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

In the matter of: Carbon Zero, LLC
P.O. Box 338
North Bennington, Vermont 05257

APPLICATION FOR VERMONT TISSUE HYDROELECTRIC PROJECT

Section 401 of the federal Clean Water Act requires that any applicant for a federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters, shall provide the licensing or permitting agency a certification from the State in which the discharge originates that any such discharge will comply with other substantive provisions of the Clean Water Act. 33 U.S.C. § 1341(a)(1). The certifying state may set forth any effluent limitations and other limitations, and monitoring requirements necessary to assure that any applicant for a federal license will comply with the Clean Water Act and with any other appropriate requirement of state law. 33 U.S.C. § 1341(d). In Vermont, the Agency of Natural Resources is the certifying agency of the state for purposes of Section 401 of the Clean Water Act. 10 V.S.A. § 1004. The Secretary of Natural Resources has delegated the authority to make certification determinations to the Department of Environmental Conservation (Department).

The Department has reviewed a water quality certification amendment application dated February 1, 2016 and filed by the Carbon Zero, LLC (Applicant) is the licensee for the Vermont Tissue Hydroelectric Project (FERC No. 14308). The licensee is seeking authorization to modify the flow regime in the secondary bypass. The original water quality certification for the project was issued on February 27, 2013 and a federal license was granted on April 25, 2013.

The current application is subject to review under the Vermont Water Quality Standards promulgated by the Agency of Natural Resources and effective beginning October 30, 2014 (Standards). (Standards, Section 1-01(A) Applicability).

Findings

Background and Project Civil Works

1. The Vermont Tissue Hydroelectric Project is located on the Walloomsac River in the Town of Bennington.

2. The Walloomsac River is a tributary of the Hoosic River, a part of the Hudson River watershed. It rises on the western slope of the Green Mountains and drains an area of 156 square miles. From Bennington, it flows northwest to the Hoosic River near Hoosick Falls, New York. The project utilizes runoff from an area of 94.5 square miles.

3. At the project location, the Walloomsac splits into two channels, forming an island in the river. The primary channel is on the north side of the island adjacent to the mill. The smaller secondary channel passes south of the island and rejoins the primary channel approximately 1,000 feet downstream for the bifurcation.

4. The primary dam is a 15-foot high concrete gravity structure with an 85-foot ogee spillway that spills into the primary channel. The dam on the secondary channel is an 80-foot long by 6-foot

high concrete structure that spans the entire channel on the far side of the island from the mill. On the southern end of the dam a 2.5-foot by 2.5-foot weir structure is cut into the crest with stop log slots on both sides of the weir to control flow through the structure.

5. A concrete training wall extends downstream from the powerhouse dividing the tailrace into two channels. The concrete wall extends approximately 60-feet downstream from the powerhouse at which point it merges with an approximately 175-foot long island that continues separate the tailrace channel from the primary channel before rejoining the primary channel. Approximately 35 feet downstream from the powerhouse is a 2.5-foot wide by 6-foot tall weir with stop log slots on both side of the structure as to control flows through the weir.

6. The project powerhouse contains two turbines. Both turbines are Ossberger Model T vertical Kaplan turbines with two Hitzinger generators. Unit 1 is located nearest to the left riverbank adjacent to the mill building and discharges into the tailrace channel. The unit has a hydraulic capacity of 24 to 185 cfs. Unit 2 is located adjacent to the dam and discharges water at the base of the dam into the primary channel. The unit has a hydraulic capacity of 21 to 162 cfs.

Applicant Proposal for Amendment

7. The Applicant is proposing to reduce the conservation flow in the secondary bypass channel from 24 cfs to 15 cfs based on further evaluation of the flow needed to provide high quality aquatic habitat. The further evaluation of the bypass flow was proposed as an option to the Applicant in the water quality certification issued by the Department on February 27, 2013.

8. The Applicant has not proposed to change the conservation bypass flows needed for the primary and tailrace channel. Conservation flows in the two bypass channels and tailrace will be provided as given in the following table.

