



# MARYLAND DEPARTMENT OF THE ENVIRONMENT

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## **Maryland Stormwater Seminars October 2013**

In October 2013, the Maryland Department of the Environment (MDE) conducted three regional seminars focusing on the implementation of environmental site design (ESD) throughout the State. These seminars were held on the Eastern Shore (October 8<sup>th</sup>), Western Maryland (October 17<sup>th</sup>) and Central Maryland (October 29<sup>th</sup>). The following is a brief summary of these seminars.

### **Introduction**

Brian Clevenger, Program Manager  
MDE Sediment, Stormwater, and Dam Safety Program

- History of Maryland's Stormwater Program
  - The stormwater program was founded in the mid 1980s to control flooding from new development.
  - The revisions in 2000 were initiated by MDE as a way of refocusing the stormwater program to address water quality, recharge, and channel erosion impacts resulting from smaller storm events. Major changes included publication of the 2000 Maryland Stormwater Design Manual (Manual).
  - Changes to the program in 2007 resulted from the passage of the Stormwater Act of 2007. These changes included revisions to the Manual that require the use ESD to the maximum extent practicable (MEP).
- Impacts of ESD on State and local stormwater management (SWM) programs are not yet known.
  - MDE staff visited several jurisdictions in the first half of 2013.
  - These visits as well as the three seminars are part of MDE's efforts to find out what is and what is not working regarding ESD use across the State.

### **Integration of Erosion and Sediment Control and SWM Plan Review**

Moderator:  
Amanda Malcolm, Acting Division Chief  
MDE Plan Review Division

#### Panelists:

Eastern Shore

Bob Shockley

Worcester County

Craig Zinter

Talbot SCD

Joe Blizzard

Kent SCD

Western Maryland

Gray Hebb

Washington County

Dee Price

Washington SCD

Central Maryland

Dave Bourdon

Prince George's SCD

Rey De Guzman

Prince George's County

Luis Dieguez

Charles SCD

#### State Perspective:

- MDE reviews both erosion and sediment control (E&SC) and SWM plans for State and federal projects. Coordinated review is not a problem.
- The 20-acre grading unit (GU) has been an issue. MDE has reviewed large projects where proposed plans exceeded the GU. In all but one case, MDE required revisions to the plans to meet as near as possible the GU criteria.

#### Common Issues:

- Plan Review Coordination:
  - Many jurisdictions have an organized committee (e.g., Technical Advisory Committee or “TAC”) that initially reviews plans.
    - After initial review, plans typically are sent directly to individual reviewers in the county.
  - Where an organized committee does not exist, commenting agencies conduct separate reviews. However, there is good communication between these agencies (typically via phone or email).
  - Being able to document a quicker, more efficient review process serves as encouragement for applicants to meet with review agencies prior to submitting concept plans or for using a committee review process.
  - The three-step process has increased the initial workload. However, where applicants have met with local agencies during the concept phase, the number of subsequent reviews has decreased.
- Types of Projects:
  - The number of new development projects submitted to local agencies has ebbed because of the economic downturn.
  - A large proportion of projects submitted are single family homes.
    - Many of these submittals qualify for use of a standard plan.

#### Regional Issues:

- There have been a number of agricultural projects that are not exempt from stormwater management. Many of these involve larger buildings (e.g., chicken houses, dairy barns). MDE is working to develop a standard plan for these projects.
- Some felt that the 20-acre grading unit may place a burden on the inspector, plan reviewer, and contractor.
- On the Eastern Shore, some jurisdictions see many plans come in just under the 5,000 square foot exemption threshold (e.g., 4,990 square feet) with no stormwater management, and believe that it is an abuse of the system.

#### Questions & Concerns:

- Is a municipal ordinance that allows projects that disturb less than 5,000 square feet to increase impervious area reasonable and/or acceptable?

**MDE Discussion:** Currently, any development that disturbs less than 5,000 square feet of land area is not required to have an approved stormwater management plan (see the Code of Maryland Regulations 26.17.05). However, local jurisdictions may be more stringent than the State regulations and require stormwater management on developments that disturb less than 5,000 square feet.

