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Division of Parks and Recreation  
Cannon Mountain Aerial Tramway and Ski Area  
9 Franconia Notch Parkway  
Franconia, NH 03580

WATER QUALITY CERTIFICATION

In Fulfillment of

NH RSA 485-A:12

**WQC # 2013-404P-001**

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Activity Name	Mittersill Terrain Area Improvements and snowmaking withdrawal from Echo Lake
Activity Location	Mittersill Ski Area Franconia, NH
Affected Surface waters	Echo Lake, NHLAK801030302-01-01 Echo Lake Beach, NHLAK801030302-01-02 Beaver Brook, NHRIV801030302-01 Lafayette Brook, NHRIV801030302-01 Meadow Brook, NHRIV801030302-02 Skookumchuck Brook, NHRIV801030302-01 Unnamed Brook, NHRIV801030302-01 Jordan Brook, NHRIV801030302-01
Owner/Applicant	New Hampshire Department of Resources and Economic Development, Division of Parks and Recreation Cannon Mountain Aerial Tramway and Ski Area 9 Franconia Notch Parkway Franconia, NH 03580
Appurtenant State permit(s) (and any amendments):	DES Wetlands Permit: 2013-01564 DES Alteration of Terrain Permit: AoT-0622
Applicable Federal permit(s):	NH Programmatic General Permit NAE-R-2012-00339 issued by the U.S. Army Corps of Engineers
DATE OF APPROVAL (subject to Conditions below)	June 25, 2014

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## A. INTRODUCTION

The New Hampshire Division of Parks and Recreation (Applicant) has filed a request for 401 water quality certification for the proposed expansion of the Mittersill Ski area in Franconia, NH (Activity). The Activity includes the widening of ski trails and an increase in water withdrawn from Echo Lake for snowmaking. A more complete description of the Activity is included in Finding D-1 of this Certification.

This Water Quality Certification (WQC or Certification) documents laws, regulations, determinations and conditions related to the Activity for the attainment and maintenance of NH surface water quality standards, including the provisions of NH RSA 485-A:8 and NH Code of Administrative Rules Env-Wq 1700, for the support of designated uses identified in the standards.

## B. WATER QUALITY CERTIFICATION APPROVAL

Based on the facts, findings and conditions noted below, the New Hampshire Department of Environmental Services (DES) has determined that there is reasonable assurance that construction and operation of the Activity will not violate surface water quality standards. DES hereby issues this Water Quality Certification, subject to the conditions in Section E, in accordance with Section 401 of the United States Clean Water Act (33 U.S.C. 1341), RSA 485-A:12,III and condition E-3 of certification WQC # 2012-404P-002 issued by DES on August 2, 2012 for the federal Clean Water Act section 404 Programmatic General Permit for New Hampshire (General Permit No: NAE-R-2012-00339) issued by the New England District of the U.S. Army Corps of Engineers.

## C. STATEMENT OF FACTS AND LAW

- C-1. Section 401 of the United States Clean Water Act (CWA, 33 U.S.C. 1341) states, in part: "Any applicant for a federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters, shall provide the licensing or permitting agency a certification from the State in which the discharge originates or will originate...that any such discharge will comply with the applicable provisions of sections 301, 302, 303, 306, and 307 of this title....No license or permit shall be granted until the certification required by this section has been obtained or has been waived...No license or permit shall be granted if certification has been denied by the State..."
- C-2. Section 401 further states, in part "Any certification provided under this section shall set forth any effluent limitations and other limitations, and monitoring requirements necessary to assure that any applicant for a Federal license or permit will comply with any applicable effluent limitations and other

limitations...and shall become a condition on any Federal license or permit subject to the provisions of this section.”

- C-3. RSA 485-A:12, III. No activity, including construction and operation of facilities, that requires certification under section 401 of the Clean Water Act and that may result in a discharge, as that term is applied under section 401 of the Clean Water Act, to surface waters of the state may commence unless the department certifies that any such discharge complies with the state surface water quality standards applicable to the classification for the receiving surface water body. The department shall provide its response to a request for certification to the federal agency or authority responsible for issuing the license, permit, or registration that requires the certification under section 401 of the Clean Water Act. Certification shall include any conditions on, modifications to, or monitoring of the proposed activity necessary to provide assurance that the proposed discharge 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.
- C-4. RSA 485-A:12, IV. 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.
- C-5. RSA 488:3 Registration Required. –
- 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-6. Env-Wq 1702.07 “Biological integrity” means 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-7. Env-Wq 1702.17 "Designated uses" means those uses specified in water quality standards for each water body or segment whether or not such uses are presently occurring.
- C-8. Env-Wq 1702.23 "Existing uses" means those uses, other than assimilation or waste transport, which actually occurred in the water body on or after November 28, 1975, whether or not they are included in the water quality standards.
- C-9. Env-Wq 1702.46 defines surface waters 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," and waters of the United States as defined in 40 CFR 122.2."
- C-10. Env-Wq 1703.01 (c) states that "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."
- C-11. Env-Wq 1703.01 Water Use Classifications.  
(a) State surface waters shall be divided into class A and class B, pursuant to RSA 485-A:8, I, II and III. Each class shall identify the most sensitive use which 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 the flows are caused by naturally occurring conditions, surface water quantity shall be maintained at levels adequate to protect existing and designated uses.
- C-12. Env-Wq 1703.19 Biological and Aquatic Community Integrity.  
(a) The 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-13. Env-Wq 1708.02 Applicability. 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 affect the existing or designated uses;  
(b) Any proposed increase in loadings to a water body 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-14. Env-Wq 1708.05 Protection of Water Quality in ORW.

(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) Water quality shall be maintained and protected in surface waters that constitute ORW, except that some limited point and nonpoint source discharges may be allowed providing that they are of limited activity which results in no more than temporary and short-term changes in water quality. "Temporary and short term" means that degradation is limited to the shortest possible time. Such activities shall 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. Such temporary and short term degradation shall only be allowed after all practical means of minimizing such degradation are implemented.

C-15. Env-Wq 1708.07 Protection of Water Quality in High Quality Waters.

(a) Subject to (b), below, high quality waters shall be maintained and protected, except that insignificant changes in water quality, as determined by the department in accordance with Env-Wq 1708.09, shall be allowed.

(b) Degradation of significant increments of water quality, as determined in accordance with Env-Wq 1708.09, in high quality waters shall be allowed only if it can be demonstrated 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 waters are located.

(c) Economic/social benefits demonstration and alternatives analysis shall not be required for authorization of an insignificant lowering of water quality. However, in allowing a lowering of water quality, significant or insignificant, all reasonable measures to minimize degradation shall be used.

(d) If the water body is Class A Water, the requirements of Env-Wq 1708.06 shall also apply.

C-16. Env-Wq 1708.09 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. The department shall not approve such a discharge or activity unless the applicant demonstrates that the proposed lowering of water quality is necessary to achieve important economic or social development, in accordance with Env-Wq 1708.10, in the area where the waterbody is located.

C-17. Env-Wq 1708.12 Transfer of Water.

(a) In this section, "transfer" means the intentional conveyance of water from one surface water to another surface water for the purpose of increasing the

volume of water available for withdrawal from the receiving surface water. The term does not include the transfer of stormwater, for the purpose of managing stormwater during construction, between basins created or otherwise lawfully used for stormwater detention or treatment, or both, and does not include the discharge of stormwater from a detention or treatment basin to a surface water.

(b) A transfer shall be exempt from (c) and (d), below, unless one or more of the following apply:

- (1) The transfer was not in active operation prior to the effective date of the 2011 readoption of this section, as determined pursuant to (f) through (i), below;
- (2) The transfer is causing or contributing to a violation of surface water quality standards in the source water or receiving water; or
- (3) A change that could impact any designated use of the source water or receiving water is made to the transfer on or after the effective date of the 2011 readoption of this section such that a water quality certification is required under RSA 485-A:12, III or IV.

(c) The transfer of water from one surface water to another shall not be allowed unless all of the following conditions are met:

- (1) The transferred water does not contain exotic aquatic species or other species of aquatic life that could result in a violation of Env-Wq 1703.19, relative to the integrity of the biological and aquatic community, in the receiving water;
- (2) Existing and designated uses will be maintained and supported in the source water and in the receiving water;
- (3) The withdrawal from the source water and transfer to the receiving water either:
  - a. Will not result in any degradation of water quality; or
  - b. Have both been reviewed under the process specified in Env-Wq 1708.10 and determined by the department to meet the criteria specified for approval in Env-Wq 1708.10(b)(1)-(3);and
- (4) A water conservation plan that meets the water conservation requirements set forth in Env- Wq 2101 has been approved by the department and is being complied with.

(d) Transferred water may be treated to comply with the requirements of this section.

(e) If a transfer is exempt under (b), above, or if all of the conditions specified in (c), above, are met, the transfer of water shall not constitute a discharge under RSA 485-A:8, I, or RSA 485-A:13, I(a).

