



# The Urban Review

## Sediment & Erosion Control Information Newsletter

### Volume Control: The Changing Face of Storm Water

A national trend is taking place that will change the way we manage storm water. Prevailing methods for handling storm water regulate the runoff rate generated by a developed site. This is typically accomplished through the use of storm water detention ponds that store and release enough of the normal storm event to avoid flooding the downstream discharge point or causing channel erosion. This method has always assumed that most of the storm water generated on site is discharged off site. New national discussions of storm water management include the capture of a storm water volume that is maintained on site.

Storm water managers are starting to see the value of including the beginning stages of the hydrological cycle, interception and infiltration, into conventional storm water management methods. Interception is the vertical capture of rain before it makes its way to the ground. Trees accomplish most of this, but all vertical structures are capable of interception. The longer the rainwater pathway the more evaporation can take place and the greater the amount of rainwater that is removed from the storm water pathway. A graphic illustration of this is snow on trees. Large clumps of snow remain in the trees and very little moisture makes its way to the ground below, providing both detention and removal of storm water. This same principle can be applied to the roofing and building industry by incorporating increased pathways for storm water and evaporation into designs like green roof and green wall technology. Rainwater reuse and harvesting technologies, like cisterns and rain barrels, will also play roles in future storm water management by reducing the volume of discharge.

Before development, significant amounts of rainfall are sequestered in the upper soil profile, to be slowly used by forests and grasslands and then discharged to creeks through

ground water interactions. Infiltration is the act of rain soaking into the soil, providing the moisture for growing plants and recharging wells and aquifers that help maintain the base flow of creeks and streams. The value and importance of infiltration to sustainable resource management is being recognized and considered in the management of storm water.

The hard impervious surfaces that come with developed lands short-circuit the hydrologic cycle and result in concentrated surface flows and rapidly discharged runoff to conveyance channels. This results in the "urban stream syndrome," the increased erosion of stream banks and the loss of in-stream habitat in urban areas due to the short-duration high-volume storm flows. Urban streams suffer from increased storm water input that is often high in nutrients, heavy metals and heated above the thermal tolerance of many aquatic species. The loss of a mediating base flow results in wide ranging conditions within the streams that few organisms can tolerate.

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Future changes to storm water management will undoubtedly require a certain volume of runoff be maintained on-site. This is already in effect for the Big Darby watershed area in Franklin County where the Ohio EPA Construction General Permit (OHC100001) requires that the infiltration of a site must be the same after as before development. Nationally, other watersheds have implemented total maximum daily load (TMDL) limits based on volume for some streams, recognizing the hydraulic limitations of the existing natural channel. This focus on volume is also expected to reduce pollutant loading as well as preserve the stream channel. The result of these changes could mean a decentralized approach to on-site storm water management with the option to trade or mitigate storm water functions within watersheds. These are necessary changes if we are to have sustainable management of our natural resources and cost-effective storm water management for continued development.

#### Inside This Issue

New EPA Rules Coming	2
Upcoming Events	2
Underground Storage Systems	3
BMP Review: Silt Fence	4

# EPA Issues New Rules for Construction Site Discharge

The U. S. Environmental Protection Agency has issued a final rule to help reduce pollution from sediment running off of construction sites. The agency believes this rule, which takes effect in February 2010 and will be phased in over four years, will significantly improve the quality of water nationwide. Once fully implemented, this regulation is projected to reduce the amount of sediment discharged from construction sites by 4 billion pounds each year.

Owners and operators of sites that impact 10 or more acres of land at one time will be required to monitor discharges and ensure they comply with specific limits on discharges to minimize the impact on nearby water bodies. This is the first time that EPA has imposed national monitoring requirements and enforceable numeric limitations on construction site storm water discharges. Many within the homebuilding industries as well as the storm water and erosion control arena have been waiting to see just how low the EPA would set the numeric limit for runoff from construction sites. The end result is 280 nephelometric turbidity units (NTU) for sites of 10 acres or more. Once implemented, the operators of sites covered under the new rules must take water samples throughout the day, and the average of all the measurements must not exceed 280 NTU. If a storm event larger than the 2-year, 24-hour storm occurs, the limitation doesn't apply that day. These new requirements will significantly reduce the amount of sediment and other pollutants discharged from construction sites.

Additionally, the final rule requires **all** construction site owners and operators to use best management practices to

ensure that soil disturbed during construction activity does not pollute nearby water bodies. It requires them to implement a range of erosion and sediment control best management practices (BMPs) to reduce pollutants in storm water discharges including discharges from activities such as dewatering and concrete washout. The rule also contains stringent requirements for soil stabilization.

