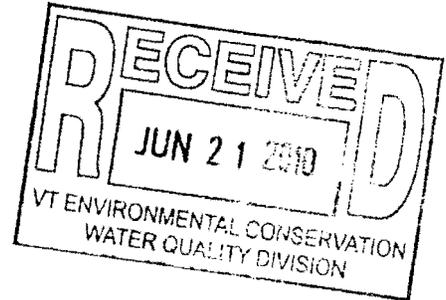




7320 MOUNTAIN ROAD
STOWE, VERMONT 05672

June 18, 2010

Mr. Tim Clear
Water Quality TMDL Coordinator
State of Vermont
Department of Environmental Conservation
Water Quality Division - Planning Section
103 South Main Street, Building 10 North
Waterbury, Vermont 05671-0408



Re: Stowe Mountain Resort Big Spruce Brook 1272 Order

Dear Tim:

Attached are our proposed plans for addressing both the groundwater iron seep adjacent to the Spruce Golf Cottage and the sediment discharges adjacent to the Upper Big Spruce Road as requested under Sections A-C in the above 1272 Order.

Please let me know if you have any questions as you review these plans.

Sincerely,

Robert A. Apple Jr.
Planning Director

Cc:

Peter LaFlamme
Justin Johnson

Phone 802-253-3701
Fax 802-253-9053
Toll Free 877-977-7823

WWW.SPRUCEPEAK.COM

At Home on the Mountain



**STOWE MOUNTAIN RESORT
IRON SEEP REMEDIATION PLAN
GOLF COURSE CLUBHOUSE VICINITY**

This plan has been prepared in accordance with Conditions A(1) and B of the Section 1272 Order issued by the Vermont Agency of Natural Resources to Stowe Mountain Resort (SMR), dated May 6, 2010. Based on ongoing observations and historic biological monitoring of Big Spruce Brook, as documented in a letter from VHB Pioneer (VHBP) to ANR, dated April 2, 2010, an existing iron seep associated with subsurface drainage infrastructure installed by SMR in the vicinity of the Golf Course Clubhouse is impacting water quality of Big Spruce Brook.

