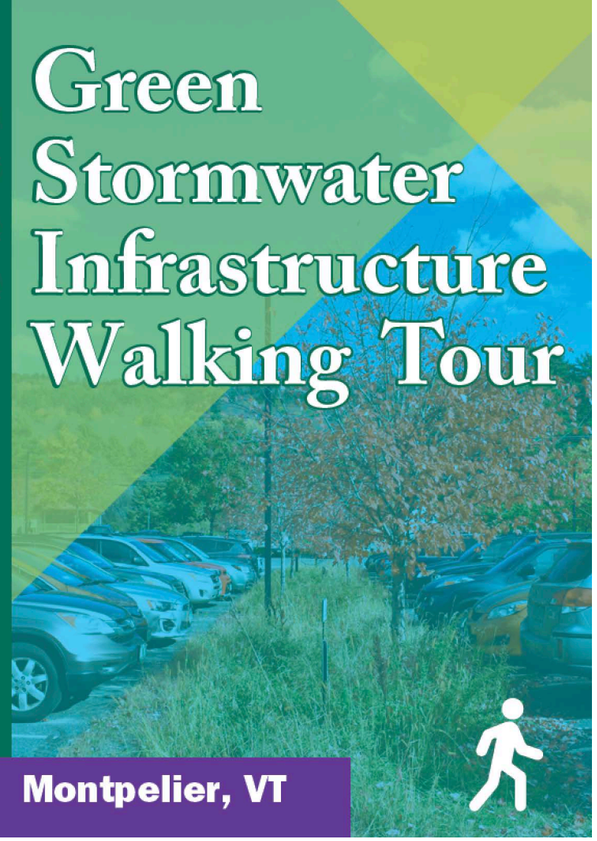
Green Stormwater Infrastructure Walking Tour



Montpelier, VT

This map was developed by University of Vermont Rubenstein School of Environment and Natural Resources student, Colin Brown, with Lake Champlain Sea Grant, UVM Extension, Friends of the Winooski River, Montpelier Conservation Commission, Winooski Natural Resources Conservation District, SE Group, and Vermont Department of Environmental Conservation. Thanks to all who helped execute this project including the businesses and organizations that allowed us to feature their GSI projects.

This project was funded by Lake Champlain Sea Grant, which is supported by the National Oceanic and Atmospheric Administration National Sea Grant College Program, U.S. Department of Commerce and administered by the University of Vermont and SUNY Plattsburgh. Printing of this publication was partially funded by an agreement awarded by the Great Lakes Fishery Commission to NEIWPCC in partnership with the Lake Champlain Basin Program.

Sea Grant Lake Champlain

THE UNIVERSITY OF VERMONT EXTENSION

Friends of the Winooski River

WINOOSKI Natural Resources Conservation District

VERMONT AGENCY OF NATURAL RESOURCES Department of Environmental Conservation

MONTPELIER CONSERVATION COMMISSION

Lake Champlain Basin Program

NE IW PCC

A great deal of credit is owed to the City of Portland, Oregon and its Stormwater Cycling Tour Map, which served as the inspiration for this version.

COVER PHOTO: COLIN BROWN

Green Stormwater Infrastructure

When it rains in a city, water hits impervious surfaces such as roofs, roads, driveways, and sidewalks and runs over them, carrying pollutants to waterways. This runoff is called stormwater. In non-urbanized areas, most of the rain that falls filters into the ground to be used by trees and vegetation or to recharge the groundwater supply. Green Stormwater Infrastructure (GSI) works by mimicking natural conditions. Specific locations in urban areas are identified where vegetation, soils, and porous substrates are used to soak up stormwater. Using GSI to manage stormwater not only helps to improve water quality, but also beautifies cities.

Practices you will see on this tour:

STORM-FRIENDLY PAVEMENT
a type of pavement that allows rainwater to filter through it rather than running across its surface and picking up pollutants along the way. Permeable Pavers, Porous Concrete, and Stormcrete® are all examples of storm-friendly pavement.

STORMWATER VELOCITY REDUCERS
structures (e.g., planted vegetative beds) that help to slow down the speed at which stormwater reaches local waterways. This practice is particularly effective during large rainfall events when flash flooding can occur.

LARGE TREES IN THE URBAN CANOPY
trees that intercept and absorb rainfall, reducing the amount of polluted water that enters waterways from impervious surfaces.