EPA is phasing in the numeric limitation over four years to allow permitting authorities adequate time to develop monitoring requirements and to allow the regulated community time to prepare for compliance with the numeric limitation. Construction sites that disturb 20 or more acres at one time will be required to conduct monitoring of discharges and comply with the numeric limitation beginning in August 2011. Beginning four years after the effective date of the final rule, the monitoring requirements and numeric limitation will apply to all sites that disturb 10 or more acres at one time. The new regulations must be incorporated into any new general permits issued in Ohio after the effective date of the regulation. The requirements also apply to individual permits issued by Ohio EPA or U.S. EPA. Therefore, the implementation date of the new requirements will vary depending on when Ohio reissues its permits and whether projects are covered by individual or general permits. The Ohio EPA plans to reissue its construction storm water general permits in 2013.

United States Environmental Protection Agency. <http://edocket.access.gpo.gov/2009/E9-28446.htm>

Kaspersen, Janice. "What EPA's Effluent Guidelines Mean for Stormwater." *Stormwater*. 11.1 (2010): 6.

## Upcoming Workshops and Events

**It's not too late to register to attend the 8th Annual Stormwater and Erosion Control Expo** being held on March 11 at the Longaberger Alumni House on the OSU Campus. Visit [www.franklinswcd.org](http://www.franklinswcd.org) for an agenda and to register.

The Ohio Contractors Association is hosting CESSWI exam review sessions and exams on May 4 and 5. A CPESC exam will be conducted on May 5 at the OCA office on Dublin Road. Contact Chris Engle for more information at [cengle@ohiocontractors.org](mailto:cengle@ohiocontractors.org). All those wishing to sit for the exams must be pre-approved by CESSWI or CPESC, Inc. For application details contact them at [info@cesswi.org](mailto:info@cesswi.org) or at [info@cpesc.org](mailto:info@cpesc.org).

**Save the Date!** The Ohio Department of Natural Resources will be hosting two hydrology workshops on March 17 and 18. Drs. Phil De Groot and Michael Menoes of Hydrosphere Engineering will present these courses for storm water design professionals on using HEC-RAS for bridge and culvert design and floodplain determinations. Earn 6 CPD hours for each course. Visit [www.franklinswcd.org](http://www.franklinswcd.org) to download registration forms and class descriptions. Contact Justin Reinhart for more information at 614-265-6691. Seating is limited, so register early!

**Vernal Pool Workshops** on March 6 and April 17. For information go to: <http://www.theoec.org/VP2010.htm>.

**A Pond Clinic** will be held on February 25 from 4-6 pm at the Division of Wildlife office at 1500 Dublin Road. Call Martha at 486-9613 for more information or visit our web site, [www.franklinswcd.org](http://www.franklinswcd.org).

Don't forget our annual **Tree and Fish Sale!** Order online now at [www.franklinswcd.org](http://www.franklinswcd.org).

# Modular Underground Storm Water Storage Systems

A number of companies have developed underground modular storm water management systems to reduce local flooding and meet government regulations. These systems infiltrate, detain or retain storm water. They are ideal for urban areas, where large unpaved surfaces for natural storm water drainage are in short supply. The underground chambers are positioned to capture excess rainwater or snow melt, from impervious surfaces such as parking lots. Once the storm subsides, the excess flow can drain from the chamber into the soil or it can be piped elsewhere for use in buildings or outdoor areas as part of a rainwater harvesting system. Modular design makes these systems relatively easy and inexpensive to install. They also lend themselves to scalability and customization. A pre-treatment module should be included to intercept sediment and prevent pollutants in the runoff from making their way into the soil.

Some of these modular systems consist of lightweight polypropylene boxes with a skeletal structure similar to that of milk crates. The chambers in other systems consist of half-pipes that are perforated and allow groundwater infiltration through the open bottom half. All of these modular systems are practical and effective methods for storing runoff and promoting



infiltration in commercial applications, such as under a parking lot, or in residential lots, to collect rooftop and driveway runoff.



Installation requires a much smaller footprint than a crushed rock system with the same amount of storm water storage capacity. This also means less expense for excavation, geotextiles, installation, liner and backfill. Systems generally include inspection tunnels and clean out portals which help to ease the logistics of system maintenance and extend the useful life of the installation. Consideration must be made for pre-treatment and pollutant removal to ensure long-term function for groundwater infiltration. Without pre-treatment, the runoff will enter directly into the system without the benefit of filtration, pollutant removal or biotic action that it would receive if routed through a rain garden or bioretention treatment train prior to infiltration.

