

## Winter 2010

### What's Inside

From the Chairman ...	2
Conference Notices ...	2
Harnessing the Vortex for Large-Scale Flood Prevention.....	3
Board of Directors .....	6
<b>Growing With the Flow: Reversing the History of Urban Hydrology .....</b>	<b>6</b>
CFM Corner .....	9
Retrofitting Floodprone Buildings .....	9
The 5 Questions a Flood- plain Manager Should Be Prepared to Answer.11	
Regional Reports.....	13
NCAFFPM Bylaws.....	15
Floodplain Mgmt Resources .....	19
Calendar.....	19

### Thank you to our Sponsors:

AECOM .....	5
Baker .....	10
ESP .....	10
Dewberry.....	13
SmartVent.....	14

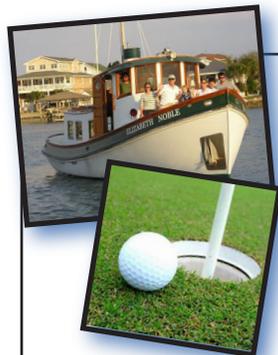


We hope you are planning to join us for the 2010 NCAFFPM Annual Conference, April 11-14 in Wrightsville Beach. In addition to the traditional relevant floodplain management topics, this year's conference will include sessions highlighting Coastal Issues. One full track on Tuesday will be dedicated to addressing coastal issues (coastal mapping in detail, NFIP compliance, CAMA requirements, building code concerns, beach nourishment, etc.). On Tuesday afternoon, there will be a panel discussion on coastal issues. The panel will include local, state and federal agencies as well as private coastal experts. For more details on workshops, see the conference agenda, which should be posted online by March 31.

If you plan to attend but haven't registered yet, go to [www.ncaffpm.org](http://www.ncaffpm.org) and print the registration form to mail with your fee by **March 29**.

### Bylaw Changes

Proposed changes to the NCAFFPM bylaws will be presented for a vote at the conference. Please review page 15-18 of this newsletter in preparation for this vote.



### Conference Social Events

**Golf Tournament** • Start off the conference by catching up with friends at the golf course. Tee times begin at 1pm on Sunday. The cost (\$50) includes prizes, refreshments, and dinner. You can sign up for golf on your registration form. For additional information, contact John Fullerton at [John.Fullerton@wilmingtonnc.gov](mailto:John.Fullerton@wilmingtonnc.gov).

**Boat Tour** • On Tuesday, we will offer a boat tour outing. Cost is \$10 per person and can be paid at the registration table at the conference.

North Carolina Association  
of Floodplain Managers

## 2010 Annual Conference

# NCAFFPM

ANNUAL CONFERENCE

Into a New Decade with  
Floodplain Management

Holiday Inn Resort  
Wrightsville Beach, NC  
April 11-14, 2010

*Note: The block of rooms at the Holiday Inn Resort has been extended to March 29.*

### CFM Exam

A Certified Floodplain Manager (CFM) Exam will be offered Wednesday, April 14, from 9am-12pm. Note: The application be approved prior to taking the exam. The application packet can be found at [www.ncaffpm.org/CFM.htm](http://www.ncaffpm.org/CFM.htm) and must be submitted by April 5. For more information, contact Anita Larson with ASFFPM at [cfm@floods.org](mailto:cfm@floods.org).

North Carolina Association  
of Floodplain Managers  
**Board of Directors**  
**2009-2010**

**Chairman**

Stephen E. Smith, CFM  
Pitt County  
252/902-3257  
sesmith@pittcountync.gov

**Vice-Chairman**

Robert Billings, PE, PH, CFM  
Mecklenburg County  
704/432-0902  
robert.billings@mecklenburgcountync.gov

**Secretary**

Neal Banerjee, PE, CFM  
Baker Engineering  
704/334-4454 x7881  
nbanerjee@mbakercorp.com

**Treasurer**

Susan Frady, CFM  
City of Hendersonville  
828/697-3010  
sfrady@cityofhendersonville.org

**Executive Director**

Bill Tingle, PG, CFM  
Mecklenburg County  
704/336-3734  
bill.tingle@mecklenburgcountync.gov

**Representatives**

Region A  
Billy Merrill, PLS, CFM  
City of Greenville  
252/329-4478  
bmerrill@greenvillenc.gov

Region B  
Heather Keefer, CFM  
Town of Holly Springs  
919/557-3938  
heather.keefe@hollyspringsnc.us

Region C  
John Fullerton, CFM  
City of Wilmington  
910/341-3247  
john.fullerton@wilmingtonnc.gov

Region D  
Annette Liggett-Lineberger  
AECOM  
336/855-8422  
annette.liggett-lineberger@aecom.com

Region E  
Mike Byrd, AICP  
Cabarrus County  
704/920-2148  
mlbyrd@co.cabarrus.nc.us

Region F  
Cynthia Barcklow, AICP, CFM  
Buncombe County  
828/250-4836  
cynthia.barcklow@buncombecounty.org

# Growing With the Flow: Reversing the History of Urban Hydrology

BY CHRISTOPHER J. ESTES, RLA, ASLA

Around the country interest is building in volume-reducing BMP's that take a portion of runoff out of the stormwater equation. Old and new research has resulted in a broader understanding of stormwater infiltration while putting to rest some stormwater myths.

