



To: Jay Peak WQRP Project File

Date: October 29, 2020  
Project #: 57201.15

Memorandum

From: Thomas Bryce,  
Water Resources Specialist

Re: Jay Peak Resort  
2020 Water Quality Remediation Plan Update

Robert Wildey, PE, CPESC,  
Water Resources Engineer

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In accordance with the terms of the 2015 Settlement Agreement with the Vermont Natural Resources Council ("VNRC") and the Vermont Department of Environmental Protection ("DEC"), Jay Peak Resort ("Jay Peak" or "Resort") is required to periodically update the Jay Peak Water Quality Remediation Plan ("WQRP"). The purpose of these updates is to identify any new proposed development activities as well as sediment reduction measures and other best management practices ("BMPs") that are required if stream segments identified in the Settlement Agreement did not meet interim or attainment biocriteria targets during the previous year's monitoring. No additional development is proposed at the Resort at this time. However, as described below, the 2019 monitoring results trigger the need for the WQRP to be amended through the implementation of additional BMPs. This document describes the proposed amendment components and provides the required information for consideration and review under the ANR Procedure for Water Quality Remediation Plans (2015).

## 2019 Monitoring Results

As reported in the 2019 Performance Report of the Water Quality Monitoring Plan report dated July 6, 2020, biomonitoring results at all streams other than the Tributary 3 to South Mountain Branch ("Tributary 3") continued to meet the biomonitoring criteria for aquatic biota in 2019. The upgradient station on Tributary 3 (SMB-T3-0.8) met all parameters except for the Pearson-Pinkham Coefficient of Similarity-Functional Groups ("PPCS-FG") metric but is considered to have met the biomonitoring criteria due to its high elevation and small watershed size. The Tributary 3 compliance station that is referenced in the Settlement Agreement ("SMB-T3-0.1") was not in attainment with the Vermont Water Quality Standards for Class B waters due to the low density of macroinvertebrates when it was sampled during the 2019 index period. A supplemental station on Tributary 3 that was sampled in 2019 in addition to the compliance station ("SMB-T3-0.3") exhibited a similar density to the compliance station and was also not in attainment. For this reason, additional measures are proposed to be implemented within the Tributary 3 watershed. These measures are described in more detail below.

## 2020/2021 Remediation Projects

### *Hotel 3 Basin Retrofits*

One of the operational phase stormwater treatment practices in the Tributary 3 watershed is the so-called "Hotel 3" basin that provides stormwater treatment and control for the Stateside Hotel and parking area, the Recreation Center, and the maintenance facility located on the north side of Stateside Road. This basin was designed and constructed in accordance with Stormwater Permit 5467-9015.10A and has been in operation since 2014. In reviewing the operation of this treatment practice, VHB noted that it consistently retained more water than other similar basins at the Resort and that the vegetation on the floor of the basin was not well-established. In order to reduce the amount of time that the basin is saturated and improve vegetation growth, VHB proposed to install a header pipe within the gravel wetland that would discharge inside the outlet control structure ("OCS"). This conduit would allow flow through the

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gravel wetland to enter the OCS without co-mingling with the overlying water in the basin that is intended to be retained during larger storm events. The invert of this conduit would be set to the same elevation as the low-flow outlet specified in the permit plans and would therefore maintain the required level of saturation within the gravel wetland component of the practice. The relocation of the orifice inside the OCS would also minimize potential clogging. This retrofit was implemented by Resort personnel during October 2020 and will be monitored to ensure it is functioning as intended.

In addition to the gravel wetland header pipe and OCS modification, a second, more intensive retrofit was evaluated by VHB. This retrofit would involve increasing the volume of storage within the basin by excavating three sides of the basin's vegetated side slopes and replacing them with stacked stone or gabion baskets. By increasing the approximately 3:1 side slopes to 1:1 at the lower elevations of the pond, this retrofit would increase the storage volume of the pond by 1,400 cubic feet (an approximately 5% increase in volume below the 12-inch orifice) and thereby allow a slightly longer retention time during the water quality volume event. The purpose of this expansion would be to meet the larger storm event requirements incorporated in the 2017 Vermont Stormwater Management Manual ("VSMM"), rather than the smaller requirements that were in effect when the treatment practice was designed using the 2002 VSMM. Due to circumstances associated with COVID-19 that are beyond the Resort's control, this retrofit was not able to be implemented during 2020 and may be revisited in 2021.

### *South Mountain Branch Tributary 3 Stream Stabilization*

Field investigations conducted in 2019 also expanded the WQRP study area beyond the immediate limits of the Resort property and examined conditions on lands on the opposite side of Route 242 to identify other potential sediment sources that require remediation. Two intermittent streams that originate at roadway culverts under Route 242 and flow southerly toward Tributary 3 were found to be actively eroding and contributing excess sediment to Tributary 3. Sediment transported downstream of these locations is thought to be responsible in part for the failure of Tributary 3 to meet biocriteria.