(f) A transfer shall be deemed to have been in active operation prior to the effective date of the 2011 readoption of this section if all of the following are true:

- (1) The infrastructure necessary for the transfer is in place and in usable condition;
- (2) Water has been transferred for at least one day in each of at least 3 years from 2000 through 2011; and

(3) At the time of its original initiation, the transfer complied with applicable legal requirements.

(g) If a transfer does not meet the conditions specified in (f), above, the person responsible for the transfer may request the department to make a determination that the transfer was in active operation by submitting the following information in writing:

- (1) The reason(s) why the infrastructure necessary for the transfer is not in place or is not in usable condition, if applicable;
- (2) The total time span, in years, over which the transfer has occurred from the first known transfer to the present;
- (3) The most recent year during which the transfer occurred; and
- (4) Why, based on the information provided in (1)-(3), above, it would be a fair and just result for the department to determine that the transfer qualifies as a transfer that was in active operation prior to the effective date of the 2011 readoption of this section.

(h) If the department determines, based on information provided pursuant to (g), above, that it would be fair and just to determine that the transfer qualifies as a transfer that was in active operation prior to the effective date of the 2011 readoption of this section, then the department shall make that determination.

(i) The department shall notify the person who requested a determination pursuant to (g), above, in writing of its decision.

C-18. In 2010, DES published guidance (hereinafter called the 2010 instream flow guidance or 2010 ISF guidance) for estimating instream flow requirements for the protection of aquatic life for situations. The guidance is available at: <http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-11-3.pdf>.

Env-Wq 2101 Water Conservation Rule. As specified in RSA 485:61, II, these rules shall apply to "all new permit applicants and applications for water withdrawals subject to the provisions of RSA 485:3, RSA 485:48, RSA 485-C:21 and section 401 of the Clean Water Act."

C-19. On August 3, 2012, the New England District of the U.S. Army Corps of Engineers reissued the federal Programmatic General Permit for New Hampshire (General Permit No: NAE-R-2012-00339). The expiration date of the NH Programmatic General Permit (PGP) is August 3, 2017. The PGP expedites review of minimal impact work in coastal and inland waters and wetlands within the State of New Hampshire. Subject to certain exclusions and conditions, the PGP eliminates the need to apply for separate approval from the Corps for most minor, non-controversial work in New Hampshire when that work is authorized by the DES Wetlands Bureau. The PGP covers the following:

- a) Work and structures that are located in, or that affect, navigable waters of the United States (U.S.) [33 CFR 328.4(c)] (regulated by the Corps under Section 10 of the Rivers and Harbors Act of 1899);

- b) The discharge of dredged or fill material into waters of the U.S. (regulated by the Corps under Section 404 of the Clean Water Act) and;
- c) The transportation of dredged material for the purpose of disposal in the ocean (regulated by the Corps under Section 103 of the Marine Protection, Research and Sanctuaries Act). The term "discharge of dredged or fill material" also includes certain discharges resulting from excavation. Applicants should contact the Corps to determine if a particular excavation discharge occurring within waters or wetlands is a regulated activity.

C-20. In accordance with Clean Water Act (CWA) Section 401 and NH statute RSA 485-A:12, III, the New Hampshire Department of Environmental Services (DES) issued a 401 Water Quality Certification (WQC # 2012-404P-002) for the current PGP on August 2, 2012. Conditions E-1 through E-6 of WQC # 2012-404P-002 state the following:

E-1. Construction or operation of all projects included under the PGP shall meet NH surface water quality standards.

E-2. Applications for projects included under the PGP shall be subject to DES review to determine whether additional conditions or an individual 401 Certification application is necessary to ensure compliance with surface water quality standards.

E-3. If DES determines that surface water quality standards are being violated by the specific project or there is reasonable potential to expect that water quality standards will be violated if more project specific conditions are not included in the 401 Certification, DES may modify this 401 Certification for the specific project to include additional conditions to ensure compliance with surface water quality standards.

E-4. Construction on any specific project permitted under the PGP shall not commence until all other applicable permits and approvals have been granted, including those permits issued through DES Wetlands Bureau and, if necessary, DES Alteration of Terrain Program.

E-5. All applicable conditions in the NH PGP shall be followed.

E-6. DES reserves the right to inspect any project permitted under the PGP and the effects of the project on affected surface waters at any time to monitor compliance with the NH surface water quality standards.

C-21. On July 29, 2013 DES received an application for 401 Water Quality Certification from the Applicant.

C-22. The Applicant collected and reported daily flow in the outlet tributary from Echo Lake, daily water level in Echo Lake and the daily volume withdrawn from Echo Lake for snowmaking at the Cannon Mountain ski area in



November and December 2013 and January and February 2014. Results were submitted to DES in an Excel spreadsheet.

- C-23. In accordance with section 401 of the CWA, this certification was issued for public comment from May 20, 2014 through June 23, 2014.

#### D. FINDINGS

- D-1 The Activity reviewed for this certification is as described in the Applicant's application for 401 Certification and in general includes the construction and operation of the following:
- a. Widening of 3 ski trails (approximately 42 acres) and installation of a new surface lift (chairlift) at the Mittersill Ski area which is estimated to disturb approximately 1,954,700 square feet of earth and impact approximately 22,820 square feet of wetlands.
  - b. Installation and operation of new 4, 6, 8 and 10 inch diameter snowmaking distribution lines (conveying air and water) located aboveground and alongside the three trails, which will be connected to the existing Cannon Mountain Ski area snowmaking system via a new set of air and water lines, as well as construction and operation of three new valve houses (approximately 150 square feet each) to facilitate operation of the snowmaking system.
  - c. Withdrawals from Echo Lake (the existing source of water for snowmaking at the Cannon Mountain Ski area) to cover ski trails at Cannon Mountain and the expanded ski trails proposed at the Mittersill ski area.
  - d. Drainage and discharge of water from the snowmaking distribution pipes to prevent the pipes from freezing at the end of a snowmaking session.
- D-2 It is DES' understanding that the New England District of the U.S. Army Corps of Engineers (Corps) will make a determination that the Activity requires a federal Clean Water Act Section 404 permit for the discharge of dredge or fill material into waters of the U.S. and that the Section 404 NH Programmatic General Permit (PGP) satisfies this requirement (see section C-5 of this Certification for further information about the PGP).
- D-3 Condition E-3 of 401 Water Quality Certification (WQC # 2012-404P-002) issued by DES for the current PGP allows DES to modify the 401 certification issued for the PGP to include additional conditions to ensure compliance with surface water quality standards (see section C-20 of this certification). DES has determined that additional conditions are necessary to ensure compliance of this Activity with surface water quality standards and that the 401 certification issued for the PGP therefore needs to be modified for this Activity.

D-4 The named and unnamed streams, ponds, and wetlands, affected by the Activity, are surface waters as defined in Env-Wq 1702.46 and, have been assigned a legislative classification of Class B<sup>1</sup>. Pursuant to RSA 485-A:8, II and Env-Wq 1700, Class B waters are intended to support the following designated uses: aquatic life, primary and secondary contact recreation, fish consumption, wildlife, and, after adequate treatment, water supply.

DES has assigned Assessment Unit (AU) identification numbers to named and unnamed surface waters that appear on 1:24,000 scale hydrography. Consequently, not all surface waters currently have an AU number. Surface waters that do not have an AU number are still considered surface waters provided they meet the definition of Env-Wq 1702.46.

Surface waters that could be potentially affected by this Activity and their associated AU numbers (where available) are shown in the following table.

Table 1

<b>Surface Water Name and AU Numbers</b>
Echo Lake, NHLAK801030302-01-01
Echo Lake Franconia State Park Beach, NHLAK801030302-01-02
Beaver Brook, NHRIV801030302-01
Lafayette Brook, NHRIV801030302-01
Meadow Brook, NHRIV801030302-02
Skookumchuck Brook, NHRIV801030302-01
Unnamed Brook, NHRIV801030302-01
Jordan Brook, NHRIV801030302-01

D-5 According to the 2012 list of impaired waters, the following surface waters in the vicinity of the proposed Activity which have assigned AU numbers are listed as impaired. All impairments, with the exception of those highlighted in bold (which have approved TMDLs), are on the Section 303(d) List. As discussed elsewhere in this Certification, water quality is not expected to be measurably impacted by the proposed withdrawals.