Not too many years ago flooding was deemed a conveyance issue. Draining watersheds with speed by making channels and stormwater infrastructure larger and more hydraulically efficient was the objective. Timing of peak flows was (and still is) a train of site specific calculations with little consideration for downstream. The fact that development drastically increases the downstream size of floodplains and major waterways was (and still is) the accepted notion. However, floodplains in developed areas are not infinite in their ability to grow, and sooner or later become a more precarious state of affairs with additions of complex levee systems that allow flood elevations to climb above the surrounding topography.

Times are changing. The broader watershed view works somewhat in reverse. We are now looking at methods to reverse and neutralize the effects of development-induced runoff caused by impervious area. We can now reduce or eliminate excess runoff with the intentional goal of shrinking the downstream flood liability. We now have the tools to allow us to quantify potential reductions in post development runoff resulting from a variety of techniques that retain and infiltrate at least 90% of the annual rainfall events.

Runoff from an acre of pavement can be as much as ten to twenty-five times greater than the runoff from an acre of grass. In urban areas, thirty to forty percent of the rainfall runs directly into the nearest stream. In heavily urbanized areas, such as central business districts, precipitation run-off can be more than fifty percent. Compare this to the amount of runoff from



woodlands, which is often less than five percent. In the mid-Altantic region infiltrating the 2-year storm can reduce the 100 year storm to the predevelopment level (Cahill) .

One sign of this change in philosophy is the recent 2009 EPA Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act. This guidance prescribes two options to be used. Option 1 requires the prevention of off-site discharge of precipitation for all events less than or equal to the 95th percentile rainfall event. Two example 95th percentile storms would be Atlanta's 1.8 inches and Baltimore's 1.6 inches. Option 2 would allow a site specific hydrologic analysis to determine the pre-development runoff conditions to be retained post-construction utilizing techniques that infiltrate, evapotranspire and/or harvest this volume.

— continued on next page

### Growing With the Flow, from page 6

Stormwater regulations in Alabama, Georgia and South Carolina already encourage the use of infiltration as part of their stormwater solutions. The North Carolina BMP Manual added porous pavements to it's infiltration tool box in 2006.

Not too long ago this practice would have been deemed by many people in North Carolina as expensive, impractical if not impossible, especially in "clay soils." However, this has been proven not to be the case in North Carolina's Piedmont soils. For example, re-

search conducted by Estes Design Inc. and UNCC has shown that typical clay soils in Mecklenburg County have more than ample capacity to infiltrate the required volume to meet pre-development conditions. Techniques such as properly designed and constructed bio-infiltration and porous pavements have been monitored for periods of 3 years or more with no evidence of failure either hydraulically or structurally. High infiltration rates are not necessary to meet predevelopment hydrology conditions. Properly designed and constructed infiltration BMP's function 24 hours a day everyday.

Now, with the advancement of porous pavement technology, we can retrofit existing urban areas to meet the pre-development hydrology goals. To be able to reverse the hydrologic and environmental impacts of runoff from urban areas is truly a ground breaking concept.

Careful consideration should be taken when implementing stormwater infiltration, but it is here to stay. In the Carolina Piedmont, clay soils can be predictable if assessed correctly. Infiltration is a stormwater solution that is necessary to reach pre-development hydrology goals. Correctly implemented storm water infiltration can be the most effective and important of all the stormwater management strategies available, because it truly treats the cause rather than the symptoms.