Flow paths through this area were likely discontinuous ephemeral or intermittent stream features with multiple flow paths across the forest floor before the two intermittent streams were established, apparently in conjunction with the original construction of Route 242 in the 1950's. Because flows through this area were consolidated by the construction of the roadway and its associated culverts, the channels are now incised along much of their length. As a result, it would not be possible to restore this system to the pre-development condition without significant impacts to the forest cover and a considerable amount of earthwork. As an alternative to such impacts, the proposed strategy is to monitor the condition of these streams in future years to see if they improve in response to the recent culvert replacement and outfall riprap installation described below.

If additional work is deemed necessary, the preferred stabilization approach would use smaller equipment and hand tools to incorporate features of natural channel design principles in a stabilization project, such as re-introducing a step-pool sequence and incorporating woody debris. These measures would largely focus on stabilizing the

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configuration and plan form geometry of the existing channels while minimizing the amount of disruption to the forest canopy. Where necessary and to provide stability for the reconfigured channels, in-stream structures made of rock or wood may be used to enhance grade control, bank protection, habitat, and flow diversity. Disturbed areas outside of the channels will be seeded and mulched upon completion of the in-stream work.

The Vermont Department of Forest, Parks, and Recreation owns this parcel and is supportive of the Resort's efforts to improve water quality through these measures. The Resort anticipates that work in the channels downstream from the Route 242 culverts would be completed using personnel and resources available through the North Woods Stewardship Center, if deemed necessary.

### *Route 242 VTrans Culvert Installations*

As a first step for the development of the stream stabilization plan for the two intermittent channels identified above, VHB determined appropriate sizes for the Route 242 culverts located at the head of these channels. This determination included an evaluation of the Lodge and Townhomes Basin 4 ("LTH-4") stormwater treatment practice that is part of the Resort. The watershed draining to this treatment practice and other design criteria included in its sizing were evaluated to confirm that the structure meets the requirements of stormwater permit authorization 5467-9015.9 and to identify the design flows directed to the Route 242 drainage ditch. In addition, VHB performed hydraulic calculations to evaluate the culvert sizes needed to meet the 2% annual exceedance probability event ("Q50") in accordance with the 2015 edition of the VTrans Hydraulic Manual.

Based on the recommendations from this analysis, VTrans replaced the two existing 18-inch corrugated metal pipe ("CMP") culverts with 24-inch CMP culverts in September 2020. The replacement culverts allow the structures to safely pass larger storm events while minimizing erosive forces at the culvert outlets. The outlets were also armored with additional scour protection stone to dissipate energy and provide an improved transition to the receiving channels.

### **2020 Monitoring Modifications**

Water quality monitoring station SMB-T3-0.3 was added as a Water Quality Monitoring Plan ("WQMP") sampling location in 2019 as part of the effort to better understand the effects of sediment loading from the two intermittent tributaries associated with the Route 242 culverts. Following discussions with DEC in 2020, it was determined that more informative data may be obtained by sampling South Mountain Branch station SMB-2.4 (DEC #427807000024). This station is located just upstream of the confluence of Tributary 3 and the South Mountain Branch main stem and has been periodically monitored by DEC in the past. The comparison of this similarly-sized watershed may be more useful in evaluating the biological and geomorphic context of Tributary 3 than the intermediate stations (SMB-T3-0.3 and SMB-T3-0.5) that are upgradient from the compliance station, as previous macroinvertebrate results at both of those stations have been similar to the compliance station at R.M 0.1. Station SMB-2.4 is therefore proposed to be monitored moving forward. This station has been added to the Station Location Map included in the Attachment.

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South Mountain Branch station SMB-1.2 (DEC #427807000012) is located on the main stem of South Mountain Branch, downstream from the Resort near Shallow Brook Road. This location also receives off-site drainage from other sources and is not a compliance station within the Settlement Agreement, but has been monitored annually by the Resort since 2012. Due to the distance of the site from the Resort, the monitoring results at this site are not particularly effective in diagnosing the need for additional BMPs at the Resort. In recent years, this site has been in attainment with the VWQS. As a result, it is proposed to discontinue monitoring at this station after 2020.

Lastly, based on the review of the water quality data collected in recent years, VHB recommends that the following updates be made to the WQMP for base flow, storm event, and winter melt water chemistry analysis:

- Field personnel will collect supplemental readings upstream and downstream from a sampling station if field parameters (pH, temperature, dissolved oxygen, specific conductivity, or turbidity) are outside of anticipated ranges during base flow, event flow and winter melt sampling.
- Field personnel will collect a sample for laboratory analysis of total iron if pH is found to be less than 6.5 standard units during base flow, event flow and winter melt sampling.

### Summary

As required by the terms of the Settlement Agreement, this proposed update to the Jay Peak WQRP update identifies the adaptive management measures that have been or are proposed to be implemented by the Resort, as well as presenting additional monitoring activities that will be undertaken moving forward. If approved, these improvements will be implemented in 2021 with the goal of meeting attainment in Tributary 3 and the other streams at the Resort.

