotaping, was completed at the Falls of Lana, viewing flows of 3.1 cfs (0.24 csm) to 13.4 cfs (1.05 csm). (Response to AIR No. 10, February 1995)

### **XIII. State Comprehensive River Plans**

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

#### *Hydropower in Vermont, An Assessment of Environmental Problems and Opportunities* (May 1988)

109. The Department publication *Hydropower in Vermont, An Assessment of Environmental Problems and Opportunities* is a state comprehensive river plan. The hydropower study, which was initiated in 1982, indicated that hydroelectric development has a tremendous impact on Vermont streams. Artificial regulation of natural stream flows and the lack of adequate minimum flows at the sites were found to have reduced to a large extent the success of the state's initiatives to restore the beneficial values and uses for which the affected waters are managed.
110. With respect to Sugar Hill Reservoir, the study recommended further analysis of reservoir stratification and downstream effects, control of access road erosion, assessment of additional recreational needs, and collection of additional information on flow regulation. Control of drawdowns and establishment of minimum flows were recommended.

111. With respect to the diversion dam, the study recommended further analysis of downstream effects on fisheries. Establishment of minimum flows for recreational values and fish habitat was recommended.
112. With respect to Silver Lake, the study report indicated that there was an informal agreement between the applicant and the Forest Service that summer operating levels would not be dropped more than 4.5 feet below the spillway crest. The study recommended formalizing the agreement and establishing minimum flows below the tailrace.

#### *1993 Vermont Recreation Plan*

113. The 1993 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 recreational use of surface waters is increasing, resulting in greater concern about water quality, public access to Vermont's waters, and shoreland development.
114. The plan's 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, cultural 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.
115. Enhancement of access and improved flow management would be compatible with this policy and balance the competing uses of recreation and hydropower. Failure to provide access would exacerbate a critical state recreational problem.
116. Another priority issue identified in the Recreation Plan is the loss or mismanagement of scenic resources. The plan notes "[t]he protection of the scenic and visual resources in Vermont is paramount if Vermont is to maintain its renowned charm and character."
117. The Scenic Resources Protection and Enhancement Policy in the Recreation Plan 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 rural traditions of Vermont.

#### **XIV. Analysis**

##### **Bodies of Water**

##### ***Sugar Hill Reservoir***

118. The proposed rule curve for operation of Sugar Hill Reservoir will substantially reduce annual fluctuations in water levels and should improve hibernacula by delaying the onset of the winter drawdown. Management for generation and guaranteed downstream conservation flows to Sucker Brook to improve aquatic habitat during the summer will continue to limit the

establishment of a littoral zone in the reservoir but will maintain the existing wetland in the southeast bay. More fish should be able to overwinter in the reservoir as the volume of the reservoir is not going to be as severely depleted.

### ***Silver Lake***

119. Stabilization of Silver Lake would present limited opportunities for littoral zone development. No wetlands were identified in association with this lake. Having continued relatively stable conditions during the recreational use period is important. During the period March 15 - May 31, the lake should be managed to maintain a stable or rising condition to protect spring spawning fish and prevent dewatering of eggs. In order to avoid drawing the reservoir in the spring, the applicant would have to carefully manage the smelt operating protocol such that the flow releases to protect smelt do not exceed inflows to the lake.

### **Water Chemistry**

120. The release of oxygen-depleted water from Sugar Hill Reservoir is likely to continue since summer water levels and outflows will be similar to historic conditions. If this is confirmed by the applicant's proposed monitoring, a baffle system or other reaeration method can be implemented.
121. The relatively shallow intake at Silver Lake apparently does not create a hypolimnetic discharge. Dissolved oxygen levels below the powerhouse tailrace consistently met standards during the applicant's monitoring. The discharge does result in an increase in temperature relative to ambient upstream conditions in Sucker Brook. The tailrace discharge on July 25, 1991 raised the brook temperature from 18.4 deg C to 25.2 deg C. This was the worst case condition in the data set. It is not believed that occasional high temperatures on this order would affect support of coldwater fish. The impact will be slightly ameliorated by the new conservation flow to be released at the diversion dam. If a persistent problem is identified at any future point, the Department can reopen the federal license to address the issue.

### **Flow Needs in Stream Reaches**

122. Conservation flows are needed both below Goshen Dam and below the diversion dam. Past operation of Goshen Dam provided a continuous minimum flow below the dam of 2.5 cfs, or 0.96 csm. The proposed operating rule would reinstitute the 2.5 cfs conservation flow year around. If inflows decline below these flows, storage will be used to augment flows. During the summer period, the three feet of storage below the normal five-foot operating range will be dedicated to providing for the conservation flow guarantee. Only when the reservoir reaches the bottom of the dedicated storage will the augmentation cease and inflows will be matched to stabilize the reservoir until flows increase. Information on summer water levels and the effect of the guaranteed flow on drawdowns is limited to the year 1989. Data collected after license issuance can be used to evaluate how often the three feet of dedicated storage is depleted. If the depletion is frequent, the benefits of reducing the conservation flow should be assessed, as it would reduce or eliminate the need to reduce dam releases to the reservoir inflow rate and help sustain a fixed release of 2.5 cfs below the diversion dam.

123. Based on the stream hydrology and the results of the habitat study below the diversion dam, a conservation flow of 2.5 cfs, or 0.26 csm, is appropriate for the reach directly downstream of the diversion dam. This represents a substantial improvement over previous conditions, which dedicated no flows to this reach below the diversion dam. Normally this flow will be assured by the guaranteed flow release from Sugar Hill Reservoir. During low flow periods when storage has been depleted at Sugar Hill Reservoir and CVPS is releasing reservoir inflows only, the 2.5 cfs will still generally be available from the reservoir release and the flow contribution from the intervening seven square mile watershed, which includes a major tributary, Dutton Brook.
124. To protect smelt spawning below the tailrace, CVPS should continue operation under its special protocol and provide the Department with its related monitoring records (brook water levels, generation schedule, smelt observations (start and end of spawning and date when hatching is complete), Silver Lake water levels, water temperature data, descriptive characterization of the hydrologic conditions, and problems encountered).

#### **Ramping**

125. Ramping is necessary at both Goshen Dam and below the project tailrace due to the large artificial flow fluctuations.

#### **Screening**

126. The existing screen at the lower end of the powerhouse tailrace should be maintained to prevent fish from ending the tailrace during generation and subsequently becoming stranded when the plant shuts down.
127. The bar spacing on the trashrack at Sugar Hill Reservoir is sufficient to prevent significant losses of fish from the reservoir. However, the spacing at Silver Lake may allow some losses. The bar spacing should be reduced when the current trashracks are replaced.

#### **Recreation**

128. Vermont Water Quality Standards require the protection of existing water uses, including the use of water for recreation. Standards also requires the management of the waters of the State to protect, maintain, and improve water quality. (Standards Section 1-03 *Anti-Degradation Policy*)
129. Uses for which Class B waters are managed include water that exhibits good aesthetic value and swimming and recreation. (Standards Section 3-04(A) *Class B Waters: Management Objectives*)
130. Changes in reservoir management and provision of minimum flow releases will improve the sports fishery and reduce or eliminate the present impairment of angling use.
131. Boating conditions in Sugar Hill Reservoir will remain similar to current conditions. The delay of the winter drawdown will improve boating in the fall.

132. The applicant is will be maintaining existing recreation facilities and providing for future recreational use through its master recreation plan. The U.S. Forest Service will continue to manage the lands at the project for recreation, including primitive camping. The designated uses of swimming and recreation will be supported.

### **Erosion**

133. The applicant identified minor erosional areas associated with reservoir recreational use. Erosion, if severe, can impair recreational use and cause turbidity and the discharge of suspended solids, potentially violating the standards for those parameters (Standards Section 3-03(B)(1) *Turbidity*; Standards Section 3-01(B)(5) *Settleable solids, floating solids, oil, grease, scum, or total suspended solids*). This certification is being conditioned on remediation of any significant erosion problems when identified by the Department.

### **Debris**

134. The applicant does not provide information on the handling and disposal of trashrack debris and other project related debris. The depositing or emission of debris and other solids to state waters violates the state solid waste laws and Standards, Section 3-01(B)(5) *Settleable solids, floating solids, oil, grease, scum, or total suspended solids*. A plan is being required as a condition of this certification.