RAIN GARDENS AND BIORETENTION BASINS
depressed vegetated garden areas designed to accept stormwater runoff from roadways, driveways, parking lots, and roofs and enable some of this runoff to soak into the ground. The water that exits these systems is cleaner than the stormwater that enters it.

RIPARIAN BUFFER RESTORATION PROJECTS
projects that restore vegetation on the banks and riparian areas of streams and rivers to minimize soil erosion and therefore the movement of nutrients to surface water during large storm events.

EDUCATIONAL SIGNAGE

If you feel inspired to take action to install or maintain a green infrastructure practice on your land or in your community, visit the websites of the project sponsors to learn about current volunteer opportunities or to obtain guidance to help make your inspiration a reality.

Curb Cuts & Winooski River

PHOTO: MICHELE BRAUN

Permeable Pavement at VNRC

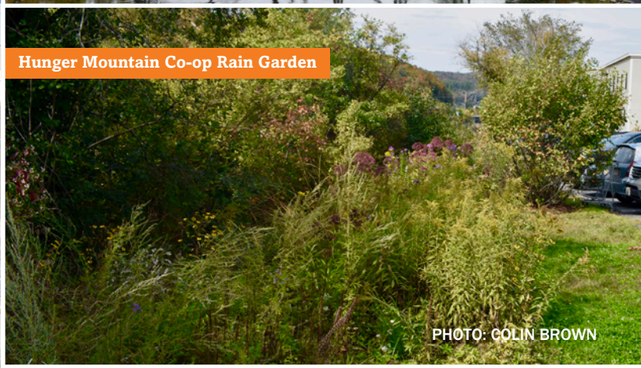
PHOTO: COLIN BROWN

Winooski Bridge

PHOTO: COLIN BROWN

Historic Flood Marker

PHOTO: PAGE GUERTIN



Hunger Mountain Co-op Rain Garden

PHOTO: COLIN BROWN

Rain Garden at VSECU

PHOTO: COLIN BROWN

Bioretention Basin at 133 State St

PHOTO: COLIN BROWN

Elementary School Rain Garden

PHOTO: COLIN BROWN

Rain Garden at CCV

PHOTO: KRISTINE STEPENUCK

Green Stormwater Infrastructure (GSI) simulates the natural hydrology of the area. Maintaining the hydrology of the land, even as we develop, is good for water quality.

Along this tour you will visit and learn about a variety of green stormwater infrastructure (GSI) practices and required maintenance. You will see bioretention basins/rain gardens, curb cuts, permeable pavement, and vegetated buffers. These GSI practices provide stormwater management and co-benefits such as wildlife habitat, urban heat island mitigation, and pollinator foraging sites. You will also see evidence of historic flooding in Montpelier and learn about the connection between land use here and water quality in Lake Champlain.

All sites on this map are visible from a road or public right of way. Please use caution as you make your way from site to site. Consider bringing a trash bag to help maintain the sites.

Highlights of Montpelier's Green Stormwater Infrastructure

1 BIORETENTION BASIN

133 State St parking lot

This bioretention basin was completed in 2010 as part of a suite of GSI demonstration projects across many state capitols. The basin includes curb cuts that direct water to it from the parking lot. Its specialized plants filter and clean stormwater runoff and reduce runoff that reaches the nearby Winooski River. Rain gardens should be regularly maintained during summer by removing weeds, which may inhibit growth of native plants.

2 PERMEABLE PAVEMENT AT VERMONT NATURAL RESOURCES COUNCIL (VNRC)

9 Bailey Ave

Permeable pavement allows stormwater to filter into the ground through openings in a solid lattice structure that is planted with grass and underlain by gravel. Permeable pavement requires regular vacuuming using industrial equipment to maintain its beneficial functions. Unfortunately, this was not known in the 1990s when this permeable pavement was installed. As a result, this lot has lost its permeability. Nonetheless, it continues to help minimize the urban heat island effect as its light color and grass-filled openings keep stormwater runoff cooler than runoff from dark-colored asphalt that absorbs heat from the sun. It also provides food to pollinators when the clover blooms.

3 RAIN GARDEN AT VSECU

Intersection of Bailey Ave and Siboinebi Trail (multi-use path)

This beautiful rain garden, installed in 2019, was designed to collect runoff from a specific drainage area and acts as a buffer for the Winooski River. The most common plants are coneflower, butterfly weed, and coral bells, although there are almost twenty species planted. The grasses and goldenrod take up and degrade toxins such as hydrocarbons that come from asphalt and vehicles. Rain gardens should be inspected regularly to look for areas of erosion and failing plants. Plants and mulch should be added or replaced as needed.

