Maryland's Urban Stormwater Best Management Practices by Era Proposal

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Introduction

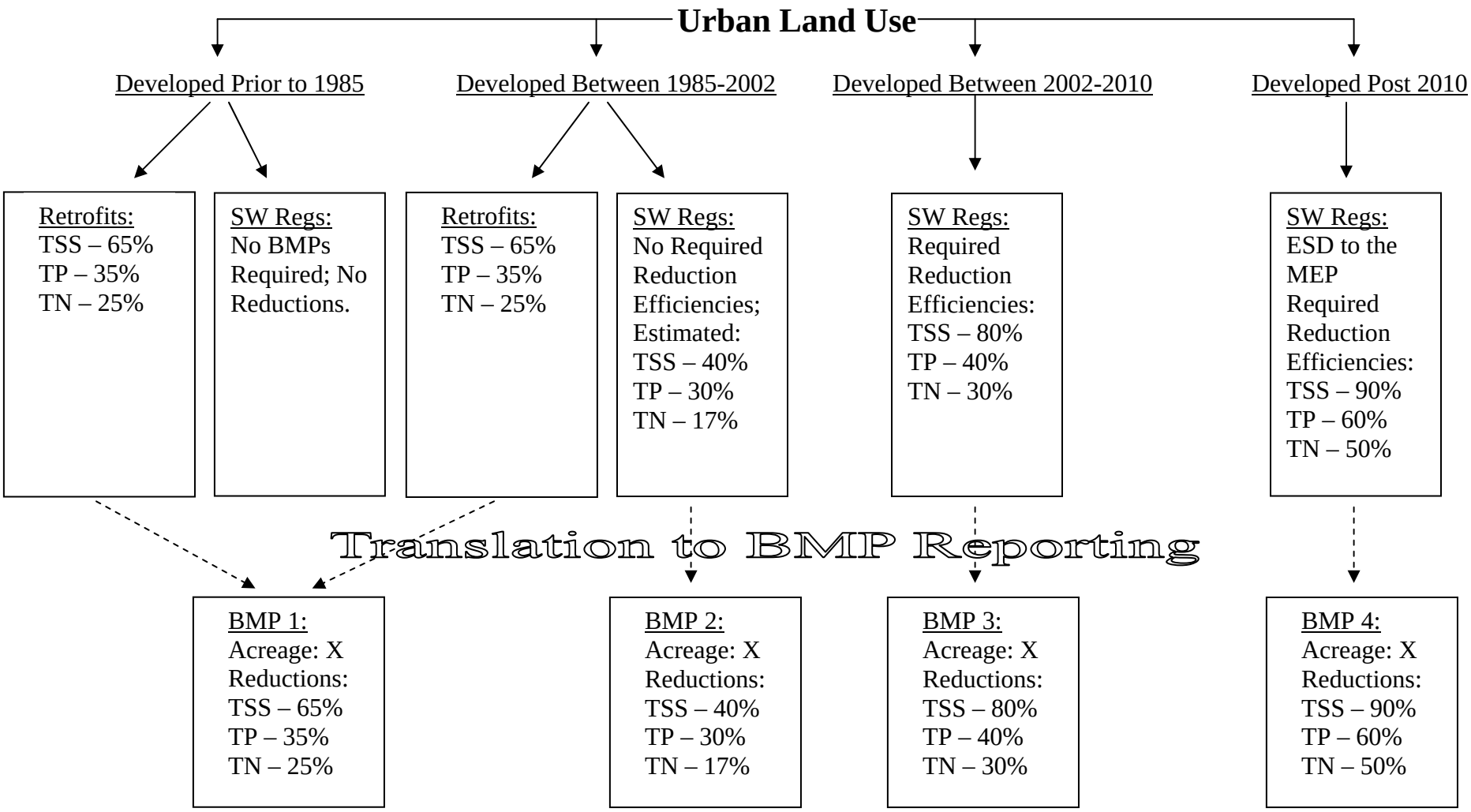
The Maryland Department of Environment (MDE) is proposing to change how it reports on the implementation of stormwater management to the Chesapeake Bay Program (CBP). This effort has been initiated because urban best management practice (BMP) information throughout Maryland is limited due to inadequate reporting, which underestimates the total number of BMPs that have been implemented. Using Chesapeake Bay Program (CBP) developed acres since 1985, there should be approximately 457,429 acres of urban land controlled by stormwater management in Maryland, but as of 2009, the reporting has only shown approximately 200,000 acres. To better reflect actual implementation, MDE proposes a change in the reporting to the CBP from individual urban BMPs to four BMP categories defined by Maryland's predominate stormwater management eras. MDE has already begun to use the stormwater management by era analysis for showing progress toward Tributary Strategy and BayStat Milestones and believes that it will also be appropriate for the CBP model and Total Maximum Daily Load (TMDL) analysis. The major stormwater management eras for this analysis are described below and depicted in Figure 1.

