

**New Hampshire Department of Environmental Services  
WATER QUALITY CERTIFICATION  
In Fulfillment of  
NH RSA 485-A:12, IV**

<b>Certification Number</b>	WQC 2022-485A12IV-002
<b>Activity Name</b>	Jackson Ski Touring Foundation Wentworth Golf Course Snowmaking Project – Ellis River Withdrawal
<b>Activity Location</b>	Jackson, New Hampshire Carroll County
<b>Potentially Affected Surface Waters Near or Downstream of the Activity</b>	Ellis River: NHRIV600020105-05; NHRIV600020105-06; NHRIV600020105-07 Goodrich Falls Dam – Ellis River: NHIMP600020105-04 Saco River: NHRIV600020302-02-01; NHRIV600020302-07; NHRIV600020304-10-01; NHRIV600020305-02
<b>Owner/Applicant</b>	Jackson Ski Touring Foundation P.O. Box 216 Jackson, NH 03846
<b>Agent Filing Application on Behalf of Owner/Applicant</b>	Ellen Chandler, Executive Director, Jackson Ski Touring Foundation
<b>Decision</b>	Grant with conditions
<b>Date of Issuance</b>	February 3, 2023

**A. INTRODUCTION**

On November 9, 2022, the New Hampshire Department of Environmental Services (NHDES) received an Application for Water Quality Certification (Application) from Jackson Ski Touring Foundation (Applicant) to withdraw water from the Ellis River to supply a snowmaking system at the Wentworth Golf Course located in Jackson, New Hampshire (Activity). In the Application, the Applicant requested a water quality certification (Certification or WQC), as required by NH RSA 485-A:12, IV, for the Activity from NHDES to withdraw up to 150 gallons per minute (gpm) of water from the Ellis River from the week after the Thanksgiving holiday in November to the week of President’s Day in February. An estimated maximum withdrawal of 1,080,000 gallons of water during that period would occur if two full snowmaking events were necessary to sustain JSTF’s cross-country skiing operations during a warm or very low snowfall winter. The withdrawn water would be used for snowmaking to cover two to three kilometers, which is approximately 1.24 to 1.86 miles, of cross-country ski trails and a ski instruction and youth program area (approximately three acres total). Snowmaking will only be performed when there is insufficient snow on the ground for grooming of cross-county ski trails. A more complete description of the Activity is provided in Findings D-1 and D-2 of this Certification.

The purpose of the Certification is to provide reasonable assurance that proposed withdrawal will comply with New Hampshire surface water quality standards specified under NH RSA 485-A:8 and NH Code of Administrative Rules Env-Wq 1700 (Surface Water Quality Standards).

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**B. DECISION**

Based on the facts, laws, findings, and conditions included herein, NHDES has determined that there is reasonable assurance that construction and operation of the proposed Activity will be conducted in a manner that will comply with New Hampshire Surface Water Quality Standards. NHDES hereby issues this Certification in accordance with NH RSA 485-A:12, IV, subject to the conditions in Section E of this Certification.

## C. FACTS AND LAWS

### I. State Certification Law

- C-1. NH RSA 485-A:12, IV, states: “No activity that involves surface water withdrawal or diversion of surface water that requires registration under RSA 488:3, that does not otherwise require the certification required under paragraph III, and which was not in active operation as of the effective date of this paragraph, may commence unless the department certifies that the surface water withdrawal or diversion of surface water complies with state surface water quality standards applicable to the classification for the surface water body. The certification shall include any conditions on, modifications to, or monitoring of the proposed activity necessary to provide reasonable assurance that the proposed activity complies with applicable surface water quality standards. The department may enforce compliance with any such conditions, modifications, or monitoring requirements as provided in RSA 485-A:22.” See Fact C-57 for language of NH RSA 488:3.

### II. State Surface Water Quality Standards<sup>1</sup>

- C-2. NH RSA 485-A:8 and Env-Wq 1700 together fulfill the requirement of Section 303 of the federal Clean Water Act that the State of New Hampshire adopt Surface Water Quality Standards consistent with the provisions of the Act.
- C-3. Env-Wq 1702.50 defines “water quality standards” as “the combination of designated uses of surface waters, and the water quality criteria for such surface waters based upon such uses.”
- C-4. Env-Wq 1701.01, titled “Purpose”, states the following: “The purpose of these rules is to establish water quality standards for the state’s surface water uses as set forth in RSA 485-A:8, I, II, III and V. These standards are intended to protect public health and welfare, enhance the quality of water, and serve the purposes of the federal Clean Water Act, 33 U.S.C. 1251 et seq., and RSA 485-A. These standards provide for the protection and propagation of fish, shellfish, and wildlife, and provide for such uses as recreational activities in and on the surface waters, public water supplies, agricultural and industrial uses, and navigation in accord with RSA 485-A:8, I and II.”
- C-5. Env-Wq 1701.02, titled “Applicability,” states the following: “These rules [Env-Wq 1700] shall apply to:  
(a) All surface waters; and  
(b) Any person who:  
(1) Causes any point or nonpoint source discharge of any pollutant to surface waters;  
(2) Undertakes hydrologic modifications, such as dam construction or water withdrawals; or  
(3) Undertakes any other activity that affects the beneficial uses or the water quality of surface waters.”
- C-6. Env-Wq 1702.44 defines “surface waters” as “‘surface waters of the state’ as defined in NH RSA 485-A:2, XIV and waters of the United States as defined in 40 CFR 122.2.”

NH RSA 485-A:2, XIV defines “surface waters of the state” as “perennial and seasonal streams, lakes, ponds and tidal waters within the jurisdiction of the state, including all streams, lakes, or ponds bordering on the state, marshes, water courses and other bodies of water, natural or artificial.”

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<sup>1</sup> All New Hampshire Surface Water Quality Standards apply to the Activity. The standards specifically called out in the Certification should not be interpreted as the only standards that may apply.

40 CFR 122.2 defines “waters of the United States.”

- C-7. Env-Wq 1702.51 defines “wetland” as “‘wetland’ as defined in RSA 482-A:2, X, as reprinted in Appendix C. Wetlands include, but are not limited to, swamps, marshes, bogs and similar areas as delineated in accordance with Env-Wt 100 et seq.” NH RSA 482-A:2, X. defines "wetlands" as “an area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal conditions does support, a prevalence of vegetation typically adapted for life in saturated soil conditions.”
- C-8. Env-Wq 1702.01 defines “7Q10” as “the lowest average flow that occurs for 7 consecutive days on an annual basis with a recurrence interval of once in 10 years on average, expressed in terms of volume per time period.
- C-9. Env-Wq 1702.05 defines “benthic community” as “the community of plants and animals that live on, over, or in the substrate of the surface water.”
- C-10. Env-Wq 1702.06 defines “benthic deposit” as “any sludge, sediment, or other organic or inorganic accumulations on the bottom of the surface water.”
- C-11. Env-Wq 1702.07 defines “best management practices” as “those practices that are determined, after problem assessment and examination of all alternative practices and technological, economic and institutional considerations, to be the most effective practicable means of preventing or reducing the amount of pollution generated by point or nonpoint sources to a level compatible with water quality goals.”
- C-12. Env-Wq 1702.08 defines “biological integrity” as “the ability of an aquatic ecosystem to support and maintain a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of a region.”
- C-13. Env-Wq 1702.17 defines “designated uses” as “those uses specified in water quality standards for each water body or segment whether or not such uses are presently occurring. The term includes the following:
- (a) Swimming and other recreation in and on the water, meaning the surface water is suitable for swimming, wading, boating of all types, fishing, surfing, and similar activities;
  - (b) Fish consumption, meaning the surface water can support a population of fish free from toxicants and pathogens that could pose a human health risk to consumers;
  - (c) Shellfish consumption, meaning the tidal surface water can support a population of shellfish free from toxicants and pathogens that could pose a human health risk to consumers;
  - (d) Aquatic life integrity, meaning the surface water can support aquatic life, including a balanced, integrated, and adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of the region;
  - (e) Wildlife, meaning the surface water can provide habitat capable of supporting any life stage or activity of undomesticated fauna on a regular or periodic basis; and
  - (f) Potential drinking water supply, meaning the surface water could be suitable for human intake and meet state and federal drinking water requirements after adequate treatment.”
- C-14. Env-Wq 1702.18 defines “discharge” as
- “(a) The addition, introduction, leaking, spilling, or emitting of a pollutant to surface waters, either

directly or indirectly through the groundwater, whether done intentionally, unintentionally, negligently or otherwise; or

(b) The placing of a pollutant in a location where the pollutant is likely to enter surface waters.”

- C-15. Env-Wq 1702.23 defines “high quality waters” as “any surface water whose water quality is better than required by any aquatic life and/or human health water quality criteria contained in these rules or other criteria assigned to the surface water, or whose qualities and characteristics make the surface water critical to the propagation or survival of important living natural resources.
- C-16. Env-Wq 1702.22 defines “existing uses” as “those uses, other than assimilation waste transport, that actually occurred in the waterbody on or after November 28, 1975, whether or not they are included in the water quality standards.”
- C-17. Env-Wq 1702.31 defines “nonpoint source” as “any source other than a point source.”
- C-18. Env-Wq 1702.33 defines “nuisance species” as “any species of flora or fauna living in or near the water whose noxious characteristics or presence in sufficient number or mass prevent or interfere with a designated use of those surface waters.”
- C-19. Env-Wq 1702.35 defines “outstanding resource water (ORW)” as “surface waters of exceptional recreational or ecological significance.”
- C-20. Env-Wq 1702.37 defines “point source” as “a discernible, confined, and discrete conveyance from which pollutants are or might be discharged, excluding return flows from irrigated agriculture or agricultural stormwater runoff. The term includes, but is not limited to, a pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft.”
- C-21. Env-Wq 1702.38 defines “pollutant” as “‘pollutant’ as defined in 40 CFR 122.2.” According to 40 CFR 122.2, “pollutant” means “dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water.”
- C-22. Env-Wq 1703.01, titled “Water Use Classifications; Designated Uses”, states the following:  
“(a) All surface waters shall be classified as provided in RSA 485-A:8, based on the standards established therein for class A and class B waters. Each classification shall identify the most sensitive use it is intended to protect.  
(b) All surface waters shall be restored to meet the water quality criteria for their designated classification including existing and designated uses, and to maintain the chemical, physical, and biological integrity of surface waters.  
(c) All surface waters shall provide, wherever attainable, for the protection and propagation of fish, shellfish and wildlife, and for recreation in and on the surface waters.  
(d) Unless high or low flows are caused by naturally-occurring conditions, surface water quantity shall be maintained at levels that protect existing uses and designated uses.”
- C-23. The Ellis River in the vicinity of the Activity is Class B (NH Chapter Laws 1949, 199:1, VI and 1967, 147:15).

- C-24. Env-Wq 1703.03(c), titled “General Water Quality”, states, in part, the following:  
“Unless otherwise specifically allowed by a statute, rule, order, or permit, the following physical, chemical, and biological criteria shall apply to all surface waters: (1) All surface waters shall be free from substances in kind or quantity that:
- a. Settle to form harmful benthic deposits;
  - b. Float as foam, debris, scum or other visible substances;
  - c. Produce odor, color, taste or turbidity that is not naturally occurring and would render the surface water unsuitable for its designated uses;
  - d. Result in the dominance of nuisance species; or
  - e. Interfere with recreational activities. [..]”
- C-25. Env-Wq 1703.08, titled “Benthic Deposits”, states the following:  
“(a) Class A waters shall contain no benthic deposits, unless naturally occurring.  
(b) Class B waters shall contain no benthic deposits that have a detrimental impact on the benthic community, unless naturally occurring.”
- C-26. Env-Wq, 1703.09, 1703.10 and 1703.12 include Surface Water Quality Standards for oil and grease; color; and slicks, odors, and surface floating solids, respectively.
- C-27. NH RSA 146-A:2, III defines “oil” as “petroleum products and their by-products of any kind, and in any form including, but not limited to, petroleum, fuel, sludge, crude, oil refuse or oil mixed with wastes and all other liquid hydrocarbons regardless of specific gravity and which are used as motor fuel, lubricating oil, or any oil used for heating or processing. The term ‘oil’ shall not include natural gas, liquified petroleum gas or synthetic natural gas regardless of derivation or source.”
- C-28. NH RSA 146-A:3 specifies, among other things, that “[t]he discharge or spillage of oil into the surface water or groundwater of this state, or in a land area where the oil will ultimately seep into surface water or groundwater is prohibited.”
- C-29. Env-Wq 1703.11, titled “Turbidity”, states the following:  
“(a) Class A waters shall contain no turbidity, unless naturally occurring.  
(b) Class B waters shall not exceed naturally occurring conditions by more than 10 NTUs.  
(c) Turbidity in waters identified in RSA 485-A:8, III shall comply with the applicable long-term combined sewer overflow plan prepared in accordance with Env-Wq 1703.05(c).  
(d) For purposes of state enforcement actions, if a discharge causes or contributes to an increase in turbidity of 10 NTUs or more above the turbidity of the receiving water upstream of the discharge or otherwise outside of the visible discharge, a violation of the turbidity standard shall be deemed to have occurred.”
- C-30. Env-Wq 1703.13, titled “Temperature”, states the following:  
“(a) There shall be no change in temperature in class A waters, unless naturally occurring.  
(b) Temperature in class B waters shall be in accordance with RSA 485-A:8, II, and VIII.”

NH RSA-A:8, II states the following for Class B waters “[A]ny stream temperature increase associated with the discharge of treated sewage, waste or cooling water, water diversions, or releases shall not be such as to appreciably interfere with the uses assigned to this class.”

NH RSA-A:8, VIII states the following: “In prescribing minimum treatment provisions for thermal wastes discharged to interstate waters, the department shall adhere to the water quality requirements and

recommendations of the New Hampshire fish and game department, the New England Interstate Water Pollution Control Commission, or the United States Environmental Protection Agency, whichever requirements and recommendations provide the most effective level of thermal pollution control.”

