



## SUBJECT - Stage II Recertification Review for Low Impact Hydropower Institute's Weybridge Project #98

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### 1 BACKGROUND

The Weybridge Hydroelectric Project (Project), Federal Energy Regulatory Commission (FERC) No. 2731, is owned and operated by the Green Mountain Power Corporation (GMP). On August 1, 2001, FERC issued a license to Central Vermont Public Service Corporation (CVPSC) for a period of 30 years<sup>1</sup>. The existing license terminates on August 1, 2031. On September 13, 2012, FERC issued an Order Approving Transfer of Licenses from CVPSC to GMP for the Project.<sup>2</sup>

The Project's current five-year Low Impact Hydropower Institute (LIHI) certification #98 expired on February 6, 2017. In a letter dated December 16, 2016, LIHI extended the certification for the Project through November 6, 2017. GMP submitted an application for recertification of the Project in July of 2017. On October 5, 2017, LIHI notified GMP that the first stage recertification review for the Project was complete. Given that the review was processed under the new, 2nd Edition LIHI Certification Handbook, the need for a Stage II review was necessary.

On November 3, 2017, LIHI extended the certification for the Project through March 31, 2018. The current term was extended again to September 30, 2018 to allow sufficient time for agency review of operations data, and finalization of the review. In early June of 2018, GMP submitted its Stage II Recertification Application.<sup>3</sup> GMP's contact is Mr. John Greenan<sup>4</sup>. LIHI assigned Mr. Gary Franc<sup>5</sup> to perform the Stage II Recertification review.

### 2 OTTER CREEK BASIN

The Project is located in the towns of Weybridge and New Haven, Vermont (latitude 44.0665, longitude -73.2162) and is situated at river mile (RM) 19.5 on Otter Creek at the head of a rock-walled gorge where the creek cascades around a small island. Otter Creek flows in a northwesterly direction and drains into Lake Champlain. Lake Champlain is a natural freshwater lake mainly within the borders of the United States between the states of New York and Vermont but partially situated across the Canada-U.S. border, in the Canadian province of Quebec. Lake Champlain drains northward through the 106-mile-long Richelieu River into the St. Lawrence River at Sorel-Tracy, Quebec. (See Figure 1).

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<sup>1</sup>[http://elibrary.ferc.gov/IDMWS/search/intermediate.asp?link\\_file=yes&doclist=1854619](http://elibrary.ferc.gov/IDMWS/search/intermediate.asp?link_file=yes&doclist=1854619)

<sup>2</sup> <http://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=13064046>

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<sup>4</sup> John Greenan, Environmental Engineer, GMP – 802-770-3213 - [John.Greenan@greenmountainpower.com](mailto:John.Greenan@greenmountainpower.com) - 2152 Post Road, Rutland, Vermont 05701

<sup>5</sup> Gary Franc – 315.715.1556 – [franclogic@verizon.net](mailto:franclogic@verizon.net)

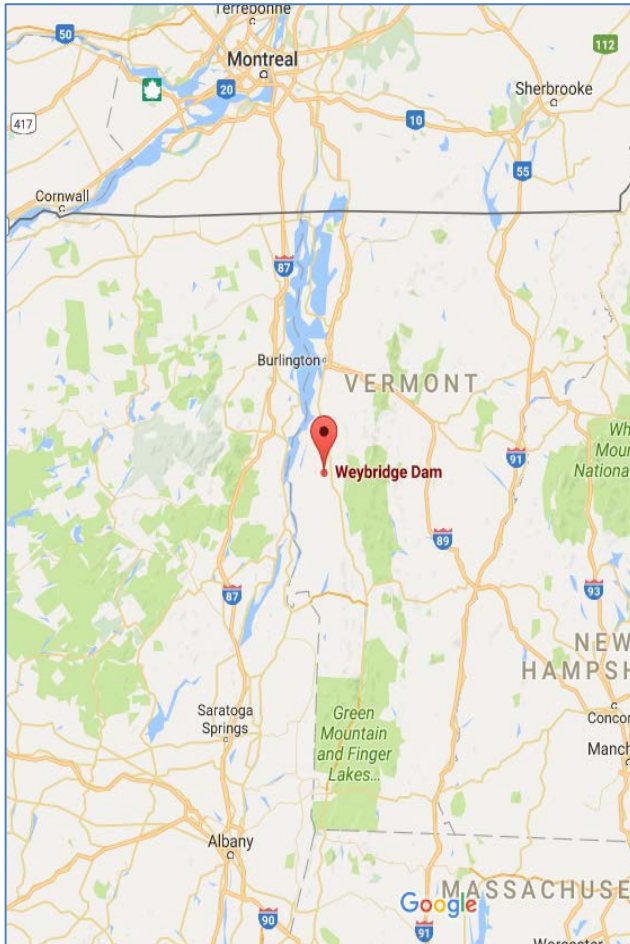


Figure 1 - Location Map

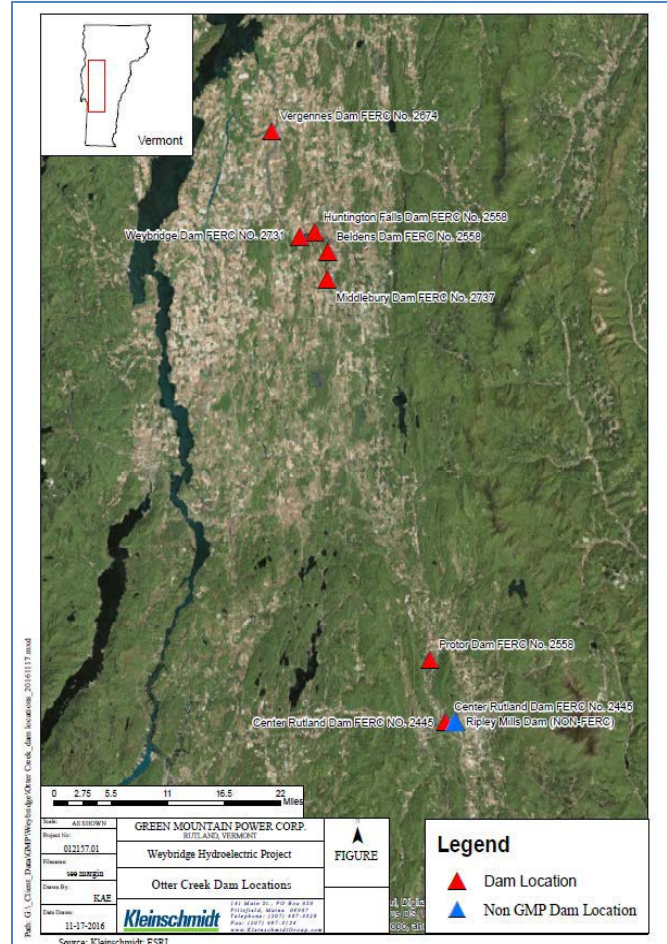


Figure 2 - Otter Creek Dams

There are seven dams upstream of the Project, five of which include power generation and one dam downstream on Otter Creek (See Figure 2). Upstream dams with power include:

- Huntington Falls Development, part of the Otter Creek Hydroelectric Project - FERC No. 2558 (OCHP) owned by GMP at RM 21.0;
- Center Rutland Project (FERC No. 2445) owned by GMP is located at RM 71;
- Proctor Development, part of the OCHP is located at RM 64.2;
- Middlebury Lower Hydroelectric Project (FERC No. 2737) owned by GMP is located at RM 24.7, LIHI #99, and;
- Beldens Development, part of the OCHP is located at RM 23.0.

Non-power upstream facilities are the Ripley Mills Dam at RM 72.0 and the Emerald Lake Dam located at RM 100. The Vergennes Hydroelectric Project (FERC No. 2674) is the only downstream dam located at RM 7.4.



## 3 REGULATORY SUMMARY

On August 1, 2001, FERC issued a license to CVPSC for a period of 30 years<sup>6</sup>. On September 13, 2012, FERC issued an Order Approving Transfer of Licenses from CVPSC to GMP for the Project.<sup>7</sup>

### 3.1 Summary of Project Compliance

Chronologically, the following Project compliance activities related to LIHI criteria have occurred during the previous LIHI certification period:

- On July 28, 2012, CVPSC and GMP filed a joint application to FERC for approval to transfer licenses for thirteen hydroelectric projects from CVPS to GMP, including the Project. On September 13, 2012, FERC issued an Order approving the transfer of the Project license to GMP<sup>8</sup>. On November 9, 2012, GMP submitted its acknowledgement of acceptance of the FERC's September 13, 2012 Order<sup>9</sup>.
- On December 31, 2013, GMP submitted the Annual HPMP Report for the Project<sup>10</sup>.
- On February 24, 2014, GMP submitted the bypass minimum flow verification study<sup>11</sup>.
- On May 5, 2014, FERC acknowledged that the minimum flow verification study met the filing requirements set forth by the August 7, 2008 Order<sup>12</sup>.
- On August 01, 2014, GMP submitted the Annual HPMP Report for the Project<sup>13</sup>.
- On December 8, 2014, GMP filed the Dam Safety Inspection Report by NYSDEC for the Project for the period May 15, 2012 to October 29, 2014. The dams, intake structure, powerhouse and downstream diversion structure were inspected.
- On April 1, 2015, GMP filed the Form 80 for the Weybridge Project<sup>14</sup>.
- On August 18, 2015, FERC filed the July 9, 2015 Environmental Inspection Report conducted to observe Project recreational facilities, public safety signage and devices and compliance with the environmental license requirements. There were no items of non-compliance identified during the inspection.
- On September 18, 2015, GMP responded to the Environmental Inspection Report. GMP confirmed that they had regraded the recreation area access road, repaired the picnic tables and replaced tables that were identified as too warped<sup>15</sup>.
- On July 29, 2016, GMP submitted the Annual HPMP Report for the Project<sup>16</sup>.
- On August 1, 2017, GMP submitted the Annual HPMP Report for the Project<sup>17</sup>.
- On August 1, 2018, GMP submitted the Annual HPMP Report for the Project<sup>18</sup>.

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<sup>6</sup>[http://elibrary.ferc.gov/IDMWS/search/intermediate.asp?link\\_file=yes&doclist=1854619](http://elibrary.ferc.gov/IDMWS/search/intermediate.asp?link_file=yes&doclist=1854619)

<sup>7</sup> <http://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=13064046>

<sup>8</sup> <http://elibrary.ferc.gov/IDMWS/common/OpenNat.asp?fileID=13064046>

<sup>9</sup> <http://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=13106693>

<sup>10</sup> <http://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=13385163>

<sup>11</sup> <http://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=13469087>

<sup>12</sup> <http://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=13536509>

<sup>13</sup> <http://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=13606881>

<sup>14</sup> <http://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=13826474>

<sup>15</sup> <http://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=13990601>

<sup>16</sup> <http://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=14319721>

<sup>17</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14650722>

<sup>18</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14990207>



- On October 12, 2018, FERC issued a facility inspection report, recommending (as related to LIHI criteria) continued inspection and maintenance procedures related to vegetation management and monitoring of shoreline erosion at a location downstream of the dam<sup>19</sup>.
- On December 28, 2018, GMP filed a request for a one-year extension of time to complete the low flow verification study under license article 402 that was scheduled for 2018 (conducted on a five-year interval, last conducted in 2013) as a result of persistent high river flows in 2018. On February 8, 2019 FERC granted an extension to September 30, 2019 with the study report to be filed by November 30, 2019<sup>20</sup>.

## 3.2 Compliance Issues

My review of the FERC docket for the prior LIHI certification period, found no article deviations or excursions. GMP proactively complied with all licensing requirements, subject to the extension request noted above.

## 4 PROJECT DESCRIPTION

The Hortonia Power Company originally constructed the hydroelectric generating station at Weybridge in 1922. The Project's west timber crib dam was replaced by a concrete dam in 1944-1945. In 1950-1951, the west dam was raised and the east timber crib dam was replaced by a concrete dam. Additionally, a second powerhouse was constructed and the original powerhouse retired.

The Project impounds 62 acres at 174.3 feet mean sea level (FTMSL) and 51 acres at 172.3 FTMSL, extends 1.5 miles upstream and has a gross capacity of 600 acre-feet (ACFT) and a useable storage capacity of 115 ACFT.

The concrete gravity dam is 30 feet high with an overall dam length of 302.6 feet and a crest elevation of 168.3 FTMSL. Both dam sections have flashboard systems that effectively raise the dam crest to elevation 174.3 FTMSL. The applicant estimates the impoundment level would raise to approximately 180.0 FTMSL under the 100-year flood of 13,675 CFS.

The west spillway section is 150 feet long and is topped with a six-foot-high hinged pneumatic steel flashboard, abutted by a tainter gate 20-foot-wide by 10-foot-high. (Figure 3). Downstream of the west spillway is a diversion wall at the south end of Rock Island to better apportion flows between the downstream west and east bypassed channels.

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<sup>19</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=15069396>

<sup>20</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=15159176>





Figure 3 - West Spillway Section – Looking Upstream

The east spillway is 116 feet long topped with a pneumatic rubber bladder with the powerhouse attached to the right side of the spillway. (See Figure 4).



Figure 4 -East Spillway Section and Powerhouse – Looking Upstream



The powerhouse contains a single vertical Kaplan turbine generator with an installed capacity of 3.0 MW and an intake containing steel trashracks with 3-inch clear spacing. The turbine's minimum hydraulic capacity is 450 cubic feet per second (CFS), while the maximum hydraulic capacity is 1,600 CFS.

Flow (%)	Flow (cfs)	Head	Turbine Efficiency	Gen Efficiency	Unit Efficiency	Trendline Check
	400	27	82%	96%	79%	79%
	600	27	88%	97%	85%	85%
	800	27	91%	97%	88%	88%
	1000	27	92%	97%	89%	89%
	1200	27	92%	97%	89%	89%
	1400	27	91%	97%	88%	88%
	1600	27	87%	97%	84%	84%

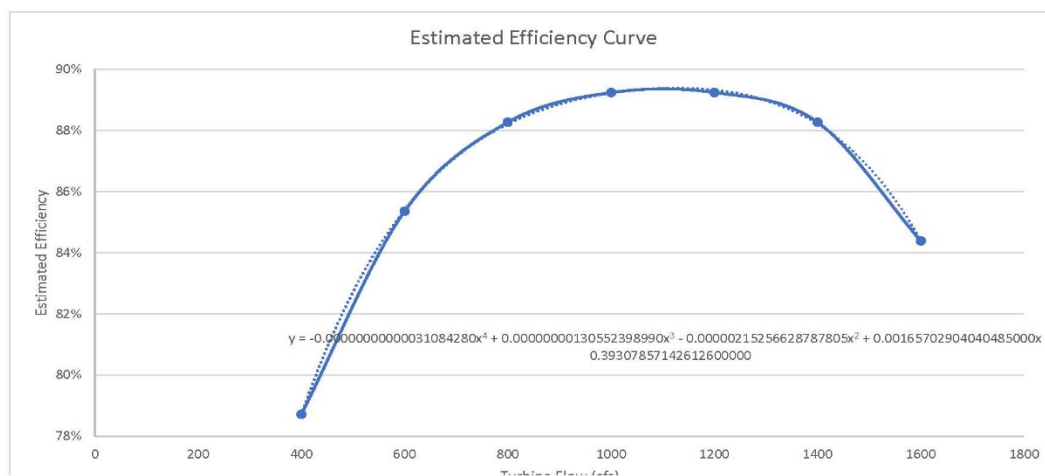


Figure 5 - Kaplan Turbine Curve

The base of the dam is approximately at elevation 138.3 FTMSL. The applicant states the tailwater elevation is 143.3 FTMSL, about 5 feet above the dam base. No information is directly provided to determine the corresponding tailwater flow at this tailwater elevation. However, a review of the Project's October 2016 through September 2017 Operation Data, submitted to the Vermont Department of Environmental Conservation (VDEC) on June 5, 2018, indicates the tailwater elevation is unchanging at an elevation of 148.15 FTMSL. Based on my review, the 143.3 FTMSL occurs when not operating the powerhouse and the 148.15 FTMSL occurs when discharging at the efficient hydraulic flow of 1,100 CFS (See Figure 5).



Generator leads and transformers connect the Project to the interconnected transmission/distribution system at the Project switchyard about 100 feet from the powerhouse.

As stated in the application, the 3.0 megawatts (MW) produces an Average Annual Generation (AAG) estimated at 13,846 megawatt-hours (MWh). This corresponds to an annual plant factor of 52.7%.

Throughout the year, when the Project is generating, a minimum flow of 125 CFS is released into the bypassed reach through the bypass gate located on the west spillway. When not generating, a total conservation flow of 250 CFS is maintained in the bypassed reach using the west spillway gate. If notified by the VDEC that walleye have been introduced into this reach of the Otter Creek, GMP raises the minimum flow to 250 CFS when generating during April and May to accommodate for walleye spawning.

