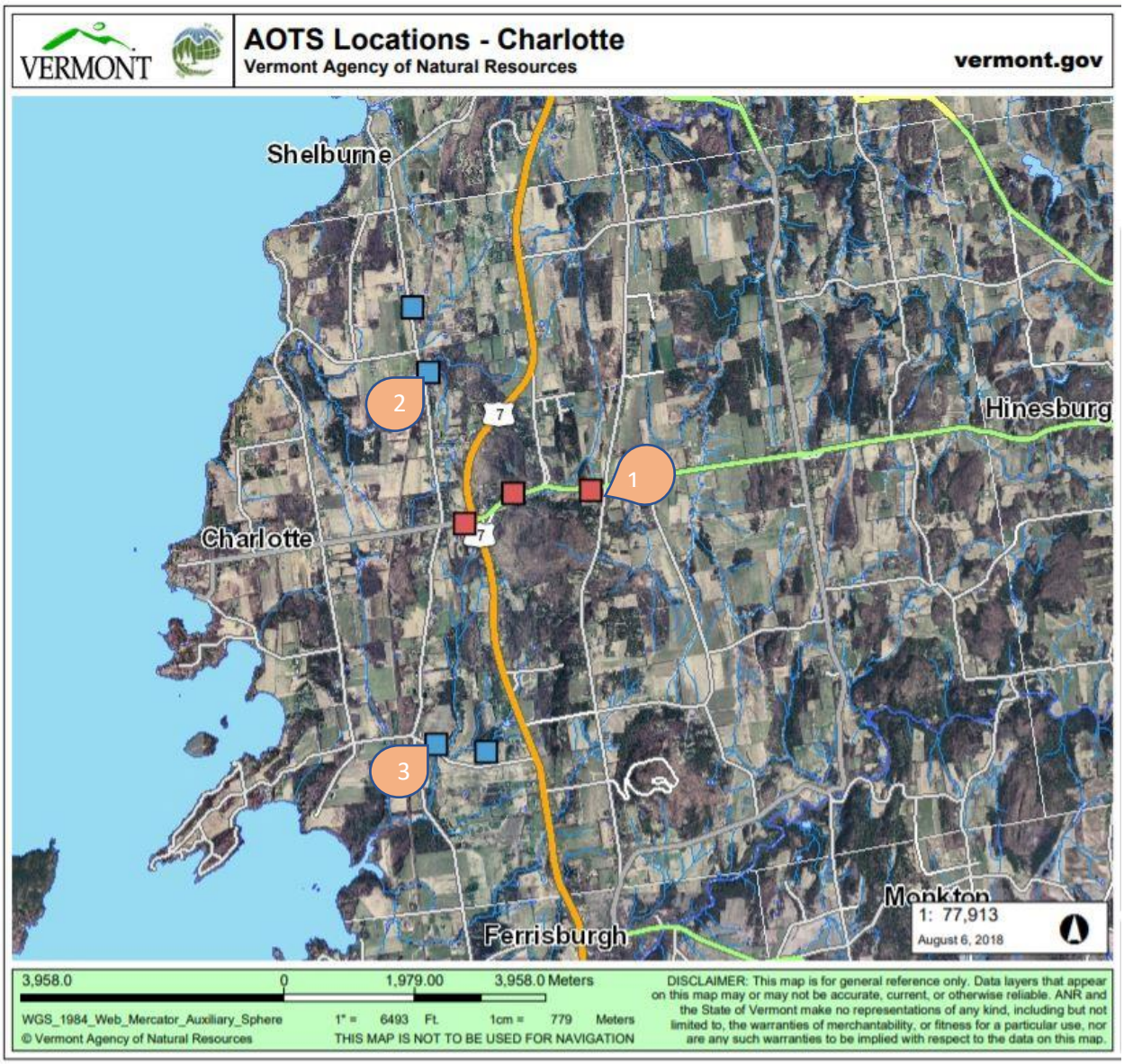
Ahead of the Storm Self-Guided Tour: Charlotte



Site Location Key

- Design and Implementation complete
- Final design complete, "shovel-ready"
- Concept design complete

Tour Stops

1. Charlotte Central School
2. DuBrul Residence
3. E. Thompson's Point Road

Charlotte Tour Stops

1 hour transit time

20 minutes transit time

1. Charlotte Central School

Bio-retention area
Sediment forebay
Infiltration trench

408 Hinesburg Road, Charlotte

Located just west of the intersection of Mt. Philo Road and Hinesburg Road. Look for "Ahead of the Storm" signs behind the Quonset Hut, and on the playground.