Table 2: Known waterbody impairments in the vicinity of the Activity

<b>Assessment Unit (AU)</b>	<b>Water Body Name</b>	<b>Cause of Impairment (Designated Use Impaired)</b>
NHLAK801030302-01-01	Echo Lake	Aluminum (AL) <b>pH (AL)</b> <b>Mercury (FC)</b>
NHLAK801030302-01-02	Echo Lake Franconia State Park Beach	Aluminum (AL) <b>pH (AL)</b> <b>Mercury (FC)</b>

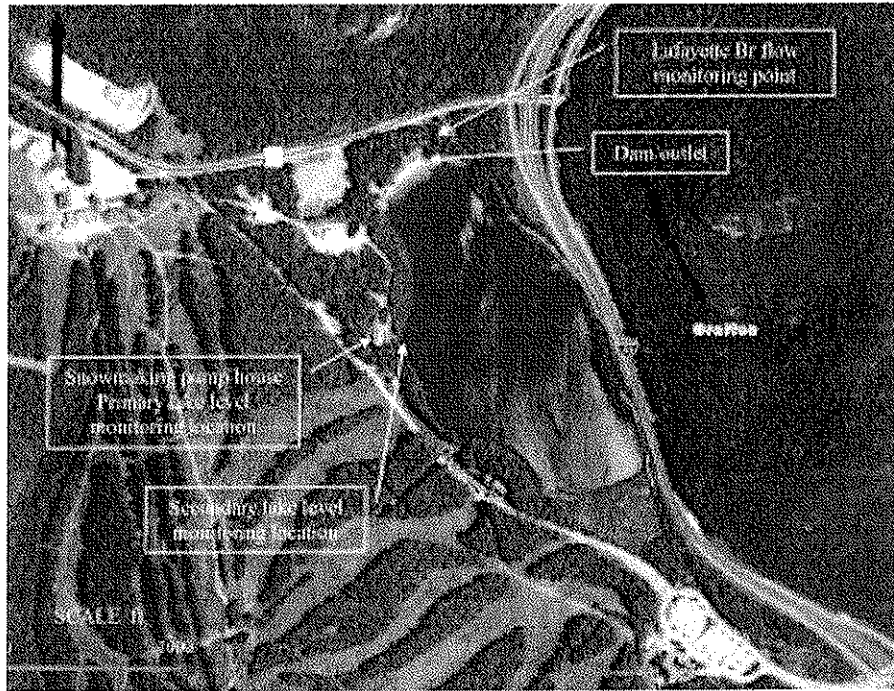
<sup>1</sup> Legislative Classifications of Surface Waters in New Hampshire. New Hampshire Department of Environmental Services. October 2008. R-WD-08-21.

Assessment Unit (AU)	Water Body Name	Cause of Impairment (Designated Use Impaired)
NHRIV801030302-01	Beaver Brook	pH (AL) <b>Mercury (FC)</b>
NHRIV801030302-01	Lafayette Brook	pH (AL) <b>Mercury (FC)</b>
NHRIV801030302-02	Meadow Brook	<b>Mercury (FC)</b>
NHRIV801030302-01	Skookumchuck Brook	pH (AL) <b>Mercury (FC)</b>
NHRIV801030302-01	Unnamed Brook	pH (AL) <b>Mercury (FC)</b>
NHRIV801030302-01	Jordan Brook	pH (AL) <b>Mercury (FC)</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 for mercury due to concentrations found in fish tissue which have resulted in a statewide fish consumption advisory. The primary source of mercury is atmospheric deposition from in-state and out-of-state emissions.

D-6 Echo Lake is located in Franconia to the east of the Cannon Mountain ski area (see Figure 1). An approximate 3 acre wetland complex is located on the southern end of the lake and Interstate I-93 is to the east. A boat launch is located on the southwest side of the lake. On the northern end there is a state beach. To the east of the beach on the northern end the lake outlets over a state-owned dam (Dam # 86.06) to an approximate 0.7 mile long tributary (the outlet tributary) that discharges to Lafayette Brook. Lafayette Brook then flows approximately 2.4 miles to Beaver Brook which flows another 0.6 miles to Meadow Brook. Meadow Brook flows approximately 0.6 miles to the Gale River which discharges to the Ammonoosuc River approximately 6 miles downstream. Beginning approximately 0.6 miles downstream of the dam, approximately 0.1 miles of the outlet tributary and approximately 1 mile of Lafayette Brook flow through the White Mountain National Forest and are therefore considered Outstanding Resource Waters (ORWs) according to Env-Wq 1708.05 (a) (see C-14).

Figure 1: Echo Lake, Franconia, NH<sup>2</sup>



- D-7 The drainage area of Echo Lake is approximately 0.5 square miles (based on the USGS Stream Stats website. ([http://water.usgs.gov/osw/streamstats/new\\_hampshire.html](http://water.usgs.gov/osw/streamstats/new_hampshire.html)).
- D-8 The outlet dam on Echo Lake (Dam # 86.06) is owned by the New Hampshire Department of Resources and Economic Development (DRED) and is estimated to have been originally constructed in the 1930s. In 1990 the DES Dam Bureau maintenance crew reconstructed the dam with essentially an in-kind replacement of the existing deteriorated structure. The spillway of the dam can be raised or lowered via addition or removal of stop logs. On July 10, 1992, various parts of the outlet structure were surveyed by DES surveyors and tied to the National Geodetic Vertical Datum (NGVD). The Applicant reports that according to Cannon staff the dam has not been modified since the 1992 DES survey and field measurements conducted by the Applicant's engineer (Horizons Engineering, Inc. or HEI) in the fall of 2013

<sup>2</sup> From Lake Level and Stream Flow Monitoring Plan, Mittersill Terrain Improvements Project, Franconia New Hampshire. Horizons Engineering, Inc. October 23, 2013 (revised 11/13/13), and New Hampshire Department of Environmental Services Inter-Department memorandum dated August 9, 2006 from the DES Dam Bureau to the DRED Division of Parks and Lands.

confirmed the dimensional datum. Based on a 1992 benchmark elevation of 1936.20 NGVD at the top of the concrete dam <sup>3</sup> (east side) HEI provided the following elevations based on measurements taken in November 2013. Unless otherwise noted, all elevations included in this Certification are based on the 1992 NGVD datum.

Table 3: Echo Lake Dam spillway elevations

<b>Top of the Dam Spillway</b>	<b>Elevation (1992 NGVD)</b>
With two 10 inch stop logs	1931.90
With one 10 inch stop log	1931.07
With no stop logs (the concrete dam crest)	1930.24

Based on a review of information in the DES Dam Bureau files<sup>4</sup>, it appears that the dam has been operated with at least one stop in place for the last 83 years with the exception of one time in 1977 where water surface measurements conducted by the Dam Bureau suggested that one stop log may have been temporarily removed at the time of the survey.

- D-9 A detailed bathymetric survey was conducted by DES on October 21, 2013. The survey did not include the approximate 3 acre wetland complex on the southern end as the water was too shallow (i.e., estimated to be less than approximately one foot deep) and the vegetation too dense for the boat to navigate through. The water surface elevation at the time of the survey was estimated to be 1931.30 (1992 NGVD) which is a little less than 3 inches of water flowing over one 10 inch stop log. Results of the Bathymetric Survey are shown below.

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<sup>3</sup> A picture of the benchmark is provided in: Lake Level and Stream Flow Monitoring Plan, Mittersill Terrain Improvements Project, Franconia New Hampshire. Horizons Engineering, Inc. October 23, 2013 (revised 11/13/13).

<sup>4</sup> From a New Hampshire Department of Environmental Services Inter-Department memorandum dated August 9, 2006 from the DES Dam Bureau to the DRED Division of Parks and Lands.

Table 4: Echo Lake Depth, Area and Volume

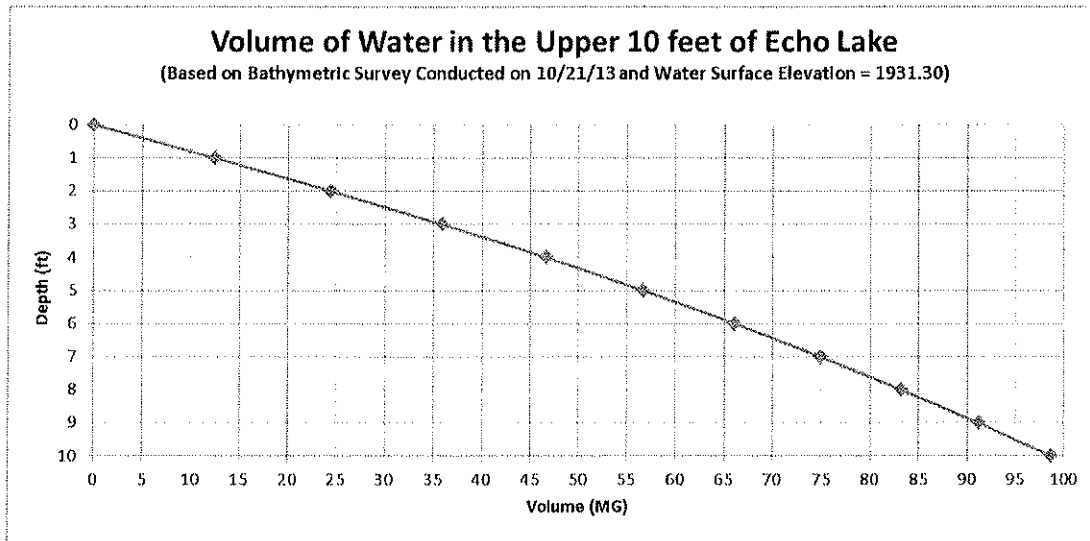
Approximate Water Surface Elevation on 10/21/13	Depth (ft)	Surface Area (acres)	% Reduction in Lake Surface Area	Incremental Volume (Million Gallons)	Cumulative Volume (Million Gallons)	% Reduction in Total Volume	Littoral Area (acres)	% Reduction in Littoral Area	Littoral Area Volume (MG)	% Reduction in Littoral Area Volume
1931.30	0	39.3	3.8%	0.00	0.00	6.6%	11.21	0.0%	66.15	0.0%
1930.30	1	37.8	7.7%	12.47	12.47	13.0%	9.70	13.4%	53.69	18.8%
1929.30	2	36.3	11.8%	11.98	24.45	19.1%	8.20	26.9%	41.70	37.0%
1928.30	3	34.6	18.5%	11.48	35.93	24.8%	6.56	41.5%	30.23	54.3%
1927.30	4	32.0	23.5%	10.80	46.73	30.2%	3.94	64.8%	19.43	70.6%
1926.30	5	30.1	28.5%	10.03	56.76	35.2%	1.97	82.4%	9.39	85.8%
1925.30	6	28.1	32.7%	9.39	66.15	39.8%	0.00	100.0%	0.00	100.0%
1924.30	7	26.4	36.1%	8.80	74.96	44.3%				
1923.30	8	25.1	39.1%	8.33	83.28	48.5%				
1922.30	9	23.9	42.6%	7.92	91.21	52.5%				
1921.30	10	22.5	56.2%	7.52	98.72	69.3%				
1916.30	15	17.2	67.3%	31.77	130.50	82.2%				
1911.30	20	12.8	78.7%	24.23	154.72	91.3%				
1906.30	25	8.4	89.0%	17.01	171.74	96.6%				
1901.30	30	4.3	95.0%	9.96	181.70	99.2%				
1896.30	35	2.0	99.6%	4.95	186.66	100.0%				
1891.30	40	0.2	100.0%	1.54	188.19	100.0%				