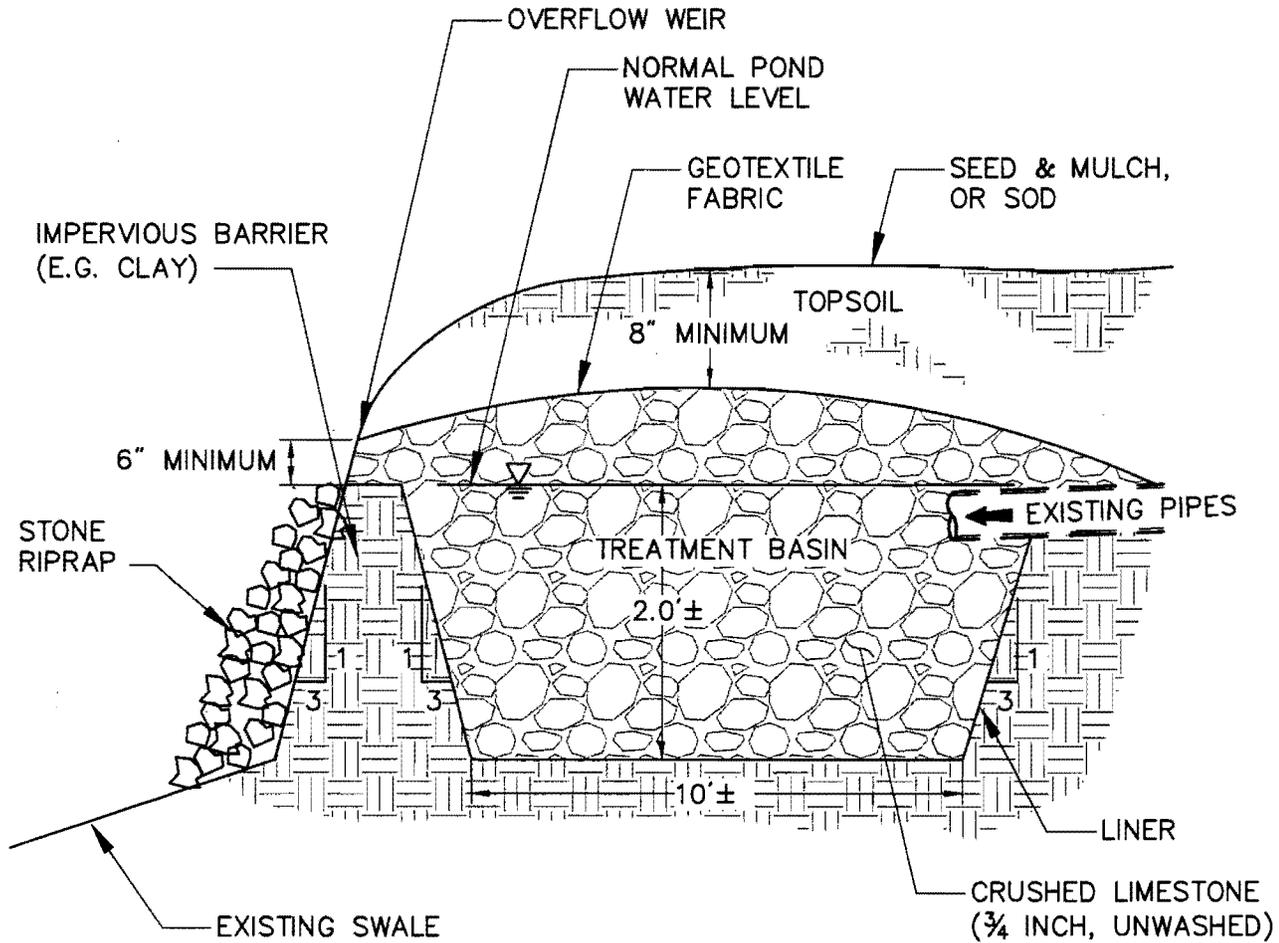
VHBP has completed a field assessment of the site, which is at the outlet of three existing small diameter underdrain pipes (4 inch, 6 inch and 8 inch lines), where iron-laden flows of groundwater emerge to an existing swale. The attached plan represents the proposed remediation plan to address the observed impacts. Given that it is not feasible to precisely determine the exact point of contact between saturated areas and fill material used during the construction of this portion of the golf course and clubhouse, it is not possible to assure that the method depicted in this plan will be completely successful. Nonetheless, the objective of the design is to maintain saturated conditions at which the existing groundwater flows make contact with the limestone, to avoid the oxidation of iron and to provide a sufficient contact time between groundwater flows with the limestone.

The proposed implementation of the Iron Seep Remediation Plan will be as follows:

1. Work will be scheduled during dry weather conditions. It is anticipated that all work can be completed during one to two days.
2. To the extent that any flow is originating from any of the three existing pipes when the work is being done, it will be piped or pumped to an adjacent undisturbed wooded area where a staked ring of haybales would be used as a temporary settling area.
3. The existing pipes will be cut back as needed to create a sufficiently sized area to construct the treatment basin as depicted on the attached plan. Material will be excavated with a backhoe and removed by SMR staff to an appropriate spoil disposal area.
4. A berm of compacted glacial till or other suitable material will be constructed on the downgradient end of the treatment basin.

5. Following excavation of the treatment basin and construction of the berm, a heavy plastic duty liner will be placed along the bottom and sidewalls.
6. The treatment basin will then be backfilled with unwashed crushed limestone of 3/4 inch or smaller size to geometry depicted on the plan.
7. A continuous layer of geotextile fabric will then be placed over the limestone materials throughout each treatment area.
8. Topsoil will then be placed to a minimum thickness of 8 inches, to achieve grades as specified by the plan.
9. Stone riprap will be placed at the outside of the berm to prevent erosion as outflow passes from the treatment basin.

