

VILLANOVA URBAN STORMWATER PARTNERSHIP GOVERNMENT- ACADEMIA – INDUSTRY

VUSP Status Report – Mar 2008

Mission Statement: *The mission of the Villanova Urban Stormwater Partnership is to advance the evolving comprehensive stormwater management field and to foster the development of public and private partnerships through research on innovative SWM Best Management Practices, directed studies, technology transfer and education.*

- Research and directed studies will emphasize comprehensive watershed stormwater management planning, implementation, and evaluation.
- Technology transfer will provide tools, guidance and education for the professional.
- Partnership Goal is to promote cooperation amongst the private, public and academic sectors.



Partners



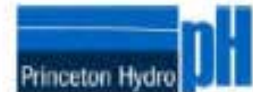
Members



Taylor Wiseman & Ta
ENGINEERS SURVEYORS SCIENTISTS



F. X. Browde, Inc.



Friends
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**VILLANOVA URBAN STORMWATER PARTNERSHIP
GOVERNMENT- ACADEMIA – INDUSTRY**

Faculty – R. Chadderton, M.Duran, R. Traver, B. Wadzuk, A. Welker, J. Komlos
Staff M. Dukart

Graduate Students Advised:

M.S. Students; Last 5 years:

M. Vanacore, D. Salas-De La Cruz, J. Ermilio, A. Braga, E. Dean, G. Woodruff, M. Rea, M. Kwiatkowski, T. Ladd, M. Gore, C. Emerson (Drexel), M. Prokop; E. Burke, E. Tokarz, T. Batrone, K. Issacs-Ricketts

In Progress: K. Hankins, M. Machusick, J. Marge, M. Fuller, J Barbis, K., Flynn., G. Jones, P. Jeffers.

Ph.D. Candidates – Clay Emerson

Referred Publications

1. Davis, A. Hunt, W. Traver, R., “Bioretention Technology: An Overview of Current Practice and Future Needs.” ASCE Journal of Environmental Engineering – (passed first review)
2. Emerson, C., Traver R., “Long-Term and Seasonal Variation of Stormwater Infiltration Best Management Practices,” Journal of Irrigation and Drainage –ASCE In Press
3. Braga, A., Horst, M., Traver, R. “Temperature Effects on the Infiltration Rate through an Infiltration Basin BMP”, Journal of Irrigation and Drainage, ASCE 2007 Nov/Dec 2007
4. Kwiatkowski, M, Welker, A., Traver, R., Vanacore, M., Ladd, T. “Evaluation of an Infiltration Best Management Practice (BMP) Utilizing Pervious Concrete”, AWRA, Oct 2007
5. Welker, A., Gore, M., Traver, R. “Evaluation Of The Long Term Impacts Of An Infiltration Bmp”, ICHE The 7th In. Conf. on Hydrosience and Engineering (ICHE-2006).
6. Emerson C. , Welty, C., Traver, R. “Closure of A Watershed-scale Evaluation of a System of Stormwater Detention Basins”, Journal of Hydrologic Engineering, ASCE, November 2006
7. Heasom, W., Traver, R. Welker, A., “Hydrologic Modeling of a Bioinfiltration Best Management Practice”, Journal of the American Water Resources Association. Oct 2006
8. Emerson C. , Welty, C., Traver, R. “A Watershed-scale Evaluation of a System of Stormwater Detention Basins”, Journal of Hydrologic Engineering, ASCE, May 2005
9. Syed A. Hashsham, S.A., Alm, E. W., Stedtfeld, R. D., Traver, R. G., and Duran, M., “Detection and Occurrence of Indicator Organisms and Pathogens”, Water Environment Research, Vol: 75, No: 6. 2004.
10. Traver, R.G., Chadderton, R.A. “Effectiveness of a Wetland Best Management Practice: First Phase,” (with R. Chadderton), Treatment Wetlands for Water Quality Improvement – Selected papers from Intecol Quebec 2000 Wetlands Conference, CH2M HILL Canada Limited – Editor John Pries, 2002

