



Drainage Program Guide

Green Stormwater Infrastructure (GSI)

Best Management Practice: Bioretention

Bioretention practices are well suited to capture stormwater from large impervious surfaces. The largest impervious surfaces on a property are typically buildings, driveways, and parking areas.

With a bioretention practice, the runoff is captured in a depressed planting area and then either infiltrates into the soil or flows slowly through to an underdrain or outlet pipe that connects to DWSD's sewer system. They can be planted with any combination of trees, perennials, shrubs or just seeded with turf grass.

What credits am I eligible for?

A bioretention practice that manages stormwater runoff from impervious surfaces can achieve up to an 80 percent drainage charge credit, depending on the available storage and site conditions. Of the maximum 80 percent credit available, up to 40 percent can be attained for controlling how fast water is leaving the property (peak flow credit) and up to 40 percent can be attained based on how much water can be permanently removed from the sewer system (through infiltration, plant uptake, etc.) (volume credit). See *A Guide to Credits for Commonly Used Stormwater Management Practices* on DWSD's drainage website (www.detroitmi.gov/drainage) for further explanation.

NOTE: Residential customers receive an automatic 25 percent credit. If practice does not exceed the 25 percent automatic credit, no additional credit will be applied.



Stormwater from the building's downspouts is directed into this bioretention practice



Linear bioretention along outer edge of parking area captures the runoff

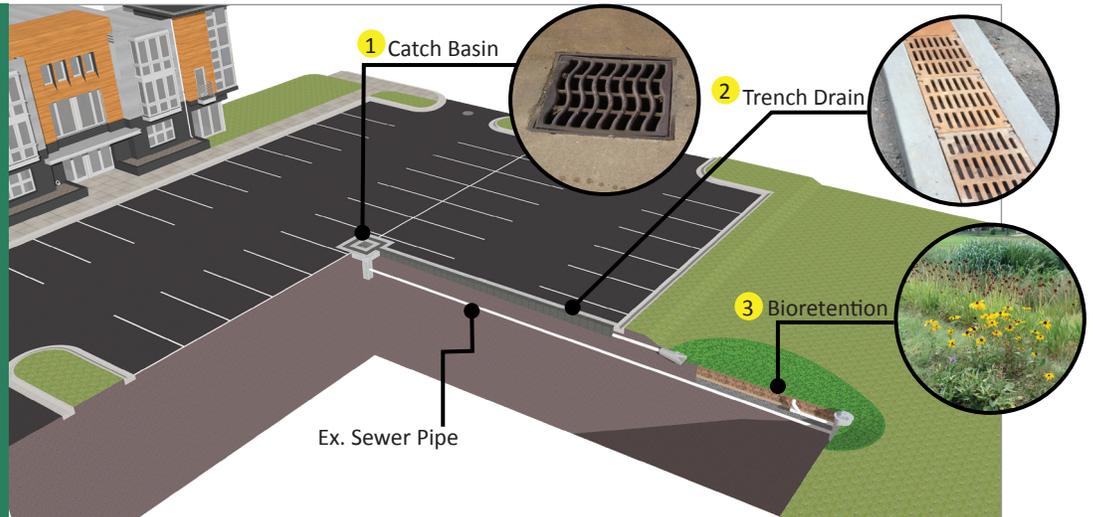


Bioretention areas within parking area islands



Components

- 1 Catch Basin:** Existing structure is modified to divert the runoff to a trench drain.
- 2 Trench Drain:** Can be installed to divert stormwater that enters the existing catch basin to the bioretention practice instead of to DWSD's combined sewer.
- 3 Bioretention:** Is installed to manage the stormwater. Use native plants that are salt tolerant if in a location that would receive snowmelt chemicals.



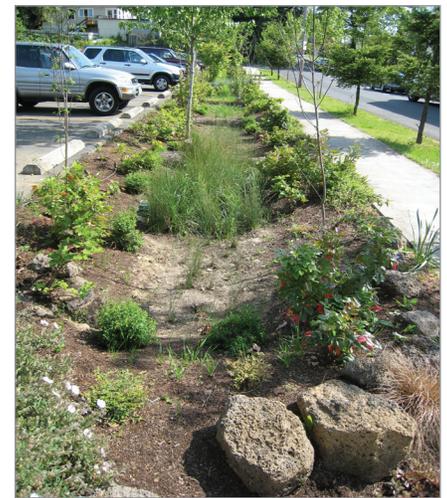
What is the typical cost of a bioretention practice?

The cost of a bioretention practice is dependent on the soil type, size of the impervious area draining into the bioretention, amount of credit desired (i.e., size of the bioretention), and type of plants selected. Bioretention practices typically cost between \$15 to \$45 per square foot.