### Decision and Certification

Based on its review of the applicant’s proposal and the above findings, the Department concludes that there is reasonable assurance that operation and maintenance of the Silver Lake Hydroelectric 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, 33 U.S.C. §1251 et seq., as amended, and other appropriate requirements of state law:

- A. **Compliance with Conditions.** The applicant shall operate and maintain this project consistent with the findings and conditions of this certification, where those findings and conditions relate to protection of water quality and support of designated and existing uses under Vermont Water Quality Standards and other appropriate requirements of state law.
  
- B. **Reservoir and Flow Management.** The Project shall be operated in accordance with the minimum flow and reservoir level management schedules tabulated below. Minimum flows shall be released on a continuous basis and not interrupted.

**Table 1a. Sugar Hill Reservoir Late Spring/Summer/Fall/Early Winter Operating Rule from May 1 through December 31**

Reservoir Level (feet msl)		Flow management
Elevation	Relative	
>1765.5	Above 0	Release at a rate as necessary to bring the reservoir down to 1765.5; maintain no less than 2.5 cfs at all times
1760.5 – 1765.5	0 to -5.0	Release no less than 2.5 cfs
1757.5 – 1760.5 (storage dedicated to providing conservation flow)	-5.0 to -8.0	Fixed release of 2.5 cfs
1757.5 (maximum allowed drawdown)	-8.0	Match inflow
Note: Based on a review of drawdown and flow release data, the Department may lower the 2.5 cfs conservation flow for this period if doing so would improve the overall flow regime for aquatic biota below Goshen Dam and below the diversion dam by reducing or eliminating the frequency and duration of drawdowns to elevation 1757.5 feet msl and the corresponding lower outflows from the reservoir. Any consideration of a lower conservation flow shall be done in consultation with the Department of Fish and Wildlife, the U.S. Fish and Wildlife Service, the U.S. Forest Service, and CVPS.		

**Table 1b. Sugar Hill Reservoir Late Winter/Early Spring Operating Rule from January 1 through April 30**

Reservoir Level (feet)		Flow management
Elevation	Relative	
>1760.5	Above -5.0	Maintain at no less than 2.5 cfs
1747.5 – 1760.5 (1747.5 maximum allowed drawdown)	-18.0 to -5.0	Maintain at no less than 2.5 cfs and manage drawdown in a manner that sufficient storage is available to accomplish this without dropping below elevation 1747.5 feet
Note: Winter drawdown begins on or about January 1 from the target elevation of 1765.5 feet msl (assuming that elevation can be attained from fall inflows while maintaining the 2.5 cfs conservation flow downstream), or after headpond ice formation, if later.		

**Table 2. Sucker Brook Diversion Management Requirements**

Period	Bypass Minimum Flow Release (cfs)
Year around	2.5
Note: Minimum flows is the value listed, or instantaneous inflow, if less.	

**Table 3. Silver Lake Water Level Management**

Summer/fall operating range (June - November)	1245.5-1247.5 feet msl
Winter/spring maximum drawdown (December - May)	1239.5 feet msl
March 15 - May 31 water level mgmt.	rising or stable

- C. **Ramping plan at Goshen Dam.** The applicant shall develop a ramping plan for the adjustment of the valve system at Goshen Dam in order to control the rate of change of downstream flows and protect downstream aquatic organisms. The plan shall cover both up ramping and down ramping. The plan shall be developed in consultation with the Department, the Vermont Department of Fish and Wildlife, and the U.S. Fish and Wildlife Service and shall be subject to Department approval. The Department reserves the right of review and approval of any material changes made to the plan at any time.
- D. **Ramping plan at Station Tailrace.** The applicant shall develop a down-ramping plan to govern reductions in the station discharge in order to prevent stranding and mortality to

downstream aquatic organisms. The plan shall be developed in consultation with the Department, the Vermont Department of Fish and Wildlife, and the U.S. Fish and Wildlife Service and shall be subject to Department approval. The Department reserves the right of review and approval of any material changes made to the plan at any time.

- E. **Smelt Spawning Protection Operating Protocol.** The applicant shall revise its 1998 written operating protocol to include: 1) monitoring to commence on or before March 15; 2) reduced or no generation to start no later than official sunset and end no earlier than official sunrise; and 3) installation of water level and water temperature dataloggers in the principal smelt spawning area and continuous data collection starting March 15 and ending when hatch is complete. A comprehensive data report and narrative review shall be filed each year with the Department and the Department of Fish and Wildlife on or before August 1 following the season. The report shall include brook water levels, generation schedule (tailrace flows), smelt observations (start and end of spawning and date when hatching is complete), Silver Lake water levels, water temperature data, a descriptive characterization of the hydrologic conditions, and any problems encountered. The report shall include data graphs, and the data shall be provided as an electronic spreadsheet file. The Department, based on a request from the Department of Fish and Wildlife, may require changes to the protocol. The applicant may also request changes, which the Department will consider and act upon after consultation with the Department of Fish and Wildlife.
- F. **Plan for method to maintain conservation flows below Sucker Brook diversion dam.** The applicant shall develop a plan, including descriptions, hydraulic design calculations, an implementation schedule, and design drawings for the measures to be used to release the bypass flows at the Sucker Brook diversion dam. The plan shall be developed in consultation with the Department and the U.S. Fish and Wildlife Service and shall be subject to Department approval. Said approval may be conditional on field verification of the flow releases. The Department reserves the right of review and approval of any material changes made to the plan at any time.
- G. **Operating plan for Sugar Hill Reservoir.** The applicant shall develop an operating plan for Sugar Hill Reservoir, indicating how the dam shall be operated to conform to the goals of the operating rules contained in Condition B. The filing shall include performance expectations for the method and equipment to be used and a supporting calculation brief; this would include consideration of how frequently adjustments to the valve system must be made to meet the goals under different background conditions. The plan shall be developed in consultation with the Department and the U.S. Fish and Wildlife Service and shall be subject to Department approval. The Department reserves the right of review and approval of any material changes made to the plan at any time.
- H. **Monitoring Plan for Reservoir and Flow Management.** The applicant shall develop a plan for continuous monitoring of flow releases at the project, both below the dams and below the station tailrace, and reservoir levels and inflows. The valves at Goshen Dam shall be rated using field testing over the range of reservoir operating levels; the results and methodology used shall be included in the plan. The applicant shall maintain continuous records of flows and reservoir levels and provide such records on a regular basis as per specifications of the Department. The plan shall be developed in consultation with the Department and the U.S. Fish

and Wildlife Service and shall be subject to Department approval. The Department reserves the right of review and approval of any material changes made to the plan at any time.

- I. **Maintenance of Dissolved Oxygen Standards below Goshen Dam.** During the first full season of operation after license issuance, dissolved oxygen and temperature conditions shall be monitored weekly from July through September directly below the Goshen Dam outlet when a dissolved oxygen profile in the reservoir near the outlet discloses stratified conditions. The applicant shall collect dissolved oxygen and temperature data at Stations a, a-1, a-2, and a-3 (ref. 1992 water quality study) and a dissolved oxygen/temperature profile at a reservoir sampling station near the outlet. Records shall include the reservoir elevation and the downstream flow release at the time of sampling. If samples at Station a are found to be substandard, the proposed baffle system shall be installed and tested to determine if it will assure maintenance of standards. A quality assurance/quality control plan shall be filed with the Department prior to initiating such a study. By December 1 following the sampling period, the applicant shall file a report of its findings and data. The Department may require additional investigation or remedial measures based on the study results.
- J. **Fish Exclusion from Station Tailrace.** The applicant shall continue to maintain a device at the lower end of the station tailrace to prevent fish from ascending the tailrace and becoming stranded. Any proposal to modify the design shall be subject to Department approval.
- K. **Silver Lake Trashrack.** When the trashrack at Silver Lake is replaced, the new rack shall be designed with a 1.5-inch or narrower bar clear spacing.
- L. **Turbine Rating Curves.** 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 the license.
- M. **Debris Disposal Plan.** The applicant shall develop a plan for proper disposal of debris associated with project operation, including trashrack debris. The plan shall be developed in consultation with the Department. After Department approval of the plan, the plan shall be filed with FERC no later than 120 days from the date of license issuance. FERC shall either approve the plan or return the plan to the applicant for revision to incorporate FERC-recommended changes. After revision, the applicant shall submit the plan to the Department for approval of the changes. The plan shall then be filed with FERC for final approval. The Department reserves the right of review and approval of any material changes made to the plan at any time.
- N. **Maintenance and Repair Work.** Any proposals for project maintenance or repair work involving the brook, Sugar Hill Reservoir, or Silver Lake, including desilting, drawdowns to facilitate repair/maintenance work, and tailrace dredging, shall be filed with the Department for prior review and approval, if said work may adversely affect water quality or cause less-than-full support of designated and existing uses of State waters.
- O. **Public Access.** The applicant shall allow public access to the project area for utilization of public resources, subject to reasonable safety and liability limitations. Such access should be prominently and permanently posted so that its availability is made known to the public. Any proposed limitations of access to State waters to be imposed by the applicant shall first be subject to written approval by the Department. In cases where an immediate threat to public

safety exists, access may be restricted without prior approval; the applicant shall so notify the Department and shall file a request for approval, if the restriction is to be permanent or long term, within 14 days of the restriction of access.

