



Assessing the performance of bioretention

Green Infrastructure: Bioretention practices can be an important tool for retention and detention of stormwater runoff. Because they utilize vegetation, bioretention practices provide additional benefits, including cleaner air, carbon sequestration, improved biological habitat, and aesthetic value.

Bioretention practices include biofiltration and bioinfiltration best management practices.

Biofiltration (<https://stormwater.pca.state.mn.us/index.php?title=Bioretention>) (bioretention with **underdrains**) is designed to retain solids and associated pollutants by **filtering** (<https://stormwater.pca.state.mn.us/index.php?title=Filteration>). A typical method for assessing the performance of BMPs with underdrains is therefore measuring and comparing pollutant concentrations at the **influent** and **effluent**. **Bioinfiltration** (bioretention bmp without underdrains) are more difficult to assess, although considering only potential impacts to surface waters, a properly functioning infiltration system is considered to be highly performing.

An online manual (<http://stormwaterbook.safl.umn.edu/>) for assessing BMP treatment performance was developed in 2010 by Andrew Erickson, Peter Weiss, and John Gulliver from the University of Minnesota and St. Anthony Falls Hydraulic Laboratory. The manual advises on a four-level process to assess the performance of a Best Management Practice.

- Level 1: Visual Inspection (<https://stormwaterbook.safl.umn.edu/assessment-programs/visual-inspection>). This includes assessments for infiltration practices and for filtration practices (<http://stormwaterbook.safl.umn.edu/filtration-practices/visual-inspection-filtration-practices>). The website includes links to a downloadable checklist.
- Level 2: Capacity Testing (<https://stormwaterbook.safl.umn.edu/assessment-programs/capacity-testing>). Level 2 testing can be applied to both infiltration and filtration practices.
- Level 3: Synthetic Runoff Testing (<https://stormwaterbook.safl.umn.edu/assessment-programs/synthetic-runoff-testing>) for infiltration and filtration practices. Synthetic runoff test results can be used to develop an accurate characterization of pollutant retention or removal, but can be limited by the need for an available water volume and discharge.
- Level 4: Monitoring for infiltration (<https://stormwaterbook.safl.umn.edu/assessment-programs/monitoring>) or filtration practices

Level 1 activities do not produce numerical performance data that could be used to obtain a stormwater management **credit (stormwater credit)** (https://stormwater.pca.state.mn.us/index.php?title=Overview_of_stormwater_credits). BMP owners and operators who are interested in using data obtained from Levels 2 and 3 should



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consult with the MPCA or other regulatory agency to determine if the results are appropriate for credit calculations. Level 4, monitoring, is the method most frequently used for assessment of the performance of a BMP.

Use these links to obtain detailed information on the following topics related to BMP performance monitoring:

- Developing an Assessment Program (<http://stormwaterbook.safl.umn.edu/developing-assessment-program>)
- Water Budget Measurement (<https://stormwaterbook.saf1.umn.edu/water-budget-measurement>)
- Sampling Methods (<https://stormwaterbook.safl.umn.edu/sampling-methods>)
- Analysis of Water and Soils (<https://stormwaterbook.saf1.umn.edu/analysis-water-and-soils>)
- Data Analysis for Monitoring (<https://stormwaterbook.saf1.umn.edu/data-analysis>)



A properly functioning bioretention practice should drain within 48 hours of a runoff event

Additional information on designing a monitoring network and performing field monitoring are found at this link (http://stormwater.pca.state.mn.us/index.php/Calculating_credits_for_bioretention#Credits_based_on_field_monitoring).

Related pages

- Bioretention terminology (including types of bioretention)
- Overview for bioretention
- Design criteria for bioretention
- Construction specifications for bioretention
- Operation and maintenance of bioretention
- Assessing the performance of bioretention
- Cost-benefit considerations for bioretention
- Calculating credits for bioretention
- Soil amendments to enhance phosphorus sorption
- Summary of permit requirements for bioretention
- Supporting material for bioretention
- External resources for bioretention
- References for bioretention
- Requirements, recommendations and information for using bioretention with no underdrain BMPs in the MIDS calculator
- Requirements, recommendations and information for using bioretention with an underdrain BMPs in the MIDS calculator

Links to pages discussing assessment of other BMPs can be found at this page (http://stormwater.pca.state.mn.us/index.php/Category:Assessing_performance).

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