Bioswales

NRCS Natural Resources Conservation Service

. . . absorb and transport large runoff events

2005

What are bioswales?

Bioswales are storm water runoff conveyance systems that provide an alternative to storm sewers. They can absorb low flows or carry runoff from heavy rains to storm sewer inlets or directly to surface waters. Bioswales improve water quality by infiltrating the first flush of storm water runoff and filtering the large storm flows they convey.

The majority of annual precipitation comes from frequent, small rain events. Much of the value of bioswales comes from infiltrating and filtering nearly all of this water.

Designing a bioswale

For best results, enhance and utilize existing natural drainage swales whenever possible. Existing swales can be enhanced with native plants. The thicker and heavier the grasses, the better the swale can filter out contaminants. Additionally, subgrade drains and amended soils may be needed to facilitate infiltration.

Other considerations when designing or maintaining bioswales:

- Costs vary greatly depending on size, plant material, and site considerations. Bioswales are generally less expensive when used in place of underground piping.
- Deep-rooted native plants are preferred for infiltration and reduced maintenance.
- Soil infiltration rates should be greater than one-half inch per hour.
- A parabolic or trapezoidal shape is recommended with side slopes no steeper than 3:1.
- Avoid soil compaction during installation.
- Swales should be sized to convey at least a 10-year storm (or about 4.3 inches in 24 hours).

A bioswale featuring native vegetation shows its fall colors.

Photo Courtesy Jim Patchett

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Maintaining a bioswale

Once established, bioswales require less maintenance than turf grass because they need less water and no fertilizer. Native grasses and forbs are adapted to Iowa rainfall patterns. Natives also resist local pests and disease.

A road ditch can serve as a bioswale. The rock trench and wetland vegetation are notable features, along with the natural drainageway in the background that serves as a bioswale for residential runoff.

For More Information

Find more information about low impact development and bioswales by visiting the following websites:

www.iowasudas.org
www.lid-stormwater.net
www.cwp.org
www.iowastormwater.org

Low Impact Development

Traditionally, storm water management has involved the rapid conveyance of water via storm sewers to surface waters. Low Impact Development (LID) is a different approach that retains and infiltrates rainfall on-site. The LID approach emphasizes site design and planning techniques that mimic the natural infiltration-based, groundwater-driven hydrology of our historic landscape. Bioswales are one component of LID.

Why is LID important:

to the environment?

- protects sensitive areas
- increases habitat for wildlife by preserving trees and vegetation
- protects local and regional water quality by reducing sediment and nutrient loads
- reduces streambank and channel erosion by reducing the frequent surges/bounces of higher flows from storm sewer discharges
- reduces frequent high and low flows associated with surface runoff, stabilizing stream flow volumes by restoring ground water discharges into receiving waters
- may reduce potential for flooding

to residents?

- increases community character
- improves quality of life
- more access to trails and open space
- pedestrian-friendly

to developers?

- reduces land clearing and grading costs
- reduces infrastructure costs (streets, curbs, gutters, sidewalks)
- increases community marketability

to communities?

- balances growth needs with environmental protection
- reduces infrastructure and utility maintenance costs

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