With respect to monitoring, VHBP proposes that regular visual observation by SMR personnel occur once the construction has been completed. This would include weekly observation through Summer 2010 to assess whether any visual indication of iron precipitation is occurring in the existing swale downgradient of the treatment basin. If determined to be necessary, based on an observable breakthrough of iron, additional monitoring, including pH measurement, determination of total and dissolved iron concentrations, and estimation of flow rates would be conducted.



Iron Seep Remediation

6/10

N.T.S.

Source: VHB

REV

LD_x

Vanasse Hangen Brustlin, Inc.

Stowe Mountain Resort
Proposed Iron Seep Remediation Plan
Golf Course Clubhouse Vicinity

Issue

The Big Spruce Brook is currently impacted by sediment laden discharges from a detention basin located near the golf course 3rd tee across from the intersection of Big Spruce Road and National Drive.

Background

In 1999, during a pre-application site walk of the property with representatives from the ANR Water Quality Division, it was found that the previously constructed alignment of the upper portions of Big Spruce Road had diverted the natural flow of surface water in the area. These flows had been diverted to a drainage way that was experiencing a large amount of erosion. The result of this field observation was a request from ANR WQD to eliminate this diversion and to reintroduce the flows from the unnamed tributary to Big Spruce Brook at a point closer to its historical alignment.

The permitted and constructed stormwater collection and conveyance system in this area of the project was designed to accommodate this goal. This was done by collecting the flows from the unnamed tributary, the historical flows from the Big Spruce Road and Big Spruce Parking Lot and routing them through a small wet detention basin. The intent of this detention basin was to assist in the removal of large diameter sediment (winter sand and the like) prior to introduction of the water to the Big Spruce Brook.

Existing Operation Condition

Under day to day operating conditions, the sediment basin works as it was originally designed to provide for ready settling of large diameter solids. Under quiescent conditions, it also allows for the settling of smaller diameter fines. Unfortunately, during larger runoff events, the turbulence in the small basin causes the fines to become re-suspended causing NTU levels to be larger at the detention basin outlet than at the basin inlet. The elevated NTU levels in the discharge have been identified as being an impact to the Big Spruce Brook receiving waters.

The stormwater watershed that is currently directed to the Big Spruce Road detention basin is located just upgradient (north) of the existing stormwater collection system that serves the remaining portion of the Spruce Hamlet development area (See Attachment 1).

Proposed Solution

The proposed solution will:

1. Separate and eliminate the co-mingling of low NTU flows from the

unnamed tributary and the higher NTU stormwater flows from the Big Spruce Parking Lot and the Big Spruce Road roadside ditch (See Attachment 2).

2. The flows from the lower NTU unnamed tributary will be piped to the existing outfall of the Big Spruce Road detention basin and the basin will be eliminated. This should significantly reduce the sediment load being introduced into Big Spruce Brook.
3. Stormwater flows from the Big Spruce Parking Lot and Big Spruce Road roadside ditch will be diverted to the National Drive stormwater collection system.