2. DuBrul Residence

Rain Garden/Bio-retention area

845 Greenbush Road

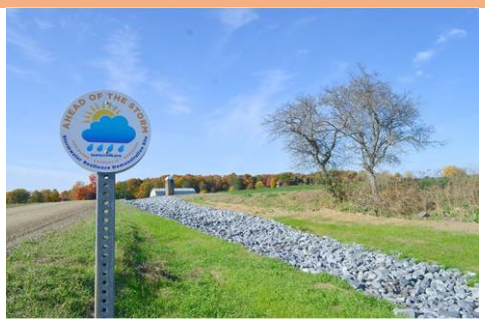
From CCS, head west on Hinesburg Road. Take a left on Church Hill Road. Continue straight to Ferry Road. Take a right on Greenbush Road. The house is 2 miles down on the right. Look for the "Ahead of the Storm" sign on the mailbox.

3. E. Thompson's Point Road

Upgraded swale
Upgraded culvert
Stone check dams

E. Thompson's Point Road, about 100 yards south of Greenbush Road

From the DuBrul Residence, head south on Greenbush Road for just over 3 miles. Turn left onto E. Thompson's Point Road. Look for the "Ahead of the Storm" sign towards the bottom of the first hill.



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Lake Champlain Basin Program

NEIWPCC
New England Interstate Water Pollution Control Commission

Ahead of the Storm

Charlotte Central School Stormwater Retention

408 Hinesburg Road, Charlotte

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.

Why here?

Charlotte Central School is located on Hinesburg Road and all the stormwater runoff from the school flows to McCabe's Brook. Currently runoff from the roof, parking lots, driveways, playgrounds, and fields is collected in a series of swales, catch-basins, underdrains, and pipes that drain to the northwest to a Vermont Class Two wetland along McCabe's Brook. McCabe's Brook drains to Shelburne Bay, and has elevated levels of phosphorus, turbidity, and E. coli. Runoff travels directly from impervious surfaces to the pipe network with no treatment. It is crucial that the headwaters of McCabe's Brook do not get overloaded with sediment and pollutants so the Brook can function properly. Students, teachers, and staff at the school have been involved in identifying the best spots on campus for stormwater treatment.

Runoff from the school travels overland and through pipes untreated to a wetland

Runoff from parking area travels down the path, carrying sediment and causing erosion

Runoff from the east parking area and part of the roof collect at the southeast building corner

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

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Design: how can we filter the water?

Since Charlotte Central School has a large campus with a lot of impervious surface, several places were identified to develop water treatment designs. Each of these designs slow the flow of water and allow pollutants to settle out, which treats the water before entering pipes that drain to McCabe's Brook. To address the water coming off the east parking lot and roof, engineers recommended a rain garden to capture gravel and sediment. An infiltration trench will reduce erosion and capture sediment from the path and playground. To address the water coming off the west parking lot and roof an underground system near the Quonset Hut will likely be required to avoid the wetland and existing school uses.

Implementation

This project will be completed in phases, with final design of the east parking lot raingarden and playground area infiltration trench as Phase I to be completed in 2019. Installation of these two treatment features and design of treatment for the west area will be completed later, dependent on funding.

Sixth grade students present a poster about stormwater design to classmates

Students and engineers consider alternatives to existing runoff

Students hold a live willow stake they planted to trap sediment from the parking lot

How much did it cost?

Funding for this project occurred in phases:

Concept Designs $7,500

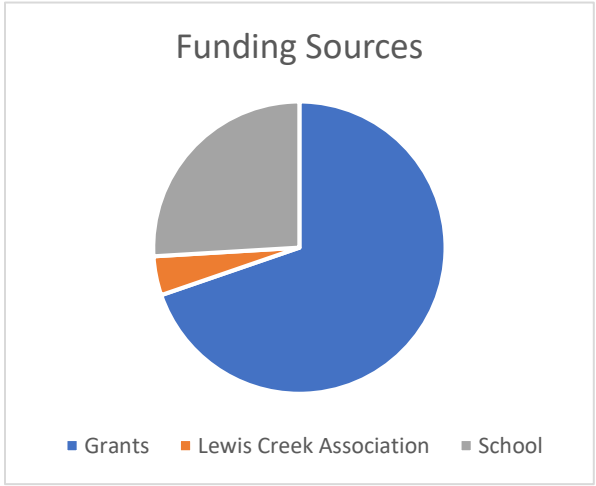
Final Designs (two) $21,000

Estimated Implementation

East Raingarden $37,000

Infiltration Trench $27,000

Total $92,500



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Ahead of the Storm

DuBrul Residence Rain Garden

845 Greenbush Road, Charlotte

Introduction

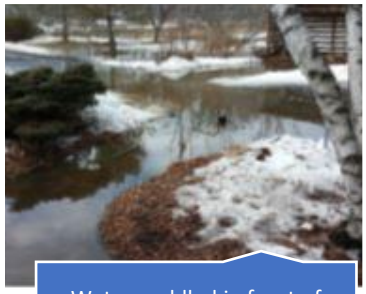
Ahead of the Storm (AOTS) grew out of a group of citizens from Charlotte, Hinesburg, and Shelburne who were concerned about the serious decline of Lake Champlain's health and water quality. Stormwater runoff from driveways, fields, parking areas, and lawns is a major factor in the deterioration of our 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.