Conservation Flows		
Channel	**June 1 through September 30**	**October 1 through May 31**
Primary Bypass	Inflow ≥ 99 cfs: 60 cfs	Inflow ≥ 153 cfs: 114 cfs
	Inflow 46 to 98 cfs: inflow minus 39 cfs	Inflow 46 to 152 cfs: inflow minus 39 cfs
	Inflow ≤ 45 cfs: 1/3 of inflow	Inflow ≤ 45 cfs: 1/3 of inflow
Secondary Bypass	Inflow ≥ 45 cfs: 15 cfs	
	Inflow < 45 cfs: 1/3 inflow	
Tailrace	Inflow > 63 cfs: 24 cfs Inflow 45 to 63 cfs: 2/3 inflow minus 15 cfs Inflow < 45 cfs: 1/3 inflow	

9. Flows will be managed as described in the following schedules.

October 1 through May 31	
River Inflow (cfs)	**Description of Operations**
0 - 41	Inflow is less than minimum operating rang of turbines, 1/3 inflow is release to each of the three channels. The tailrace is watered via the weir in the training wall.
42 - 45	Minimum capacity of the primary channel turbine is reached. 2/3 inflow minus 6 cfs spillage over the dam passes through the primary channel turbine and the main channel flow is divided evenly between the main channel and the tailrace at the training wall weir. 1/3 flow is discharged through the secondary dam up to 45 cfs inflow.
46 - 153	Maximum conservation flow for the secondary spillway has been reached. Primary channel turbine ramps up to 108 cfs. 24 cfs spills through the tailrace weir.
154 - 193	The primary channel turbine ramps down to 68 cfs allowing the tailrace turbine to come online as the tailrace weir is closed. The primary channel turbine increased flow until it returns to its conservation flow of 108 cfs.
193 - 314	Flows increase to maximum for the tailrace turbine. All conservation flow requirements are reached
315 -368	Flows increase to maximum for the primary channel turbine.
368+	Both turbines are operating at maximum capacity and all additional flow is passed over the two spillways

Flow Distribution

River Inflow (cfs)	Tailrace Weir (cfs)	Tailrace Turbine (cfs)	Primary Dam Spillway	Primary Channel Turbine (cfs)	Secondary Dam Spillway &Weir (cfs)
0 - 41	0 - 13.6	0	0 - 13.6	0	0 - 13.6
42 - 45	14 - 15	0	6	8 - 9	14 - 15
46 - 153	15.5 - 24	0	6	9.5 - 108	15
154 - 193	0	64	6	69 - 108	15
193 - 314	0	50 - 185	6	108	15
315 -368	0	185	6	109 - 162	15
368+	0	185	6+	162	15+

June 1 through September 30					
River Inflow (cfs)	**Description of Operations**				
0 - 41	Inflow is less than minimum operating rang of turbines, 1/3 inflow is release to each of the three channels. The tailrace is watered via the weir in the training wall.				
42 - 45	Minimum capacity of the primary channel turbine is reached. 2/3 inflow minus 6 cfs spillage over the dam passes through the primary channel turbine and the main channel flow is divided evenly between the main channel and the tailrace at the training wall weir. 1/3 flow is discharged through the secondary dam up to 45 cfs inflow.				
46 - 153	Maximum conservation flow for the secondary spillway has been reached. Primary channel turbine ramps up to 108 cfs. 24 cfs spills through the tailrace weir.				
154	The primary channel turbine ramps down to 54 cfs allowing the tailrace turbine to come online as the tailrace weir is closed. The primary channel turbine increased flow until it returns to its conservation flow of 108 cfs.				
154 - 260	Flows increase to maximum for the tailrace turbine. All conservation flow requirements are reached				
261 - 368	Flows increase to maximum for the primary channel unit.				
368+	Both turbines are operating at maximum capacity and all additional flow is passed over the two spillways				
Flow Distribution					
River Inflow (cfs)	**Tailrace Weir (cfs)**	**Tailrace Turbine (cfs)**	**Primary Channel via Spillway (cfs)**	**Primary Channel Turbine (cfs)**	**Secondary Channel Spillway & Weir (cfs)**
0 - 41	0 - 13.6	0	0 - 13.6	0	0 - 13.6
42 - 45	14 - 15	0	6	8 - 9	14 - 15
46 - 153	15.5 - 24	0	6	9.5 - 108	15
154	0	79	6	54	15
154 - 260	0	54 - 185	6	54	15
261 - 368	0	185	6	55 - 162	15
368+	0	185	6+	162	15+

10. Condition B of the water quality certification (issued February 27, 2013) requires the project to operate in strict run-of-river mode except in limited circumstances specified in Condition D.

Aquatic biota and habitat

11. Class B waters are managed to provide high quality habitat for aquatic biota (Standards, Section 3-03(A)). Aquatic biota are defined as "organisms that spend all or part of their life cycle in or on the water." (Standards, Section 1-01(B)) Included, for example, are fish, aquatic insects, amphibians and some reptiles, such as turtles.