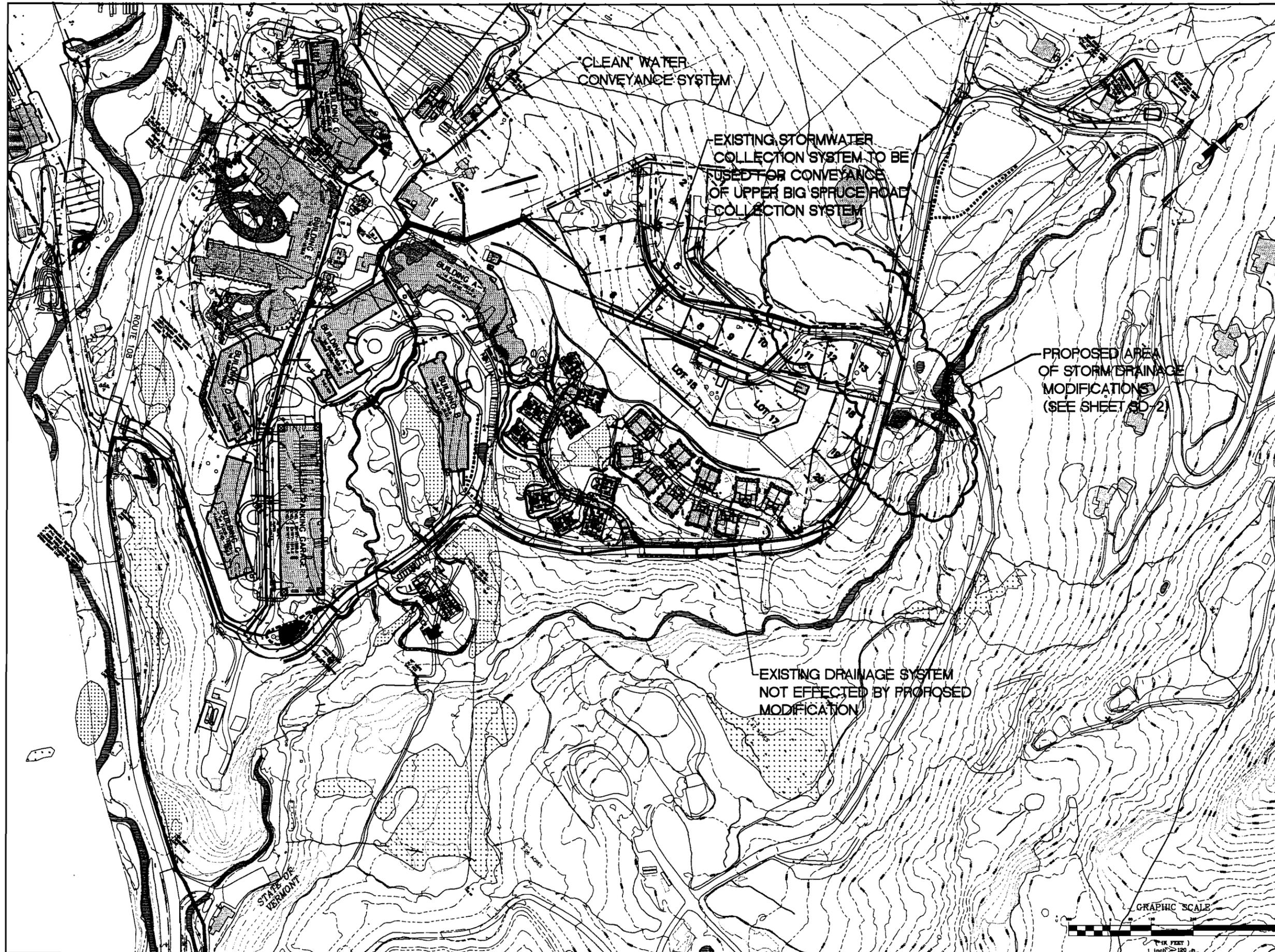
These flows will be subject to additional treatment at the sediment chamber and swirl treatment facility located on the edge of the Inspiration ski trail (See Attachment 1).

Flows will continue down through the collection system until they reach the Snowmaking Pond forebay and main pond body. After extensive detention, these flows are released to the West Branch Little River.

Summary

The proposed measures will:

1. Eliminate the introduction of sediment loads from the Big Spruce Parking Lot and Big Spruce Road roadside ditch to Big Spruce Brook thereby reducing the previously identified impacts to this stream.
2. Redirect runoff from the Big Spruce Parking Lot and Big Spruce Road roadside ditch to the existing Spruce Hamlet stormwater collection and treatment system.
3. The runoff from this portion of the project will receive initial treatment at an existing online settling and treatment facility. This settling facility is subject to a scheduled inspection and sediment removal regiment which is part of the Operation and Maintenance plan for this facility.
4. Flows will continue to an oversized wet pond forebay and treatment facility prior to being introduced into the West Branch Little River.