How do I get the water from my impervious surfaces to the bioretention?

How the stormwater runoff gets from an impervious surface (e.g., parking area; rooftops) to the bioretention will depend on site conditions. One of the first steps is to identify any catch basins that receive runoff from the impervious surface area.

1. Identify all downspouts from the roof, and whether they are directly connected to DWSD's sewer system. Disconnect downspouts and direct one or more downspouts to a vegetated area or bioretention practice on site.
2. For parking areas, if there is a catch basin in the low point of the parking area (center), a trench drain may need to be installed to capture the water before it enters a sewer pipe. This will keep the water close to the surface of the parking area and help keep the bioretention shallower.
3. If there is a catch basin around the outside edge of the parking area, the catch basin could be removed and the runoff could be directed to the bioretention practice through a shallow stone or vegetated channel.
4. If there are no catch basins in the existing parking area, a linear bioretention practice is a feasible alteration that extends along the outside edge of the parking lot drain. Be sure the linear bioretention is installed along the edge to where the parking area drains.



The stormwater in this parking lot flows to the outside edge where a vegetated bioretention practice was installed to manage the water before it leaves the property



An existing parking lot in Southfield, Michigan, was restriped and a section of pavement at the low point was removed and planted for stormwater management

Do I have to maintain the bioretention practice?

Just like you would maintain a garden or lawn at your home, bioretention practices on properties require maintenance. Typical maintenance activities include:

- Removing weeds regularly (more frequently during first couple of years).

- 💧 Periodic watering, especially during the one-to-two season establishment period.
- 💧 Removal of accumulated trash and dirt.
- 💧 Adding mulch when needed.

What is the expected return on my investment?

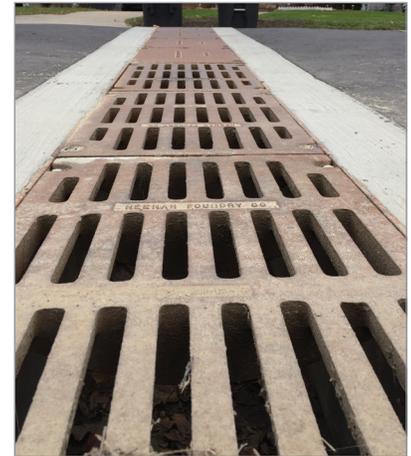
The return on investment will depend on the size of the installed practice and the resulting credit reduction.

Credit Related Design Guidelines

- 💧 All water stored above the ground surface must drain within 24 hours.
- 💧 The detention volume provided must be sufficient for at least the two-year storm event to qualify for a peak flow credit.

Setback Requirements

- 💧 From property line: 10-foot minimum
- 💧 From parking space: 3-foot minimum
- 💧 From building: 10-foot minimum to edge
- 💧 From private well: 50-foot minimum



An example of a trench drain installed to capture runoff prior to entering the catch basin connected to DWSD's sewer system



Bioretention installed in existing parking lot island to capture and infiltrate stormwater



Bioretention practices reduce the amount of stormwater runoff that flows into the City's already burdened sewer system, improve water quality by filtering out pollutants, promote infiltration to the groundwater table, and increase habitat for birds and butterflies.

Permits and Forms

- ◆ Sewer Tap (DWSD): Contact DWSD at 313.964.9236
- ◆ Plumbing Permit from the Building, Safety, Engineering and Environmental Department (BSEED): Any time project work on private property connects to City sewer, contact: BSEED's Plumbing Inspector at 313.224.3158
- ◆ Parking Lot Requirements: (BSEED) – To confirm City parking requirements, contact BSEED's Zoning Department at 313.224.1317
- ◆ Complete engineered drawings stamped by a registered Professional Engineer or Landscape Architect must accompany the Drainage Charge Credit Application. Additional required documentation is found on the application and can be downloaded from www.detroitmi.gov/drainage

Additional Resources

For Drainage Charge Credit Information and other resources, visit the drainage webpage: www.detroitmi.gov/drainage

Specific documents to review:

- ◆ Guide to Drainage Credits
- ◆ Guide to Credits for Commonly Used Stormwater Management Practices
- ◆ Credit Calculator
- ◆ Credit Application

Low Impact Development Manual for Michigan:
www.semco.org/reports/lid/index.html

Michigan Plant List:
www.michigan.gov/documents/deq/wrd-nps-landscape4wq_401217_7.pdf

<http://therouge.org/our-wrik/river-restoration>



Rooftop drainage can be directed to a green stormwater practice, as shown here, before overflowing into the combined sewer system.



Stone infiltration trench installed around the outside perimeter of an existing parking area to manage the runoff from the parking area.

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