12. The Walloomsac River is managed as a cold water fishery. Naturally reproducing populations of brook, brown, and rainbow trout are present, with brown trout being the most abundant in the lower Walloomsac. Brook, brown, and rainbow trout are also stocked in the spring to supplement the popular recreational fishery. Other fish species that have been collected during electrofishing surveys include blacknose dace, longnose dace, longnose sucker, white sucker, common shiner, golden shiner, slimy sculpin, brown bullhead, and creek chub.

13. The secondary bypass channel is about 250 feet long and is mostly devoid of gravel and therefore is not suitable spawning habitat for trout. The channel substrate was mostly exposed bedrock, interspersed with large cobble and boulder-sized angular rock with soft silt and sand along of the margins of this channel. These channel characteristics extended from the dam all the way down to the confluence of the main river channel. However, where secondary channel converged with the primary channel, the bottom substrate changed to a mixture of fine and coarse gravel and rubble suitable for trout spawning and egg incubation.

Flow Needs for Protection of Aquatic Habitat

14. The current conservation bypass flow requirement for the secondary channel is 24 cfs as issued in the water quality certification. The Department of Fish and Wildlife observed this flow on June 30, 2010.

15. The Applicant, working in collaboration with the Department of Environmental Conservation and Department of Fish and Wildlife, conducted a demonstration flow assessment of the secondary channel on November 2, 2015. The objectives of the flow demonstration were to 1) provide adequate connectivity to prevent stranding; 2) water velocities suitable to adult and juvenile trout and minnow species (0.5 – 1.5 feet/second feeding lanes with cover nearby), and 3) faster velocity plumes where water enters pools as to create mix habitat conditions with fast water next to slow moving water and the creation of eddies and water circulation throughout.[1]

16. Flows were provided by adjusting the height of the stop logs in the weir opening on the south side of the secondary dam. The project Program Logic Control system was set to its normal operational setting of hold the impoundment elevation approximately one-inch above the secondary dam crest. The flow demonstration assessment made qualitative observations of the depth, velocity, and current patterns at flow releases of 24, 21, 18, 15, and 12 cfs. Additionally, a wetted width measurement was taken at each flow at two transects located in the riffle section of the channel.

[1] Vermont Tissue Mill Hydroelectric Project, Secondary bypass channel habitat-flow needs assessment study plan. Vermont Agency of Natural Resources. October 14, 2015.

17. The wetted width did not significantly decrease across each flow assessed as part of the demonstration assessment as indicated in the table below.[2]

	Wetted Width (feet)	
Assessment Flow # (cfs)	**Transect 1**	**Transect 2**
1 (24 cfs)	50.0	60.6
2 (21 cfs)	50.0	60.2
3 (18 cfs)	49.8	59.9
4 (15 cfs)	49.3	58.4
5 (12 cfs)	48.5	57.2

18. Additionally, velocities did not change significantly with across each flow evaluated because the decrease in depth resulted in more confined and concentrated channels of flow between the boulders and cobble. However, the depth did significantly decrease as flow decreased, most noticeably at flow of approximately 12 cfs (Flow No. 5). In the pool, velocities noticeably decreased at the lower flows. Fast water plumes entering slower water areas and their associated turbulence decreased as well as the overall water circulation and current within the bypass as flows decreased.

19. There were two large concentration of faster whitewater in the bypass, where the falls enters the pool and at the outlet of the pool. These concentrations of faster moving water provide cover for fish, but also create areas of fast water near slow water that can serve as feeding lanes for fish. In addition, the quantity of water entering the pool influences the water velocity and circulation in the pool and as a result its habitat value. Observations at a flow of 12 cfs (Flow No. 5) the movement of water through the pool became too quiescent and lost the rippled surface found at the higher flows which provide cover for fish.

20. Water depths in the secondary bypass decreased with each successive flow assessed. In comparing the flow at 24 cfs (Flow No. 1) to 12cfs (Flow No. 5), the bypass width was noticeably reduced in width. A rocky area near the confluence with the primary channel (left side) essentially became dewatered at 12 cfs (Flow No. 5), and an area between the two transects (right side) was reduced to a depth of about two inches.

Analysis

21. The original water quality certification application was subject to review under the version of Standards that became effective on December 30, 2011. There are no subsequent changes to the Standards that would affect the review of the proposed change in the secondary bypass flow. The management objectives and associated criteria for aquatic biota, wildlife, and aquatic habitat use of Class B waters remain the same.

