RMR Pacific LLC
620 Ragged Mtn. Road
Danbury, NH 03230

WATER QUALITY CERTIFICATION
In Fulfillment of
Section 401 of the United States Clean Water Act (33 U.S.C 1341)
WQC # 2007-005

Activity Name	Ragged Mountain Phase I Development
Activity Location	Town of Danbury, Merrimack County.
Affected Surface waters	Gulf Brook, West Brook, Center Brook, Bog Pond, Bog Brook, Beverley Brook, Frazier Brook, Eagle Pond, and other unnamed brooks and wetlands tributary to Bog Pond and Eagle Pond
Owner/Applicant	RMR Pacific LLC 620 Ragged Mountain Road Danbury, NH 03230
Appurtenant permit(s):	U.S. Army Corps of Engineers Individual Permit DES Wetlands Bureau Permit DES Alteration of Terrain Permit DES Groundwater Discharge Permit DES approval of Wastewater Treatment Plant Design DES approval for Small Production Wells for Small Community Water Systems and associated Water Conservation Plan DES Water Conservation Plan for all other Surface Water Withdrawals DES Water Use Registration
DATE OF APPROVAL (subject to Conditions below)	November 4, 2009

A. INTRODUCTION

RMR Pacific LLC (Applicant) proposes to construct and operate Ragged Mountain Phase I development (Activity), including construction and operation of: 120 residential units off Plowman Road and the necessary infrastructure including 16,500 linear feet (3.1 miles) of roadway, water and sewer, stormwater conveyance, and appurtenant structures; a wastewater treatment plant with effluent disposal by land application via drip irrigation, spray irrigation and as snow; a 57,599 gallon per day well field, pumphouse, water storage tank and access road for public water supply; golf course renovations; new golf course practice field and putting green; clubhouse and parking lot expansion; ski trail

expansion and a new terrain park including nine new trails within the residential area footprint; a new lift line; withdrawal of water from Bog Pond for snowmaking during winter months, and; continued operation of the existing ski trails and appurtenances, all on parcels of land in Danbury south of Bog Pond, approximately 2.4 miles south of the intersection of NH Route 104 and Ragged Mountain Road owned by the applicant. In all, approximately 157.3 acres will be disturbed.

This 401 Water Quality Certification (401 WQC) 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. 401 CERTIFICATION APPROVAL

Based on the findings and conditions noted below, the New Hampshire Department of Environmental Services (DES) has determined that any discharge associated with the Activity will not violate surface water quality standards, or cause additional degradation in surface waters not presently meeting water quality standards. DES hereby issues this 401 WQC subject to the conditions defined in Section E of this 401 Certification, in accordance with Section 401 of the United States Clean Water Act (33 U.S.C. 1341).

C. STATEMENT OF FACTS AND LAW

C-1. Section 401 of the United States Clean Water Act (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, states: "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:8 and Env-Wq 1700 (Surface Water Quality Regulations, effective May 21, 2008) together fulfill the requirements of Section 303 of the Clean Water Act that the State of New Hampshire adopt water quality standards consistent with the provisions of the Act.

C-5. Env-Wq 1701.02, entitled "Applicability", states that:

"(a) These rules shall apply to all surface waters.

(b) These rules shall apply to any person who causes point or nonpoint source discharge(s) of pollutants to surface waters, or who undertakes hydrologic modifications, such as dam construction or water withdrawals, or who undertakes any other activity that affects the beneficial uses or the level of water quality of surface waters."

C-6. Env-Wq 1702.15 "Cultural eutrophication" means the human-induced addition of wastes containing nutrients to surface waters which results in excessive plant growth and/or a decrease in dissolved oxygen.

C-7. Env-Wq 1702.18 defines a 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-8. Env-Wq 1702.39 defines a pollutant as: "pollutant" as defined in 40 CFR 122.2. This 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-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. Surface waters are navigable waters for the purposes of certification under Section 401 of the Clean Water Act. Surface waters are jurisdictional wetlands for the purposes of wetlands permitting under RSA 482-A.

C-11. The named and unnamed rivers and streams, lakes and ponds, and wetlands, affected by the Activity, are surface waters under Env-Wq 1702.46.

C-12. 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-13. Env-Wq 1703.06 (b) states that " bacteria criteria shall be applied at the end of a wastewater treatment facility's discharge pipe."

C-14. Env-Wq 1703.14 "Nutrients" states the following:

"(b) Class B waters shall contain no phosphorus or nitrogen in such concentrations that would impair any existing or designated uses, unless naturally occurring.
(c) Existing discharges containing either phosphorus 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 phosphorus into lakes or ponds.
(e) There shall be no new or increased discharge(s) containing phosphorus 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-15. Env-Wq 1703.19, entitled "Biological and Aquatic Community Integrity", states that

"a. The surface waters shall support and maintain a balanced, integrated and adaptive community of organisms having a species compostion, diversity, and functional organization comparable to that of similar natural habitats of a region; and

b. Differences from naturally occurring conditions shall be limited to non-detrimental differences in community structure and function."

C-16. Env-Wq 1703.21 (a)(1) states that "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 injure or are inimical to plants, animals, humans or aquatic life."

C-17. Env-Wq 1708.01 regarding antidegradation states the following: "The purpose of these antidegradation provisions is to ensure that the following provisions of 40 CFR 131.12 are met:

(a) Existing uses and the level of water quality necessary to protect the existing uses shall be maintained and protected;

(b) 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 that, in accordance with Env-Wq 1708.10, 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 assure water quality adequate to fully protect existing uses. Further, the department shall assure 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 contrd shall be implemented;

(c) For insignificant 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. In allowing such degradation or lower water quality, the department shall assure water quality adequate to protect existing uses fully. Further, the department shall assure 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;

C-18. Env-Wq 1708.02 states that 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 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-19. Env-Wq 2101.02 (d) states that pursuant to RSA 485:61, II, the Water Conservation regulations (Env-Wq 2101) "shall apply to applicants for permits and applications for water withdrawal subject to the provisions of RSA 485:3, RSA 485:48, RSA 485-C:21, and section 401 of the federal Clean Water Act, including:

(1) New sources of groundwater for community water systems;
(2) New sources of groundwater for bottled and bulk water operations;
(3) New sources of groundwater that exceed 57,600 gallons over any 24-hour period; and
(4) New surface water sources of water supply associated with projects that require a water quality certification pursuant to Section 401 of the federal Clean Water Act."

C-20. Env-Wq 2101.10 of the Water Conservation regulations (Env-Wq 2101) states that "a water user shall submit a report that demonstrates compliance with Env-Wq 2101.01 through Env-Wq 2101.08 in accordance with this section, as follows:"...

"(e) For a new withdrawal from a surface water body associated with a project requiring a 401 Water Quality Certification, the report shall be submitted with the application for a 401 Water Quality Certification pursuant to Section 401 of the federal Clean Water Act."

C-21. Pes 1001.01 of the NH Division of Pesticides regulations states that "No residential property owners, private applicator, or commercial applicator shall apply pesticides within the following of the reference line:

(a) Within 25 feet as it pertains to surface waters; and

(b) Beyond 25 feet in such a manner or by such methods that would result in the presence of pesticides within 25 feet of the reference line of any lake, pond, river or coastal water."

C-22. The Activity reviewed for this 401 Certification requires a federal wetlands permit from the U.S. Army Corps of Engineers under the federal Clean Water Act Section 404. The Applicant has submitted an application for a U.S. Army Corps of Engineers individual wetlands permit.

C-23. The Applicant is responsible for the Activity, including construction and operation.

C-24. The Applicant filed an application for a DES 401 Water Quality Certification dated February 3, 2009 for the Activity.

C-25. Documents reviewed for this 401 WQC include

a. "Application for 401 Water Quality Certification for RMR Pacific, LLC. For Phase I Development Area, Golf Course Renovation and Ski Trail Expansion" and associated tables, figures and appendices, Horizons Engineering LLC project Number 08118, dated February 2009 and received by DES on March 6, 2009.

b. "Preliminary Basis of Design and Technology Assessment Report, Ragged Mountain Resort Community Wastewater System, Danbury, New Hampshire". Prepared by Horizons Engineering. January 2009 (received by DES January 12, 2009).

C-26. The Applicant filed an application for the Activity for a DES Wetlands Bureau Permit on October 14, 2008. On August 26, 2009, the DES Wetlands Bureau issued a permit for the proposed Activity (DES File Number 2008-02217).

C-27. On November 5, 2008 the DES Wetlands Bureau issued a Wetlands Permit (DES File Number 2007-02879) to temporarily impact 11,500 square feet of wetlands for installation and operation of a temporary water withdrawal pipe from Bog Pond to the Lower Pond for the snowmaking. The Applicant operated the temporary withdrawal pipe during the 2008/2009 snowmaking season. On September 1, 2009, the the DES Wetlands Bureau issued a second amendment to this permit to allow operation of the temporary withdrawal pipe in the winter of 2009/2010.

C-28. The Applicant filed an application for the Activity for a DES Alteration of Terrain Program Permit on July 11, 2008. On August 26, 2009, the DES Alteration of Terrain Bureau issued an Alteration of Terrain permit for the proposed Activity (DES Permit Number WPS – 8427).

C-29. On June 3, 2009, the Applicant received conditional approval from the DES Drinking Water and Groundwater Bureau (NHDES #999060) for two new small community wells in accordance with Env-Dw 301, Small Production Wells for Small Community Water Systems.

C-30. On August 4, 2008, the Applicant received conditional approval from the DES Drinking Water and Groundwater Bureau of a water conservation plan for the new small community water system (NHDES #999060) in accordance with the Env-Ws 390, Water Conservation Rules.

C-31. The U.S. Army Corps of Engineers (Corps) issued a public notice for the Activity (File Number: NAE-2008-410) on February 10, 2009. The public comment period ended on March 12, 2009.

C-32. The Applicant will need to obtain a Groundwater Discharge Permit in accordance with Env-Wq 402 from the DES Drinking Water and Groundwater Bureau for the proposed wastewater treatment facility and land application of treated wastewater effluent. As of the date of issuance

of this 401 Certification, the Applicant had not yet submitted an application for the Groundwater Discharge Permit.

D. FINDINGS

D-1. The Activity reviewed for this 401 Certification is as described in sectionA of this 401 Certification with further details provided in the documents reviewed for this application (see sectionC-25 of this 401 Certification).

D-2. The Activity requires water quality certification under Section 401 of the federal Clean Water Act and New Hampshire RSA 485-A:12, III.

D-3. The named and unnamed rivers and streams, lakes and ponds, and wetlands, affected by the Activity, are surface waters of the State under Env-Wq 1702.46. Exceptions to this are the so called "Upper Pond" and "Lower Pond". The Upper Pond is an approximate 2.3 acre man-made pond constructed in the 1960s located at the base of the ski trails approximately 200 feet east of the existing ski bdge. The Lower Pond is an approximate 1.2 acre man-made pond constructed in the 1990s located on the Ragged Mountain golf course just west of the 8th hole and just south of existing wetlands bordering Bog Pond. Both ponds were constructed for the purpose of providing water for snowmaking and irrigation. Based on 1956 USGS topographic mapping the area where the two ponds were constructed was originally uplands. Since the ponds were constructed in uplands and not existing surface waters, and since the ponds were constructed for the purpose of snowmaking and irrigation and not to support the designated uses for State surface waters[1] (i.e., aquatic life, primary or secondary contact recreation, drinking water supply after adequate treatment and wildlife), the Upper and Lower Ponds are not considered surface waters of the State.

D-4. The Activity will result in a discharge and may cause the permanent alteration of, or temporary impacts to surface waters.

D-5. Storm water runoff, including snowmelt, and groundwater flow to surface waters from within the area affected by the Activity during warm and cold-weather conditions are discharges under the definitions of Env-Wq 1702.18.

D-6. Since the Activity will involve new discharges of pollutants and new withdrawals, the antidegradation provisions of Env-Wq 1708 apply (see section C-18 of this 401 Certification).

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1 For a discussion of designated uses for surface waters of the State, see the 2008 Section 305(b) and 303(d) Consolidated Assessment and Listing Methodology. NH Department of Environmental Services. March 2008. NHDES-R-WD-05-29.

D-7. Surface waters that could be potentially affected by the Activity and their associated DES assessment unit (AU) numbers (where available) include the following:

Smith River Watershed: Bog Pond (NHIMP700010702-02); Bog Brook (NHIMP700010702-03); Center Brook, West Brook and Unnamed Brooks to Bog Pond (NHRIV700010702-07 and NHRIV700010702-09); Gulf Brook (NHRIV700010702-08); and other unnamed tributaries and wetlands.

