
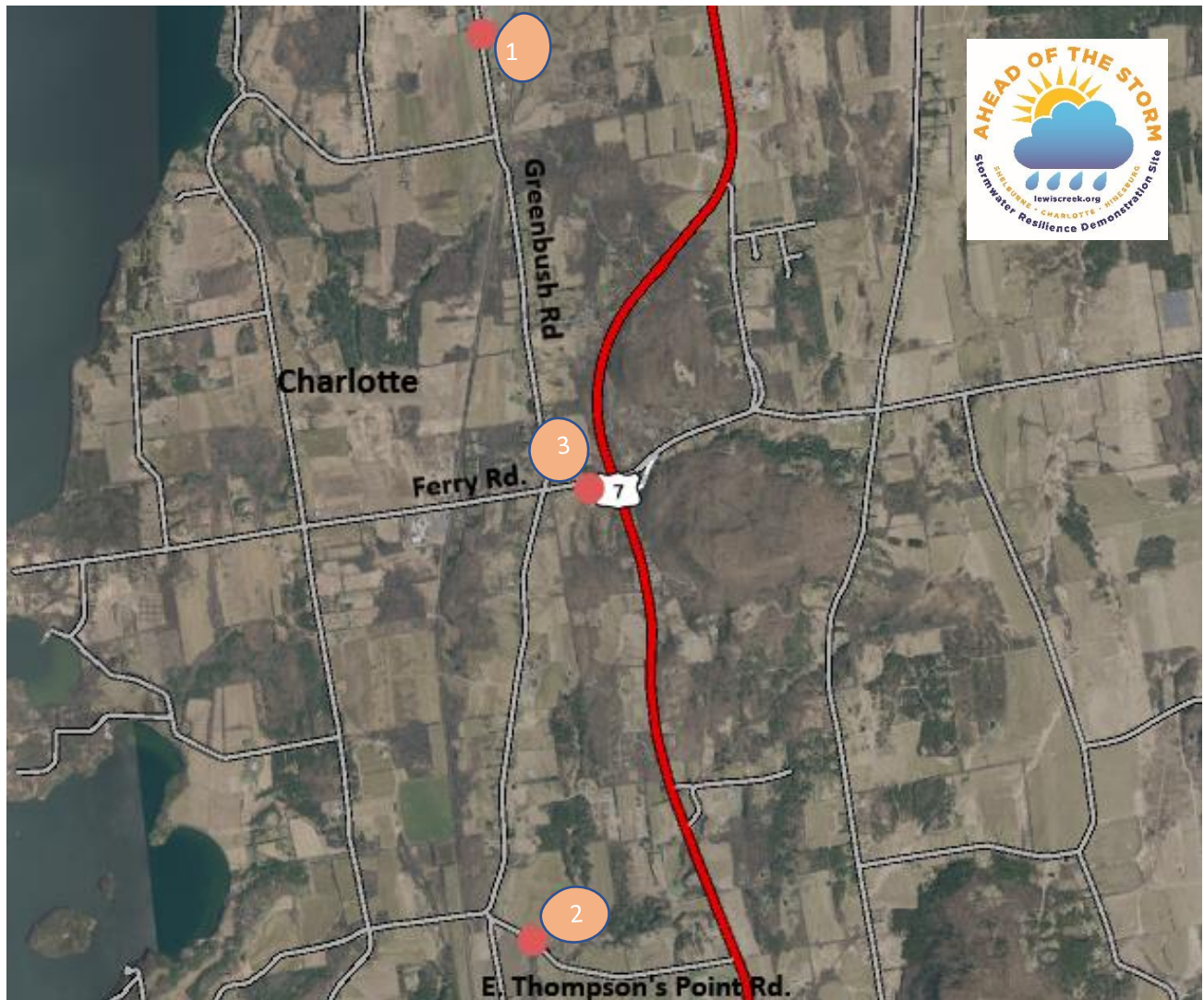


Ahead of the Storm Charlotte Bike Tour

 8.8 miles
1.5-2 hour transit time



Tour Stops

1. DuBrul Residence, 845 Greenbush Road
2. East Thompson's Point Road
3. Charlotte Library, 115 Ferry Road



1. DuBrul Residence

Rain garden/Bio-retention area

845 Greenbush Road

From the Charlotte Library, head west on Ferry Road. At the four-way stop, take a right on Greenbush Road. The house is 2 miles ahead on the right. Look for the “Ahead of the Storm” sign on the mailbox.



