

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

In the matter of: Charles Hotchkin and Claire Fay  
321 Prive Hill Road  
Richford, VT 05476

**APPLICATION FOR ALDER BROOK MINI HYDRO PROJECT**

The Vermont Department of Environmental Conservation (the Department) has reviewed a water quality certification application dated October 29, 2009 and filed by Charles Hotchkin and Claire Fay (the applicant) for the Alder Brook Mini Hydro Project. The supporting documentation for the application includes the applicant's Federal Energy Regulatory Commission (FERC) exemption application filed with FERC on August 6, 2009 and subsequent filings by the applicant.

In accordance with 10 V.S.A. § 1004, the current application is subject to review under the Vermont Water Quality Standards (Standards) adopted by the Water Resources Panel that became effective on January 1, 2008 (Standards, Section 1-01. Applicability and Definitions).

The Department held a public hearing on March 8, 2010 under the rules governing certification and received testimony during the hearing and, as written filings, through March 10, 2010.

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

**Findings**

**Background and General Setting**

1. The Alder Brook Mini Hydro Project is located on Alder Brook in the town of Richford, Vermont, immediately downstream of the crossing of Wightman Hill Road. The site is currently undeveloped.
2. Alder Brook originates in the Town of Richford, flows through the northeast corner of Montgomery and into Enosburg where it joins the Trout River. The total drainage area of Alder brook is 5.4 square miles. The drainage area upstream of the project location is 3.4 square miles.
3. The brook upstream of Wightman Hill Road is hydrologically unregulated and the watershed is relatively undeveloped and includes 33 acres of wetlands.
4. In this area, Alder Brook is an upland stream with a riffle and pool morphology in a well-shaded stream corridor.
5. The Wightman Hill Road crossing of Alder Brook consists of a 10-foot diameter corrugated steel culvert maintained by the Town of Richford. The downstream end of the culvert is supported and surrounded by a concrete outlet headwall. The culvert discharges directly into a bedrock gorge.

6. The bypass reach consists of ledge substrate in a small gorge approximately 200 ft. long that ends at a ten-foot-high falls. There is a large scour pool at the base of the falls. The remainder of the bypass reach is an approximately 30-foot long riffle with cobble and boulder substrate.

### **Project and Civil Works**

7. The intake structure will consist of a drop inlet with dimensions of 4 ft. by 8 ft. by 3 ft. (w x l x h). The structure will be mounted at the outlet of the Wightman Hill Road culvert. The inlet will be screened with a metal grate to prevent coarse debris from entering the structure and a screen to prevent fine debris and fish from entering the penstock.
8. As designed, 50 percent of inflow will be captured by the intake structure. An orifice in the intake structure will release 0.85 cfs, or all flow entering the structure if less, into the bypassed reach. The combination of the 0.85 cfs released from the structure and the flow not captured and flowing directly into the bypass will provide a bypass flow of at least 1.7 cfs (0.5 csm), or inflow if less, at all times.
9. A 12-inch diameter penstock will convey water 250 feet to the powerhouse. Two double-suction pumps, with 3 cfs and 1 cfs capacity, will drive 7 kW and 2 kW generators, respectively. The 2 kW unit will operate during the months of February and July-September. The larger unit will be used the remainder of the year.
10. The powerhouse will be located in a currently inactive gorge approximately 35 feet from the stream. The morphology of the gorge walls and the absence of developed soil at the base of the gorge suggests, that under certain conditions, it does transmit flow.
11. The power house will be a 10 ft. x 12 ft. shed founded on a hand laid stone foundation. The walls will be insulated/soundproofed and sided with unfinished hemlock. The roof will be moss-covered.
12. A 14-inch diameter tailrace pipe will carry water from the turbine building back to Alder Brook. Approximately 200-250 feet of Alder Brook will be bypassed by the penstock and tailrace.
13. The project, with its total installed capacity of 7kW will produce an average annual output of 37,621 kWh.

### **River Hydrology and Streamflow Regulation**

14. The applicant estimated an annual flow duration curve for the site by using data from two USGS gages, 04293500 (Missisquoi River near East Berkshire, VT) and 01150800 (Kent Brook near Sherburne, VT).
15. The applicant proposes to operate the project in strict run-of-river mode.<sup>1</sup>

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<sup>1</sup>A true run-of-river project is one which does not operate out of storage and, therefore, does not artificially regulate streamflows below the project's tailrace. Outflow from the project is equal to inflow to the project's impoundment on an instantaneous basis. The flow regime below the project is essentially the river's natural regime, except in special circumstances, such as following project shutdowns.

16. As designed, the minimum bypass flow of 1.7 cfs, or inflow if less, will be met through a combination of flow that is not captured by the intake and flow through the bypass orifice in the intake structure.