Frazier Brook Watershed: Eagle Pond (NHLAK700030401-03); Beverly Brook (NHRIV700030401-05); Frazier Brook and unnamed tributaries (NHRIV700030401-06); unnamed brook to Eagle Pond (NHRIV700030401-07); and other unnamed tributaries and wetlands.

All of the above surface waters are Class B, with the exception of all surface waters in the Frazier Brook watershed (which is in the Blackwater River watershed) which is Class A[2]. Consequently, New Hampshire Class A surface water quality standards apply to all surface waters in the Frazier Brook watershed and New Hampshire Class B surface water quality standards apply to all other potentially affected surface waters. Class B waterways are considered suitable for aquatic life, primary and secondary contact recreation, fish consumption, wildlife, and, after adequate treatment, as a water supply. Class A surface waters support the same designated uses, however, in accordance with RSA 485-A:8 I there can be no discharge of sewage or waste (as defined in RSA 485-A:2) into Class A waters. Land application of treated wastewater that is properly designed and implemented, is not expected to result in a discharge of sewage or waste into surface waters and is therefore allowed in the watersheds of Class A and B waters.

D-8. According to the NH Fish and Game Department on May 21, 2009, Bog Pond and Eagle Pond are warm water fisheries. All tributary rivers and stream to these ponds are considered to be coldwater fisheries.

D-9. Based on the NH 2008 Section 305(b) and 303(d) Surface Water Quality Report (see http://des.nh.gov/organization/divisions/water/wmb/swqa/2008/index.htm), there is insufficient information to assess the surface waters discussed in section D-7 of this 401 Certification for each designated use, with the exception of the following:

> All surface waters in NH (including those potentially impacted by the proposed Activity) are listed as impaired for fish consumption due elevated levels of mercury in fish tissue. The primary source of

2 Legislative Classifications of Surface Waters in New Hampshire. New Hampshire Department of Environmental Services. October 2008. R-WD-08-21.

mercury is atmospheric deposition from sources such as the burning of fossil fuels, incinerators etc.

In addition, Assessment Unit NHRIV700030401-05 (Beverly Brook) is listed as impaired for Aquatic Life due to elevated levels of iron. The probable source of iron is listed as a landfill.

D-10. 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, which include all surface waters identified in sectionD-7 of this 401 Certification. Through its processing and issuance, the DES wetlands permit addresses the dredge and fill impacts to jurisdictional wetlands.

D-11. 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 identified in section D-7 of this 401 Certification. Through its processing, and issuance, the DES Alteration of Terrain permit will address many of the potential impacts of stormwater from the Activity on receiving surface waters.

D-12. The Applicant submitted an application for an Alteration of Terrain (AoT) permit in 2008. Consequently, review of the AoT application is based on the old regulations and not the new, more comprehensive and protective AoT regulations which became effective January 1, 2009 (Env-Wq 1500). Since many of the receiving waters are small headwater streams with little dilution, and the fact that a portion of the project flows to Beverly Brook which is a Class A waterbody, it is appropriate to require construction related and permanent stormwater controls to be in accordance with the current AoT regulations (Env-Wq 1500).

D-13. The Activity may temporarily or permanently result in increased peak stormwater flows and reductions in groundwater recharge due to increases in impervious surfaces such as buildings, roads and parking lots. The 401 Certification decision relies, in part, on an approved permit from the DES Alteration of Terrain Program and design and construction of all stormwater controls in accordance with the current Alteration of Terrain regulations (Env-Wq 1500, effective January 1, 2009). The current regulations require post-development stormwater flows to be no greater than pre-development flows and provisions to ensure that groundwater is properly recharged. Through its processing and anticipated issuance, the DES Alteration of Terrain Permit and requirements to comply with the current Alteration of Terrain regulations will address the potential stormwater related impacts of the Activity on peak flows and groundwater recharge.

D-14. Construction of the Activity may result in the water quality violations due to erosion and deposition of settleable and suspended solids. To prevent such violations, the 401 Certification decision relies, in part, on an approved permit from the DES Alteration of Terrain Program coupled with a requirement to design and construct all construction related stormwater erosion control measures in accordance with current Alteration of Terrain Permit regulations (Env-Wq 1500, effective January 1, 2009).

In light of the sensitive resources within the project area and scale of the proposed Activity, the following additional construction BMP inspection and reporting requirements and turbidity monitoring are considered necessary to prevent construction related surface water quality violations.

A. A Certified Professional in Erosion and Sediment Control or a Professional Engineer licensed in New Hampshire ("Monitor"), shall be employed to regularly inspect the site.

B. The Monitor shall inspect the site at least once a week and as specified elsewhere in this section.

C. The Monitor shall regularly provide technical assistance to the Contractor on appropriate Best Management Practices for Erosion and Sediment Control requirements

D. Weekly Erosion Control Meeting: The Applicant's prime Contractor for the Activity (prime Contractor) shall hold weekly erosion control meetings with the Monitor. Minutes of the meeting shall be kept on file and made available to DES upon request.

E. Inspection Frequency

1. Daily Inspections: The prime Contractor shall inspect all erosion control measures every day that work is conducted from the time construction commences and earth is disturbed until construction is complete.

2. Weekly Inspections: After construction has commenced and earth has been disturbed, the Monitor shall conduct weekly erosion control site inspections to verify all erosion control measures are maintained properly to protect surface waters and wetlands. The Monitor shall document and report its findings, including recommendations for maintenance of BMPs or the addition of new control measures to the prime Contractor.

3. Pre-storm inspections: The Monitor shall print the 5-day forecast once daily (7-9 am) for the duration of the project. All forecasts shall be clearly marked with the date and time, kept on file, provided to the prime Contractor. In addition, the 5-day forecast

on the day of the weekly meeting shall be attached to the weekly meeting minutes distributed by the Monitor. Inspection shall occur within 24 hours prior to the start of any rain event of 0.5 inches or more in a 24-hour period that is predicted to occur during the workweek. A normal workweek is Monday through Friday. Holidays and weekends are included as part of the normal workweek when work is anticipated to occur on those days. If the predicted event occurs outside of the normal workweek, the inspection shall occur on the normal workday just before any scheduled days off, such as holidays and weekends. Unless otherwise approved by DES, the Accuweather website (http://home.accuweather.com/index.asp?partner=accuweather) shall be used for the purpose of predicting future precipitation amounts. Future precipitation amounts on the Accuweather web site may be determined by typing in the location of the project (city, state and/or zip code), clicking on the link for Days 1-5 forecasts and then clicking on the day(s) of interest.

F. Emergency Inspections During Storm Events: Inspections shall occur during the daylight hours (Monday through Sunday, including holidays) during storm events whenever plumes are visible or if turbidity sampling indicates water quality standards are exceeded due to turbid stormwater from the construction site. Inspections and corrective action shall be implemented during the daylight hours (Monday through Sunday, including holidays) until turbidity water quality standards are met.

G. Post Storm Inspections: Inspections shall occur on the first workday following storms of greater than 0.5 inches in a 24-hour period. Precipitation amounts shall be based on precipitation recorded at a rain gauge installed at the construction site or other approved method. Inspections and corrective action shall be implemented during the daylight hours (Monday through Sunday, including holidays) until turbidity water quality standards are met.

H. Winter Shutdown Inspections: Inspections during winter shut down shall occur as specified in the NPDES General Permit for Stormwater Discharges from Construction Activities (commonly known as the Construction General Permit)

I. Provisions for Handling Emergencies: Contact information shall be provided to DES for at least two people that DES can contact at any time regarding construction related stormwater concerns. The Applicant shall prepare an Emergency Procedures Plan describing procedures to address and correct emergency, construction related stormwater issues in an expeditious manner. The plan shall include the responsibilities of key individuals. the availability of equipment, and the availability of erosion

control and BMP supplies. All emergency erosion control and BMP supplies must be kept on-site.

J. Inspection and Maintenance Plans and Reports: Written inspection and maintenance reports shall include the items stipulated in the EPA NPDES General Permit for Stormwater Discharges from Construction Activities, as well as the predicted 24-hour rainfall for pre-storm inspection reports, measured rainfall amounts for post-inspection reports. The reports shall also indicate if erosion control measures "pass" or "fail". Unless otherwise authorized by DES, the reports shall be submitted to DES by electronic mail (email) within 24 hours of each inspection.

K. Weather Station Specifications: Unless otherwise authorized by DES, the Applicant shall be responsible for maintaining a weather station that can measure rainfall to an accuracy of 0.01 inches, monitor temperature to an accuracy of 1 degree Fahrenheit or Celsius, and has hourly data storage and download capabilities.

L. Precipitation Notification Plan: The Applicant shall specify how the Monitor, and others, will be notified when precipitation has occurred that will trigger the need for inspections and/or turbidity sampling. Automatic notification is preferred. If considered necessary and feasible by DES, the weather station shall be equipped to send automatic email notifications to notify the Monitor when construction BMP inspections and/or turbidity sampling is necessary. Should automated email notification be considered necessary, it shall be capable of the following: Start of rain event: Once 0.25 inches of rain or rain-mix precipitation has been measured an automated email notification will be sent to the prime Contractor, the Monitor, and any other interested parties. The email shall provide hourly rainfall, and time of rainfall for the previous 24 hours. End of rain event: Once six hours without rain or rain-mix precipitation has passed an automated email notification will be sent to the prime Contractor, the Monitor and DES. The email shall provide hourly rainfall and time of rainfall from the start of the rain event to the end of the rain event, including the six hour "dry" period.

M. Turbidity Monitoring: To confirm that construction best management practices (BMPs) for controlling erosion are performing as intended, turbidity monitoring is needed. Unless otherwise authorized by DES, the Applicant shall submit a Turbidity Sampling Plan that includes the turbidity monitoring elements specified in the February 2, 2009 DES Inter-Department Communication entitled "Amendment of the November 16, 2006 Guidance for BMP Inspection and Maintenance and Turbidity Sampling and Analysis Plans for I-93 Expansion Project Water Quality Certification". This document includes guidance regarding sampling station number and locations, sampling frequency, sampling duration, size of storms that need to be sampled, how soon after the start of

precipitation sampling should begin, quality assurance quality control provisions, and turbidity meter specifications.

The above construction inspection/maintenance, turbidity monitoring and reporting requirements, combined with a requirement that a sufficient quantity of erosion control supplies shall be kept on site to expeditiously respond to erosion control issues, should be sufficient to ensure and confirm that proposed erosion control measures during construction are not causing or contributing to surface water quality violations.

Similar inspection, maintenance and monitoring can be required to ensure that permanent erosion control measures continue to function properly after construction.

D-15. The Activity includes the creation of impervious surfaces, such as roadways, parking lots, and buildings and corresponding rooftops. The use of roadways by vehicular traffic can cause the deposition of metals including but not limited to copper, lead, and zinc, and petroleum-based compounds including but not limited to gasoline, PAHs, oil and grease on impervious surfaces. Stormwater runoff can mobilize and transport metals and petroleum-based compounds from impervious surfaces. Stormwater runoff from impervious surfaces, as well as pervious surfaces (i.e. lawns with fertilizers) can also contain elevated concentrations of nitrogen and phosphorus. To prevent degradation and/or water quality violations, a pollutant loading analysis can be conducted, to ensure that adequate permanent stormwater controls are selected to prevent an increase in pollutant loads to surface waters. To ensure that assumptions made in the pollutant loading analysis actually remain in effect, submittal of legally binding documentation (i.e., such as deed restrictions and conservation easements) can be required. The Applicant submitted a pollutant loading analysis with the 401 Certification application. The analysis, as submitted, does not demonstrate no additional loading of pollutants. Revisions are needed to comply with the "no additional loading" criteria. Legally binding documentation may also be required for reasons mentioned above. All permanent stormwater practices (i.e., best management practices or BMPs) referenced in the loading analysis must be designed in accordance with current Alteration of Terrain regulations (Env-Wq 1500 effective January 1, 2009).

D-16. Stormwater runoff from galvanized roofs can contain elevated levels of zinc which can be toxic to aquatic life.

D-17. Operation of the Activity could result in the application of pesticides such as herbicides and insecticides in the golf course and residential areas. Improper application of pesticides can harm aquatic life and result in surface water quality violations. In New Hampshire, pesticides are regulated by the Department of Agriculture Pesticide Division. As stated in Pes 1001.01(see section C-21), no residential property owners, private

applicator, or commercial applicator shall apply pesticides within the 25 feet of surface waters or beyond 25 feet in such a manner or by such methods that would result in the presence of pesticides within 25 feet of any lake, pond, river or coastal water. The NH Pesticide regulations also require licensing or permitting of all commercial and private pesticide applicators as well as pesticide dealers. Through this process, only persons demonstrating satisfactory competence in the safe and legal use of pesticides within New Hampshire may apply pesticides. Compliance with the NH Pesticide Division regulations regarding the application of pesticides combined with monitoring and requirements for residential homeowners to comply with pesticide regulations is expected to prevent water quality standard violations due to pesticides.

