



Assessing the performance of stormwater ponds

Green Infrastructure: Constructed basins (ponds and wetlands) 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.



Constructed basins (**wet ponds** (https://stormwater.pca.state.mn.us/index.php?title=Stormwater_ponds) and **stormwater wetlands** (https://stormwater.pca.state.mn.us/index.php?title=Stormwater_wetlands)) are designed to retain solids and associated pollutants by settling. A typical method for assessing the performance of constructed basins is therefore measuring and comparing pollutant concentrations at the **influent** and **effluent**.

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 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 \(https://stormwaterbook.safl.umn.edu/water-budget-measurement\)](https://stormwaterbook.safl.umn.edu/water-budget-measurement)
- [Sampling Methods \(https://stormwaterbook.safl.umn.edu/sampling-methods\)](https://stormwaterbook.safl.umn.edu/sampling-methods)
- [Analysis of Water and Soils \(https://stormwaterbook.safl.umn.edu/analysis-water-and-soils\)](https://stormwaterbook.safl.umn.edu/analysis-water-and-soils)
- [Data Analysis for Monitoring \(https://stormwaterbook.safl.umn.edu/data-analysis\)](https://stormwaterbook.safl.umn.edu/data-analysis)

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_stormwater_ponds#Credits_Based_on_Field_Monitoring).

Case studies include the following.

- [Performance Assessment of a Pond-Wetland Stormwater Management Facility - Markham, Ontario \(http://www.trca.on.ca/dotAsset/26185.pdf\)](http://www.trca.on.ca/dotAsset/26185.pdf)
- [Case Study #11: Stormwater Retention Ponds: Maintenance vs. Efficiency \(http://stormwaterbook.safl.umn.edu/case-studies/case-study-11-stormwater-retention-ponds-maintenance-vs-efficiency\)](http://stormwaterbook.safl.umn.edu/case-studies/case-study-11-stormwater-retention-ponds-maintenance-vs-efficiency)
- [Pollutant Removal Dynamics of Three Wet Ponds in Canada \(http://www.cwp.org/online-watershed-library/c_at_view/63-research/69-stormwater\)](http://www.cwp.org/online-watershed-library/c_at_view/63-research/69-stormwater) (scroll down page to article)
- [Assessing the Nonpoint Source Pollutant Removal Efficiencies of a Two-Basin Stormwater Management System in an Urbanizing Watershed \(http://scholar.lib.vt.edu/theses/available/etd-05302000-16250046/unrestricted/ThesisSBLFinal.PDF\)](http://scholar.lib.vt.edu/theses/available/etd-05302000-16250046/unrestricted/ThesisSBLFinal.PDF)

Related pages

- [Overview for stormwater ponds](#)
- [Types of stormwater ponds](#)
- [Design criteria for stormwater ponds](#)
- [Design considerations for constructed stormwater ponds used for harvest and irrigation use/reuse](#)
- [Construction specifications for stormwater ponds](#)
- [Assessing the performance of stormwater ponds](#)
- [Operation and maintenance of stormwater ponds](#)
- [Cost-benefit considerations for stormwater ponds](#)
- [Calculating credits for stormwater ponds](#)
- [Stormwater wet pond fact sheet](#)
- [References for stormwater ponds](#)
- [Requirements, recommendations and information for using stormwater pond as a BMP 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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