When used for detention, the underground modular systems may eliminate the need for surface storm water basins along with their erosion potential, algae and other aesthetic

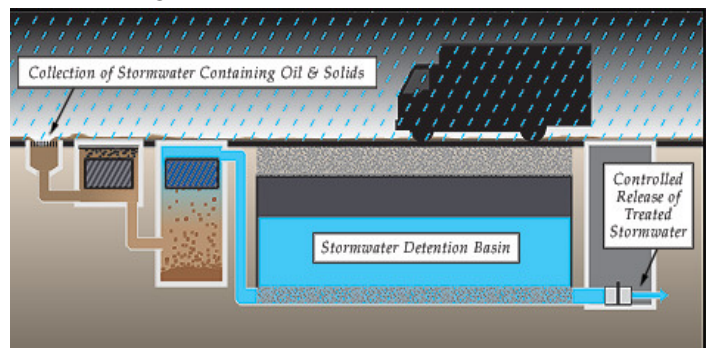
problems, and the concern with heated runoff to ecologically sensitive streams.



When an underground system is used for infiltration, it is important to take into consideration the soil type and hydrologic group. For instance, a system installed in clayey soils with a seasonal high water table will not have the infiltration capacity during the wet season that it has when the water table is lower. The chambers will already be full of ground water, as would a detention basin. Infiltration, when it does occur, will take place at a slower rate. Therefore, the systems function most effectively when installed in soils with good infiltration characteristics. Sediment and volume-based hydrologic impacts can be reduced or eliminated if the modules are used as infiltration systems. In residential developments, small modules on individual lots can be the beginning of a treatment train to infiltrate storm water and eliminate runoff.

When the EPA's new limits for turbidity and volume go into effect, these systems will be a useful tool in reaching that goal. Systems installed on sites over five acres may need review by the Ohio EPA for approval if being considered as a substitute for traditional basin detention.

Underground storm water storage modules can help recharge groundwater resources by replicating nature's own process of infiltration. They help reduce costs and achieve the most efficient land use possible with their innovative technology and tested solutions for storm-water management in urban areas.





FRANKLIN SOIL AND WATER  
CONSERVATION DISTRICT  
1328 Dublin Road, Suite 101  
Columbus, Ohio 43215  
(614) 486-9613 Fax: (614) 486-9614  
www.franklinswcd.org

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## **BMP Review: Silt Fence Redux**

We all know how to install silt fence. Or do we? Maybe we just forgot. There are a few basic requirements for properly installing a silt fence and they make all the difference in whether it works or not. Remember: silt fences work by ponding water and allowing the sediment time to settle out.

The first requirement is that it should be installed “on the contour.” This means that a level placed along the top will read evenly. If the silt fence runs up and down hill at all, the water will flow along the fence line until it reaches a low spot. At that point, the water builds until the fence fails. A level fence will capture sheet flow evenly, allow it to pond evenly, and slowly release it at a controlled rate. The fence should not be placed across a drainage path. For more concentrated flow conditions, use temporary diversions, rock checks, sediment traps and basins.

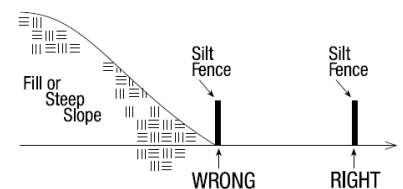
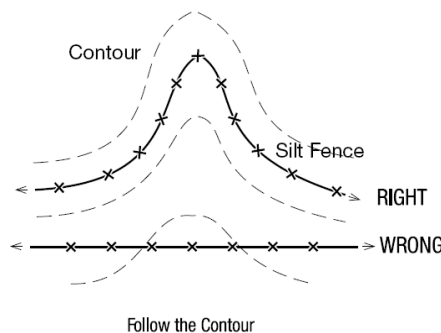
Secondly, the fence must be entrenched 6-8 inches into the ground. If water flows underneath the fence at any point, gullies will form, the fence is compromised and it is rendered useless.

Thirdly, the fence should be placed away from the toe of a slope at least 5 feet. It should not be used to mark work limits or to indicate the boundary line of a spoils pile. The silt fence must be allowed room to function. Again, it works by ponding water, so allow room for it.

Additionally, stakes must be on the down-slope side of the fence.

The ends of a line of silt fence must be brought upslope slightly to prevent water flowing around the ends.

Lastly, and most importantly, the silt fence must be in place before any earth disturbing activities begin.



Maximize Distance From the Toe of the Slope, Leaving at Least 5' Distance.

*Creating Conservation Solutions For Over 60 Years*