D-18. Operation of the Activity during the winter will likely include application of deicing chemicals to roads and other impervious surfaces that contain chloride (i.e. rock salt). Chlorides are conservative substances that persist in the environment and are not treatable by standard best management practices. Frequent application of road salt can result in levels of chloride in surface waters that are harmful to aquatic life. Compliance with DES Salt Minimization Plan guidance [3] can help minimize salt use. The guidance includes ways to minimize application of de-icing chemicals including typical application rates and use of pervious pavements which, according to the University of New Hampshire Stormwater Center [4] can reduce the need for deicing chemicals by approximately 75 percent If pervious pavements are not proposed, the guidance requires justification for not using pervious pavements.

D-19. Projects involving alteration of terrain can result in discharges to surface waters of nutrients such as phosphorus and nitrogen that can lead to excessive aquatic plant growth and impairment of aquatic life and contact recreational uses such as swimming or wading. Application of fertilizers can be a primary source of nutrients. Fertilizers were not specifically addressed in the 401 Certification application. Submittal of a Fertilizer Minimization plan and implementation of the approved plan, can be required to address potential nutrient concerns associated with fertilizers. The plan should address current and future fertilizer usage and annual nutrient loadings to the golf course and other areas within the property of the Activity and recommend ways to minimize fertilizer use. As a minimum the plan should require soil testing to determine appropriate application rates and use of fertilizers with slow release nitrogen and little to no phosphorus as soils in New Hampshire most likely have sufficient phosphorus. The plan should also quantitatively compare existing annual

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3 Salt Minimization Plan Requirements (draft). Last Revised 7/21/09. New Hampshire Department of Environmental Services. DES-WMB Guidance Number 027.
4 2007 Annual Report. University of New Hampshire Stormwater Center. www.unh.edu/erg/cstev.

fertilizer loadings of total phosphorus (TP) and total nitrogen (TN) to the golf course to future loadings using standard fertilizers and spray irrigation with treated wastewater with a goal of keeping future loadings at or below existing loadings. Finally, the plan should specify that in all areas except the golf course, fertilizers shall not include any pesticides.

D-20. Projects involving alteration of terrain can result in water temperature increases due to removal of vegetation adjacent to surface waters that provide natural shading, construction of impervious surfaces such as pavement and rooftops and construction of best management practices such as detention ponds. Significant temperature increases can adversely impact the Biological and Aquatic Community Integrity (Env-Wq 1703.19) of surface waters especially in temperature sensitive cold water fisheries Although Bog Pond is a warm water fishery, the brooks and streams draining to Bog Pond or Beverly Brook are considered cold water fisheries by the NH Fish and Game Department (see section D-8 of this 401 Certification). The Applicant has not specifically addressed temperature in the 401 Certification application. A requirement to submit a Water Temperature Impact Plan to DES for approval that addresses how the Activity will impact water temperatures and, if necessary, to revise the design based on the approved plan, can be required to address temperature concerns.

D-21. Wastewater:

The proposed Activity will result in increased wastewater volume that will need to be adequately treated and disposed of to prevent significant degradation of surface waters. Typical pollutants of concern in treated domestic wastewater include 1) organics (which are measured in terms of the 5 day biochemical oxygen demand or BOD5) which can lead to reduced levels of dissolved oxygen in surface waters that are harmful to aquatic life 2) total suspended solids (TSS) which can clog fish gills and result in sediment deposits that can harm benthic aquatic organisms 3) nutrients such as phosphorus and nitrogen which can cause algal blooms and oxygen depletion in surface waters, 4) bacteria which can cause gastrointestinal illness if ingested, 5) ammonia which can be toxic to aquatic organisms and contribute to low dissolved oxygen and 6) other substances flushed into the sewer system by consumers which may be toxic to aquatic life. In January 2009, the Applicant submitted a Preliminary Basis of Design (PBD) to DES for review (see section C-25b). According to the PBD, wastewater will not be discharged directly to surface waters; rather it will be treated and reused by applying it back to the land via drip irrigation, spray irrigation and snow. Since the Activity involves the discharge of wastewater on to or into the ground or groundwater, the Applicant must obtain a groundwater discharge permit (GWDP) from DES in accordance with Env-Wq 402. To date the Applicant has not filed an application for a GWDP.

The GWDP requires:

a. At least secondary treatment (BOD5 and TSS $\leq$ 30 mg/L, and disinfection) of the wastewater prior to discharge to the ground or groundwater (Env-Wq 402.22);

b. That the discharge will not violate groundwater [Env-Wq 402.22 (d)] or surface water quality standards [Env-Wq 402.22 (e)];

c. Conditions for monitoring the wastewater and groundwater treatment system, groundwater quality and surface water quality; record keeping; and reporting to assure conformance with the rules ([Env-Wq 402.20 (a)]; and

d. DES approval of the wastewater facility (WWTF) design plans and operations manual [Env-402.15(h)].

GWDPs can be modified at any time by DES if necessary to protect human health or the environment or to ensure compliance with Env-Wq 402 [Env-Wq 402.29 (d)].

The PBD (see section C-25b) mentioned above provides a general idea of the proposed wastewater disposal system. Approval of the PBD does not constitute approval of the system as a GWDP per Env-Wq 402 is still needed before construction can commence. As previously mentioned the Applicant has not yet submitted an application for a GWDP.

According to the PBD:

a. The community wastewater system will serve the existing ski base lodge which presently has an on-site septic system, and the residential area;

b. The system will only serve the Ragged Mountain Resort; no residential or commercial service connections outside of the resort boundaries will be allowed, and no industrial wastes or septage will be accepted;

c. Treatment is proposed to be provided by a membrane bioreactor system followed by ultraviolet disinfection. The Applicant has selected Enviroquip as the preferred treatment equipment vendor.

d. Enviroquip based their preliminary design on meeting the limits shown below. As also shown, Enviroquip equipment can meet lower limits if necessary.

Table 1: Effluent Concentrations achievable with the Enviroquip WWTF

Parameter	Effluent Limits assumed by Enviroquip for Ragged Mountain WWTF	Typical Values	Minimum Effluent Limits Guaranteed by Enviroquip (would require additional equipment/processes)
BOD5 (mg/L)	< 6 mg/L	< 2 mg/L	< 5 mg/L
TSS (mg/L)	< 6 mg/L	< 2 mg/L	-
TN (mg/L)	< 13 mg/L	< 10 mg/L	< 3 mg/L
NH3(mg/L)	< 1 mg/L	< 1	< 1
TP (mg/L)	< 1	< 1	< 0.1
Alkalinity (mg/L)	< 75	-	-
Fecal Coliform	-	< 2.2 CFU/ 100 mL	-

BOD5=5 day biochemical oxygen demand; TSS = Total Suspended Solids; TN = Total Nitrogen; NH3= Ammonia; TP = Total Phosphorus

e. Treated effluent will then be routed to the existing 14 million gallon man-made holding pond near the ski lodge that is currently used to provide water for irrigation and snowmaking (i.e., the Upper Pond). A diversion channel is proposed upstream of the Upper Pond to reroute surface water around the pond to an existing wetland channel. During the winter months treated effluent will be blended in the Upper Pond with water from other sources and used for making snow on the ski area. During summer months, the treated effluent will be blended in the Upper Pond with water from other sources on the property and used for golf course and grounds irrigation. Off-season (spring and fall) and during periods of low irrigation or snowmaking demand, treated effluent will be discharged to a subsurface drip irrigation system located within the ski trail network.

f. General limits of the proposed spray irrigation system on the golf courses and of the proposed drip irrigation system on the ski slopes were provided on plans.

g. The Applicant's engineer (Horizons Engineering) has indicated that the average dilution factor in the Upper Pond for reclaimed effluent over the snowmaking season is reported to be approximately 3.5:1, and that if required, the system could be configured to maintain a specific minimum dilution factor by disposing of treated effluent in the period prior to the start of the snowmaking season and using water from other sources on the property to initially fill the Upper Pond.

Based on conversations with the DES Wastewater Engineering Bureau (S. Nall) that review and approve WWTF design and operations plans, redundancy in all critical WWTF equipment will be required for this facility. The primary reason for this is that the Applicant does not have a backup system to treat wastewater (i.e. such as a subsurface system) should the proposed wastewater system fail.

Aside from making sure the WWTF is properly designed and operated (which will be addressed by the GWDP) the primary surface water concern with the proposed wastewater system is the potential for degradation of surface waters due to land application of the treated effluent. Although water reuse is encouraged to minimize impacts on the hydrology, it must be done responsibly to avoid adverse environmental impacts due to addition of pollutants. This is especially true for the proposed Activity which is located in the headwaters where many of the surface waters have relatively little dilution to assimilate the impacts of additional anthropogenic pollutant loadings.

The potential for surface water quality violations associated with the proposed wastewater system include 1) overflow of the Upper Pond containing blended treated effluent, 2) runoff or overspray from spray irrigation systems in the warm months using blended treated effluent 3) breakout of blended treated effluent from the drip irrigation lines to surface waters and/or 4) runoff from melting snow made from blended treated effluent.

To prevent overflow of the Upper Pond, a condition can be added to this 401 Certification prohibiting overflow of the Upper Pond when it contains blended treated WWTF effluent. Further, to help prevent overflow of the Upper Pond, the Applicant proposes to construct a diversion ditch upstream of the Upper Pond to reroute surface water around the pond to an existing wetland channel. This will not only help prevent unintended overflow of the pond but will also benefit the aquatic life in downstream surface waters by making more flow available year round.

To address breakout or runoff from overspray of blended treated effluent a condition can be added this 401 Certification requiring at least 50 foot separation between drip irrigation lines and spray from spray irrigation systems. Providing such a buffer will minimize the chances of direct discharge of the blended treated effluent to surface waters from these systems. In addition the GWDP will ensure the drip irrigation system is properly designed with appropriate application rates to prevent overloading and breakout. The GWDP will also include requirements to monitor surface and groundwaters to ensure that the reclaimed WWTF effluent is not causing or contributing to surface water quality violations.

The GWDP will also include limits on the WWTF effluent. Although an application for a Groundwater Discharge Permit has not been submitted,

the DES Drinking Water and Groundwater Bureau's best estimate of WWTF effluent limits at this time is 10 mg/L of BOD5, 10 mg/L of TSS, 1 mg/L of TP and no detectable levels of fecal coliform based on a 7 day median, and a maximum daily fecal coliform of 14 counts/100 ml. However, effluent limits assumed by Enviroquip for the Ragged Mountain WWTF (see Table 1) include BOD5 and TSS of 6 mg/L, TN of 13 mg/L, NH3 of 1 mg/L, and TP of 1 mg/L. To reduce the potential for water quality violations due to WWTF pollutant loadings, WWTF effluent limits should be atleast as stringent as the concentrations assumed by Enviroquip.

With regards to surface water quality standards for bacteria, RSA 485-A:8,II states that for Class B waters the 60 day geometric mean based on at least 3 samples shall not exceed 126 Escherichia coli / 100 mL and that the maximum in a single sample shall not exceed 406 / 100 mL. Env-Wq 1703.06 (b) states that the bacteria criteria shall be applied at the end of wastewater treatment facility's discharge pipe. Since Escherichia coli is a subset of fecal coliform and since the fecal coliform effluent limit of 14 counts/100 mL is lower than the surface water quality geometric mean criteria of 126 counts/100 mL, the fecal coliform limit will be protective of surface water quality standards for bacteria.

WWTF effluent can include many other pollutants, which may themselves be toxic or may become toxic when combined with other pollutants. To determine the overall toxicity of the effluent, bioassays can be required to be periodically performed on the WWTF effluent. Such tests are called whole effluent toxicity tests. Information from these tests can be used to determine the minimum dilution needed in the Upper Pond to keep the blended effluent non-toxic.

Since there is more opportunity for infiltration, complexation with soils, uptake in plants and increased degradation of organics during the growing season, the requirements in the GWDP (which will specify appropriate drip irrigation application rates and monitoring of surface and groundwaters), are expected to be adequate to prevent water quality standard violations due to land application of treated effluent in the warm weather months (March through October).