Areas and volumes do not include the wetland complex on the southern end of Echo Lake

As shown in Table 4, Echo Lake has a total volume of approximately 188 million gallons (MG), a surface area of approximately 39 acres and the maximum depth of approximately 40 feet. Dividing the total volume by the surface area yields an average depth of 14.7 feet. Incremental volumes for the depth intervals shown are also provided. As shown there are approximately 12 MG in each foot of water in the upper 2 feet. The table also provides information on the littoral zone, which is typically assumed to be the upper 6 feet of water (although it may be deeper in Echo Lake due to its high clarity). The total area of the littoral zone is approximately 11 acres and the total volume of the littoral zone is approximately 66 MG. None of the values shown in the table include the approximate 3 acre wetland complex at the southern end of the lake.

Figure 2 shows the volume in the upper depths of Echo Lake (up to a maximum of 10 feet).

Figure 2



D-10 Based on a trophic survey conducted by DES in 2004/2005, Echo Lake is a "crystal clear" oligotrophic lake. Trophic surveys conducted in 1978 and 1986 also categorized the lake as oligotrophic. In addition to vegetation in the wetlands complex on the southern end, the trophic survey documented some aquatic vegetation along the western and eastern banks and categorized the abundance of this vegetation as "sparse".

D-11 Echo Lake and the Gale River are very popular cold water fishery destinations for anglers. To keep pace with demand the New Hampshire Fish and Game Department (NHFGD) manages Echo Lake as a put and take trout fishery<sup>5</sup>. Each year they stock the lake with approximately 4500 catchable size trout (one, two and three year olds).

It is not known if trout in Echo Lake naturally reproduce. To help determine if they do, the NHFGD plans to conduct a study in the fall of 2014 to assess all trout age classes within Echo Lake and to monitor the influx of natural reproduction.

In 2000, the NHFGD conducted a survey on Lafayette Brook. Wild Brook Trout and Brown Trout were caught in the brook. Juvenile salmon (presumed to be seeking refuge from the warmer surface temperatures of the Gale River) were also captured. Results indicated that the habitat in the brook at

<sup>5</sup> The information provided in this section was provided from Dianne Timmins of the NHFGD.

the time of the surveys was sufficient to sustain natural reproduction of Brook Trout and Brown Trout. Recruitment from abutting tributaries supplements the fishery in the Gale River. Based on the results of the data collected, Lafayette Brook is considered by the NHFGD to be an important recruitment tributary.

- D-12 According to the Applicant, snowmaking operations at Cannon Mountain commenced in 1968. Water use records submitted by the Applicant in accordance with RSA 488:3, include the volume of water withdrawn annually from Echo Lake since 1988 (26 years). The withdrawal is located on the west side of the lake approximately 1000 feet south of the beach. Water is withdrawn using a 30 inch inside diameter intake pipe connected to a rectangular concrete intake structure that extends approximately 224 feet into the lake from the edge of the west bank (latitude and longitude in dd:mm:ss are 44:10:31 N and 070:41:41 W). The rectangular concrete intake structure has a screen covered opening on top. The elevation of the screen is approximately 1926.61, which is approximately 5.29 feet below the dam spillway with two 10 inch stop logs in place and approximately 3.63 feet below the dam spillway with no stop logs in place. The intake pipe is connected to a pump house near the west bank of the lake that contains one variable speed pump with a capacity of 830 gallons per minute (gpm) and four fixed rate pumps capable of pumping 675 gpm for a combined capacity of 3530 gpm<sup>6</sup>.

To increase storage for snowmaking, a second stop log is typically added at the dam near the end of October after the fishing season ends and is removed in April before the fishing season starts<sup>7</sup>. This practice has been ongoing since 1999.

Withdrawals for snowmaking typically occur between November 1 and the end of February however, to provide more flexibility, the Applicant has requested approval to withdraw water for snowmaking from October 15 through mid-March. During other times of the year, limited withdrawals (i.e., less than approximately 150,000 gallons each) are typically made for "associated activities" such as to test and remove scaling from the snowmaking system (once to twice annually), fill barrels for chair lift loading tests (once annually – the barrels simulate people) and to support a pond skimming contest in April where a small temporary artificial pond is made at the base of the mountain (with plastic liner) and filled with water from Echo Lake. According to the Applicant, water used to test and remove scaling from the distribution pipes is returned to the pump pit and is not discharged into Echo Lake.

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<sup>6</sup> From Lake Level and Stream Flow Monitoring Plan, Mittersill Terrain Improvements Project, Franconia New Hampshire by Horizons Engineering, Inc. October 23, 2013 (revised 11/13/13).

<sup>7</sup> According to NHFGD website, the fishing season for trout ponds such as Echo Lake begins on the fourth Saturday in April and ends on October 15 (see <http://www.eregulations.com/newhampshire/fishing/freshwater/lakes-ponds-general-rules/>).

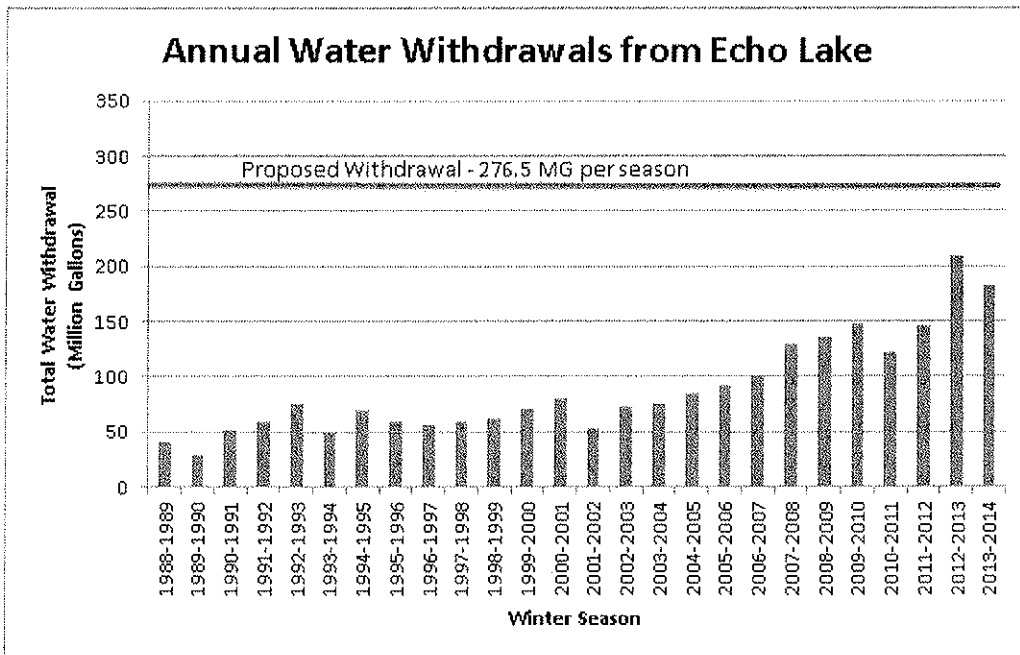


Figure 3 shows the annual withdrawals from Echo Lake since 1988. As shown, ski season withdrawals have increased by approximately 1.5 to 2.5 times since 2006/2007. According to the Applicant this is due to extension of the snow season and addition of snowmaking equipment.