The diversion structure, located downstream of the dam and situated between the downstream end of Rock Island and the upstream end of Wyman Island (See Figure 6), allows GMP to properly channel flows east and west around Wyman Island. GMP ensures a 125 CFS flow is met within the east channel and 100 CFS flow is met within the west channel when the 250 CFS conservation flow is being released.



Figure 6- Downstream Diversion Dam

For net inflows in excess of 1,600 CFS, the turbine is run at full capacity and excess flow is passed over the spillways. The Project is allowed to operate as a daily pulsing facility during normal and low flow conditions with drawdowns up to 2 feet.

From April 1 through June 14, the Project is primarily operated in a run-of-river (ROR) mode. During this period, the impoundment is maintained three inches below the flashboard crest of 174.3 FTMSL, given that the available inflow is above 575 CFS<sup>21</sup> (See Figure 7) and unless the flashboard section needs

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<sup>21</sup> Based on a flow duration analysis, 575 CFS, which represents the sum of the minimum flow of 125 CFS and the minimum allowable turbine flow of 450 CFS, is exceeded approximately 96 percent of the time from April 1 through Jun 14. Also, if walleye are introduced into Otter Creek, the minimum flow is raised to 250 CFS in April and May, requiring an inflow of at least 700 CFS to allow for ROR operation. Based on April and May flow duration curves, ROR operation occurs 99 and 90 percent of the time, respectively, if walleye are present.





to be manually tripped, in which case the impoundment level is reestablished within 24 hours of the river stabilizing. During the remainder of the year the impoundment is limited to a 2.0 feet drawdown below the flashboard crest, unless necessary for dam maintenance or operator safety, or due to a non-power emergency beyond the control of GMP.

The drainage area of Otter Creek upstream of the Project is approximately 756 square miles (SQMI). The average annual flow (AAF) at the Project for a ten-year period (10YR) including calendar years 2007 through 2016 is 1,468 CFS or about 1.94 CFS per SQMI.

Flow data for the Project is estimated using two USGS gages located upstream of the Project:

- USGS Gage 04282500 – Otter Creek at Middlebury, VT (G1) which measures Otter Creek flow for an upstream drainage area of 628.0 SQMI. G1's AAF for 10YR is 1,229.3 CFS or 1.96 CFS per SQMI, and;
- USGS Gage 04282525 – New Haven River at Brooksville, Near Middlebury, VT (G2) which measures New Haven River flow for an upstream drainage area of 115.0 SQMI. G2's AAF for 10YR is 234.3 CFS or 2.04 CFS per SQMI

The drainage area of Otter Creek just above its confluence with New Haven River is 636.1 SQMI. Flow at G1 is prorated to this location by multiplying by a factor of  $(636.1 / 628.0)^{0.80}$  or 1.01<sup>22</sup>.

The drainage area of the New Haven River at its confluence with Otter Creek is 116.4 SQMI. The application indicates that no flow adjustment is made from the recorded flow at G2. The adjusted G1 flow and the G2 flow are added together to represent the Otter Creek just below the confluence of the

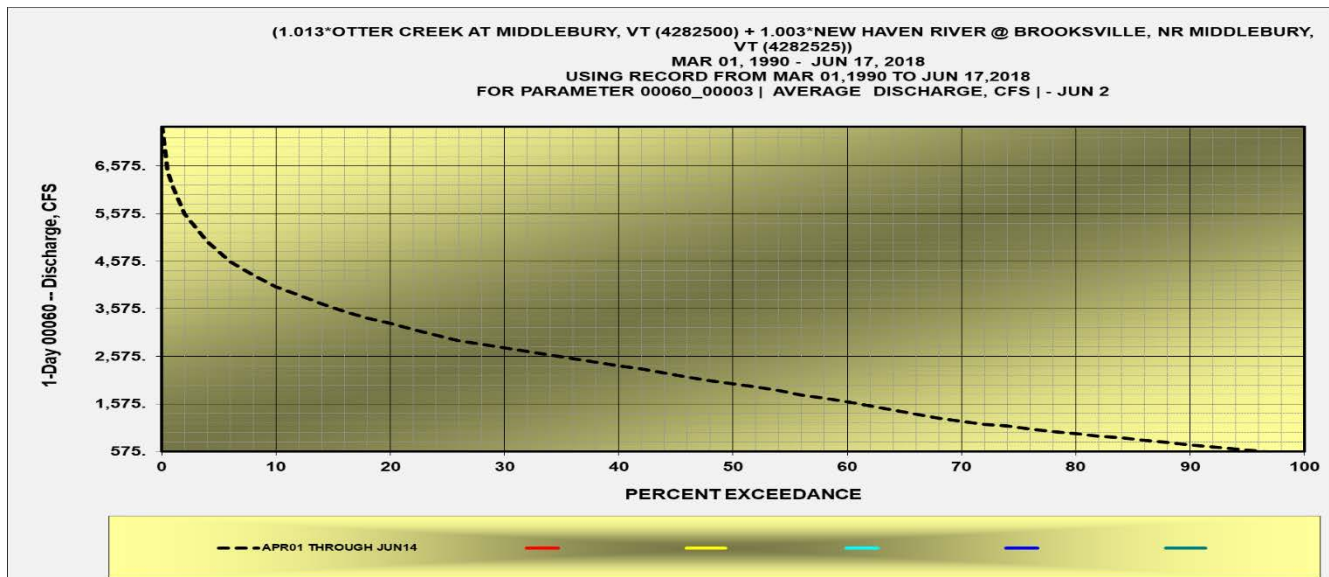


Figure 7 - April 1 through Jun 14 Available Inflow

<sup>22</sup> The exponent of 0.80 is used as a means of accounting for reduced runoff per SQMI as the size of the drainage area increases. No information was supplied as to how 0.80 was determined. However, given that the drainage area ratio is relatively close to 1.0, the use of the exponent has a minor effect.





New Haven River with Otter Creek. The drainage area at this location is 752.5 SQMI. Finally, the inflow for the Project is estimated by multiplying the added flows using a factor of  $(755.8/752.5)^{0.80}$  or 1.003.

During the prior LIHI certification no major equipment upgrades occurred and no major operational changes occurred at the Project. Due to deterioration of the wooden sluice gate, GMP received approval from the VDEC for an emergency in-kind replacement with a steel sluice gate. The sluice gate replacement occurred at the end of October 2016. GMP states that no major facility upgrades are planned in the near future.

## 5 ZONES OF EFFECT (ZOE's)

The applicant has defined three ZOE's for the Project defined from upstream to downstream on the Otter Creek as depicted in Figures 8 and 9:

1. Impoundment - RM 21.0 (Huntington Falls Dam) to RM 19.5 (Project Dam)
2. Bypass Reach - RM 19.5 (Project Dam) to RM 19.8 (downstream end of Rock Island);
3. Downstream - RM 19.5 (downstream end of Project powerhouse) to RM 7.4 (Vergennes Dam).

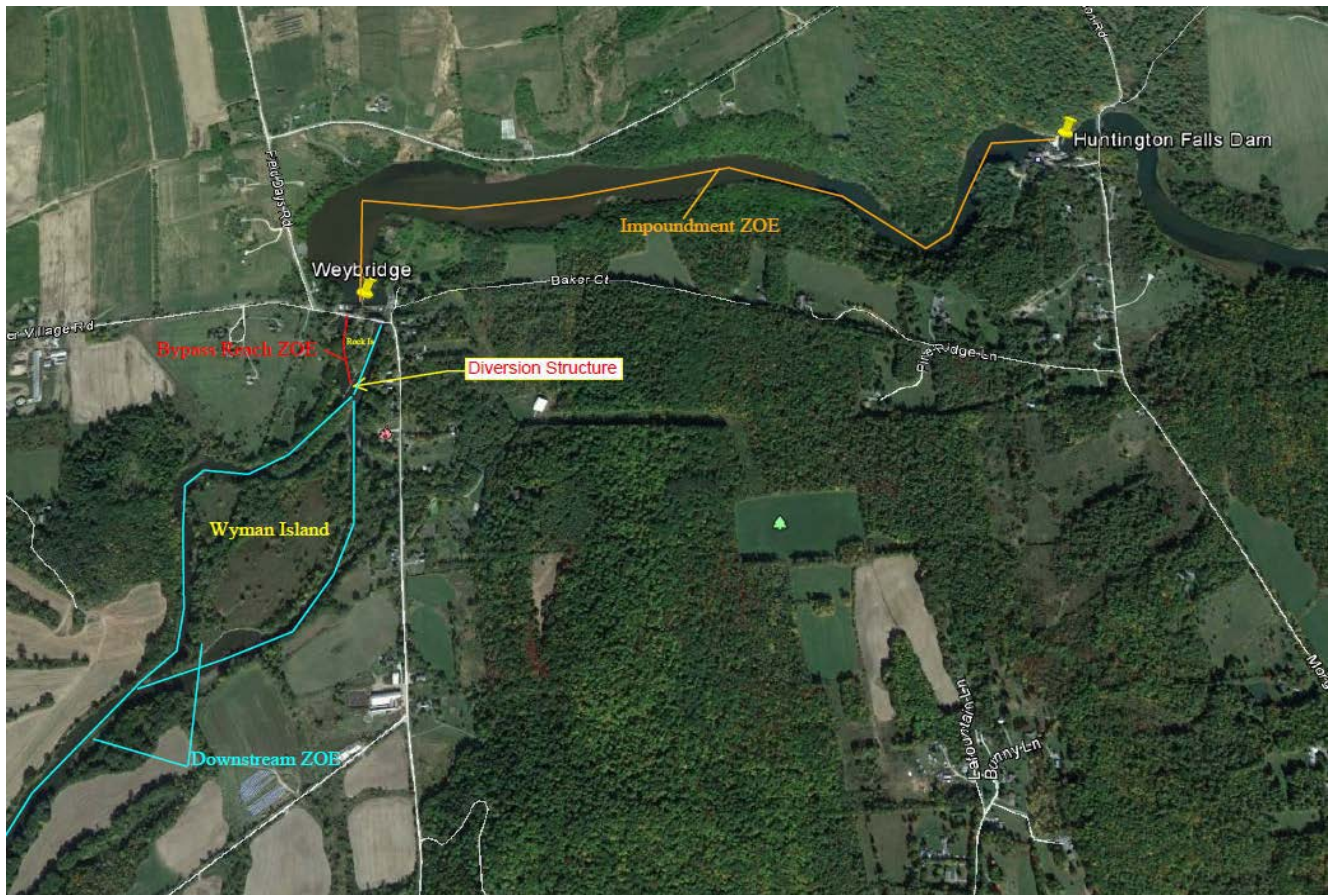


Figure 8- ZOE's

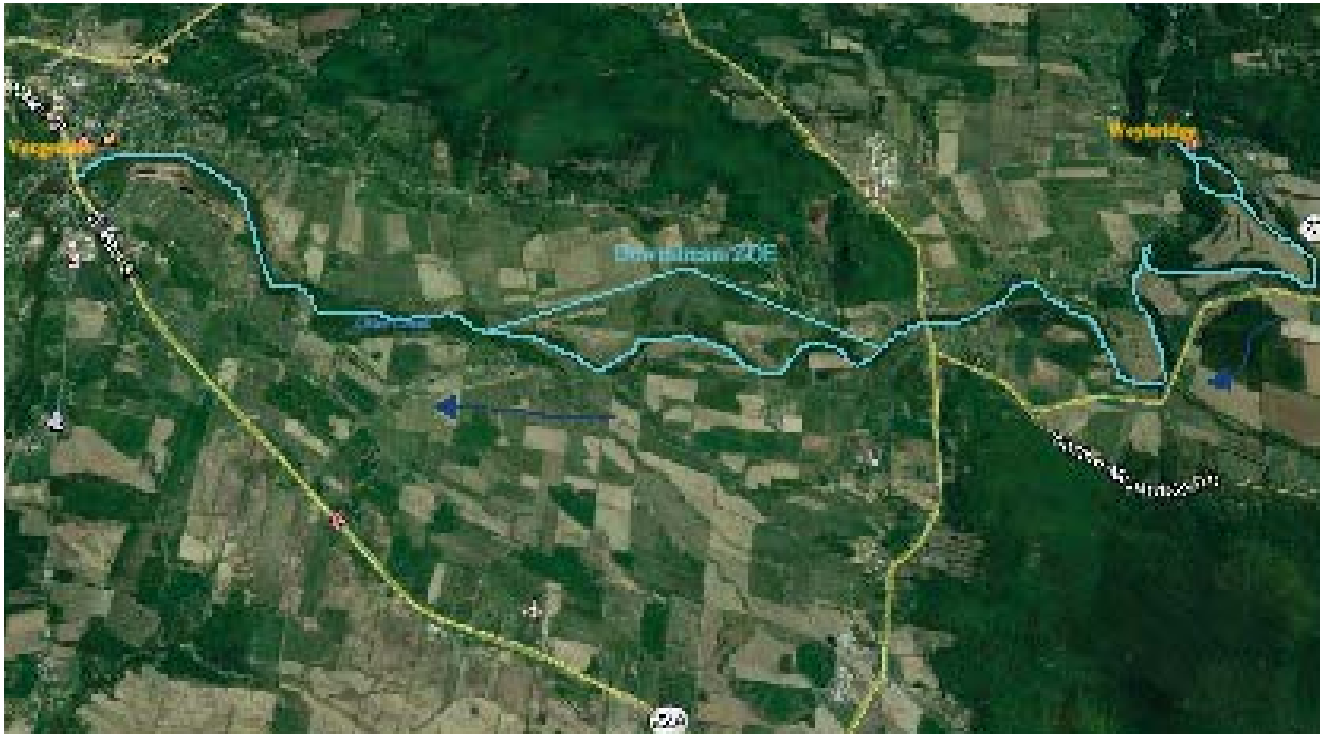


Figure 9 - ZOEs Continued

## 6 LIHI RE-CERTIFICATION PROCESS

On October 5, 2017, LIHI notified GMP that the first stage recertification review for the Project was complete. Given that the review was processed under the new, second Edition LIHI Certification Handbook, the need for a Stage II review was necessary. Public comment on this revised application terminated on December 26, 2017. No public comments were received.

As part of my review, a FERC e-library search was conducted to verify claims in the Recertification Application. My review concentrated on the period from the start of the previous LIHI certification, February 6, 2012 through the latest entry in February 2019, for FERC docket numbers P-2731.

Additionally, on June 15, 2018, this reviewer emailed the agencies listed in the Project's LIHI application: (VDEC)<sup>23</sup>, Vermont Fish and Wildlife Department (VFWD)<sup>24</sup>, Vermont Department of Historical Preservation (VDHP)<sup>25</sup> and the US Fish and Wildlife Service (USFWS)<sup>26</sup>.

<sup>23</sup> VDEC - Jeff Crocker, Streamflow Protection Coordinator - 802-490-6151 - [jeff.crocker@vermont.gov](mailto:jeff.crocker@vermont.gov); Eric Davis, River Ecologist - 802-490-6180 - [eric.davis@vermont.gov](mailto:eric.davis@vermont.gov)

<sup>24</sup> VFWD - Bob Popp, Department Botanist - 802-476-0127 - [bob.popp@vermont.gov](mailto:bob.popp@vermont.gov); Lee Simard, Fisheries Biologist - 802-622-4017 - [lee.simard@vermont.gov](mailto:lee.simard@vermont.gov); Tim Appleton - 802-476-0198 - [Tim.Appleton@vermont.gov](mailto:Tim.Appleton@vermont.gov)

<sup>25</sup> VDHP - Scott Dillon, Survey Archaeologist - 802-272-7358 - [Scott.Dillon@vermont.gov](mailto:Scott.Dillon@vermont.gov)

<sup>26</sup> USFWS -Melissa Grader, Federal Activities - 413-548-8002 - [Melissa\\_Grader@fws.gov](mailto:Melissa_Grader@fws.gov); Brett Towler, Hydraulic Engineer - 413-253-8727 - [Brett\\_Towler@fws.gov](mailto:Brett_Towler@fws.gov)



In my email I stated, “*I am the LIHI reviewer tasked with determining whether Green Mountain Power (GMP)’s Weybridge Hydroelectric Project (FERC No. 2731) should be LIHI recertified. I am emailing you today because you have been identified in the application by the owner as resource agency contacts familiar with the project. I would appreciate your perspective regarding the project’s proposed operation with regard to satisfying its environmental obligations (FERC articles, MOUs, etc.). Without your input my review can only be based on the documents found in the application and FERC docket. Thank you for your time in this matter. The LIHI application can be found at this web address – <https://lowimpacthydro.org/lihi-certificate-98-weybridge-hydroelectric-project-weybridge-and-new-haven-vermont/>”.*

Agency responses follow:

- VDEC - On June 18, 2018, I received an email from Eric Davis stating, “... *the Agency conducted a preliminary review of the potential impacts of the Weybridge project last year when the applicant was developing their application. As part of that review, we asked for operating records to ensure the project is operating in compliance with its certification conditions and not impacting threatened and endangered species. We have just received this information rather recently ... I’d like to be able to review the operations data in time for you to incorporate any feedback into your recommendation ...*”
- VDEC – On February 26, 2019, I received an email from Eric Davis stating, “*the Agency of Natural Resources has been reviewing the pending LIHI application for the Weybridge Hydroelectric Project to be certified as low impact. Prior to submitting its LIHI application, the applicant via Kleinschmidt Group engaged Agency staff. Subsequent to its application, Kleinschmidt provided one year of operations data to confirm compliance with water quality certification (WQC) conditions. Further, Kleinschmidt provided rating curves for the minimum flow gate to provide additional context to the operations data. The Agency has completed its review and supports certification of the facility as low impact.*”

## 7 RE-CERTIFICATION REVIEW

This section contains my Stage II recertification review of the Project with regard to LIHI’s certification criteria.