As previously discussed, during the winter months (November through February) treated WWTF effluent is proposed to be blended with water from Bog Pond in the Upper Pond and used to make snow. Some of the manmade snow is likely to be applied directly over surface waters with no setback. When the snow melts (mostly in the early spring) there is a greater potential for pollutants in the snow to flow into surface waters with little to no treatment due to partially frozen or saturated soils and relatively cold temperatures which can reduce plant uptake and biological degradation processes, reduce infiltration, increase runoff, and reduce the formation of soil complexes due to less contact time and higher dilution.

To prevent surface water quality violations due to melting of manmade snow containing treated effluent the concentration of blended treated effluent in the Upper Pond should be as close as possible to typical levels in receiving surface waters (or water quality criteria if levels in receiving waters exceed water quality criteria). In addition, and as discussed below, seasonal limits are needed on the mass of pollutants from the WWTF that can be in the snow to prevent significant degradation and violations of regulations prohibiting the addition of new pollutants.

With regards to maximum pollutant limits in the Upper Pond, Table 2 shows the measured concentrations of pollutants in two of the headwater streams on the site (surface water sampling stations SW-4 and SW-5) as well as Bog Pond (SW-6). This data was provided by the Applicant in the 401 Application and was collected in 2008 from mid June to mid November. Also shown for comparison is the Applicant's proposed WWTF effluent concentration and the applicable water quality criteria (if available).

Table 2 : Comparison of WWTF Effluent Concentrations to On-Site Stream Concentrations

Parameter	WWTF Effluent Concentration assumed in Enviroquip WWTF Design	Gulf Brook SW-4 [1,2,3,4,5]	Unnamed Stream SW-5 [3,4]	Bog Pond Culvert SW-6 [2,3,4,5]	Water Quality Criteria
BOD5 (mg/L)	< 6	5 samples < 6	2 samples < 6	4 samples < 6	None
TSS (mg/L)	< 6	4 samples < 5 1 sample[3]= 10	2 samples < 5	3 samples = 5 1 sample [2] = 21	None
TP (mg/L)	< 1	4 samples < 0.05 1 sample[2] < 0.08	1 sample < 0.05 [3] 1 samples = 0.05 [4]	2 samples [4,5] = 0.05 2 samples [2,3] = 0.08	Probable criteria for Lakes and Ponds ~ 0.012 mg/L; Rivers / Streams ~ 0.055 mg/L
TN (mg/L)	< 13	5 samples < 0.5	2 samples < 0.5	1 sample [5] = 0.5 1 sample [4] = 0.6 1 sample [3] = 0.7 1 sample [2] = 0.9	None
NH3 (mg/L)	< 1	NM	NM	NM	~ 3 mg/L

Notes:
1. Sample taken on 6/18/08
2. Sample taken on 7/14/08
3. Sample taken on 8/7/08
4. Sample taken on 10/2/08
5. Sample taken on 11/13/08

As shown, concentrations of BOD5, which is a measure of the amount of organics in the effluent, were reported as < 6 mg/L in the two headwater streams and Bog Pond. The DES laboratory uses a reporting detection limit of 3 mg/L and most surface waters tested in New Hampshire have BOD5 levels of < 3 mg/L. Although the reporting detection limit is < 3 mg/L, the actual BOD5 in clean rivers and streams should much less than 3 mg/L (i.e., < 1 mg/L). Consequently it is proposed that the blended treated effluent in the Upper Pond for snowmaking have a BOD5 of < 3 to minimize degradation and to prevent violations of dissolved oxygen water quality standards.

TSS was reported as < 5 mg/L in the two headwater streams in 6 of the samples and 10 mg/L in one sample. Bog Pond had 3 samples at < 5 mg/L and one at 21 mg/L. The reporting detection limit used by the DES laboratory is 5 mg/L and most surface waters tested in New Hampshire have TSS levels of < 5 mg/L (except during storms when erosion can cause spikes in TSS). Consequently it is proposed that the blended treated effluent in the Upper Pond for snowmaking have a TSS of < 5 mg/L to minimize degradation and the potential for sedimentation and aquatic life impairment due to excess solids.

In the headwater streams, TP was < 0.05 mg/L in five of the stream samples, equal to 0.05 mg/L in one sample and < 0.08 mg/L in one sample. In Bog Pond, two samples (10/2/08 and 11/13/08) had TP levels of 0.05 mg/L and the two summer samples had 0.08 mg/L. Data collected by DES [5] on 8/28/87 and 1/19/88 revealed concentrations of 0.036 and 0.008 mg/L respectively at a depth of 1 meter. The concentration at a depth of 1.5 meter depth was lower (0.011 mg/L) on 8/28/87 and the same (0.008 mg/L) on 1/19/88. In freshwaters, it is well accepted that TP is usually the nutrient which limits aquatic growth. Typical levels in streams with little anthropogenic influence are about 0.01 to 0.02 mg/L. The reporting detection level typically used by the DES laboratory is 0.005 mg/L.

New Hampshire surface water quality regulations currently include narrative (Env-Wq 1703.14, see C-14) but no numeric standards for TP. The narrative standards 1) allows TP in Class B waters provided it does not impair an existing or designated use, unless naturally occurring 2) prohibit new or increased discharges of TP into lakes or ponds and 3) prohibits new discharges of TP to tributaries of lakes or ponds that would contribute to cultural eutrophication or growth of weeds or algae in such lakes or ponds (see C-13). Based on a study done in 1987 and 1988 by DES[5], Bog Pond is considered eutrophic. Consequently, according to Env-Wq 1703.14 (see C-13), there can be no new discharges of TP into Bog Pond or tributaries

5 New Hampshire Lakes and Ponds Inventory, Volume V. April 1989. New Hampshire Department of Environmental Services. Staff Report No. 166.

to Bog Pond that would contribute to cultural eutrophication. Assuming that TP is the cause of eutrophication in the Bog Pond, TP levels of blended effluent in the Upper Pond should be no greater than current TP levels in Bog Pond of about 0.05 mg/L and preferably should be less.

As previously mentioned, New Hampshire does not currently have numeric nutrient criteria for freshwaters but expects to in the near future. Levels which can cause water quality violations depend on the type of waterbody. Research to date indicates that to prevent algal blooms that could impair recreational uses and lead to low dissolved oxygen levels that could impair aquatic life, TP in lakes and ponds should not exceed 0.012 mg/L unless naturally occurring [6]. In rivers and streams, studies conducted in New York suggest that TP should be below 0.065 mg/L to prevent impairment of benthic macroinvertebrates. DES is in the process of collecting nutrient and benthic macroinvertebrate data to determine appropriate criteria for New Hampshire rivers and streams. A preliminary regression based on limited data (which are not statistically significant) suggest a TP threshold of about 0.055 mg/L in rivers and streams (unless naturally occurring), which is close to the results in New York. As mentioned, more data is being collected to improve the statistical significance of the regression.

Based on the above it is proposed that the blended treated effluent in the Upper Pond for snowmaking have a TP of < 0.05 mg/L. This value is just below what was measured in the sample collected from Bog Pond in November of 2008 but above the sample taken in January 1988 (0.008 mg/L) and therefore should be achievable and provide some capacity for the addition of WWTF effluent to the Upper Pond for snowmaking. Further, this value is less than what current research in NY and NH suggest is necessary to protect benthic macroinvertebrates (i.e., approximately 0.055 to 0.065 mg/L) in wadeable streams. Actual concentrations in the headwater streams are not known due to the relatively high reporting detection limit used in 2008 (i.e., < 0.05 mg/L). However, based on DES experience and measured TP concentrations in rainfall[7] (around 0.017 mg/L), it's likely that headwater stream TP concentrations are around 0.02 mg/L. By setting the maximum TP concentration in the Upper Pond at 0.05 mg/L, a dilution of only 2:1 is needed to reduce concentrations to approximately 0.02 mg/L and prevent significant degradation. Such dilution is likely to occur from natural precipitation and/or melting natural snow. In addition, there is likely to be some losses of TP (although not as much as during the warmer months) due to soil complexation, and plant uptake.

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6 Draft Total Maximum Daily Load studies currently being prepared by NH Department of Environmental Services for nutrient impaired lakes

7 Rust Pond Wolfeboro, New Hampshire Pond and Diagnostic Study. Final Report. Winter 2007. NH Department of Environmental Services. Document Number DES-R-WD-07-24.

TN levels in the two headwater streams were < 0.5 mg/L and steadily decreased in Bog Pond from 0.9 mg/L in July to 0.5 mg/L in November. Samples taken by DES [5] on 8/28/87 and 1/19/88 showed concentrations of about 0.5 and 0.4 mg/L respectively. The DES laboratory typically uses a reporting detection limit of 0.30 mg/L (i.e., 0.25 mg/L for total kjeldahl nitrogen and 0.05 mg/L for nitrite and nitrate) and most "clean" surface waters tested in New Hampshire have TN levels < 0.5 mg/L. Although nitrogen is not usually the nutrient limiting algal growth in freshwaters, t is important to keep TN levels as low as possible to prevent degradation and possible impairment in downstream tidal waters where nitrogen is typically the "limiting" nutrient. High levels of nitrogen in tidal waters can lead to excess algal blooms, low dissolved oxygen levels, and/or loss of eelgrass. Water quality impairments in estuaries due to nitrogen are becoming more and more prevalent. Long Island Sound, the Chesapeake Bay, and even some of New Hampshire's Great Bay estuary are listed as impaired for nitrogen due to excess algae, low dissolved oxygen and/or loss of eelgrass. Though some nitrogen is removed in freshwaters, estuarine studies conducted for Long Island Sound suggest that not all is attenuated prior to reaching estuaries [8]. To minimize the impact on downstream estuaries (the proposed Activity is in the Merrimack River watershed which flows into the estuary at Newburyport, MA) and degradation of surface waters on site, it is proposed that the blended treated effluent in the Upper Pond for snowmaking have a TN of < 0.6 mg/L. Based on winter sampling results in Bog Pond, this level should be achievable and should provide some capacity for the addition of treated WWTF effluent in the Upper Pond for snowmaking. With dilution from natural precipitation and snowmelt, combined with some pollutant losses due to plant uptake and soil complexation, such concentrations are not expected to significantly exceed ambient concentrations or result in water quality violations in the receiving waters.

NH3 levels were not measured in the headwater streams or Bog Pond. DES' experience is that NH3 levels in New Hampshire surface waters are usually less than 0.2 mg/L which is well less than the level that can be toxic to aquatic life (approximately 3 mg/L of NH3-N at pH of 7 and water temperature of 25 degrees C). Most NH3 in aquatic systems is readily converted to nitrite and nitrate by nitrifying bacteria via a process known as nitrification. Since NH3 is included in the measurement of TN and since the proposed TN level in the pond is less than the NH3 toxicity value of 3 mg/L, the proposed TN value of < 0.6 mg/L in the Upper Pond will also be protective of toxicity caused by NH3.

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8 An Evaluation of Potential Nitrogen Load Reductions to Long Island Sound from the Connecticut River Basin,. Barry M. Evans. The Pennsylvania State University. March 18, 2008.

Based on the discussion above, proposed limits for the Upper Pond when it includes treated wastewater effluent and is used for snowmaking are shown in Table 3.

Table 3: Maximum Pollutant Concentrations in WWTF Effluent and Blended Effluent in Upper Pond During the Snowmaking Season

Parameter	Maximum Concentration of Blended Treated Effluent in Upper Pond During Snowmaking Season
BOD5	< 3 mg/L
TSS	< 5 mg/L
TP	< 0.05 mg/L
TN	< 0.6 mg/L

In addition to wintertime restrictions on concentrations in the Upper Pond, it is also necessary to restrict the total seasonal mass of pollutants in snow from WWTF effluent to prevent degradation in Bog Pond and violations of Env-Wq 1703.14 which prohibits new or increased discharges of phosphorus into lakes or ponds and new or increased discharges of phosphorus or nitrogen into tributaries of lakes and ponds that could would contribute to cultural eutrophication or growth of weeds or algae in such lakes and ponds. The snow made from the Upper Pond will primarily consist of water from Bog Pond and treated WWTF effluent. Pollutants reaching Bog Pond from melted snow made from Bog Pond are not new additions to the Pond since they originated from Bog Pond. However, pollutants in treated WWTF effluent are new additions to the watershed. Without mass limits on the amount of WWTF pollutants in snow made with WWTF effluent, runoff from the melting snow could significantly increase loadings to Bog Pond, which is not allowed. To prevent this from happening, calculations were performed to determine what the allowable loadings should be. Results for TP, TN, BOD5 and TSS are shown in Table 4. Target concentrations in Bog Pond due to loadings from the WWTF were first set at low levels (i.e. less than or equal to ½ the reporting detection limit). The maximum allowable mass of pollutants in snow due to WWTF effluent for each snowmaking season was then computed by multiplying the target concentration by the volume in Bog Pond (see footnote 5). As shown, TP is the most restrictive at 1.3 lbs/season followed by TN at 79.9 and then BOD5 and TSS at 532.7 lbs/season. Knowing the total mass per season, the average daily WWTF load was then estimated by dividing the total mass by the number of days in the snowmaking season (120). To get an idea of the average daily volume of WWTF effluent that could be discharged to the Upper Pond during the snow making season, the average daily mass loading was then divided by the typical effluent concentration achievable with the Enviroquip WWTF and

appropriate conversion factors. At the assumed WWTF concentrations shown, TP had the lowest allowable average daily WWTF flow (1331 gpd) and would therefore dictate the volume of WWTF effluent that could be discharged to the Upper Pond for snow making. If the WWTF effluent concentrations are lower than those shown below, theamount of flow that the WWTF can contribute to snowmaking increases. For example if the WWTF discharges 0.1 mg/L TP, the allowable average daily WWTF volume increases 10 fold to 13,306 gpd.