C-31. Env-Wq 1703.14, titled “Nutrients”, states the following:

- “(a) Class A waters shall contain no phosphorous or nitrogen unless naturally occurring.
- (b) Class B waters shall contain no phosphorous or nitrogen in such concentrations that would impair any existing or designated uses, unless naturally occurring.
- (c) Existing discharges containing either phosphorous or nitrogen which encourage cultural eutrophication shall be treated to remove phosphorus or nitrogen to ensure attainment and maintenance of water quality standards.
- (d) There shall be no new or increased discharge of phosphorous into lakes or ponds.
- (e) There shall be no new or increased discharge(s) containing phosphorous or nitrogen to tributaries of lakes or ponds that would contribute to cultural eutrophication or growth of weeds or algae in such lakes and ponds.”

C-32. Env-Wq 1703.18, titled “pH”, states the following:

- “(a) The pH of Class A waters shall be as naturally occurs.
- (b) As specified in RSA 485-A:8, II, the pH of Class B waters shall be 6.5 to 8.0, unless due to natural causes.
- (c) As specified in RSA 485-A:8, III, the pH of waters in temporary partial use areas shall be 6.0 to 9.0 unless due to natural causes.”

C-33. Env-Wq 1703.19, titled “Biological and Aquatic Community Integrity”, states the following:

- “(a) All surface waters shall support and maintain a balanced, integrated and adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of a region.
- (b) Differences from naturally-occurring conditions shall be limited to non detrimental differences in community structure and function.”

C-34. Env-Wq 1703.21, titled “Water Quality Criteria for Toxic Substances”, states the following:

- “(a) Unless naturally occurring or allowed under part Env-Wq 1707, all surface waters shall be free from toxic substances or chemical constituents in concentrations or combinations that:
  - (1) Injure or are inimical to plants, animals, humans or aquatic life; or
  - (2) Persist in the environment or accumulate in aquatic organisms to levels that result in harmful concentrations in:
    - a. Edible portions of fish, shellfish, or other aquatic life; or
    - b. Wildlife that might consume aquatic life.”

C-35. Env-Wq 1705.01, titled “Assimilative Capacity”, under Part Env-Wq 1705, titled “Flow Standards”, states the following:

- “(a) Subject to (b), below, the department shall hold not less than 10 percent of the assimilative capacity of each surface water in reserve to provide for future needs.
- (b) For purposes of combined sewer overflows, the department shall determine compliance based on 99 percent of the assimilative capacity of the receiving surface water.”

C-36. Antidegradation provisions are included in Env-Wq 1702 and Env-Wq 1708.

- a. Env-Wq 1702.03 defines “antidegradation” as “a provision of the water quality standards that maintains and protects existing water quality and uses.”

- b. Env-Wq 1708.02 states the following: “Antidegradation shall apply to: (a) Any proposed new or increased activity, including point source and nonpoint source discharges of pollutants, that would lower water quality or adversely affect the existing or designated uses; (b) Any proposed increase in loadings to a waterbody when the proposal is associated with existing activities; (c) Any increase in flow alteration over an existing alteration; and (d) Any hydrologic modifications, such as dam construction and water withdrawals.”
- c. Antidegradation applies to all parameters as evidenced by Env-Wq 1708.08(a) under “Assessing Waterbodies”, which states the following: “The applicant shall characterize the existing water quality and determine if there is remaining assimilative capacity for each parameter in question.”
- d. Env-Wq 1708.03(a) states the following: “A proposed discharge or activity shall not eliminate any existing uses or the water quality needed to maintain and protect those uses.”
- e. Env-Wq 1702.04 defines “assimilative capacity” as “the amount of a pollutant or combination of pollutants that can safely be released to a waterbody without causing violations of applicable water quality criteria or negatively impacting uses.”
- f. Env-Wq 1708.08 describes the process for assessing waterbodies to determine if there is remaining assimilative capacity for each parameter in question, including the requirement under Env-Wq 1708.08(h) for the department to reserve no less than 10% of a surface water’s assimilative capacity as specified under Env-Wq 1705.01 (see Fact C-35).
- g. Env-Wq 1708.09, titled “Significant or Insignificant Determination”, states, in part, the following: “(a) Any discharge or activity that is projected to use 20% or more of the remaining assimilative capacity for a water quality parameter, in terms of either concentration or mass of pollutants, or volume or flow rate for water quantity, shall be considered a significant lowering of water quality. (b) The department shall not approve a discharge or activity that will cause a significant lowering of water quality unless the applicant demonstrates, in accordance with Env-Wq 1708.10, that the proposed lowering of water quality is necessary to achieve important economic or social development in the area where the waterbody is located. (c) [...] any applicant proposing an activity that will cause an insignificant lowering of water quality shall not be required to demonstrate that the activity is necessary to provide important economic or social development, provided the applicant implements best management practices to minimize degradation.”
- h. Env-Wq 1708.01(b)(1), in general, states that for significant changes in water quality, where the quality of the surface waters exceeds levels necessary to support propagation of fish, shellfish, and wildlife, and recreation in and on the water, that quality shall be maintained and protected unless the department finds, after full satisfaction of the intergovernmental coordination and public participation provisions and the analysis required by Env-Wq 1708.10, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the surface waters are located. In allowing such degradation or lower water quality, the department shall ensure water quality adequate to fully protect existing uses. Further, the department shall ensure that the highest statutory and regulatory requirements shall be achieved for all new and existing point sources and that all cost effective and reasonable best management practices for nonpoint source control shall be implemented.
- i. Env-Wq 1708.01(b)(2) states the following: “The department shall not approve any proposed discharge or activity that might cause degradation or lower water quality, without such conditions as are necessary to ensure that: a. Water quality will be adequate to protect existing uses; b. The highest statutory and regulatory requirements will be achieved for all new and existing point sources; and c. All cost effective and reasonable best management practices for nonpoint source control will be implemented.”

C-37. Env-Wq 1708.04, titled “Protection of Water Quality in ORW”, states the following:



“(a) Surface waters of national forests and surface waters designated as natural under RSA 483:7-a, I, shall be considered outstanding resource waters (ORW).

(b) Subject to (c), below, water quality shall be maintained and protected in surface waters that constitute ORW.

(c) The department shall allow a limited point or nonpoint source discharge to an ORW only if:

- (1) The discharge will result in no more than temporary and short-term changes in water quality, wherein “temporary and short-term” means that degradation is limited to the shortest possible time;
- (2) The discharge will not permanently degrade water quality or result at any time in water quality lower than that necessary to protect the existing and designated uses in the ORW; and
- (3) All practical means of minimizing water quality degradation are implemented.”

C-38. Env-Wq 1708.06, titled “Protection of Water Quality in High Quality Waters”, states the following:

“(a) Subject to (b) through (d) below, high quality waters shall be maintained and protected.

(b) The department shall evaluate and authorize insignificant changes in water quality as specified in Env-Wq 1708.09.

(c) The department shall allow degradation of significant increments of water quality, as determined in accordance with Env-Wq 1708.09, in high quality waters only if the applicant can demonstrate to the department, in accordance with Env-Wq 1708.10, that allowing the water quality degradation is necessary to accommodate important economic or social development in the area in which the receiving water is located.

(d) If the waterbody is Class A Water, the requirements of Env-Wq 1708.05 shall also apply.”

### III. Requirements for Impaired Waters and Applicable Total Maximum Daily Load

C-39. Section 303(d) of the Clean Water Act (33 U.S.C. 1313(d)) and the regulations promulgated thereunder (40 CFR. 130) require states to identify and list surface waters that are violating state water quality standards (i.e., Section 303(d) List) that do not have an approved Total Maximum Daily Load (TMDL) for the pollutants causing impairment. For these water quality-impaired waters, states must establish TMDLs for the pollutants causing the impairments and submit the list of impaired surface waters and TMDLs to the U.S. Environmental Protection Agency (EPA) for approval. TMDLs include source identification, determination of the allowable load and pollutant reductions (by source) necessary to meet the allowable load. Once a TMDL is established, the pollutant/surface water is transferred to the list of impaired waters with approved TMDLs (known as Category 4A waters). The Section 303(d) List is, therefore, a subset of all impaired waters. The most recent Section 303(d) list of impaired waters approved by EPA is the [2020/2022 Section 303\(d\) List](#). A list of all impaired waters is available through the [NHDES website](#).

C-40. On December 20, 2007, EPA approved the [Northeast Regional Mercury TMDL](#) which addressed mercury impairments in all of New Hampshire’s fresh surface waters, including the Ellis River.

C-41. When a surface water does not meet Surface Water Quality Standards (i.e., when a surface water is impaired), the addition of pollutants causing or contributing to impairment should be avoided as indicated in the following rule and statute:

Env-Wq 1703.03(a) states the following: “The presence of pollutants in the surface waters shall not justify further introduction of pollutants from point or nonpoint sources, alone or in any combination.”

NH RSA 485-A:12, I, under "Enforcement of Classification", states, in part, the following: "After adoption of a given classification for a stream, lake, pond, tidal water, or section of such water, the department shall enforce such classification by appropriate action in the courts of the state, and it shall be unlawful for any person or persons to dispose of any sewage, industrial, or other wastes, either alone or in conjunction with any other person or persons, in such a manner as will lower the quality of the waters of the stream, lake, pond, tidal water, or section of such water below the minimum requirements of the adopted classification."

#### **IV. New Hampshire Rivers Management and Protection Program**

C-42. RSA 483 established the New Hampshire Rivers Management and Protection Program to, among other things, conserve and protect outstanding characteristics of designated rivers or river segments including recreational, fisheries, wildlife, environmental, hydropower, cultural, historical, archaeological, scientific, ecological, aesthetic, community significance, agricultural, and public water supply.

C-43. RSA 483:4, VIII defines "designated river" as "that portion of a perennial river which has been specifically designated by the general court pursuant to RSA 483:15."

RSA 483:4, XI defines "Instream public uses" as "those uses which comprise the state's interests in surface waters including, but not limited to: navigation; recreation; fishing; storage; conservation; maintenance and enhancement of aquatic and fish life; fish and wildlife habitat; wildlife; the protection of water quality and public health; pollution abatement; aesthetic beauty; and hydroelectric energy production."

RSA 483:4, XVI defines "protected instream flow" as "a stream flow pattern which is established to maintain water for present and future instream public uses."

C-44. RSA 483:15, IV, in part, designates the Saco River from the southern boundary of Crawford Notch State Park to the New Hampshire-Maine state line as a rural river.

C-45. RSA 483:9-a, titled "Rural River Protection", specifies, in part, the following:  
"I. The commissioner, in consultation with the advisory committee, shall adopt rules under RSA 541-A specifying the standards, criteria, and procedures by which protected instream flows shall be established and enforced for each designated river or segment. [...]  
V. A protected instream flow shall be established by the commissioner for each designated rural river or segment and any upstream impoundment or diversion facility which may affect the natural flow characteristics or natural character of the designated river or segment pursuant to RSA 483:9-c."

C-46. RSA 483:12-a, titled "State Action; Notification of Rivers Coordinator; Petition for Review", specifies the following:  
"I. Any state agency considering any action affecting any river or segment designated under this chapter shall notify the rivers coordinator and the local river management advisory committee prior to taking any such action. Such agency shall forward to the rivers coordinator and the local river management advisory committee for review and comment copies of all notices of public hearings, or, where a public hearing is not required, a copy of the application for issuance of a permit, certificate, or license within the designated river or corridor under RSA 485-C, RSA 485-A, RSA 483-B, RSA 12-E, RSA 270:12, RSA 482, RSA 482-A, except notifications for minimum impact activities under RSA 482-A:3, V and XII and for routine roadway maintenance under RSA 482-A:3, XVI on land used for agricultural purposes, RSA 149-M, RSA 430, or RSA 147-A. If an agency is notified by the rivers coordinator that a proposed activity would violate a protection measure under RSA 483:9, 483:9-a, 483:9-aa, or 483:9-b, such agency shall

deny the application.”

- C-47. Chapter Env-Wq 1900, titled “Rules for the Protection of Instream Flow on Designated Rivers”, are the rules that the commissioner of NHDES adopted in accordance with RSA 483:9-c, I.
- C-48. Env-Wq 1901.01, titled “Purpose”, states the following: “The purpose of these rules is to specify standards, criteria, and procedures by which protected instream flows shall be established and enforced for each designated river segment in order to maintain water for instream public uses and to protect the resources for which the river or river segment is designated. The department shall establish protected instream flows for the designated rivers described in RSA 483:15 and adopt water management plans for the water management planning areas (WMPAs) of the designated rivers.”
- C-49. Env-Wq 1901.02 titled “Applicability” states the following: “The requirements set forth in Env-Wq 1900 shall apply to:
- (a) Designated rivers or river segments and their tributary drainage areas;
  - (b) Affected water users; and
  - (c) Affected dam owners and the associated water body impounded by the dam.”
- C-50. Env-Wq 1902.03 defines “affected water user” as “a water user required to be registered under RSA 488:3 and having a withdrawal or discharge at any location within the WMPA of a designated river.”
- C-51. Env-Wq 1902.13 defines “water management planning area (WMPA)” as “the tributary drainage area to a designated river for which a water management plan is required.”
- C-52. Env-Wq 1905.03, titled “Water Conservation Plans”, states, in part, the following:
- “(a) Each affected water user in a WMPA required to have a water management plan under Env-Wq 1905.01 shall have an individual water conservation plan that is prepared by the affected water user and approved by the department in accordance with this section.
  - (b) Each individual water conservation plan shall be incorporated into the water management plan for the WMPA.”
- C-53. Env-Wq 1905.04, titled “Water Use Plans”, states, in part, the following:
- “(a) Each affected water user in a WMPA subject to a water management plan under Env-Wq 1905.01 shall:
    - (1) Have an individual water use plan that is prepared by the department in consultation with the affected water user.”
- C-54. Env-Wq 1905.06, titled “Water Management Plan Document”, states, in part, the following:
- “(a) The department shall prepare a proposed water management plan document specifying the conservation and operational measures required for each affected water user and affected dam owner in the WMPA to meet the protected instream flows.”
- C-55. Env-Wq 1906.03 “Compliance” states the following:
- “(a) Affected water users and affected dam owners shall comply with the adopted water management plan and its implementation schedule.
  - (b) Each affected water user and affected dam owner shall maintain records of the actions taken to comply with a water management plan.
  - (c) Each affected water user and affected dam owner shall allow the department to review the records specified in (b) above upon request.

