

Stormwater Retrofits on School Properties: Integrating Green Stormwater Infrastructure Design with Water Quality Education and Long-Term Stewardship



Services / Expertise

Stormwater Assessment & Permitting
Stormwater Retrofit Design
Water Quality Education
Data Assessment
Conceptual Plans
Cost Estimate
Project Design
Construction Management

Markets

Watershed Protection Organizations
State Government
Municipal & RPCs

Project Locations

St. Albans City School
St. Albans, Vermont
Smilie Memorial School
Bolton, Vermont
Rumney Memorial School
Middlesex, Vermont
Cabot School
Cabot, Vermont

Dates

2015–2017

Project Owners

Friends of Northern Lake Champlain
Winooski NRC
Friends of the Winooski River



Students at the St. Albans City School participated in the planting of a bioretention facility with native species. Photo credit: Friends of Northern Lake Champlain.

STONE has worked with a variety of watershed organizations, municipalities, schools, and community stakeholders to improve stormwater management on school grounds and engage students in both the benefits and long-term stewardship of the implemented stormwater retrofit. Below are a few examples.

ST. ALBANS CITY SCHOOL. Stone worked with the Friends of Northern Lake Champlain, and teachers and students at St. Albans City School, to complete this project that integrated education and stormwater management improvements. Stone designed a bioretention area to treat the first inch rainfall from 0.6 acres of impervious surfaces, and provided construction oversight. Stone staff also worked directly with the students to complete hand-auger soil characterization and infiltration testing within the proposed bioretention practice footprint. The practice was constructed in the spring of 2015, and the students planted water-loving vegetation that they selected during in-class exercises in the late summer of 2015.

CABOT SCHOOL. The Cabot School generates runoff that enters the local stormwater system before being discharged to the nearby Winooski River without treatment, some of which is generated by nearby properties including 900 feet of Danville Hill Road. The goal of this project was to complete a stormwater master plan for the Cabot School campus and its associated drainage area, including upland “run on” water. The result was 100% designs for and implementation of three treatment areas on school property, along with a list of other runoff control projects that can be pursued in the future.

The Friends of the Winooski River (FWR) retained Stone to assess the drainage area and identify possible practices for stormwater mitigation and water quality improvements. An initial list of seven opportunities was narrowed to three

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implementation projects using three broad criteria: greatest stormwater reduction and water quality benefits, projects that required detailed engineering design to implement, and projects that Cabot School was interested in pursuing. Stone worked with FWR and the teachers at the Cabot School to engage students in learning about the impacts of runoff and the benefits of green stormwater infrastructure, including a series of in-class discussions and a field component where students participated in identifying runoff reduction and treatment opportunities.

SMILIE SCHOOL. Stormwater runoff from this school campus flowed, generally un-treated, to Joiner Brook and then to the Winooski River. Building on the success of similar work at Cabot School, the Friends of the Winooski River retained Stone to assess the campus and identify possible practices for stormwater mitigation and water quality improvement. Stone developed a stormwater management plan for the campus, summarizing results from a field screening and feasibility evaluation of potential stormwater mitigation strategies. An initial list of nine site improvements and stormwater treatment opportunities was narrowed to three implementation projects.

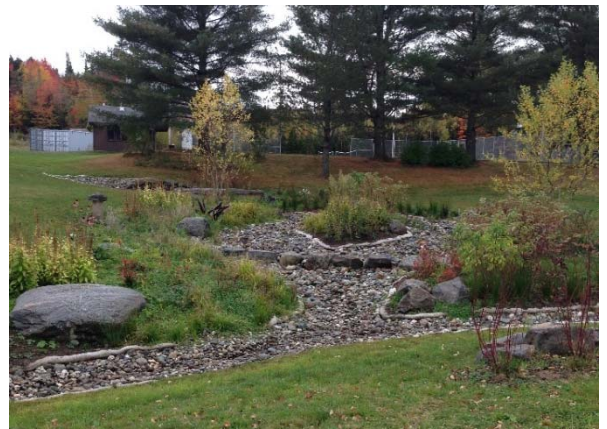
Stone worked with the FWR, the facilities director for the Chittenden Easy Supervisory Union, and Smilie School administration to complete final designs for three high-priority stormwater mitigation practices, including a bio-retention area at the school entrance to collect and treat stormwater from the adjacent roof, rain garden with a riser inlet to collect and treat runoff from adjacent roof surface to allow for infiltration, and soil and vegetative restoration of the river access road within the adjoining US Route 2 right-of-way to limit vehicular traffic, reduce compaction, and encourage infiltration. Stone secured necessary permits, provided construction bid documents, specifications, and bidding process assistance, site stake-out and construction oversight, and assisted Friends of Winooski with approval of contractor pay requests, final construction inspection, and grant/project close-out. The three constructed designs reduce stormwater volume by 11,845 cubic feet and improve water quality by reducing the annual sediment and phosphorus load by an estimated 75 and 0.2 pounds respectively.



A bioretention area, shown above just after construction, captures and treats runoff from the school's rooftop.

RUMNEY MEMORIAL SCHOOL. Rumney Memorial School is located on Shady Rill Road, Middlesex, which runs parallel to Martin's Brook (locally called Shady Rill). Rumney's campus is composed of a terraced school yard, gravel parking lot and drop off area, and a building with a footprint of slightly more than half an acre. To the east of the building, stormwater from the roof flows out of under-sized gutters onto the sidewalk, then picks up sediment from the drop off area before flowing into an actively eroding roadside ditch. To the west of the building, more runoff flows into a grass ditch and into a small pipe that runs under the road and into the school's property across the road. After a storm event, the field is saturated with water, and one can hear the water flowing from the field into Martin's Brook. The banks of Martin's Brook at this juncture are eroded and vegetation is failing.

Winooski NRC D sought to improve stormwater management at the school by diverting and filtering stormwater from the school's roof and hard surface areas into bioretention areas before it entered



The stormwater retrofit practice installed at the Rumney School, shown here a year after construction, treats runoff from more than one acre of previously unmanaged impervious surface.

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local waterways. Working collaboratively, Stone and a landscape architect partner supported completion of site and feasibility assessments. Together, we secured additional funding for engineering design and project implementation. The stormwater design improvements included a design focused on open channel flow, a retention practice sized for detention of up to the water quality volume (first 0.9 inches of rainfall), and safe passage of larger storm flows. Landscaping improvements focused on using native vegetation and creating a 'learning stream' demonstration element that was integrated with treatment practice design.

The improvements were constructed in the summer of 2016. Stakeholders including Rumney School facilities staff, students, and parents regularly complete routine maintenance for the constructed practice. Stone remains in dialogue with Winooski NRC and Vermont DEC regarding improvements within the drainage area to further reduce runoff volumes reaching Martin's Brook from Shady Rill Road.