It should be noted that the volumes shown in Figure 3 are approximately 15 percent lower than values originally reported by the Applicant. This is because recent (January 28, 2014) flowmeter calibration results submitted by the Applicant showed that the flowmeter has been overestimating withdrawal volumes by approximately 15 percent. According to the Applicant this is the first time the flowmeter had been checked. The flowmeter error is scheduled to be corrected prior to the 2014/2015 ski season.

The highest recorded withdrawal from Echo Lake occurred during the 2012/2013 season when approximately 209 MG of water was withdrawn for snowmaking. Withdrawals through February 14, 2014 for the 2013/2014 season were slightly less at approximately 182 MG. According to the Applicant no additional withdrawals occurred for the 2013/2014 season after February 14.

Figure 3



\*(Note: Values have been corrected to account for the 15% flowmeter error)

The Applicant has requested approval to increase Echo Lake withdrawals by an additional 67.5 MG for snowmaking on 42 acres of trails at the Mittersill Ski Area. Compared to withdrawals in 2012/2013 this would increase the maximum amount of water withdrawn from Echo Lake by 32 percent to 276.5

MG as shown in the table below. This is a significant increase given that the total volume of Echo Lake is approximately 188 MG (see Finding D-9).

Table 5: Existing (2012/2013 ) and Proposed Withdrawals

<b>Reason</b>	<b>Million Gallons* (MG)</b>
Existing maximum snowmaking withdrawal (2012/2013 season)	209
Volume needed to cover additional 42 acres of terrain at Mittersill	67.5
Total proposed maximum snowmaking withdrawal from Echo Lake per ski season	276.5 (32% increase)

\*(Note: Values have been corrected to account for the 15% flowmeter error)

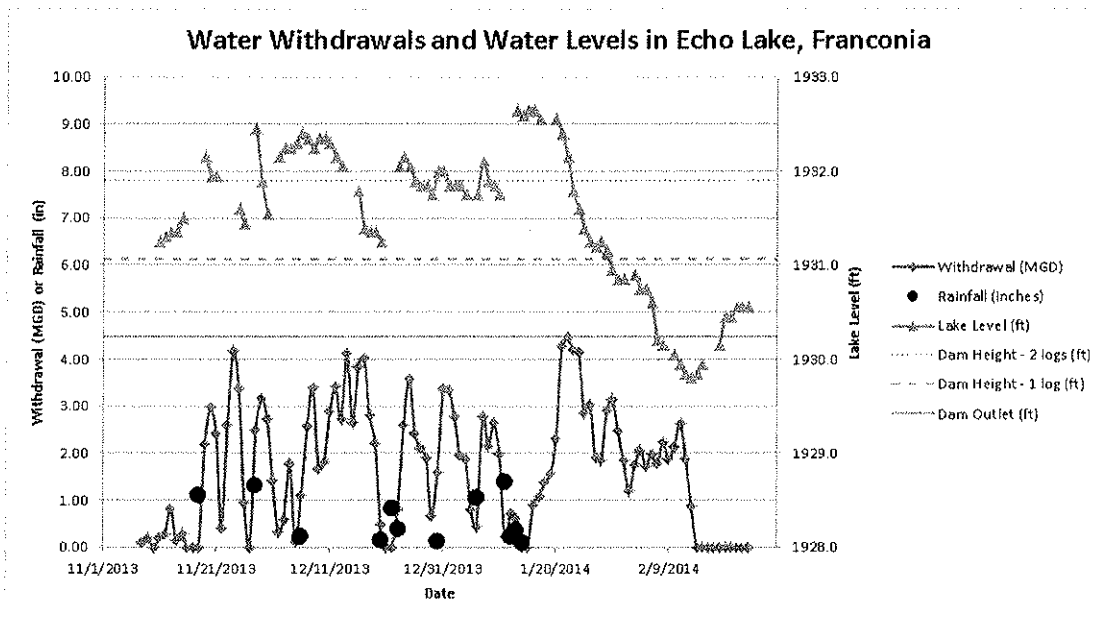
The Applicant intends to utilize the existing intake piping and intake structure in Echo Lake but proposes to increase the pumping capacity from approximately 3500 gpm to approximately 5000 gpm.

- D-13 Although withdrawal volumes have been reported annually, information regarding the range of water level fluctuations and outlet flows from Echo Lake during the snowmaking season was not available. To address this data gap the Applicant monitored lake elevation and outflow during the 2013-2014 season in accordance with a monitoring plan approved by DES<sup>6</sup>. Outflow was measured in the outlet tributary at the downstream end of a 42 inch culvert located approximately 50 feet downstream of the dam. Water levels in the lake were measured by a staff gage near the intake structure. Elevations were tied to 1992 NGVD. Results are summarized in Table 6 and are graphically presented in the figures that follow. As expected, lake level and lake outflow (Figure 4 and 5) decrease significantly when snowmaking withdrawals from the lake occur. As shown in Table 6, the estimated inflow to the lake during the monitoring period ranged from approximately 1.0 to 1.7 million gallons per day (mgd).

Table 6: Summary Statistics for 2013-2014 Ski Seasons

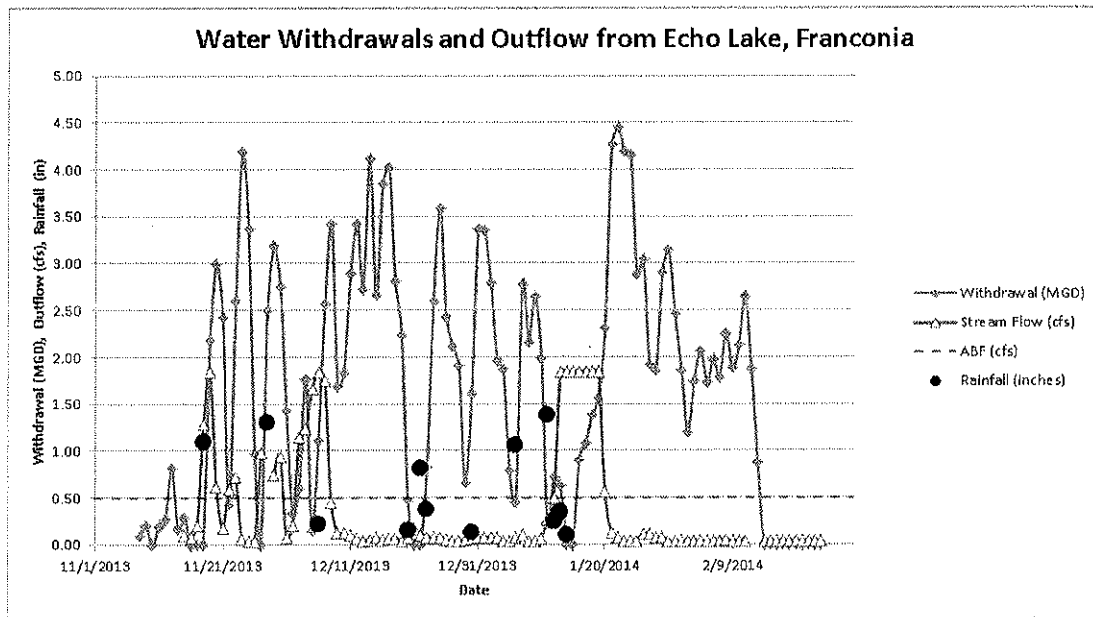
Parameter	Value
Total Volume Withdrawn	182 MG (corrected for flowmeter error)
Maximum Lake Elevation	1932.70
Minimum Lake Elevation	1929.75 ( 2.15 feet below dam spillway with two 10 inch stop logs in place and 0.49 feet below the dam spillway with no stop logs in place)
Maximum Drop in Lake Elevation during a pumping session	2.95 feet
Maximum Outflow	Greater than 1.85 cfs (1.20 mgd)
Minimum Outflow	0.01 cfs (0.006 mgd)
Estimated inflow to lake based on water balance	Ranged from approximately 1.55 cfs (1.0 mgd) to 2.6 cfs (1.7 mgd)

Figure 4



(Note: Withdrawal volumes have been corrected to account for flowmeter error)

Figure 5



(Note: Withdrawal volumes have been corrected to account for flowmeter error)

D-14 As indicated in Finding D-13, withdrawals from Echo Lake for snowmaking can significantly impact the magnitude of flow released over the dam and into the outlet tributary. Therefore, to ensure support and maintenance of biological and aquatic community integrity (Env-Wq 1703.19), it is necessary to establish minimum flows.

To determine appropriate minimum flows in the Echo Lake outlet tributary, 2010 guidance prepared by DES for estimating instream flow requirements for the protection of aquatic life in flowing waters (see Fact C-18) was consulted. The guidance cites the "Natural Flow Paradigm" which recognizes that the best environmental flows for aquatic life are flows with natural unregulated, un-diverted streams, but that within that variability there is room for off-stream water use. The guidance includes various methods for estimating minimum flows that range from simple desktop standard setting methods to detailed modeling of fish habitat relative to flow.