(d) Any affected water user or affected dam owner that complies with the adopted water management plan shall be deemed to be in compliance with the water quality standards relative to stream flow established in RSA 485-A and Env-Wq 1700.”

## V. New Hampshire Water Use Registration and Reporting Program

- C-56. NH RSA 488 established the New Hampshire Water Use Registration and Reporting Program (WURRP) within NHDES, and NH RSA 488:1 states: “Statement of Purpose. – This chapter provides for uniform statewide collection of water use data to understand how water resources are utilized in the state by establishing procedures and standards for the registration, measurement, and reporting of water use. The legislature recognizes the fundamental importance of water resources and intends to provide a framework to obtain and maintain basic water use data for the state. The legislature recognizes that information describing the major water uses of the state along with assessing the amount of water in a given watershed or aquifer are integral to all water resource quantity assessments and management decisions. Water use data is necessary to understand the effects of cumulative uses, transfers, discharges, and consumptive water losses in aquifers and watersheds in the state. Water use data also identifies the quantity and timing of existing water uses, and this information can be used to estimate future water needs of the state. Water use data is also necessary for verifying compliance with and equitable enforcement of state laws pertaining to groundwater and surface water.”
- C-57. NH RSA 488:3, states: “I. No person shall withdraw or discharge a cumulative amount of more than 20,000 gallons of water per day, averaged over any 7-day period, or more than 600,000 gallons of water over any 30-day period, at a single real property or place of business without registering the withdrawal or discharge with the department. Transfers of such volume of water shall also be registered. Registration shall be in addition to any required permits. II. No registration shall be transferred to another person without written notification to the commissioner.”
- C-58. RSA 488:4, titled “Measurement Required”, states: “Each withdrawal, discharge, or transfer required to be registered under this chapter shall be metered or measured by a technically appropriate and verifiable method approved by the commissioner. Withdrawals and discharges shall be measured at the point of withdrawal or discharge, respectively. Transfers shall be measured at a technically appropriate point approved by the commissioner.”
- C-59. RSA 488:4-a, titled “Measurement of Withdrawals for Snowmaking”, states: “Notwithstanding RSA 488:4, water use associated with snowmaking shall be measured at the point water is withdrawn from any natural source of water for use by a snowmaking system and at the point that water is entering into the snowmaking system, and such water withdrawal and use shall be measured by an appropriate and calculable method such as a weir, stream gauge, meter, or a technically appropriate and calculable method utilizing the manufacturer's plated specifications as they relate to gallons of water pumped per minute. Diversions from natural sources into storage reservoirs may be measured by using the measurement of the amount of water entering a snowmaking system and by calculating the change in the amount of water stored in the storage reservoir, provided separate records of the water withdrawn from each natural source are maintained.
- C-60. Env-Wq 2102 includes requirements for water use registration and reporting and applies to any person required to register a water use under NH RSA 488:3, I, namely any person whose cumulative incoming water or cumulative outgoing water exceeds an average of 20,000 gallons of water per day in any 7-day period, or exceeds a total volume of 600,000 gallons in any 30-day period (see Fact C-57). Env-Wq 2102.07 requires each water user that is not an agriculture water user, a limited water user, or the owner of a mobile facility that qualifies for an intermittent registration under Env-Wq 2102.32(a)(1) to report

water use in accordance with Env-Wq 2102.07.

- C-61. Env-Wq 2102.10, titled “Measurement of Volume of Water Use Required,” states, in part:  
“(a) Each water user that is not an agriculture water user, a limited water user, or the owner of a mobile facility that qualifies for an intermittent registration under Env-Wq 2102.32(a)(1) shall use the methods described in Env-Wq 2102.11 through Env-Wq 2102.15 to measure or quantify:  
(1) The monthly volume of withdrawal and discharge for each registered source and destination, respectively;  
(2) The 24-hour maximum volume for each month reported, if available; and  
(3) The monthly volume(s) of water transferred to or from another facility. [...]”
- C-62. Env-Wq 2102.11, titled “Accuracy” states:  
“(a) The method of measurement or quantification of water use shall be accurate to within 10 percent.  
(b) If meters are not used, the water user shall:  
(1) Document in detail the method employed for estimating water use; and  
(2) Demonstrate that the results satisfy the accuracy requirement in (a), above.”
- C-63. The Applicant is required to register and report water use of the Activity with the NHDES WURRP because the Activity’s cumulative incoming water will exceed an average of 20,000 gallons of water per day in any 7-day period, or exceeds a total volume of 600,000 gallons in any 30-day period.

## **VI. State Certification Application and Other Documents and Records**

- C-64. *Water Quality Certification Application:* On November 9, 2022, NHDES received the Application for Water Quality Certification for the Activity from the Applicant (Application). The record for this Certification decision includes the information provided in the Application and the references in this Certification.
- C-65. *Certification Public Comment Period* NHDES issued a draft Water Quality Certification for public comment from January 10, 2023 to 4 pm on February 1, 2023.

### **D. FINDINGS**

#### **I. Applicant’s Proposal**

- D-1. The proposed Activity is described in the narrative, a schematic, figures, river flow measurements and statistics, maps, and calculations provided in the Application (see Introduction A and Fact C-64). On January 3, 2023, NHDES received from the Applicant revised language to amend the description of the Activity. In the Application as amended, the Applicant provided the following description of the Activity, among other information:

“The [Applicant] proposes to use a temporary, portable snowmaking system using Ellis River as a water supply. A map showing the layout of the snowmaking system is provided as A-1 and a schematic diagram of the snowmaking system is provided as Figure A-2 (see Finding D-2). The snowmaking system will include a low-pressure pump that will withdraw a maximum of 150 gallons per minute (gpm) from the Ellis River. Withdrawal of water from the Ellis River will be accomplished using a floating intake strainer. Water will be drawn in through the strainer and then through a 4-inch diameter suction hose to the inlet of the low-pressure pump. There will be no alteration of the bank or riverbed to accommodate the water withdrawal. The floating intake screen will prevent the

capture of fish. The strainer and suction hose will be placed in the river at the beginning of a snowmaking session and removed from the river at the end of each snowmaking session.

The low-pressure pump will be mounted on a sled and will be relocated as necessary between snowmaking sessions. A permanent pump house will not be constructed. The water will be conveyed from the low-pressure pump through a series of hoses up to 750 feet from the river to a 40-HP high pressure pump with a maximum capacity of 150 gpm. The high-pressure pump will boost the water pressure to a maximum of 400 pounds per square inch (psi). The performance curve for the 40 HP high-pressure pump shows the maximum pumping rate of 150 gpm when coupled to a 40 HP motor. Therefore, 150 gpm will be the maximum pumping rate for the snowmaking system. The actual pumping rate for each snowmaking session can be determined by documenting the pump discharge pressure and then using the discharge pressure and pump performance curve to determine the flow rate. The pumping rate of the snowmaking system can also be determined using performance chart provided by the manufacturer of the snowmakers (HKD). The snowmaker performance chart shows the water flow rate for each HKD Halo snowmaker based on the pressure at the inlet of the snowmaker and the operational settings of the snowmaker.

The water will be conveyed from the high-pressure pump through 2-inch diameter high-pressure hoses to the two snowmakers. [The Applicant] will be using two portable HKD fan snowmakers. Each HKD Halo Fan snowmaker has a capacity of 25 to 150 gallons per minute (gpm), with an average pumping rate of 50-70 gpm per snowmaker under normal snowmaking conditions at this location. When making snow, the water withdrawal rate from the Ellis River would equal 40 to 150 gpm combined for the two HKD fan snowmakers, which is equivalent to 0.09 to 0.33 cfs. There is no plan to use additives to the snowmaking process. The frequency of snowmaking will vary from none (natural snow coverage is sufficient throughout the ski season) to two or more full coverage snow making events starting the week after Thanksgiving and continuing as necessary until late February, per winter season. The water withdrawal rate will be adjusted to between 40 and 150 gpm based on conditions such as air temperature and relative humidity (dew point), with lower flow rates at higher temperatures (close to or above freezing) and higher flow rates at lower temperatures (less than 15°F).

With the exception of small volumes of water drained from the hoses and equipment at the end of each snowmaking session (less than 600 gallons), all water withdrawn from the Ellis River by this system will be processed through the snowmakers.

The withdrawal strainer and suction hose will be placed in the river at locations between the Wentworth Golf Course/Jackson Ski Touring Bridge that is located immediately east of the Route 16 bridge over the Ellis River and a location approximately 0.25 miles downstream at the confluence of the Wildcat Brook and Ellis Rivers, depending on the portion of the trail system where snow is being made ( 44:08:27 N, 71:11:17 W downstream to 44:08:37 N, 71:11:01 W).

Snowmaking will generally start when temperatures, relative humidity (dew point), etc. allow the week after Thanksgiving and will end no later than the week of the Presidents Holiday in February each year. Snowmaking will be performed intermittently over that period as necessary to maintain sufficient cover for skiing on the Wentworth Golf Course Trail System. Water withdrawal for snowmaking will not occur if sufficient snow (6- to 12-inches depth with sufficient density) for grooming covers the [Applicant]'s ski trails and ski lesson area on the Wentworth Golf Course (approximately 3 acres, which is equivalent to 2 to 3 km of cross-country ski trails 20 feet wide) during this period. Snowmaking will only occur as an insurance if insufficient snow coverage for grooming is available on the Wentworth Golf Course by late November or early December and will

end no later than the week of the Presidents Holiday in February, should snow cover on these ski trails be lost due to a winter rainstorm or thaw. The snow requirements for cross-country ski trails are a fraction of that for an alpine ski trail, as the pushing off and loss of snow daily by cross-country skiing is minimal. The principal need is to have a sufficient base to be able to groom and regroom, and to sustain a minimum snow depth during periods of partial thaws, or no snow conditions.

The period for snowmaking would be from the Sunday following Thanksgiving in November to the end of Presidents week in February. The time of day and duration of each snowmaking event would vary depending on air temperature, relative humidity (dew point), etc., which are key factors that impact how fast snow can be manufactured. At 50 gpm per snowmaker it would take approximately 15 hours to make minimal coverage with a base of 3 inches of snow. At 70 gpm per snowmaker approximately 11 hours would be required to make the same amount of snow. A longer lasting target base of 12 inches of snow would take 44 – 60 hours on average to make. Typically, 0 to 2 full coverage snow making events per winter would be needed along with several shorter duration snowmaking events. The actual number of snowmaking events will vary from year to year depending on weather conditions such as the amount of natural snow as well as the frequency and duration of thaws and rainfall.”

D-2. In the Application, the Applicant provided the following map showing the layout of the snowmaking system, labelled as Figure A-1, and a schematic diagram of the snowmaking system, labelled as Figure A-2 (see Finding D-1):

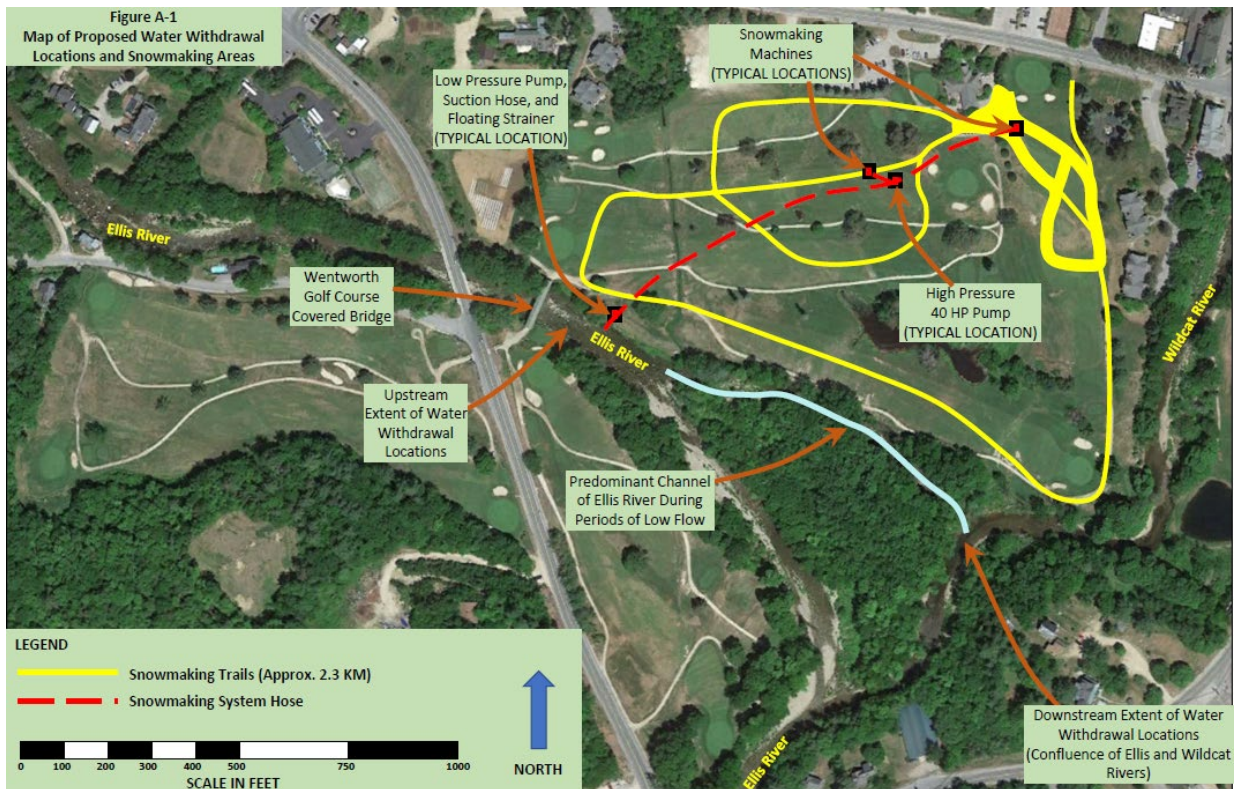
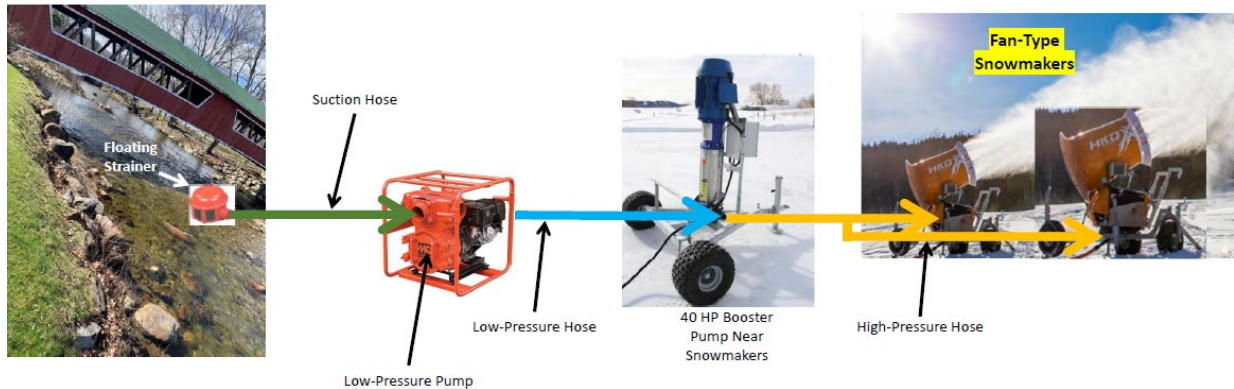




