



# UPDATES

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## PARTICLE SIZE AND SETTLING VELOCITY DISTRIBUTIONS IN URBAN STORMWATER RUNOFF

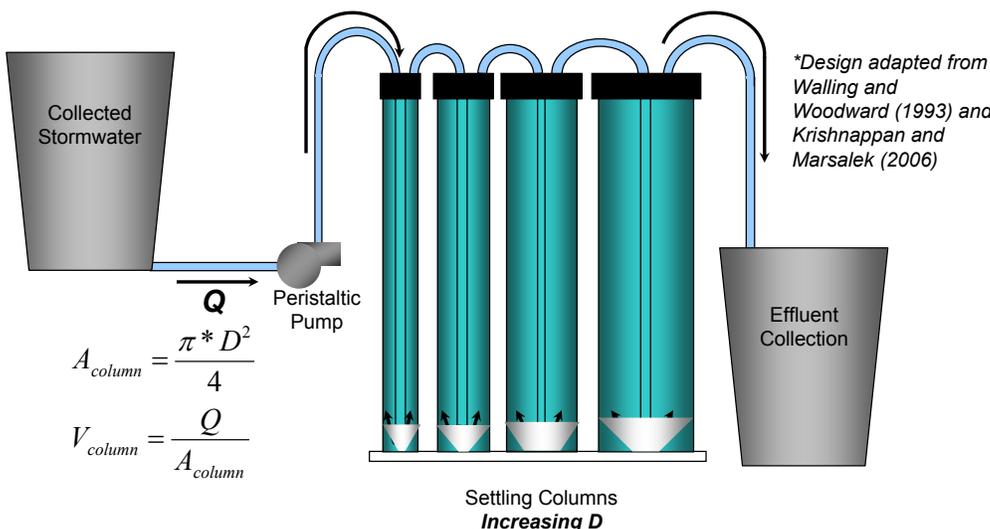
Contributed by Eric Hettler

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**Funded by: Minnesota Pollution Control Agency, Local Road Research Board, Mississippi Watershed Management Organization, and Minnehaha Creek Watershed District**

The research team is currently working to apply simple, effective methods to characterize the particle size distribution and settling velocity distribution in urban stormwater runoff. Since many best management practices depend on settling velocity, a better understanding of the settling velocity distribution can lead to more efficient and more site-specific designs. An elutriation device developed by Walling and Woodward (1993) and Krishnappan and Marsalek (2004) is being modified and tested to determine its effectiveness in measuring the settling velocity distribution of solids in stormwater. In the elutriation device, stormwater is pumped vertically through a column of a known diameter, and the upward velocity can be calculated for a given flow rate. Solids with a settling velocity greater than the upward velocity settle in the column while solids with a smaller settling velocity are flushed through the column. Initial experiments show the elutriation device can be effective in separating solids based on settling velocities. Work on the elutriation device and other potential solutions is ongoing.

Once a cheap, simple, and effective method to characterize settling velocity distribution is developed, the research team hopes to work with consultants and watershed districts to apply the methods in the field.



## WELCOME

Thank you for reading our newsletter! Readers like you create opportunities for partnerships which are crucial to our quest for improving the methods for assessment and maintenance of stormwater BMPs.

This newsletter is an outreach effort of a project sponsored by the Minnesota Pollution Control Agency (MPCA) and in cooperation with other agencies and organizations. The project team developed the online manual “Assessment and Maintenance of Stormwater Best Management Practices” (<http://wrc.umn.edu/outreach/stormwater/bm-passessment>) and continues research to revise the manual with the most current information.

### STORMWATER BEST MANAGEMENT PRACTICES ASSESSMENT PROJECT TEAM:

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*UPDATES is a quarterly newsletter designed to share news, current stormwater research efforts, and contact information related to the development of assessment methods and O&M education for stormwater best management practices. For more information, or if you would like to share information, data, or coordinate efforts, please contact Andy Erickson ([eric0706@umn.edu](mailto:eric0706@umn.edu)).*

# IMPACTS OF STORMWATER INFILTRATION ON GROUNDWATER

Contributed by Pete Weiss ([weiss008@umn.edu](mailto:weiss008@umn.edu))

**Funded by Minnesota Pollution Control Agency**

Infiltration of stormwater, which is being more widely used across the country, can increase groundwater recharge, reduce runoff peak flows and volumes, and reduce non-point source pollution. There has been, however, an increased concern in Minnesota that pollutants present in stormwater may contaminate groundwater. Thus, to understand the fate of infiltrated stormwater pollutants and better understand the risk of groundwater contamination, a literature review of scientific and engineering journals was undertaken.

The review found that risk of contamination by heavy metals, hydrocarbons, and phosphate are typically very low. Metals and hydrocarbons are usually removed in the first 20-50 cm of soil media or less and phosphate concentrations were found to be higher in groundwater than the infiltration water. The latter finding suggests that phosphates are leached from the soil into the infiltrating runoff. Bacteria and viruses were also found to be typically filtered by the infiltration media but under favorable conditions they can survive for extended periods of time and be mobile. Although the risk of groundwater contamination from the aforementioned contaminants is low, documented cases of contamination for each contaminant do exist so care and long-term planning are essential to the preservation of groundwater resources.