### 7.1 LIHI Criterion A-Flows

The development satisfies the “LIHI flows criterion” in all ZOE’s by meeting alternative standard A-2<sup>27</sup>.

In accordance with License Article 401, throughout the year when the Project is generating, a minimum flow of 125 CFS is released into the bypassed reach through the bypass gate located on the west spillway. When not generating, a total conservation flow of 250 CFS is maintained in the bypassed reach using

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<sup>27</sup> Agency recommendations - Identify the proceeding and source, date, and specifics of the agency recommendation. Explain the scientific or technical basis for the agency recommendation, including methods and data used. Explain how the recommendation relates to agency management goals and objectives for fish and wildlife. Explain how the recommendation provides fish and wildlife protection, mitigation and enhancement.





the west spillway gate. If notified by the VDEC that walleye have been introduced into this reach of the Otter Creek, GMP raises the minimum flow to 250 CFS when generating during April and May to accommodate for walleye spawning.

Per the August 7, 2008, FERC Order Amending Minimum Flow Under Articles 401 and 402 (FOAMF)<sup>28</sup>, GMP ensures a 125 CFS flow is met within the east channel and 100 CFS flow is met within the west channel when the 250 CFS conservation flow is being released, by use of the diversion structure located downstream of the dam and situated between the downstream end of Rock Island and the upstream end of Wyman Island. The diversion structure includes a control weir with stop log slots at the diversion structure's downstream end. A 15-foot-wide by 3.5-foot-high notch in the control weir passes water from the pool formed by the control weir and the diversion structure downstream into the west channel around Wyman Island.

In 2013, GMP contracted with Multiple Resource Management, Inc. (MRM) to conduct a flow verification study in the Wyman Island west channel. Field measurements were taken on October 16, 2013. Discharge measured at USGS Gage 04282500 on the Otter Creek at Middlebury, VT was approximately 340 CFS. Flow measured in the west channel was calculated to be 95.4 CFS, slightly lower than the 100 CFS target. On May 5, 2014, a Bypass Minimum Flow Report (BMFR) pursuant to the FOAMF was filed with FERC<sup>29</sup>. On May 5, 2014<sup>30</sup>, FERC acknowledged that the BMFR met the requirements of the FOAMF and did not request additional information. The next BMFR is due April 30, 2019.

For net inflows in excess of 1,600 CFS, the turbine is run at full capacity and excess flow is passed over the spillways. License Article 403 allows the Project to operate in a daily pulsing mode during normal and low flow conditions where impoundment drawdowns are limited up to 2 feet.

From April 1 to June 15, the Project is primarily operated in a ROR mode<sup>31</sup>. During this period, the impoundment is maintained three inches below the flashboard crest of 174.3 FTMSL, unless the flashboard section needs to be manually tripped, in which case the impoundment level is reestablished within 24 hours of the river stabilizing. During the remainder of the year the impoundment is limited to a 2.0 feet drawdown below the flashboard crest, unless necessary for dam maintenance or operator safety, or due to a non-power emergency beyond the control of GMP.

License Article 403 is derived from a VDEC letter dated May 25, 1999<sup>32</sup> and a USFWS letter dated May 24, 1999<sup>33</sup>. The USFWS letter recommended the following:

- Provide a minimum flow in the bypass reach of 125 CFS when the unit is operating. This will be increased to 250 CFS in April and May for walleye spawning once successfully introduced to Otter Creek;

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<sup>28</sup> <http://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=11770877>

<sup>29</sup> [http://elibrary.ferc.gov:1/idmws/file\\_list.asp?document\\_id=14189118](http://elibrary.ferc.gov:1/idmws/file_list.asp?document_id=14189118)

<sup>30</sup> [http://elibrary.ferc.gov:1/idmws/file\\_list.asp?document\\_id=14212762](http://elibrary.ferc.gov:1/idmws/file_list.asp?document_id=14212762)

<sup>31</sup> Based on a flow duration analysis, 575 CFS, which represents the sum of the minimum flow of 125 CFS and the minimum allowable turbine flow of 450 CFS, is exceeded approximately 96 percent of the time from April 1 through Jun 14 (See Figure 6). Also, if walleye are introduced into Otter Creek, the minimum flow is raised to 250 CFS in April and May, requiring an inflow of at least 700 CFS to allow for ROR operation. Based on April and May flow duration curves, ROR operation occurs 99 and 90 percent of the time, respectively, if walleye are present.

<sup>32</sup> [http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=1950223](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1950223)

<sup>33</sup> [http://elibrary.ferc.gov:0/idmws/file\\_list.asp?document\\_id=1953093](http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1953093)





- Provide a minimum flow of at least 250 CFS or inflow from the tainter gate at the top of the bypass channel when the unit is not operating;
- Construct a diversion structure in consultation with the VDEC and USFWS below the Project to split the flow between channels on the east and west sides of Wyman Island;
- Limit peaking to a 4.5 to 1 ratio of maximum to minimum flow in a 24-hour period to minimize impacts to fish habitat. Existing up-ramping and down-ramping procedures will continue to be utilized.
- Limit impoundment drawdowns to two feet, with the pond held stable from April 1 to June 15 of each year to provide for bass spawning. Annual drawdowns of greater than two feet expected for maintenance are to be coordinated with the VDEC.

The VDEC letter:

- Documented an instream flow study used to determine the habitat/flow relationship at a number of the locations downstream of the Project including the bypass reach. Within the bypass reach, habitat for walleye spawning and incubation peaked at about 300 CFS and decreased at higher flows. A flow of 250 CFS provided nearly the same amount of habitat as at 450 CFS. Habitat for adult rainbow trout was maximized at 175 CFS, but the habitat/flow curve was relatively flat from 125-250 CFS. It was determined within the study and by agencies that a release of 250 CFS, or inflow, when the Project is not generating and 125 CFS during generation would provide acceptable habitat conditions in the bypass reach;
- Stated the management objective for the riverine reaches downstream of the dam is to provide aquatic habitat conditions that support a diversity of species including fish, mussels and invertebrates, and their life cycle requirements, similar to that which would exist without the Project;
- Flows within the bypass reach should enhance habitat for local riverine species including rainbow trout.
- VDEC impoundment evaluation is that drawdowns in excess of two feet will affect plant communities and aquatic organisms that may utilize them. The agency's management objective for Otter Creek is the provision of high-quality aquatic habitat in the waters affected by the Project. By limiting impoundment drawdowns to 2 feet during normal operations, wetlands and other shoreline aquatic resources are still provided within healthy river flows. Additionally, eliminating reservoir drawdowns from April 1 to June 15 enhances fish spawning opportunities in the impoundment area.

My review of the FERC docket for the prior LIHI certification period, found no article deviations or excursions and no requests for time extensions pertaining to flow issues or impoundment fluctuations. GMP proactively complied with all licensing requirements. The only new issue dealt with the requirement to file BMFRs. The next report is due on April 30, 2019.

Given that GMP abides with filing and recommendations of future BMFRs, it is my recommendation that the Project is in compliance concerning ecological flow criteria.



## 7.2 LIHI Criterion B-Water Quality

The application states that the development satisfies the “LIHI water quality criterion” in all ZOE’s by meeting alternative standard B-2<sup>34</sup>.

Otter Creek has been designated by the Vermont Water Resources Board (VWRB) as Class B waters. The VWRB has also designated the reach from the upstream Proctor wastewater plant outfall to the river’s mouth as warm-water fish habitat.

Class B reaches are managed to achieve and maintain a high level of quality compatible with certain beneficial values and uses<sup>35</sup>. Values are high quality habitat for aquatic biota, fish and wildlife and 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.

On September 7, 2016, the VDEC issued, under Section 303(d) of the Federal Clean Water Act, a list<sup>36</sup> of waters considered to be impaired based on water quality monitoring efforts. Otter Creek was listed as “impaired” with specific portions of Otter Creek having different pollutants:

- Lower Otter Creek, below Vergennes Waste Water Treatment Facility for e. Coli (downstream of Project);
- Otter Creek in vicinity of Rutland Waste Water Treatment Facility for e. Coli (upstream of Project);
- Little Otter Creek RM 15.4 to RM 16.4 for agricultural nutrients and sediments (downstream of Project);
- Lake Champlain (Ferrisburg) for elevated levels of PCBs in lake trout (downstream of Project).

In an email dated January 27, 2017, the VDEC concurred that Project operations continue to not be a contributing cause to impairment in the river. Project operations data was additionally provided to VDEC on June 5, 2018 for verification of Project WQC compliance. VDEC responded on June 27, 2018 and confirmed that the Project is operating in accordance with the WQC. The Applicant provided additional operations information to VDEC on December 28, 2018 and VDEC responded to LIHI on February 26, 2019 supporting LIHI recertification (See Appendix A, pages A-2 through A-6). The May 7, 2001 Project WQC is included in Appendix A, starting on page A-11.

My review of the FERC docket for the prior LIHI certification period, found no article deviations or excursions and no requests for time extensions pertaining to WQC issues. GMP proactively complied with all licensing requirements. No new issues have arisen. It is my recommendation that the Project is in compliance concerning water quality criteria.

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<sup>34</sup> Agency recommendation - If facility is located on a Water Quality Limited river reach, provide an agency letter stating that the facility is not a cause of such limitation. Provide a copy of the most recent Water Quality Certificate, including the date of issuance. Identify any other agency recommendations related to water quality and explain their scientific or technical basis. Describe all compliance activities related to the water quality related agency recommendations for the facility, including on-going monitoring, and how those are integrated into facility operations

<sup>35</sup> [http://dec.vermont.gov/sites/dec/files/documents/WSMD\\_WaterQualityStandards\\_2014.pdf](http://dec.vermont.gov/sites/dec/files/documents/WSMD_WaterQualityStandards_2014.pdf)

<sup>36</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)



## 7.3 LIHI Criterion C-Upstream Fish Passage

The Project satisfies the “LIHI upstream fish passage criterion” in all ZOE’s by meeting alternative standard C-1<sup>37</sup>.

No natural populations of anadromous<sup>38</sup> or catadromous<sup>39</sup> fish are present within the Project’s reaches of the Otter Creek. The VDEC manages the section of Otter Creek that extends from the Project upstream to the Huntington Falls dam primarily as a warm-water fishery. The principle gamefish species found in the Project impoundment are northern pike and smallmouth bass. Other gamefish that are present include largemouth bass, brown trout and rainbow trout<sup>40</sup>. Other species that occur upstream of the Project include rock bass, bluegill, pumpkin seed, yellow perch, brown bullhead, white sucker, and fall fish.

The reach below the Project is managed as a mixed warm-water and cool-water fishery. Fish species found downstream are similar to those occurring upstream, with the exception of mirror carp, which is only found downstream of the dam. VDEC stocks landlocked Atlantic salmon and walleye downstream of the Vergennes Project, the most downstream facility on Otter Creek. Walleye is a non-native species specifically stocked for recreational angling.

There is no federal mandatory prescription for the passage of riverine fish upstream of the Project dam, however License Article 405 reserves future FERC authority to order such upstream fishways if prescribed by the Department of the Interior (DOI).

Historically, migratory fish from Lake Champlain ascended many of its tributaries to access spawning waters. Landlocked Atlantic salmon are naturally occurring potamodromous<sup>41</sup> species that historically existed within the Lake Champlain Basin. Natural populations of Atlantic salmon were extirpated from Lake Champlain Basin approximately 150 years ago. Today landlocked Atlantic salmon are stocked in the lower Otter Creek below the downstream Vergennes Project by the VDEC and USFWS.

Lake sturgeon in Vermont are classified as an endangered species. The extent to which lake sturgeon enter Otter Creek from Lake Champlain and occur below the downstream Vergennes Project is unclear, though, Otter Creek is classified as a historic spawning area for the species.

To meet the goals of the bi-state plan for the development of Lake Champlain’s salmonid fishery<sup>42</sup>, upstream and downstream passage provisions are being investigated at dams on certain Lake tributaries. In Vermont, the Winooski River and the Lamoille River are included in this effort; however, this initiative has not been extended to Otter Creek as the other tributaries present a better opportunity for cold water fish spawning.

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<sup>37</sup> Not applicable - The facility does not create a barrier to upstream passage, or there are no migratory fish in the vicinity of the facility and the facility is nor the cause of extirpation of such species if they had been present historically.

<sup>38</sup> Migrates from salt water to fresh water to spawn.

<sup>39</sup> Migrates from fresh water to salt water to spawn.

<sup>40</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=8033634>

<sup>41</sup> Migrates within fresh water only.

<sup>42</sup> Strategic Plan for Development of Salmonid Fisheries in Lake Champlain, NYS Department of Environmental Conservation, October 4, 1977.



Throughout the prior LIHI certification period, GMP has not received notice from agencies of a need for upstream passage. No new issues have arisen. It is my recommendation that the Project is in compliance concerning upstream fish passage criteria.

## 7.4 LIHI Criterion D-Downstream Fish Passage

The Project satisfies the “LIHI downstream fish passage criterion” in all ZOE by meeting alternative standard D-1<sup>43</sup>.

No downstream passage requirements have been identified for migratory or riverine species. Existing riverine species appear to be abundant upstream and downstream of the Project<sup>44</sup>.

As stated in section 7.3, the VDEC manages the section of Otter Creek that extends from the Project upstream to the Huntington Falls dam primarily as a warm-water fishery. The principle gamefish species found in the Project impoundment are northern pike and smallmouth bass. Other gamefish that are present include largemouth bass, brown trout and rainbow trout. Other species that occur upstream of the Project include rock bass, bluegill, pumpkin seed, yellow perch, brown bullhead, white sucker, and fall fish. The reach below the Project is managed as a mixed warm-water and cool-water fishery. Fish species found downstream are similar to those occurring upstream supporting the applicant’s statement that no barriers to downstream passage exist. In the 2013 FERC Environmental Assessment for the upstream Otter Creek Project (FERC No. 2558), approximately 25 fish species are known to occur in Otter Creek<sup>45</sup>.

Downstream fish dispersal is facilitated by the Project’s spillway, tainter gate, or turbine which additionally requires passage through steel trashracks with 3-inch clear spacing. Fish passage is also allowed over the downstream diversion structure and through the flow control weir. The WQC requires that GMP consult with the VDFW prior to replacement of Project trashracks. Such consultation will concentrate on the need, if any, in reducing fish entrainment at the trashracks.

Finally, license article 405 reserves future FERC authority to order downstream fishways if prescribed by the DOI.

Throughout the prior LIHI certification period, GMP has not received notice from agencies of a need for downstream passage. No new issues have arisen. It is my recommendation that the Project is in compliance concerning downstream fish passages criteria.

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<sup>43</sup> Not applicable - 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. For riverine fish populations that are known to move downstream, explain why the facility does not contribute adversely to the sustainability of these populations or to their access to habitat necessary for successful completion of their life cycles. Document available fish distribution data and the lack of migratory fish species in the vicinity. If migratory fish species have been extirpated from the area, explain why the facility is or was not the cause of this.

<sup>44</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=8033634>

<sup>45</sup> <https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=13315251>





## 7.5 LIHI Criterion E-Watershed Protection

The Watershed Protection criterion is designed to ensure that sufficient action has been taken to protect, mitigate and enhance environmental conditions in the watershed. The applicant states that the development satisfies the “LIHI Watershed Protection criterion” in all ZOE by meeting alternative standard E-1<sup>46</sup>.

There are no requirements for a buffer zone, shoreline management plan or similar protection requirements for the Project. Land cover units with non-significant ecological value identified within the vicinity of the Project can be found in Table 1<sup>47</sup>.