Figure A-2

Schematic Diagram of Proposed Snowmaking System  
Jackson Ski Touring Foundation



## II. Water Quality Certification Required

- D-3. Surface Water Quality Standards are summarized in Facts C-2 through C-38 and apply to all New Hampshire surface waters as defined in Fact C-6.
- D-4. The Ellis River, where the Activity would be located, is a surface water and is subject to New Hampshire’s Surface Water Quality Standards (see Facts C-2, C-3, C-4, and C-6 and Findings D-1 and D-2).
- D-5. The proposed Activity involves the withdrawal of surface water that will require registration under RSA 488:3 (See Fact C-57).
- D-6. Because the proposed Activity involves a withdrawal from a surface water that will require registration under RSA 488:3, NHDES must issue a Certification in accordance with RSA 485-A:12, IV before the proposed withdrawal can commence (see Fact C-1 and Findings D-1 and D-5).
- D-7. The Applicant submitted an application for Certification (see Fact C-64).
- D-8. The Applicant is Responsible for the Activity. If the person responsible for the Activity and, therefore, this Certification changes prior to the expiration of this Certification, it would become necessary to notify NHDES of the change so that NHDES can ensure compliance with the certification (See Fact C-1 and Finding D-9). Condition E-6 addresses this finding.

## III. State Authority for Certification Conditions, Modifications and Monitoring

- D-9. NH RSA 485-A:12, IV (see Fact C-1) states, in part, the following: “The certification shall include any conditions on, modifications to, or monitoring of the proposed activity necessary to provide reasonable assurance that the proposed activity complies with applicable surface water quality standards. The department may enforce compliance with any such conditions, modifications, or monitoring requirements as provided in RSA 485-A:22.” Necessary conditions on and monitoring of an activity include, but are not limited to, the following:
  - Identification of the effective date and expiration of a certification so that an applicant and



- other persons know when the certification conditions are applicable to the applicant;
- Notification to NHDES if control of the Activity changes from the Applicant to a new person so that NHDES and other persons know who is responsible for the Activity;
- Requiring an applicant to comply with Surface Water Quality Standards to certify the Activity;
- Requiring an applicant to obtain approval from NHDES prior to modifying an activity that could have a significant or material effect on the findings or conditions of a certification so that NHDES may amend a certification, as necessary, to ensure that a modified activity will comply with Surface Water Quality Standards;
- Monitoring to determine compliance with conditions in this certification;
- On-site inspections;
- Development, submission, and implementation of monitoring plans;
- Analysis, preparation, and submittal of reports that summarize monitoring results or compliance with applicable permits so that NHDES and others may know whether there is compliance with Surface Water Quality Standards or certain permits applicable to an activity; and
- Notifying appropriate authorities in a timely manner when deviations from conditions in this certification occur.

**IV. Potentially Affected Surface Waters**

D-10. NHDES has assigned Assessment Unit (AU) identification numbers to many, but not all surface waters. The surface waters that could be potentially affected by the Activity and its associated AU numbers include, but are not limited to, the following:

Assessment Unit ID	Description
NHRIV600020105-05	Ellis River - Unnamed Brook - Meserve Brook - Spruce Brook
NHRIV600020105-06	Ellis River - Unnamed Brook
NHIMP600020105-04	Goodrich Falls Dam-Ellis River
NHRIV600020105-07	Ellis River - Unnamed Brook
NHRIV600020302-02-01 NHRIV600020302-07 NHRIV600020304-10-01 NHRIV600020305-02	Saco River

- D-11. The surface waters potentially affected by the Activity are classified as Class B (see Facts C-22 and C-23 and Finding D-10).
- D-12. A requirement for all surface waters is to protect the designated uses defined in Env-Wq 1702.17, which include swimming and other recreation in and on the water, fish consumption, shellfish consumption (for tidal waters), aquatic life integrity, wildlife, and after adequate treatment as a water supply. Designated uses apply "...whether or not such uses are presently occurring" (see Facts C-13 and C-22).
- D-13. The surface waters in the vicinity of the Activity are not outstanding resource waters (see Facts C-19 and C-37) but are high quality waters for flow, among other Surface Water Quality Standards (see Facts C-15 and C-38).
- D-14. According to the 2020/2022 305(b)/303(d) lists of impaired waters (see Fact C-39), the following surface

water in the vicinity of the proposed Activity is listed as impaired:

<b>Assessment Unit (AU)</b>	<b>Waterbody Name</b>	<b>Cause of Impairment (Designated Use Impaired)</b>
NHRIV600020105-05	Ellis River - Unnamed Brook - Meserve Brook - Spruce Brook	<b>Mercury (FC)</b> <b>Iron (AL)</b> <b>pH (AL)</b>
NHRIV600020105-06	Ellis River - Unnamed Brook	<b>Mercury (FC)</b> <b>pH (AL)</b>
NHIMP600020105-04	Goodrich Falls Dam-Ellis River	<b>Mercury (FC)</b> <b>pH (AL)</b>
NHRIV600020105-07	Ellis River - Unnamed Brook	<b>Mercury (FC)</b> <b>pH (AL)</b> <b>Lead (AL)</b> <b>Escherichia Coli (PCR)</b>
NHRIV600020302-02-01	Saco River	<b>Mercury (FC)</b> <b>pH (AL)</b> <b>Lead (AL)</b>
NHRIV600020302-07	Saco River	<b>Mercury (FC)</b>
NHRIV600020304-10-01	Saco River	<b>Mercury (FC)</b>
NHRIV600020305-02	Saco River	<b>Mercury (FC)</b> <b>pH (AL)</b> <b>Aluminum (AL)</b>
Notes: AL = Aquatic Life, PCR = Primary Recreation, SCR = Secondary Recreation, FC = Fish Consumption, SFC = Shellfish Consumption. Impairments highlighted in bold have approved TMDLs. All other impairments are on the Section 303(d) List. All fresh surface waters are impaired mercury due to elevated levels of mercury in fish tissue which has resulted in statewide fish consumption advisory.		

When a surface water does not meet Surface Water Quality Standards (i.e., when the surface water is impaired), the addition of pollutants causing or contributing to impairment should be avoided (see Fact C-41). As noted above, all fresh surface waters in New Hampshire are impaired for mercury due to concentrations found in fish tissue, which have resulted in a statewide fish consumption advisory. On December 20, 2007, EPA approved the Northeast Regional Mercury TMDL which addressed mercury impairments in all New Hampshire fresh surface waters (see Fact C-40). The primary source of mercury is atmospheric deposition from in-state and out-of-state emissions. The surface waters in the vicinity or downstream of the Activity are also listed as impaired for pH, iron, lead, aluminum, or Escherichia coli. The proposed Activity is not expected to have an impact on mercury, iron, pH, lead, aluminum, or Escherichia coli levels in surface waters. When a surface water whose water quality is better than required by any aquatic life and/or human health water quality criteria or other criteria assigned to the surface water, or whose qualities and characteristics make the surface water critical to the propagation or survival of important living natural resources, the surface water is high quality waters (see Facts C-15 and C-38). Surface waters in the vicinity of the Activity are high quality waters except for the aforementioned impairments.

D-15. NHDES is not aware of a gage on the Ellis River that measures flow on a regular or historical basis. In the

Application, the Applicant proposes to use United States Geological Survey (USGS) Gage 010642505, which is located on the Saco River at River Street in Bartlett, New Hampshire, as a surrogate gage. Historical and real-time measurements of flow and river depth at USGS Gage 010642505 since September 2009 are available on-line on a USGS website.<sup>2</sup> The drainage area to USGS Gage 010642505 is approximately 90.7 square miles (sm). The drainage areas for the proposed water withdrawals for snowmaking from the Ellis river range from 28.9 square miles, for locations on the Ellis River upstream of the confluence with the Wildcat Brook, to 52.6 square miles, for locations on the Ellis River just downstream of the confluence with Wildcat Brook, depending on the withdrawal location. The drainage areas of those locations are approximately 29% and 58%, respectively, of the drainage area of the Saco River at USGS Gage 010642505. Flows at the withdrawal locations could be approximated by using a drainage area ratio method, which involves calculating the ratio of the withdrawal drainage area to the USGS Gage 010642505 drainage area (i.e.,  $28.9 \text{ sm}/90.7 \text{ sm} \approx 0.32$  for the withdrawal location upstream of the confluence with the Wildcat Brook or  $52.6 \text{ sm}/90.7 \approx 0.58$  for the withdrawal location upstream of the confluence with the Wildcat Brook) and multiplying the flow at USGS Gage 010642505 by that ratio (i.e., flow at USGS Gage 010642505  $\times 0.32 \approx$  flow at the withdrawal location in the Ellis River that would be upstream of the confluence with the Wildcat Brook or flow at USGS Gage 010642505  $\times 0.58 \approx$  flow at the withdrawal location in the Ellis River that would be downstream of the confluence with the Wildcat Brook). In the Application, the Applicant stated the following about using the drainage area ratio method for determining flows at the withdrawal locations:

“The characteristics of these Saco and Ellis River watersheds in this area are quite similar. The two watersheds are roughly parallel and abut each other on approximately north to south axis. Both watersheds include areas above tree line and high elevation areas of the Presidential Range. Therefore, pro-rating data from the Saco River gage in Bartlett is a reasonable approach for estimating the flow rates in the Ellis River. However, because mountain topography, aspect and elevation make precipitation variable over small spatial distances, a 1 to 1 ratio of the Saco watershed area to the Ellis River or Ellis at the Wildcat River watershed areas may not have the same runoff rates prorated to equivalent cfs/square mile of watershed. Therefore, in addition to comparing watershed areas, [the Applicant] also compared the 7Q10 flow rates for the Saco and Ellis River watersheds.”

See Fact C-8 for a definition of “7Q10”. See Finding D-16 for a description of the Applicant’s comparisons of 7Q10 flows for the Activity.

D-16. In the Application, the Applicant stated the following about using a 7Q10 low flow ratio method, instead of the drainage area ratio method, for the Activity using data from USGS Gage 010642505 to calculate flow of the Ellis River at withdrawal locations and determine if a withdrawal would be considered “insignificant” under Env-Wq 1708.09 (see Facts C-36 and C-38 and Finding D-20):

“The USGS StreamStats model calculates 7Q10 flows for annual periods and for certain subperiods of the year, including the period from January 1 to March 15.[<sup>3</sup>] The USGS StreamStats website does not provide 7Q10 flows for the full December to late February period when snowmaking will occur.

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<sup>2</sup> USGS. (Accessed December 12, 2022). USGS 010642505 Saco River At River Street, At Bartlett, NH. Accessed December 12, 2022: <https://waterdata.usgs.gov/monitoring-location/010642505/#parameterCode=00065&period=P7D>.

<sup>3</sup> StreamStats is a USGS web application that provides access to an assortment of Geographic Information Systems analytical tools that are useful for water-resources planning and management, and for engineering and design purposes. The map-based user interface can be used to delineate drainage areas for user-selected sites on streams, and then get basin characteristics and estimates of flow statistics for the selected sites anywhere this functionality is available. The StreamStats application may be accessed at the following USFGS website: <https://streamstats.usgs.gov/ss/>.

The January 1 to March 15 flows provided by StreamStats are the StreamStats flows that have the most overlap with the snowmaking period. Flow data from the Saco River gage in Bartlett [i.e., the USGS Gage 010642505] show [...] that flows from late November through December 31 are typically greater than flows from January 1 through March 15. Therefore, the use of 7Q10 data for the January 1 through March 15 time period to compare the watersheds is considered to be conservative [January 1 through March 15 7Q10 flow at the USGS Gage 010642505 is 34.3 cfs].

The [drainage area ratios are] slightly higher ratios for the Ellis River to the Saco River at the Bartlett gage when watershed area is used in comparison to when January 1 to March 15 7Q10 flows are used. These differences may be the result of differences between rainfall, snowmelt, and elevation that affect the Saco and Ellis River watersheds differently. To be conservative, this analysis uses the January 1 to March 15 7Q10 flow rates to determine the ratios that will be used to compare flow readings in the Saco River at the Bartlett gage to the snowmaking water withdrawal locations at the Ellis River in Jackson. [...]

The ratios listed [...] are used to develop ‘natural’ flow statistics for the Ellis River in Jackson by using flow rates measured at USGS Gage 010642505 on the Saco River gage in Bartlett. The estimated ‘natural’ flow statistics for the Ellis River are then used in the analysis [...] to determine if the water withdrawals proposed by the [Applicant] are insignificant in accordance with Env-Wq 1708.09.”