### Standards Designation

17. The Vermont Water Quality Standards (Standards) are promulgated by the Vermont Water Resources Panel pursuant to 10 V.S.A., Chapter 47, Water Pollution Control. Section 1252 of the chapter provides for the classification of State waters as either Class A or Class B and authorizes the Panel to adopt standards of water quality to achieve the purpose of classification.
18. Alder Brook has been designated by the Vermont Water Resources Panel as Class B waters.
19. The Anti-Degradation Policy in the Standards requires that “[a]ll waters shall be managed in accordance with [Standards] to protect, maintain, and improve water quality.” (Standards, Section 1-03A)
20. Class B waters are managed to achieve and maintain a high level of quality that supports the following designated uses: aquatic biota, wildlife and aquatic habitat; aesthetics; public water supply; irrigation of crops and other agricultural uses; swimming and other primary contact recreation; boating, fishing and other recreational uses. (Standards, Section 3-04A)
21. The waters of Alder Brook are designated coldwater fish habitat for the protection and management of fisheries. (Standards, Section 3-05)
22. In Class B waters, the dissolved oxygen standard for coldwater fish habitat streams is not less than 7mg/L and 75 percent saturation at all times, nor less than 95 percent saturation during late egg maturation and larval development of salmonids in areas that the Secretary determines are salmonid spawning or nursery areas important to the establishment or maintenance of the fishery resource. At all times in all other waters designated as a coldwater fish habitat, the standard is not less than 6 mg/L and 70 percent saturation. (Standards, Section 3-04B.2)
23. The temperature standard for coldwater fish habitat limits increases to 1.0° F from ambient conditions. (Standards, Section 3-01B.1b)
24. The turbidity standard is 10 NTU as an annual average under dry weather base-flow conditions for coldwater fish habitat. (Standards, Section 3-04B.1a)
25. Under the Class B criterion for aquatic biota, wildlife and aquatic habitat, the Standards require “[n]o change from the reference condition that would prevent the full support of aquatic biota, wildlife, or aquatic habitat uses. Biological integrity is maintained and all expected functional groups are present in a high quality habitat. All life-cycle functions, including overwintering and reproductive requirements are maintained and protected.” (Standards, Section 3-04B.4)
26. The Hydrology Policy in the Standards requires that “[t]he proper management of water resources now and for the future requires careful consideration of the interruption of the natural flow regime and the fluctuation of water levels resulting from the construction of new, and the operation of existing, dams, diversions, and other control structures.” (Standards Section 1-02E.1)

27. The Hydrology criteria require that, for Class B waters that have not been classified as WMT 1, streamflows be protected in such a manner that the change from the natural flow regime “provide for maintenance of flow characteristics that ensure the full support of uses and comply with the applicable water quality criteria.” There is a preference for study-based, site-specific streamflow protection standards; however, use of general hydrologic standards is also accepted. (Standards, Section 3-01C)
28. In 10 V.S.A. §1250, the legislature enumerated the State water quality policy. The State’s policy is to upgrade the quality of its waters and reduce existing risks to water quality over the long term and to protect and enhance the quality, character and usefulness of its surface waters. Further, it is the State’s policy to allow beneficial and environmentally sound development.
29. On September 24, 2008, the USEPA approved a list, prepared by the Department under Section 303(d) of the Federal Clean Water Act, indicating waters considered to be impaired based on water quality monitoring efforts. Alder Brook is not listed as impaired on Vermont’s 303(d) list.

### **Water Chemistry**

30. Hydroelectric projects can affect the physical and chemical properties of rivers and streams, most significantly the dissolved oxygen concentration and temperature. These effects are the result of project design, the artificial regulation of natural stream flow, and loss of reaeration. Water quality may be degraded to the point that Water Quality Standards are violated.
31. No site-specific water chemistry data exist for Alder Brook.

### **Aquatic Biota and Habitat**

32. Under Vermont Water Quality Standards (Standards), Class B waters (which includes those affected by this project) are managed to provide high quality habitat for aquatic biota. (Standards, Section 3-03A) Aquatic biota are defined 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. Aquatic habitat is defined as “the physical, chemical, and biological components of the water environment.” (Standards, Section 1-01B)
33. Alder Brook is likely to provide habitat for brook trout and other fish species. Pools in the bypass likely support fish year around, but spawning is likely to be limited due to the lack of suitable substrate.
34. Since the project is to be operated in an instantaneous run-of-river mode, the affected aquatic habitat is primarily the reach of brook bypassed by the penstock. Most of the bypassed channel consists of ledge substrate in a small gorge. At the lower end, there is a 10-foot-high waterfall with a large scour pool at its base and then approximately 30 feet of riffle with boulder substrate leading to the point where the tailrace pipe would rejoin the stream channel. The rocky substrate was judged by the Department of Fish and Wildlife to have limited habitat value.