2. E. Thompson’s Point Road

Upgraded swale
Upgraded culvert
Stone check dams
E. Thompson’s Point Road,
about 300 yards south of
Greenbush Road

From the DuBrul Residence, head south on Greenbush Road for 3.8 miles. Turn left onto E. Thompson’s Point Road. Look for the “Ahead of the Storm” sign on your left towards the bottom of the first hill.

3. Charlotte Library

Bio-retention area (rain garden)
Rain barrels

115 Ferry Road, Charlotte

From E. Thompson’s Point Road, head west, then turn right (north) on Greenbush Road. At the four-way stop, turn right on Ferry Road. Turn right into the Town Hall and Library parking lot. Look for the “Ahead of the Storm” sign in the rain garden near the library entrance (southeast corner of library).





Introduction

Ahead of the Storm (AOTS) grew out of a group of citizens from Charlotte, Hinesburg, and Shelburne who were concerned about the serious decline of Lake Champlain's health and water quality. Stormwater runoff from driveways, fields, parking areas, and lawns is a major factor in the deterioration of our water quality. Most impervious surfaces were created before regulations requiring water quality treatments were in place or fall below regulatory thresholds. Therefore, runoff is not managed to remove pollutants or slow flows and soils and phosphorus are mobilized and end up in Lake Champlain. AOTS helps communities change the way stormwater is managed on properties to reduce water pollution and be more prepared for extreme weather events and impacts of climate change. Fifteen municipal, educational, and private properties have been selected to become demonstration sites to showcase more optimal conservation practices in a variety of landscape settings. Monitoring and stewardship over time is crucial to successfully addressing water quality issues.

Examples of some constructed *Ahead of the Storm* demonstration sites:



Filter strip off Shelburne Community School parking lot slows down and filters water before it reaches the swale and McCabe's Brook



Check dams along a roadside swale slow down water before it reaches Thorp Brook



Rain garden alongside a residential road helps clean stormwater before it drains to Munroe Brook



Ahead of the Storm

DuBrul Residence Rain Garden

845 Greenbush Road, Charlotte

Why here?

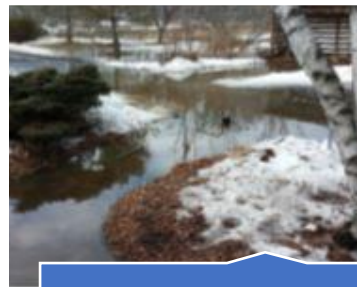
Water quality sampling results note very high phosphorus and turbidity in the Holmes Brook watershed. Therefore, the purpose of this design was to slow water flows and filter pollutants while avoiding water damage to the house. The DuBrul residence experienced water damage at their garage and front house entrance during large rain and snow melt events. Previously, runoff from the road, adjacent property, driveway, and front yard collected near the house, draining a total of 5 acres of land. This stormwater flows to Holmes Creek and discharges to Lake Champlain at the Charlotte Town Beach.

The DuBrul property is an ideal location to treat stormwater from multiple locations. The rain garden is visible from the road, so neighbors and people driving by can view it. The design slows water down, increases capacity to treat larger volumes and filters runoff while largely maintaining mature fruit trees, avoiding underground utilities, and reducing maintenance needs.

Before construction photos:



Runoff from the road and adjacent property flows toward DuBrul property



Water puddled in front of home



Bio-retention area identified adjacent to driveway

Design: how can we filter the water?

The landowner took initial steps toward stormwater treatment by hiring Landscape Design, Inc. to do an initial survey and concept design for the rain garden. Engineers at Milone & MacBroom advanced the concept to a final design with the goal to capture and treat stormwater, protect water quality, and reduce the potential for flood damage at the house.