- P. **Recreational Facilities.** Recreational facilities shall be constructed and maintained consistent with the proposed recreation plan. Prior to construction at individual facilities, final design plans and details shall be filed with the Department for review and comment. The applicant is advised to consult with the Department and the U.S. Forest Service in the development of plans. Where appropriate, filings shall include an erosion control plan that will be subject to Department approval prior to commencement of construction.
- Q. **Erosion Control.** Upon a written request by the Department, the applicant shall design and implement erosion control measures as necessary to address erosion occurring as a result of use of project recreational facilities. Any work that exceeds minor maintenance shall be subject to prior approval by the Department and FERC.
- R. **Restoration Fund.** The applicant shall contribute \$250,000 to a fund (Fund) to be known as the Lake Champlain and Tributaries Restoration Fund, which shall be created by the State of Vermont and administered by an independent non-profit community foundation (the Fund Trustee) chosen by the applicant and the Vermont Agency of Natural Resources. The Fund, which shall include the contribution and associated earnings as well as outside monies contributed by others and associated earnings, is to only be used for eligible projects, the purpose of which are to:
- a) Protect, restore and enhance the ecosystem integrity and ecological connectivity of the community of aquatic life in the Lake Champlain ecosystem and its tributaries.
  - b) Protect, restore and enhance lake sturgeon and their habitats in the Lake Champlain basin and its tributaries.
  - c) Restore a self-sustaining land-locked Atlantic salmon population in Lake Champlain through habitat restoration and fish monitoring programs.
  - d) Protect the riparian zones along Lake Champlain tributaries for the benefit of the ecological and recreational resources, through the purchase of land or easements.

The Fund shall not be used for projects located outside of the Lake Champlain basin, or on New York tributaries of Lake Champlain. The applicant shall make a nonrefundable contribution in the amount of \$250,000 within 30 days of the completion of the following two events: (a) issuance of this certification or if this certification is the subject of an appeal, upon the completion of the appeal process provided that the certification contains conditions that are materially similar to this original certification and (b) issuance of a FERC license that contains conditions of this certification, or a certification issued on appeal with materially similar conditions, or if the FERC license is the subject of an appeal, upon the completion of the appeal process provided that the FERC license contains conditions that are materially similar to the final certification.

The Fund Trustee shall make investment decisions, and shall disburse monies from the Fund from time to time, in whole or in part, based upon recommendations made by representatives of the CVPS, the ANR, the U.S. Fish and Wildlife Service, the Vermont Natural Resources Council and Trout Unlimited who shall serve as the Fund Advisors. The Fund Advisors shall make decisions based upon vote of a majority of the Fund Advisors (not simply a quorum thereof). Any party may permanently withdraw as a Fund Advisor upon written notice to the other Fund Advisors. The Fund Advisors may solicit proposals from nonprofit organizations, educational institutions, units of government, and officially appointed commissions, boards or other entities within the state of Vermont for projects which address any of the above purposes. The Fund Advisors may target a specified portion of the funds to specific protection, mitigation, or enhancement objectives or to specific areas which are encompassed within the purposes and geographic scope defined above.

The Fund Trustee shall only disburse monies from the Fund when matching funds are contributed to a project by Parties or entities other than CVPS, at a ratio of no less than \$1 of outside monies for every \$2 drawn from CVPS's contribution and Fund earnings thereon.

- S. **Compliance Inspection by Department.** The applicant shall allow the Department to inspect the project area at any time to monitor compliance with certification conditions.
- T. **Approval of Project Changes.** 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 where appropriate and authorized by law and only as related to the change proposed.
- U. **Reopening of License.** The Department may request, at any time, that FERC reopen the license to consider modifications to the license as necessary to assure compliance with Vermont Water Quality Standards.
- V. **Continuing Jurisdiction.** The Department reserves the right to add and alter the terms and conditions of this certification, when authorized by law and as appropriate to carry out its responsibilities during the life of the project with respect to water quality.

Dated at Waterbury, Vermont this  
5<sup>th</sup> day of December, 2008

Laura Q. Pelosi, Commissioner  
Department of Environmental Conservation



By

Larry R. Fitch, Director  
Facilities Engineering Division

**From:** [Davis, Eric](#)  
**To:** [Kayla Easler](#); [Katie Sellers](#)  
**Cc:** [McHugh, Peter](#); [Popp, Bob](#); [Marshall, Everett](#); [Gobeille, John](#); [Mackenzie, Chet](#)  
**Subject:** RE: Silver Lake FERC No. 11478  
**Date:** Friday, July 14, 2017 1:41:50 PM

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Good morning Kayla,

The Agency has reviewed our records for the Silver Lake Project and provides the following information regarding water quality and rare, threatened, and endangered species requested by Kleinschmidt to develop a complete LIHI application.

#### Water Quality

*The 2016 State of Vermont 303(d) List of Impaired Waters has not identified the waters of the Project, nor waters directly downstream, including Dunmore Lake and Leicester River, as "impaired".*

*Could you please confirm, to your best abilities, that this is still true for the project and that the continued operations of the project do not contribute to water quality limitations?*

The Agency has reviewed its 2016 list of Priority Surface Waters. Lake Dunmore and the Leicester River is listed on Part E, waters altered by aquatic invasive species, due to locally abundant Eurasian Watermilfoil growth. Additionally the six-mile stretch of the Leicester River downstream of Lake Dunmore is listed on Part F, waters altered by flow regulation, due to artificial flow regulation and possible downstream fish passage problems associated with the Salisbury hydroelectric project.

I can confirm that the current operations of the Silver Lake project are not a contributing cause to the listing of portions of the Leicester River as priority waters for management action.

#### Rare, Threatened and Endangered Species

*Could you a) review the below species list to make sure it is accurate and/or suggest updates as appropriate; and b) review this list to confirm that the Project continues to not negatively affect any of the currently listed species that may occur within the Project area?*

##### *Endangered Species*

*Indiana bat*

*Northern long-eared bat*

*Bald eagle*

##### *Species of Greatest Conservation Need*

*American bittern*

*Peregrine falcon*

*Short eared owl*

##### *Species of Concern*

*Black-crowned night-heron*  
*Pied-billed grebe*

Our Natural Heritage Program and Fish and district staff have reviewed the provided list, as well as other recent records for RTE species in the project area. We confirm the accuracy of your list with a few minor exceptions/additions (see table below). Specifically, we note that two state-endangered or -threatened bats (small-footed, tri-color; see table below) and three rare vascular plants, all of which have some potential for being adversely affected by hydropower infrastructure or operations, are present within the Silver Lake hydroelectric project’s footprint. Additionally, although not classified as ‘rare, threatened, or endangered’, we note that rainbow smelt (*Osmerus mordax*) are and will continue to be an important species within the context of hydropower operations at the Silver Lake Project.

Beyond reviewing your list for accuracy, the biologists considering the Silver Lake project suggest that the project should minimally affect these species subject to (a) operations in accordance with the conditions specified in its 401 Water Quality Certification, including the continued implementation of smelt spawning flow agreements, (b) continued adherence to tree cutting and maintenance practices affording maximal bat protection (Article 405), and (c) minor modifications to powerline right-of-way maintenance to increase the viability of blue-eyed grass.