### **Fish Passage**

35. Based on an evaluation by the Department of Fish and Wildlife, the waterfall in the bypass reach of the project is not passable by fish moving upstream.
36. Fish moving downstream could be trapped in the intake structure if the inlet is not properly screened. The applicant proposes to use the minimum flow outlet as a route to allow fish to exit the structure.

### **Wildlife and Wetlands**

37. An assessment conducted by the applicant's consultant concluded there are no federally regulated wetlands at the project site.
38. As assessment by the Department Wetlands Program identified Class Two wetlands, which are those regulated under Vermont Wetland Rules, upstream but not in the project area. No state protected wetlands would be affected by the project.

### **Rare and Endangered Species and Outstanding Natural Communities**

39. No federally listed threatened or endangered species are known to inhabit the project area.
40. The Vermont Endangered Species Law (10 V.S.A. §§5401 to 5403) governs activities related to the protection of endangered and threatened species. No state protected species are known to occur in the project area.

### **Erosion**

41. No streambank erosion problems that may be attributable to project development or operation have been identified.
42. Large volumes of bedload material have been reported to be transported through the project area from upstream during high-flow events.

### **Recreational Use**

43. Recreational use of the brook in the project area has historically been limited and of a local nature.
44. Toward the lower end of the bypass reach is a large scour pool that is used for swimming by the property owner on the east side of the brook. General public access to the stream has been restricted by the property owner.
45. Access from the applicant's property is very steep and few people attempt to access the swimming hole using that route.
46. The applicant has not historically prohibited access to the brook by the public, nor are there any plans in the future to do so.

### **Aesthetics**

47. The Standards require that Class B waters be managed for good aesthetic value. Class B waters must be managed to achieve and maintain a level of quality that supports the following

designated uses: “Aesthetics – water character, flows, water level, bed and channel characteristics, exhibiting good aesthetic value . . . “ (Standards, Section 3-04A.2) This is applicable to the bypassed reach, which, while short, is currently hydrologically unregulated. Flows through this reach must be adequate to meet Standards.

48. There will be no excavation of the bedrock gorge associated with development or operation of the project.

### **Analysis**

#### **Water Chemistry**

49. The absence of site-specific data notwithstanding, it is likely that Alder Brook meets standards for both dissolved oxygen and temperature. It is an upland stream with a riffle-pool morphology, resulting in good aeration. The stream corridor is well-shaded, resulting in favorable temperatures for cold-water species like brook trout.
50. Negative impacts on other water chemistry parameters are unlikely given the scale of the project, the run-of-river operation, lack of an impoundment, and provisions for bypass flows.

#### **Flow and Water Level Management**

51. The project is proposed to be operated run-of-river, so there will be no storage upstream of the intake structure nor flow fluctuations downstream of the bypass reach.
52. Given the limited habitat value of the bypass, a year-round bypass conservation flow of 1.7 cfs (0.5 csm) will adequately protect aquatic habitat.
53. Bypass flow requirements may not be met if debris or ice alter the flow path at the culvert or clog the bypass flow orifice. This certification will be conditioned to require daily inspection of the intake and culvert and, as needed, debris and ice removal whenever the project is operating.
54. Any changes to the Wightman Hill Road culvert by the Town of Richford could alter the flow path and change the proportion of flow entering the intake structure. This certification will require the applicant to verify that the intake is operating as designed if any changes are made to the culvert and redesign the intake as necessary to meet the design objectives.

#### **Fish Passage**

55. Given the natural barrier presented by the falls, upstream fish passage facilities are not considered necessary at the project.
56. Provisions are needed to ensure that fish can safely move downstream past the intake structure. By condition of this certification, a final intake design to allow sufficient fish passage will require Department approval prior to construction of the project.

#### **Recreation**

57. The applicant has indicated a willingness to continue to allow public access to the stream for recreation.

58. By condition of this certification, the applicant shall be required to allow continued public access to the area, while giving due consideration to safety and liability issues.

#### **Erosion**

59. Development of the project may cause some localized erosion. The Department will maintain continuing jurisdiction over this issue and require modifications where found necessary to abate erosion.

#### **Debris**

60. The applicant does not provide information on the handling and disposal of debris captured by the intake structure and other project-related debris. The depositing or emission of debris and other solids to state waters violates Vermont's solid waste laws and Standards, Section 3-01B.7. Debris may also impair aesthetics.
61. All debris disposal, including bedload material deposited in and around the intake structure, shall be governed by a debris disposal plan that will be required by condition of this certification.