This design creates a bio-retention area (or rain garden) in the front lawn to treat runoff from existing impervious surfaces; it slows runoff, increases water storage, retains sediment, promotes infiltration, and redirects flow away from the house and garage. Runoff calculations indicate that the rain garden treats the runoff from the 1-inch rain storm that occurs during 90% of all rain events.



Take a tour of the AOTS locations at lewiscreek.org!

Implementation

Implementation occurred in Fall 2017 by Junior Lewis Excavating. Several trees and hedges were removed and an attractive depression was dug to create the bio-retention area north of the driveway to store water. Flowering native perennials were planted and stones were placed at the rain garden outlet to control the ponding level.

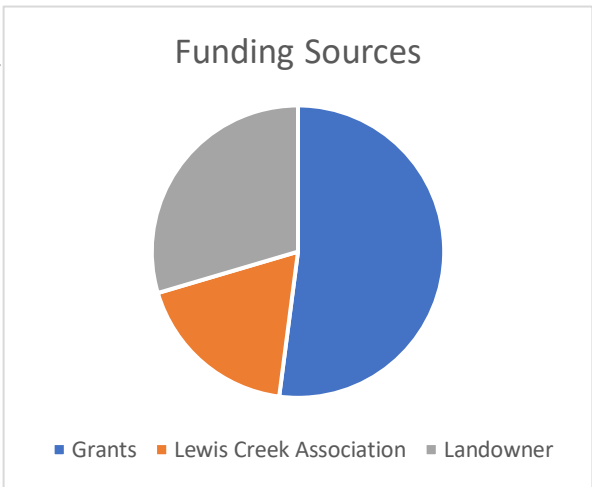
After construction photos:



How much did it cost?

Funding for this project occurred in phases:

- Survey and Concept Design: Paid for by landowner
- Final design \$8,500
- Implementation \$4,828
- Outreach \$3,000
- Total \$16,328**





Ahead of the Storm

East Thompson's Point Road / Thorp Brook

East Thompson's Point Road, Charlotte

Why here?

Water quality sampling results note very high phosphorus and sediment in the Thorp Brook watershed due to poorly infiltrating clay soils and historic/present agricultural use. Therefore, the purpose of this design is to slow flows and filter pollutants from stormwater runoff before it enters Thorp Brook. Thorp Brook empties into Lake Champlain at Town Farm Bay about a mile downstream. This spot on the east side of East Thompson's Point Road drains 17.3 acres of agricultural land, residential property, and roads. The drainage ditch next to the road was undersized and eroding and caused water to overtop and erode the adjacent field.

The treatment area is adjacent to Mack Farm and is part of the Town of Charlotte Right of Way. This highly visible location allows residents driving by to see this practice at work.

Before construction photos:



Rill erosion has occurred in the Mack farm field when water cuts across the field



The undersized vegetated swale along E. Thompson's Point Road



Runoff from Greenbush Road and homes travels through this site to Thorp Brook

Design: how can we filter the water?

Water traveling through this site needed to be slowed down to reduce erosion, sediment, and high levels of pollutants entering Thorp Brook. Rather than just improving water quality and flood resiliency for today, this design was created to account for more frequent and larger storms expected in the future due to climate change. Engineers created a three-cell bio-retention area by installing stone filter berms to slow water and capture sediment and nutrients. Swales leading to the bio-retention area were designed to be larger, with a "U" shape instead of a "V" shape to reduce erosion. Swales are vegetated where the slope allows, so plants can help soak up water and nutrients. Where steeper, the swale is rock-lined with check dams to eliminate erosion and trap sediment. The undersized culvert was replaced with a large culvert to accommodate high water events.

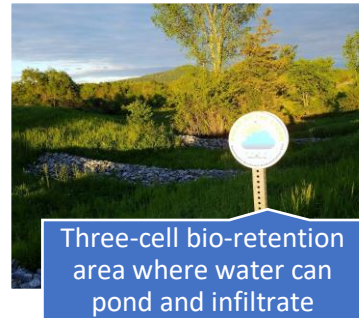
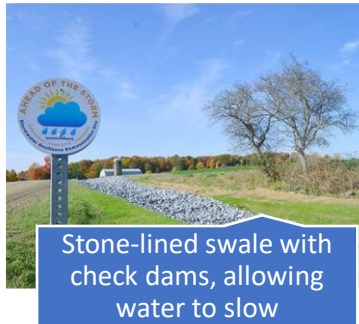


Take a tour of the AOTS locations at lewisecreek.org!