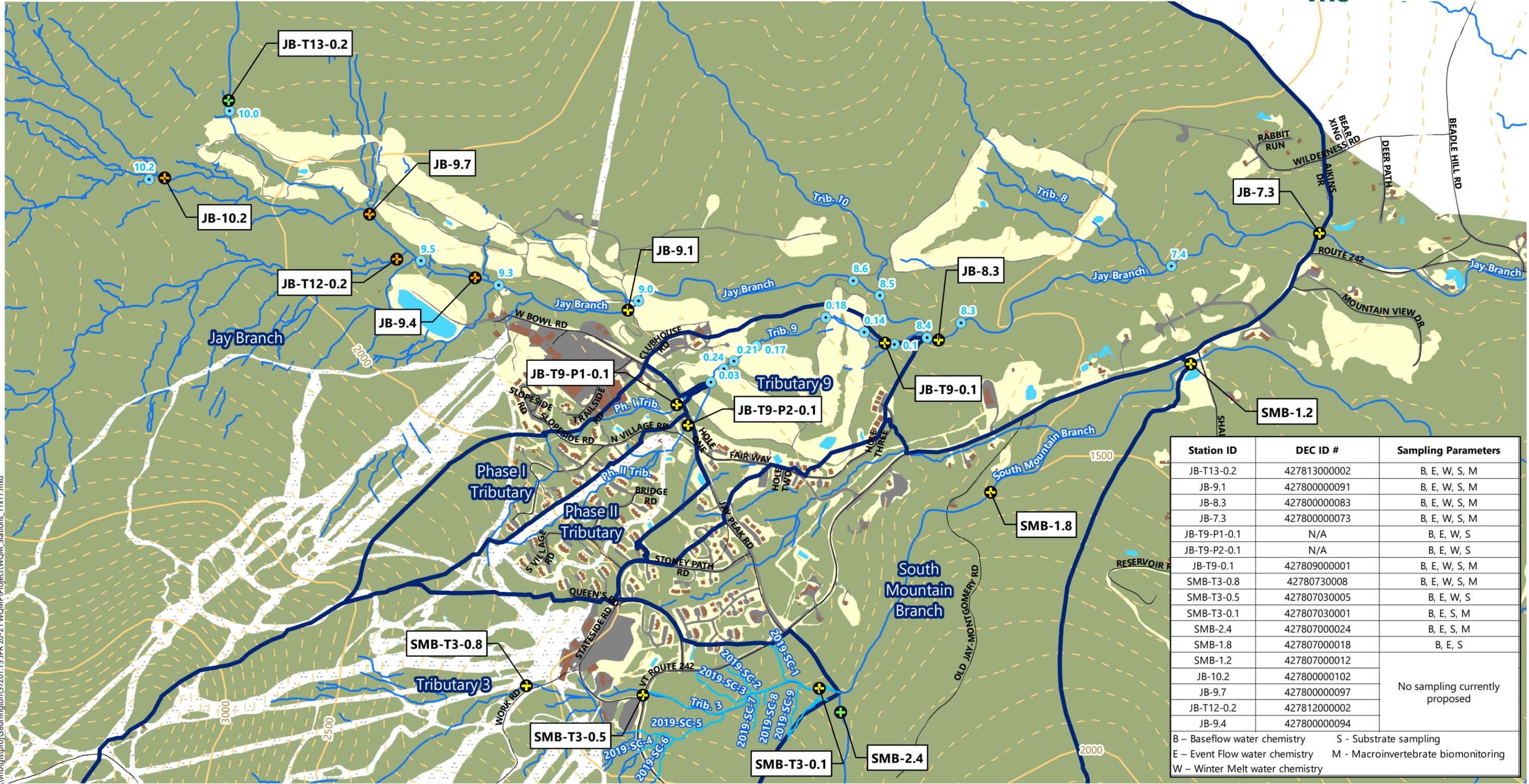
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**ATTACHMENT**



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Jay Peak Resort Water Quality Monitoring | Jay, Vermont

- Water Quality Monitoring Station (VHB, 2012) +
- 2018 Landuse/Landcover (VHB) ■ Building
- Forest
- Open
- Transportation
- Water
- Ski Trails —
- River Mile (VHB, 2012) ●
- Watershed Boundary (VHB, 2012) ▭
- Stream (VHB/VCGI, 2015) —
- Stream (VHB, 2019) —
- Road (VTrans, 2017) —
- 500 ft Contour (VCGI, 2018) —
- 50 ft Contour (VCGI, 2018) —

Water Quality Monitoring Station Location Map

Sources:  
 VCGI (Vermont Center for Geographic Information - Various Dates)  
 VTrans (Vermont Department of Transportation - 2015)  
 VHB - 2011-2019