



## Tips for Designing Green Infrastructure

### What is a bioswale?

A bioswale is a vegetated open trench designed to temporarily store and infiltrate stormwater. It is planted with deep-rooted native grasses and plants that enhance infiltration, cooling, and cleansing of water in order to improve water quality.

Bioswales are considered a creative means of controlling runoff, and have the potential to provide ecological services such as improved water quality, mitigation of wetland loss, flood containment, and improved aesthetics.

#### Components

- \* Pretreatment (optional)
- \* excavated channel
- \* soil
- \* outlet control
- \* check dams
- \* stone (optional)
- \* underdrain (limited application)
- \* vegetation

#### Key elements

- \* Open channel design that balances storage, treatment, and infiltration with peak flow conveyance needs.
- \* Check dams often used to increase storage, dissipate energy, and control erosion.
- \* Native vegetation increases friction and stabilizes soil.
- \* Designated to fit into many types of landscapes in an aesthetically pleasing manner.

#### Vegetation

Swale vegetation must meet certain criteria for the vegetation planted along a swale to maintain channel stability and improve the

bioswale's ability to filter pollutants from stormwater. The vegetation must:

- \* provide a dense cover and a root or rhizome structure that holds the soil in place in order to resist erosion;
- \* it must stand upright during storm event in order to provide maximum residence time and pollutant removal;
- \* tolerate a bioswale's soil conditions (pH, compaction, composition); and
- \* tolerate periodic flooding and drought.



*A bioswale can be used along roadways as well as in parking lots.*

Bioswales and their plant materials can present unique and different visual characteristics from conventional drainage or landscape design. Turf grass lawns, woody perennials, drought-tolerant, riparian or exotic plants, and cobbles can all be used, depending on the desired aesthetic effect.

### **Design Considerations and Limitations**

Many factors should be considered before designing and constructing a bioswale including: slope of the land, soil composition, available space, types of vegetation, climate, and dimensions of the bioswale and of the site. Soil infiltration limitations can be overcome with the use of under-drains.



### **Maintenance**

Although through proper vegetation selection a bioswale may be relatively low maintenance, some bioswales may require regular plant maintenance for aesthetic reasons. This maintenance includes regular mowing, irrigation, and pruning.

Regular maintenance activities for bioswales should include inspection of surface drainage systems to ensure removal of any sediment buildup and trash; repair of surfaces that have been damaged by erosion, rodents, vehicles or other causes; care of plant materials; replacement of dead plants; and regular irrigation during dry periods. Inspections and repair to bioswales should be scheduled far enough in advance of the first seasonal rains to allow for any repairs that may be necessary, and during and after each major storm.

## **Additional Resources**

City of Binghamton Code & Legislation Chapter 227, Erosion Control and Stormwater Management and Chapter 410, Zoning.

[www.cityofbinghamton.com](http://www.cityofbinghamton.com)

[www.streamteamok.net/Doc\\_link/Green%20Parking%20Lot%20Guide%20%28final%29.PDF](http://www.streamteamok.net/Doc_link/Green%20Parking%20Lot%20Guide%20%28final%29.PDF)

[http://www.dec.ny.gov/docs/water\\_pdf/swdm2010chptr5.pdf](http://www.dec.ny.gov/docs/water_pdf/swdm2010chptr5.pdf)

[http://cfpub.epa.gov/npdes/home.cfm?program\\_id=298](http://cfpub.epa.gov/npdes/home.cfm?program_id=298)

<http://water.epa.gov/polwaste/green/>

<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/>

<http://cfpub.epa.gov/npdes/stormwater/swbasicinfo.cfm>

CITY OF BINGHAMTON  
Department of Planning,  
Housing, and Community  
Development

38 Hawley Street, 4th Floor  
Binghamton, NY 13901  
Phone: (607) 772-7028  
Fax: (607) 772-7063

Website:  
[www.cityofbinghamton.com/departments.asp?zone=dept-planning](http://www.cityofbinghamton.com/departments.asp?zone=dept-planning)