- Project and construction phasing often results in drainage patterns that are different prior to and during construction than post-construction. When this occurs, there are often problems associated with the increase and/or decrease in the volume of runoff during construction, especially if there is a change in how water flows onto adjacent properties.

**MDE Discussion:** Stormwater management (SWM), and erosion and sediment control (E&SC) plans should ensure the safe and non-erosive conveyance of runoff during and after construction. Any changes in flow patterns because of construction phasing should be addressed to ensure safe and non-erosive conditions throughout the transition. The approval of a SWM or E&SC plan does not create or affect any right to change the way water flows onto or off an adjacent property. MDE advises local jurisdictions to withhold plan approval until the developer obtains from adjacent property owners any temporary or permanent easements or other necessary property interests concerning flowage of water, including changes in the location or nature of discharge from the site.

**Environmental Site Design (ESD) to the Maximum Extent Practicable (MEP)**

Moderator:

Stewart Comstock, Senior Regulatory & Compliance Engineer  
MDE Program Review Division

Panelists:

Eastern Shore	Western Maryland	Central Maryland
Joe Miller*	Martin Covington	Mark Etheridge
Caroline County	Carroll County	Montgomery County
Joe Arthur	Dave Crable	Kimberly Burgess
Wicomico County	Frederick County	Baltimore City

\*Joe Miller submitted a presentation but was unable to attend.

State Perspective:

- ESD means using small-scale stormwater management practices, nonstructural techniques, and better site planning to mimic natural hydrologic runoff characteristics and minimize the impact of land development on water resources.
- MEP means designing stormwater management systems so that all reasonable opportunities for using ESD planning techniques and treatment practices are exhausted and only where absolutely necessary, a structural BMP is implemented.
- At a minimum, ESD shall address the recharge volume ( $Re_v$ ) and the water quality volume ( $WQ_v$ ). The channel protection volume ( $Cp_v$ ) is met when ESD practices are designed according to 5.2.2 of the Manual, “Environmental Site Design Sizing Criteria.”

Common Issues:

- Several jurisdictions receive plans with SWM designs that only treat the runoff from the first inch of rainfall using ESD practices, with the remaining rainfall being directed into a structural practice. Designers target the minimum requirement of 1” ( $WQ_v$ ) instead of the MEP requirement.

**MDE Discussion:** Since the passage of the Stormwater Act of 2007, the focus of the stormwater program has shifted to mimicking the natural hydrology of forested conditions while also increasing recharge and water

quality treatment. Therefore, the goal is to treat to the MEP a single volume – the  $ESD_v$  – using small-scale practices found in Chapter 5 of the Manual. As a result, the  $ESD_v$  has no direct or mathematical relation to  $WQ_v$ ,  $Re_v$  or  $Cp_v$ . The  $ESD_v$  is the volume needed to reduce runoff from the 1 year storm to levels mimicking forested conditions. The entire  $ESD_v$  acts as channel protection while providing the additional benefits of recharge and water quality treatment of a larger volume of runoff.

- Jurisdictions across all three regions said that one reason given to them by developers for not doing ESD to the MEP is the concern that the practices will attract/breed additional mosquitoes during the summer months.

**MDE Discussion:** There is guidance on this issue on MDE’s website.<sup>1</sup> Whether a practice captures the runoff from 1 inch of rainfall or the entire  $ESD_v$  does not significantly alter the potential for mosquito breeding. The potential for attracting/breeding of mosquitoes and other nuisance species is reduced greatly when stormwater practices are designed in accordance with the Manual and properly maintained.

#### Regional Issues:

- In Central Maryland, MDE approval letters are often used as leverage to compel local jurisdictions to allow specific proprietary practices.

**MDE Discussion:** According to the stormwater management regulations, ESD and structural stormwater management practices may be used for new development runoff control if they meet the performance criteria established in the Manual and are approved by MDE. When these conditions are met, MDE issues a letter to the manufacturer that outlines the conditions for approval. Each letter issued by MDE contains the condition that a practice may be used “provided it is accepted locally.” This enables local jurisdictions not to allow the use of practices on a case-by-case basis.

- There was an issue in both Central and Western Maryland about the abuse of the submerged gravel wetland (SGW). Because there is no drainage area limit, SGWs are being used essentially to treat larger drainage areas (similar to a stormwater pond).