The Impoundment ZOE shoreline is primarily bordered by forested upland areas and pasture/hay areas. Closer to the dam and bypass reach, the shoreline is more open with low intensity housing nearby. Throughout the Downstream ZOE, the shoreline primarily contains pasture/hay and crop lands and high intensity development near the town of Vergennes.

An erosion study was completed by Knight Consulting Services (KCS) in 1997, including both the Project impoundment and the downstream reaches to the Lemon Fair River in Vermont. For the downstream reach, the observer concluded that, although there are some banks experiencing severe erosion, Project operation is not a significant influence. In reaching that conclusion, the observer noted that peaking to total plant capacity (1,600 CFS) rarely occurs<sup>48</sup>. The observer concluded that the impoundment shoreline erosion was relatively minor compared to downstream erosion and that the predominant factors are related to natural high flows and perhaps ice action, but not operational cycling of the impoundment<sup>49</sup>.

Table 1 - Project Area Land Cover As Classified By The National Land Cover Database 2011	
Classification	Description
11	Open Water- areas of open water, generally with less than 25% cover of vegetation or soil
21	Developed, Open Space- areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
22	Developed, Low Intensity- areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% percent of total cover. These areas most commonly include single-family housing units.
23	Developed, Medium Intensity -areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50% to 79% of the total cover. These areas most commonly include single-family housing units.
24	Developed High Intensity-highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80% to 100% of the total cover.

<sup>46</sup> Not applicable - If there are no lands with significant ecological value associated with the facility, document and justify. Document that there have been no Shoreline Management Plans or similar protection requirements for the facility.

<sup>47</sup> Source - National Land Cover Database 2011 - [https://www.mrlc.gov/nlcd11\\_leg.php](https://www.mrlc.gov/nlcd11_leg.php)

<sup>48</sup> Peaking typically operates the turbine at its efficient flow setting of 1,100 CFS.

<sup>49</sup> Weybridge Project – Application for New License from Major Project (5 MW or Less), May 1998, vol. III, Appendix B, Erosion Study Report, October 30, 1997.



Table 1 - Project Area Land Cover As Classified By The National Land Cover Database 2011	
Classification	Description
41	Deciduous Forest- areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously in response to seasonal change.
42	Evergreen Forest- areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species maintain their leaves all year. Canopy is never without green foliage.
43	Mixed Forest- areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75% of total tree cover.
52	Shrub/Scrub- areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.
81	Pasture/Hay-areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20% of total vegetation.
90	Woody Wetlands- areas where forest or shrub land vegetation accounts for greater than 20% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.
95	Emergent Herbaceous Wetlands- Areas where perennial herbaceous vegetation accounts for greater than 80% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

Throughout the prior LIHI certification period, no new issues have arisen. It is my recommendation that the Project is in compliance concerning shoreline and watershed protection criteria.

## 7.6 LIHI Criterion F-Threatened and Endangered Species

The Threatened and Endangered Species Protection Criterion is designed to ensure that the facility does not negatively impact state or federal threatened or endangered species.

The applicant states that the development satisfies the “LIHI Threatened and Endangered Species Protection criterion” in all ZOE’s by meeting alternative standard F-2<sup>50</sup>.

A U.S. Fish and Wildlife Service Information for Planning and Conservation (IPaC) Trust Resources report was generated on January 17, 2017 for the Project impoundment ZOE.

The IPaC report identified one federally endangered bat species, the Indiana Bat (*Myotis sodalists*), and one federally threatened species, the Northern Long-eared Bat (*Myotis septentrionalis*) that may occur within the Project area. Both bat species are additionally listed as endangered with the VFWD Natural Heritage Inventory (VNHI), which is a species list covering state-threatened or state-endangered animals in Vermont according to Vermont’s Endangered Species Law (10 V.S.A. Chap. 123).<sup>51</sup> Given no critical habitat has been identified in the area and the transient nature of the identified species, continued Project operations are not expected to impact these species.

<sup>50</sup> Finding of No Negative Effects – Need to identify all listed species in the facility area based on current data and 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.

<sup>51</sup> <http://vtfishandwildlife.hosted.civiclive.com/common/pages/DisplayFile.aspx?itemId=268519>



The VNHI additionally identified 14 migratory birds that may occur within the Project area. All of the bird species listed are considered birds of federal “conservation concern.” The following bird species may be found within the Project area: American Bittern (*Botaurus lentiginosus*), Bald Eagle (*Haliaeetus leucocephalus*), Black Tern (*Chlidonias niger*), Black-billed Cuckoo (*Coccyzus erythrophthalmus*), Black-crowned Night-heron (*Nycticorax nycticorax*), Canada Warbler (*Wilsonia Canadensis*), Common Tern (*Sterna hirundo*), Olive-sided Flycatcher (*Contopus cooperi*), Peregrine Falcon (*Falco peregrinus*), Pied-billed Grebe (*Podilymbus podiceps*), Prairie Warbler (*Dendroica discolor*), Short-eared Owl (*Asio flammeus*), Willow Flycatcher (*Empidonax traillii*), and Wood Thrush (*Hylocichla mustelina*).

The only year-round bird found in the Project area is the Bald Eagle. All of the other 13 species are found exclusively during breeding season.

As identified under the Vermont Endangered Species Law (10 V.S.A. Section 5401 and 5403) the following state endangered and threatened migratory bird species may occur within the Project area:

- Osprey (*Pandion haliaetus*), a state-threatened species, are known to use this reach of the river on a transitory basis, but no known nesting attempts exist;
- Bald Eagle (*Haliaeetus leucocephalus*), a state-endangered species, may also be found within the Project area;
- A February 15, 2017, email from VDEC additionally identified the hybrid thread-leaved pondweed (*Stuckenia x fennica*) and the Riverweed (*Podostemum ceratophyllum*) to be two state-listed rare species that may occur upstream of the dam.
- Within the February 15, 2017 email, the VDEC also identified two other species that occur immediately upstream of the Middlebury dam and are likely to also occur between that structure and the Weybridge dam: fluted-shell (*Lasmigona costata*) and the Creek heelsplitter (*Lasmigona compressa*), state threatened and rare species, respectively.

A second U.S. Fish and Wildlife Service Information for Planning and Conservation (IPaC2) Trust Resources report was generated on January 17, 2017 for the Project bypassed reach ZOE and downstream ZOE.

The IPaC2 report found:

- The bypass reach ZOE and downstream ZOE contained all of the same species as identified in the Impoundment ZOE, with the exception of one additional listed Migratory bird: the Golden-winged Warbler (*Vermivora chrysoptera*). The Golden-winged Warbler is a species identified as a federal “conservation concern”;
- A hackberry stand (*Celtis occidentalis*), which is considered to be a significant community in Vermont, exists in the upper floodplain of Otter Creek below the dam;
- A state threatened plant species, green dragon (*Arisaema dracontium*), also exists approximately 2.5 miles below the Weybridge dam.<sup>47</sup> Because the green dragon population is elevated above the river by over 8 feet, the population exists above the Project’s influence;
- The February 15, 2017 email from VDEC additionally identified the Giant floater (*Pyganodon grandis*) a state threatened species and the creeping lovegrass (*Eragrostis hypnoides*) a rare species to occur downstream of the Weybridge dam.



Per VDEC email dated May 30, 2017, it was identified that continued Project operations will not have a negative impact on rare plants in any ZOE's.

The USFWS drafted a Recovery Plan in 2007 for the Indiana Bat<sup>52</sup> and the VFWD published an October 2010 recovery plan for the bald eagle<sup>53</sup>.

Per VDEC email dated June 20, 2017, VDEC stated that given the WQC was conditioned to ensure compliance with all applicable provisions of the Vermont Water Quality Standards and other appropriate requirements of state law, VDEC can confirm that if operated with its certification, the Project does not negatively impact the above noted species.

Related communications are included in Appendix A, pages A-8 through A-10.

A review of the FERC docket indicates that during the prior LIHI certification period, the Project is in compliance with both state and federal resource agencies concerns pertaining to threatened and endangered species and that no new areas of concern have occurred, and there is no negative effect from Project operations on such species, thus the Project meets this criterion.

## 7.7 LIHI Criterion G-Cultural Resource Protection

The Cultural Resource Protection Criterion is designed to ensure that the Project does not negatively impact approved state, provincial, federal, and recognized tribal plans designed for the protection, enhancement and mitigation to cultural and historic resources.

The applicant states that the Project satisfies the "LIHI cultural and historic resources criterion" in all ZOE's by meeting alternative standard G-2<sup>54</sup>.

Per License Article 407, a Programmatic Agreement (PA) was signed by CVPSC, FERC and the VDHP for managing historic properties, executed on February 21, 2001<sup>55</sup>.

The PA requires GMP to monitor and manage the Project and any archaeological and historic structures within the Project's area according to the Historic Properties Management Plan (HPMP) filed on November 22, 2002<sup>56</sup>. GMP is aware of the consultation requirements with the VDHP prior to any construction or land disturbing activities set forth in Article 407.

Throughout the prior LIHI certification period, the Project has maintained compliance of the HPMP. The following HPMP reports have been filed:

- On August 3, 2012, CVPSC filed the 2012 Annual HPMP Report<sup>57</sup>.

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<sup>52</sup> [https://www.fws.gov/midwest/endangered/mammals/inba/pdf/inba\\_fnldrftrecpln\\_apr07.pdf](https://www.fws.gov/midwest/endangered/mammals/inba/pdf/inba_fnldrftrecpln_apr07.pdf)

<sup>53</sup> <http://www.vtfishandwildlife.com/common/pages/DisplayFile.aspx?itemId=111337>

<sup>54</sup> Approved Plan:- Provide documentation of all approved plans for the protection, enhancement, and mitigation of impacts to cultural and historic resources affected by the facility. Document that the facility is in compliance with all such plans..

<sup>55</sup> [https://elibrary.ferc.gov/idmws/search/intermediate.asp?link\\_info=yes&doclist=2127065](https://elibrary.ferc.gov/idmws/search/intermediate.asp?link_info=yes&doclist=2127065)

<sup>56</sup> <http://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=10615741>

<sup>57</sup> <http://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=13040102>





- On October 31, 2013, GMP submitted the 2013 Annual HPMP Report<sup>58</sup>.
- On August 1, 2014, GMP submitted the 2014 Annual HPMP Report<sup>59</sup>.
- An Archaeological Phase II Testing of Native American Site VT-AD-44 report was prepared and filed with the VDHP in 2015.
- On July 29, 2016, GMP submitted the Annual 2016 HPMP Report<sup>60</sup>.
- On August 1, 2017, GMP submitted the Annual 2017 HPMP Report<sup>61</sup>.

Throughout the prior LIHI certification period, the Project has complied with all requirements regarding cultural resource protection, mitigation or enhancement included in the FERC license and no new areas of concern have arisen, thus the Project meets this criterion.

## 7.8 LIHI Criterion H-Recreation

The development satisfies the “LIHI recreation criterion” in all ZOE by meeting alternative standard H-2<sup>62</sup>. A Recreation Plan (RP)<sup>63</sup> has been developed to allow continued free public access at the Project as approved by FERC on July 30, 2002<sup>64</sup>. As-built recreation facility drawings were filed with the FERC on May 29, 2003<sup>65</sup> and approved by the FERC on July 18, 2003<sup>66</sup>.

In accordance with the RP, facilities include:

1. A canoe take-out and portage trail within the Impoundment ZOE;
2. A canoe portage trail and portage put-in, a parking area and picnic tables are provided in the bypass reach and downstream ZOEs;

During the prior LIHI certification period, the following recreational compliance events occurred:

- On January 27, 2014, FERC issued a notice to remind GMP of the obligation to file a Form 80 for the period of March 15, 2014 to April 1, 2015<sup>67</sup>;
- On April 1, 2015, GMP filed the FERC Form 80<sup>68</sup>. The next Form 80 is not due again until April 1, 2021.
- On July 9, 2015, a FERC Environmental Inspection was completed at the Project, including an assessment of recreation activities<sup>69</sup>. The recreational facilities and landscaping surrounding the facilities were documented to be in good condition with the exception of the picnic tables at the recreation site on Rock Island. The inspector found that the tables were warped and not considered usable. The inspector recommended that in order to provide a safe and enjoyable user experience at the picnic sites, GMP needed to either repair or replace the worn out tables. Also,

<sup>58</sup> <http://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=13385163>

<sup>59</sup> <http://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=13606881>

<sup>60</sup> <http://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=14319721>

<sup>61</sup> <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14650722>

<sup>62</sup> Agency Recommendation - Document resource agency recommendations and enforceable recreation plan that is in place for recreational access or accommodations. Document that the facility is in compliance with all such recommendations and plans.

<sup>63</sup> <http://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=10145895>

<sup>64</sup> [http://elibrary.ferc.gov:1/idmws/file\\_list.asp?document\\_id=2302521](http://elibrary.ferc.gov:1/idmws/file_list.asp?document_id=2302521)

<sup>65</sup> [http://elibrary.ferc.gov:1/idmws/file\\_list.asp?document\\_id=4107955](http://elibrary.ferc.gov:1/idmws/file_list.asp?document_id=4107955)

<sup>66</sup> [http://elibrary.ferc.gov:1/idmws/file\\_list.asp?document\\_id=4120447](http://elibrary.ferc.gov:1/idmws/file_list.asp?document_id=4120447)

<sup>67</sup> <http://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=13446378>

<sup>68</sup> <http://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=13826261>

<sup>69</sup> [http://elibrary.ferc.gov:1/idmws/file\\_list.asp?document\\_id=14367084](http://elibrary.ferc.gov:1/idmws/file_list.asp?document_id=14367084)



the condition of the access road to the picnic area was noted as a follow up item. The access road had been heavily rutted and contained numerous potholes from road use following wet conditions. In order to reduce the potential for erosion and runoff to adjacent land, GMP was requested to regrade and restore this access road;

- On September 18, 2015, GMP responded to the Environmental Inspection Report<sup>70</sup>. GMP confirmed that they had regraded the Weybridge recreation area access road, repaired the Weybridge picnic tables and replaced tables that were identified as too warped.

Throughout the prior LIHI certification period, the Project has complied with all requirements regarding recreation included in the FERC license. The Project allows access to the reservoir and downstream reaches without fees or charges, thus the Project meets this criterion.

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<sup>70</sup> <http://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=13990601>



## 8 RECOMMENDATION

A review of the recertification application and a FERC docket search from the start of the previous LIHI certification, approximately February 6, 2012 through present day, exemplifies that GMP has been proactive regarding environmental issues associated with the Project.

Filings were on time without the need of time extension requests. The docket search review resulted in no major non-compliance issues surfacing in the record. The Project is also in compliance with state and federal resource agency recommendations applicable to the LIHI criteria and continues to satisfy all LIHI criteria.

Therefore, I recommend that GMP be issued a LIHI recertification for an additional five years for the Weybridge Project, LIHI #98.

**Gary M. Franc**



**FRANC LOGIC**

*Licensing & Compliance*

*Hydropower Consulting & Modeling*



APPENDIX A  
DOCUMENTS

**From:** [Davis, Eric](#)  
**To:** [gary](#)  
**Cc:** [mfischer@lowimpacthydro.org](mailto:mfischer@lowimpacthydro.org)  
**Subject:** RE: Low Impact Hydro Institute - Weybridge Project - LIHI #98  
**Date:** Tuesday, February 26, 2019 6:23:14 PM

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Good afternoon Gary,

The Agency of Natural Resources has been reviewing the pending LIHI application for the Weybridge Hydroelectric Project to be certified as low impact.

Prior to submitting its LIHI application, the applicant via Kleinschmidt Group engaged Agency staff. Subsequent to its application, Kleinschmidt provided one year of operations data to confirm compliance with water quality certification (WQC) conditions. Further, Kleinschmidt provided rating curves for the minimum flow gate to provide additional context to the operations data.

The Agency has completed its review and supports certification of the facility as low impact.

Thank you,  
Eric

**Eric Davis, River Ecologist**

1 National Life Drive, Main 2  
Montpelier, VT 05620-3522  
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<http://www.watershedmanagement.vt.gov/rivers>



VERMONT DEPARTMENT OF  
ENVIRONMENTAL CONSERVATION  
**WATERSHED  
MANAGEMENT DIVISION**  
RIVERS PROGRAM



**From:** [Katie Sellers](#)  
**To:** [mfischer@lowimpacthydro.org](mailto:mfischer@lowimpacthydro.org)  
**Subject:** FW: Weybridge Project - Operations Data Submission for LIHI Application  
**Date:** Friday, December 28, 2018 9:12:53 AM  
**Attachments:** [Weybridge Gate Discharge Capacity.xlsx](#)

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Hi Maryalice – Update re: Weybridge. The below and attached information was just sent to VTDEC.

