

# Towns of Hardwick and St. Johnsbury Stormwater Management Planning and Implementation



## Services / Expertise

Urban Retrofit Planning  
Stormwater Project Scoping  
Stormwater Project Engineering and Design  
Developed Lands Erosion Control  
Open Channel Drainage System  
Stakeholder Coordination  
Project Permitting  
Construction Phase Engineering

## Markets

Watershed Organizations  
Local and Regional Governments

## Project Location

Hardwick, Vermont  
St. Johnsbury, Vermont

## Date Completed

2015–present

## Project Owner

Caledonia County Natural Resource  
Conservation District

## Stone Project ID#

18-072, 16-138, 15-215

## Project Manager

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## Project Team

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*Implementation of Oak Street GSI project identified in St. Johnsbury's stormwater master plan included construction of a bioretention swale with an underdrain at the drain outlet designed to allow water that is unable to infiltrate to flow to the stormwater collection system (left) and photo of a bioswale following construction (right).*

STONE worked with the Caledonia County Natural Resources Conservation District (CCNRCD) to support the Towns of St. Johnsbury and Hardwick in developing stormwater master plans for core areas within each Town. In both cases, stormwater problem areas and strategic retrofit opportunities identified through screening were carried through a detailed examination and prioritization process that considered possible regulatory changes, future growth, and the suitability of different types of best management practices to each problem area. In consultation with the Towns, CCNRCD staff, and key stakeholders including property owners, Vermont DEC, and VTTrans, a series of high-priority projects (six in St. Johnsbury and two in Hardwick) were advanced to preliminary design, including the development of 30% engineering designs, opinions of probable cost, and identification of permitting needs.

Stone's engineers designed a series of bioswales in the Oak Street neighborhood in coordination with a planned combined sewer separation project to complete a complex, high-priority project identified in St. Johnsbury's stormwater master plan in 2018. The final design of the bioswales included site evaluation and development of standard details for infiltrating and underdrained bioswales. Stone performed pre-construction coordination and construction inspection services for the bioswales in close coordination with the engineering firm in charge of the larger sewer separation and waterline replacement project. The Oak Street Neighborhood project was the first in Vermont to combine neighborhood-scale green infrastructure with "gray" infrastructure to reduce combined sewer overflow events and received an Engineering Excellence Merit Award from the Vermont chapter of the American Council of Engineering Companies in 2019.

In Hardwick, Stone worked with CCNRCD to advance the two high-priority stormwater retrofits identified in the Town's Stormwater Master Plan. One of the priority retrofits was a gravel wetland stormwater treatment system at the Hazen

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Union High School. The campus includes a large school building with approximately 2 acres of rooftop area, tennis courts, parking lot and associated access roads and driveways, and a large athletic field. Due to poorly draining soils, presence of bedrock, and a shallow seasonal high groundwater table, this area of the recreational fields is wet throughout the entire year. The existing paved swale provides conveyance but no water quality treatment or peak flow control of stormwater runoff. The gravel wetland designed and constructed in 2019 to replace the paved swale now provides water quality treatment for a drainage area of 3.4 acres, of which 1.6 acres is impervious parking lot, driveway, and tennis courts. The design accommodates 100% of the water quality volume for a 1" storm event, provides water quality treatment including sediment and phosphorous removal, and provides storage and velocity reduction of runoff during storm events.



*Stone developed final designs and provided construction oversight for the Hazen Union gravel wetland in Fall 2019.*

Stone also developed restoration designs for an eroding drainage channel along VT Route 14 near Bessette Storage in Hardwick, Vermont. The site was an unnamed tributary to Coopers Brook that served as a drainage ditch conveying intermittent stream flow and storm runoff from roughly 111 acres and delivering heavy sediment loads to the Fluvial Erosion Hazard Area of the brook. Our design re-sized the channel to accommodate bankfull flows (1.6 to 2-year peak flow events) and added floodplain benches to accommodate up to the 100-year peak flow event. A pool and step were included on the upstream end, providing easily-maintained sediment trapping. The vegetation plan specified salt-tolerant plants with limited growth heights to adhere to highway sight distances. Stone worked with project stakeholders to minimize resource conflicts, address obstacles for permitting, ensure feasible operation and maintenance requirements, and secure landowner support. Site meetings and consistent communication with adjoining landowners, the DEC Watershed Planner, Rivers Program, Wetlands Program, VTtrans (District Office and MOB), and other stakeholders provided a forum to report progress and address concerns as they arose, keeping the work on track for completion. Project benefits include increased channel roughness, lower channel velocities, a significant increase in channel conveyance, and increased resiliency during storm events. Stone completed designs in 2019; provided construction specifications, bid documents and contractor selection support in early 2020; and provided construction oversight in the summer and fall of 2020.



*The drainage ditch along VT Route 14 in Hardwick carrying flow and runoff from a 111- acre drainage to Cooper Brook before (left) and after (right) channel and floodplain restoration improvements were completed in 2020.*