Why here?

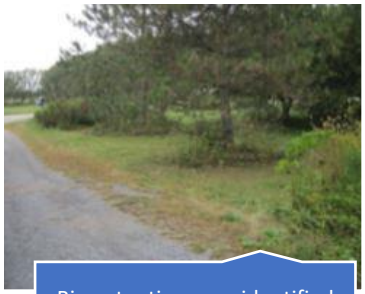
Water quality sampling results note very high phosphorus and turbidity in the Holmes Brook watershed. Therefore, the purpose of this design was to slow water flows and filter pollutants while avoiding water damage to the house. The DuBrul residence experienced water damage at their garage and front house 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 then flows to Holmes Creek and then discharges to Lake Champlain at the Charlotte Town Beach.

The DuBrul property is an ideal location to treat stormwater from the town road. The rain garden is visible from the road, so neighbors and people driving by can view it and see it in action. 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.

Runoff from the road and adjacent property flows toward DuBrul property



Water puddled in front of home



Bio-retention area identified adjacent to driveway

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

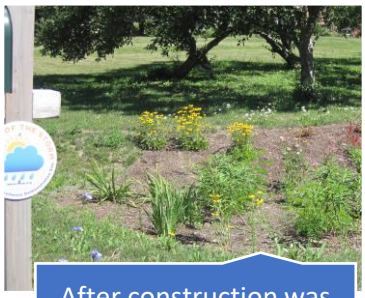
Design: how can we filter the water?

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 bio-retention area treats the runoff from the 1-inch rain storm that occurs during 90% of all rain events.

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 was completed in Fall 2017

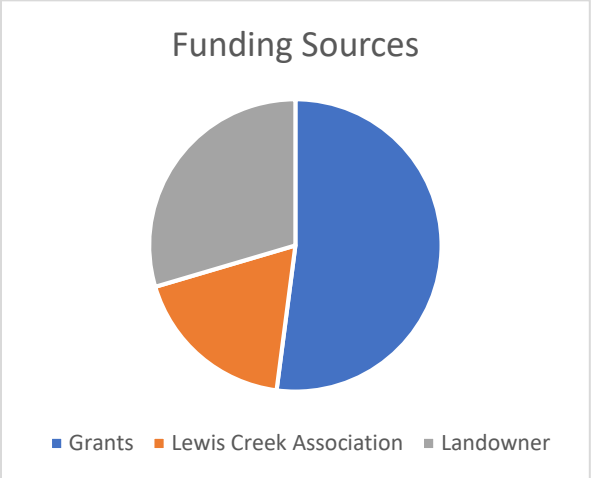
Water is contained in the bio-retention area after a rain event

Spring Melt: water can slowly infiltrate the soil instead of running off

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**



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Ahead of the Storm

East Thompson's Point Road / Thorp Brook

East Thompson's Point Road, Charlotte

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.

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 entering 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.

Rill erosion has occured 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

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

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Design: how can we filter the water?

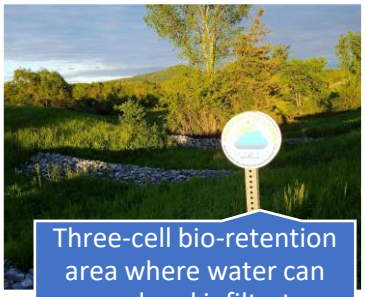
To reduce the erosion and transport of sediment occurring, along with a high level of pollutants entering Thorp Brook, the water traveling through this site needed to be slowed down. Rather than just improving water quality and flood resiliency for today, this design was created to account for more frequent and larger storms expected in the future from 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.

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.

Stone-lined swale with check dams, allowing water to slow

Enlarged swale with vegetation starting to fill in west of the culvert



Three-cell bio-retention area where water can pond and infiltrate

How much did it cost?

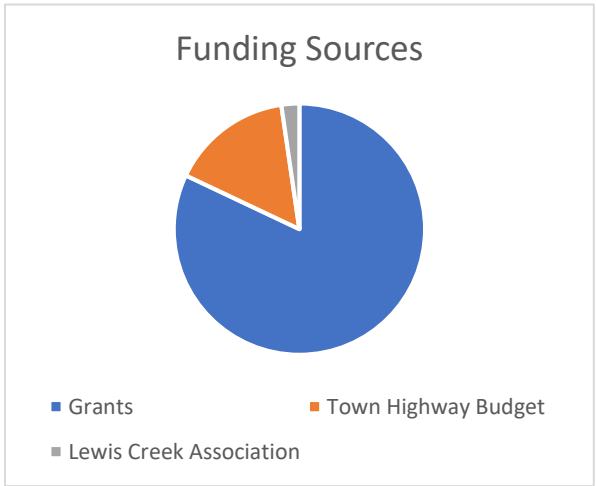
Funding for this project occurred in phases:

Concept Design $8,400

Final Design (not required)

Implementation $34,000

Total $42,400



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