PLANS PREPARED BY:



CIVIL ENGINEERING ASSOCIATES, INC.
10 MANSFIELD VIEW LANE, SOUTH BURLINGTON, VT 05403
802-864-2222 FAX: 802-864-2271 web: www.cem4.com

DRAWN
ACL
CHECKED
DSM
APPROVED
DSM

OWNER:

SPRUCE PEAK
REALTY, LLC

PROJECT CONSULTANTS:

PROJECT TITLE:

SPRUCE PEAK
AT
Stowe
STOWE VERMONT

DATE	CHECKED	REVISION

OVERALL
STORM DRAIN
REALIGNMENT
SITE PLAN

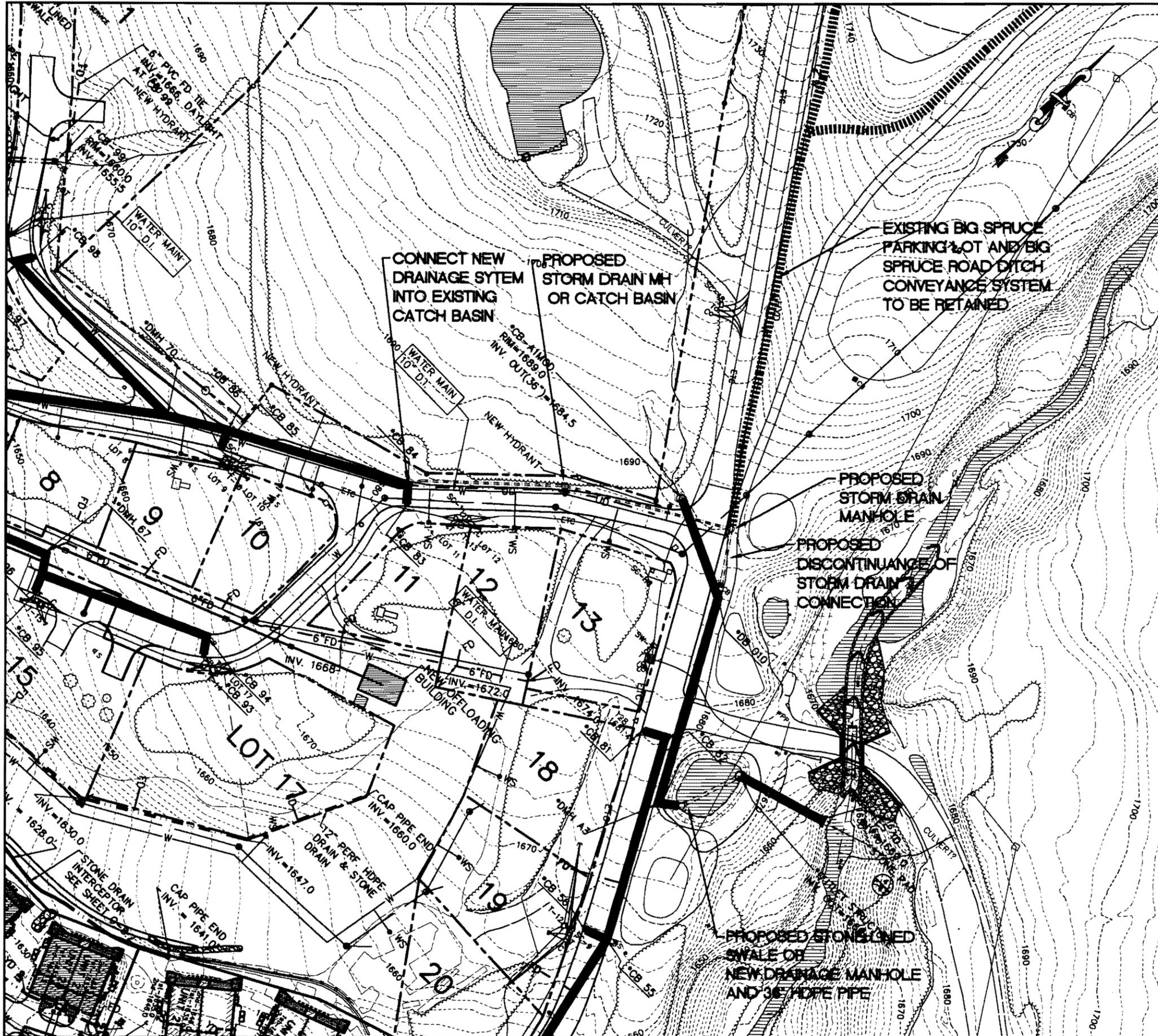
DATE
MAY, 2010

SCALE
1" = 120'

PROJ. NO.
02142

DRAWING NUMBER

SD-1



Issues
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Background
 In 1988, during a pre-application site walk of the property with representatives from the ANR Water Quality Division, it was found that the previously constructed alignment of the upper portions of Big Spruce Road had diverted the natural flow of surface water in the area. These flows had been diverted to a drainage way that was experiencing a large amount of erosion. The result of this field observation was a request from ANR WQD to eliminate this diversion and to reintroduce the flows from the unnamed tributary to Big Spruce Brook at a point closer to its historical alignment.

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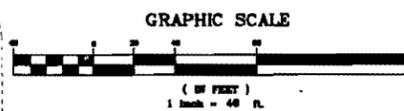
Existing Operations Condition
 Under day to day operating conditions, the sediment basin works as it was originally designed to provide for ready settling of large diameter solids. Under quiescent conditions, it also allows for the settling of smaller diameter fines. Unfortunately, during larger runoff events, the turbulence in the small basin causes the fines to become re-suspended causing NTU levels to be larger at the detention basin outlet than at the basin inlet. The elevated NTU levels in the discharge have been identified as being an impact to the Big Spruce Brook receiving waters.