The above analysis assumes no losses of pollutants due to biodegradation, plant uptake, or complexation in soils. Consequently, since the analysis started out with low target levels that were well below detection and since the analysis did not account for losses (in reality there will be some losses), the maximum allowable seasonal loads in snow from the WWTF shown in Table 4 is not expected to result in an increase in pollutant loads to Bog Pond and should therefore comply with water quality standards.

Table 4 : Maximum Allowable Seasonal WWTF Pollutant Loadings in Snow

Pollutant	Concentration in Bog Pond due to WWTF loadings (mg/L)	Bog Pond Volume (liters)	Maximum Allowable lbs in snow from WWTF per season	Average lbs per day from WWTF assuming 120 days of snowmaking (Nov thru Feb)	Typical Effluent Concentrations achievable with the Enviroquip WWTF (mg/L)	Average daily WWTF flow that could be used for snowmaking (Gallons per day)
TP	0.0025	241616960	1.3	0.011	1	1331
TN	0.15	241616960	79.9	0.666	10	7984
BOD	1	241616960	532.7	4.439	2	266120
TSS	1	241616960	532.7	4.439	2	266120

D-22. Withdrawals:

Surface water and groundwater withdrawals can alter the timing and shape of the natural hydrograph, reduce the flow, volume, depth and surface area of surface waters and increase the duration and area of wetlands exposed to prolonged dry conditions due to reductions in groundwater base flow. These alterations can, in turn, increase the concentration of potentially toxic pollutants due to less dilution, lower ambient dissolved oxygen levels and increase water temperatures due to lower flows and velocities especially during summer low flow periods. Such physical and chemical changes to the aquatic habitat can adversely impact

aquatic biota. Setting limits on the timing of withdrawals, the maximum change in water level, the minimum flow that must remain in surface waters, and maximum allowable withdrawals can minimize the impact of withdrawals on aquatic life to acceptable levels. This is especially important in areas such as the proposed Activity which is located in the headwaters and has a relatively small drainage area (approximately 6.68 square miles to the Bog Pond dam). Table 5 provides a summary of existing and proposed water withdrawals for the proposed Activity including the purpose of the withdrawal, the season, the source of withdrawal, rates of withdrawal, as well as information on how water is returned to the land and potential losses. As shown, withdrawals are proposed for snowmaking, drinking water and irrigation. Overall, withdrawals are expected to significantly increase from approximately 69 million gallons per year (MG/yr) to approximately 164 MG/yr; a 140% increase. Although some will be returned to the land via, drip irrigation, spray irrigation or as snow, there is the potential for losses in groundwater recharge and surface water volume and flow, especially during normal low flow conditions due to plant uptake, transpiration, evaporation, and less opportunity for groundwater recharge.

With regards to drinking water withdrawals, the existing water system consists of a transient non-community water system that serves the base lodge buildings and the maintenance shop. The system consists of a single bedrock well located adjacent to the base lodge that pumps to two cast-in-place concrete atmospheric storage tanks located on the ski slope above the lodge. Water use is highly variable with an estimated average demand of 18,000 gallons per day (gpd) in the winter and approximately 3,000 gpd in the off-season. For future conditions (Phase I), the existing well will remain in operation. In addition, two new overburden production wells located on the northeast corner of the property approximately 1300 feet from Bog Pond were recently permitted for domestic water supply and fire protection with a production volume of 57,599 gpd. Water will be pumped to a booster station and then to an atmospheric storage tank located uphill of the residential development. On a year-round basis, the existing well and two newly approved wells will withdraw a maximum of approximately 24 million gallons per year (MG/year) of groundwater for overall system demand (see Table 5). Compared to existing conditions, this represents an increase of over 700% in annual groundwater withdrawal volume. Much of the groundwater extracted will end up as reclaimed wastewater which the Applicant proposes to treat and reapply to the land via drip irrigation (year round), as snow (winter) and spray irrigation (warmer months) (see section D-21 for information on the proposed plan to reclaim treated wastewater). Though some will be returned to the land, it will be on a different time scale than existing conditions (i.e., may not be available

Table 5: Existing and Proposed Water Withdrawals

Purpose	Existing or Proposed (Phase I)	Season	Source	Average Withdrawal Rates			Return (Discharge back to Groundwater and/or Surface Water)	Comments
				Gallons per Minute (gpm)	Gallons per Day (gpd)	Million Gallons (MG) per Season		
Snow Making	Existing (prior to November 2008)	Nov thru Feb	Gulf Brook to Lower Pond	150.0	216,000	25.9	Snow melt with some losses due to plant uptake, transpiration and evaporation. There is also the potential for less groundwater recharge due to water being converted to snow which will then melt and drain primarily as surface runoff instead of remaining in the ponds where there is more opportunity for infiltration.	Water from Gulf Brook flows by gravity to Lower Pond via a 6 inch pipe with a shutoff. Maximum pumping rate from Lower Pond to Upper Pond is 350 gpm. Used 70 million gallons in 2005-2006. Received wetlands permit on 11/5/08 to pump up to 500 gpm from Bog Pond from November 2008 to the spring of 2009 for snowmaking.
			Groundwater recharge, direct precipitation and flow from Gulf Brook to Lower Pond which is then pumped to the Upper Pond which also receives water from groundwater, direct precipitation and runoff.	156.7	225,667	27.1		
			Total	306.7	441,667	53.0		
	Phase 1	Nov thru Feb	Withdrawal from Bog Pond which is then pumped to Lower Pond and then to Upper Pond. Groundwater and direct precipitation help replenish all ponds. In addition Bog Pond receives surface runoff and the Upper Pond can receive treated wastewater.	694.4	1,000,000	120.0	Same as above	Maximum requested pumping rate from Bog Pond is 1150 gpm. Diversion ditch to be constructed at Upper Pond to divert runoff away from pond. Existing pumping capacity from Lower Pond to Upper Pond to be increased at some point in future from 350 gpm to 1500 - 2000 gpm. Gulf Brook withdrawal to be eliminated.
				% increase over Existing		126%		
Drinking Water	Existing	Nov thru Feb	Groundwater - Bedrock Well	12.5	18,000	2.16	Groundwater via subsurface system	Serves 2 base lodge buildings and the maintenance shop. Peak demand estimated
		Mar thru Oct	Groundwater - Bedrock Well	2.1	3,000	0.74		
			Total	5.5	7,932	2.90		
	Phase 1	Nov thru Feb	Groundwater - Existing Bedrock Well	12.5	18,000	2.16		
		Mar thru Oct	Groundwater - Existing Bedrock Well	2.1	3,000	0.74		
		Jan thru Dec	Groundwater - 2 new overburden wells	40.0	57,599	21.02		
			Total	45.5	65,531	23.9		
				% increase over Existing		726%		
Irrigation	Existing	mid May to early Oct (~ 130 days)	Upper Pond is replenished with groundwater, direct precipitation and water pumped from Lower Pond.	18.5	26,709	3.5	Potential for losses in groundwater recharge due to plant uptake, transpiration and evaporation	Upper Pond serves 5 golf course holes
			Lower Pond is replenished with groundwater, direct precipitation and water from Upper Pond (gravity feed).	48.2	69,444	9.0		Lower Pond serves 13 golf course holes
			Total	66.8	96,154	12.5		Water from Lower Pond can be pumped to Upper Pond. Water from Upper Pond can flow by gravity to Lower Pond (this is used rarely).
	Phase 1	mid May to early Oct (~ 130 days)	Upper Pond is replenished with groundwater, direct precipitation, treated wastewater and water pumped from Lower Pond. Lower Pond is replenished with groundwater, direct precipitation and water from Upper Pond (gravity feed). Upper Pond will be the primary source of irrigation.	106.8	153,846	20	Potential for losses in groundwater recharge due to plant uptake, transpiration and evaporation	Peak demand of ~ 220,000 gpd during 3-4 driest weeks. Diversion ditch to be constructed at Upper Pond to divert runoff away from pond.Water from Lower Pond can be pumped to Upper Pond. Water from Upper Pond can flow by gravity to Lower Pond (this is used rarely).
				% increase over Existing		60%		
Totals	Existing			379.0	545,752	68.4		
	Phase 1			846.8	1,219,377	163.9		
				% increase over Existing		140%		

during low flow conditions), and not all will be returned due to plant uptake, transpiration, evaporation and/or snow melt with rapid runoff and less opportunity for infiltration.

On June 3, 2009, the Applicant was issued an approval for two small community wells by the DES Drinking Water and Groundwater Bureau and has conducted pumping tests for the two new wells in accordance with Env-Dw 302.11, Proposal for Pumping Test Program of large production well rules. According to Stephen Roy, P.G., of the Drinking Water and Groundwater Bureau, although the production volume requested by the Applicant (57,599 gpd) does not strictly meet the definition of a large groundwater withdrawal (57,600 gpd), due to the water system design criteria in NH that require community systems to develop twice (2X) their expected source capacity needs, the system was held to the same testing criteria and metrics as the large community production well / large groundwater withdrawal programs. This includes addressing the impact evaluation criteria stipulated in RSA 485-C:21 V-c (f) and (g) of the Groundwater Protection Act which state that no large groundwater withdrawal shall reduce surface water levels or flows that will, or do, cause a violation of surface water quality rules adopted by DES, or cause a net loss of values of submerged lands under tidal and fresh waters and its wetlands as set forth in RSA 482-A. Consequently, the drinking water withdrawal permit issued by the DES Drinking Water and Groundwater Bureau includes long-term monitoring provisions to ensure that withdrawals from the two new drinking water wells do not violate surface water quality standards (Env-Wq 1700) and do not cause a net loss of values of submerged land and its wetlands. Long-term monitoring provisions include additional wetland monitoring near the influence area of the wells, shallow groundwater table monitoring near wells and brooks and a use restriction on the wells themselves to minimize their influence on shallow groundwater levels. For purposes of reporting and review efficiency, the well monitoring provisions will be incorporated into the monitoring and reporting program of the wetland mitigation plan for the site.

In addition, and as a related matter, prior to obtaining approval for the new community wells, the Applicant submitted and received DES approval on August 4, 2008 of a water conservation plan specifically pertaining to the operation of the community water system. In general the water conservation plan covers the installation of water meters, water accounting, leak detection and repair, pressure management, a conservation based rate structure and an outreach program. In accordance with Env-Wq 2101, the Applicant will also need to submit and receive DES approval of a water conservation plan for all other withdrawals including those for snowmaking and irrigation (see sections C-19 and C-20 of this 401 Certification).

With regards to snowmaking withdrawals, it is estimated that after the completion of Phase I, approximately 120 million gallons (MG) will be needed to make snow from November 1 through the end of February. Compared to existing conditions (approximately 53 MG) this represents a

126 percent increase in water needed for snowmaking. Under current conditions (prior to November 2008), water for snowmaking is supplied from the Lower and Upper Pond. Both ponds are partially replenished by direct precipitation and groundwater. In addition the Lower Pond is supplied with water from Gulf Brook via a 6 inch gravity pipe at an estimated rate of 150 gallons per minute (gpm). The Upper Pond is also supplied by water pumped from the Lower Pond (at a maximum rate of 350 gpm) and surface water runoff from the upstream watershed (97.8 acres).