Happy Holidays!  
Katie

Katie E. Sellers, M.S.  
Regulatory Coordinator

**Kleinschmidt**

Office: 207-416-1218

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**From:** Katie Sellers  
**Sent:** Friday, December 28, 2018 9:11 AM  
**To:** 'Davis, Eric' <Eric.Davis@vermont.gov>  
**Cc:** Andy Qua <Andy.Qua@KleinschmidtGroup.com>; Greenan, John  
<John.Greenan@greenmountainpower.com>; Jennifer Jones  
<Jennifer.Jones@KleinschmidtGroup.com>  
**Subject:** RE: Weybridge Project - Operations Data Submission for LIHI Application

Hi Eric –

In the SCADA data, negative values indicate the tainter gate is closed – and the ‘negativeness’ of the number has to do with the slack in the chain, which is to keep load off the chain during cold weather. A positive value means the gate is open and the value is in feet. Because of icing problems in winter that made it difficult to control minimum flow with the tainter gate, a minimum flow gate was installed at the facility in 2003. The SCADA data for the minimum flow gate is the gate opening in feet.

When the headpond is at the maximum 2 foot drawdown with no generation, the minimum flow gate isn’t large enough to pass the 250 cfs required unless the units are running. To make up the difference, the tainter gate is programmed to open and supplement the flow when necessary. How that is done is programmed in the PLC, and there is a ramping process during startup and shutdown to adjust gate openings as the headpond elevation changes after unit shutdown.

Since the set-up has changed a bit since the flow study, there are not any gate openings that directly correlate to minimum flows/confirmation that minimum flows are being met. To help with your analysis, though, we have developed a minimum flow gate discharge capacity worksheet (attached). This worksheet includes minimum flow gate rating curves and a “Minimum Flow Discharge Table” tab which includes a discharge table that compares headpond elevation with gate opening height (in feet) to determine theoretical minimum flow discharge. Per a comparison of the operations data and

the discharge table (note that the "Minimum Flow Gate Pos" column unit of measurement is in feet), it appears that the minimum flow of at least 125 cfs was easily passed or 250 cfs when the station wasn't generating. The only times where minimum flows may have been right on the 125 cfs line or just below were when the sluice gate replacement occurred in October 2016 and during the March 2017 drawdown for flashboard work.

Hopefully this provides some further clarification. Let us know if you have any follow up questions. Thank you for your patience on this and happy new year!

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

**Sent:** Tuesday, July 10, 2018 12:45 PM

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

**Cc:** Andy Qua <[Andy.Qua@KleinschmidtGroup.com](mailto:Andy.Qua@KleinschmidtGroup.com)>; Greenan, John

<[John.Greenan@greenmountainpower.com](mailto:John.Greenan@greenmountainpower.com)>

**Subject:** RE: Weybridge Project - Operations Data Submission for LIHI Application

Hi Katie,

I'm progressing in my review of the Weybridge project operations data and I'm hoping you can help me think about a couple of the values recorded by the PLC system to complete my review.

So far I've been able to determine as a preliminary matter that the PLC is recording all of the data specified in the flow management plan to demonstrate compliance. Additionally, the downstream flows look good. So, I'm just trying to think through the minimum flow portion of condition B and article 401 of the FERC license. At the time of relicensing there was gauging performed (attached) that showed a taintor gate opening of .44 feet was needed to pass 125 cfs and a gate opening of .88 feet was needed to pass 250 cfs.

In this context, I'm wondering how I should view the values included in the spreadsheet for minimum flow gate position and taintor gate. What are the values in reference too? What would be the equivalent for gate openings listed above?

Thanks,  
Eric

**Eric Davis, River Ecologist**

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<http://www.watershedmanagement.vt.gov/rivers>



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**WATERSHED**  
MANAGEMENT DIVISION  
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---

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

**Sent:** Tuesday, June 05, 2018 3:27 PM

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

**Cc:** Andy Qua <[Andy.Qua@KleinschmidtGroup.com](mailto:Andy.Qua@KleinschmidtGroup.com)>; Greenan, John  
<[John.Greenan@greenmountainpower.com](mailto:John.Greenan@greenmountainpower.com)>

**Subject:** Weybridge Project - Operations Data Submission for LIHI Application

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

- 2016-2017 Weybridge Operations Data\_FINAL.xlsx (21.8 MB)

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

Hi Eric,

Kleinschmidt, on behalf of GMP, herein provides one-year (2016-2017) of Weybridge Hydroelectric Project (FERC No. 2731) operations data via ShareFile for review. This operations data is being supplied to the Vermont Department of Environmental Conservation (VDEC) for verification of Project compliance with the VDEC Water Quality Certificate conditions, as requested for Low Impact Hydropower Institute certification application review.

The attached 2016-2017 data depicts project generation, headpond level, river flow, and flashboard data to display operations occurring at the Weybridge Project. As depicted in the spreadsheet cover page, flow data was prorated from USGS gage 04282500 – Otter Creek at Middlebury, VT and USGS gage 040282525 – New Haven River at Brooksville, Near Middlebury, VT. Compliant operations are represented well across the dataset. As displayed in the data, the headpond was drawn down at the end of October 2016 for a sluice gate replacement and a short drawdown occurred again at the end of March 2017 to allow for flashboard work. Additional fluctuations in headpond levels correlate to the following identified occurrences:

- Weather events
- River forecast considerations
- Faulty transducer data
- Temporary maintenance activities

- Generator trips

In addition, please find a theoretical turbine rating curve for the Weybridge Project attached. This theoretical curve was developed using a combination of the attached operations data and standard factory information on the individual turbine. This curve has an accuracy range of approximately +5% to -10%.

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

Thank you,  
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

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**From:** [Davis, Eric](#)  
**To:** [Katie Sellers](#)  
**Cc:** [Nuria Claudio](#)  
**Subject:** RE: Weybridge Hydroelectric Project - Review for LIHI Re-Certification  
**Date:** Friday, January 27, 2017 10:01:10 AM  
**Attachments:** [image002.png](#)

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Good morning Katie,

I can confirm that waters listed below are on Vermont's 303 (d) List of Impaired Waters: Part A – Impaired Surface Waters in need of a TMDL. For each reach, I can describe the cause of impairment and the potential impact of project operations.

- Lower Otter Creek, BELOW Vergennes Waste Water Treatment Facility
  - This reach is listed as impaired for e. Coli due to periodic and recurring combined sewer overflows of the wastewater pump station. The projects current operations continue to not be a contributing cause to impairment of this reach.
- Otter Creek in vicinity of Rutland Waste Water Treatment Facility
  - This reach is listed as impaired for e. Coli due to the Rutland City WWTF collection system passing combined sewer overflows. The projects current operations continue to not be a contributing cause to impairment of this reach.
- Little Otter Creek RM 15.4 to RM 16.4 for Agricultural nutrients and sediments.
  - This reach is on a tributary to Otter Creek. It is listed as impaired for nutrients and sediment. The projects current operations continue to not be a contributing cause to impairment of this reach.
- Lake Champlain (Ferrisburg) for elevated levels of PCBs in Lake Trout
  - This segment is listed as impaired for PCBs. The projects current operations continue to not be a contributing cause to impairment of this segment.

Eric

**Eric Davis, River Ecologist**

1 National Life Drive, Main 2  
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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:** Katie Sellers [<mailto:Katie.Sellers@KleinschmidtGroup.com>]  
**Sent:** Tuesday, January 17, 2017 5:06 PM  
**To:** Davis, Eric <[Eric.Davis@vermont.gov](mailto:Eric.Davis@vermont.gov)>  
**Cc:** Nuria Claudio <[Nuria.Claudio@Kleinschmidtgroup.com](mailto:Nuria.Claudio@Kleinschmidtgroup.com)>  
**Subject:** Weybridge Hydroelectric Project - Review for LIHI Re-Certification

**From:** [Popp, Bob](#)  
**To:** [Katie Sellers](#)  
**Subject:** RE: Weybridge Hydroelectric Project - LIHI Review  
**Date:** Tuesday, May 30, 2017 11:52:52 AM

---

Hi Katie, I have no plants to add to the list. If nothing is changing in the operating protocol, then there should be no impact to the rare plants.

Thanks for checking with us.

Bob

Bob Popp  
Department Botanist  
VT. Dept of Fish & Wildlife  
5 Perry St. Suite 40  
Barre, VT. 05641

(802) 476-0127  
[bob.popp@vermont.gov](mailto:bob.popp@vermont.gov)

---

**From:** Katie Sellers [<mailto:Katie.Sellers@KleinschmidtGroup.com>]  
**Sent:** Friday, May 26, 2017 9:25 AM  
**To:** Popp, Bob <[Bob.Popp@vermont.gov](mailto:Bob.Popp@vermont.gov)>  
**Subject:** Weybridge Hydroelectric Project - LIHI Review

Hi Bob,  
I have another Low Impact Hydropower Institute application in need of threatened and endangered plant species review. This is for the Weybridge Hydroelectric Project (FERC No. 2731) located on Otter Creek.

Upon reviewing pertinent environmental documents for this Project, a list of potential threatened and endangered species that may occur within this project area has been developed. Could you a) review the below species list to make sure it is accurate and/or suggest updates as appropriate; and b) review this list to confirm that the Project continues to not negatively affect any of the currently listed species that may occur within the Project area?

Species List:  
-hybrid thread-leaved pondweed (*Stuckenia x fennica*)  
-Riverweed (*Podostemum ceratophyllum*)  
-hackberry stand (*Celtis occidentalis*)  
-green dragon (*Arisaema dracontium*)  
-creeping lovegrass (*Eragrostis hypnoides*)

No changes to the project or tree cutting are planned at this time. A map depicting the Weybridge Project area in need of review is attached (red highlighted area stretching from Huntington Falls

**From:** [Davis, Eric](#)  
**To:** [Katie Sellers](#)  
**Cc:** [Nuria Claudio](#)  
**Subject:** RE: Weybridge Hydroelectric Project - Review for LIHI Re-Certification  
**Date:** Tuesday, June 20, 2017 2:40:54 PM  
**Attachments:** [image005.png](#)

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Hi Katie,

The Agency has reviewed our records for the Weybridge project and provides the following information regarding rare, threatened, and endangered species requested by Kleinschmidt to aid in the development of a complete LIHI application.

-

Rare, Threatened and Endangered Species

I can confirm that the Project, as it currently operates and with no plans for tree removal, does not have the potential to negatively affect listed bat, bird, and plant species.

In regards to the three mussel species, while there are no records of rare or state-listed freshwater mussels immediately upstream of the Weybridge dam, listed species do occur upstream of the Middlebury dam, where one rare (Creek Heelsplitter) and one state-endangered species (Fluted-shell) occur not far upstream. Since these two species haven't been reported in Otter Creek anywhere downstream of the Middlebury dam, it is difficult to know whether they might occur within the section affected by Weybridge hydroelectric operations. One state-listed freshwater mussel occurs downstream of the dam, Giant Floater. It has been reported in Otter Creek in New Haven as well as the Lemon Fair River. It is, therefore, likely that it occurs or did occur in Otter Creek upstream of the Lemon Fair Confluence as well, though no survey data for that section. If this species does occur in the downstream portion of Otter Creek that is affected by hydroelectric operations, regular fluctuation of water level would prevent Giant Floater from using the dewatered areas (primarily along the shores), thus potentially reducing overall available habitat.

However, the presence of mussel species, including ones that are state listed as endangered or threatened, were explicitly considered in the water quality certification for the project (Finding 64). Given the certification was conditioned to ensure compliance with all applicable provisions of the Vermont Water Quality Standards and other appropriate requirements of state law, I can confirm that if operated in compliance with its certification, the project would not negatively impact these species

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

Thank you,  
Eric

**Eric Davis, River Ecologist**

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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:** Katie Sellers [mailto:Katie.Sellers@KleinschmidtGroup.com]  
**Sent:** Tuesday, February 21, 2017 3:10 PM  
**To:** Davis, Eric <Eric.Davis@vermont.gov>  
**Cc:** Nuria Claudio <Nuria.Claudio@Kleinschmidtgroup.com>  
**Subject:** RE: Weybridge Hydroelectric Project - Review for LIHI Re-Certification

Hi Eric – Thanks for passing this information along.

Can Chet (or others) possibly confirm that the Project, as it currently operates and with no plans for tree removal, continues to not negatively impact any of the currently listed species as identified in the finalized species list below?:

*Giant floater – state-threatened*  
*Creeping lovegrass – rare*  
*Hybrid thread-leaved pondweed – rare*  
*Riverweed – rare*  
*Fluted-shell – state-threatened*  
*Creek heelsplitter – rare*  
Indiana Bat - Endangered  
Northern Long-eared Bat - Endangered  
Osprey - SGCN  
Bald Eagle - Endangered

Thank you,  
Katie

Katie Sellers  
Regulatory Coordinator  
**Kleinschmidt**  
Office: 207-416-1218

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

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

APPLICATION FOR WEYBRIDGE  
HYDROELECTRIC PROJECT

The Water Quality Division of the Vermont Department of Environmental Conservation (the Department) has reviewed a water quality certification application filed by Central Vermont Public Service Corporation (the applicant) for the Weybridge Hydroelectric Project. The application was filed by letter dated June 29, 2000. The application was reviewed under the Vermont Water Quality Standards (Standards) adopted by the Water Resources Board on April 2, 1997, in accordance with Section 1-01(A) *Applicability*. The application includes the applicant's Federal Energy Regulatory Commission (FERC) license application, filed with FERC under a cover letter dated May 26, 1998. Project changes subsequent to the date of the license application were summarized in a letter dated April 22, 1999 from the applicant to the Department.

The Department placed a draft certification decision on notice February 9, 2001 under the rules governing certification and received written comments through March 14, 2001.

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

**I. Background/General Setting**

1. Otter Creek, Vermont's longest river, flows about one hundred miles from its source at Emerald Lake in Dorset north to its mouth at Lake Champlain in Ferrisburgh. The river has been heavily developed for hydroelectric power generation, hosting seven active dams on the mainstem. The applicant operates hydroelectric facilities at Middlebury Lower Dam and Weybridge Dam, the fifth and second dams, respectively, above the river's mouth. The other dams are owned by Green Mountain Power Corporation (GMP) and OMYA, Inc.
2. Weybridge Dam is located in Weybridge village at River Mile 19.5. Here the river opposes its northerly route by returning to a southerly flow orientation. The dam is at the head of a rock gorge where the river splits around a small island. That island also splits the dam structure into a west (river right) and an east (river left) section. The project impounds a reach of river about 1.5 miles in length, extending up river to Huntington Falls.



**Water Quality Certification**  
**Weybridge Hydroelectric Project**  
**Page 2**

3. Of Otter Creek's 936 square mile watershed, the project utilizes runoff from an area of 750 square miles.
4. The Federal Energy Regulatory Commission licensed the project on May 12, 1980, with the term of the license running for a period of twenty years through May 31, 2000. Federal jurisdiction over the project was determined based on the Commission having found in 1965 that Otter Creek is a navigable waterway.

**II. Project and Civil Works**

5. The site was originally developed through the construction of a timber crib dam in about 1870. That dam was succeeded by another crib dam in 1910. The Hortonia Power Company, formed in 1912, undertook the development of hydroelectric generation at Weybridge and three other projects in the Otter Creek basin--the Middlebury Lower, Salisbury and Silver Lake projects. Hortonia Power Company constructed the hydroelectric generating station at Weybridge in 1922. The station housed a 750 hp waterwheel driven by a head of 18 feet. Later, the timber crib dam connecting the island with the west shore was replaced by a concrete dam substantially completed in 1944. The project assumed its present form when, in 1951, the east timber crib dam was replaced by a concrete dam, an integral powerhouse, and an adjacent wasteway. At that time, the project capacity was increased from 500 kW to 3,000 kW.
6. The powerhouse houses a single Kaplan-type turbine unit manufactured by S. Morgan Smith Co. and operating under a design head of 31 feet. (Redevelopment in 1951 resulted in an increase in the head on the order of 13 feet.) The turbine drives a Westinghouse generator.
7. The dam is a concrete gravity structure about 30 feet high and founded on bedrock. The crest elevation is 168.3 feet NGVD. The right (west) spillway is 150 feet long and incorporates a single Taintor gate, 20 feet x 10 feet high, and six foot high hinged steel flashboards, which are manually tripped. The gate can be operated on-site or remotely from the applicant's dispatch center. The left spillway, 116 feet long, is surmounted by automatic inflatable rubber flashboards six feet high. The flashboard systems raise the effective crest of the dam to elevation 174.3 feet NGVD. A stoplog sluice, three feet wide, is located adjacent to the intake.
8. A set of trashracks with a 3.0-inch clear spacing is located at the headworks. The trashracks are cleaned by a blower system and a

mechanical rake. The license application does not indicate how disposal of debris removed from the trashracks is handled.