In Table A-1 of the Application, the Applicant provided the following information for comparing a drainage area ratio method and a 7Q10 low flow ratio method:

Location	Drainage Area Ratio Method		7Q10 Low Flow Ratio Method (January 1 to March 15)	
	Area (sm)	Ratio to USGS Gage 010642505	7Q10 Flow (cfs)	Ratio to USGS Gage 010642505
Location Gage 010642505	91	1.00	34.3	1.00
Ellis River Withdrawal Locations Upstream of Wildcat Confluence	28.9	0.32	9.13	0.27
Ellis River Withdrawal Locations Downstream of Wildcat Confluence	52.6	0.58	17.1	0.50

The ratios between January 1 to March 15 7Q10 flows of the proposed withdrawal locations of the Activity and the location of USGS Gage 010642505 are smaller than the ratios of the drainage areas of those same locations using the drainage area ratio method (i.e., 0.27 and 0.50 ratios using the 7Q10 flow ratio method are smaller than 0.32 and 0.58 ratios than using the drainage ratio method, respectively). NHDES agrees with the Applicant that calculating flows using the 7Q10 flow ratio method would be more conservative than the drainage area ratio method. Compared to the drainage area ratio method, using the 7Q10 low flow ratio method would result in higher measured flows on the Saco River at USGS Gage 010642505 and, therefore, the Ellis River, before the Applicant could withdraw at the maximum proposed rate of 0.334 cfs or 150 gpm for those withdrawals being considered “insignificant” under Env-Wq 1708.09 (see Facts C-36 and C-38 and Finding D-20).

D-17. The NHDES Water Use Registration and Reporting database includes data submitted by those who must register and report withdrawals and discharges with the NHDES WURRP (see Fact C-57). NHDES

reviewed its Water Use Registration and Reporting database for water withdrawals from the Ellis River, Wildcat Brook, and Saco River to determine the magnitude of active surface water withdrawals that could affect flow at the proposed water withdrawal locations during November, December, January, and February (i.e., the months when the withdrawals for the Activity would occur). NHDES determined that two withdrawals on the Ellis River and one withdrawal on Wildcat Brook could influence flow on the Ellis River while the Applicant is withdrawing water from the withdrawal locations of the Activity. However, NHDES determined that rates of existing withdrawals would be less than the withdrawal rate of the Activity and less than 1 percent of the upstream 10<sup>th</sup> percentile flow of the Ellis River based on daily averages of the highest reported monthly withdrawals. NHDES also determined that a significant portion of the existing withdrawals is returned as base flow to the Ellis River via septic system discharges to the groundwater. Therefore, NHDES determined that the combination of existing and proposed withdrawals would still provide 10 percent of the assimilative capacity of flow of the Ellis River would be held in reserve as required under Env-Wq 1705.01(a) (see Fact C-35).

## V. Potential Impacts of Withdrawals on Surface Water Quality Standards

- D-18. As stated in Finding D-12, all designated uses apply whether or not the uses are presently occurring. If not properly controlled, withdrawals from rivers and streams can result in impairment of designated uses including, but not limited to, aquatic life. Examples of how aquatic life can be adversely impacted by winter withdrawals include, but are not limited to, reductions in wetted habitat and river velocity due to less water, which can cause increased icing and lower dissolved oxygen levels due to less atmospheric contact and mixing. Reductions in water flow caused by withdrawals can also expose amphibians and reptiles (e.g., turtles and frogs) that hibernate underwater in the winter to freezing temperatures and possible death. These potential impacts can contribute to violations of Surface Water Quality Standards for Biological and Aquatic Community Integrity (see Fact C-33).
- D-19. NHDES expects the withdrawal restrictions discussed in Findings D-20, D-21, and D-24 and required in Conditions E-8 and E-9 will be protective of aquatic organisms and will help ensure the proposed withdrawal will comply with Surface Water Quality Standards.

## VI. Antidegradation

- D-20. Since the Applicant is proposing an Activity that involves a withdrawal from a surface water, the Activity is subject to antidegradation requirements under Env-Wq 1708 (see Fact C-36). If NHDES determines the Activity will only cause an insignificant degradation of water quality, then NHDES is required to authorize the Activity provided the Applicant implements best management practices to minimize degradation (see Facts C-11, C-36, and C-38). In the Application, the Applicant provided data and calculations to determine withdrawal rates for the Activity that would be considered insignificant, which is dependent on calculated flows of the Ellis River. During a review of the data and calculations, NHDES generally agreed with the Applicant's determination of withdrawal rates that would be considered insignificant. In Appendix A of this Certification, NHDES describes, in detail, how NHDES determined that the proposed withdrawal would satisfy the antidegradation provisions of Env-Wq 1708. The withdrawal requirements of Conditions E-9.a, E-9.b, E-9.e, E-9.g, E-9.h, and E-9.i will help ensure compliance with antidegradation provisions. The recordkeeping requirements of Conditions E-10.a, E-10.b, E-10.d, E-10.e, E-10.f, E-10.g, and E-10.h and the reporting requirements of E-11 will help ensure compliance with those withdrawal requirements. To help ensure compliance with those withdrawal, recordkeeping, and reporting requirements, it is also necessary for the Applicant to develop and submit for NHDES approval an Operations, Maintenance, and Reporting Plan (OMRP) that describes how the Activity will be operated. The OMRP would communicate to operators of the Activity and any other person how the Activity should be operated to achieve compliance with conditions of this Certification. Condition E-12

addresses the necessity of an OMRP.

## **VII. Best Management Practices (BMPs)**

- D-21. Under Env- Wq 1708.09(c), the Applicant must implement BMPs to minimize degradation of water quality (see Facts C-11 and C-36) . In the Application, the Applicant described certain characteristics of the Activity that meet the definition of BMPs. NHDES has determined that compliance with the conditions in this Certification will satisfy BMP requirements and serve to minimize degradation of the Ellis River caused by the Activity. Example BMPs include the following:
- 1) The requirements in Condition E-7 to register and report the withdrawal with the NHDES Water Use Registration and Reporting program so that the cumulative effects of all major withdrawals and discharges can be tracked;
  - 2) The water intake device requirements in Condition E-8, which includes, among other requirements, installation of a screen on the water intake device (i.e., floating intake strainer) to prevent impingement and entrainment of aquatic organisms; and
  - 3) The withdrawal restrictions required in Condition E-9 to help minimize the amount of water that may be withdrawn.
  - 4) The recordkeeping requirements of Condition E-10.c and the reporting requirements of E-11 will help ensure compliance with BMPs required by this Certification.

To help ensure compliance with those BMPs required by this Certification, it is necessary for the Applicant to develop and submit for NHDES approval an Operations, Maintenance, and Reporting Plan (OMRP) that describes how the Activity will be operated. The OMRP would communicate to operators of the Activity and any other person how the Activity should be operated to achieve compliance with conditions of this Certification. Condition E-12 addresses the necessity of an OMRP.

## **VIII. Other NHDES Requirements**

- D-22. If NHDES discovers that operation of the Activity is causing a significant degradation of water quality, or is causing or contributing to a violation of Surface Water Quality Standards, it may be necessary for NHDES to amend this Certification (See Facts C-22, C-36, C-38 and Finding D-20). Condition E-3 addresses this Finding.
- D-23. Because the proposed withdrawal exceeds the withdrawal thresholds in RSA 488:3, the Applicant must register the Activity with, and report the Activity to, the NHDES WURRP (see Facts C-56, C-57, and C-63 and Finding D-6). Registering and reporting the withdrawal with WURRP allows NHDES to track the cumulative volume of withdrawals in the watershed, which is important for determining how withdrawals are degrading surface water quality and to ensure that current and proposed withdrawals will comply with Surface Water Quality Standards. To properly report surface water withdrawals, the Applicant should comply with requirements for withdrawals, including measuring withdrawals in accordance with applicable laws and rules (see Facts C-58, C-59, C-60, C-61, and C-62) Condition E-7 addresses this Finding.
- D-24. To prevent the proposed intake device from entraining and impinging aquatic life when the pump is operating, it is necessary to have a screen installed on the end of the intake device that is acceptable to the New Hampshire Fish and Game Department (NHFGD) and can be periodically installed in surface waters, removed from surface waters, maintained, and cleaned in a manner that will not cause a violation of Surface Water Quality Standards, for parameters including, but not limited to, turbidity (see Fact C-29) and visible plumes (see Facts C-24 and C-26). On January 3, 2023, NHDES received from the Applicant a copy of a photo of the proposed screen of the intake device and a copy of an email from

NHFGD, dated December 29, 2022, that informed the Applicant that the screen was acceptable to NHFGD. Conditions E-8.b, E-8.d, and E-81.e address this Finding.

- D-25. The Saco River downstream of the Activity is a designated river and is classified as a rural river (see Fact C-44). Therefore, the Activity is within the water use management planning area of the Saco River. As such, the Activity is within the jurisdiction of the New Hampshire Rivers Management and Protection Program and the Applicant will be an affected water user when the Applicant commences the Activity (see Facts C-42 through C-55). In accordance with NH RSA 483:9-a and Env-Wq 1900, NHDES must establish protected instream flows (PIFs) and adopt water management plans (WMPs) for each designated river that include details on how to implement the PIFs. To comply with PIFs and Surface Water Quality Standards associated with instream flow, affected water users must comply with the adopted WMPs. NHDES has not yet established PIFs or a WMP for the water use management planning area of the Saco River. If and when NHDES adopts a WMP that establishes PIFs, and if NHDES specifies withdrawal limits for the Activity in a WMP that are more stringent than the withdrawal conditions specified Condition E-9 of this certification, then Condition E-9 would need to be modified in accordance with Condition E-3 of this certification.

### E. CERTIFICATION CONDITIONS

Unless otherwise authorized or directed by NHDES, the following conditions shall apply:

- E-1. **Effective Date and Compliance with Certification Conditions:** This certification shall become effective on the date this certification is granted and shall remain effective for as long as the Applicant operates the Activity. The Applicant shall operate the Activity to comply with this Certification.

For an explanation of why this condition is necessary to assure that the Activity will comply with Surface Water Quality Standards, see Fact C-1 and Finding D-9.

- E-2. **Compliance with Water Quality Standards:** The Activity shall not cause or contribute to a violation of Surface Water Quality Standards.

For an explanation of why this condition is necessary to assure that the Activity will comply with Surface Water Quality Standards, see Fact C-1 and Finding D-9.

- E-3. **Modification of Certification:** NHDES may amend this Certification as necessary to ensure compliance with Surface Water Quality Standards, when authorized by law, and, if necessary, after notice and opportunity for hearing.

For an explanation of why this condition is necessary to assure that the Activity will comply with Surface Water Quality Standards, see Findings D-9 and D-22.

- E-4. **Proposed Modifications to the Activity:** The Applicant shall consult with and receive prior written approval from NHDES regarding any proposed modifications to the Activity that could have a significant or material effect on the findings or conditions of this certification. If necessary, NHDES may modify the Certification in accordance with condition E-3 of this Certification.

For an explanation of why this condition is necessary to assure that the Activity will comply with Surface Water Quality Standards, see Findings D-9 and D-22.

- E-5. **Compliance Inspections:** In accordance with applicable laws, the Applicant shall allow NHDES to inspect the Activity and affected surface waters to monitor compliance with the conditions of this Certification.

For an explanation of why this condition is necessary to assure that the Activity will comply with Surface Water Quality Standards, see Finding D-9.

- E-6. **Transfer of Certification:** If the Applicant plans to transfer responsibility of the Activity to another person (i.e., any municipality, governmental subdivision, public or private corporation, individual, partnership, or other entity), the Applicant shall provide the contact information of the new person, including name, address, phone number, and email in writing to NHDES prior to the transfer.

For an explanation of why this condition is necessary to assure that the Activity will comply with Surface Water Quality Standards, see Fact C-57 and Findings D-8 and D-9.

- E-7. **Water Use Registration and Reporting:** Within 30 days of commencing the Activity, the Applicant shall register the withdrawal(s) from the Ellis River with the NHDES Water Use Registration and Reporting Program and comply with all WURRP requirements.

For an explanation of why this condition is necessary to assure that the Activity will comply with Surface Water Quality Standards, see Fact C-57 and Findings D-9, D-21, and D-23.

- E-8. **Water Intake Device:**

- a. The Applicant shall equip the water intake device (i.e., floating intake strainer) with a screen to reduce velocities around the intake device to prevent impingement of aquatic organisms. The screen shall be designed per guidance provided by the NHFGD.
- b. The Applicant shall keep the water intake device and hose as close as practicable to the bank of the Ellis River and not interfere or cause unsafe conditions associated with boating and other recreational uses of the Ellis River.
- c. The Applicant shall only install the water intake device and hose in the Ellis River just prior to a snowmaking session and the Applicant shall remove the intake device and hose from the Ellis River at the end of each snowmaking session. The Applicant shall install and remove the intake device and hose by hand.
- d. The Applicant shall install, remove, maintain, and clean the water intake device and associated screen(s) on the device in a manner that will not cause a violation of Surface Water Quality Standards, for parameters including, but not limited to, turbidity and visible plumes (see Facts C-24 and C-26) and in a manner that will not alter the riverbank or riverbed.
- e. For any changes to the type of screen for the water intake device that was previously accepted by NHFGD as described under Finding D-24, or changes to procedures for placement of water intake device and associated hose required under Conditions E-8.b and E-8.c, the Applicant shall consult with and receive prior written approval from NHDES in accordance with Condition E-4.

For an explanation of why this condition is necessary to assure that the Activity will comply with Surface Water Quality Standards, see Facts C-24, C-26, and C-29 and Findings D-1, D-9, D-21, and D-24. the citations referenced in this condition.