<b>Scientific Name</b>	<b>Common Name</b>	<b>Rank Rank</b>	<b>Status Status</b>	<b>Notes / comments</b>
<b>Vascular Plant</b>				
<i>Isoetes lacustris</i>	Lake Quillwort	S1		<i>Very rare but historically observed in Silver Lake</i>
<i>Desmodium perplexum</i>	Perplexing tick-trefoil	S2		<i>Observed in powerline right-of-way; no concerns unless a different management regime is pursued</i>
<i>Sisyrinchium angustifolium</i>	Blue-eyed Grass	S2S3		<i>Present in powerline right-of-way; late-season (Sept 1+) mowing recommended to allow flowering/fruitletting; also found along Sugar Hill Reservoir’s shoreline and may be negatively affected by regime change.</i>
<b>Vertebrate Animal</b>				
<i>Perimyotis subflavus</i>	Tri-colored Bat	S1	E	<i>Documented in vicinity of penstock</i>
<i>Myotis leibii</i>	Eastern Small-footed Bat	S1	T	<i>Documented in vicinity of penstock</i>

Formal Application Review

The Agency hopes the input above assists you in developing a complete LIHI application. As you may know the Agency’s review of LIHI applications has evolved, and the Agency has now developed a practice of requesting one year of project operations records to review for compliance with certification conditions in order to provide meaningful input into the LIHI review process. While we could request these when the application is noticed, we know it takes time and effort to pull this

data together and thought it may be beneficial to the review process to flag this as an information need as early as possible.

Please let me know if you have additional questions,  
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.](#)

---

**From:** Kayla Easler [mailto:Kayla.Easler@KleinschmidtGroup.com]  
**Sent:** Wednesday, June 14, 2017 11:21 AM  
**To:** Davis, Eric <Eric.Davis@vermont.gov>  
**Cc:** Katie Sellers <Katie.Sellers@KleinschmidtGroup.com>  
**Subject:** Silver Lake FERC No. 11478

Good morning, Eric,

Here is another LIHI re-certification application for Green Mountain Power: Silver Lake Hydroelectric Project (FERC No. 11478) located on Sucker Brook in the towns of Goshen, Leicester, and Salisbury, Addison County, Vermont.

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

The 2016 State of Vermont 303(d) List of Impaired Waters has not identified the waters of the Project, nor waters directly downstream, including Dunmore Lake and Leicester River, as "impaired".

Could you please confirm, to your best abilities, that this is still true for the project and that the continued operations of the project do not contribute to water quality limitations?

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

Best,

Kayla A. Easler  
Regulatory Coordinator

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

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and the environment*

**From:** Katie Sellers  
**To:** ["Davis, Eric"](#)  
**Cc:** ["Greenan, John"](#); [Andy Qua](#); ["Beth Eliason"](#); [Bent, Jacob](#)  
**Subject:** Silver Lake - Operations Data Submission for LIHI Application  
**Date:** Tuesday, October 30, 2018 7:14:00 PM  
**Attachments:** [SL\\_efficiency\\_vs\\_gate\\_position.pdf](#)

---

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

- 2016-2017 Silver Lake Operation Data\_FINAL.xlsx (27.4 MB)

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

Hi Eric,

Kleinschmidt, on behalf of GMP, herein provides one-year (2016-2017) of Silver Lake Hydroelectric Project (FERC No. 11478) operations data via ShareFile for review. This operations dataset is being supplied to the Vermont Department of Environmental Conservation (VDEC) for verification of Project compliance with Water Quality Certificate conditions, as requested for Low Impact Hydropower Institute application review.

The attached 2016-2017 data depicts project generation, headpond levels, and river flow data to display operations occurring at the Silver Lake Project. As depicted in the spreadsheet cover page, flow data was prorated from USGS gage 01142500 – Ayers Brook at Randolph, VT. Ayers Brook data has and continues to be used to estimate flow in the Silver Lake watershed. In addition, please find a Silver Lake Station efficiency curve attached.

Compliant operations are represented well across the dataset. Please note that on 1/18/2017 Silver Lake penstock maintenance was conducted. During that time, the Silver Lake pond was maintained at 1246.8 feet. Because the Silver Lake transducer is located downstream of the headgate which was shut to dewater the penstock for maintenance, the transducer was not recording the accurate pond level during the work sequence. Also note that inaccurate or bad data is shown on: 11/6/16; 3/21/17; 4/12/17; and 4/27/17.

The attached operational data is considered provisional by GMP, but has been vetted with operations staff. Should you have any questions upon review, please do not hesitate to contact John or myself. GMP remains available to provide background information or further explanation as needed.

Thank you!  
Katie

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

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

**Kleinschmidt**

Office: 207-416-1218

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

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**APPENDIX D**

**SUCKER BROOK FISH DISTRIBUTION DATA**

**From:** [Mackenzie, Chet](#)  
**To:** [Katie Sellers](#); [McHugh, Peter](#)  
**Cc:** [Davis, Eric](#); [Good, Shawn](#)  
**Subject:** RE: Silver Lake FERC No. 11478  
**Date:** Monday, May 07, 2018 10:05:20 AM

---

Sorry about that. 326 = Rainbow trout; 329 = Brook trout.

**My e-mail has been changed to:** [chet.mackenzie@vermont.gov](mailto:chet.mackenzie@vermont.gov).

Chet MacKenzie  
Fisheries Program Manager  
Vermont Fish & Wildlife Dept.  
271 North Main St., Suite 215  
Rutland, VT 05701-2423  
[chet.mackenzie@vermont.gov](mailto:chet.mackenzie@vermont.gov)  
802-786-3864

---

**From:** Katie Sellers <Katie.Sellers@KleinschmidtGroup.com>  
**Sent:** Monday, May 07, 2018 10:00 AM  
**To:** Mackenzie, Chet <Chet.Mackenzie@vermont.gov>; McHugh, Peter <Peter.McHugh@vermont.gov>  
**Cc:** Davis, Eric <Eric.Davis@vermont.gov>; Good, Shawn <Shawn.Good@vermont.gov>  
**Subject:** RE: Silver Lake FERC No. 11478

Hi Chet, This is very helpful, thank you. I will reference Vermont Fish and Wildlife when referring to this data.

Quick question - which species is Code 326?

Best!  
Katie

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

***Kleinschmidt***

**Office: 207-416-1218**

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

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---

**From:** Mackenzie, Chet [<mailto:Chet.Mackenzie@vermont.gov>]  
**Sent:** Monday, May 07, 2018 9:43 AM  
**To:** McHugh, Peter <[Peter.McHugh@vermont.gov](mailto:Peter.McHugh@vermont.gov)>; Katie Sellers <[Katie.Sellers@KleinschmidtGroup.com](mailto:Katie.Sellers@KleinschmidtGroup.com)>  
**Cc:** Davis, Eric <[Eric.Davis@vermont.gov](mailto:Eric.Davis@vermont.gov)>; Good, Shawn <[Shawn.Good@vermont.gov](mailto:Shawn.Good@vermont.gov)>

**Subject:** RE: Silver Lake FERC No. 11478

Good morning:

Dave Callum sampled 3 stations on Sucker Brook in 1969. He did a single electrofishing pass at each station. Brook, Brown and rainbow trout were captured at that time. An Excel file with the raw data is attached. Code 329 = Brook trout; 329 = Rainbow; 328 = Brown trout.

The second file is the summary data normally reported in our federal aid reports.

The USFS may have sampled Sucker Brook more recently. You can check with Dan McKinley or Steve Roy.

Chet

**My e-mail has been changed to:** [chet.mackenzie@vermont.gov](mailto:chet.mackenzie@vermont.gov).

Chet MacKenzie  
Fisheries Program Manager  
Vermont Fish & Wildlife Dept.  
271 North Main St., Suite 215  
Rutland, VT 05701-2423  
[chet.mackenzie@vermont.gov](mailto:chet.mackenzie@vermont.gov)  
802-786-3864

---

**From:** McHugh, Peter  
**Sent:** Monday, May 07, 2018 8:07 AM  
**To:** Mackenzie, Chet <[Chet.Mackenzie@vermont.gov](mailto:Chet.Mackenzie@vermont.gov)>; Good, Shawn <[Shawn.Good@vermont.gov](mailto:Shawn.Good@vermont.gov)>  
**Cc:** Davis, Eric <[Eric.Davis@vermont.gov](mailto:Eric.Davis@vermont.gov)>  
**Subject:** FW: Silver Lake FERC No. 11478

Have you any data/reports on Sucker Brook that Katie can access? I checked the DJ reports tech docs and didn't see anything that jumped out (other than a brief narrative report from Ken Cox), so I thought I'd go directly to the sources...