For the Echo Lake outlet tributary, the New England Aquatic Flow Policy Method (NEABF) was selected to determine minimum flows. Since the drainage area to Echo Lake is less than 50 square miles (as reported in Finding D-7, the drainage area is 0.5 square miles), the default values of the NEABF were used. The minimum NEABF default value is equal to the

drainage area multiplied by a yield 0.5 cubic feet per second per square mile of drainage (cfsm). This value applies at all times of the year except when superseded by spawning and incubation flow recommendations. For example, if Eastern Brook Trout are present the recommended flow releases are to be based on a yield of 1.0 cfsm in the fall/winter (October 1 through March 14) and 4.0 cfsm in the spring (March 15 through May 31).

As reported in Finding D-11, a study conducted by NHFGD in 2000 found wild (i.e., naturally reproducing) young-of-the-year Brook Trout and Brown Trout in Lafayette Brook (located just downstream of the Echo Lake outlet tributary) and concluded that the habitat in the brook at the time of the surveys was sufficient to sustain natural reproduction of both species. NHFGD further states that sustainability of the trout fishery in the Gale River (located further downstream) is supplemented by recruitment from Lafayette Brook and other abutting tributaries, which in turn provides a benefit to anglers. It's possible that habitat in the outlet tributary could also support wild Brook Trout provided there was sufficient flow.

Based on the above, support and maintenance of biological and aquatic community integrity (Env-Wq 1703.19) can be achieved by requiring a minimum flow in Echo Lake outlet tributary during the snowmaking season (November through February) of 0.5 cubic feet per second (cfs)<sup>8</sup>, which is equivalent to 0.32 million gallons per day (mgd). In April, 2014, the Applicant requested a minimum outflow of 0.25 cfs to provide more water for snowmaking. A flow of 0.25 cfs is based on the default ABF yield of 0.5 cfsm which applies when spawning and incubation in the fall/winter are not a concern. Based on historical records which indicate that flows from Echo Lake have routinely been reduced to almost zero during the snowmaking season (see Finding D-13), a minimum outflow of no less than 0.25 cfs, though not ideal, would still be an improvement in flow passed downstream of Echo Lake. Based on the above discussion, combined with the fact that the drainage area of Echo Lake represents a relatively small portion (approximately 20 percent) of the total drainage area of Lafayette Brook at its confluence with the Echo Lake outlet tributary, a lower minimum flow is acceptable provided the flow is no less than 0.25 cfs and the Applicant conducts a DES approved assessment that indicates the lower minimum flow will result in no more than a 20 percent difference (as compared to 0.5 cfs) in habitat characteristics (i.e., average depth, top wetted width, wetted cross sectional area, average velocity) at selected transects in the outlet channel.

Except as noted below, when snowmaking withdrawals have ceased and the lake and outflow have fully recovered from the influence of snowmaking activities (i.e., the lake has re-filled and lake inflow equals lake outflow) flow over the dam will be as naturally occurs. However, should there be occasions when flows are temporarily altered (such as during placement or removal of stop logs, dam maintenance or for the "associated activities" mentioned in

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<sup>8</sup> 0.5 cfs = 0.5 square miles x 1.0 cfsm

Finding D-12), the minimum flow should be based on the seasonal NEABF default yields discussed above, or natural inflow, whichever is less. A summary of flows that DES believes are necessary to achieve water quality standards is presented in Table 7.

Table 7: Minimum Flows

<b>Reason for flow alteration</b>	<b>Time of Year</b>	<b>Minimum Flow</b>
Snowmaking withdrawals from Echo Lake	October 15 through March 14	0.5 cfs (0.32 mgd) (or lower provided the lower flow is no less than 0.25 cfs and the Applicant conducts a DES approved assessment that indicates the lower minimum flow will result in no more than a 20 percent difference (as compared to 0.5 cfs) in habitat characteristics (i.e., average depth, top wetted width, wetted cross sectional area, average velocity) at selected transects in the outlet channel.)
Temporary flow alteration due to dam maintenance or other DES approved situation (other than snowmaking).	October 1 through March 14	0.5 cfs (0.32 mgd) or natural inflow, whichever is less.
	March 15 through May 31	2.0 cfs (1.29 mgd) or natural inflow, whichever is less.
	June 1 through September 30	0.25 cfs (0.16 mgd) or natural inflow, whichever is less.

As indicated in Finding D-13, flows in the outlet tributary during the 2013-2014 snowmaking season frequently fell below 0.5 cfs (0.32 mgd). Although greater than what was released at all times in the 2013-2014 season, an outflow of 0.32 mgd is significantly less than the estimated inflow of approximately 1.0 to 1.7 mgd to Echo Lake (see Finding D-13, Table 6). This suggests that there should still be sufficient inflow to replenish Echo Lake even if at a required release rate of 0.32 mgd.

D-15 As indicated in Finding D-13, withdrawals from Echo Lake for snowmaking can significantly impact the magnitude and frequency of water level fluctuations in Echo Lake. As shown, the maximum drawdown during the 2013/2014 snowmaking season was approximately 2.95 feet and the minimum water surface elevation was 1929.75 feet which is 2.15 feet below the dam spillway

with two stop logs in place and 0.49 feet below the dam spillway assuming no stop logs. Significant and frequent water level fluctuations can harm aquatic vegetation in the littoral zone which are critical to bait and predatory fish, and expose and possibly kill hibernating aquatic organisms and eggs laid by fish in the littoral zone or tributaries. Therefore, to ensure support and maintenance of biological and aquatic community integrity (Env-Wq 1703.19), it is necessary to establish limits on the magnitude and timing of water level fluctuations in Echo Lake.

To protect hibernating organisms as well as any fish eggs in the littoral areas<sup>9</sup>, the NHFGD recommends minimum lake levels during the snowmaking season that are essentially equal to the level in the fall when organisms typically hibernate.

As reported in Finding D-8, the dam has been operated with at least one 10 inch stop log in place for many years. A second 10 inch stop log is typically added near the end of October after the fishing season ends on October 15<sup>th</sup>. The second stop log is then removed in April before the fishing season starts on the fourth Saturday in April. Ice fishing on Echo Lake is not allowed.

In April, 2014, the Applicant requested they be allowed to lower the lake to elevation 1928.24 during the snowmaking season, which is two feet lower than the dam spillway without any stop logs in place. On April 22, 2014, DES staff conducted an investigation to determine if temporary lowering of the lake to this elevation in the fall, followed by refilling and fluctuating the lake during in the fall/winter for snowmaking, would have a significant impact on the approximate 3-acre wetland at the south end of Echo Lake. The wetland complex is comprised of forested wetlands to the south and emergent and shrub scrub wetlands with channelized flow and small areas of open water to the north end which abuts the open water of the lake. The primary functions of the emergent and shrub shrub wetlands are sediment trapping, nutrient attenuation, and shoreline anchoring with wildlife habitat as a secondary function. The investigation concluded that fluctuating the lake in this manner should not have a significant impact on this wetland system since most of the fluctuations will occur outside of the growing season<sup>10</sup>. Further, to protect these wetlands, the dam should continue to be operated with one 10 inch stop in place during the vast majority of the growing season (similar to historical practices for the past 83 years).

For the reasons stated above, DES believes the following water level restrictions are considered necessary to support and maintain the biological

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<sup>9</sup> According to the NHFGD (Dianne Timmins), trout typically spawn from late September to late October. The amount of time it takes for the eggs to hatch depends on the water temperature with hatch times increasing with decreasing water temperatures. In general, trout eggs typically hatch in late winter.

<sup>10</sup> NHDES Interoffice Memorandum. 4/30/14.

and aquatic community integrity of Echo Lake in accordance with Env-Wq 1703.19:

- a. Minimum Lake Level: A minimum lake level during the snowmaking season (October 15 through March 14) which is approximately equal to the lowest average lake elevation during any consecutive 30 day period from September 15 through October 31 but which is no less than elevation 1928.24 . This should allow sufficient time for the hibernating organisms to find places to overwinter in the submerged areas while the lake is at its lowest level and, therefore, prevent them from being exposed to freezing during the snowmaking season.
- b. When measures are taken to increase the flow from Echo Lake to the outlet tributary in order to lower the lake elevation, the lake should be drawn down at a rate of no more than approximately 6 inches per day (see Finding D-16) and precautions should be taken to prevent flooding downstream. In addition, appropriate measures should be taken to minimize the transport of excess sediment, located just upstream of the dam, to the downstream outlet tributary.
- c. Maintain the minimum flows discussed in Finding D-14 at all times.
- d. When measures are taken to increase or decrease outflow from Echo Lake to the outlet tributary, it should be done in a gradual manner to allow the aquatic organisms downstream time to adapt.
- e. Require withdrawals to cease within a specified period if water levels during the snowmaking season fall below the minimum lake level discussed in section D-15.a. above. According to the Applicant, approximately 2 hours is needed to shutdown the snowmaking system without damaging the equipment.
- f. The dam spillway elevation (and lake elevation) may be increased after October 15 to provide more storage for snowmaking.
- g. To reduce the impact on littoral vegetation and to support the anglers on Echo Lake, continue operating the dam with only one 10 inch stop log in place (spillway elevation 1931.07) from just before the start of the trout fishing season in April to at least early September.