- E-9. **Withdrawal Conditions:** Unless otherwise approved by NHDES in writing, withdrawals from the Ellis River shall:
- a. Be at the locations shown in the Application (see Fact C-64 and Findings D-1 and D-2);
  - b. Only occur from the first Sunday after fourth Thursday in November (i.e., the first Sunday after the Thanksgiving holiday in the U.S.) to the first Saturday after the third Monday in February (i.e.,



- the first Saturday after President’s day holiday in the U.S.);
- c. Be a snowmaking event with the intent of achieving 3 to 12 inches of groomed snow coverage for the ski trails and ski lesson area on the Wentworth Golf Course. Snowmaking events could range from complete coverage of bare ground with 3 to 12 inches of snow to events that replace snow on a limited portion of the trails where snow cover is insufficient because of a thaw or other weather conditions.
- d. Not occur when sufficient depth and density of groomed snow coverage is achieved on the ski trails and ski lesson area on the Wentworth Golf Course;
- e. Be metered, measured, or quantified by a technically appropriate and verifiable method that is accurate within 10 percent at the point water is withdrawn from any natural source of water for use by a snowmaking system and at the point that water is entering into the snowmaking system (one measuring device shall satisfy that requirement if withdrawn water is going directly to the snowmaking system during the withdrawal);
- f. Not result in a discharge of water directly to the Ellis River (e.g., via overland, piped, or channelized flow);
- g. Not exceed 0.334 cfs or 150 gpm;
- h. Be based on daily checks of instantaneous river flow at USGS Gage 010642505; and
- i. Only cause an “insignificant” degradation of surface water quality as described in Appendix A of this Certification and as summarized in Table A-5 of that Appendix, which is copied, below.

**Table A-5: Summary of authorized maximum withdrawals assuming Q up is measured just upstream of the proposed withdrawal location**

Month	Q up = Ellis River Flow Upstream of Confluence with Wildcat Brook (cfs)	Saco River equivalent to Min Q up for Ellis River Flow Upstream of Confluence with Wildcat Brook (cfs)	Q up = Ellis River Flow Downstream of Confluence with Wildcat Brook (cfs)	Saco River equivalent to Min Q up for Ellis River Flow Downstream of Confluence with Wildcat Brook (cfs)	Maximum Withdrawal when river flow is greater than or equal to Q up (cfs)	Maximum Withdrawal when river flow is less than Q up (cfs)
November	32.7	122.7	59.7	119.8	0.334 (150 gpm)	= 0.01 x Q up
December	37.6	141.4	69.0	138.5		
January	27.4	103.0	49.9	100.1		
February	18.2	68.4	32.6	65.4		

For an explanation of why this condition is necessary to assure that the Activity will comply with Surface Water Quality Standards, see Facts C-58, C-59, C-61, and C-62 and Findings D-1, D-2, D-9, D-19, D-20 and D-21 as well as the citations referenced in this condition.

- E-10. **Recordkeeping:** During periods of withdrawals from the Ellis River, the Applicant shall maintain daily records demonstrating compliance with this Certification. To the maximum extent practicable, records shall be automatically generated and recorded, and operation of the systems shall be automated. Daily records shall include the following:
- a. The location of the withdrawal in the Ellis River, including whether the withdrawal location is upstream or downstream of the confluence with Wildcat Brook;
  - b. Date and time that withdrawals start and stop;
  - c. The depth and characteristics of snow conditions on the Wentworth Golf Course prior to withdrawal;
  - d. River flow at USGS Gage 010642505 and the time the river flow at the gage was recorded;

- e. Pumping rate (in cfs and gpm);
- f. Withdrawal / river flow (in percent);
- g. Volume pumped (in gallons) per calendar day;
- h. The method used to meter, measure, or quantify the withdrawal, including documentation showing the method to be technically appropriate, verifiable, and accurate within 10 percent; and
- i. Time that screens on the intake pipe were cleaned.

For an explanation of why this condition is necessary to assure that the Activity will comply with Surface Water Quality Standards, see Finding D-9, D-20, and D-21.

- E-11. **Reporting:** The Applicant shall submit the following reports to NHDES via email:
- a. Records required under Condition E-10 of this Certification shall be maintained by the Applicant and submitted to NHDES within 7 days of receiving a written request by NHDES; and
  - b. By March 31<sup>st</sup> of each year the Applicant shall prepare and submit an annual report to NHDES to demonstrate compliance with Conditions E-8, E-9, E-10, and E-13 for withdrawals that occurred during the prior snowmaking season. In the report, the Applicant shall show all calculations for all reported Information or data that rely on calculations (e.g., provide an Excel workbook that shows the calculations). Should there be any non-compliance with this Certification (see Condition E-13), the Applicant shall provide a summary of the non-compliances, including the reasons for the non-compliance and corrective actions taken to prevent such non-compliances from reoccurring.

For an explanation of why this condition is necessary to assure that the Activity will comply with Surface Water Quality Standards, see Findings D-9.

- E-12. **Operations, Maintenance, and Reporting Plan (OMRP):** Prior to commencing the Activity, the Applicant shall prepare, submit to NHDES, and obtain NHDES approval of an Operations, Maintenance, and Reporting Plan (OMRP) that describes, in detail, how the Activity will be operated, recorded, and reported so that the Applicant complies with Conditions E-8, E-9, E-10, E-11, and E-13 of this Certification. Upon approval by NHDES, the Applicant shall then implement the OMRP. If, at any time, revisions to the conditions in this Certification that affect the OMRP are directed by or approved by NHDES, the Applicant shall update the OMRP as necessary within 60 days (or other time period acceptable to NHDES) of being notified by NHDES, submit the revised OMRP to NHDES for approval, and then implement the most recently approved OMRP.

For an explanation of why this condition is necessary to assure that the Activity will comply with Surface Water Quality Standards, see Findings D-9, D-20, and D-21.

- E-13. **Notification of Non-compliance:** The Applicant shall notify NHDES via email<sup>4</sup> within 48 hours of any discovery of non-compliance with this Certification. Such notification shall include the date(s) of non-compliance, reasons for non-compliance, corrective actions taken to prevent such non-compliance from reoccurring, and date(s) the Applicant achieved compliance.

For an explanation of why this condition is necessary to assure that the Activity will comply with Surface Water Quality Standards, see Finding D-9.

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<sup>4</sup> Email records to the NHDES Water Quality Certification Supervisor at [wqc@des.nh.gov](mailto:wqc@des.nh.gov).

#### F. NHDES CONTACT

Reports and other items that must be submitted to NHDES under a condition of this Certification should be sent to the NHDES Water Quality Certification Supervisor and to the following NHDES email address:

[wqc@des.nh.gov](mailto:wqc@des.nh.gov). On the date this certification is granted, James Tilley is the NHDES Water Quality Certification Supervisor and can be reached at [james.w.tilley@des.nh.gov](mailto:james.w.tilley@des.nh.gov) or (603) 271-0699. If you have questions regarding this certification, please contact James Tilley. If you are unable reach the NHDES Water Quality Certification Supervisor, please contact NHDES at (603) 271-3503.

#### G. ENFORCEMENT

Certification conditions are subject to enforcement mechanisms available to the state of New Hampshire.

#### H. APPEAL PROCEDURE

Any person aggrieved by this decision may appeal to the N.H. Water Council ("Council"). An Environmental Fact Sheet with information on appealing a decision of the N.H. Department of Environmental Services can be found at the following link: [CO-7 \(nh.gov\)](#). A link to the Council's rules, is available on the [New Hampshire Environmental Council website](#) (or more directly at the [Water Council page](#)). Copies of the rules also are available from the NHDES Public Information Center at (603) 271-2975.

#### I. SIGNATURE & DATE



Rene J. Pelletier, P.G., Director  
NHDES Water Division

2/3/23  
Date

- ec: Fred Symmes, Jackson Ski Touring Foundation
- Ken Kimball, Jackson Ski Touring Foundation
- Julie Atwell, Town Administrator, Town of Jackson
- Ben Halcyon, Chair, Conservation Commission Town of Jackson
- Mark Dindorf, Chair, Saco & Swift Rivers Local Advisory Committee
- John Magee (NHFGD)
- Erin Holmes (NHDES)
- Stacey Herbold (NHDES)
- Kelsey Vaughn (NHDES)
- Christina Rambo (NHDES)
- Ted Diers (NHDES)

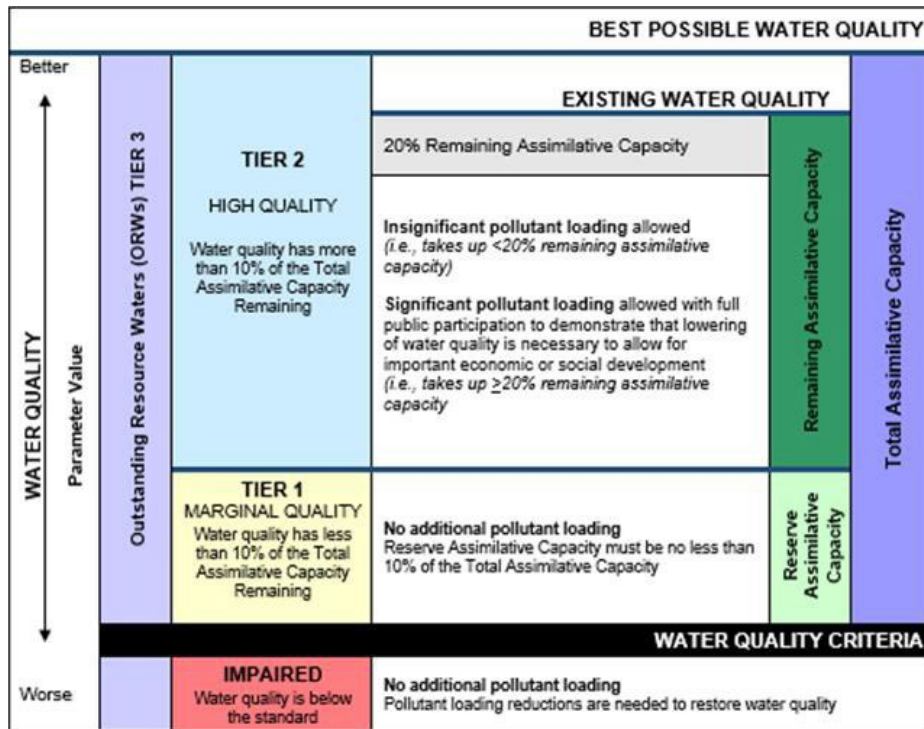
**J. APPENDIX A**

**APPENDIX A**

Methodology for Determining Insignificant Withdrawals from the Ellis River for Snowmaking

Antidegradation provisions of the New Hampshire’s surface water quality standards are included in Env-Wq 1708 and apply to water withdrawals [Env-Wq 1708.02(d)].<sup>1</sup> Env-Wq 1702.03 defines “antidegradation” as “a provision of the water quality standards that maintains and protects existing water quality and uses.” Figure A-1 shows how the various antidegradation terms (i.e., total assimilative capacity, water quality criteria, reserve and remaining assimilative capacity, etc.) relate to one another. In this appendix, NHDES describes how it applied antidegradation rules to the Activity to determine the flows necessary to be protective of aquatic life and the withdrawals from Ellis River that would be considered “insignificant” as defined in the antidegradation regulations.

**Figure A-1: Antidegradation Schematic**



**a. Equations for Determining Total, 10% Reserve (Tier 1) and Remaining Assimilative Capacity.**

Rules for assessing surface waters to determine the total, 10% reserve and remaining assimilative capacity are included in Env-Wq 1708.08, titled “Assessing Waterbodies”. Applicable rules are provided below.

<sup>1</sup> Env-Wq 1708.02: Antidegradation shall apply to: (a) Any proposed new or increased activity, including point source and nonpoint source discharges of pollutants, that would lower water quality or adversely affect the existing or designated uses; (b) Any proposed increase in loadings to a waterbody when the proposal is associated with existing activities; (c) Any increase in flow alteration over an existing alteration; and (d) Any hydrologic modifications, such as dam construction and water withdrawals.”

Env-Wq 1708.08(a) "The applicant shall characterize the existing water quality and determine if there is remaining assimilative capacity for each parameter in question."

Env-Wq 1708.08(c) "Where flows will or might be altered, existing conditions shall be established based on the existing maximum allowed water withdrawals or impoundment, diversion, or fluctuation of streamflow, as applicable."

Env-Wq 1708.08(d) "Remaining assimilative capacity shall be evaluated by comparing existing water quality, as specified in (b) and (c) above, to the state's water quality criteria."

Env-Wq 1708.08(f): "Subject to (h) below, if the department determines, based on the information submitted, that there is no remaining assimilative capacity for a specific parameter, no further degradation with regard to that parameter shall be allowed."

Env-Wq 1708.08(g): "Subject to (h) below, if the department determines that there is some remaining assimilative capacity, then the department shall proceed in accord with Env-Wq 1708.09."

Env-Wq 1708.08(h): "Determinations made pursuant to (f) or (g), above, shall account for Env-Wq 1705.01, which requires the department to reserve no less than 10% of the surface water's assimilative capacity."

(Env-Wq 1705.01(a): "Subject to (b) below, the department shall hold not less than 10 percent of the assimilative capacity of each surface water in reserve to provide for future needs.")

Env-Wq 1703.01, titled "Water Use Classifications; Designated Uses", specifies the following regarding flow quantity:

(d) Unless high or low flows are caused by naturally-occurring conditions, surface water quantity shall be maintained at levels that protect existing uses and designated uses.

As shown in Figure A-1 and the following equation, the Total Assimilative Capacity (TAC) is equal to the "Best Possible Water Quality" (or in this case the Best Possible Flow or  $Q_{best}$ ) minus the Water Quality Criteria flow or  $Q_{wqc}$ .

$$\text{Equation 1: } TAC = Q_{best} - Q_{wqc}$$

Referring once again to Figure A-1, the flow corresponding to 10% reserve assimilative capacity (10%RESAC, Tier 1) can be determined by the following equation:

$$\text{Equation 2: } Q_{(10\%RESAC \text{ or tier } 1)} = Q_{wqc} + (0.10 \times TAC)$$

According to Figure A-1 and the following equation, the remaining assimilative capacity (REMAC), is equal to the Existing Water Quality (or in this case the Existing Flow or  $Q_{exist}$ ) minus the  $Q_{tier 1}$ .

$$\text{Equation 3: } REMAC = Q_{exist} - Q_{tier 1}$$

According to Env-Wq 1708(d), the Remaining Assimilative Capacity (REMAC) must be evaluated "[...] by

comparing existing water quality, as specified in (b) and (c) above, to the state's water quality criteria." Env-Wq 1708.08(c) specifies that "[w]here flows will or might be altered, existing conditions shall be established based on the existing maximum allowed water withdrawals or impoundment, diversion, or fluctuation of streamflow, as applicable." As discussed later, existing flows for this Activity will be based on calculations of near-continuous, real-time instream flow measurements that would be calculated by the Applicant so that existing flows will be representative of what is actually occurring upstream, both now and in the future. Whenever upstream river flows fall below specified thresholds, withdrawals will need to be reduced to *de minimis* levels.