---

**From:** Katie Sellers <[Katie.Sellers@KleinschmidtGroup.com](mailto:Katie.Sellers@KleinschmidtGroup.com)>  
**Sent:** Friday, May 4, 2018 3:38 PM  
**To:** Davis, Eric <[Eric.Davis@vermont.gov](mailto:Eric.Davis@vermont.gov)>; Kayla Easler <[Kayla.Easler@KleinschmidtGroup.com](mailto:Kayla.Easler@KleinschmidtGroup.com)>  
**Cc:** McHugh, Peter <[Peter.McHugh@vermont.gov](mailto:Peter.McHugh@vermont.gov)>; Popp, Bob <[Bob.Popp@vermont.gov](mailto:Bob.Popp@vermont.gov)>; Marshall, Everett <[Everett.Marshall@vermont.gov](mailto:Everett.Marshall@vermont.gov)>; Gobeille, John <[John.Gobeille@vermont.gov](mailto:John.Gobeille@vermont.gov)>; Mackenzie, Chet <[Chet.Mackenzie@vermont.gov](mailto:Chet.Mackenzie@vermont.gov)>  
**Subject:** RE: Silver Lake FERC No. 11478

Hi Eric – We are also in the midst of finalizing the Silver Lake LIHI Application. Would the ANR happen to have any reports or white papers that describe the Sucker Brook fish population/distribution data? LIHI is looking to see more data on Sucker Brook fisheries and Google is only getting me so far.

Any insights would be much appreciated.

Thank you!

Katie

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

**Regulatory Coordinator**

***Kleinschmidt***

**Office: 207-416-1218**

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---

**From:** Davis, Eric [<mailto:Eric.Davis@vermont.gov>]

**Sent:** Friday, July 14, 2017 1:42 PM

**To:** Kayla Easler <[Kayla.Easler@KleinschmidtGroup.com](mailto:Kayla.Easler@KleinschmidtGroup.com)>; Katie Sellers <[Katie.Sellers@KleinschmidtGroup.com](mailto:Katie.Sellers@KleinschmidtGroup.com)>

**Cc:** McHugh, Peter <[Peter.McHugh@vermont.gov](mailto:Peter.McHugh@vermont.gov)>; Popp, Bob <[Bob.Popp@vermont.gov](mailto:Bob.Popp@vermont.gov)>; Marshall, Everett <[Everett.Marshall@vermont.gov](mailto:Everett.Marshall@vermont.gov)>; Gobeille, John <[John.Gobeille@vermont.gov](mailto:John.Gobeille@vermont.gov)>; Mackenzie, Chet <[Chet.Mackenzie@vermont.gov](mailto:Chet.Mackenzie@vermont.gov)>

**Subject:** RE: Silver Lake FERC No. 11478

Good morning Kayla,

The Agency has reviewed our records for the Silver Lake Project and provides the following information regarding water quality and rare, threatened, and endangered species requested by Kleinschmidt to develop a complete LIHI application.

#### Water Quality

*The 2016 State of Vermont 303(d) List of Impaired Waters has not identified the waters of the Project, nor waters directly downstream, including Dunmore Lake and Leicester River, as "impaired".*

*Could you please confirm, to your best abilities, that this is still true for the project and that the continued operations of the project do not contribute to water quality limitations?*

The Agency has reviewed its 2016 list of Priority Surface Waters. Lake Dunmore and the Leicester River is listed on Part E, waters altered by aquatic invasive species, due to locally abundant Eurasian Watermilfoil growth. Additionally the six-mile stretch of the Leicester River downstream of Lake Dunmore is listed on Part F, waters altered by flow regulation, due to artificial flow regulation and possible downstream fish passage problems associated with the Salisbury hydroelectric project.

I can confirm that the current operations of the Silver Lake project are not a contributing cause to the listing of portions of the Leicester River as priority waters for management action.

#### Rare, Threatened and Endangered Species

Could you a) review the below species list to make sure it is accurate and/or suggest updates as appropriate; and b) review this list to confirm that the Project continues to not negatively affect any of the currently listed species that may occur within the Project area?

*Endangered Species*

*Indiana bat*

*Northern long-eared bat*

*Bald eagle*

*Species of Greatest Conservation Need*

*American bittern*

*Peregrine falcon*

*Short eared owl*

*Species of Concern*

*Black-crowned night-heron*

*Pied-billed grebe*

Our Natural Heritage Program and Fish and district staff have reviewed the provided list, as well as other recent records for RTE species in the project area. We confirm the accuracy of your list with a few minor exceptions/additions (see table below). Specifically, we note that two state-endangered or -threatened bats (small-footed, tri-color; see table below) and three rare vascular plants, all of which have some potential for being adversely affected by hydropower infrastructure or operations, are present within the Silver Lake hydroelectric project’s footprint. Additionally, although not classified as ‘rare, threatened, or endangered’, we note that rainbow smelt (*Osmerus mordax*) are and will continue to be an important species within the context of hydropower operations at the Silver Lake Project.

Beyond reviewing your list for accuracy, the biologists considering the Silver Lake project suggest that the project should minimally affect these species subject to (a) operations in accordance with the conditions specified in its 401 Water Quality Certification, including the continued implementation of smelt spawning flow agreements, (b) continued adherence to tree cutting and maintenance practices affording maximal bat protection (Article 405), and (c) minor modifications to powerline right-of-way maintenance to increase the viability of blue-eyed grass.

<b>Scientific Name</b>	<b>Common Name</b>	<b>Rank Rank</b>	<b>Status Status</b>	<b>Notes / comments</b>
<b>Vascular Plant</b>				
<i>Isoetes lacustris</i>	Lake Quillwort	S1		<i>Very rare but historically observed in Silver Lake</i>
<i>Desmodium perplexum</i>	Perplexing tick-trefoil	S2		<i>Observed in powerline right-of-way; no concerns unless a different management regime is pursued</i>
<i>Sisyrinchium</i>	Blue-eyed Grass	S2S3		<i>Present in powerline right-of-way; late-season</i>

<i>angustifolium</i>				(Sept 1+) mowing recommended to allow flowering/fruiting; also found along Sugar Hill Reservoir's shoreline and may be negatively affected by regime change.
<b>Vertebrate Animal</b>				
<i>Perimyotis subflavus</i>	Tri-colored Bat	S1	E	Documented in vicinity of penstock
<i>Myotis leibii</i>	Eastern Small-footed Bat	S1	T	Documented in vicinity of penstock

Formal Application Review

The Agency hopes the input above assists you in developing a complete LIHI application. As you may know the Agency's review of LIHI applications has evolved, and the Agency has now developed a practice of requesting one year of project operations records to review for compliance with certification conditions in order to provide meaningful input into the LIHI review process. While we could request these when the application is noticed, we know it takes time and effort to pull this data together and thought it may be beneficial to the review process to flag this as an information need as early as possible.

Please let me know if you have additional questions,  
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)



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**From:** Kayla Easler [<mailto:Kayla.Easler@KleinschmidtGroup.com>]  
**Sent:** Wednesday, June 14, 2017 11:21 AM  
**To:** Davis, Eric <[Eric.Davis@vermont.gov](mailto:Eric.Davis@vermont.gov)>  
**Cc:** Katie Sellers <[Katie.Sellers@KleinschmidtGroup.com](mailto:Katie.Sellers@KleinschmidtGroup.com)>  
**Subject:** Silver Lake FERC No. 11478

Good morning, Eric,

Here is another LIHI re-certification application for Green Mountain Power: Silver Lake Hydroelectric Project (FERC No. 11478) located on Sucker Brook in the towns of Goshen,

Leicester, and Salisbury, Addison County, Vermont.