Karst areas and other areas where the subsurface has cracks and fissures can obviously increase the risk of groundwater contamination. Also, any system that utilizes subsurface injection increases the risk of groundwater contamination. Finally, salts are not removed by any infiltration systems and in some cold weather climates, salt concentrations of groundwater and area lakes has been documented to be increasing. This is presumably due to application of salt to roadways during the winter months. With all pollutants, the risks of infiltration versus other means of stormwater management must be carefully weighed and considered.

TO READ THE FULL REPORT go to:  
<http://home.safl.umn.edu/bmackay/pub/pr/pr515.pdf>

# POLYCYCLIC AROMATIC HYDROCARBONS (PAHS) IN WET POND SEDIMENTS

Contributed by Scott Kyser

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**Funded by Minnesota Pollution Control Agency**

High levels of Polycyclic Aromatic Hydrocarbons (PAHs) have been found in many stormwater pond sediments in the Minneapolis/St. Paul metro area. Under MPCA regulations dredged sediments containing high levels of PAHs must be disposed of in a landfill which is prohibitively expensive for many municipalities. The potential to remediate PAH containing sediments through composting techniques is being investigated first using a proof-of-concept benchtop experiment and later an outdoor field size experiment. The goal of the project is to design a composting procedure that effectively remediates PAH containing sediments to lower levels so that they can be disposed of more cost-effectively.



WET POND IN HERITAGE PARK, MINNEAPOLIS  
Photo courtesy A. Erickson

## EVENTS

**November 5th:** (Arden Hills, MN). Design of Stormwater Pollution Prevention Plans (Including Assessment and Maintenance of Stormwater BMPs). (<http://www.erosion.umn.edu/courses/schedule.htm>)

**November 5th:** Stormwater U (North St. Paul, MN). Stormwater Pond Management: Easements & Vegetation Maintenance. (<http://www.extension.umn.edu/Stormwater/>)

**November 16-20:** International Low Impact Development Conference (Seattle, WA). Four Levels of Assessment for LID Practices and Improvements in Infiltration Rates of Compacted Soil with Tillage and Compost.

**November 17th and 18th:** (Medina, MN). Design of Stormwater Pollution Prevention Plans (Including Assessment and Maintenance of Stormwater BMPs). (<http://www.erosion.umn.edu/courses/schedule.htm>)

**November 17th** (Madison, WI) and **November 18th** (Kansas City, MO): The changing face of the stormwater industry. A seminar hosted by Hydro International, Inc. The four levels and A new method to test and assess the performance of hydrodynamic separators.

**November 17-20:** American Water Resources Association (AWRA) (New Orleans, LA). Assessing Hydrodynamic Separators under High Water Flow Conditions.

**November 20th:** Minnesota Public Works Association Fall Conference (Brooklyn Center, MN). Storm Water BMPs: Analysis of Costs and Benefits from a Public Works Perspective and Do-It-Yourself Worksheet for Members.

**December 4-6:** Minnesota Association of Watershed Districts (MAWD) Annual Trade Show and Meeting (Alexandria, MN). Poster presentations.

**January 5-7:** An International Perspective on Environmental and Water Resources (Bangkok, Thailand). Evaluation of Hydrodynamic Separators as an Urban Stormwater BMP, Maintenance of Stormwater Management Practices, and Assessment of the Stormwater Infiltration and Pollutant Removal Capacities of Rain Gardens.

## SAFL RESEARCH UPDATES

Assistant engineer Andrew Fyten, shown here monitoring an Environment21 stormwater management device, is one of many researchers working on issues of stormwater Best Management Practices (BMPs) at SAFL. Other recent activities include graduate student Dave Saddoris and researcher Omid Mohseni's study of potential scouring resuspension and outwash of stormwater BMP devices. Mohseni is also working with the American Society for Testing and Materials (ASTM) to provide the first industry standard for testing. For more about SAFL's Stormwater BMP engineering services, please visit: [www.safl.umn.edu/research/stormwaterBMPassessment](http://www.safl.umn.edu/research/stormwaterBMPassessment).



## RECENT PUBLICATIONS

Maintenance of Stormwater BMPs, by Joo-Hyon Kang, Peter T. Weiss, John S Gulliver, C. Bruce Wilson. Stormwater Magazine, Volume 9, Number 8, Nov/Dec 2008.

<http://www.stormh2o.com/november-december-2008/issue-40172.aspx>

Inventory of road salt uses in the Minneapolis/St. Paul metropolitan area, by Andrew Sander, Eric Novotny, Omid Mohseni, and Heinz Stefan. SAFL Project Report 503, December 2007.

<http://home.safl.umn.edu/bmackay/pub/pr/pr503.pdf>

Road salt effects on the water quality of lakes in the Twin Cities metropolitan area, by Eric Novotny, Dan Murphy and Heinz Stefan. SAFL Project Report 505, Dec. 2007.

<http://home.safl.umn.edu/bmackay/pub/pr/pr505.pdf>