4 THE WINOOSKI RIVER

Along the Siboinebi Trail to the Guertin Pocket Park footbridge and on to the Transit Center

This is one of the largest tributaries to Lake Champlain, contributing 10% of the lake's volume each year. It flows 90 miles from its source in Cabot to its outlet in Colchester, VT. Due to its size, it impacts Lake Champlain more than many other tributaries. As Montpelier sits on its banks, land uses here can significantly influence how clean the river is, and in turn, how clean the lake is. Efforts of businesses, individuals, and governments to build and maintain GSI practices in Montpelier are important to protect both the river and the lake.

5 CURB CUTS, BIORETENTION BASINS AND RIPARIAN BUFFER AT THE TRANSIT CENTER

Taylor St

Look between the transit center and the path to find these subtle GSI practices—installed in 2019—that filter pollutants from the parking lot runoff. A bit of trivia about about curb cuts is that they were first designed to help disabled World War II veterans access sidewalks. To maintain curb cuts, check for sediment, debris, or trash build up, which can limit stormwater entry to the basin.

6 RAIN GARDEN AT HUNGER MOUNTAIN CO-OP

623 Stone Cutters Way

This rain garden, installed in 2013, is designed to collect and infiltrate about 90% of runoff from the parking lot. To maintain this rain garden, the catch—a grate that collects trash and other debris as it enters the rain garden—is cleaned out every two years. Additional plants are occasionally added to ensure it can effectively absorb stormwater.

7 RAIN GARDENS AT UNION ELEMENTARY SCHOOL

1 Park Ave

To address stormwater runoff from two steep and mostly paved slopes that drain towards the school, two rain gardens were installed in 2019. These contain gabion baskets, which are rectangular boxes made with woven wire mesh and filled with stone. These help stabilize the steep edges of the rain garden. Water-loving plants installed between them help use and infiltrate stormwater and minimize runoff. Gabions should be checked over time to ensure the wire mesh is not damaged and that vegetation is not causing damage to the box.

8 HISTORIC FLOOD LEVELS MARKER

Langdon St bridge over the North Branch Winooski River

Historic floods in Montpelier are marked by a post that delineates extreme high-water marks. The North Branch was straightened and channelized, disconnecting it from its floodplain, which provided a place where floodwaters could slow and settle. As climate changes, extreme events have increased in number and intensity. Future flooding may be reduced if GSI practices are implemented widely in Montpelier and upstream.

9 OPTIONAL EXCURSION: BIORETENTION BASIN AT COMMUNITY COLLEGE OF VERMONT (CCV)

660 Elm St

Take the scenic route to get to CCV through Hubbard Park – observing the many large trees that intercept rainfall and minimize the urban heat island effect. At CCV, bioretention basins were installed in the parking lot in 2012. It provides habitat and food sources for wildlife. Standing stems and spent flower heads in the basin can be particularly valuable as a food source for birds and cover for wildlife during winter.

Sources:

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- *Vermont Department of Environmental Conservation. (2020). Winooski River Basin: A Story Map for the Tactical Basin Plan.*

View the online map!

To view this map and other communities' maps, visit:
www.uvm.edu/seagrant/gi-bike-map

LET @LAKECHAMPLAINSG KNOW ABOUT YOUR #MONTPELIERGSITOUR EXPERIENCE ON INSTAGRAM OR TWITTER OR EMAIL US AT SEAGRANT@UVM.EDU

GLOSSARY OF TERMS

Native plant – a plant that occurs naturally in a region, state, ecosystem, or habitat without direct or indirect human actions.

Evapotranspiration – the process by which water is transferred from the land to the atmosphere by evaporation from the soil, plants, and other surfaces.

Erosion – the process by which the surface of the Earth is worn away by the action of water, wind, and other natural events.

Riparian – the land alongside a stream or river.

Runoff – rainwater or snowmelt that runs across the land.

Urban heat island effect – the temperature discrepancy between built areas and nearby rural areas, where built areas are hotter because of man-made surfaces (e.g., pavement and buildings) that absorb and store heat.

ICONS

- *Storm-Friendly Pavement*
- *Stormwater Velocity Reducers*
- *Stormwater Trees and Urban Canopy*
- *Rain Gardens and Bioretention*
- *Riparian Buffer Restoration Projects*
- *Educational Signage*