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

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

Best,

Kayla A. Easler  
Regulatory Coordinator

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

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RIVER	YEAR	MONTH/DAY	STATION	ELEVATION	RUN	SPECIES	LENGTH (MM)	WEIGHT	LENGTH (INCHES)
57	1969			1540	1	326	89	-9	3.5
57	1969			1540	1	326	84	-9	3.3
57	1969			1540	1	326	102	-9	4
57	1969			1540	1	326	86	-9	3.4
57	1969			1540	1	326	86	-9	3.4
57	1969			1540	1	326	86	-9	3.4
57	1969			1540	1	326	94	-9	3.7
57	1969			1540	1	326	94	-9	3.7
57	1969			1540	1	326	91	-9	3.6
57	1969			1540	1	326	74	-9	2.9
57	1969			1540	1	326	81	-9	3.2
57	1969			1540	1	326	94	-9	3.7
57	1969			1540	1	326	71	-9	2.8
57	1969			1540	1	326	79	-9	3.1
57	1969			1540	1	326	76	-9	3
57	1969			1540	1	326	89	-9	3.5
57	1969			1540	1	326	74	-9	2.9
57	1969			1540	1	326	79	-9	3.1
57	1969			1540	1	326	89	-9	3.5
57	1969			1540	1	326	99	-9	3.9
57	1969			1540	1	326	76	-9	3
57	1969			1540	1	326	76	-9	3
57	1969			1540	1	326	86	-9	3.4
57	1969			1540	1	326	91	-9	3.6
57	1969			1540	1	326	86	-9	3.4
57	1969			1540	1	326	79	-9	3.1
57	1969			1540	1	326	97	-9	3.8
57	1969			1540	1	326	99	-9	3.9
57	1969			1540	1	326	74	-9	2.9
57	1969			1540	1	326	91	-9	3.6
57	1969			1540	1	326	89	-9	3.5
57	1969			1540	1	326	79	-9	3.1
57	1969			1540	1	326	89	-9	3.5
57	1969			1540	1	326	94	-9	3.7
57	1969			1540	1	328	191	-9	7.5
57	1969			1540	1	328	193	-9	7.6
57	1969			1540	1	326	84	-9	3.3
57	1969			1540	1	326	76	-9	3
57	1969			1540	1	326	79	-9	3.1
57	1969			1540	1	326	86	-9	3.4
57	1969			1540	1	329	135	-9	5.3
57	1969			1540	1	329	46	-9	1.8
57	1969			1540	1	329	48	-9	1.9
57	1969			1540	1	329	97	-9	3.8
57	1969			1540	1	329	48	-9	1.9
57	1969			1540	1	329	43	-9	1.7
57	1969			1540	1	329	104	-9	4.1
57	1969			1540	1	329	48	-9	1.9
57	1969			1540	1	329	46	-9	1.8
57	1969		801	640	1	329	71	-9	2.8
57	1969		801	640	1	329	71	-9	2.8
57	1969		801	640	1	329	147	-9	5.8
57	1969		801	640	1	329	175	-9	6.9
57	1969		801	850	1	329	86	-9	3.4
57	1969		801	850	1	329	71	-9	2.8
57	1969		801	850	1	329	91	-9	3.6
57	1969		801	850	1	329	76	-9	3
57	1969		801	850	1	329	66	-9	2.6
57	1969		801	850	1	329	51	-9	2
57	1969		801	850	1	329	71	-9	2.8
57	1969		801	850	1	329	64	-9	2.5
57	1969		801	850	1	329	66	-9	2.6
57	1969		801	850	1	329	81	-9	3.2
57	1969		801	850	1	329	76	-9	3
57	1969		801	850	1	329	64	-9	2.5

Code 326 = Rainbow Trout

Code 328 = Brown Trout

Code 329 = Brook Trout

Stream	Date	Station	Elevation	Length (ft)	Ave Width (ft)	Length (M)	Width (m)	Species	Class	Mean Wt (g)	Popest	PopSE	N	PopVar	Upper Cl	Lower Cl	Pop/km	Pop/mi	Pop/acre	kg/hectare	lbs/acre	lbs/mi	comments	Station Identifier	Latitude	Longitude
SUCKER BROOK	821026		640	175		53		BNT	1		1	1			0	0	19	31	0	0	0	0	ONE RUN	SUCKER BROOK0640	43.90421	-73.06406
SUCKER BROOK	821026		640	175		53		BNT	3		9	9			0	0	170	274	0	0	0	0	ONE RUN	SUCKER BROOK0640	43.90421	-73.06406
SUCKER BROOK	821026		640	175		53		BKT	1		4	4			0	0	75	121	0	0	0	0	ONE RUN	SUCKER BROOK0640	43.90421	-73.06406
SUCKER BROOK	821026		640	175		53		BKT	3		1	1			0	0	19	31	0	0	0	0	ONE RUN	SUCKER BROOK0640	43.90421	-73.06406
SUCKER BROOK	821026		640	175		53		BKT	4		1	1			0	0	19	31	0	0	0	0	ONE RUN	SUCKER BROOK0640	43.90421	-73.06406
SUCKER BROOK	690801		640	200		61		BKT	1		2	2			0	0	33	53	0	0	0	0	ONE RUN	SUCKER BROOK0640	43.90421	-73.06406
SUCKER BROOK	690801		640	200		61		BKT	2		1	1			0	0	16	26	0	0	0	0	ONE RUN	SUCKER BROOK0640	43.90421	-73.06406
SUCKER BROOK	690801		640	200		61		BKT	3		1	1			0	0	16	26	0	0	0	0	ONE RUN	SUCKER BROOK0640	43.90421	-73.06406
SUCKER BROOK	690801		850	100		31		BKT	1		12	12			0	0	387	623	0	0	0	0	ONE RUN	SUCKER BROOK0850	43.9073	-73.06016
SUCKER BROOK	690801		1540	250		76		RBT	1		38	38			0	0	500	805	0	0	0	0	ONE RUN	SUCKER BROOK1540	43.91473	-73.01865
SUCKER BROOK	690801		1540	250		76		BNT	3		2	2			0	0	26	42	0	0	0	0	ONE RUN	SUCKER BROOK1540	43.91473	-73.01865
SUCKER BROOK	690801		1540	250		76		BKT	1		6	6			0	0	79	127	0	0	0	0	ONE RUN	SUCKER BROOK1540	43.91473	-73.01865
SUCKER BROOK	690801		1540	250		76		BKT	2		3	3			0	0	39	63	0	0	0	0	ONE RUN	SUCKER BROOK1540	43.91473	-73.01865

**From:** [Staats, Sue -FS](#)  
**To:** [Katie Sellers](#)  
**Subject:** RE: Fish data for Sucker Bk from GMNF  
**Date:** Thursday, May 17, 2018 9:05:52 AM  
**Attachments:** [image001.png](#)  
[image002.png](#)  
[image003.png](#)  
[image004.png](#)  
[GMNF\\_SuckerBk\\_PopulationEstimates\\_1993\\_to\\_2006.xlsx](#)  
[GMNF\\_SuckerBk\\_Monitoring\\_Sites.pdf](#)

---

Hi Katie,

Attached is a spreadsheet with the population estimate data and a list of non-salmonids for our two sites on Sucker Brook. I also attached a map with both sites labeled on it. Please let me know if you have any questions or need further information; I am in the field a fair amount, but will get back to you asap!

Sue.



**Sue Staats**  
**Fish and Wildlife Technician**

**Forest Service**  
**Green Mountain and Finger Lakes National Forests, Rochester Ranger District**

p: 802-767-4261 x5515

f: 802-767-4777

[sstaats@fs.fed.us](mailto:sstaats@fs.fed.us)

99 Ranger Road  
Rochester, VT 05767

[www.fs.fed.us](http://www.fs.fed.us)



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**From:** Katie Sellers [mailto:[Katie.Sellers@KleinschmidtGroup.com](mailto:Katie.Sellers@KleinschmidtGroup.com)]

**Sent:** Thursday, May 10, 2018 1:45 PM

**To:** Staats, Sue -FS <[sstaats@fs.fed.us](mailto:sstaats@fs.fed.us)>

**Subject:** RE: Fish data for Sucker Bk from GMNF

Hi Sue – Thanks for touching base.

I think the population estimate data and the species list of non-salmonids should work perfectly. Site maps/locations would definitely be helpful if that is easy to pass along too.

Thanks again

Katie

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

***Kleinschmidt***

**Office: 207-416-1218**

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

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**From:** Staats, Sue -FS [<mailto:sstaats@fs.fed.us>]  
**Sent:** Thursday, May 10, 2018 10:24 AM  
**To:** Katie Sellers <[Katie.Sellers@KleinschmidtGroup.com](mailto:Katie.Sellers@KleinschmidtGroup.com)>  
**Subject:** Fish data for Sucker Bk from GMNF

Hi Katie,

I work with Steve Roy and Dan McKinley, and they passed along to me your request for fish distribution data for Sucker Brook. Over the years, we have sampled fish in Sucker Bk in two locations, and I am happy to share that data with you. Our data are in different formats: we have raw data as individual trout captured with lengths and weights, and we have those same data as population estimates by size-class by species. We also have a species list of non-salmonids (no numbers). Do either of those formats fit what you are looking for? All raw data are in Excel. Also, do you need site maps/locations?

Thanks,  
Sue.