**b. Equation for Withdrawal to be "Insignificant"**

Conditions that will allow the withdrawal to be considered "insignificant" are described below.

According to Env-Wq 1708.09, titled "Significant or Insignificant Determination":

"(a) Any discharge or activity that is projected to use 20% or more of the remaining assimilative capacity for a water quality parameter, in terms of either concentration or mass of pollutants, or volume or flow rate for water quantity, shall be considered a significant lowering of water quality.

(b) The department shall not approve a discharge or activity that will cause a significant lowering of water quality unless the applicant demonstrates, in accordance with Env-Wq 1708.10, that the proposed lowering of water quality is necessary to achieve important economic or social development in the area where the waterbody is located.

(c) [...] any applicant proposing an activity that will cause an insignificant lowering of water quality shall not be required to demonstrate that the activity is necessary to provide important economic or social development, provided the applicant implements best management practices to minimize degradation."

Under Env-Wq 1708.06, titled "Protection of Water Quality in High Quality Waters, NHDES is required to "[...] evaluate and authorize insignificant changes in water quality as specified in Env-Wq 1708.09."

In terms of flow, withdrawals can be considered "insignificant" for antidegradation purposes, if the withdrawals do not use 20% or more of the remaining assimilative capacity (REMAC) of flow. This can be accomplished by monitoring flow on a surrogate gage, which is U.S. Geological Survey Gage 010642505 - Saco River at River Street in Bartlett, New Hampshire (USGS Gage 010642505). The Applicant would use that flow to calculate flow on the Ellis River at the proposed withdrawal locations and use a pumping system that can vary the rate of water withdrawal from 40 gallons per minute (gpm) to 150 gpm based on the calculated upstream flow of the Ellis River. The rate of withdrawal at any time would be calculated in accordance with the following equation:

$$\text{Equation 4: } \text{Insignificant withdrawal (WD insig)} = 0.20 \times [\text{Q exist} - \text{Q tier 1}]$$

Where:

WD insig = the maximum that can be withdrawn to be considered "insignificant" [i.e., without exceeding 20% of the remaining assimilative capacity (REMAC)].

Q exist = Q up = the river flow measured at a gage upstream of the withdrawal or the

river flow measured just downstream of the withdrawal plus the current rate of withdrawal.

$Q_{\text{tier 1}} = \text{Tier 1}$  (see Equation 2)

This Certification is focused on withdrawals that are considered to cause “insignificant” degradation of water quality under antidegradation rule. By not proposing withdrawals that would cause “significant” degradation of water quality, the Applicant is not required to go through an additional antidegradation review as described in the next section of this appendix.

**c. Additional Antidegradation Requirements If Withdrawal is “Significant”**

If the Applicant wants to withdraw 20% or more of the remaining assimilative capacity in river, the withdrawal would be considered “significant” and the Applicant would need to demonstrate, in accordance with Env-Wq 1708.10, the following:

- The proposed additional withdrawal is necessary to accommodate the Activity;
- The Activity will provide net economic or social development in the area in which the waterbody is located; and
- The net social and economic benefits outweigh the environmental impact (i.e., the significant degradation of water quality).

To determine if the above criteria are met, the Applicant would need to submit an alternative analysis as described in Env-Wq 1708.10(d), (e), and (f). If, after reviewing the information provided by the Applicant, NHDES makes a preliminary determination to approve the request, NHDES must provide opportunity for public comment, including a public hearing if requested, in accordance with Env-Wq 1708.11. Following the public participation process, NHDES would then make a final decision to grant or deny the request. Note that in this case, NHDES may also require a site-specific study to determine flows necessary to protect select fish or macroinvertebrate species and life stages, such as a study based on the Instream Flow Incremental Methodology.

**d. Methodology for Determining “Insignificant” Withdrawals**

As previously discussed, an “insignificant” withdrawal is dependent on the existing upstream flow ( $Q_{\text{exist}}$ ) and  $Q_{\text{tier 1}}$  (see Equation 4).  $Q_{\text{tier 1}}$  is dependent on the TAC which is dependent on knowing  $Q_{\text{wqc}}$  and  $Q_{\text{best}}$  (see Equation 1 and Equation 2 above). Different aquatic species and life stages are more dependent on flows during various months and it is important to retain as much natural variability as possible according to the concept of the natural flow regime paradigm, which posits that naturally occurring temporal fluctuations in streamflow are necessary for maintaining natural ecological communities. By determining the flows of the Ellis River necessary for withdrawals to be considered “insignificant”, NHDES is identifying flows necessary to maintain adequate natural flow variability and ecological communities.

NHDES is not aware of a gage on the Ellis River that measures flow on a regular or historical basis. In the Application, the Applicant proposes to use USGS Gage 010642505 as a surrogate gage to calculate flow statistics at the proposed withdrawal locations of the Activity. USGS Gage 010642505 is located on the Saco River at River Street in Bartlett, New Hampshire and is approximately six miles southwest of the proposed withdrawal locations. Historical and real-time measurements of flow and river depth at USGS Gage 010642505 since



September 2009 are available on-line on a USGS website.<sup>2</sup> The drainage area to USGS Gage 010642505 is approximately 90.7 square miles (sm). The drainage area for the proposed variable water intake zone for snowmaking from the Ellis river ranges from 28.9 square miles, for locations on the Ellis River upstream of the confluence with the Wildcat Brook, to 52.6 square miles, for locations on the Ellis River just downstream of the confluence with Wildcat Brook, depending on the withdrawal location. The drainage areas of those locations are approximately 29% and 58%, respectively, of the drainage area of the Saco River at USGS Gage 010642505. Flows at the locations of the withdrawal could be approximated by using a drainage area ratio method, which involves calculating the ratio of the withdrawal drainage area to the USGS Gage 010642505 drainage area (i.e.,  $28.9 \text{ sm}/90.7 \text{ sm} \approx 0.32$  for the withdrawal location that would be upstream of the confluence with the Wildcat Brook or  $52.6 \text{ sm}/90.7 \approx 0.58$  for the withdrawal location that would be downstream of the confluence with the Wildcat Brook) and multiplying the flow at USGS Gage 010642505 by that ratio (i.e., flow at USGS Gage 010642505  $\times 0.32 \approx$  flow at the withdrawal location in the Ellis River that would be upstream of the confluence with the Wildcat Brook or flow at USGS Gage 010642505  $\times 0.58 \approx$  flow at the withdrawal location in the Ellis River that would be downstream of the confluence with the Wildcat Brook).

In the Application, the Applicant stated the following about using the drainage area ratio method for determining flows, in units of cubic feet per second (cfs), at the withdrawal locations:

“The characteristics of these Saco and Ellis River watersheds in this area are quite similar. The two watersheds are roughly parallel and abut each other on approximately north to south axis. Both watersheds include areas above tree line and high elevation areas of the Presidential Range. Therefore, pro-rating data from the Saco River gage in Bartlett is a reasonable approach for estimating the flow rates in the Ellis River. However, because mountain topography, aspect and elevation make precipitation variable over small spatial distances, a 1 to 1 ratio of the Saco watershed area to the Ellis River or Ellis at the Wildcat River watershed areas may not have the same runoff rates prorated to equivalent cfs/square mile of watershed. Therefore, in addition to comparing watershed areas, [the Applicant] also compared the 7Q10 flow rates for the Saco and Ellis River watersheds.”

Env-Wq 1702.01 defines “7Q10” as “the lowest average flow that occurs for 7 consecutive days on an annual basis with a recurrence interval of once in 10 years on average, expressed in terms of volume per time period.”

In the Application, the Applicant stated the following about using a 7Q10 low flow ratio method, instead of the drainage area ratio method, at USGS Gage 010642505 and the withdrawal locations to determine if a withdrawal would be considered “insignificant”:

“The USGS StreamStats model calculates 7Q10 flows for annual periods and for certain subperiods of the year, including the period from January 1 to March 15.<sup>[3]</sup> The USGS StreamStats website does not provide 7Q10 flows for the full December to late February period when snowmaking will occur. The January 1 to March 15 flows provided by StreamStats are the StreamStats flows that have the most overlap with the snowmaking period. Flow data from the Saco River gage in Bartlett [i.e., the USGS Gage 010642505] show

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<sup>2</sup> USGS. (Accessed December 12, 2022). USGS 010642505 Saco River At River Street, At Bartlett, NH. Accessed December 12, 2022: <https://waterdata.usgs.gov/monitoring-location/010642505/#parameterCode=00065&period=P7D>.

<sup>3</sup> StreamStats is a USGS web application that provides access to an assortment of Geographic Information Systems analytical tools that are useful for water-resources planning and management, and for engineering and design purposes. The map-based user interface can be used to delineate drainage areas for user-selected sites on streams, and then get basin characteristics and estimates of flow statistics for the selected sites anywhere this functionality is available. The StreamStats application may be accessed at the following USFSGS website: <https://streamstats.usgs.gov/ss/>.

[...] that flows from late November through December 31 are typically greater than flows from January 1 through March 15. Therefore, the use of 7Q10 data for the January 1 through March 15 time period to compare the watersheds is considered to be conservative [January 1 through March 15 7Q10 flow at the USGS Gage 010642505 is 34.3 cfs].

The [drainage area ratios are] slightly higher ratios for the Ellis River to the Saco River at the Bartlett gage when watershed area is used in comparison to when January 1 to March 15 7Q10 flows are used. These differences may be the result of differences between rainfall, snowmelt, and elevation that affect the Saco and Ellis River watersheds differently. To be conservative, this analysis uses the January 1 to March 15 7Q10 flow rates to determine the ratios that will be used to compare flow readings in the Saco River at the Bartlett gage to the snowmaking water withdrawal locations at the Ellis River in Jackson. [...]

The ratios listed [...] are used to develop ‘natural’ flow statistics for the Ellis River in Jackson by using flow rates measured at USGS Gage 010642505 on the Saco River gage in Bartlett. The estimated ‘natural’ flow statistics for the Ellis River are then used in the analysis [...] to determine if the water withdrawals proposed by the [Applicant] are insignificant in accordance with Env-Wq 1708.09.”

In Application, the Applicant provided the information in Table 1 for comparing a drainage area ratio method and a 7Q10 low flow ratio method:

**Table A-1. Drainage Area Ratio Method vs. 7Q10 Low Flow Ratio Method for Ellis River withdrawal**

Location	Drainage Area Ratio Method		7Q10 Low Flow Ratio Method (January 1 to March 15)	
	Area (sm)	Ratio to USGS Gage 010642505	7Q10 Flow (cfs)	Ratio to USGS Gage 010642505
Location Gage 010642505	91	1.00	34.3	1.00
Ellis River Withdrawal Locations Upstream of Wildcat Brook Confluence	28.9	0.32	9.13	0.27
Ellis River Withdrawal Locations Downstream of Wildcat Brook Confluence	52.6	0.58	17.1	0.50

The ratios between January 1 to March 15 7Q10 flows of the proposed withdrawal locations of the Activity and the location of USGS Gage 010642505 are smaller than the ratios of the drainage areas of those same locations using the drainage area ratio method (i.e., 0.27 and 0.50 ratios using the 7Q10 flow ratio method are smaller than 0.32 and 0.58 ratios than using the drainage ratio method, respectively). NHDES agrees with the Applicant calculating flows using the 7Q10 flow ratio method would be more conservative than the drainage area ratio method because using ratios from the 7Q10 flow ratio method would result in calculated flows at the withdrawal locations that would be less than calculated flows using the drainage area withdrawal method. Compared to the drainage area ratio method, using the 7Q10 low flow ratio method would result in higher measured flows on the Saco River at USGS Gage 010642505 and, therefore, the Ellis River, before the Applicant could withdraw at the maximum proposed rate of 0.334 cfs or 150 gpm for those withdrawals being

considered “insignificant” under Env-Wq 1708.09.

NHDES downloaded daily average flow data from USGS Gage 010642505 for the period from September 18, 2009 to December 12, 2022 to calculate a flow percentile for each month that the Applicant proposes to withdraw water from the Ellis River (i.e., November, December, January, and February). Using the distribution of all the average daily flows for a particular month, monthly flow percentiles (i.e., 10<sup>th</sup>, 25<sup>th</sup>, and 75<sup>th</sup> percentiles) provide the flow that represents the percentage of days when average daily flow was at or below that particular flow in each month. For example, NHDES determined that the 10<sup>th</sup> percentile flow, or Q10 flow, of the Saco River in December at USGS Gage 010642505 was approximately 114 cfs, which means that daily average flows in December were 114 cfs or less for 10 percent of the average daily flows; and NHDES determined that the 75<sup>th</sup> percentile flow, or Q75 flow, of the Saco River in December was approximately 328 cfs, which means that daily average flows in December were 327.5 cfs or less for 75 percent of the average daily flows. Q50 is the middle flow meaning it is the flow that is both exceeded and not exceeded approximately 50 percent of the time (i.e., the median flow).