On November 5, 2008 the Applicant received Wetlands Permit 2007-02879 to temporarily impact 11,500 square feet of wetlands for installation of a water withdrawal pipe from Bog Pond to the Lower Pond for the snowmaking. The permit included minimum flow requirements over the Bog Pond dam, a maximum withdrawal rate of 500 gpm and, per the request of the NH Fish and Game Department to protect hibernating reptiles and amphibians, cessation of pumping if the water level at the Ragged Mountain Road culvert fell 4 or more inches below the level recorded between October 27 and November 8, 2009. To maintain the minimum flow downstream of the Bog Pond dam, the permit called for the pumping to be reduced or for water to be released from storage upstream of the Bog Pond dam (i.e., via removal of stop logs) provided that the water level requirements at the Ragged Mountain Road culvert are maintained. The permit also states that the approval is for a one year water withdrawal (interpreted to be from November 2008 to spring 2009) and shall not be used on an annual basis.

In accordance with the Wetland Permit 2007-02879, the Applicant submitted a report with the 401 Application summarizing water withdrawal from Bog Pond, flow and pond stage data for the 2008 and early 2009 snowmaking season. Overall it was estimated that withdrawal volumes during the study period ranged from 150 to 375 gallons per minute (gpm) with an average of approximately 325 gpm. Several problems were encountered during the study including 1) ice buildup that blocked the intake pipe several times and resulted in surging making it impractical to accurately measure flow, and 2) unsafe ice conditions at the Ragged Mountain culvert which made it unsafe to measure water levels by hand and resulted in installation of an automated data collector at the culvert on January 23, 2009. In addition, flow over the dam was estimated using a sharp crested weir equation assuming all flashboards were in place and no stop logs were removed. Due to the high sensitivity of flow to slight changes in stage and dam geometry, the calculated flows are considered estimates. Further, according to staff in the DES Dam Bureau (email from Dan Mattaini on June 2, 2009), the sharp crested weir equation most likely overestimates flow by 10 to 20 percent at low flows (i.e., when the depth over the flashboards is less than approximately 0.2 feet). Since the existing equation is not considered accurate for low flows, and since the

equation would have to be adjusted if stop logs are removed (which could introduce more error) it is recommended that a more accurate method of flow measurement be developed such as measurement of flow in a stable channel section just downstream of the dam. This would require accurate readings of flow and depth on several occasions to develop a stage discharge curve and would not require adjustment of the stage discharge curve if stop logs were removed from the upstream dam. Because of the sensitivity of flow to depth, water level measurements should be taken and recorded with an automated data collector. On September 26, 2009 the Applicant's engineer measured flow in the channel just downstream of the dam as well as at the dam using the weir equation. Flow in the channel was estimated to be 1.69 cfs which was much lower than the calculated flow at the dam using the weir equation of 4.1 cfs. This further supports the need to develop a more accurate method of measuring flow from the dam.

On September 1, 2009, the DES Wetlands Bureau issued a second amendment to permit number 2007-02879 to allow operation of the temporary withdrawal pipe in the winter of 2009/2010. For future years, the Applicant must first obtain the approval of the DES Watershed Bureau. The second amendment includes provisions to 1) monitor flow and water level at the Ragged Mountain Road culvert and at the concrete culvert below the Bog Pond dam, 2) to maintain a minimum flow of 3.4 cfs (Winter Q80) over the dam from January 1, 2010 to March 14, 2010, 3) to limit the maximum pumping rate for snowmaking to 500 gpm, 4) to cease pumping when the water level under Ragged Mountain Road falls 4 inches below the level recorded between October 27 and November 8, 2010 or if the minimum flow over the dam falls below 3.4 cfs, and 4) to submit weekly reports to DES and NH Fish and Game Department. Operation of the temporary withdrawal pipe for snowmaking in accordance with Wetlands Permit number 2007-02879 is allowed until the permit expires or until a permanent withdrawal pipe and associated infrastructure is constructed (see below), whichever is first. The intent is to operate the temporary withdrawal pipe for as few years as possible.

For Phase I, water for snowmaking will continue to be drawn from the Upper Pond for the period November 1 through February but with upgraded infrastructure (ie., permanent withdrawal infrastructure as described below). The Upper Pond will be supplied with water from groundwater, direct precipitation, treated wastewater pumped from the wastewater treatment facility, and water pumped from the Lower Pond. Diversion ditches will be installed upstream of the Upper Pond to direct surface runoff away from the Pond in order to allow more storage for treated wastewater. Water from the Lower Pond can currently be pumped to the Upper Pond at a maximum rate of approximately 350 gpm however the Applicant plans to increase the pumping capacity to 1500 – 2000 gpm in the future. Water in the Lower Pond will be replenished with

groundwater, direct precipitation, and water pumped directly from Bog Pond at a maximum rate of 1150 gpm The existing surface water withdrawal from Gulf Brook to the Lower Pond (approximately 150 gpm) will be eliminated.

With regards to spray irrigation, and as shown in Table 5, it is estimated that after completion of Phase I, approximately 20 million gallons (MG) will be needed to spray irrigate the golf course from mid-May to early October. Compared to existing conditions (approximately 12.5 MG) this represents a 60 percent increase in water needed for irrigation. Under current conditions water for spray irrigation is supplied from the Lower and Upper Pond. Five golf course holes are irrigated with water from the Upper Pond and the remaining 13 holes are irrigated with water from the Lower Pond. Both ponds are partially replenished by direct precipitation and groundwater. The Upper Pond is also supplied by water pumped from the Lower Pond [at a maximum rate of 350 gallons per minute (gpm)] and surface water runoff from the upstream watershed (97.8 acres). Water can also flow by gravity through a pipe from the Upper Pond to the Lower Pond however this is used only on rare occasions when it is necessary to fill the Lower Pond for aesthetic purposes.

For Phase I, the Applicant proposes to continue using both the Upper and Lower Pond for spray irrigation but plans to make the Upper Pond the primary source. Water in the Lower Pond will be replenished per current conditions described above. Water in the Upper Pond will be replenished via groundwater, direct precipitation, water pumped from the Lower Pond and treated wastewater pumped from the wastewater treatment plant. As previously mentioned in the snowmaking discussion, diversion ditches will be constructed to divert surface water runoff away from the Upper Pond to provide more storage for treated wastewater.

As previously discussed in this section, the drinking water withdrawal permit recently issued by the DES Drinking Water and Protection Bureau for the two new small community wells includes long-term monitoring provisions to ensure that withdrawals from the two new wells do not violate surface water quality standards (Env-Wq 1700) and do not cause a net loss of values of submerged land and its wetlands. Withdrawals for snowmaking and spray irrigation, however, require conditions in this 401 Certification to ensure that water quality standards for the protection of aquatic life are not violated due to physical and/or chemical changes in aquatic habitat caused by reductions in flow, volume and/or water surface elevations and increased frequency of the same.

With regards to minimum water surface elevations associated with the permanent withdrawal structure, the NH Fish and Game Department (NHFGD) requires cessation of pumping from Bog Pond for snowmaking (November through February) if the water level in Bog Pond at the Ragged

Mountain Road culvert falls 4 or more inches below the average level for that year based on daily measurements recorded between September 1st through November 15th (or such other period as determined by the NHFGD and DES). The primary purpose of this requirement is to protect hibernating amphibians and reptiles. During the measurement period described above and the remaining months (March through October) the NHFGD would like to see the flashboards and stop logs at the Bog Pond Dam remain in place to protect the upstream wetlands vegetation unless there is a specified need for water drawdown for management purposes To protect aquatic life downstream, it will be necessary to pass some minimum flow downstream at all times even when water elevations drop below the elevations desired by the NHFGD.

The NHFGD is also concerned about aquatic life being sucked into the permanent withdrawal snowmaking intake pipe in Bog Pond and wants the opportunity to review the design to ensure that intake velocities and screen openings are sufficient to protect aquatic life.

Although the Upper and Lower ponds are not considered surface waters of the State, preventing the water surface elevations in the ponds from being drawn down too low for extended periods is important to protect and prevent the drying out and degradation of adjacent surface waters of the state (i.e., including wetlands). Such non-natural lowering of the water table can adversely impact hibernating amphibians and reptiles, and eliminate or alter the species of aquatic vegetation. To ensure that the withdrawals from the Upper and Lower ponds do not result in any surface water quality violations or a net loss in the function and value of wetlands, monitoring of adjacent jurisdictional surface waters of the state (which includes wetlands) and a representative reference area can be conducted.

To determine minimum flows necessary for the protection of aquatic life downstream of the Bog Pond dam when the permanent withdrawal is operational, guidance [9] developed by DES was used. The guidance is based on the Natural Flow Paradigm (NFP)[10] which recognizes that the best environmental flows for aquatic life are flows with natural variability of unregulated, undiverted streams, but that within this variability there is room for off-stream water use. The guidance includes three methods which, in order of increasing complexity, include the New England Aquatic Base Flow Policy Method (NEABF), the November 2000 Modified Method (N2K) and the Instream Flow Incremental Method (IFIM). Each of the three assessment methods provides an estimate of natural flow conditions or allowed deviations from natural.

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9 *Methods for Estimating Instream Flow Requirements for Protection of Aquatic Life, Guidance Document 401 Water Quality Certification Program.* NH Department of Environmental Services. January 20, 2009.
10 The Natural Flow Regime. Bioscience Vol 47, No. 11; pp 769-783. Methods for Estimating Instream Flow Requirements for Protection of Aquatic Life.

The NEABF could not be used because it should only be applied to watersheds greater than 50 square miles (the watershed to the Bog Pond dam is only 6.68 square miles). The IFIM method, which is the most complex, is a river segment specific incremental modeling method requiring significant time and effort that is applicable in cases where the NEABF and N2K methods are not applicable, long term criteria for a river segment is warranted and there is sufficient time and funding available. For this project the N2K method was applicable so it was not necessary to use the IFIM.

The N2K method is a desktop, standard setting method to estimate water availability values from historical daily hydrologic data and is applicable for watersheds between 3.26 and 689 square miles. As described in the guidance, it is first necessary to determine flows that are exceeded 60 percent (Q60), 80 percent (Q80) and 90 percent (Q90) of the time for the winter (January – March 15), spring (March 16 – June 30), summer (July 1 – October 31) and fall (November 1 – December 31) seasons. It is also necessary to determine the average 7 day low flow that occurs, on the average, once every 10 years (the 7Q10). For each season minimum allowable flow and water availability for each of four "Phase Conditions" is determined in accordance with the criteria shown in Table 6.

Table 6: N2K Method Minimum Flow and Water Availability Criteria

	Phase Condition	Minimum Allowable Flow at Compliance Measuring Point	Water Availability
Above seasonal Q60	Cap	Stream flow minus 8% stream flow	8% stream flow
Below seasonal Q60	Phase I	Stream flow minus 4% of seasonal Q60 flow	4% of seasonal Q60 flow
Below seasonal Q80	Phase II	Stream flow minus 2% of seasonal Q80 flow	2% of seasonal Q80 flow
Below seasonal Q90	Phase III	Stream flow minus 5% of annual 7Q10 flow	5% of annual 7Q10 flow

According to the N2K Method, when flow is below a phase conditions Q-value for more than four days, on the following day that phase's minimum flow conditions are set for the next 10 days. If a more restrictive phase condition persists for more than four days, on the following day the more restrictive phase condition minimum flows are then set for the next 10 days. If during a 10 day event period, the flow has been greater than or equal to 1.5 times the applicable phase for four consecutive days, the limits are rescinded on the following day.

A description of how the seasonal minimum flows for each Phase condition was determined for this Activity is included in a July 1, 2009 memorandum by Wayne Ives of DES. In general, seasonal and annual flow statistics were generated using regression analysis software created by USGS known as the Automated Streamflow Frequency Recharge Estimation Tool

for Streams and Watersheds in New Hampshire. Flows were determined at the Bog Pond dam (i.e., the compliance measuring point). Results are shown in Table 7. The 7Q10 at the Bog Pond Dam is 0.18 cfs. As shown seasonal flows during the summer months are quite low (i.e., 0.43 to 1.26 cfs). As will be discussed, minimum required flows over the dam will be even less. This emphasizes the need for an accurate means of measuring flow over the dam. As previously discussed in this section, the method used to measure flow over the dam during the 2008/2009 snowmaking withdrawal study is not considered accurate, especially at low flows.