**Sue Staats**  
**Fish and Wildlife Technician**

**Forest Service**  
**Green Mountain and Finger Lakes National Forests, Rochester Ranger District**

**p: 802-767-4261 x5515**

**f: 802-767-4777**

[sstaats@fs.fed.us](mailto:sstaats@fs.fed.us)

99 Ranger Road  
Rochester, VT 05767

[www.fs.fed.us](http://www.fs.fed.us)



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Green Mountain National Forest - Sucker Brook Trout Population Data, 1993 -2006

Site name	Coordinates (NAD 83)	Site Length	Species	Age - and Size-class	Population Estimate and Confidence Interval <sup>a</sup> by Year											
					1993	1994	1996	1997	1998	1999	2002	2006				
Monitoring site 1	43.91624 -73.01683	250 ft.	Brook trout	0+	58 (52-68)	18 (18-20)	16 (16-17)	41 (41-42)	28 (28-30)	86 (62-121)	50 (43-62)	40 (30-62)				
				<151.9 mm length	12 (12-14)	16 (16-17)	21 (21-22)	18 (18-18)	12 (12-13)	17 (17-19)	20 (16-32)	11 (11-11)				
				>152.0 mm length	2 (cbc)	4 (4-5)	3 (cbc)	1 (cbc)	2 (cbc)	4 (4-4)	1 (cbc)	3 (3-3)				
				Total (all classes combined)	72 (66-81)	38 (38-40)	40 (40-42)	59 (59-60)	42 (42-44)	103 (83-127)	73 (60-92)	50 (44-61)				
				Brown trout	0+	2 (2-8)	9 (9-12)	0	2 (2-7)	3 (cbc)	0	7 (7-9)	1 (cbc)			
				<151.9 mm length	1 (1-2)	2 (cbc)	0	1 (1-4)	0	3 (3-4)	0	0				
				>152.0 mm length	2 (cbc)	1 (cbc)	2 (cbc)	0	0	1 (cbc)	3 (3-4)	0				
				Total (all classes combined)	5 (5-8)	12 (12-14)	2 (cbc)	4 (3-18)	4 (cbc)	4 (4-4)	10 (10-12)	1 (cbc)				
				Monitoring site 2	43.90259 -72.98591	200 ft.	Brook trout	0+			24 (24-26)	20 (20-21)	38 (36-43)	84 (82-88)		
								<151.9 mm length			39 (37-44)	21 (20-25)	18 (15-28)	33 (32-37)		
>152.0 mm length			0					1 (cbc)	2 (2-3)	2 (cbc)						
Total (all classes combined)			65 (61-72)					42 (41-46)	60 (53-71)	120 (116-126)						
Brown trout	0+							0	0	0	0					
<151.9 mm length								0	0	1 (1-2)	0					
>152.0 mm length								0	0	0	0					
Total (all classes combined)								0	0	1 (1-2)	0					

a = confidence interval in parenthesis, cbc indicates that confidence interval cannot be calculated.

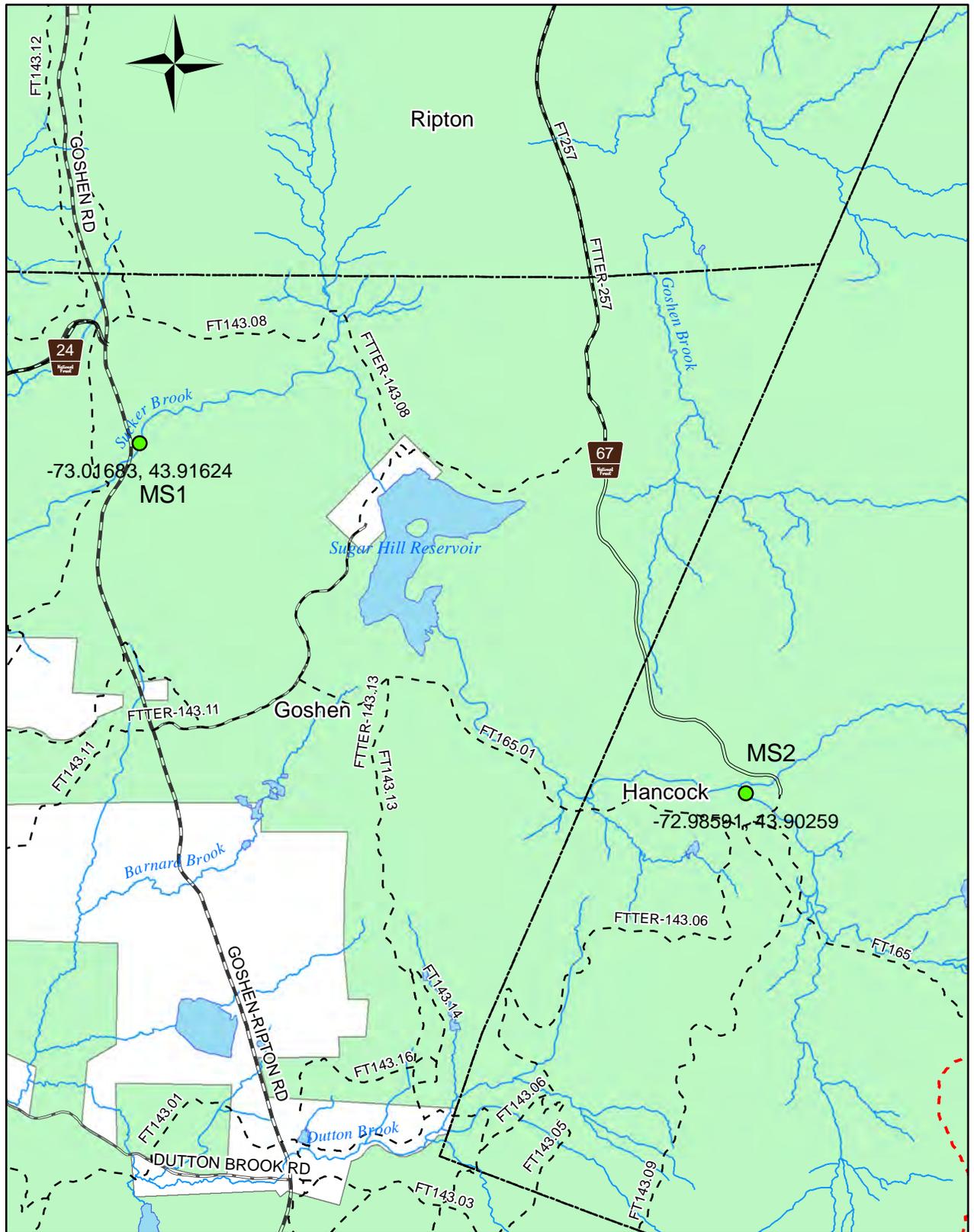
Green Mountain National Forest - Sucker Brook, 1993 -2006

Non-salmonid species captured

---

Slimy sculpin	<i>Cottus cognatus</i>
Longnose dace	<i>Rhinichthys cataractae</i>
Bluegill	<i>Lepomis macrochirus</i>
Blacknose dace	<i>Rhinichthys atratulus</i>
Brown bullhead	<i>Ameiurus nebulosus</i>
Pumpkinseed	<i>Lepomis gibbosus</i>

# GMNF Sucker Brook Fish Population Monitoring Sites



**Legend**

-  Town Boundary
-  Green Mountain and Finger Lakes National Forests

**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 03301-5094  
Phone: (603) 223-2541 Fax: (603) 223-0104  
<http://www.fws.gov/newengland>

In Reply Refer To:

April 10, 2017

Consultation Code: 05E1NE00-2017-SLI-1280

Event Code: 05E1NE00-2017-E-02485

Project Name: Silver Lake Hydroelectric LIHI Certification Project

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

To Whom It May Concern:

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

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

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

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the

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

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

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

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.), and projects affecting these species may require development of an eagle conservation plan ([http://www.fws.gov/windenergy/eagle\\_guidance.html](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(s):

- Official Species List

## Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

**New England Ecological Services Field Office**

70 Commercial Street, Suite 300

Concord, NH 03301-5094

(603) 223-2541

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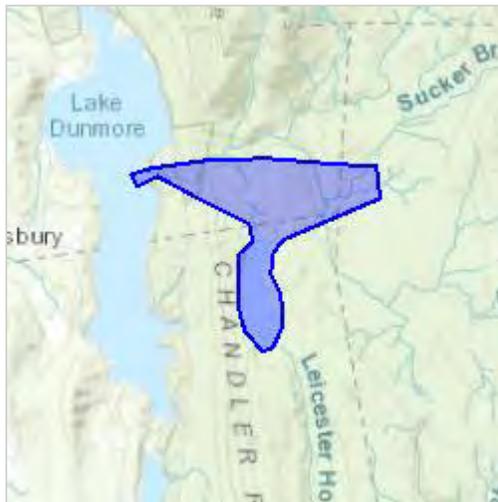
## Project Summary

Consultation Code: 05E1NE00-2017-SLI-1280  
Event Code: 05E1NE00-2017-E-02485  
Project Name: Silver Lake Hydroelectric LIHI Certification Project  
Project Type: DAM  
Project Description: LIHI Certification review project

### Project Location:

Approximate location of the project can be viewed in Google Maps:

<https://www.google.com/maps/place/43.89547922254884N73.05310999792414W>



Counties: Addison, VT

## Endangered Species Act Species

There is a total of 2 threatened, endangered, or candidate 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. See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area. Please contact the designated FWS office if you have questions.