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- Summary**
 The proposed measures will:
1. Eliminate the introduction of sediment loads from the Big Spruce Parking Lot and Big Spruce Road roadside ditch to Big Spruce Brook thereby reducing the previously identified impacts to this stream.
 2. Redirect runoff from the Big Spruce Parking Lot and Big Spruce Road roadside ditch to the existing Spruce Hamlet stormwater collection and treatment system.
 3. The runoff from this portion of the project will receive initial treatment at an existing on-site settling and treatment facility. This settling facility is subject to a scheduled inspection and sediment removal regimen which is part of the Operation and Maintenance plan for this facility.
 4. Flows will continue to an oversized wet pond forebay and treatment facility prior to being introduced into the West Branch Little River.



PLANS PREPARED BY:

 CIVIL ENGINEERING ASSOCIATES, INC.
 10 HANFIELD VEW LANE, SOUTH BURLINGTON, VT 05403
 802-884-2323 FAX: 802-884-2277 WWW: WWW.CEA-VT.COM

ISSUED:
 ACL
 CHECKED:
 DSM
 APPROVED:
 DSM

OWNER:
SPRUCE PEAK REALTY, LLC

PROJECT CONSULTANTS:

 PROJECT TITLE:
SPRUCE PEAK AT

STATE: VERMONT

DATE	DESCRIPTION	BY/REVISED

STORM DRAIN REALIGNMENT SITE PLAN

DATE: MAY, 2010
 SCALE: 1" = 40'
 PLAN NO: 02142
 SHEET NUMBER: **SD-2**

Vermont Department of Environmental Conservation

Water Quality Division

103 South Main Street, Building 10 North

Waterbury, VT 05671-0408

Agency of Natural Resources

[phone] 802-241-3770

[fax] 802-241-3287

July 8, 2010

Spruce Peak at Stowe
Attn: Robert A. Apple Jr.
7320 Mountain Road
Stowe, VT 05672