9. The increase in operating head achieved in the 1951 redevelopment was partially gained through extensive channelization of the tailrace reach for 2,200 feet below the project. Approximately 20,000 cubic yards of material, including 5,000 cubic yards of bedrock, were removed. (*Weybridge Project - Application for New License for Major Project (5 MW or Less)*, May 1998, vol. III, *National Register of Historic Places Registration Form*, Section 8, p. 28)
10. The impoundment has a surface area of approximately 62 acres and a gross storage capacity of approximately 600 acre-feet. Useable storage has been estimated at 115 acre-feet with a two-foot drawdown.
11. The normal tailwater elevation is 143.3 feet NGVD. The tailwater elevation was reduced through the channelization project during the 1951 redevelopment.
12. The plant produces an average annual output of 14,000,000 kWh.

### **III. River Hydrology and Streamflow Regulation**

13. The flow of Otter Creek is regulated by several of the hydroelectric facilities in the basin. Five hydroelectric dams are located on the river mainstem between the river's mouth and Middlebury. Starting at the mouth and going upstream, the five are Vergennes (River Mile 7.4), Weybridge (River Mile 19.5), Huntington Falls (River Mile 21.0), Beldens (River Mile 23.0), and Middlebury Lower (River Mile 24.7). GMP's Vergennes Hydroelectric Project was relicensed on July 30, 1999 for a 30-year term effective June 1, 1999. The Middlebury Lower Project, owned by the applicant, is also in relicensing and received a water quality certification from the Department on June 2, 1999. The Huntington Falls and Beldens facilities are owned by OMYA, Inc. and were redeveloped under a license amendment issued in 1986 to increase the installed capacity at both facilities. OMYA, Inc. also owns two upstream facilities on the mainstem of the river, Proctor Station at Sutherland Falls and the Center Rutland Hydroelectric Project in Rutland. The applicant owns several facilities in the Leicester River and East Creek watersheds.
14. The Beldens and Huntington Falls plants are operated as strict run-of-the-river facilities. As such, they no longer regulate flows to preferentially generate on peak. The applicant proposes to operate the Middlebury Lower facility in a strict run-of-the-river mode under

the new license. The utility, however, proposes to maintain a daily cycle operation at the Weybridge facility except during the spring period, April 1 - June 15, when the station would be operated run-of-river. As licensed, the Vergennes Hydroelectric Project is being operated as a strict run-of-the-river station. The Center Rutland and Proctor facilities are also operated as run-of-the-river stations. Inflows to the Weybridge Project can be considered as almost unaffected by artificial flow regulation. Lower Otter Creek from Weybridge to Lake Champlain is influenced by the project's peaking operation, with the most pronounced effect being in the reach directly below Weybridge dam. The Vergennes Project, by tracking instantaneous inflows, passes the Weybridge Project's flow impacts downstream, but channel storage attenuates the artificial flow fluctuations.

15. From Middlebury to Vergennes, about two-thirds of the river has been impounded by hydroelectric dams.
16. The Weybridge Project is remotely operated as a daily peaking plant through the applicant's Rutland dispatch center. When inflows exceed a flow of 1,600 cfs, the maximum turbine capacity, the project is no longer able to regulate flow and, therefore, operates run-of-river, spilling excess flows at the dam. Under normal operations, the impoundment is cycled two feet as many as three times a day depending on inflows and the ability to replenish storage for the next peak electrical demand period. Occasionally drawdowns of up to four feet occur for special generational circumstances and up to six feet for maintenance and inspection work. Under the current license, the applicant maintains a minimum flow of 140 cfs below the dam. Normally flows are only in the channel below the west spillway when the station has been taken off line and the Taintor gate opened to provide the 140 cfs downstream flow requirement. (The channel is referred to as the "Bypass".) The minimum hydraulic capacity for the turbine is 450 cfs.
17. At the beginning and end of each generation cycle, the applicant ramps flows to reduce the impact of the flow fluctuations on fish and other aquatic organisms downstream.
18. Otter Creek is free flowing for three miles below Weybridge Dam before the river enters the impoundment of the Vergennes Project about one half mile upstream of the Lemon Fair confluence.
19. Since 1903, the U.S. Geological Survey has operated a surface water gaging station (No. 04282500) on Otter Creek in Middlebury village. The intervening watershed between the gage and the project dam is about 122 square miles. The following hydrologic statistics are

available based on a direct proration of statistics from the gage data through water year 1999:

Mean annual flow	1,200 cfs
Annual runoff	21.67 inches
10% exceeds	2,770 cfs
50% exceeds	750 cfs
90% exceeds	310 cfs
7Q10	188 cfs (p.o.r. through 1981)

**Applicant proposal for relicensing:**

20. The applicant proposes to continue to operate the Weybridge Project as a peaking project using a two-foot operating cycle in the impoundment. Cycling would be suspended in the spring, from April 1 through June 15, to protect fish spawning use in the impoundment and downstream.
21. In the Bypass, the applicant would provide a continuous minimum flow of 125 cfs, increasing that flow to 250 cfs when the station is not operating. The minimum bypass flow during operation would be increased to 250 cfs during April and May should walleye be introduced to the Weybridge-Vergennes reach of Otter Creek in the future.
22. The proposal would result in a below-project conservation flow of 250 cfs, except for the spring run-of-river period. Directly below the project is a large island named Wyman Island. To restore habitat in the channel on the west side of Wyman Island, the applicant would construct a diversion weir at the lower end of the Bypass to shunt at least 125 cfs to the west channel.
23. To reduce the impact of peaking-related flow fluctuations on downstream habitat, the applicant would manage releases such that the ratio of each 24-hour-period's high flow to low flow does not exceed 4.5:1. Ramping would also continue to be used during the transition between generation and non-generation.

**IV. Standards Designation**

24. Otter Creek has been designated by the Vermont Water Resources Board as Class B waters. The Water Resources Board has also designated the reach from the Proctor wastewater treatment plant outfall to the river's mouth, with the exception of the segment between the Beldens and Huntington Falls dams, as warmwater fish habitat.

**Water Quality Certification**  
**Weybridge Hydroelectric Project**  
**Page 6**

25. Class B stream reaches are managed to achieve and maintain a high level of quality compatible with certain beneficial values and uses. Values are high quality habitat for aquatic biota, fish and wildlife and water quality that consistently exhibits good aesthetic value; uses are public water supply with filtration and disinfection, irrigation and other agricultural uses, swimming, and recreation. (Standards, Section 3-03(A) *Class B Waters: Management Objectives*)
26. The dissolved oxygen standard for warmwater fish habitat streams is 5 mg/l and 60 percent saturation at all times. Depending on ambient stream temperature conditions, the temperature standard limits increases to values between 1.0 and 5.0°F from background. (Standards, Section 3-01(B)(2) *Temperature*) The turbidity standard is 25 NTU. (Standards, Section 3-03(B)(1) *Turbidity*)
27. Under the general water quality criteria, all waters, except mixing zones, are managed to achieve, as in-stream conditions, aquatic habitat with “[n]o change from background conditions that would have an undue adverse effect on the composition of the aquatic biota, the physical or chemical nature of the substrate or the species composition or propagation of fishes.” (Standards, Section 3-01(B)(5) *Aquatic Habitat*)
28. Standards Section 2-02(B) *Hydrology: Artificial Flow Conditions* requires that “[t]he flow of waters shall not be controlled or substantially influenced by man-made structures or devices in a manner that would result in an undue adverse effect on any existing use, beneficial value or use or result in a level of water quality that does not comply with these rules.” The project dam is a man-made structure that artificially regulates water levels and streamflows.

**Present status:**

29. On July 11, 2000, the Department issued, under Section 303(d) of the Federal Clean Water Act, a list of waters considered to be impaired based on water quality monitoring efforts. The project reach is not listed as impaired.
30. The Department also issued a four-part list, *List of Priority Surface Waters* (July 13, 2000). Part F lists those surface waters where water quality or habitat are being altered by flow regulation. The 2.5 mile segment of Otter Creek directly below Weybridge Dam is listed as having aquatic life support impacted by artificial flow regulation caused by this project.



#### V. Water Chemistry

31. During July and August 1982, the Department of Environmental Conservation completed limited summer sampling of dissolved oxygen and temperature at the project. Sampling was also done on July 27, 1982 by Aquatec, a consulting firm retained by the applicant. Downstream water temperatures mostly were in the range of 24 to 30°C. Many of the samples exhibited supersaturated dissolved oxygen concentrations, indicating substantial algal activity. The study lacked early morning sampling needed to disclose how much of a diurnal swing in dissolved oxygen occurs and what worse-case predawn conditions are. One early morning sample collected at 0638 below the project measured only 60% saturation, probably due to algal respiration. All daytime samples exceeded the minimum standards for warmwater fish habitat.
32. The applicant collected dissolved oxygen and temperature data more or less weekly from July 15 to September 2, 1997 at four stations: the head of the impoundment, in the headrace just upstream of the trashracks, the tailrace, and the Bypass. Flows were relatively low at estimated generation flows of 80-400 cfs. About 0.1 foot of spillage was maintained. All dissolved oxygen concentrations measured in excess of 7 mg/l and 80% saturation, well above the minimum standards for dissolved oxygen.

#### VI. Aquatic Biota and Habitat

33. Class B waters are managed for high quality habitat for aquatic biota (Standards, Section 3-03(A) *Class B Waters: Management Objectives*). Aquatic biota are defined in Standards, Section 1-01(B) *Definitions* as "organisms that spend all or part of their life cycle in or on the water." Included, for example, are fish, aquatic insects, amphibians, and some reptiles, such as turtles.
34. Otter Creek is managed to support both coldwater and warmwater fish. Fish species found below the dam include largemouth and smallmouth bass, brown and rainbow trout, yellow perch, northern pike, fallfish, some panfish species, white sucker, brown bullhead and a number of minnow species. The impoundment has a similar compliment of fishes, although trout are found primarily below the project or above the upstream Huntington Falls dam. The river reach below the project dam is managed as a mixed warmwater/coolwater fishery, while the impoundment is managed primarily as a warmwater fishery.
35. The Department of Fish and Wildlife has indicated an interest in introducing walleye into the downstream Vergennes impoundment

as a future management option. Should this introduction be undertaken and walleye become established, adult walleye would be expected to migrate upstream to the vicinity of the Weybridge dam where there is suitable habitat within the project area downstream of the dam for spawning and incubation.

36. Lower Otter Creek supports a rich diversity of freshwater mussels species. The giant floater mussel, observed about four miles below the Weybridge project, is currently state listed as threatened. The fluted-shell mussel, which is a state endangered species, has been found both upstream and downstream of the project and can be expected to occur at the project. No recent mussel surveys have been completed in the project area, although numerous mussels were observed in a portion of the channel west of Wyman Island during fisheries studies.

#### Flow needs for protection of aquatic habitat

37. In order to provide a base of information on the flow needs of aquatic life downstream, the applicant conducted an instream flow study in 1997 in cooperation with the Agency (*Weybridge Instream Flow Study, Otter Creek, FERC Project No. 2731*, Gomez and Sullivan Engineers, P.C., August 1997). Habitat availability under different flow regimes was modeled using the Instream Flow Incremental Methodology, a commonly used modeling technique originally developed by the U.S. Fish and Wildlife Service. The model uses field data related to river depths, velocities, and substrate characteristics.
38. Three islands downstream of the dam and the channelization work completed in 1951 provide for a complex flow distribution. For study purposes, critical habitat reaches were defined as the **Main Channel** (500 feet long), the **Bypass** (600 feet long), the **West Channel** (the natural channel on the west side of Wyman Island, about 2,900 feet long), and the **East Channel** (about 2,600 feet long). The Main Channel extends from where the Bypass and tailrace join off the south end of the dam island to where the East and West channels form at the north tip of Wyman Island. The East Channel is the channelized reach on the east side of Wyman Island. It is uniformly trapezoidal with steep sides and a smooth bed. A third, relatively small island flanks the East Channel, creating another channel further to the east. That island extends for about one third the length of the East Channel near the upper end of that channel.
39. Based on the 1997 habitat study, it was determined that no flows enter the West Channel until total project discharge exceeded 200

cfs, and only a small proportion of project releases were found to enter the West Channel at higher flows. It is believed that, prior to the channelization work, flows were almost evenly split between the East and West channels. Based on the 1997 study, the flow distribution was determined to be as shown in the following table.

**Table 1. Flow Distribution at Wyman Island, 1997.**

Total Flow (cfs)	Percentage of Flow in Each Channel	
	East Channel	West Channel
100	100	0
250	95	5
300	93	7
500	90	10
1,000	80	20
2,000	76	24

The habitat/flow study also indicated that, where the East Channel splits around the small island, about 43 percent of the flow stays in the channel next to Wyman Island and the remainder goes into the channel to the far east. (Except for a determination of the flow split, this latter channel was not studied further, and its habitat availability was assumed to be equivalent to the other channel.) The split flows rejoin and travel another 1,400 feet down the East Channel before joining the West Channel flows.

The flow distribution is not stable. A 1998 flood substantially modified the hydraulics of the inlet conditions to the West Channel.

40. Most of the river reach between the dam and the downstream end of Wyman Island is characterized by gravel and cobble substrate. The Bypass contains ledge features and some boulders, with generally coarser substrate than is found elsewhere in the study area. Ledge also occurs in the tailrace area and off the upper tip of Wyman Island. These areas and the upper half of the East Channel are fairly armored and do not contain much small gravel (less than one inch diameter). These areas appear to be relatively stable. In contrast, the lower East Channel exhibits areas of bank erosion and sections of river bottom with exposed silts and clays that were likely exposed during channelization work.

41. Natural channel substrates appear to be intact in the West Channel and unaffected by the channelization work. The substrate is characterized as gravels, cobbles, and a few boulders. Since the channel historically carried a significant portion of the river flows, its channel width is relatively large compared to the amount of flow it now carries. The lower half of the West Channel has fairly uniform depth, substrate and flow conditions and lacks a well defined thalweg.
42. Issues considered in the habitat study and the consultation process, which involved the applicant, the Agency, and the U.S. Fish and Wildlife Service, included 1) bypass flow needs, 2) base flow needs in the East and West channels, 3) hydropеaking impacts, and 4) the effects of the 1951 channelization work, which both modified the East Channel's habitat quality and resulted in drastically reduced flows in the West Channel. Flows in the tailrace reach were not considered to be an issue; the 600-foot reach, which was altered during the channelization work, remains flooded even when the plant is shut down.
43. For management of a warmwater and coldwater fish community below the dam, data was collected in each of the channels, except for the tailrace. The evaluation species and life stages varied according the habitat types in each of the channel reaches; all of the targeted species and life stages studied are provided in the following table.

**Table 2. Evaluation Species and Life Stages**

Species	Life Stage
Rainbow Trout	adult, juvenile
Smallmouth Bass	all stages
Fallfish	all stages
Walleye (future mgmt.)	spawning and incubation
Macroinvertebrates	

Data was collected at eight transects, representing 7,230 feet of riverine habitat.

44. Habitat was modeled over a range of flows from a total river flow of about 100 cfs to 4,100 cfs. In the Bypass, the modeled range was 13 to 445 cfs. (*Weybridge Instream Flow Study, Otter Creek, FERC Project No. 2731*, Gomez and Sullivan Engineers, P.C., August 1997, Table 5.1-1)

45. *Main Channel.* The main channel reach of 500 feet is the only reach receiving the total flow of the river. Historically, under highwater conditions, some flows entering the Bypass would jump the bank into a high-flow channel and enter the West Channel before reaching the Main Channel. This high-flow channel is planned to be used as the route for diverting conservation flows to the West Channel using the diversion weir. The diversion weir will affect the hydrology of the Main Channel. The Main Channel is a riffle reach of cobbles and boulders that provides fish cover and habitat superior to the East Channel.

In the Main Channel, habitat for walleye spawning and incubation was found to be maximized at 870 cfs, remaining within 85 percent of maximum value from 750 to 1,000 cfs. Habitat for rainbow trout adults was maximized at 375 cfs, remaining high from 250 to 600 cfs. A flow range of 200 to 400 cfs provided the most habitat for fallfish juveniles, while adult habitat was highest over the range 85 to 250 cfs. Macroinvertebrate habitat was maximized in the flow range of 250 to 900 cfs. Lower flows lacked suitable water depths, and higher flows exhibited excessive velocities. The general lack of overlap of suitable flow ranges makes optimization of a single conservation flow for all target species and life stages impossible.

