

Mount Sunapee Resort Stream Restoration and Streambank Stabilization



Services / Expertise

Stream Restoration & Floodplain Reconnection
Bank Stabilization
Culvert Replacement
Infrastructure Protection
Channel Migration
Topographic Survey
Stream Restoration
Channel Restoration Plan & Design
Hydrologic & Hydraulic Modeling
Erosion Prevention & Sediment Control Plan
100% Design Plans & Opinion of Probable Cost
Stakeholder Collaboration & Stewardship
Permitting Support
Project Implementation

Markets

Watershed Protection Organizations
Site/Property Owners

Project Location

Newbury, New Hampshire

Date Completed

2020 – Present

Project Owner

Lake Sunapee Protective Association /
Vail Resort Management Company

Project ID#

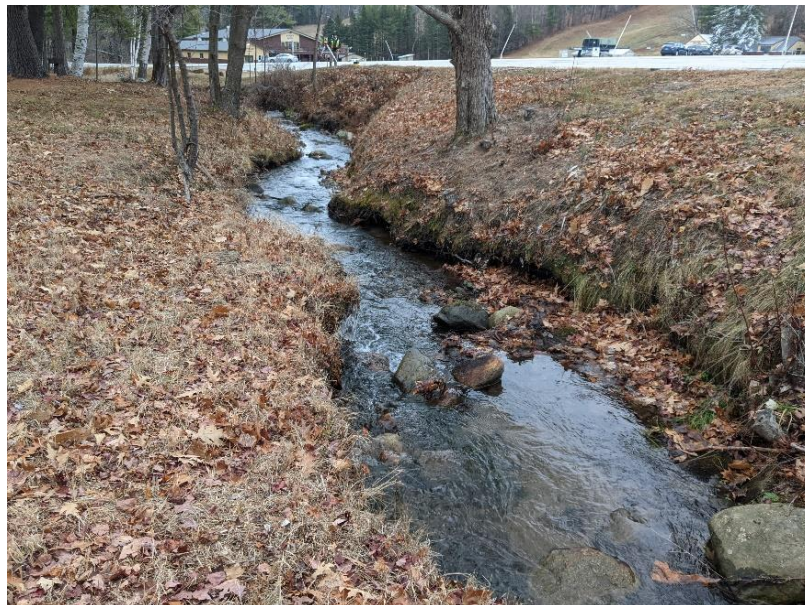
17-135

Project Manager

Gabe Bolin, PE, Senior Engineer
603-809-6101
gbolin@stone-env.com

Project Team

Branden Martin, PE



Beck Brook eroding the parking lot embankment at Mount Sunapee Resort in Newbury, NH

STONE was hired by the Lake Sunapee Protective Association to provide assessment, design, permitting, and construction oversight services for streambank stabilization along the parking lot at the Mount Sunapee Resort. The Resort was established in 1909 with a single chair lift, three trails, and a single lodge. Throughout the 1950s and 1960s the lift and trail network was expanded significantly, and two more lodges were constructed; the original lodge was replaced in 1999. Aerial imagery shows the Resort parking lot in its existing configuration as early as 1985, suggesting that it was constructed during Resort expansion in the 1950s-60s. An existing stream channel was routed around the parking lot embankment and includes a sharp 90-degree turn and approximately 500 linear feet of straightened channel. The modern hydrologic/hydraulic regime associated with incremental development and increased snow production at the Resort, coupled with increases in high intensity/high volume storm events, resulted in increasingly erosive conditions in the channel and slope failure along the toe of the parking lot embankment. Stone was retained to utilize stream restoration and floodplain reconnection techniques to repair the failures, prevent further erosion, and create a dynamically-stable stream planform with improved aquatic habitat.

Stone staff completed a full topographic survey, assessed a culvert providing passage under a vehicular/pedestrian crossing, and assessed geomorphic stability of the stream channel and adjacent banks. We found that the culvert was undersized relative to bankfull flow conditions, and as intended by the original designers, the channelized stream was generally disconnected from its floodplain. Stone compiled hydrologic data for similar gaged streams near the project site and performed a gage transfer to

Mount Sunapee Resort Stream Restoration and Streambank Stabilization



model stormflows at the project site based on the best available gage data. We used our field-collected observations and this hydrologic data to develop hydraulic models for existing and proposed stream conditions.

Stone developed a restoration design that included adjusting of the stream channel away from the parking lot embankment, re-establishing channel sinuosity, grading floodplain benches along both sides of the stream channel, developing a log/boulder step-pool series for habitat and grade control, and strategic placement of stone along the bank toe in high-velocity areas. The design calls for replacing the existing culvert with a single-span bridge, re-established an open-channel configuration and eliminating flow contraction issues.

Following completion of final designs, Stone provided permitting support including processing, submission, and coordination for a New Hampshire Standard Dredge and Fill Wetland Permit and a US Army Corps of Engineers New Hampshire General Permit. Construction of this restoration project is scheduled for the summer of 2022. The design, when implemented, will introduce less bank hardening than with traditional bank stabilization methods, and will promote stream-floodplain connectivity and the development of quality habitat.



Entrenched 90-degree bend around parking lot embankment at Mount Sunapee Resort in Newbury, NH



Erosion of parking lot embankment due to culvert flow contraction at Mount Sunapee Resort in Newbury, NH