Table 7: Flow Statistics at the Bog Pond Dam

Season	% Time Flow is Exceeded	Flow (cfs)
Winter (1/1-3/15)	60	4.71
Spring (3/16 – 6/30)	60	15.85
Summer (7/1 – 10/31)	60	1.26
Fall (11/1 – 12/31)	60	6.81
Winter (1/1-3/15)	80	3.38
Spring (3/16 – 6/30)	80	9.2
Summer (7/1 – 10/31)	80	0.67
Fall (11/1 – 12/31)	80	4.27
Winter (1/1-3/15)	90	2.53
Spring (3/16 – 6/30)	90	6.33
Summer (7/1 – 10/31)	90	0.43
Fall (11/1 – 12/31)	90	2.99

Daily flow measurements in the Bog Pond watershed are needed to determine the appropriate Phase Condition. Since there are no gages in the upstream watershed, a local gage with similar drainage area and elevation (i.e., the Cockermouth River gage below Hardy Brook in Groton, NH - USGS 010780000) was selected as the surrogate for the Bog Pond Dam. Daily flows at the Cockermouth River gage, which is approximately 13 miles from the proposed Activity, are available on-line (http://waterdata.usgs.gov/nh/nwis/uv/?site_no=01077400&PARAmeter_cd=00065,00060) and can be transposed to the Bog Pond Dam using the area ratio method. The drainage area to the Cockermouth River gage is 21.4 square miles and the Bog Pond dam watershed is 6.68 square miles.

Based on the discussion above, seasonal flows and equations for determining the minimum allowable flow at the Bog Pond Dam for each Phase Condition and season are shown in Table 8.

Table 8: Minimum Flow Requirements at the Bog Pond Dam and Maximum Withdrawal based on the N2K Method:

Season	Flow Thresholds at Cockermouth River Gage (Q_{CMR}) for Determining Phase Condition	Minimum Required Flow (cfs) over the Bog Pond Dam ($Q_{Bog\ Min}$) (see notes)	Phase Condition (see notes)
Winter (1/1-3/15)	For Q_{CMR} > 15.09 cfs	$Q_{Bog\ Min}$ = 0.92 *(Q_{CMR} * 6.68 / 21.4)	Cap
	For $Q_{CMR} \leq$ 15.09 cfs but > 10.83 cfs,	$Q_{Bog\ Min}$ = (Q_{CMR} * 6.68 / 21.4) - (0.04 * 4.71)	Phase I
	For $Q_{CMR} \leq$ 10.83 cfs but > 8.11 cfs,	$Q_{Bog\ Min}$ = (Q_{CMR} * 6.68 / 21.4) - (0.02 * 3.38)	Phase II
	For $Q_{CMR} \leq$ 32.50 cfs,	$Q_{Bog\ Min}$ = (Q_{CMR} * 6.68 / 21.4) - (0.05 * 0.18)	Phase III
Spring (3/16-6/30)	For Q_{CMR} > 50.78 cfs,	$Q_{Bog\ Min}$ = 0.92 *(Q_{CMR} * 6.68 / 21.4)	Cap
	For $Q_{CMR} \leq$ 50.78 cfs but > 29.47 cfs,	$Q_{Bog\ Min}$ = (Q_{CMR} * 6.68 / 21.4) - (0.04 * 15.85)	Phase I
	For $Q_{CMR} \leq$ 29.47 cfs but > 20.28 cfs,	$Q_{Bog\ Min}$ = (Q_{CMR} * 6.68 / 21.4) - (0.02 * 9.2)	Phase II
	For $Q_{CMR} \leq$ 20.28 cfs,	$Q_{Bog\ Min}$ = (Q_{CMR} * 6.68 / 21.4) - (0.05 * 0.18)	Phase III
Summer (7/1-10/31)	For Q_{CMR} > 4.04 cfs,	$Q_{Bog\ Min}$ = 0.92 *(Q_{CMR} * 6.68 / 21.4)	Cap
	For $Q_{CMR} \leq$ 4.04 cfs but > 2.15 cfs,	$Q_{Bog\ Min}$ = (Q_{CMR} * 6.68 / 21.4) - (0.04 * 1.26)	Phase I
	For $Q_{CMR} \leq$ 2.15 cfs but > 1.38 cfs,	$Q_{Bog\ Min}$ = (Q_{CMR} * 6.68 / 21.4) - (0.02 * 0.67)	Phase II
	For $Q_{CMR} \leq$ 1.38 cfs,	$Q_{Bog\ Min}$ = (Q_{CMR} * 6.68 / 21.4) - (0.05 * 0.18)	Phase III
Fall (11/1-12/31)	For Q_{CMR} > 21.82 cfs,	$Q_{Bog\ Min}$ = 0.92 *(Q_{CMR} * 6.68 / 21.4)	Cap
	For $Q_{CMR} \leq$ 21.82 cfs but > 13.68 cfs,	$Q_{Bog\ Min}$ = (Q_{CMR} * 6.68 / 21.4) - (0.04 * 6.81)	Phase I
	For $Q_{CMR} \leq$ 13.68 cfs but > 9.58 cfs,	$Q_{Bog\ Min}$ = (Q_{CMR} * 6.68 / 21.4) - (0.02 * 4.27)	Phase II
	For $Q_{CMR} \leq$ 9.58 cfs,	$Q_{Bog\ Min}$ = (Q_{CMR} * 6.68 / 21.4) - (0.05 * 0.18)	Phase III

Establishing conditions that require maintenance of the minimum flowsat the Bog Pond dam will protect aquatic life downstream of the dam. However, as previously discussed, the NHFGD has established minimum pond elevations to protect adjacent wetland vegetation during the warm weather months and hibernating amphibians and reptiles during the cold weather months. The intent is to keep water surface elevationsin Bog Pond at or above these levels as frequently as possible. To balance the need to protect aquatic biota both downstream (by maintaining minimum flows) and upstream (by maintaining water levels at or above the NHFGD target pond water surface elevations), a requirement to pass a relatively low flow, such as the Q98 (i.e., flow that is exceeded 98 percent of the time) for the rare times when water surface elevations may fall below the NHFGD target levels can be established. Setting the minimum pond outflow at a relatively low flow will slow the rate at which the pond would continue to drain and drop in elevation and will shorten the time to refill the pond when wet weather returns. Although the Q98 may be below the minimum flow shown in Table 8, it is not expected to harm aquatic life downstream because it is expected to occur very infrequently and for relatively short periods of time. Once the pond refills above the target elevations, the minimum flows shown in Table 8 would resume. Seasonal Q98 flows at the Bog Pond Dam are shown in Table 9

Table 9: Seasonal Q98 flows at the Bog Pond Dam

Season	Q98 (cfs)
Winter (1/1-3/15)	1.6
Spring (3/16 – 6/30)	3.26
Summer (7/1 – 10/31)	0.25
Fall (11/1 – 12/31)	1.44

In addition to the above, it is also necessary to restrict or cease certain withdrawals when downstream flows or minimum target water surface elevations in Bog Pond cannot be met. All withdrawals that are likely to influence Bog Pond water surface elevations during low flow conditions should cease or be restricted during this time. To determine which withdrawals should be restricted, a study can be done to quantify the extent to which withdrawals will influence Bog Pond during low flow conditions.

D-23. Confirmation that operation of the Activity does not cause or contribute to surface water quality violations can be determined by development and implementation of a surface water monitoring plan with appropriate quality assurance/ quality control provisions

D-24. As stated in section C-20 of the 401 Certification, the Applicant is to prepare and submit a water conservation plan in accordance with Env-Wq 2101. A water conservation plan has not yet been received by DES. Implementation of the Water Conservation Plan will help minimize the impact of water withdrawals on the natural hydrology.

E. WATER QUALITY CERTIFICATION CONDITIONS

Unless otherwise authorized by DES, the Applicant shall comply with the following conditions:

E-1. The Activity shall not cause or contribute to a violation of surface water quality standards. If DES determines that surface water quality standards are being violated as a result of the Activity, DES may modify this 401 Certification to include additional conditions to ensure the Activity complies with surface water quality standards, when authorized by law, and after notice and opportunity for appeal in accordance with section F of this 401 Certification.

E-2. 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 401 Certification.

E-3. The Applicant shall consult with DES regarding any proposed modifications to the Activity, including construction or operation, to determine whether this 401 Certification requires modification in the future.

E-4. The Applicant shall comply with the conditions of the DES Wetlands Bureau permits issued for the Activity by the DES Wetlands Bureau, including any amendments. The conditions shall become conditions of this 401 Certification upon issuance of this 401 Certification.

E-5. Operation of the existing temporary Bog Pond withdrawal pipe for snowmaking shall be in accordance with Wetlands Permit number 2007-02879, including any amendments, until the wetlands permit expires or until a permanent Bog Pond withdrawal pipe and associated infrastructure (see section D-22 of this Certification) is constructed, whichever is first.

E-6. The Applicant shall comply with the conditions of the DES Alteration of Terrain Program Permit issued for the Activity by the DES Terrain Alteration Bureau, including any amendments. The conditions shall become conditions of this 401 Certification upon issuance of this 401 Certification provided they are more stringent than stormwater requirements specified in this 401 Certification. This 401 Certification approval is contingent upon issuance of the DES Alteration of Terrain Program permit.

E-7. The Applicant shall comply with the conditions of the DES Groundwater Discharge Permit for the Activity's wastewater treatment system issued by the DES Drinking Water and Groundwater Bureau, including any amendments. The conditions shall become conditions of this 401 Certification upon issuance of this 401 Certification. This 401 Certification approval is contingent upon issuance of the DES Groundwater Discharge permit.

E-8. The Applicant shall comply with the conditions of the DES conditional approval of two small community wells and associated water conservation plan for the drinking water system (DES # 999060) by the DES Drinking Water and Groundwater Bureau, including any amendments. The conditions shall become conditions of this 401 Certification upon issuance of this 401 Certification.

E-9. Prior to construction, the applicant shall submit a plan to DES for approval, to verify that the withdrawals from the Upper and Lower ponds do not result in any surface water quality violations or a net loss in the function and value of wetlands. The plan shall include, but not be limited to, monitoring of adjacent jurisdictional surface waters of the state (which includes wetlands) and a representative reference area. The Applicant shall then implement the approved plan. Should any violations of water quality or net loss in the function and value of wetlands be found, the Applicant shall, within 30 days of being notified by DES, submit a plan to DES for approval to reduce withdrawals at the Upper and Lower ponds to comply with water quality standards and to restore any wetlands which

have experienced a net loss in function or value. The Applicant shall then implement the approved plan.

E-10. Bog Pond Withdrawal Conditions (the following conditions apply to the proposed "permanent" withdrawal discussed in section D-22 of this Certification and not to the existing temporary Bog Pond withdrawal discussed in condition E-5 of this Certification):

a. Prior to construction of any portion of Phase I (which includes the permanent Bog Pond withdrawal pipe and associated infrastructure for snowmaking), the Applicant shall submit a report to DES (i.e., Impact of Withdrawals on Bog Pond Report, and receive DES approval of the report, that quantifies the impact of all existing and proposed withdrawals on Bog Pond water surface elevations and flows during low flow conditions and provides recommendations for restrictions on such withdrawals during low flow conditions.

b. Prior to construction of any portion of Phase I (which includes the permanent Bog Pond withdrawal pipe and associated infrastructure for snowmaking), the Applicant shall submit and obtain DES approval of a Water Conservation Plan for all applicable withdrawals, including those for snowmaking and irrigation, in accordance with Env-Wq 2101. The Applicant shall then implement the approved plan.

c. Prior to construction of any portion of Phase I (which includes the permanent Bog Pond withdrawal pipe and associated infrastructure for snowmaking), the Applicant shall submit a plan to DES for approval, and then implement the approved plan, for permanently eliminating the existing Gulf Brook withdrawal.

d. Prior to construction of any portion of Phase I (which includes the permanent Bog Pond withdrawal pipe and associated infrastructure for snowmaking), the Applicant shall obtain approval from the NH Fish and Game Department and DES of the intake structure to withdraw water from Bog Pond for snowmaking and then construct the approved intake structure.

e. Withdrawals from Bog Pond for snowmaking shall only occur from November 1 through February (i.e., the snowmaking season) and at a maximum pumping rate of 1150 gallons per minute.

f. Unless otherwise directed by the NH Fish and Game Department, the target minimum water surface elevation in Bog Pond during the snowmaking season shall be four inches below the average of daily readings measured at the Ragged Mountain Road culvert between September 1st and November 15th (inclusive). The Applicant shall determine this target minimum water surface elevation each year. Should the water surface elevation in Bog Pond fall below this target level, all snowmaking withdrawals from Bog Pond shall immediately cease and not resume until the water surface elevation in Bog Pond is once again above the minimum target level.

g. During the period March 1st through November 15th, the water surface elevation in Bog Pond shall be kept at or above the existing flashboard elevations as frequently as possible. Should the watersurface elevation in Bog Pond fall below this level at any timeduring this period, withdrawals shall immediately cease and/or be restricted in accordance with the DES approved "Impact of Withdrawals on Bog Pond Report" (see condition E-10a of this 401 Certification). The withdrawal restrictions shall remain in effect until the water surface elevation in Bog Pond is once again above the minimum target level.

h. Unless otherwise authorized by DES, minimum flows over the Bog Pond Dam shall be in accordance with sectionD-22, Table 8 of this 401 Certification and the following:

1) The Phase Condition for determining which minimum flow applies shall be based on the flow at the Cockermouth River gage (Q_{CMR}) and shall remain in effect for at least 10 days with the following exceptions:

a) If during the 10 day period, Q_{CMR} flows decrease and fall within the range of a more restrictive Phase Condition (i.e., the Phase II Condition is more restrictive than the Phase I Condition) and persist for at least 4 consecutive days, then the minimum flow requirements at the Bog Pond Dam ($Q_{Bog\ Min}$) specified in Table 8 for the more restrictive Phase Condition shall become effective on the following day, which shall be the first day of a new 10 day evaluation period.

b) If during the 10 day period, Q_{CMR} flows increase and exceed the product of the flow threshold for the next least restrictive Phase Condition multiplied by 1.5, for at least 4 consecutive days, the minimum flow requirements at the Bog Pond Dam ($Q_{Bog\ Min}$) specified in Table 8 for the next least restrictive Phase Condition shall become effective on the following day, which shall be the first day of a new 10 day evaluation period.

c) If during the 10 day period, conditions 1) a) or 1) b) do not occur, the Phase Condition and minimum flow requirements at the Bog Pond Dam ($Q_{Bog\ Min}$) specified in Table 8 shall be based on the Q_{CMR} flow on the 10th day. This Phase Condition shall become effective on the following day, which shall be the first day of a new 10 day evaluation period.