#### **Project Infrastructure**

62. Development of the project will involve construction of the intake within the active stream channel and other infrastructure (penstock, powerhouse and tailrace) in an inactive channel. All of the project infrastructure will be new construction.
63. If the project ceases to operate and is no longer maintained, there is the potential for ongoing water quality impacts resulting from the presence of the civil works. By condition of this certification, all project infrastructure will be required to be removed and the site restored to pre-project conditions if the project ceases to operate for a period of one year.

#### **Aesthetics**

64. Flows through the bypass reach will meet the Standards. Water character, flows, water level, bed and channel characteristics will be maintained to exhibit good aesthetic value.

### Decision and Certification

The Department has examined the project application and bases its decision in this certification upon an evaluation of the information contained therein that is relevant to the Department's responsibilities under Section 401 of the federal Clean Water Act and has examined other pertinent information deemed relevant by the Department, sufficient to permit the Department to certify that there is reasonable assurance that operation and maintenance of the Alder Brook Mini Hydro Project as proposed by the applicant and in accordance with the following conditions will not cause a violation of Vermont Water Quality Standards and will be in compliance with sections 301, 302, 303, 306, and 307 of the Federal Clean Water Act, 33 U.S.C. §1251 et seq., as amended, and other appropriate requirements of state law.

- A. **Compliance with Conditions.** The applicant shall construct, 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 and Water Level Management.** The facility shall be operated in a true run-of-the-river mode. When the facility is not operating, all flows shall be released to the bypass. A flow of 1.7 cfs, or inflow if less, shall be released into the bypass at all times.
- C. **Intake Design.** Prior to construction, the applicant shall develop a final intake design that will ensure compliance with the bypass flow requirement and that will not impede the downstream movement of fish. The design shall be developed in consultation with the Department, the Department of Fish and Wildlife and the U.S. Fish and Wildlife Service. The design shall be subject to Department review and approval. The Department reserves the right of review and approval of any material changes made to the design over the life of the project.
- D. **Monitoring.** On each day when the project operates, the applicant shall inspect the intake structure and culvert for evidence of debris or ice accumulation and remove debris or ice as necessary to ensure that the bypass flow requirement is met. The applicant shall maintain a log of daily inspection and maintenance activities and provide the records to the Department upon request.
- E. **Debris Disposal.** The applicant shall develop a plan for proper disposal of debris associated with project operation, including bedload and other debris deposited in and around the intake structure. The plan shall be developed in consultation with the Department, and a draft shall be submitted to the Department for review at least 60 days prior to commencement of project operation. The final plan shall be subject to Department approval. The Department reserves the right of review and approval of any material changes made to the plan at any time.
- F. **Maintenance and Repair Work.** Any proposals for project maintenance or repair work 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 a designated use of State waters.
- G. **Wightman Hill Road Culvert Modifications.** If any modifications are made to the Wightman Hill Road Culvert, the applicant shall submit to the Department an analysis of the resulting flow path and its effect on compliance with the bypass flow requirement. The

analysis shall include, if necessary, a plan to modify the intake so that bypass flow requirements are met. The plan for modifications shall be subject to review and approval by the Department prior to its implementation.

- H. **Public Access.** The applicant shall allow public access to the project lands for utilization of public resources, subject to reasonable safety and liability limitations. Any proposed limitations of access to State waters to be imposed by the applicant shall first be subject to written approval by the Department. Access may be restricted without prior approval when an immediate threat to public safety exists. In those cases, 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.
- I. **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 project development or operation. Any work that exceeds minor maintenance shall be subject to prior approval by the Department and FERC.
- J. **Commencement of Operation.** The applicant shall notify the Department within two weeks of project completion and commencement of operation.
- K. **Record Drawings.** The applicant shall provide the Department with a set of as-built plans for the record within one year of the completion of construction.
- L. **Compliance Inspection by Department.** The applicant shall allow the Department to inspect the project area at any time to monitor compliance with certification conditions.
- M. **Posting of Certification.** A copy of this certification shall be prominently posted within the project powerhouse.
- N. **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.
- O. **Reopening of Exemption.** The Department may request, at any time, that FERC reopen FERC's exemption for this project to consider modifications necessary to assure compliance with Vermont Water Quality Standards.
- P. **Project Decommissioning.** If the project does not generate energy for a period of one year, the Department may require the applicant to remove all civil works and restore the site to its pre-project condition. Infrastructure removal will be subject to a plan and schedule developed by the applicant. The final plan shall be subject to Department approval.
- Q. **Continuing Jurisdiction.** The Department reserves the right to alter or amend this certification over the life of the project when such action is necessary to assure compliance with Vermont Water Quality Standards and to respond to any changes in classification or management objectives for the affected waters.

Dated at Waterbury, Vermont this  
16<sup>th</sup> day of March, 2010

Justin G. Johnson, Commissioner  
Department of Environmental Conservation

By

  
Peter LaFlamme, Director  
Water Quality Division

PL/BTF