D-16 The Applicant proposes to increase the maximum pumping rate from approximately 3500 gpm (5.0 MGD) to approximately 5000 gpm (7.2 MGD). Assuming 12 million gallons of water per foot in the upper layers of Echo Lake (see Finding D-9), the maximum pumping rate translates to a drawdown rate of approximately 7.2 inches per day. However, this is conservative (i.e., high) as it does not account for inflow. Assuming an inflow of 1.7 MGD (see Finding D-13), the maximum drawdown rate is estimated to be 5.5 inches per



day. This assumes the pumps would be operating at 5000 gpm for 24 consecutive hours, which is also believed to be a conservative assumption.

NHFGD typically recommends a maximum drawdown rate of approximately 6 inches per day to allow less mobile aquatic organisms (such as mussels) sufficient time to adapt to the changing water levels. This guidance, however, is most applicable in the warmer months as mussels do not typically move in the winter and cold temperatures. NHFGD does not have guidance for cold weather drawdown rates.

Given that the estimated maximum drawdown rate during the ski season satisfies the NHFGD warm weather maximum drawdown rate of 6 inches per day, a maximum pumping rate of approximately 5000 gpm is considered acceptable for support and maintenance of biological and aquatic community integrity (Env-Wq 1703.19). This assumes the intake structure under existing and proposed pumping rates will not impinge or entrain fish. It is recommended that the Applicant be required to demonstrate to the satisfaction of the NHFGD that the intake structure will not impinge or entrain fish.

If the water level is drawn down for any reason during the warmer months (i.e. such as for dam maintenance or other reasons approved by DES), the maximum drawdown rate should be no more than approximately 6 inches per day in accordance with NHFGD guidance.

- D-17 Under current conditions, withdrawals from Echo Lake produce snow that, when melted, flows back to Echo Lake as well as unnamed tributaries to Meadow Brook (AUID NHRIV801030302-02). Flow from Echo Lake eventually reaches Meadow Brook via an unnamed tributary (the outlet tributary for Echo Lake) which flows into Lafayette Brook, Beaver Brook and then Meadow Brook. Meadow Brook discharges to the Gale River. Therefore, all water under current snowmaking conditions flows back to Meadow Brook and the Gale River. According to the Applicant, the 67.5 million gallons of water withdrawn from Echo Lake and used at Mittersill will not flow back to Echo Lake and reach Meadow Brook via the Echo Lake outlet tributary, Lafayette Brook and Beaver Brook, but will reach Meadow Brook via Tucker Brook. Consequently, under proposed conditions, all water used for snowmaking at Cannon and Mittersill ski areas will eventually drain back to Meadow Brook and the Gale River. According to the Applicant, approximately 4500 million gallons of natural precipitation currently falls within this watershed. The addition of 67.5 million gallons per year associated with the proposed snowmaking at Mittersill represents an approximate 1.5% increase in annual contributions to this drainage area. Although water withdrawn from Echo Lake for snowmaking at the Mittersill ski area will not drain back to Echo Lake, surface water quality regulation Env-Wq 1708.12 (Transfer of Water) does not apply since "transfer" means the intentional conveyance of water from one surface water to another surface water for the purpose of increasing the

volume of water available for withdrawal from the receiving surface water [Env-Wq 1708.12(a)].

- D-18 As discussed in Finding D-1, water withdrawn from Echo Lake will be applied directly to the slopes at Mittersill and will not be used to increase the volume of water available for withdrawal from a receiving water. Beginning approximately 0.6 miles downstream of the dam, approximately 0.1 miles of the outlet tributary and approximately 1 mile of Lafayette Brook flow through the White Mountain National Forest and are therefore considered Outstanding Resource Waters (ORWs) according to Env-Wq 1708.05 (see C-14). Env-Wq 1708.05 (b) states that "Water quality shall be maintained and protected in surface waters that constitute ORW, except that some limited point and nonpoint source discharges may be allowed providing that they are of limited activity which results in no more than temporary and short-term changes in water quality. "Temporary and short term" means that degradation is limited to the shortest possible time. Such activities shall 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. Such temporary and short term degradation shall only be allowed after all practical means of minimizing such degradation are implemented."

The proposed withdrawal from Echo Lake for snowmaking is not expected to result in any permanent degradation of the ORW and may improve water quality since flow during the snowmaking season will be increased in the outlet tributary and Lafayette Brook (see Finding D-14 and Condition E-8b)

- D-19 Each time the snowmaking pumps are shutoff, water from the snowmaking pipe network must drain to prevent freeze damage to the pipes due. Often the residual static head in the system allows the water to be dispersed as man-made snow through the downhill snow guns. However, there are occasions where water must be drained from the low point in the system. This water (called drainback) is currently discharged back to Echo Lake. The proposed snowmaking distribution system at Mittersill will release its drainback water via a 2-inch valve at a stone stabilized outlet of an existing culvert where it eventually reaches an unnamed tributary of Meadow Brook. The rate of drainback flow in the Mittersill system will be controlled by the valve to reduce velocity and minimize the potential for scour.

Depending on the type and layout of the system, drainback water can cause significant erosion, contain potential contaminants (i.e., oil/grease) and have relatively higher temperatures compared to the receiving surface water. To relieve concerns associated with drainback water, the Applicant can be required to demonstrate that the existing and proposed drainback water at the Cannon and Mitterskill ski areas respectively will not result in water quality standard violations in the receiving waters. If necessary monitoring can be required to document the volume discharged and to collect data on any parameters of potential concern. Relative to Mitterskill Ski Area, the potential for any water quality related issues associated with the Mittersill

drainback water can be further abated by requiring that the drainback outlet be located a considerable distance away from any surface water.

- D-20 The Activity includes dredge and fill of wetlands. The 401 Certification decision relies, in part, on an approved permit from the DES Wetlands Bureau for the potential construction-related impacts to jurisdictional wetlands. Through its processing and issuance, the DES wetlands permit is expected to address the dredge and fill impacts to jurisdictional wetlands.
- D-21 The Activity includes alteration of terrain which may impact surface waters. The 401 Certification decision relies, in part, on an approved permit from the DES Alteration of Terrain Bureau for the potential construction and/or operation-related impacts of stormwater from the Activity on surface waters. Through its processing, and issuance, the DES Alteration of Terrain permit is expected to address the potential impacts of stormwater from the Activity on receiving surface waters during and after construction.
- D-22 The existing and proposed surface water withdrawal from Echo Lake is large enough that it requires registration and reporting to DES in accordance with RSA 488:3. A review of DES records shows that facility registered water use on June 18, 1988 and was assigned Water User ID: 20429.
- D-23 The activity includes a new application for water withdrawal that is subject to Env-Wq 2101 Water Conservation. Therefore, a water conservation plan needs to be approved by DES and implemented by the Applicant.

#### E. WATER QUALITY CERTIFICATION CONDITIONS

Unless otherwise authorized by DES, the following conditions shall apply.

- E-1. **Modification of PGP 401 Certification:** This Certification is a modification of the 401 Water Quality Certification (WQC # 2012-404P-002) issued by DES for the NH Programmatic General Permit (PGP) issued by the New England District of the U.S. Army Corps of Engineers (Corps) in 2012 (see sections D-2 and D-3 of this certification). The conditions specified herein are in addition to the conditions included in certification WQC # 2012-404P-002 (see section C-20) and only apply to this Activity.
- E-2. **When Certification Conditions Apply:** The conditions of this Certification shall apply once construction of the Activity described in Finding D-1 begins.
- E-3. **Compliance with Water Quality Standards:** The Activity shall not cause or contribute to a violation of surface water quality standards. DES may modify this Certification to include additional conditions to ensure the Activity complies with surface water quality standards.

- E-4. **Proposed Modifications:** The Applicant shall consult with DES regarding any proposed modifications to the Activity to determine whether this Certification requires modification in the future.
- E-5. **Inspection:** The Applicant shall allow DES to inspect the Activity and its effects on affected surface waters at any time to monitor compliance with the conditions of this Certification.
- E-6. **Compliance with Other Permits:** The Applicant shall comply with the conditions of the DES Wetlands permit, DES Alteration of Terrain permit and the DES Shoreland Protection permit (if applicable), including any amendments. The conditions of these permits shall become conditions of this Certification upon issuance of this Certification.
- E-7. **Transfer of Certification:** Transfer of this Certification to a new owner shall require notification to and approval by DES.
- E-8. **Withdrawal Lake Elevation and Outflow Restrictions:**
  - a. Surface water withdrawals for snowmaking and associated activities at the Cannon Mountain and Mittersill ski areas shall only be from Echo Lake. Surface water withdrawals for snowmaking shall only occur from October 15 through March 14 of each year (i.e., the snowmaking season). Limited surface water withdrawals (i.e., typically less than 150,000 gallons each) from Echo Lake outside of the snowmaking season for "associated activities" such as testing of the snowmaking distribution system for integrity and to remove scaling from inside the pipes (approximately twice per year), filling of barrels to conduct chair lift load tests (typically once per year) and filling of a small temporary manmade pond at the base of Cannon Mountain to support a pond-skimming contest in April, are also allowed. Withdrawals from Echo Lake at any other time or for any other purpose are prohibited unless approved by DES.
  - b. Minimum outflow from Echo Lake shall be in accordance with Table 8. To the maximum extent practicable, flow over the dam shall be equal to inflow.
  - c. Snowmaking withdrawals shall cease within 4 hours of when outflow measurements indicate that flow is less the minimum flow (see Table 8) and shall not resume until measurements indicate that the outflow is greater than the minimum flow shown in Table 8.
  - d. Echo Lake elevations shall comply with those shown in Table 9.
  - e. Snowmaking withdrawals shall cease within 4 hours of when Echo lake level measurements indicate that the unfrozen lake surface elevation is less than that shown in Table 9 and shall not resume until lake level measurements indicate that the unfrozen lake surface elevation is greater than that shown in Table 9.