Significant Conference Proceedings (Since 2004)

1. LeBoon, M., Traver, R. “An Infiltration Model Of An Underground Rock Storage Bed Infiltration Bmp”, ASCE EWRI National Symposium 2007.
2. Wadzuk, B, Heasom, W., Traver, R.,”Re-conceiving the Villanova University Constructed Stormwater Wetland”, ASCE EWRI National Symposium 2007
3. Davis A, Hunt, W., Traver R. Clar, M. “Bioretention Technology: An Overview of Current Practice and Future Needs” LID National Symposium, 2007 (Extended Abstract)
4. Tokarz, E. Traver, R., Heasom, W. “Experiences from Long Term Monitoring of Stormwater Infiltration BMPs”, LID National Symposium, ASCE 2007 (Extended Abstract)
5. Gore, M., Welker, A. Traver, R., “Evaluation of the Long Term Impacts of an Infiltration BMP” ICHE 2007
6. Heasom, W., Traver R., “Modeling a BioInfiltration Best Management Practice “ LID National Symposium, ASCE 2007 (Extended Abstract)
7. Ermilio, J., Traver, R, “Hydrologic and Pollutant Removal Performance of a Bio-Infiltration BMP”, EWRI 2006 – National Symposium
8. Rea, M., Traver, R. Performance Monitoring of a Stormwater Wetland Best Management Practice, National Conference, World Water & Environmental Resources Congress 2005 (EWRI/ASCE)
9. Emerson, C., Traver, R., The Villanova Bio-Infiltration Traffic Island: Project Overview, National Conference, World Water & Environmental Resources Congress 2004 (EWRI/ASCE)
10. Traver, R., Infiltration Strategies for Low Impact Development, National Conference, World Water & Environmental Resources Congress 2004 (EWRI/ASCE)

Masters / Ph.d. Theses *Links on the Website*

2008

Clay, Keisha, Erika, Tom

2007

Megan Vanacore, [An Infiltration Model of an Underground Rock Storage Bed Infiltration](#)
D. Salas-DeLaCruz Chemical Eng., [Stormwater Total Hydrocarbon and Hydrologic Mass Balance and a Chloride Mass Balance of the VU Stormwater Wetland](#)

Matt Gore, [Evaluation and Restoration of Two Seepage Pits with Special Considerations for Nutrient, Metal, and Bacterial Contents](#)

Erin Burke, [An Examination of the Effect of Plant Density on Low Reynolds Number Flow in a Wetland](#)

2005

Jordan Ermilio, [Characterization Study of a Bio-Infiltration Stormwater BMP](#)

Gregg Woodruff, [Pollutant Removal Efficiency and Seasonal Variation of a Storm Water Wetland BMP](#)

Erika Dean, [A Hydrologic Analysis Of An Infiltration BMP](#)

Andrea Braga, [An Infiltration Analysis of the Villanova Porous Concrete Infiltration Basin BMP](#)

Matthew Rea, [Pollutant Removal Efficiency of a Stormwater Wetland BMP during Baseflow and Storm Events](#)

2004

Michael Kwiatkowski, [Water Quality Study of a Porous Concrete Concrete Infiltration BMP](#)

Tyler Ladd, [Water Quantity Study of a Porous Concrete Concrete Infiltration BMP](#)

Matt Prokop, [Determining the Effectiveness of the Villanova Bio-Infiltration Traffic Island in Infiltrating Annual Runoff](#)

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Other Publications (Links on Website)

Stormwater Magazine –

“Bioretention And Bioinfiltration BMPs” – Oct 1007

“Villanova University Stormwater Partnership” September 2006

“Constructing an Infiltration Trench Retrofit BMP” July 2005

“Lessons in Porous Concrete,” July 2005

“VUSP Porous Concrete” July 2004

Conferences Hosted

2007 Pennsylvania Stormwater Symposium – Oct 2007 - 300 Attendees

Proceedings published – Projected live and recorded

Grants In Progress:

2008 - 2011? Stormwater Wetland Reconfiguration - 319 Program Lead PI - Wadzuk
Construction only

2007- 2009 – Pervious Concrete – Porous Asphalt Comparison Study (EPA, PADEP, Prince Georges County) Lead PI Welker - 2 Graduate Students – Faculty Time

2007-2009- Watershed Impact of Stormwater Bioretention and Bioinfiltration BMPs – CiCCEET (With University of Maryland and NC State) 1 Graduate Student, Lab Tech – Faculty Time, PI Traver

2007-2008 Nutrient Loading in a Mature Constructed Stormwater Wetland EPA 2 Graduate Students Faculty Time PI - Wadzuk

2006-2009 – BMP Raingarden Cluster – Pennsylvania Growing Greener II Lead PI – Traver
Construction Only

2006- 2009 Temple Villanova Sustainable Stormwater Initiative William Penn Foundation VU lead Traver, 1 grad student Website / Data Coordinator

2003 – Present –PaDEP- EPA 319 National Monitoring Program Lead PI Traver – 2 GS

Partner Contributions

Paid for \$60000 upgrade in lab equipment, etc.

OTHER ACTIVITIES

National Academy Committee - Reducing Stormwater Discharge Contributions to Water Pollution

EPA Green Infrastructure Green Infrastructure Forum

Speakers EPA Region 2 – Monitoring Conference

ASCE/EWRI Stormwater Infrastructure Committee

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Stormwater Wetland - (319 Grant - 1998): An existing stormwater detention basin on Villanova University property has been converted into an extended detention wetland BMP. The stormwater wetland treats runoff from a 41 acre site that includes 16 impervious acres. The contributing watershed forms the headwaters of a watershed listed as medium priority on the degraded watershed list. The project has been published as an EPA 319 Success Story. Currently under renewed study, with new grant to reconfigure.



Bioinfiltration Traffic Island (NMP). – (Growing Greener Grant, 2001) A traffic island was retrofitted creating a Bioinfiltration BMP during summer 2001. The facility provides for infiltration of the initial first flush. Groundwater Monitoring has been added to this site for 2007. Believed to be the only continuously monitored site in the nation of this type.



Porous Concrete Demonstration Site – (319 Grant, 2002) The grant was to create a porous concrete infiltration facility in an existing central paved area on the Villanova University campus. The porous concrete site was built in 2002, but the initial concrete pour failed. This surface was replaced in the summer of 2003, and repaired in 2004. Runoff from the site and surrounding buildings are captured and infiltrated, decreasing the flows and pollution to a high priority stream segment on the 303(d) list. The site has a much higher capacity than the Bioinfiltration Traffic Island as it overlies a large rock holding bed. Sampling was halted at this site in Dec 2006.



Infiltration Trench (NMP) (319 Grant –2004). The project is designed to capture runoff from an elevated parking deck and then infiltrate it through a rock bed into the ground. The project presents some unique possibilities. As the water is piped through storm drains to the site, filtration devices can be used and tested at this site. It is the only site available with a 100% impervious drainage area. It is believed that the bottom filter fabric has sealed, with infiltration only occurring through the sides.



Pervious Concrete / Pervious Asphalt (EPA, 319 Program – NRMCA – Prince Georges County). This project is designed to capture runoff from a faculty staff parking area on campus, and then pass the flow through either a pervious concrete or porous asphalt surface course, and then infiltrate it through a rock bed into the ground. The project presents some unique possibilities, to include comparing the performance from both a hydrologic and environmental view of the technologies. Hydrocarbon testing is part of the project, and it will be added to the NMP in 2008.



Green Roof (Villanova University 2006) This Green Roof is a demonstration and undergraduate research / laboratory experience project. A raingage, overflow gage, and temperature sensors are mounted. Constructed on the CEER first floor roof, it is visible from the second floor stairway.



Pavilion BioInfiltration (VU 2007) This student designed infiltration site is built to reduce runoff from a heavily used parking area. Instrumented for Flow only.