American Water Resources Association
2009 ANNUAL WATER RESOURCES CONFERENCE
November 9-12, 2009
Seattle, WA

Wednesday, Nov. 11
3:30 PM – 5:00 PM
SESSION 52: Surface Water / Stormwater Management Innovation

Sustainable Stormwater: Optimized Management of Ponds and Other BMPs - Ann Shortelle, MACTEC Engineering and Consulting, Inc., Newberry, FL (co-author: Shannon Carter-Wetzel)

Stormwater ponds serve many vital functions for the counties and municipalities nationwide, including, for example, flood control, stormwater treatment, as aesthetic amenities and habitat for wading birds. Without appropriate maintenance, however, their ability to provide these services deteriorates. Historically, the focus has been on water quantity/conveyance and flood control. Today, however, the potential functionality of stormwater ponds to reduce external loading to impaired waterbodies in response to TMDLs has been recognized. Additionally, for stormwater ponds serving as aesthetic amenities, water quality deterioration within the ponds themselves detracts from the ponds' value. In addition, in some situations, stormwater may be useful to augment nonpotable water supplies. Cities and counties may control hundreds of stormwater ponds, constructed wetlands, and similar BMPs. Together, these BMPs, especially ponds, represent a significant resource to not only properly handle stormwater quantities, but also provide significant potential for water quality treatment of stormwater prior to discharge into waters of the State, and augmentation of nonpotable water supplies, for sustainable watersheds. Although stormwater ponds are individually inspected for NPDES reporting purposes, assessing them as a group to identify and prioritize ponds with the highest potential for water quality treatment, operational maintenance to enhance habitat, stormwater quantity handling or other factors, will result in better management for multiple purposes. This paper reviews the potential utility of stormwater ponds and similar BMPS, presents frameworks for screening and prioritizing ponds for stormwater sustainability, and strategies for improving their functionality. A two step screening process has been utilized to identify and rank ponds according to sustainability criteria (e.g. potential for water quality treatment based upon loading and capacity, proximity to impaired waterbodies, land availability for low impact development modifications, etc.). This system is also useful in prioritizing ponds for maintenance and operational upgrades to enhance sustainability.

Urban Stormwater Modeling using YouTube Videos - Joseph Brascher, Clear Creek Solutions, Inc., Tumwater, WA

In the City of Olympia, Washington, the Yauger Park stormwater drainage system provides flood control for much of the western portion of the city. Since 2001 the drainage basin has experienced two years of major storm events that taxed the performance of the stormwater system. The December 2007 storm caused extensive flooding along Cooper Point Road and Black Lake Blvd, while the period between November 2006 and January 2007 resulted in several long-duration events that flooded Yauger Park to the limit of its stormwater capacity. The City of Olympia contracted with Clear Creek Solutions to study the recent floods for the purpose of evaluating the effects of stormwater management, facility improvements, and modifications to the Yauger Park stormwater drainage system. This work required updating the Yauger Park drainage basin WWHM3 and SWMM stormwater models. This included calibration of recent precipitation events, re-classification of surrounding drainage basins, investigation of hydrologic and hydraulic performance, and the addition of the North Percival stormwater facility to the model. Specific information and flood data on the extent and depth of flooding in the vicinity of Cooper Point Road SW and Capital Mall Drive during the December 3-4, 2007, flood was lacking. This information was important to accurately model the capacity of the Yauger Park stormwater drainage system. In an effort to acquire the best available data for the stormwater model calibration Clear Creek Solutions searched the Internet looking for photos and videos of the flood. We found several videos posted on YouTube that showed the flooding. Based on these videos we were able to determine the approximate maximum water elevation at the intersection of Cooper Point Road and Capital Mall Drive. This information led to several changes in the model that eventually led to significant improvements in the calibration of the model. The use of non-

traditional sources of urban flood information, such as YouTube, provides a potential treasure of valuable data that increases stormwater modeling accuracy.

Lakewood Raincatchers: Reducing Combined Sewer Overflows to South Lake Washington by Constructing Rain Gardens and Cisterns to Manage Rooftop Runoff from Private Property - Matthew Fontaine, Herrera Environmental Consultants, Inc., Seattle, WA (co-authors: Bob Spencer, Robin Kirschbaum,)

Like many cities in the United States, a large portion of Seattle's underground drainage pipe network consists of combined stormwater/wastewater systems that were designed to convey both sewage and rainfall runoff from developed land, such as rooftops and roadways. These systems are frequently overwhelmed during large rain storms, resulting in combined sewer overflows (CSOs) into local lakes and Puget Sound. These CSO events are a significant water quality concern locally and around the nation. Traditionally, large centralized detention facilities have been used for CSO mitigation, storing high flow volumes during the peak of a storm, and releasing flow back to the system after the storm has subsided. Currently Seattle Public Utilities, in partnership with the U.S. Environmental Protection Agency, is evaluating alternative decentralized strategies for preventing CSOs by capturing and controlling rain-water on individual single-family residential parcels. Herrera Environmental Consultants is helping Seattle Public Utilities conduct a pilot study of decentralized runoff control using rain gardens and cisterns in the Lakewood neighborhood of Seattle. The main objective of the pilot study is to compile data for decentralized strategies including: in-sewer flow reduction, residential participation in a voluntary project, implementation methods, construction feasibility, risks, construction costs, and maintenance and stewardship by homeowners. The project is currently scheduled for construction in 2009. The data collected during this project will be used by SPU to assess whether these decentralized strategies are feasible for incorporation in future CSO control planning and for future capital projects. This presentation will describe homeowner participation statistics, hydrologic and hydraulic modeling conducted to evaluate project effectiveness, results of construction feasibility assessments, and the project design process. The presentation will also discuss lessons learned related to homeowner recruitment, combined sewer modeling, and challenges of working on private property in a highly developed urban environment.

Muskingum Optimization for Analysis of Regionalized Stormwater Detention - John McEnery, University of Texas at Arlington, Arlington, TX

This project investigates the effect of regionalized detention upon required detention volume within an urbanizing watershed as opposed to localized site-specific detention. The benefit of various regional placements of basins are evaluated and optimized. The approach is to compare hydrologic responses that reflect the effect of detention basins placed within the completely urbanized watershed, by generating models of both the overall watershed and detailed subbasins. For planning within a developing watershed, this requires modeling both the ultimate developed condition with and without detention. These models are used to compare regionalized detention placement, as opposed to the localized practice. From a watershed having 114 subbasins several individual subbasins distributed throughout the watershed are studied first. Detailed models of the selected individual subbasins are generated representing the ultimate urbanized condition, with and without local detention. Optimization within HEC-HMS is used to estimate parameters of Muskingum routing reaches that resemble the effects of site-specific detention. Then by simulating those effects in other subbasins, detained hydrographs for other subbasins are generated without the rigor of specifically modeling each of the detention basins. Because the details of eventual urbanized conditions had to be anticipated in order to individually model each of the 114 subbasins, it is more direct to estimate the effects of site-specific detention on some subbasins and then simulate that effect for the other subbasins in the watershed. By utilizing this approach, the overall watershed model with localized detention is developed. This approach accomplishes modification of the overall watershed model to reflect the hydrologic response including localized detention. Finally, the overall watershed model is modified again, this time with detention applied only at selected regional sites. These regionalized basins are designed to reduce peak flow rates to values comparable with those which are accomplished by the use of localized detention. By comparing the total required detention volumes resulting from these models, the effective of various regionalized schemes versus localized detention upon the storage volumes needed to achieve reduction of the urban storm flow peaks are evaluated.