Re: Stowe Mountain Resort Big Spruce Brook 1272 Order:

Dear Rob:

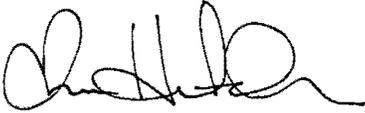
I am writing in response to your letter dated June 18th, 2010 and to our recent site visit on Friday, June 25, 2010. After reviewing the proposed plans and the items we discussed on our site visit we request that the following comments be incorporated into the restoration plans:

1. Addressing the groundwater iron seep using the proposed remediation plan as presented in VHB Pioneer's Stowe Mountain Resort Iron Seep Remediation Plan Golf Course Clubhouse Vicinity is acceptable as proposed. However, we request that the weekly post-construction visual observations be submitted to us electronically as a quarterly summary.
2. As recommended by Steve Fiske, we request that the WQ monitoring add total iron to the base flow monitoring of Big Spruce Site 0.3 and that the amount of iron precipitate be assessed using the periphyton assessment protocols during the Biomonitoring of this reach, in addition to the visual monitoring of the seep and stream.
3. We request that the proposed plan to lower the impacts of sediment into Big Spruce Brook be amended to include the following components:
 - a) Stormwater runoff from Big Spruce Road should be collected on both sides of the road before being collected at National Drive. Currently only the east side of road is being collected and treated. The runoff from the west side of the road discharges to the brook that runs alongside the roadway without sufficient treatment. A roadside ditch with a permanent check dam system, or stone lined waterway, designed according to the Vermont Standards and Specifications for Erosion Prevention and Sediment Control should be included for both sides of the road.
 - b) Please evaluate whether the Spruce Hamlet stormwater collection and treatment system can accommodate the additional flows within the permitted design capacity.
 - c) The culvert that crosses under the driveway to the Ski Club should be eliminated to avoid co-mingling of roadway runoff and the stream.

- d) Monitor the effectiveness of ongoing efforts to capture roadway sediment into the Ski Club Brook by sampling the brook at the top and bottom of the roadway.

Please let me know if you have any questions.

Sincerely,



Christina Hutchinson
Environmental Analyst
Stormwater Management Section

Cc:

Tim Clear, Agency of Natural Resources
Steve Fiske, Agency of Natural Resources
Padraic Monks, Agency of Natural Resources
Mary Nealon, Bear Creek Environmental



Bear Creek Environmental

297 East Bear Swamp Road, Middlesex, Vermont 05602
Phone: (802) 223-5140 / Fax: (802) 229-4410

July 7, 2010

Mr. Tim Clear
Water Quality Division
Agency of Natural Resources
103 South Main Street
Waterbury, VT 05671-0408

**RE: Stowe Mountain Resort
2010 Water Quality Monitoring Program**

Dear Tim:

Rob Apple and I met with Christina Hutchinson and Steve Fiske on June 25, 2010 to discuss modifications to the water quality monitoring program at Stowe Mountain Resort. Many of the recommendations were included in the 2009 Annual Water Quality Evaluation, dated May 31, 2010.

At our recent meeting, we agreed to the following changes to the monitoring program.

1. Drop nutrients (e.g. nitrogen and phosphorus analytes) for the event-based sampling rounds;
2. Add total iron to baseflow sampling at Big Spruce Brook (RM 0.3);
3. Reduce baseflow sampling to once per year during the late summer/fall period;
4. Add monitoring stations on lower and upper Ski Club Brook (tributary that currently flows into Big Spruce Basin) and on Big Spruce Brook above the basin (RM 0.7) for the event-based sampling rounds.