**MDE Discussion:** This goes against the principle of “ESD to the MEP”, which is about mimicking natural hydrologic conditions. “Natural hydrology” consists of small, dispersed flows across a site, rather than a centralized, concentrated flow that results from using larger, “end-of-pipe” facilities. Additional guidance on this topic can be found on MDE’s website.<sup>2</sup>

#### Questions & Concerns:

- Many jurisdictions in Central Maryland have requested that MDE keep the counties “in the loop” with any additional approved proprietary practices.

**MDE Discussion:** MDE will start forwarding copies of approval letters to all jurisdictions.

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<sup>1</sup><http://mde.maryland.gov/programs/Water/StormwaterManagementProgram/Documents/www.mde.state.md.us/assets/document/mosquito%202005.pdf>

<sup>2</sup>[http://mde.maryland.gov/programs/Water/StormwaterManagementProgram/SedimentandStormwaterHome/Documents/ESDMEP%20Design%20Guidance%20SGW%20\(2\).pdf](http://mde.maryland.gov/programs/Water/StormwaterManagementProgram/SedimentandStormwaterHome/Documents/ESDMEP%20Design%20Guidance%20SGW%20(2).pdf)

## Field Implementation of ESD

Moderator:

Deb Cappuccitti, Senior Regulatory & Compliance Engineer  
MDE Program Review Division

Panelists:

Eastern Shore

Western Maryland

Central Maryland

Van Funk

Angie Patterson

Karuna Pujara

Cecil County

Allegany County

State Highway Administration

John Kling

John Swauger

Chad Edmonson

Queen Anne's County

Washington County

Howard County

State Perspective:

- During field visits the previous summer, MDE saw some good examples of design/field implementation and some not so good examples.
- MDE presented one field example. This was the new Science, Technology, Engineering and Math (STEM) building at Hagerstown Community College. Stormwater management included a rainwater harvesting system for non-potable water use, green roofs, and micro-bioretenion facilities. There were many island bioretention areas throughout the new parking lot. Overall, this was a good example of ESD implementation.
- All but two bioretention areas were functioning properly. These two facilities were not draining well and, in each case, the filter was clogged. Because these were designed and built the same way as the other facilities, no one was quite sure why they failed. The contractor replaced the geotextile with pea gravel and now they seem to be working.

Common Issues:

- A good number of micro-bioretenion facilities are sparsely vegetated or have plantings only on the sides and not the bottom of the facility. Several jurisdictions asked MDE for better guidance regarding landscaping of these facilities. Another frequent question is how vegetation contributes to the effectiveness of these facilities, if at all. Hiring a landscape architect to design facility plantings was also discussed.
- Some counties mentioned facing situations where a bioretention facility failed because the filter fabric clogged. What materials should be used to reduce/prevent this problem?

**MDE Discussion:** MDE no longer recommends using filter fabric between layers within filtering practices. Instead, designs should incorporate a bridging layer (e.g., #8 or #9 stone) between the filtering media and the larger stone surrounding the underdrain system.

- There are recurring issues with floating mulch in many micro-bioretenion facilities (covered in detail later).

Regional Issues:

- One county on the Eastern Shore noted that contractors need to understand SWM facilities and how they function. Sometimes the contractor does not want to follow sequence of construction. Also, owners typically

do not understand maintenance; many unhook rain barrels for example. Education is needed and it may be a good idea to include SWM education within the green card class.

- One county in Western Maryland showed a couple of field examples. The first was new development with permeable asphalt pavement and three micro-bioretenment facilities. All of them appeared to be working. The only complaint by the contractor was the difficulty in running the paver used for the permeable asphalt installation due to the site's small size. A recent redevelopment project for a CVS and Arby's also used permeable concrete and micro-bioretenment areas. Most of those BMPs are working well. However, one of the facilities has ponded water and a dry underdrain. The county is currently investigating the site to determine the problem and a solution. One current theory is that sediment deposition in the storm drain during construction clogged the surface although the plan specified that the SWM practices be constructed after construction was complete.
- A jurisdiction in Central Maryland showed an example where a micro-bioretenment facility receiving runoff from a nearby highway was eventually overwhelmed by road salt and failed. It was then retrofitted to a structural BMP (a sand filter).
- One jurisdiction in Central Maryland presented many positive examples of ESD implementation as well as examples of a few learning experiences. One of these learning experiences involved steep slopes to a bioretention facility in a homeowner's front yard. The jurisdiction is working on improving the communication between county plan reviewers, builders, inspectors, and homeowners to ensure a smoother process. The jurisdiction is also making efforts to educate homeowners about these practices because it is critical to the success of the program.