Implementation

Implementation occurred in Summer 2016 by Junior Lewis Excavating. The site was excavated to increase the swale (to the west/left when looking at the sign from the road) and create bio-retention areas (directly in front of and down the hill to the right of the sign). The culvert at the crest of the hill (west of the sign) was upsized, and the adjacent part of the swale was stone lined. Stone filter berms and check dams were installed and erosion matting and seeding were put in place.

After construction photos:



How much did it cost?

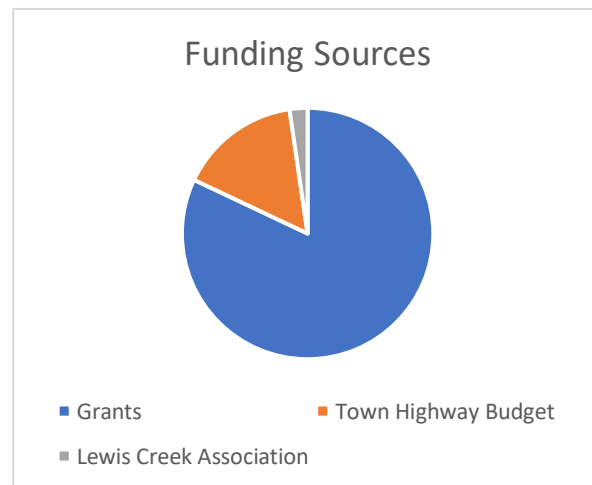
Funding for this project occurred in phases:

Concept Design \$8,400

Final Design (not required)

Implementation \$34,000

Total \$42,400





Ahead of the Storm

Charlotte Library
115 Ferry Road, Charlotte

Why here?

Runoff from the Charlotte Library's 6,200 square foot building and associated driveway and sidewalks left the property untreated. Stormwater runoff flowed overland offsite either across the driveway to a swale which flows to Thorp Brook or to a newly installed trench drain on the Village Green leading to Pringle Brook, a tributary of Holmes Brook. Thorp Brook has shown high levels of nutrient and sediment loading, brought in part by stormwater. Runoff is unable to infiltrate into the lawn based on poorly draining soils.

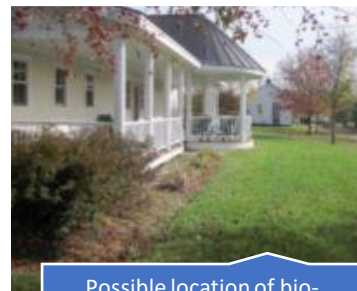
Before construction photos:



West side of the library



Possible location of bio-retention area between 2 trees in lawn area



Possible location of bio-retention area to west of building, using existing bed

Design: how can we filter the water?

In order to improve water quality, engineers at Milone & MacBroom created designs to slow runoff, increase infiltration, and enhance vegetation on the half-acre property. The designs included bio-retention areas in existing landscaped beds on the west side of the building to slow runoff and increase storage capacity, and a rain barrel to water the gardens and flower beds from the untreated water coming off the roof. Since soils are tight and the water table is high at this site, infiltration or underground treatment practices would not be effective.



Take a tour of the AOTS locations at lewisecreek.org!

Implementation

The library addition (constructed in 2020) somewhat altered the original designs, and included removing the library entrance driveway, replacing soil in the area, and installing gutters, rainbarrels, pipes, and a bio-retention area east of the building. This removed a net 0.06 acres of impervious and provided treatment for 0.14 acres of runoff from the roof. Additional bio-retention areas are planned for the west roof runoff.

After construction photos:



Bio-retention area east of building with rain barrels (where former entrance driveway was)



Bio-retention area planned for this west side of building; runoff from sidewalk sheet flows into vegetation



Gutter, downspout, and installed rain barrel for garden watering

How much did it cost?

Funding for this project occurred in phases:

- Survey and Concept Design \$3,900
 - Planning and Design Phase II \$0 (volunteer)
 - Implementation \$20,000
- Total \$23,900**