— continued on next page

**Figure 1.**  
*One of eight bio-retention cells completed at Wilmore Walk, Charlotte, NC*



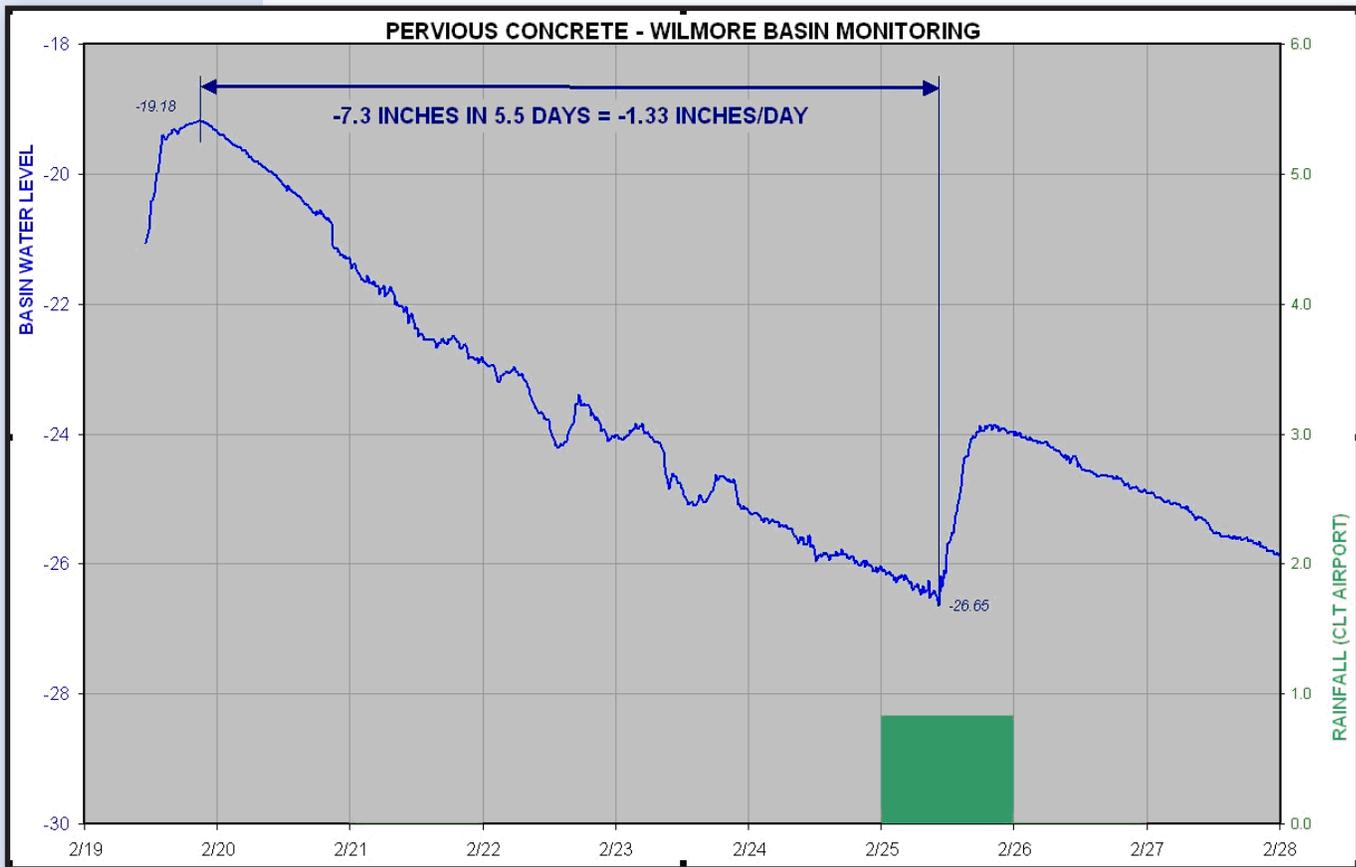
**Figure 2.**  
*Subgrade prep for infiltration basin, Wilmore Walk*



**Figure 3.**  
*Completed pervious concrete and infiltration basin captures the 2-year 24-hour storm, Wilmore Walk*



Growing With the Flow, from page 7



**Figure 4.**  
Infiltration data  
after filling with  
watering truck,  
Wilmore Walk

**Footnotes**

- <sup>i</sup> Christopher J. Estes, President of Estes Design Inc. Charlotte, NC, <http://www.estesdesign.com/>
- <sup>ii</sup> A High-Density, Low Impact Development with Infiltration in a Limestone Area: The Village at Springbrook Farms, Andrew Potts, P.E., M. ASCE; Michele Adams, P.E., M. ASCE; Thomas Cahill, P.E.
- <sup>iii</sup> Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act (PDF) - Peter S. Silvia - Dec. 4, 2009, <http://www.epa.gov/owow/nps/lid/section438/>
- <sup>iv</sup> Storm Water Infiltration in Clay Soils: A Case Study of Storm water Retention and Infiltration Techniques in the North Carolina Piedmont: Storm Water Magazine January-February 2009, Christopher J. Estes, Estes Design Inc., Charlotte, NC 28271, <http://www.stormh2o.com/january-february-2009/infiltration-clay-soils.aspx>
- <sup>v</sup> Monitoring Report for the Wilmore Walk Porous Pavement Monitoring Study Prepared for City of Charlotte Stormwater Services. Prepared by Craig J. Allan, and Megan Gray. Department of Geography and Earth Sciences, UNC Charlotte