Other:

- At least two counties on the Eastern Shore do not release use and occupancy permits until as-builts are submitted and approved. This requirement typically is not used where the project involves the construction of a larger subdivision (e.g., roads and infrastructure).
- One Eastern Shore county holds bonds until the project BMPs have been determined to be functioning. Up to half of the bond may be released earlier if it is a large project. Infiltration tests are required to be performed in the field to confirm hydrologic soil group.
- One county in Western Maryland requires that all plans include a critical inspection checklist for BMP installation that indicates times when an inspector must be on site. This is part of a tracking system so that when a permit is released, the appropriate notifications remind inspectors to make sure that no critical inspections are missed. A sign off sheet is also included on the plans and the county guidelines include what to look for in various practices.
- One county in Central Maryland presented a new, electronic plan review process called PDOX. This allows the county to track changes made throughout plan review. This also makes it easier to write and embed color-coded comments on the plans. This has helped to further improve and streamline the plan review process.

## Local Clarifications/Modifications of ESD Practices

Moderator:

Ray Bahr, Division Chief  
MDE Program Review Division

Panelists:

Eastern Shore	Western Maryland	Central Maryland
Michael Merbaugh Talbot County	Myron Frock Carroll County	Bruce Appell Harford County
Kordell Wilen Cecil County	Reggie Breeding Garrett County	Matthew Keenan MDE Plan Review

State Perspective:

- The purpose of this session was to find out where more clarification or guidance is needed for better ESD implementation.
- There are instances when allowing variations from the design criteria found in the Manual may be acceptable. Where there are unique site conditions and/or geographic or hydrologic characteristics, local agencies have found opportunities to implement SWM designs that do not always meet the recommendations or requirements found in the Manual. MDE encourages local plan approval authorities to use best professional judgment when unique conditions require alternate approaches to SWM design. MDE recommends that where variations to design criteria are sought, jurisdictions use sound engineering principles, document all justifications, and continuously monitor the BMPs for performance.

Regional Issues:

- The Eastern Shore has large areas of C and D soils and/or seasonally high groundwater that limit the use of infiltration practices. There is also limited topographic relief that hinders the use of any BMP with an underdrain system or piped outlet. Where these conditions exist, the SGW is often used to provide stormwater treatment.

One jurisdiction has modified the SGW design to enhance applications for smaller drainage areas. PVC liners are used along the bottom and sides to ensure wet conditions. In addition, concrete or timber structures are used for more precise outlet control water elevation within the SGW. The jurisdiction is monitoring several facilities where these modifications were used, and as of the seminar, all were functioning as designed.

- The proposed stormwater management plan for a local bridge replacement and road widening project in an Eastern Shore county called for removing a wooded area to install a bioretention facility. The reviewing agency determined that removing woods was not ESD. Instead, the jurisdiction recommended using the non-rooftop disconnection technique. However, the area within the road right-of-way available for stormwater management was too narrow to meet the requirements for the disconnection of non-rooftop technique found in Chapter 5 of the Manual.

To resolve the issue, the reviewing agency recommended using soil amendments to increase the permeability of the in situ soils and enhance runoff reduction within the right-of-way. This also reduced the number of bioretention practices needed and the footprint of those practices. Using soil amendments also preserved forested areas along the roadway. The progress of this project will be closely monitored by the county.

**MDE Discussion:** MDE is also interested in the outcome of this project. The use of innovative solutions to unique problems is encouraged on a case-by-case basis. While soil amendments are used as a method of improving soil permeability, the Manual does not recognize this practice as a specific ESD technique.

