

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 promotes rainfall infiltration 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.



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.

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
- stabilizes stream flow by reducing variability of surface runoff; restores ground water discharges into receiving surface waters
- reduces potential for flooding

to residents?

- increases community character
- improves quality of life
- increases 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

For More Information

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

www.lid-stormwater.net

www.cwp.org

www.nrcs.org/buildinggreen/links/site.asp

www.plant-materials.nrcs.usda.gov/technical/publications/wetland.html

<http://www.mt.nrcs.usda.gov/technical/ecs/water/setbacks/>

More information on this topic is also available from your local NRCS or county conservation district office.

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Bioswales

... absorb and transport large runoff events

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 and snowmelt to storm sewer inlets or directly to surface waters. Bioswales improve water quality by enhancing infiltration of the first flush of storm water runoff and filtering the large storm flows they convey.

About 30 to 40 percent of Montana's annual precipitation comes from small rain events. Much of the value of bioswales comes from filtering nearly all of this water.

Designing a Bioswale

For best results, enhance and utilize existing natural drainage swales whenever possible. Maintain riparian areas before and during construction to act as "natural" bioswales.



This bioswale is planted with native sweetgrass (*Hierochloa odorata*.)

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:

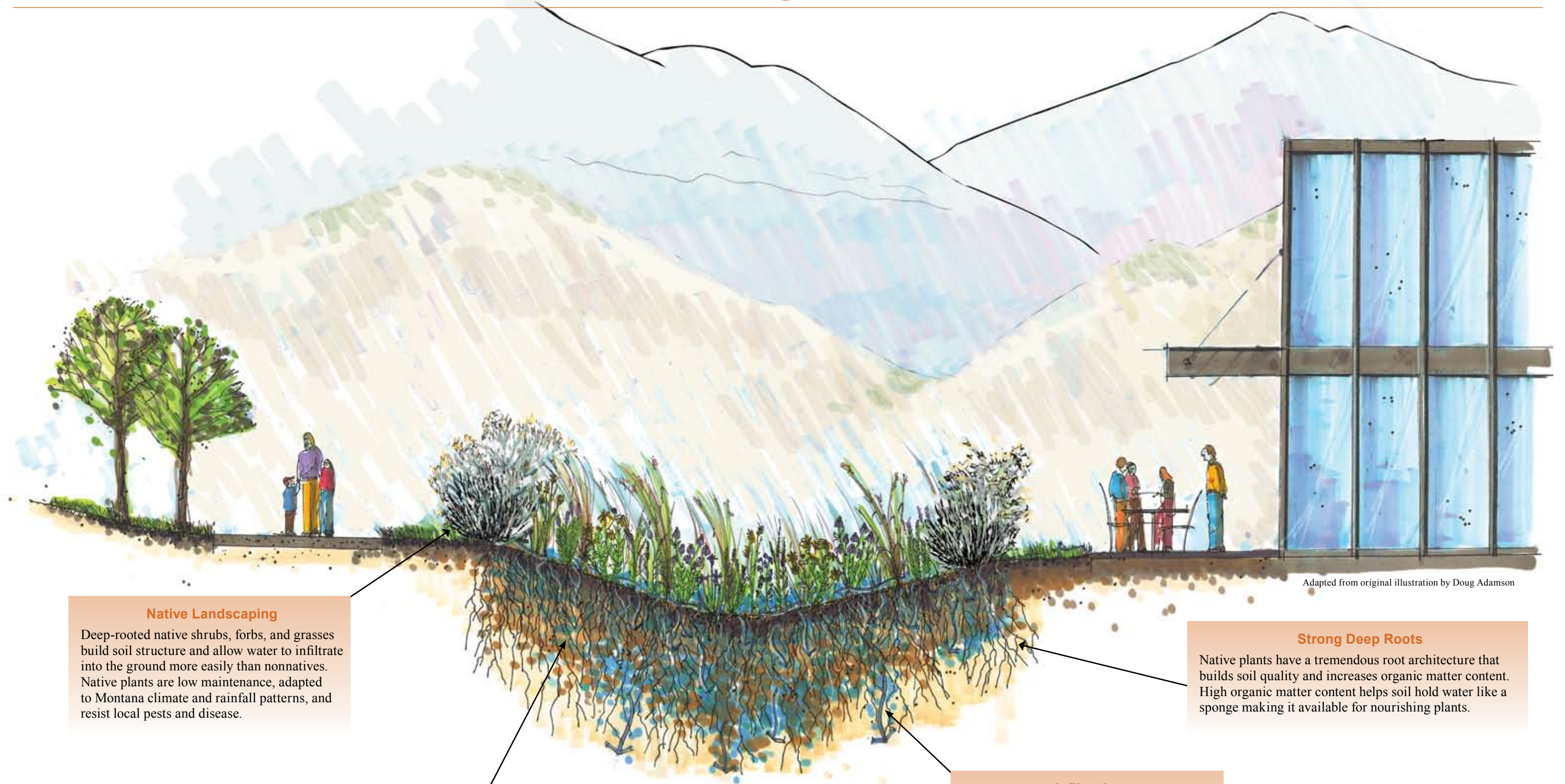
- Costs vary greatly depending on size, plant material, and site considerations. Bioswales are generally less expensive when used in place of underground piping.
- Deep-rooted native plants are preferred to promote water infiltration and reduce maintenance. They are also better at controlling erosion.
- Evaluate site soil conditions. Soil infiltration rates should be greater than one-half inch per hour.
- Avoid soil compaction during installation.
- A parabolic or trapezoidal shape is recommended with side slopes no steeper than 3:1.
- Collaborative projects with neighbors and adjacent property owners are usually more effective at reducing runoff.
- Swales should be sized to convey at least a 10-year storm (or about 2.4 inches in 24 hours).

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 Montana's climate and soil conditions. Native plants also resist local pests, disease, and weed infestations.

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Bioswale in a Corporate Setting



Adapted from original illustration by Doug Adamson

Native Landscaping

Deep-rooted native shrubs, forbs, and grasses build soil structure and allow water to infiltrate into the ground more easily than nonnatives. Native plants are low maintenance, adapted to Montana climate and rainfall patterns, and resist local pests and disease.

Soil Amending

Along with native plantings, soils amended with compost and sand may be needed to facilitate infiltration. A rock trench can be installed down the center of the swale.

Infiltration

Water infiltrated through bioswales helps recharge groundwater, which supplies rivers and streams with a slow, purified seep rather than surges of polluted surface runoff from roofs and other impervious areas.

Strong Deep Roots

Native plants have a tremendous root architecture that builds soil quality and increases organic matter content. High organic matter content helps soil hold water like a sponge making it available for nourishing plants.