22. The project will continue to be operated in strict run-of-river mode so downstream flow will not be altered by change in conservation bypass flow of the secondary channel.
23. A flow of 24 cfs (Flow No. 1) provided velocities that were suitable for adult and juvenile trout species. The quality of habitat in the pool decreased to some extent across the first four flows, but

[2] Vermont Tissue Mill Hydroelectric Project. Secondary channel flow assessment and report. Rod Wentworth. Vermont Department of Fish and Wildlife. December 9, 2015.

circulation and flow into the pool to break up the water surface was sufficient to providing cover for fish. A flow of 15 cfs (Flow No. 4) was assessed as protecting high quality aquatic habitat with a diversity of velocities and adequate depth. A release of 12 cfs (Flow No. 5) was assessed not protecting high quality habitat. Therefore, did not meet Standards.

24. The conservation bypass flow for the primary channel and the tailrace have not been changed from the original certification, therefore will continue to support high quality aquatic habitat.

25. The seasonal management of flow at the project will be slightly modified from the original certification as indicated in finding 9, but will still be conducted in a way that support trout spawning and incubation in the primary channel and high quality aquatic habitat in the secondary and tailrace channels.

Decision and Certification

The Department has examined the project application and other pertinent information deemed relevant by the Department in order to issue a decision in this Certification pursuant to the Department's responsibilities under Section 401 of the federal Clean Water Act. After examination of these materials, the Department certifies that there is reasonable assurance that operation and maintenance of the Vermont Tissue Mill Hydroelectric Project as proposed by the Applicant and in accordance with the following conditions will not cause a violation of Vermont Water Quality Standards and will be in compliance with sections 301, 302, 303, 306, and 307 of the Federal Clean Water Act, 33 U.S.C. § 1251 et seq., as amended, and other appropriate requirements of state law.

B. **Flow Management.** Except as allowed in Condition C below, the facility shall be operated in a true run-of-the-river mode where instantaneous flows below the tailrace shall equal instantaneous inflow to the impoundment at all times. When the facility is not operating, all flows shall be spilled at the primary and secondary dams. The following conservation flow requirements shall be maintained at all times except during drawdowns conducted in accordance with Condition C of the original water quality certification.

Conservation Flows		
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	Inflow ≤ 45 cfs: 1/3 of inflow	Inflow ≤ 45 cfs: 1/3 of inflow
Secondary Bypass	Inflow ≥ 45 cfs: 15 cfs	
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Tailrace	Inflow > 63 cfs: 24 cfs Inflow 45 to 63 cfs: 2/3 inflow minus 15 cfs Inflow < 45 cfs: 1/3 inflow	

Effective Date and Expiration of Certification

This certification shall become effective on the date of issuance, and the condition of any certification shall become conditions of the federal permit (33 U.S.C. § 1341(d)). If the federal authority denies a permit, the certification becomes null and void. Otherwise, the certification runs for the terms of the federal license or permit.

Enforcement

Upon receipt of information that water quality standards are being violated as a consequence of the project's construction or operation or that one or more certification conditions has not been complied with, the Secretary, after consultation with the Applicant and notification of the appropriate federal permitting agency, may, after notice and opportunity for a public hearing, modify the Certification and provide a copy of such modification to the Applicant and the federal permitting agency.

Certification conditions are subject to enforcement mechanisms available to the federal agency issuing the license and to the state of Vermont. Other mechanisms under Vermont state law may also be used to correct or prevent adverse water quality impacts from construction or operation of activities for which certification has been issued.

Appeals

Pursuant to 10 V.S.A. Chapter 220, any appeal of this decision must be filed with the clerk of the Environmental Division of the Superior Court within 30 days of the date of the decision. The Notice of Appeal must specify the parties taking the appeal and the statutory provision under which each party claims party status; must designate the act or decision appealed from; must name the Environmental Division; and must be signed by the appellant or their attorney. In addition, the appeal must give the address or location and description of the property, project, or facility with which the appeal is concerned and the name of the Applicant or any permit involved in the appeal. The appellant must also serve a copy of the Notice of Appeal in accordance with Rule 5(b)(4)(B) of the Vermont Rules for Environmental Court Proceedings. For further information, see the Vermont Rules for Environmental Court Proceedings, available on line at www.vermontjudiciary.org. The address for the Environmental Division is 32 Cherry Street, 2nd Floor, Suite 303; Burlington, VT 05401 (Tel. 802.828.1660).

Dated at Montpelier, Vermont this
XXth day of July, 2016
Alyssa Schuren, Commissioner
Department of Environmental Conservation

By _____
Peter LaFlamme, Director
Watershed Management Division
Department of Environmental Conservation