- One jurisdiction has developed a guidance document that includes modifications to some of the BMPs found in the Design Manual. These modifications typically are developed to address geographic or hydrologic conditions found within the jurisdiction. Any modifications to local guidance should be reviewed by MDE to ensure consistency with the Manual.

Two examples of this local guidance are modifications to drywells and disconnection of non-rooftop runoff. In the first case, the jurisdiction allows a larger drainage area to individual drywells provided the design incorporates a perforated pipe that distributes runoff more evenly within the practice. The second modification allows the disconnection of non-rooftop runoff technique to be used where average slopes exceed the 5% requirement. One feature of this modification is the addition of an underdrain that extends into the road or driveway shoulder. This feature provides safe conveyance of runoff away from the edge of pavement enhancing drainage and decreasing maintenance.

- Because of its mountainous topography, another jurisdiction also has modified the rooftop and non-rooftop disconnection techniques. In areas where slopes slightly exceed 5%, this jurisdiction promotes the use of a landscaped infiltration swale for stormwater management. These swales are located perpendicular to the slope and include a series of rock “bleeders” to drain excess runoff safely from the swale system.
- One Central Maryland jurisdiction requires that the overbank flood protection volume ( $Q_{p2 \text{ or } 10}$ ) be addressed for the ten-year design storm, which commonly results in the construction of centralized stormwater management facilities. Recognizing that the SGW does not have a maximum drainage area, several plans were submitted that combined a SGW with the centralized stormwater facility to address all stormwater management requirements. In many cases, these concept plans featured SGWs in areas where soils were well drained (e.g., A or B soils) and an impermeable liner was needed to ensure wet conditions with the practice. The reviewing agency required additional ESD techniques and/or practices distributed across the project to better meet the ESD to the MEP requirement. The jurisdiction also required the developer to relocate the SGW to D soils where it would better mimic natural hydrology.

**MDE Discussion:** While SGWs may be used to mimic natural hydrologic conditions where there are poorly drained soils (e.g., D soils) or high water tables, they should not be considered as ESD when used outside of those conditions. See MDE’s guidance document on SGWs listed above for more information.

Also discussed was how this jurisdiction addressed some problems with landscaped ESD practices. One common problem is that the mulch used becomes suspended during rainfall events. To address the problem of “floating mulch”, the jurisdiction suggests using non-floating alternatives like sea or oyster shells or landscaping gravel. In the latter case, the jurisdiction recommends using white or light colored material to avoid “burning” the vegetation.

- Another presentation discussed several modifications that were reviewed by MDE’s Plan Review Division. In this case, one modification was to a permeable pavement design as part of the redevelopment of a medical building and an associated parking garage. Soils throughout the site were poorly drained (D) or fill soils. While not typically allowed in fill, testing indicated that local infiltration rates were acceptable for using permeable pavements. For this project, the permeable pavement design included underdrain systems that discharged to additional stormwater practices that were capable of meeting the entire  $ESD_v$ .

## Questions & Concerns:

- Because there is no maximum drainage area, jurisdictions are seeing misapplication and/or overuse of the SGW design. MDE needs to provide better guidance on design details.
- Many ESD practices are landscaped and floating mulch is a common problem. What options or alternatives are available?

**MDE Discussion:** There are several options for resolving this issue; most notably using mulch (e.g., shredded hardwood mulches or landscape gravel) that does not float, or by mixing the mulch into the upper layer of the filtering media.

- More education about stormwater management that targets developers and residents would be helpful.
- Many slopes in the Western and Central Maryland region exceed the 5% maximum listed for several of the nonstructural techniques. What alternatives or options are available when steeper slopes predominate?

**MDE Discussion:** Currently, there are not many standard designs that allow for overland filtering on steeper slopes. This is one of the many SWM topics that MDE continues to explore.

## Closing

Brian Clevenger, Program Manager  
MDE Sediment, Stormwater, and Dam Safety Program

The stormwater conferences that were held in October 2013 are part of a continuous and necessary dialogue that must be maintained between MDE and local plan review agencies. This communication is essential for improving the implementation of the stormwater management program in Maryland. In the near future, MDE will provide further clarification on the major issues raised at each of the three conferences in cooperation with local program expertise. Any updated information will be issued as official guidance via e-mails, letters and webpage listings.