

# Section 7

## Shoreland Best Management Practices

Bioengineering projects are critical to stabilizing eroding shorelines, preventing future erosion, improving lake health, and providing wildlife habitat. However, these restoration projects often must be paired with upland practices that slow, intercept, infiltrate, and clean stormwater to protect a newly installed shoreland stabilization project from being washed out. In areas where significant stormwater flows towards the shore, particularly from upland impervious areas like runoff from a roof or driveway, restoration projects should be protected by using stormwater best management practices (BMPs).

The following information provides an overview of common shoreland BMPs, which are the same suite of options that are used and often required through the Vermont Stormwater Program (see [Section 2](#) for more information about permitting). Sizing and siting of BMPs is especially important along sensitive shorelands to avoid over disturbing areas while ensuring proper functionality of the BMP. In general, all BMPs, whether required through a permitting program or installed voluntarily, are designed to provide water quality, groundwater recharge, and flow reduction functions. Appropriately sizing a BMP to perform these functions requires an analysis of the area of land draining to the practice, the amount of impervious area in the drainage area, and the permeability of the soils. Comprehensive information to guide proper sizing of BMPs can be found in the resources below:

- The Vermont League of City and Towns [Green Stormwater Infrastructure Tool Kit](#)
- Lake Champlain Sea Grant [Rain Garden Manual](#)
- [Vermont Guide to Stormwater Management for Homeowners and Small Businesses](#)
- [Green Stormwater Infrastructure \(GSI\) Fact Sheet](#)
- [Lake Wise BMP Fact Sheets](#)
- VTDEC Operations and Maintenance Manual
- [Shoreland Permitting Best Management Practices](#)



First year raingarden installed above a bioengineering project at Prouty Beach along Lake Memphremagog, Newport, VT.





Photo: VT ANR Lake Wise Program

## CULVERT PLUNGE POOLS

Stormwater that flows through culverts is usually traveling quickly and can be very erosive. A stone pool installed at the culvert outlet slows the water, reducing its erosive energy and allowing sediment to settle out, keeping it out of waterways.

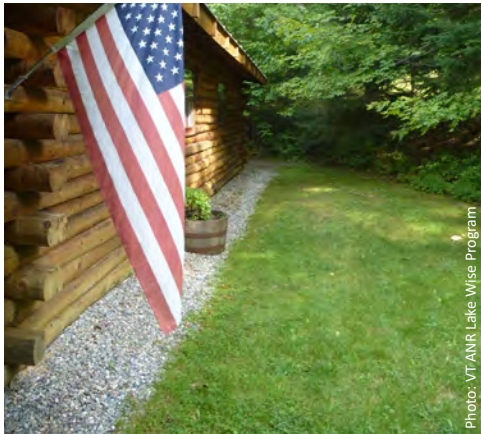


Photo: VT ANR Lake Wise Program

## DRIPLINE TRENCH

A trench of rock can be located below a structure's unguttered roof line to dissipate the erosive force of roof runoff and allow water to infiltrate into the ground.



Photo: Watershed Consulting Associates, LLC

## DRY WELLS

Dry wells consist of a hole that is dug and filled with stone. They can be installed in locations where stormwater is concentrated such as roof gutter downspouts to collect and infiltrate stormwater runoff.



Photo: VT ANR Lake Wise Program

## ESTABLISH A NO MOW ZONE

Landscaping dominated by mowed lawn provides little stormwater management or wildlife habitat benefits. Designating areas as low or no mow zones and even restricting lawn solely to pathway areas ("mow where you go") help protect shoreland projects and dissipate stormwater runoff.



Photo: VT ANR Lake Wise Program

## INFILTRATION STEPS

Steps constructed out of pervious beds of gravel can capture, filter, and infiltrate stormwater runoff from sloped pathways. A set of well defined steps can also keep foot traffic from damaging nearby vegetated areas and causing additional erosion.



Photo: Watershed Consulting Associates, LLC

## INFILTRATION TRENCHES

An infiltration trench is a shallow, stone-lined channel that collects and infiltrates stormwater. This practice can disconnect stormwater from impervious areas like driveways and buildings from surface waters by collecting it and allowing it to sink into the ground.





Photo: Watershed Consulting Associates, LLC

## RAIN BARRELS

Rain barrels can be placed to collect and store stormwater from guttered roof downspouts. The water can be used later for activities such as irrigation.



Photo: Watershed Consulting Associates, LLC

## TURNOUTS

Turnouts interrupt runoff flow from sloped impervious surfaces like driveways and paths and direct that runoff to stable, vegetated areas. A depression can be dug at the end of the turnout to further slow stormwater and allow sediment to settle out.



Photo: Watershed Consulting Associates, LLC

## RAIN GARDENS

Rain gardens are planted depressions that capture runoff from areas such as rooftops, driveways, or parking lots. They slow, filter, and infiltrate runoff while irrigating plants in the garden. Rain gardens are an attractive way to treat runoff from impervious surfaces and also provide important pollinator plants for wildlife.



Photo: VT ANR Lake Wise Program

## VEGETATED SWALES

Swales are linear depressions where stormwater is collected and conveyed. In the depression, native, wet tolerant vegetation is allowed to grow. The vegetation filters and slows stormwater runoff as it flows through the swale while also providing wildlife habitat.



Photo: Watershed Consulting Associates, LLC

## STONE LINED DITCHES

Placing large rocks inside ditches in areas with significant slopes (>8%) can prevent erosion within the ditch itself, provide surface roughness to slow water velocities, and provide time for sediment to settle out of stormwater runoff as it moves downslope.



Photo: VT ANR Lake Wise Program

## WATER BARS

Water bars intercept water as it flows down unpaved paths or driveways and redirects it to stable, vegetated areas, mitigating erosion, preventing sediment from reaching waterways, and slowing and infiltrating stormwater.