46. *Bypass.* For the range of flows modeled, habitat for walleye spawning and incubation was maximized at about 300 cfs and decreased at higher flows. A flow of 250 cfs was found to provide nearly the same amount of habitat as a flow of 450 cfs. Habitat for adult rainbow trout was maximized at 175 cfs, but the amount of habitat changed little between 125 to 250 cfs. Macroinvertebrate habitat was greatest at about 250 cfs and declined about 35 percent with flows reduced to 125 cfs.
47. *East Channel.* There are two distinct reaches in the East Channel—the upstream reach adjacent to the small island and the downstream reach. The upstream reach receives only a portion of the East Channel flow because of the island split, and it was more altered by the channelization work in 1951. In the downstream reach, more habitat was found for all target life stages of smallmouth bass and fallfish at flows less than 200 cfs. For macroinvertebrates, habitat increased rapidly with flow, up to a maximum at a flow of 375 cfs. The habitat/flow relationship for the upper reach was found to be similar.

Habitat availability for fallfish fry and for smallmouth bass young-of-year was maximized at flows of 100 to 140 cfs. For fallfish fry, flows in the range of 140 to 200 cfs provided similar habitat conditions without locational shifts in suitability. (A habitat



mapping function of the model was used to assess the specific location of stream cells where habitat of differing qualities was located over the range of flows.) At 375 cfs, much of the channel became unsuitable, and this trend continued until only a small amount of habitat remained at the channel margins. For bass young-of-year, the locations of suitable cells began shifting as flow increased to 172 cfs. Continued increases in flow resulted in further declines in habitat and a shift of suitable cells to the channel margins.

For the lower reach, most of the channel contained suitable habitat for macroinvertebrates at 200 cfs. As flows declined below 172 cfs, all suitable habitat was lost. Similarly, at 1,000 cfs there were almost no suitable cells.

48. *West Channel.* A riffle reach about midway down the West Channel was considered separately in the assessment of West Channel habitat. Outside of this riffle reach, the proposed conservation flow, 125 cfs, was found to provide close to the maximum habitat for most target species and life stages over the range of flows modeled. Spawning and incubation habitat for fallfish, however, was low at all flows, and habitat for adult smallmouth bass peaked at 300 cfs, with only about half as much habitat available at 125 cfs. Similarly, macroinvertebrate habitat was maximized at about 400 cfs and declined by 40 percent at 125 cfs.

At the riffle, a flow of 125 cfs was found to generally provide lower percentages of maximum habitat, although these results seemed to conflict somewhat with a visual assessment of habitat made during a joint flow demonstration completed on October 6, 1998. During the demonstration, a flow of 120 cfs was observed in the West Channel, and the representative from the Department of Fish and Wildlife judged it as adequate.

The amount of adult bass habitat was found to be relatively low throughout the West Channel at all flows modeled. Adult bass habitat quality was not high until depths exceed three feet, but velocities may be unsuitable at the flows necessary to reach that depth. The Department of Fish and Wildlife biologist concluded that adult bass are likely to utilize the West Channel for feeding, but may seek deeper, slower water downstream for resting, and that juvenile bass can better utilize the shallower water. The amount of juvenile habitat available in the West Channel was judged to be much greater.

The modeling indicated that a flow of about 600 cfs or greater would accommodate future walleye spawning and incubation in the riffle reach.

**West Channel diversion weir**

49. The existing entrance to the West Channel is just below the Bypass and off the Main Channel. If sufficient flows are released from the power station, some water flows into the West Channel. The control at the channel entrance is a gravel bed, and the proportion of flow entering the West Channel was found to have changed significantly between the 1997 habitat study and the 1998 flow demonstration. This change was attributed to a large-magnitude flood which occurred in June 1998<sup>1</sup> and apparently caused the control to shift.
50. To restore base flows to the West Channel, the applicant proposes to construct a diversion weir in the Bypass upstream of the main inlet of the West Channel. A second inlet to the West Channel would carry the diverted flows. That inlet channel was judged to occasionally carry high flows and, under the proposal, the entrance to that channel would be lowered and widened to provide, with the weir, the correct hydraulic split of the 250 cfs Bypass flow between the East and West channels. The applicant, the Agency, and the U.S. Fish and Wildlife Service agreed that, in addition to providing the target flow distribution, the following design criteria would be used for the diversion weir:
  - a. It will include an upstream fish passage device, enabling fish to move up into the Bypass.
  - b. It will have a high degree of permanence and require little or no maintenance.
  - c. Its design will include a means of adjusting the distribution of flow diverted and passing over the structure, to assure that flow targets will be met.
  - d. It will not result in unplanned channel or bank erosion.
  - e. The natural appearance of the site will be retained inasmuch as possible.

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<sup>1</sup>The New Haven River basin was particularly hard hit during the June 27, 1998 flood. The New Haven River enters Otter Creek about one mile upstream of Huntington Falls. A gage (drainage area of 115 square miles) located near the mouth of the New Haven River recorded a peak flow of 21,700 cfs on that date, and a mean daily flow of 6,680 cfs. That river apparently caused a transitory high flow at Weybridge. It is noteworthy that the Otter Creek mainstem at the upstream Middlebury gage only experienced a mean daily flow of 3,270 cfs on that date and flows receded in the days following. (*Water Resources Data, New Hampshire and Vermont, Water Year 1998*, U.S. Geological Survey, 1999)

- f. It will not create a safety hazard.
51. For the October 1998 demonstration, granular substrate material at the proposed inlet channel was removed and jersey barriers were installed across the Bypass to test the feasibility of the proposal and allow flow observations to occur in the critical habitat areas.
52. Three test flows were observed: 1) a bypass release of 246 cfs without project generation, 2) a bypass release of 170 cfs with project generation at about 536 cfs, and 3) a bypass release of 170 cfs with project generation at about 1,280 cfs. Some leakage of bypass flows through the temporary weir occurred.

*Bypass 246 cfs/Generation None:* About 155 cfs entered the West Channel via the excavated diversion channel. The diversion channel appeared as a high gradient riffle at this flow and was judged as providing very good habitat. Under the project proposal, the proposed flow regime would result in new, sustained habitat in this section of channel. Below the riffle reach, a crossover channel carried a portion of the flow to the West Channel's main entrance channel, and some of this flow, estimated at 35 cfs, actually moved back out into the East Channel. A net flow of about 120 cfs, slightly less than the proposed conservation flow, flowed downstream through the West Channel. Because there was no generation flow during this particular test and because the weir discharge distribution was not controlled (principally leakage through the structure and around the right end), there was some habitat dewatering at the head of the Main Channel directly below the diversion weir. The test diversion weir was also noted to have flooded a portion of the Bypass. At the weir, the water surface dropped about 2.3 feet across the structure.

*Bypass 170 cfs/Generation 536 cfs:* About 121 cfs was diverted by the weir and an additional 46 cfs entered the West Channel via its main entrance channel. The resulting total West Channel flow was about 167 cfs. Because the project was operating, Main Channel substrate was not dewatered unlike the conditions observed during the first test flow.

*Bypass 170 cfs/Generation 1,280 cfs:* The pool in the upper section of the West Channel gained sufficient flow to become more of a run. In the shallower portions of the West Channel further downstream, the conditions did not appear markedly different from the earlier two tests, and a conclusion was reached that peaking would not be significantly detrimental to habitat quality in the reach. At the weir, the water surface dropped about 9-12 inches across the structure.

53. The flow demonstration included removal of a pair of concrete blocks to provide openings in the crest of the diversion weir, so as to emulate a fish passage device. The openings that were created passed an estimated 18 cfs in total. The Taintor gate was opened to provide a bypass flow of about 250 cfs. As noted earlier in the test, the downstream area was substantially dewatered. Design of fish passage will necessitate providing sufficient flow to accommodate fish movement, physically and behaviorally.

**Artificial flow fluctuations**

54. The project is not operated to cycle to its maximum turbine capacity. Under the applicant's proposal, it would limit the peaking ratio between the peak flow and the conservation flow to 4.5:1 during any 24-hour period. Existing upramping and downramping procedures would continue to be utilized. In addition, because the impoundment will be held stable between April 1 and June 15 each year, no peaking will occur during this period.
55. The West Channel experiences relatively minor peaking since a larger proportion of the generation discharge flows down the East Channel. During the flow demonstration work, the West Channel experienced a total flow of about 440 cfs with the project generating at maximum capacity (about 1,600 cfs).

**Fish passage/movement**

56. Historically, migratory fish from Lake Champlain ascended many of its tributaries to access spawning waters. To meet the goals of the bistate plan for the development of the Lake's salmonid fishery (*A Strategic Plan for Development of Salmonid Fisheries in Lake Champlain*, NYS Department of Environmental Conservation, October 4, 1977), upstream and downstream passage provisions are being sought at dams on certain Lake tributaries. In Vermont, the Winooski River and the Lamoille River are included in this effort; however, this initiative has not been extended to Otter Creek as the other tributaries present a better opportunity for coldwater fish spawning.
57. The U.S. Fish and Wildlife Service requested a reservation of authority under Section 18 of the Federal Power Act to prescribe fishways at Weybridge Dam should future management plans warrant such measures. (Letter from Andrew L. Raddant, Regional Environmental Officer, U.S. Department of Interior Office of Environmental Policy and Compliance, to David Boergers, Secretary, FERC, May 24, 1999)

58. Fish injury and mortality due to intake entrainment and trashrack impingement may occur. Fish entering the headrace may not be able to exit and may pass through the 3.0-inch spaces between the trashrack bars and become subject to turbine mortality.

## VII. Wildlife and Wetlands

59. In July 1996, William D. Countryman, a wetlands consultant, observed three wetland complexes associated with the project impoundment. Only one of the wetlands, Wetland C, is subject to protection under the Vermont Wetland Rules as a Class Two wetland. Wetland C is located near the head of the impoundment on riparian terraces elevated above the impoundment; it was judged not to be hydrologically dependent on the impoundment. According to the consultant, the "largest and best developed" wetland complex (Wetland A) is located on the inside of the river bend directly upstream of the dam. The third wetland (Wetland B) is on the outside of the bend opposite. (*Weybridge Project - Application for New License for Major Project (5 MW or Less)*, May 1998, vol. III, Appendix B, memorandum from William Countryman to Bruce Peacock, CVPS, September 3, 1996)
60. Wetland A is a shallow to deep marsh on alluvium deposited on the inside of the river bend. It is dominated by cattails, bur-reed, rice cutgrass, and arrowhead. These plant species tend to be drawdown tolerant, especially rice cutgrass, an annual which would be expected to compete favorably against other plant species that are less tolerant. Functionally, the wetland provides habitat for fish and wildlife, including migratory birds, and has aesthetic value.
61. Wetland B is a shallow marsh dominated by narrow-leaved cattail and bulrushes. Functionally, the wetland provides water quality value by filtering sediment and nutrients from runoff coming from an upgradient pasture.
62. The applicant measured the change in impoundment surface area when the impoundment is drawn two feet and four feet. It dropped from 62 acres (full) to 51 acres and 41 acres, respectively. (*Weybridge Project - Application for New License for Major Project (5 MW or Less)*, May 1998, vol. III, Appendix B, Impoundment Wetted Area Study, undated) The impoundment maps produced in this study were compared to the wetlands map to determine the extent of dewatering of wetlands A and B during drawdowns of two and four feet. The two wetlands become about 66 percent and 15 percent dewatered, respectively, during a two-foot drawdown. During a four-foot drawdown, the wetlands are dewatered 78 percent and 96 percent, respectively.



63. Much of the reduced surface area acreages recorded in the Impoundment Wetted Area Study stem from the backwater limits moving downstream as the impoundment is lowered. The backwater is reduced by about 1,500 feet when the impoundment is drawn four feet. This represents about 8 acres of the 21-acre surface area reduction. Therefore, about 13 acres of aquatic habitat is dewatered by a four-foot drawdown. For a two-foot drawdown, there is significantly less dewatering of habitat, about 6 acres. In addition to wetlands A and B, the dewatered habitat includes a relatively narrow band of shoreline along both banks of the river.

#### **VIII. Rare and Endangered Plants and Animals; Outstanding Natural Communities**

The Vermont Endangered Species Law (10 V.S.A. § 5401 to 5403) governs activities related to the protection of endangered and threatened species.

64. The project reach is likely to support mussel species, including ones that are state listing as endangered or threatened, although no recent surveys have been completed to confirm use.
65. Osprey, a state-threatened species, are known to use this reach of the river on a transitory basis, with no known nesting attempts.
66. A hackberry stand, which is considered to be a significant community in Vermont, exists in the upper floodplain of Otter Creek below the dam, but is unaffected by normal project operations. A state-listed threatened plant species, green dragon, also exists below the dam, but elevated above the river by over eight feet.
67. No other protected species have been listed for the project reach.

#### **IX. Shoreline Erosion**

68. Shoreline erosion is common for valley-bottom rivers like Otter Creek as they change their channel form through meander processes that erode the alluvial floodplain soils. An erosion survey was completed by Knight Consulting Engineers, Inc. on October 15, 1997, including both the impoundment and the downstream reach to the Lemon Fair. For the downstream reach, the observer concluded that, although there are some banks experiencing severe erosion, project operation is not a significant influence. In reaching that conclusion, he noted that peaking to total plant capacity (1,600 cfs) rarely occurs. The observer concluded that the impoundment shoreline erosion was relatively minor compared to downstream erosion and that the predominant factors related to natural high flows and perhaps ice action, and not operational cycling of the

impoundment. (*Weybridge Project - Application for New License for Major Project (5 MW or Less)*, May 1998, vol. III, Appendix B, Erosion Study Report, October 30, 1997)

#### X. Recreational Use

69. Recreational uses at the project include angling, boating, sightseeing, and picnicking. The applicant estimated that approximately 182 people visited the project and participated in some form of recreation in 1996 (*Weybridge Project - Application for New License for Major Project (5 MW or Less)*, May 1998, vol. I, p. E-25). The applicant estimated that 10 percent of the project shoreline is accessible to the public via the applicant's lands. Otter Creek is particularly popular for canoeing as it is boatable for much of the year.
70. A day use area with a picnic tables and parking currently exists on the island below the old powerhouse. The applicant also provides a canoe portage with a take-out located on the east bank just upstream of the dam and a put-in at the south tip of the island. The applicant proposes several recreational improvements, including replacement of the information sign, installation of an interpretive sign, directional signs, and modifying one of the picnic tables for handicapped use.
71. The portage take-out is located at a very steep bank, making it very difficult to use, especially when the impoundment is drawn down. The Department recommended, in a letter to FERC dated May 25, 1999, that the applicant consider, when drafting the final recreation plan, whether the canoe take-out can be relocated a short distance upstream to allow canoes to be put in or taken out over a less steep bank. This area may involve land outside of the project boundary.

#### XI. Aesthetics

72. The impoundment shoreline is primarily bordered by forested upland areas. Closer to the dam, the shoreline is more open; near the right bank are Field Days Road and Twitchell Hill Road. The dam itself is in a village setting. Below the dam, the river courses through a bedrock gorge split by a forested island. The old powerhouse (c. 1922) on the island adds interest to the setting, which otherwise is largely dominated by the dam, highway bridges, powerhouse, and substation. Except for the Taintor gate discharge, the dam rarely spills, and no special spillage for aesthetics is proposed as part of this relicensing.

## XII. State Comprehensive River Plans

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)

73. 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.
74. With respect to the Weybridge Project, the plan included recommendations that the Department continue to attempt to resolve flow issues related to the current project license and the 1975 water quality certification. These issues have been considered in the Department's current review.

### *1993 Vermont Recreation Plan*

75. 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.
76. The Water Resources and Access Policy is:  
  
It is the policy of the State of Vermont to protect the quality of the rivers, streams, lakes, and ponds with scenic, recreational, 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.
77. The applicant proposes to provide continued access to the river in the project area with shoreline access only limited in the immediate area of the powerhouse where an area has been fenced. This 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.

78. 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.”
79. The Scenic Resources Protection and Enhancement Policy is:

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

### **XIII. Analysis**

#### **Water Chemistry**

80. Available water quality sampling by the Department of Environmental Conservation and by the applicant does not disclose any critical water quality issues at the project. The dissolved oxygen concentrations met the concentration and saturation standards set forth in Standards. The project, as proposed, will spill a minimum of 125 cfs at all times via the Taintor gate. This flow is somewhat less than the river’s 7Q10 value, which has been estimated at 188 cfs. Discharge of this flow through the gate will provide a high level of oxygen entrainment.

Since the below-project conservation flow would be 250 cfs, the project will not be capable of operating when inflows recede below 250 cfs. Under those conditions, all flows would spill and benefit from this point source of reaeration during critical low flow periods. Based on the U.S. Geological Survey gage data, spillage of all inflows will occur, on the average, about 3 percent of the time in June, 8 percent of the time in July, 17 percent of the time in August, and 15 percent of the time in September.