2) If the water surface elevation in Bog Pond falls below the minimum described in conditions E-10f and E-10g, flow passing over the dam shall be as close to but no less than the appropriate Q98 flow specified in section 0, Table 9 of this 401 Certification. This 401 Certification is based on the premise that water surface elevations in Bog Pond very rarely fall below the minimum levels described in E-10f and E-10g.

Should operation of the Activity indicate that this is not the case, the Applicant shall, within 30 days of being notified by DES, submit a plan to DES for approval to reduce the frequency of water surface elevation excursions to acceptable levels by making adjustments to its dam operation and /or withdrawals. The Applicant shall then implement the approved plan.

i. If the measured flow over the Bog Pond dam is less than the minimum flow required at the Bog Pond Dam ($Q_{Bog\ Min}$) specified in condition E-10h of this 401 Certification, all withdrawals from the Activity shall immediately cease and/or be restricted in accordance with the DES approved "Impact of Withdrawals on Bog Pond Report" (see condition E-10a of this 401 Certification). The withdrawal restrictions shall remain in effect until the minimum required flow at the Bog Pond Dam ($Q_{Bog\ Min}$) is passed for at least 4 consecutive days.

E-11. Prior to construction of any portion of Phase I (which includes the permanent Bog Pond withdrawal pipe and associated infrastructure for snowmaking), the Applicant shall submit a Bog Pond Operations Plan to DES for approval, and then implement the approved plan. The plan shall describe how compliance with the minimum flow, minimum water surface elevation and withdrawal conditions specified in Condition E-10 of this 401 Certification will be accomplished. Unless otherwise authorized by DES, the plan shall include, but not be limited, to the following:

a. How the water level at the Ragged Mountain Road culvert will be automatically measured and recorded on a continuous basis during the snowmaking season (November through February), including corrections to account for inaccuracies due to factors such as ice buildup in the winter;

b. How the minimum allowable water level in Bog Pond at the Ragged Mountain Road culvert during the snowmaking season (November through February) will be determined;

c. How inspections will be conducted and records of such inspections kept to identify and remove (after receiving all necessary approvals) any obstructions in Bog Pond (i.e., including, but not limited to, beaver dams) that could impact minimum flows or water surface elevations in Bog Pond;

d. How the flow at the Bog Pond dam (preferably at a point just downstream of the dam that has a stable channel configuration) will be automatically measured and recorded on a continuous basis including corrections to account for inaccuracies due to factors such as ice buildup in the winter;

e. How the water surface elevation at the Bog Pond Dam will be automatically measured and recorded on a continuous basis and

compared for compliance with minimum target water surface elevations;

f. How flows at the Cockermouth River gage will be tracked and recorded to determine the appropriate Phase Condition and minimum required flows over the Bog Pond dam;

g. How the volume for each of the Activity's withdrawals will be automatically determined and recorded on a continuous basis.

h. How DES will be notified within 24 hours of any non-compliance with this 401 Certification and of actions taken to get back into compliance;

i. How records will be kept and an annual compliance report will be submitted to DES as specified in condition E-12 of this 401 Certification.

E-12. The Applicant shall maintain daily records of the information specified in condition E-11 of this 401 Certification, and submit this information to DES within 30 days of receiving a request from DES. Unless otherwise directed by DES, the Applicant shall submit a compliance report by May 15th of each year for the period April (of the previous year) through March that summarizes compliance with the required minimum flow, water surface elevations, withdrawal restrictions, any periods of non-compliance and actions taken to get back into compliance.

E-13. Wastewater Treatment Facility Effluent limits for the proposed WWTF shall be no less stringent than the following: BOD5 = 6 mg/L, TSS = 6 mg/L, TN = 13 mg/L, TP = 1 mg/L, NH3 = 1 mg/L and maximum daily fecal coliform = 14 counts/100 mL.

E-14. Only the Upper Pond shall be allowed to receive treated WWTF effluent. No treated WWTF effluent shall be allowed in the Lower Pond.

E-15. When the Upper Pond contains treated WWTF effluent it shall not be allowed to overflow and discharge directly to surface waters.

E-16. Treated wastewater applied to the land via drip or spray irrigation shall not be applied within 50 feet of any surface water.

E-17. If the Upper Pond is used for snowmaking, and if treated wastewater is applied to the Upper Pond during the snowmaking season (November through February) the concentration of blended treated effluent in the Upper Pond during the snowmaking season shall not exceed the limits shown in section D-21, Table 3 of this 401 Certification. If limits are exceeded, no additional discharges of treated WWTF effluent shall be allowed into the Upper Pond until concentrations in the Upper Pond once again meet the limits shown in Table 3.

E-18. The maximum total seasonal load of TP, TN, BOD5 and TSS in snow from treated WWTF effluent shall not exceed the limits shown in section D-21 Table 4 of this 401 Certification.

E-19. Prior to construction of the WWTF, the Applicant shall submit a plan to DES for approval, and then implement the approved plan, to monitor and document pollutant concentrations in the Upper Pond and for controlling discharges from the WWTF to ensure compliance with conditions E-13 through E-18 of this 401 Certification.

E-20. All construction related and permanent stormwater control measures shall be designed and constructed in accordance with the current Alteration of Terrain permit regulations (Env-Wq 1500, effective January 1, 2009).

E-21. Unless otherwise authorized by DES, the Applicant shall keep a sufficient quantity of erosion control supplies on the site at all times during construction to facilitate an expeditious (i.e., within 24 hour) response to any construction related erosion issues on the site.

E-22. The Applicant shall develop and submit a Construction BMP Inspection and Maintenance Plan to DES for approval at least 90 days prior to construction. Unless otherwise authorized by DES, the plan shall incorporate all elements described in section D-14 (items A through L) of this 401 Certification. The Applicant shall then implement the approved plan.

E-23. The Applicant shall prepare a turbidity sampling plan to confirm that measures to control erosion during construction are not causing or contributing to surface water quality violations. Unless otherwise authorized by DES, the turbidity sampling plan shall include the turbidity monitoring elements specified in the February 2, 2009 DES Inter-Department Communication entitled "Amendment of the November 16, 2006 Guidance for BMP Inspection and Maintenance and Turbidity Sampling and Analysis Plans for I-93 Expansion Project Water Quality Certification" which includes guidance regarding sampling station number and locations, sampling frequency, sampling duration, size of storms that need to be sampled, how soon after the start of precipitation sampling should begin, quality assurance quality control provisions, and turbidity meter specifications, The plan shall be submitted to DES for approval at least 90 days prior to construction. The Applicant shall then implement the approved plan. Unless otherwise authorized by DES, the turbidity sampling results along with station ID, date, time, other field notes, and a description of corrective actions taken when violations of state surface water quality criteria for turbidity are found, shall be submitted to DES via electronic mail within 48 hours of collection.

E-24. Unless otherwise authorized by DES, the Applicant shall develop and submit a monitoring plan to DES for approval at least 90 days prior to

construction. The purpose of the plan is to confirm that operation of the Activity is not causing or contributing to violations of state surface water quality standards. The plan shall include the parameters to be sampled, the location, timing and frequency of sampling, sampling and laboratory protocols, quality assurance / quality control provisions as well as when data will be submitted to DES. The applicant shall consult with DES and submit the monitoring data in a format that can be automatically uploaded into the DES Environmental Database. Once approved by DES, the Applicant shall implement the sampling plan.

E-25. Prior to construction, the Applicant shall submit a Water Temperature Impact Plan to DES for approval, that addresses how the Activity will impact water temperatures in surface waters. If necessary the Applicant shall revise the design based on the approved plan. The plan shall maximize the use of natural buffers (preferably at least 50 feet wide) adjacent to cold water fisheries. The Applicant shall then implement the approved plan,

E-26. Prior to construction, the Applicant shall submit a pollutant loading analysis to DES for approval that demonstrates no additional loading of pollutants. All permanent stormwater practices (i.e., best management practices or BMPs) referenced in the loading analysis must be designed in accordance with current Alteration of Terrain regulations (Env-Wq 1500 effective January 1, 2009). Where necessary, enforceable documents such as deed restrictions and conservation easements) shall be provided to ensure that assumptions made in the pollutant loading analysis, remain in effect in perpetuity. The Applicant shall then implement the approved plan.

E-27. In order to ensure the long-term effectiveness of approved permanent stormwater practices, the Applicant shall develop an Inspection and Maintenance (I & M) plan approved by DES. Unless otherwise authorized by DES, the I & M plan shall comply with the requirements of the Alteration of Terrain regulations (Env-Wq 1500 – effective 01-01-2009), section Env-Wq 1507.08 Long Term Maintenance). Prior to construction, the Applicant shall submit the I & M plan to DES for approval and then implement the approved plan.

E-28. The Applicant shall comply with all applicable State and Federal law and regulations regarding application of pesticides, including herbicides and insecticides and shall minimize use of all pesticides to the maximum extent practicable in all areas including the residential areas and golf course No pesticides shall be applied within 25 feet of any surface water unless otherwise allowed in writing by the NH Department of Agriculture, Pesticide Division. The Applicant shall make this a legally binding requirement on all home owners (such as a deed restriction) and record such documentation in the registry of deeds. Prior to construction, the

Applicant shall provide DES with a copy of the legally binding documentation and proof that it has been recorded in the registry of deeds. Prior to construction, the Applicant shall also provide DES with a list of pesticides being used on the property, the location and frequency of application, the name of the applicator and their NH pesticide license or permit number. If requested by DES, the same shall be provided to DES by January 1 of each year once construction commences.

E-29. Prior to construction, the Applicant shall submit and receive DES approval of a Fertilizer Minimization Plan. As a minimum, the plan shall address the items in section D-19 of this 401 Certification. The Applicant shall then implement the approved plan.

E-30. Prior to construction, the Applicant shall submit a Salt Minimization Plan in accordance with guidance referenced in section D-18 to DES for approval. The Applicant shall then implement the approved plan. As stated in the guidance, the Applicant shall identify where pervious pavement is proposed and provide justification for not using pervious pavements in areas where it is not proposed.

E-31. Prior to construction, the Applicant submit documentation to DES identifying the materials that will be used on all building roofs. No buildings shall be constructed with galvanized roofs.

E-32. The terms and conditions of this 401 Certification may be modified and additional terms and conditions added as necessary to ensure compliance with New Hampshire surface water quality standards, when authorized by law, and after notice and opportunity for hearing.

F. APPEAL

If you are aggrieved by this decision, you may appeal the decision to the Water Council. Any appeal must be filed within 30 days of the date of this decision, and must conform to the requirements of Env-Wc 200. Inquiries regarding appeal procedures should be directed to NHDES Council Appeals Clerk, 29 Hazen Drive, PO Box 95, Concord, NH 03302-0095; telephone (603) 271-6072.

If you have questions regarding this Certification, please contact Gregg Comstock at (603) 271-2983.

Harry T. Stewart
Director, DES Water Division

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