Table 8: Minimum Required Outflow from Echo Lake

Reason for Flow Alteration	Time of Year	Minimum Flow
Snowmaking withdrawals from Echo Lake	October 15 through March 14	0.5 cfs (0.32 mgd) (or lower provided the lower flow is no less than 0.25 cfs and the Applicant conducts a DES approved assessment that indicates the lower minimum flow will result in no more than a 20 percent difference (as compared to 0.5 cfs) in habitat characteristics (i.e., average depth, top wetted width, wetted cross sectional area, average velocity) at selected transects in the outlet channel.)
Temporary flow alteration not associated with snowmaking such as dam maintenance, the "associated activities" mentioned in condition E-8a above or other DES approved activities.	October 1 through March 14	0.5 cfs (0.32 mgd) or natural inflow, whichever is less.
	March 15 through May 31	2.0 cfs (1.29 mgd) or natural inflow, whichever is less.
	June 1 through September 30	0.25 cfs (0.16 mgd) or natural inflow, whichever is less.

Table 9: Allowable Echo Lake Elevations

Time of Year	Unfrozen Echo Lake Elevation
Snowmaking Season (October 15 through March 14)	The minimum lake elevation for each snowmaking season shall be determined annually and shall be equal to the lowest average lake elevation during any consecutive 30 day period (based on daily measurements) between September 15 and October

Time of Year	Unfrozen Echo Lake Elevation
	31(inclusive) minus 4 inches (0.33 feet), or elevation 1928.24, whichever is greater <sup>11</sup> . At no time shall the lake be drawn down below elevation 1928.24. After October 15, the Applicant may raise the dam spillway elevation (i.e., via stop log addition) to provide storage for snowmaking.
Beginning of trout fishing season in April (or earlier) to at least September 7	Maximum spillway and minimum lake elevation of 1931.07 (top of one 10 inch stop log).

- f. When measures are taken to increase or decrease flow from Echo Lake to the outlet tributary, it shall be done in a gradual manner to minimize the impact on aquatic organisms downstream.
- g. When measures are taken to increase the flow from Echo Lake to the outlet tributary in order to lower the lake elevation, the Applicant shall take precautions to prevent flooding and transport of excess sediment downstream and shall strive to lower the lake at a rate that does not exceed 6 inches per day.
- h. Within 60 days of issuance of this Certification (or other date acceptable to DES), the Applicant shall demonstrate to the satisfaction of the NHFGD that the water intake structure in Echo Lake will not impinge or entrain fish under existing and proposed pumping rates and if necessary shall modify the intake structure to achieve this objective in accordance with a schedule acceptable to the NHFGD.
- i. Within 60 days of issuance of this Certification (or other date acceptable to DES), the Applicant shall demonstrate to the satisfaction of DES that the drainback water at Cannon Mountain and Mittersill ski areas are not and will not cause water quality standard violations in the receiving waters. If requested by DES, the applicant shall prepare and implement a DES approved monitoring plan to confirm that standards will be met. The plan may include (but is not limited to) requirements to monitor the volume of drainback water discharged and possible testing for parameters including but not limited to temperature and contaminants the drainback water may contain. Based on

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<sup>11</sup> For example, if the average 30 day lake elevation based on daily measurements was 1929.33, the lake could be drawn down to elevation 1929.00 (1929.33-0.33= 1929.00) during the following snowmaking season. If, however, the average 30 day lake elevation was 1928.40, the lake could be drawn down to 1928.24 during the following snowmaking season (1929.40 - 0.33= 1928.07, but since this is less than 1928.24, the minimum is 1928.24)

the information provided, modifications to the drainback systems may be required.

- j. Drainback water for the Mittersill Ski Area shall be discharged no closer than 100 feet from the intended receiving surface water and shall be designed to prevent scour.
- k. Exceptions to the above restrictions may be approved by DES for reasons such as emergencies, scheduled maintenance pre-approved by DES or other reasons described in the DES approved Operations Plan (see Condition E-14).

**E-9. Monitoring and Recording:**

- a. The Applicant shall monitor and record
  - i. the volume withdrawn from Echo Lake (i.e., pumped) on at least an hourly basis, and
  - ii. the Echo Lake water surface elevation and outflow over the Echo Lake dam ) as frequently as possible (preferably on an hourly basis) but no less frequent than twice per day from September 1 through March 14 and at least once per day at all other times when withdrawals occur and/or the lake is being purposely drawn down or is in the process of refilling after being purposely drawn down.
- b. Prior to the 2014/2015 ski season, the Applicant shall implement measures to correct existing inaccuracies in the flowmeter used to measure snowmaking withdrawal volumes.

**E-10. Notification:** The Applicant shall notify DES in writing (email is acceptable) within 48 hours of any deviation from the minimum outflow or lake elevation requirements specified in Condition E-8. The notification shall include the reason for the noncompliance and what is being done to prevent the noncompliance from occurring again.

**E-11. Annual Compliance Report:** Unless otherwise directed by DES, the Applicant shall submit a compliance report by May 1 of each year for the period September 1 through April 30 that includes the maximum pumping rate and the total volume withdrawn as well as a summary of compliance with the required minimum outflow and minimum lake elevation requirements, any periods of non-compliance, the reason for non-compliance and actions taken to get back into compliance. Submittals shall include all data in an electronic MS Excel spreadsheet with appropriate tables and charts to facilitate analysis and with areas of non-compliance clearly identified.

**E-12. Water Use Registration and Reporting:** The Applicant is an existing registered water user. The applicant shall continue to measure and report all withdrawals to the Water Use Registration and Reporting Program in

accordance with RSA 488:3, Env-Wq 2102, and this Water Quality Certification. The Applicant shall consult with the DES Water Use Registration and Reporting Program to determine specific measuring and reporting requirements for the Mittersill Ski Area. The Applicant shall then implement the measuring and reporting requirements.

- E-13. **Water Conservation Plan:** Within 90 days of issuance of this Certification (or other date acceptable to DES) the Applicant shall submit a Water Conservation Plan to DES for review. The applicant shall obtain DES approval of and begin implementation of a water conservation plan that meets the water conservation requirements set forth in Env-Wq 2101 prior to commencement of the 2014-2015 snowmaking season.
- E-14. **Operations Plan:** Within 90 days (or other date acceptable to DES), the Applicant shall submit an Operations Plan to DES and NHFGD for approval. The Applicant shall then implement the approved plan. The Operations Plan shall describe in detail how compliance with this Certification will be measured, recorded and reported, a description (including accuracy) of equipment that will be used and how it will be maintained and notification requirements. To the maximum extent feasible, measurement and recording of withdrawals, lake elevation and outflow shall be automated. The plan shall be updated as necessary each year. If revisions are proposed to the plan, the Applicant shall first consult with and gain DES approval of the proposed changes and provide DES and NHFGD with a copy of the revised plan if requested.




### APPEAL

Any person aggrieved by this decision may appeal to the N.H. Water Council ("Council") by filing an appeal that meets the requirements specified in RSA 21-O:14 and the rules adopted by the Council, Env-WC 100-200. The appeal must be filed directly with the Council within 30 days of the date of this decision and must set forth fully every ground upon which it is claimed that the decision complained of is unlawful or unreasonable. Only those grounds set forth in the notice of appeal can be considered by the Council.

Information about the Council, including a link to the Council's rules, is available at <http://nhec.nh.gov/> (or more directly at <http://nhec.nh.gov/water/index.htm>). Copies of the rules also are available from the DES Public Information Center at (603) 271-2975.

If you have questions regarding this Certification, please contact Owen David at (603) 271-0699 or [Owen.David@des.nh.gov](mailto:Owen.David@des.nh.gov)



Eugene J. Forbes, P.E.  
Director, DES Water Division

cc: Town of Franconia, Town Manager/Administrator  
Town of Franconia, Conservation Commission  
Carol Henderson, NH Fish and Game Dept  
David Keddell, U.S. Army Corps of Engineers