



Vegetated Swales

Treating and Conveying Stormwater

Lake friendly living
means using lakeshore
BEST MANAGEMENT
PRACTICES

BMP

Vegetated Swales:
Acceptable best management practice for addressing stormwater runoff from impervious surface under the Shoreland Protection Act (Chapter 49A of Title 10, § 1441 et seq.).

LAKE BENEFITS

The plants in a swale filter slow stormwater runoff while sediments and other pollutants settle out. Swales are cost effective, attractive and can provide wildlife habitat and visual enhancements to lakeshore homes, camps and recreation areas.

MATERIALS

Native plants, mulch, amended soil, and stones and pipe for drainage if needed.

Description: Vegetated swales, also called bio-swales, are shallow open channels lined with dense vegetation designed to treat, attenuate, and convey excess runoff. Vegetated swales can replace curb or gutter systems and although they require more space, they manage runoff better.

Purpose: As the runoff flows along the length of the swale, the vegetation slows and filters the water allowing it to infiltrate into the ground. Where soils do not drain well, swales are typically lined and convey runoff to a drywell or infiltration trench. A swale can look like a typical landscaped area. Vegetated swales can be designed to provide infiltration, but are primarily used to convey water.

How to:

- The recommended slope for vegetative swales is 1-5 percent. However, for 5 percent slopes, check dams should be used to reduce flow velocity and erosion potential. Swales should run parallel to contours of the landscape. Swales are not appropriate for highly sloped areas.
- Grasses or sedges are typically used in vegetated swales, but other native plants can be used as well. Refer to the BMP on Planting and Re-naturalizing Areas for a list of recommended native species.
- The bottom of a swale is generally 2-4 feet above the seasonal high water table.
- Outlet protection should be provided at the swale's discharge point to prevent scour or erosion.

Sizing: The width of the swale can be calculated using complex equations. However, this methodology can be simplified to the following rule: the total surface area of the swale should be one percent of the area that drains to the swale (500 square feet for each acre).

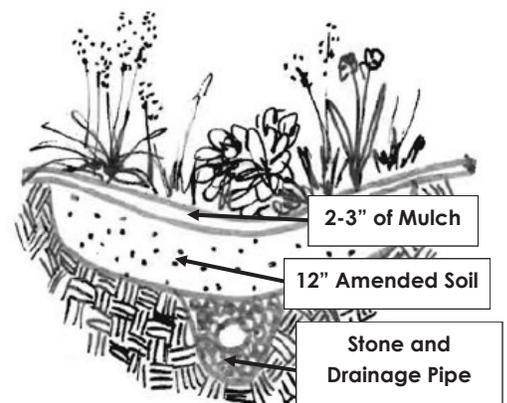
Vegetation: Swales can be planted with a variety of trees, shrubs, grasses, and ground covers. Plants that can tolerate both wet and dry soil conditions are best. Plant grassy swales with native broadleaf, dense-rooted grass varieties. For best stability, avoid trees on bermed side slopes.

Vermont Agency of Natural Resources ~ Lakes & Ponds Program ~ watershedmanagement.vt.gov/lakes.htm



Source: Michigan State University

Vegetated Swale Cross-Section



Source: Vermont Low Impact Development

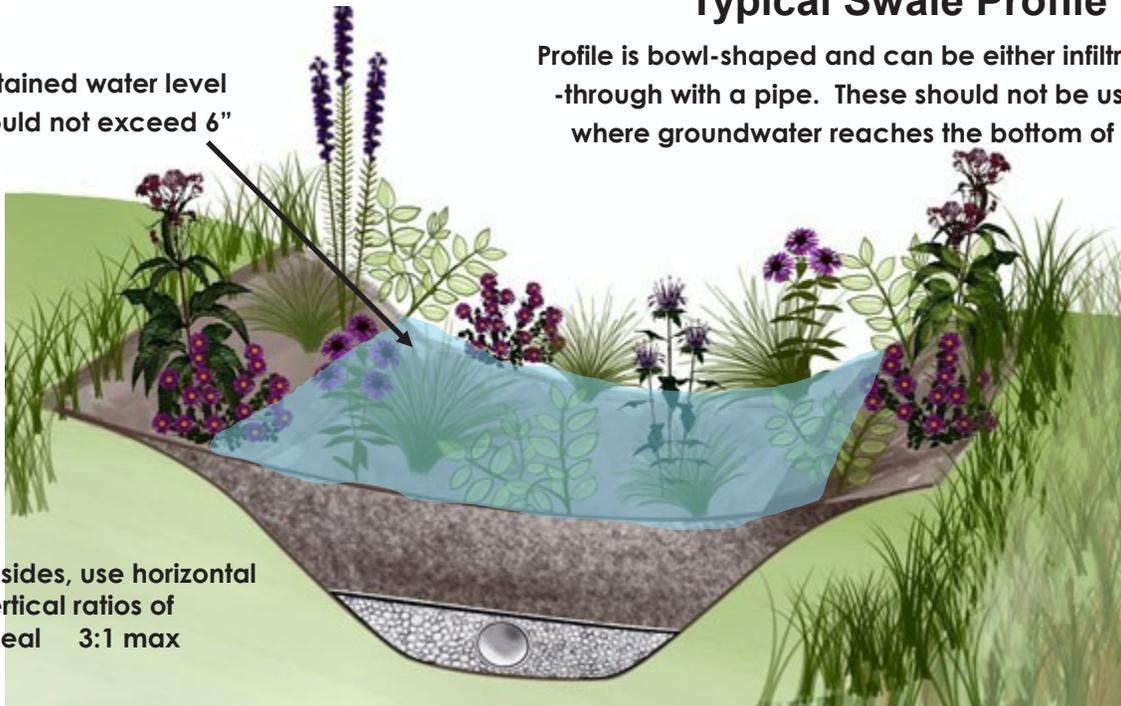
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Typical Swale Profile

Profile is bowl-shaped and can be either infiltrative, or flow-through with a pipe. These should not be used in areas where groundwater reaches the bottom of the swale.

Retained water level should not exceed 6"



For sloping sides, use horizontal to vertical ratios of 4:1 ideal 3:1 max

Widths vary between 3 and 8 feet wide

Check Dams: Check dams can be installed in swales to promote additional infiltration, to increase storage, and to reduce flow velocities. Earthen check dams are not recommended because of their potential to erode. Check dams should be installed every 50 feet if they are placed on earth sloping at 5 percent.

Maintenance:  Inspect swales periodically, especially after major storm events. Remove sediment and trash, clean and repair inlets and outlets as needed. Maintain side slopes to prevent erosion and ensure proper drainage. Summer irrigation and weed pulling may be required in the first one to three years. With proper construction and maintenance, swales can last indefinitely.



Vegetated swale on roadside with check dams installed.



Vegetated swale planted with native flowers and vegetation.