---

## Mammals

NAME	STATUS
Indiana Bat ( <i>Myotis sodalis</i> ) No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/5949">https://ecos.fws.gov/ecp/species/5949</a>	Endangered
Northern Long-eared Bat ( <i>Myotis septentrionalis</i> ) No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/9045">https://ecos.fws.gov/ecp/species/9045</a>	Threatened

## Critical habitats

There are no critical habitats within your project area.

---

**From:** Kayla Easler  
**To:** "[Davis, Eric](#)"; [Katie Sellers](#)  
**Cc:** [McHugh, Peter](#); [Popp, Bob](#); [Marshall, Everett](#); [Gobeille, John](#); [Mackenzie, Chet](#)  
**Subject:** RE: Silver Lake FERC No. 11478  
**Date:** Friday, August 18, 2017 8:54:00 AM  
**Attachments:** [image001.png](#)

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Thank you all for the review. We are working with GMP on getting the operations information for additional review at this time.

Thank you again for your time and have a great weekend.

Kayla A. Easler  
Regulatory Coordinator

**Kleinschmidt**

Direct: (207) 416-1271

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

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**From:** Davis, Eric [mailto:[Eric.Davis@vermont.gov](mailto:Eric.Davis@vermont.gov)]  
**Sent:** Friday, July 14, 2017 1:42 PM  
**To:** Kayla Easler <[Kayla.Easler@KleinschmidtGroup.com](mailto:Kayla.Easler@KleinschmidtGroup.com)>; Katie Sellers <[Katie.Sellers@KleinschmidtGroup.com](mailto:Katie.Sellers@KleinschmidtGroup.com)>  
**Cc:** McHugh, Peter <[Peter.McHugh@vermont.gov](mailto:Peter.McHugh@vermont.gov)>; Popp, Bob <[Bob.Popp@vermont.gov](mailto:Bob.Popp@vermont.gov)>; Marshall, Everett <[Everett.Marshall@vermont.gov](mailto:Everett.Marshall@vermont.gov)>; Gobeille, John <[John.Gobeille@vermont.gov](mailto:John.Gobeille@vermont.gov)>; Mackenzie, Chet <[Chet.Mackenzie@vermont.gov](mailto:Chet.Mackenzie@vermont.gov)>  
**Subject:** RE: Silver Lake FERC No. 11478

Good morning Kayla,

The Agency has reviewed our records for the Silver Lake Project and provides the following information regarding water quality and rare, threatened, and endangered species requested by Kleinschmidt to develop a complete LIHI application.

#### Water Quality

*The 2016 State of Vermont 303(d) List of Impaired Waters has not identified the waters of the Project, nor waters directly downstream, including Dunmore Lake and Leicester River, as "impaired".*

*Could you please confirm, to your best abilities, that this is still true for the project and that the continued operations of the project do not contribute to water quality limitations?*

The Agency has reviewed its 2016 list of Priority Surface Waters. Lake Dunmore and the Leicester River is listed on Part E, waters altered by aquatic invasive species, due to locally abundant Eurasian Watermilfoil growth. Additionally the six-mile stretch of the Leicester River downstream of Lake Dunmore is listed on Part F, waters altered by flow regulation, due to artificial flow regulation and

possible downstream fish passage problems associated with the Salisbury hydroelectric project.

I can confirm that the current operations of the Silver Lake project are not a contributing cause to the listing of portions of the Leicester River as priority waters for management action.

Rare, Threatened and Endangered Species

*Could you a) review the below species list to make sure it is accurate and/or suggest updates as appropriate; and b) review this list to confirm that the Project continues to not negatively affect any of the currently listed species that may occur within the Project area?*

*Endangered Species*

*Indiana bat*

*Northern long-eared bat*

*Bald eagle*

*Species of Greatest Conservation Need*

*American bittern*

*Peregrine falcon*

*Short eared owl*

*Species of Concern*

*Black-crowned night-heron*

*Pied-billed grebe*

Our Natural Heritage Program and Fish and district staff have reviewed the provided list, as well as other recent records for RTE species in the project area. We confirm the accuracy of your list with a few minor exceptions/additions (see table below). Specifically, we note that two state-endangered or -threatened bats (small-footed, tri-color; see table below) and three rare vascular plants, all of which have some potential for being adversely affected by hydropower infrastructure or operations, are present within the Silver Lake hydroelectric project’s footprint. Additionally, although not classified as ‘rare, threatened, or endangered’, we note that rainbow smelt (*Osmerus mordax*) are and will continue to be an important species within the context of hydropower operations at the Silver Lake Project.

Beyond reviewing your list for accuracy, the biologists considering the Silver Lake project suggest that the project should minimally affect these species subject to (a) operations in accordance with the conditions specified in its 401 Water Quality Certification, including the continued implementation of smelt spawning flow agreements, (b) continued adherence to tree cutting and maintenance practices affording maximal bat protection (Article 405), and (c) minor modifications to powerline right-of-way maintenance to increase the viability of blue-eyed grass.

<b>Scientific Name</b>	<b>Common Name</b>	<b>Rank Rank</b>	<b>Status Status</b>	<b>Notes / comments</b>
<b>Vascular</b>				

<b>Plant</b>				
<i>Isoetes lacustris</i>	Lake Quillwort	S1		<i>Very rare but historically observed in Silver Lake</i>
<i>Desmodium perplexum</i>	Perplexing tick-trefoil	S2		<i>Observed in powerline right-of-way; no concerns unless a different management regime is pursued</i>
<i>Sisyrinchium angustifolium</i>	Blue-eyed Grass	S2S3		<i>Present in powerline right-of-way; late-season (Sept 1+) mowing recommended to allow flowering/fruitletting; also found along Sugar Hill Reservoir's shoreline and may be negatively affected by regime change.</i>
<b>Vertebrate Animal</b>				
<i>Perimyotis subflavus</i>	Tri-colored Bat	S1	E	<i>Documented in vicinity of penstock</i>
<i>Myotis leibii</i>	Eastern Small-footed Bat	S1	T	<i>Documented in vicinity of penstock</i>

Formal Application Review

The Agency hopes the input above assists you in developing a complete LIHI application. As you may know the Agency's review of LIHI applications has evolved, and the Agency has now developed a practice of requesting one year of project operations records to review for compliance with certification conditions in order to provide meaningful input into the LIHI review process. While we could request these when the application is noticed, we know it takes time and effort to pull this data together and thought it may be beneficial to the review process to flag this as an information need as early as possible.

Please let me know if you have additional questions,  
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](#).

---

**From:** Kayla Easler [<mailto:Kayla.Easler@KleinschmidtGroup.com>]

**Sent:** Wednesday, June 14, 2017 11:21 AM

**To:** Davis, Eric <[Eric.Davis@vermont.gov](mailto:Eric.Davis@vermont.gov)>

**Cc:** Katie Sellers <[Katie.Sellers@KleinschmidtGroup.com](mailto:Katie.Sellers@KleinschmidtGroup.com)>

**Subject:** Silver Lake FERC No. 11478

Good morning, Eric,

Here is another LIHI re-certification application for Green Mountain Power: Silver Lake Hydroelectric Project (FERC No. 11478) located on Sucker Brook in the towns of Goshen, Leicester, and Salisbury, Addison County, Vermont.

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

The 2016 State of Vermont 303(d) List of Impaired Waters has not identified the waters of the Project, nor waters directly downstream, including Dunmore Lake and Leicester River, as "impaired".

Could you please confirm, to your best abilities, that this is still true for the project and that the continued operations of the project do not contribute to water quality limitations?

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

Best,

Kayla A. Easler  
Regulatory Coordinator

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

Direct: (207) 416-1271

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

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