

# Lake Wise Info Sheet



## Shoreland Best Management Practices for Lake-friendly Living.

### Benefits

- Water Quality
- Wildlife Habitat
- Prevents Erosion
- Slow, Spread, Sink Stormwater
- Visual Appeal
- Low Cost
- Low Maintenance
- Protection & Resiliency

Acceptable BMP under the Vermont Shoreland Protection Act

### Related Info Sheets:

- Vegetated Swales
- Filter Berms
- Downspout Disconnection & Rain Barrels

# RAIN GARDENS

## Upland stormwater management



Landscape for Life

### Description.

Rain gardens are both aesthetic and functional concave gardens with native plants that filter stormwater runoff, reduce erosion, and replenish groundwater.

Section drawing of a rain garden.

### Applicability.

Rain gardens are designed to capture and filter stormwater from developed areas. They collect water in bowl-shaped vegetated areas and allow it to slowly soak into the ground while native plants and soils filter out pollutants such as sediments and nutrients. Avoid areas with high groundwater tables, the bottom of the rain garden should be 3 feet or more above the seasonal high groundwater table and at least 1 foot above\*. Not recommended for steep slopes\*\*.

### How to.

1. Locate an open area where stormwater flows from roofs, driveways, pathways, lawns, or other developed areas via surface flow or from a pipe or swale. Avoid steep slopes.

Soils should be well drained; do not select areas where water regularly ponds. A rain garden should optimally infiltrate water at a rate of 1/2-inch per hour or soak in within 24-48 hours. If there isn't a well-drained area, e.g., areas with heavy clay soils, you can dig a larger or deeper depression and add a sandy soil filter bed mix to increase water retention capacity.

\*Underdrains can adapt rain gardens to function with high groundwater levels (within 3 feet of bottom) and low infiltration rates.

Select an area at least 10 feet away from existing structures (in most cases) or septic systems.

**\*\*If slopes are greater than 8%, you may need internal check dams or berms to create a stepped or terraced design.**

### PERCOLATION TEST

**Dig a hole 2-3' deep, fill with water and let it drain fully, twice. On the third time, monitor the infiltration rate for 1/2" per hour - if a 2' hole drains within 48 hours, you are good to go!**

VERMONT

DEPARTMENT OF ENVIRONMENTAL CONSERVATION  
WATERSHED MANAGEMENT DIVISION



Graphics by Greenleaf Design, LLC



### Rain Garden Area.

Sandy Filter Bed Depth  
(inches)

0      12      18      24

Drainage Area  
(square feet)

Area of Rain garden  
(square feet)

500	79	49	42	36
1,000	158	99	83	72
2,000	317	198	167	144
3,000	475	297	250	216
4,000	633	396	333	288
5,000	792	495	417	360
7,500	1,188	742	625	540
10,000	1,583	990	833	720

Adapted from the VLCT GSI Simplified Sizing Tool for Small Projects and based on a one-inch storm event in a 24-hour period.



VT Lake Wise Program

**A lakeside rain garden infiltrates water runoff.**

### How to.

**2.** While rain gardens vary in size, they are most effective when they treat the first inch or more of stormwater runoff in a precipitation event. The size will depend on the drainage area, soil infiltration rates, and the ponding depth. Measure the drainage area - all the impervious and semi-impervious (e.g., short-grass lawns, steep slopes) surface area the rain garden will receive runoff from. Calculate rain garden size using the table above or the **VLCT Green Stormwater Infrastructure Simplified Sizing Tool** for 'Bioretention and rain gardens' for precise size calculations. If space is limited, rain gardens can be made smaller. Even when undersized, rain gardens provide significant water quality benefits.

**3.** Mark off the area for the rain garden using string or spray paint. Call **1-888-Dig-Safe** to ensure there are no underground utilities nearby. Remove sod and existing vegetation by physically removing or suppressing and solarizing with black plastic.

**4.** Dig a flat-bottomed basin with the lowest point approximately 6 inches below the ground surface

(up to 12 inches for areas with limited space). The edges should be gently sloped towards the bottom. If soils are not well drained, dig down further and replace with a 12-inch to 36-inch deep sandy filter bed mix, comprised of a roughly 70/30 mix of sand and native soils. Option to add a 3-inch layer of washed crushed stone underneath the filter bed mix for added water retention capacity. If on a slope, berms can be built around the basin to maintain a level bottom and ponding depth.

**5.** Stabilize the inlet area with crushed stone or river rock to prevent scouring and erosion. A pre-treatment forebay, a small depression lined with stone, can be built for areas with a lot of sediments (e.g., driveways, roads) to allow suspended solids to settle before runoff enters the basin.

**6.** Design an outlet at the level of the desired ponding depth to direct overflow to a stabilized area, e.g. stone lined outlet directing flow to a meadow filter strip or naturally vegetated area that is not at risk of eroding.





### Materials.

- ☀ Spray paint or string to mark area
- ☀ Shovel or backhoe
- ☀ Washed crushed stone or river rock for inlet, outlet, bottom (optional)

- ☀ Native plants
- ☀ Sand for filter bed mix (optional)
- ☀ Low-phosphorus compost (optional)
- ☀ Mulch, peastone, or river rock groundcover
- ☀ For underdrain: 4-inch PVC pipe, drill to perforate underdrain pipe, washed crushed stone & nonwoven geotextile fabric

### The scoop on compost.

Compost is rich with organic matter and excellent for water retention, but can leach excess nutrients when applied in excess. You can minimize or omit compost with appropriate native plant selections. Avoid compost in areas with long ponding periods, low infiltration rates, and high groundwater tables. If you do use compost, try to use low-phosphorus compost made from leaf litter and yard waste rather than manure or food scrap-based compost.

### Maintenance.

Watch during rain storms and see how it works! Monitor infiltration capacity and make sure it does not get clogged by periodically removing accumulated debris and sediment from inlet and bottom. Inspect the rain garden after large rain events and in the spring.

Plants will likely need regular watering during the first growing season and in very dry periods after that. Remove weeds and invasive plants. Replace plants that die. Leave plants in the fall and remove dead plant material in late spring to allow for wildlife habitat benefits. Embrace messiness! It is a living system and need not be manicured.

### How to.

7. Seed or plant the rain garden with hardy native species that can withstand periods of flooding and drought. Plant the inlet and lowest point of the garden with wet tolerant native plant species. Native plants that can tolerate drier conditions should be planted along the slopes of the garden. Refer to the **Lake Wise Native Plant List**, **Restore Natural Plant Communities**, and the plant lists in the manuals listed to the right.
8. Some compost can be added around the plant roots when planting to encourage growth and water retention during establishment rather than applying to the surface of the rain garden. Compost should be used very sparingly to avoid introducing excess nutrients.
9. Cover bare soil in the garden with a groundcover of wood chips (or mulch, although more likely to float), stone (peastone, river rock, crushed stone), or a living groundcover (sedges, windflower, golden alexander).

### For more information...

- 💧 **Rain Garden Manual for Vermont and the Lake Champlain Basin (2021)**
- 💧 **The Vermont Rain Garden Manual (2009)**
- 💧 **The Vermont Guide to Stormwater Management for Homeowners and Small Businesses (2018)**

