

# Vegetated Swale



**PURPOSE:** Vegetated swales are an alternative to traditional storm sewer systems that use pipes to convey stormwater runoff. Vegetation planted along the swale enhances infiltration of runoff into the soil, and can aid in the settling and filtering of pollutants from runoff.

The swale itself is an open, U-shaped channel, planted with grass, shrubs or trees along the base and sides of the swale. Vegetation provides an initial filter, as well as a means for slowing the rate of runoff. The vegetated or grassed top layer is underlain by a thick layer of highly organic, permeable soil, which further filters runoff. An additional layer of aggregate laid under the soil layer can significantly reduce the peak volume and conveyance rate of stormwater.

In areas with steeper slopes (greater than three percent), the addition of a check dam to a swale works to slow or “check” the speed of runoff as it courses through the swale, which allows for increased infiltration. Placing the dam near the source of runoff vastly reduces its speed. The ponding area created on the back side of the dam enables sediment to settle out of runoff. Check dams can be placed in series to increase their effectiveness. Materials suitable for check dams include: wood, concrete, stone, and earth.

**NOTE:** Grass-only swales provide less infiltration and pollutant removal capabilities than swales planted with a mix of shrub and tree vegetation. Swales should be located at least 100 feet from drinking water sources to avoid contamination.

## Benefits and Uses

- Filters some contaminants from runoff prior to its discharge to streams and storm sewer systems
- Provides some recharge to groundwater supply
- Reduces peak volume and velocity of stormwater runoff to streams and storm sewer systems
- Helps alleviate flooding and erosion downstream
- Applicable to all types of sites (residential/commercial/industrial)
- Inexpensive to install and maintain
- Enhances aesthetics of local landscape
- Can be incorporated along roadways and parking lots as an alternative to curbs

## Additional Resources

PA Department of Environmental Protection

- [www.dep.state.pa.us](http://www.dep.state.pa.us)

- Pennsylvania Stormwater Best Management Practices Manual

US Environmental Protection Agency

[www.epa.gov](http://www.epa.gov)

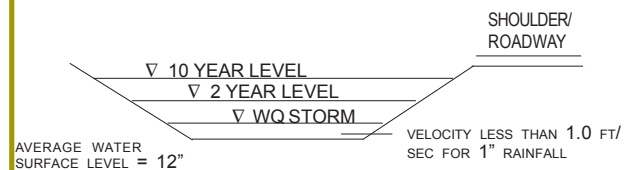
Stormwater Manager's Resource Center

[www.stormwatercenter.net](http://www.stormwatercenter.net)

## General Design Considerations

- Design should incorporate existing site features, land use, size of drainage area, soil type and slope to maximize effectiveness
- Minimum infiltration rate of permeable soil media should be at least 0.5 inch per hour
- Slope for length of swale should be 2% to 6%; side slope should be 3:1 or 4:1
- Bottom width of swale from 2 to 8 feet
- Design for maximum ponding depth of 18 inches; maximum ponding time of 48 hours
- Construct swales in areas of uncompacted soil where possible
- Soil media should contain a high level of organic material to assist with pollutant removal
- Permeable soil layer should be at least 30 inches deep within the ponding area created by the check dam
- Allow for a 12 to 24-inch base layer of stone aggregate to reduce peak rate and volume
- Height of check dam can be designed for various frequency storms (ex. 10-year)
- Maximum amount of filtering occurs for water depths below six inches
- Select dense, low-growing native vegetation that is tolerant of varying water level conditions
- Vegetation should not be submerged for prolonged periods of time
- Mature tree cover should allow light to pass through to other vegetation
- Follow guidelines for erosion control and runoff velocity/flow depth
- Incorporating a swale with an infiltration trench or wetland aids with pollutant removal; follow design guidelines for constructing each specific type of BMP
- Consider pretreatment options, such as a filter strip, if a swale is the sole means of treatment for runoff
- Routinely inspect for pooling water, eroded vegetation, litter and blockages
- Reseed sparse areas as necessary

### Cross Section of Vegetated Swale



### Vegetated Swale from Top