We will make an effort to collect four to six event-based sampling rounds during the 2010 monitoring period with a focus on Big Spruce Brook. Please let me know if you have any questions or comments regarding the revised monitoring program.

Sincerely,

Mary M. Nealon
Principal/Aquatic Biologist
Certified Professional and Erosion and Sediment Control

cc: Rob Apple, Spruce Peak Realty
Steve Fiske, Agency of Natural Resources
Padraic Monks, Agency of Natural Resources
Christina Hutchinson, Agency of Natural Resources
Edward Stanak, District Environmental Commission #5



Bear Creek **Environmental**

297 East Bear Swamp Road, Middlesex, Vermont 05602
Phone: (802) 223-5140 / Fax: (802) 229-4410

July 22, 2010

Mr. Steve Fiske
Aquatic Biologist
RA LaRosa Laboratory
Water Quality Division
Agency of Natural Resources
103 South Main Street
Waterbury, VT 05671-0408

**RE: Stowe Mountain Resort
2010 Water Quality Monitoring Program**

Dear Steve:

I am writing on behalf of Stowe Mountain Resort (SMR) in response to your letter dated July 7, 2010. In general, we are in agreement with the revisions to the water quality monitoring program outlined in your letter. I am writing to further clarify our understanding of the changes to the 2010 monitoring program. I will respond separately to each of the items outlined in your letter.

1. SMR is in agreement with item #1 in your letter.
 - Event based monitoring will continue to capture 3-4 freshet events after/during significant rainfall events. Bear Creek Environmental, LLC will sample when there is at least ½ inch of rain, and will make an effort to capture events of 1 inch or more of precipitation when possible.
 - Event based monitoring will continue at the three major stormwater discharge points as recommend in the 2009 monitoring report prepared by Bear Creek Environmental, LLC.
 - An upstream and downstream monitoring location will be added on Ski Club Brook, as recommended in the 2010 monitoring report.
 - SMR will continue to sample for chloride during one summer and one fall event at the biomonitoring stations.

2. It was my understanding that we agreed to drop nutrients from the event-based sampling at our meeting on June 25, 2010. However, SMR is willing to request the analytes (pH, alkalinity, chloride, TN, DP, TSS, turbidity, conductivity, and temperature) you list for event-based nutrient sampling in item #2 of your letter. These parameters will be requested for the six biomonitoring stations as well as the upper station on Big Spruce Brook for one summer and one fall event. Event-based sampling at the other monitoring stations during the summer/fall event-based sampling will continue to include the following parameters: pH, TSS, turbidity, conductivity, and temperature.

We recommend discontinuing the sampling at the upper Pinnacle Brook station, given the record of low nutrient levels at both the upper and lower stations. A very small portion of the golf course (holes 7 and 8) drains toward Pinnacle Brook below the upper monitoring station, and the lower station is sufficient for determining if nutrient levels are above background.

3. Stowe Mountain Resort will continue to sample thaw events and any additional freshet events (beyond the summer and fall event-based nutrient sampling) for pH, TSS, turbidity, conductivity and temperature. We are agreeable to adding alkalinity and chloride for the biomonitoring stations.
4. We are in agreement with the reduction of baseflow monitoring to once per year during the late summer/early fall.
5. We plan to combine the nitrogen parameters into one laboratory analysis for total nitrogen, per your suggestion. Total iron will be added to the monitoring at Big Spruce 0.3.

Thank you for feedback regarding the water quality monitoring program. Please feel free to contact Rob Apple or me if you have questions.

Sincerely,

Mary M. Nealon
Principal/Aquatic Biologist
Certified Professional and Erosion and Sediment Control

cc: Rob Apple, Spruce Peak Realty
Padraic Monks, Agency of Natural Resources
Tim Clear, Agency of Natural Resources ✓
Christina Hutchinson, Agency of Natural Resources
Edward Stanak, District Environmental Commission #5