81. There are protracted periods during which the plant is shut down and no releases, except unquantified leakage, are made into the tailrace reach. The lack of flows in this reach may result in substandard conditions of low dissolved oxygen and high temperatures in the tailrace pool. Low dissolved oxygen levels could cause a fish kill for fish residing in the pool. It could also create a condition where a plug of water with a dissolved oxygen deficit could be flushed downstream when the station starts back up, causing impacts downstream until the water becomes sufficiently mixed and aerated.

This certification is being conditioned to require the applicant to monitor the tailrace water quality during such periods to determine if special operational measures will be necessary to assure there are no violations of water quality standards. For the purpose of determining whether there may be a problem, the dissolved oxygen monitoring will cover the period July - September in order to target worse-case conditions, although significant dissolved oxygen deficits, if they occur, may extend to June and October as well.

**Flow Needs in Stream Reaches for Habitat Protection**

82. Channelization of the river in 1951 and operation of the project in a peaking mode has degraded downstream aquatic habitat in a river where unimpounded habitat is relatively scarce. As a result of the channelization project, the East Channel lacks natural channel characteristics favorable to providing high quality aquatic habitat. It is deficient in shallow, low velocity habitat over a wide range of flows, typically found along the stream margins in natural channels. It also lacks large bed elements (such as boulders and cobbles), which would provide velocity refuges for fish. The habitat modeling done by the applicant indicated that even under natural moderate-to-high flows the reach becomes unsuitable due to excessive velocities. The East Channel is particularly poor habitat for the younger fish life stages. Large and more mobile fish capable of coping with higher velocities and changing habitat conditions are more likely to utilize the East Channel. There is no feasible way to ameliorate this situation. Extensive channel modifications to restore historic conditions would be prohibitively expensive and would be likely to unacceptably raise the tailwater elevation.
83. The West Channel contains higher quality physical habitat and offers the greatest opportunity for improvement through the establishment of a suitable flow regime. The proposed diversion structure, if successful, will restore flow, and hence habitat conditions, to the West Channel. The influence of hydropeaking in this channel is not significant. Although the pool at the upstream end of the West Channel does not receive as much flow as would be desirable, the lack of habitat in that section is offset by the creation of new habitat in the proposed diversion channel. The diversion channel will provide high gradient, fast water habitat, a type of habitat that is less common in Lower Otter Creek.
84. The diversion structure must provide for the target flow distribution and include a fish passage device that will allow fish to safely and effectively move upstream to the Bypass. The agreed-upon criteria listed in Finding 50 should be applied in the design. The design should also consider the need to avoid dewatering of habitat in the

Main Channel when the project is not operating and the need to use a low-profile structure to avoid flooding a significant amount of the Bypass habitat.

85. Into the Bypass, the licensee proposes to release 250 cfs, or inflow if less, when the project is not generating, and 125 cfs during generation. This flow regime will provide acceptable habitat conditions in the Bypass.
86. Walleye spawning and incubation occurs during April and May. Potential spawning and incubation habitat exists in the Main Channel, in the Bypass, and in the West Channel. The project will be operating in a run-of-river mode during this period and providing at least 250 cfs should the Department of Fish and Wildlife begin to manage for walleye in the downstream reach. Under the proposed operating regime and diversion configuration, walleye spawning and incubation habitat will be protected in the Main Channel and the Bypass. A lower level of support will be provided in the West Channel, since that channel was found to require on the order of 600 cfs to support walleye use, and operation of the project at full capacity (1,600 cfs) through most of the spring will result in substantially less than 600 cfs in the West Channel.

#### **Impoundment Habitat**

87. Impoundment aquatic habitat, including the wetland habitats, are currently impacted by drawdowns of up to six feet. Under the original licensing proposal, the applicant indicated that the normal peaking operation would use a two-foot cycle, but that additional less frequent operational drawdowns of four feet and six feet would occur 20-30 times annually and 10 times annually, respectively. The applicant's wetland and impoundment wetted area studies indicate that extensive dewatering of aquatic habitat occurs when drawdowns exceed two feet in magnitude. Impoundment water level fluctuations adversely affect fish, wildlife and plant life. Due to freezing effects, winter drawdowns are believed to be more problematic than those during warmer periods. Effects can include freezing of plant tubers, freezing of hibernating reptiles and amphibians, and ice scour. Summer drawdowns, especially on hot days, can cause plant dessication and mortality and stranding and loss of fish.
88. The applicant revised its drawdown proposal on April 22, 1999, limiting the operational drawdown to no greater than two feet and eliminating drawdowns between April 1 and June 15. The applicant indicated that drawdowns in excess of two feet may occasionally be needed for dam maintenance or operator safety, and agreed to consult with the Agency of Natural Resources before undertaking



such drawdown, unless necessary due to an emergency. Drawdowns in excess of two feet would not relate to system demand and line stabilization, however. (Letter from Michael J. Scarzello, P.E., applicant to Jeffrey R. Cueto, P.E., Department, April 22, 1999)

89. The elimination of spring drawdowns would benefit spring spawning of warmwater fish species as dewatering of eggs would be avoided. The six-foot-high steel flashboards may occasionally be manually tripped during spring highwater events, but the frequency of such events is low due to the control provided by the Taintor gate and the rubber flashboard system. The applicant indicated that, if the boards were tripped, they would be reset within 24 hours of the river stabilizing.
90. Even with optimal timing and minimization of the drawdown duration, some mortality of fish and benthic organisms is expected. Drawdowns several days in duration may be sufficient to cause substantial plant mortality. To the extent feasible, drawdowns in excess of two feet should be avoided. Where the drawdowns are unavoidable, the magnitude and duration of the drawdown should be minimized. Any planned drawdowns should be scheduled to take place at the end of the growing season but before herptile hibernation (about October 15) or freezing conditions begin. The next best option is timing for the latter half of June, preferably on a cool, overcast day. Limiting the duration of such drawdowns is also very important. One drawdown per year that is poorly timed or lasts long enough to cause significant plant or benthos mortality will have lasting effects, negating the benefits of drawdown limitations.

#### **Screening**

91. The 3.0-inch bar spacing on the trashracks may promote fish entrainment. Consideration should be given to using racks with a one-inch clear spacing at such time as the racks need replacement. By condition of this certification, the applicant shall be required to consult the Department of Fish and Wildlife at the time the trashracks for the plant are scheduled for replacement, and to obtain Department approval for the design.

#### **Recreation and Aesthetics**

92. 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 improve and protect water quality in such a manner that the beneficial uses and values associated with a water's classification are attained. (Standards, Section 1-03 *Anti-degradation Policy*)

93. Beneficial values and uses of Class B waters include water that exhibits good aesthetic value and swimming and recreation. (Standards, Section 3-03(A) *Class B Waters: Management Objectives*) Standards, Section 2-02(B) *Hydrology: Artificial Flow Conditions* prohibits regulation of river flows in a manner that would result in an undue adverse effect on any existing use or beneficial value or use.
94. The applicant has proposed certain minor recreational improvements and will provide continued public access to the project area. The portage will accommodate through boating as well as a starting point to boat the impoundment of the downstream reach as far as Lake Champlain. By condition of this certification, the applicant shall be required to investigate relocation of the take-out to a more suitable location and consult with the Department on future recreational improvements.
95. The forested natural condition of the island, gorge, and impoundment should be preserved as the forested shoreline adds visual interest, as well as adding to wildlife habitat. This certification is being conditioned to require the applicant to maintain the forested riparian zone to the extent feasible.

**Erosion**

96. Erosion, if severe, can impair recreational use and cause turbidity and the discharge of suspended solids, potentially violating the standards for those parameters (Turbidity: Standards, Section 3-03(B)(1); Total Suspended Solids: Standards, Section 3-01(B)(7)). No unusual shoreline erosion problems potentially attributable to project operation have been documented at the project.
97. Recreational use of project lands may cause some localized erosion. Proper recreation planning limits the risk of significant erosion; however, the Department will maintain continuing jurisdiction over this issue and require modifications where found necessary to abate erosion.

**Debris**

98. 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)(7) *Settleable solids, floating solids, oil, grease, scum, or total suspended solids*. Debris may also impair aesthetics and boating. A plan is being required as a condition of this certification.

**General Conclusions**

99. The project, if operated consistent with the conditions of this certification, will support the designated uses for Class B waters (Standards, Section 3-03(A) *Class B Waters: Management Objectives*); will not have a significant impact on aquatic biota, fish or wildlife such that the existing populations would have their viability impaired (Standards, Section 1-03(B)(2)(a) *Anti-degradation Policy: Protection of Existing Uses*); and will not significantly degrade the use of the water body for recreation, fishing, water supply or commercial purposes (Standards, Section 1-03(B)(2)(a) *Anti-degradation Policy: Protection of Existing Uses*).
100. As required under Standards, Section 2-02 *Hydrology*, the applicant's artificial regulation of flows, if consistent with the conditions of this certification, will not result in an undue adverse effect on any existing or designated use, including high quality habitat for aquatic biota, fish and wildlife. In making this determination, the Water Quality Policy (10 V.S.A. § 1250) has been considered, including the need to allow beneficial and environmentally sound development.
101. All of the restrictions and conditions set forth herein, in conjunction with the applicant's proposal, are necessary to ensure compliance with all applicable provisions of the Vermont Water Quality Standards and other appropriate requirements of state law.

**ACTION OF THE DEPARTMENT**

Based on its review of the applicant's proposal and the above findings, the Department concludes that there is reasonable assurance that operation and maintenance of the Weybridge 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, P.L. 92-500, as amended, and other appropriate requirements of state law:

- A. 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. **Flow Management.** Except as allowed in Condition C below, the project shall be operated to provide conservation flows of 125 cfs in the Bypass and the West Channel and 125 cfs in the East Channel. When the project is not operating, the total conservation flow of 250 cfs shall be maintained using a Taintor gate release into the Bypass. During the period April 1 - June 15, the project shall be operated with a stable impoundment in a true run-of-river mode (outflow equal to impoundment inflow on an instantaneous basis). Upon a written request by the Department, the applicant shall increase the April - May conservation flow for the Bypass to 250 cfs. The request shall follow the Department's receipt of a written notification from the Department of Fish and Wildlife that walleye management has been instituted for the Vergennes impoundment. The Department of Fish and Wildlife shall provide the applicant with a copy of the notification, which shall include a walleye management plan with a stocking schedule. The Department may suspend this spring flow requirement upon a determination that walleye management has been abandoned or discontinued. Minimum flows shall be released on a continuous basis and not interrupted. Operations shall utilize the proposed ramping protocols and the maximum 24-hour generating release cycling ratio of 4.5:1.
- C. **Impoundment Management.** During the spring run-of-river period, the impoundment shall be maintained no more than three inches below the flashboard crest (three inches below 174.3 feet NGVD), unless the flashboard section needs to be manually tripped, in which case it would be reset within 24 hours of the river stabilizing. During the remainder of the year, the impoundment shall not be drawn more than 2.0 feet below the flashboard crest, unless necessary for dam maintenance or operator safety, or due to a non-power emergency beyond the control of the applicant. Planned, non-emergency drawdowns shall be subject to prior consultation with and approval by the Department, with the intent that drawdowns in excess of 2.0 feet are to be avoided to the extent feasible, and if not avoidable, timed to minimize adverse impacts.
- D. **Flow Distribution Structure.** The applicant shall construct a flow distribution structure at the lower end of the Bypass to provide for compliance with the conservation flows required in this certification. The structure shall be designed in accordance with the criteria set forth in Finding 50 above and shall use a low profile to minimize flooding of the Bypass. The design shall be filed with the Department within 120 days of issuance of this certification and shall be subject to Department approval. The design shall include a rating that shows the expected apportionment of flows between the West and East channels, including apportionment when total project releases decline below 250 cfs. The structure shall be designed to

limit dewatering of habitat in the Main Channel when the station is off line. The design shall include provisions for one or more devices to accommodate upstream and downstream fish movement between the Main Channel and the Bypass. The design shall also include the proposed implementation schedule and an erosion control plan. The erosion control plan shall include a description of how flows are to be managed during the construction period. No construction shall commence until Department approval is received.

- E. **Flow Management Plan.** The applicant shall develop and file with the Department a flow management plan detailing how the project will be operated to comply with the conservation flow and impoundment fluctuation limitations set forth in this certification. The plan shall include information on how the project will be managed to control lag times and avoid related non-compliance with the conservation flow requirements. The plan shall also incorporate information on ramping, complying with the 4.5:1 cycling ratio, and managing run-of-river spring operations. 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.
- F. **Flow Distribution Structure Performance Reports.** For the first five years of use, the applicant shall file annual reports with the Department detailing the performance of the flow distribution structure. The reports shall be filed within 60 days of the end of the calendar year and shall include information on the stability of the flow rating, the reliability of the fish movement devices, and structural damage, if any. Visual observations shall be made at least monthly between December and March and at least once every two weeks between April and November, and the observations shall be documented in the annual reports. The annual reports shall include any recommendations on structural modifications and any opinions on expected long-term effectiveness of the structure. Should it be determined after the fifth year that the structure does not reliably maintain conservation flows and cannot reasonably be adapted to perform as intended, the applicant shall propose an alternate method for compliance. Should it be determined that the structure will no longer be used for maintenance of conservation flows, the applicant shall remove the structure and restore the river channel.

- G. **Flow Management during Impoundment Refill.** Following an approved maintenance drawdown and assuming that refill cannot otherwise be reasonably accomplished, up to 10 percent of instantaneous project inflow may be placed in storage in order to refill the impoundment without significantly reducing downstream flows.
- H. **Monitoring Plan for Impoundment and Flow Management.** The applicant shall develop a plan for continuous monitoring of flow releases at the project (Taintor gate releases into the Bypass, discharges from the powerhouse, and spillage, if any), impoundment levels, and inflows. The plan shall provide for an initial field verification of the design flow distribution at the flow distribution structure and periodic field measurements thereafter to assure that the distribution has not changed; the point of compliance in the West Channel shall be located below the two islands at the channel entrance (about 1,000 feet below the proposed flow distribution structure). The applicant shall maintain continuous records of flows and impoundment 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. 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 plan shall be filed for Department approval. 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.
- I. **Tailrace Dissolved Oxygen Monitoring.** The applicant shall monitor tailrace dissolved oxygen concentrations at the dam during the period July - September when generation has been suspended for at least 48 hours. The purpose of the monitoring is to determine if special freshening flows are needed to assure that substandard dissolved oxygen conditions are not produced by plant shutdowns. The applicant shall file a plan of study within 90 days of issuance of this certification for Department approval, with sampling to be initiated during the first season following license issuance. Should the monitoring disclose a problem, the applicant shall propose a remedial measure, subject to Department approval. Monitoring results shall be filed on or before December 31 of the sampling year. The applicant may cease monitoring when the Department determines that adequate representative data has been collected consistent with the study plan.



- J. **Prevention of Fish Entrainment at Intake.** Prior to the next replacement of the intake trashrack, the applicant shall consult with the Department of Fish and Wildlife with respect to trashrack design to determine the appropriate bar clear spacing and shall file the trashrack design information with the Department of Environmental Conservation for approval prior to commencement of work.
- K. **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.
- L. **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.
- M. **Maintenance and Repair Work.** Any proposals for project maintenance or repair work, including desilting, drawdowns in excess of 2.0 feet below the crest of the flashboards to facilitate repair/maintenance work, and tailrace dredging, shall be filed with the Department for prior review and approval, if said work may have a material adverse effect on water quality or cause less-than-full support of an existing use or a beneficial value or use of State waters.
- N. **Public Access.** The applicant shall allow public access to the project lands 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.

- O. **Recreational Facilities.** Recreational facilities shall be constructed and maintained consistent with a recreation plan approved by the Department. The plan shall be filed with the Department within 60 days of license issuance and shall include an updated implementation schedule. If changes to current plan are contemplated, the applicant is advised to consult with the Department in the development of revised plans. The applicant shall investigate and propose, if feasible, improvement of the existing canoe access or relocation to a riverbank location that is less steep and provides for safer use. Where appropriate, the recreation plans shall include details on erosion control. Modifications to the recreation plan shall also be subject to Department approval over the term of the license.
- P. **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 the project lands for recreation. Any work that exceeds minor maintenance shall be subject to prior approval by the Department and FERC.
- Q. **Compliance Inspection by Department.** The applicant shall allow the Department to inspect the project area at any time to monitor compliance with certification conditions.
- R. **Posting of Certification.** A copy of this certification shall be prominently posted within the project powerhouse.
- S. **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.
- T. **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.
- U. **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 with respect to water quality during the life of the project.

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Weybridge Hydroelectric Project  
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Canute E. Dalmasse  
Commissioner

By

/s/

Wallace McLean, Director  
Water Quality Division

Department of Environmental Conservation

Dated at Waterbury, Vermont  
this 7<sup>th</sup> day of May, 2001

c      Distribution List