NHDES multiplied the monthly flow percentiles calculated from data collected at USGS Gage 010642505 by the 7Q10 low flow ratios to determine the monthly flow percentiles at the proposed withdrawal locations (i.e., multiplied the monthly flow percentiles of flow at USGS Gage 010642505 by 0.27 and 0.50 for Ellis river withdrawal locations upstream and downstream, respectively, of the confluence with the Wildcat Brook). NHDES considered the transposition of the USGS Gage 010642505 flows by 7Q10 flows sufficient since the ratios are lower than using the drainage area ratio method. In addition, NHDES reviewed its Water Use Registration and Reporting database for water withdrawals from the Ellis River, Wildcat Brook, and Saco River to determine the magnitude of active surface water withdrawals that could affect flow at the proposed water withdrawal locations during November, December, January, and February (i.e., the months when the withdrawals for the Activity would occur). NHDES determined that two withdrawals on the Ellis River and one withdrawal on Wildcat Brook could influence flow on the Ellis River while the Applicant is withdrawing water from the withdrawal locations. However, NHDES determined that rates of existing withdrawals would be less than the withdrawal rate of the Activity and less than 1 percent of the upstream 10<sup>th</sup> percentile flow of the Ellis River based on daily averages of the highest reported monthly withdrawals. NHDES also determined that a significant portion of the existing winter withdrawals is returned as base flow to the Ellis River via septic system discharges to the groundwater. Therefore, NHDES determined that the combination of existing and proposed withdrawals would still provide 10 percent of the assimilative capacity of flow of the Ellis River would be held in reserve as required under Env-Wq 1705.01(a).

Calculated monthly flow percentiles for the Ellis River at the proposed withdrawal locations are shown in Table A-2.

**Table A-2. Monthly flow percentiles at the proposed withdrawal locations on the Ellis River.**

Month	Ellis River Withdrawal Locations Upstream of Wildcat Brook Confluence (CFS)					Ellis River Withdrawal Locations Downstream of Wildcat Brook Confluence (CFS)				
	Q10	Q20	Q25	Q50	Q75	Q10	Q20	Q25	Q50	Q75
1	23	26	28	35	51	43	49	53	66	95
2	14	17	18	25	38	26	33	34	47	72
3	14	17	23	38	77	26	32	42	71	144
4	44	66	76	121	219	82	124	141	227	411
5	45	68	78	124	207	83	128	146	231	388
6	17	25	28	41	64	32	46	53	78	120
7	13	17	18	27	43	25	31	33	50	81
8	10	12	13	18	28	19	22	24	34	52
9	7	9	10	14	27	13	16	18	26	50
10	10	17	18	35	74	19	32	34	66	138
11	26	30	34	46	76	49	57	63	87	141
12	30	35	36	52	87	57	65	68	97	163
<b>Annual</b>	13	19	22	38	80	25	36	42	72	149

For the proposed Activity, NHDES selected Q75 as Q best and initially selected Q25 as Q wqc for each month (from Table A-1). With regards to frequency of occurrence, these flows equally bracket the Q50 flow (i.e., the median or middle flow). NHDES believes that if the Q wqc is set below the median, Q best should be set above the median to minimize the impact of the withdrawals on the “natural” median value for each month.

Before proceeding, it is important to note that whatever flow is selected for Q wqc for each month, NHDES is not implying that it is appropriate to withdraw water down this flow for the entire month. Rather, selection of Q wqc and Q best allows one to calculate Q tier 1 which sets the threshold for antidegradation purposes, above which some limited withdrawals may be allowed if there are no violations of surface water quality standards, the withdrawals do not appreciably affect the natural variability of flows by “flatlining”<sup>4</sup> the hydrograph, and the Applicant implements best management practices as required under Env-Wq 1708.09(c).

Upon further analysis, NHDES determined that setting Q wqc equal to Q25 for all months when the withdrawal is proposed may unnecessarily limit the amount of water that could be withdrawn during months of high flow. If withdrawals are necessary, it is generally a best management practice to allow withdrawal when river flows are relatively high. Therefore, NHDES determined that it was appropriate to lower the Q wqc depending on the maximum percentage of water that the proposed Activity could withdraw. This is based on the following theory:

As the maximum percent of river flow withdrawn increases, the frequency that it is allowed to occur should decrease to minimize the impact on the resource and the monthly median flow.

<sup>4</sup> Flatlining the hydrograph means the downstream river flow remains constant or at a near-constant level for a substantial amount of time (hours) due to the withdrawal.

Based on the above theory, NHDES selected the following criteria to determine an appropriate Q wqc for the proposed withdrawal for each month:

Monthly Q wqc = Monthly Q10 if the maximum percent of upstream river flow withdrawn is no more than 5%.

Monthly Q wqc = Monthly Q20 if maximum percent of upstream river flow withdrawn is greater than 5% and no more than 10%.

Monthly Q wqc = Monthly Q25 if maximum percent of upstream river flow withdrawn is greater than 10% and no more than 15%.

Knowing Q wqc and Q best for each month, NHDES used Equation 1, Equation 2, Equation 3 and Equation 4 (see sections a. and b. above) to determine the monthly TAC, Q tier 1, REMAC and withdrawal that would not exceed 20% of the REMAC, respectively. NHDES determined the maximum percent of river that could be withdrawn each month by setting Equation 4 equal to the maximum proposed withdrawal of 0.334 cfs (150 gpm), solving for Q up, and then dividing 0.334 cfs by Q up.

Final monthly values of Q wqc, Q best, Q tier 1, minimum Q up (i.e., minimum upstream flow) that will result in withdrawals that are considered “insignificant” (i.e., will use no more than 20 percent of the remaining assimilative capacity), for the requested withdrawals from the Ellis River upstream and downstream of the confluence with Wildcat Brook are shown in Table A-3 and Table A-4, respectively. The maximum percent of river withdrawn each month by the proposed Activity is also presented.

**Table A-3: Monthly values of Q wqc, Q best, Q tier 1, minimum Q up (i.e., minimum upstream flow) on the Ellis River, and minimum Q up on the Saco River at USGS Gage 010642505 to withdraw 0.334 cfs (150 gpm) from the Ellis River upstream of the confluence with Wildcat Brook that would cause an “insignificant” degradation of water quality.**

Month	Q wqc (cfs)	Percentile for the month of Q wqc	Q best = Q75 for month (cfs)	Maximum % used of Remaining Assimilative Capacity (REMAC)	Q tier 1 (cfs)	Max Pump Rate (cfs)	Min Q up to pump 0.334 cfs and be less than 20% REMAC (cfs)	Max Pump Rate / Min Q up (%)	Saco River equivalent to Min Q up to pump 0.334 cfs (cfs)
11	26.0	Q10	75.5	20	31.0	0.344	32.7	1.0	122.7
12	30.3	Q10	86.5	20	36.0	0.344	37.6	0.9	141.4
1	23.0	Q10	50.6	20	25.8	0.344	27.4	1.2	103.0
2	14.1	Q10	38.3	20	16.5	0.344	18.2	1.8	68.4

**Table A-4: Monthly values of Q wqc, Q best, Q tier 1, minimum Q up (i.e., minimum upstream flow) on the Ellis River, and minimum Q up on the Saco River at USGS Gage 010642505 to withdraw 0.334 cfs (150 gpm) from the Ellis River downstream of the confluence with Wildcat Brook that would cause an “insignificant” degradation of water quality.**

Month	Q wqc (cfs)	Percentile for the month of Q wqc	Q best = Q75 for month (cfs)	Maximum % used of Remaining Assimilative Capacity (REMAC)	Q tier 1 (cfs)	Max Pump Rate (cfs)	Min Q up to pump 0.334 cfs and be less than 20% REMAC (cfs)	Max Pump Rate / Min Q up (%)	Saco River equivalent to Min Q up to pump 0.334 cfs (cfs)
11	48.8	Q10	141.5	20	58.0	0.344	59.7	0.6	119.8
12	56.8	Q10	162.0	20	67.4	0.344	69.0	0.5	138.5
1	43.1	Q10	94.7	20	48.2	0.344	49.9	0.7	100.1
2	26.4	Q10	71.8	20	31.0	0.344	32.6	1.0	65.4

**e. De minimis Withdrawal**

When the Applicant is unable to withdraw water at the maximum proposed withdrawal rate of 0.334 cfs (150 gpm) because the withdrawal would cause a significant degradation of water quality (i.e., when Q up is below the minimum Q up shown in Table A-3 and Table A-4), NHDES authorizes a *de minimis* withdrawal rate equal to 1% of Q up (i.e., 1% of upstream flow on Ellis River) for the Activity. NHDES authorizes this *de minimis withdrawal* rate with the condition that the withdrawal does not result in a surface water quality violation and provided there are no new water users that require a portion of the water lost to the *de minimis* withdrawal rate. NHDES determined the *de minimis* withdrawal rate to be protective of aquatic life and allow at least some volume of water to be withdrawn in each of the requested months.

**f. Summary of Authorized Withdrawals**

In summary, NHDES authorizes withdrawals that are equal to the greater of the following, subject to a maximum withdrawal rate of 0.334 cfs (150 gpm):

**WD insig = 0.20 x (Q up – Monthly Q tier 1) where:**

**Q up is equal to the river flow measured or calculated just upstream of the withdrawal;**

**and**

**Monthly Q tier 1 is from Table A-3 and Table A-4 (varies monthly).**

**Or**

**WD *de minimis* = 1% of Q up.**

Considering antidegradation and the *de minimis* flow allowance of 1 percent, and assuming upstream river flow (Q up) is measured just upstream of the proposed withdrawal, Table A-5 summarizes the authorized withdrawals for the months when the proposed withdrawal will occur:

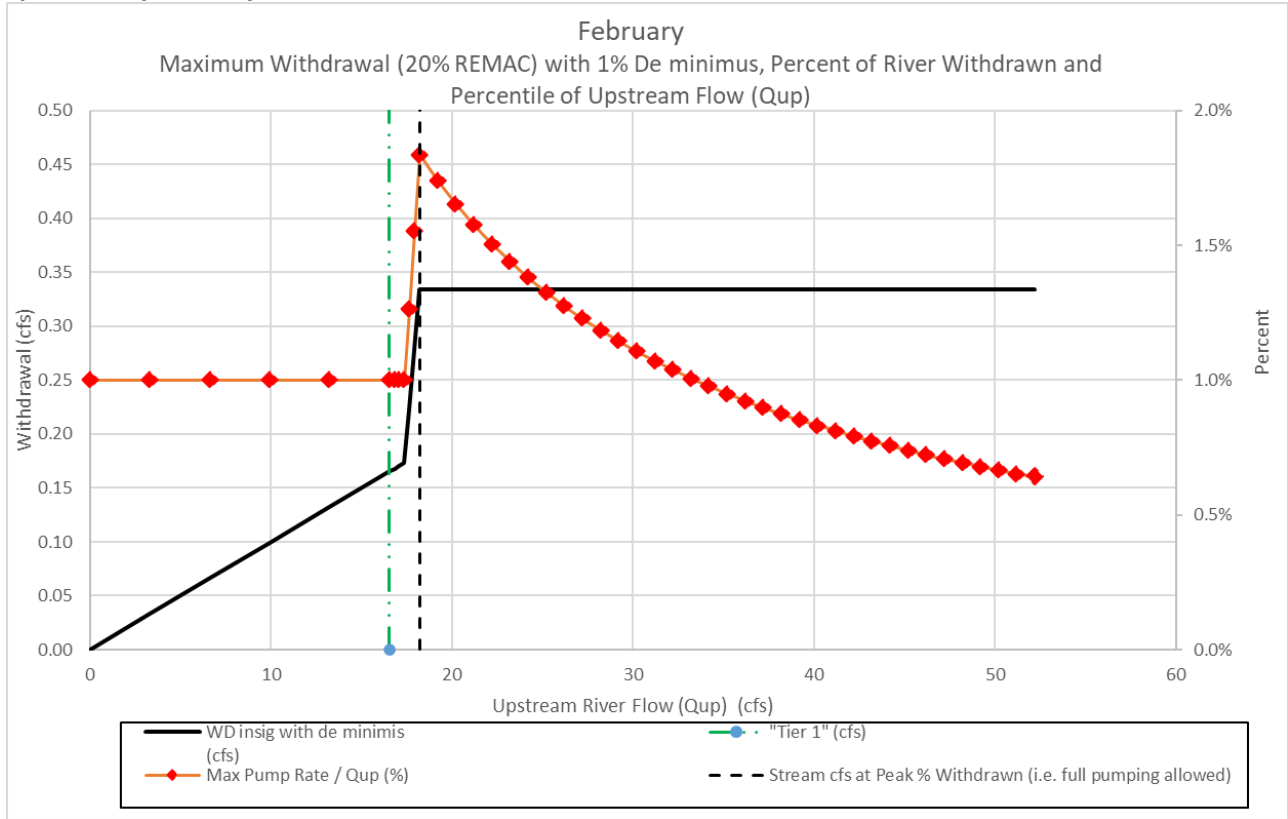
**Table A-5: Summary of authorized maximum withdrawals assuming Q up is measured just upstream of the proposed withdrawal location**

Month	Q up = Ellis River Flow Upstream of Confluence with Wildcat Brook (cfs)	Saco River equivalent to Min Q up for Ellis River Flow Upstream of Confluence with Wildcat Brook (cfs)	Q up = Ellis River Flow Downstream of Confluence with Wildcat Brook (cfs)	Saco River equivalent to Min Q up for Ellis River Flow Downstream of Confluence with Wildcat Brook (cfs)	Maximum Withdrawal when river flow is greater than or equal to Q up (cfs)	Maximum Withdrawal when river flow is less than Q up (cfs)
November	32.7	122.7	59.7	119.8	0.334 (150 gpm)	= 0.01 x Q up
December	37.6	141.4	69.0	138.5		
January	27.4	103.0	49.9	100.1		
February	18.2	68.4	32.6	65.4		

**g. Examples**

Maximum withdrawal, Q tier 1 and percent of river flow withdrawn (shown as Max Pump Rate/Q up) for February as a function of the upstream river flow (Q up) are shown in Figure A-2 and Figure A-3 as calculated for the Ellis River upstream and downstream of the confluence with Wildcat Brook, respectively.

**Figure A-2: Maximum withdrawal, Q tier 1, and percent of river flow withdrawn – February - Ellis River upstream of the confluence with Wildcat Brook**





**Figure A-3: Maximum withdrawal, Q tier 1, and percent of river flow withdrawn – February - Ellis River downstream of the confluence with Wildcat Brook**