Major Stormwater Management Eras

Prior to any stormwater management in the State, urban runoff was directed into nearby waterways with little thought of either volume control or water quality treatment. In 1982, the Maryland General Assembly passed the State's first Stormwater Management law. While this law focused primarily on flood control, a preferred order of BMP implementation was established for treating water quality. Local ordinances and programs necessary to address the requirements of the new stormwater management law were completed by 1985. Because stormwater management programs did not occur statewide until this time, MDE proposes that urban land developed before 1985 be recorded with no pollutant load reductions.

Local programs, criteria, and associated BMPs to address the 1982 Stormwater Management law were implemented in Maryland from 1985 through 2001. Pollutant removal efficiencies for the BMPs implemented during this era are based upon CBP guidance.[1] Additionally, an analysis of MDE's Urban Best Management Practice database and a survey of Maryland Counties were used to determine the proportional coverage of each BMP type.[2] Based upon these data and analysis, MDE proposes that CBP urban land data between 1985 and 2001 be recorded with pollutant removal efficiencies of 40% for total suspended solids, 30% for total phosphorus, and 17% for total nitrogen.

Figure 1. **Stormwater Management by Era**

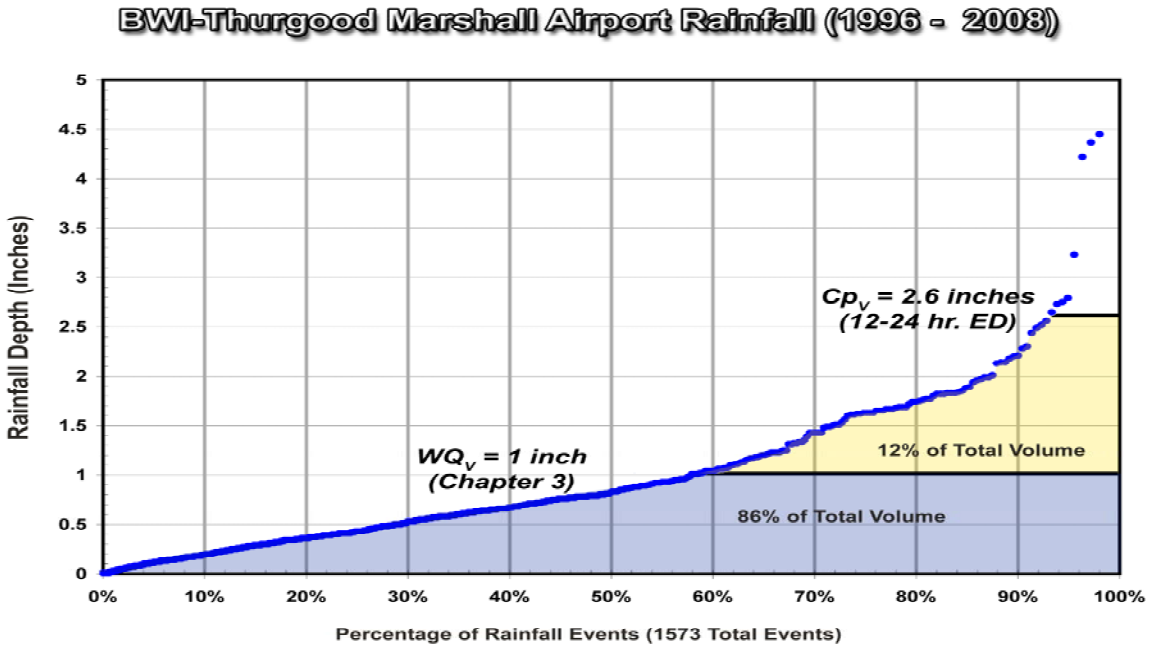


Significant changes to Maryland's Stormwater Management law occurred in 2000 with a focus on improving BMP water quality performance. The *2000 Maryland Stormwater Design Manual*, incorporated into the Code of Maryland Regulations as part of the 2000 update, stipulated volumetric criteria for groundwater recharge, water quality treatment, and channel protection. These criteria were based upon a *Technical Support Document for the State of Maryland Stormwater Design Manual Project*,[3] where all BMPs were required to meet an 80% reduction efficiency for total suspended solids, and a 40% reduction efficiency for total phosphorus.

Also, based on the typical BMPs implemented during this era and CBP guidance on pollutant removal efficiencies for these BMPs, a 30% reduction for total nitrogen is estimated. Counties and municipalities were implementing Maryland's *2000 Maryland Stormwater Design Manual* by 2002. MDE proposes that CBP land use data between 2002 and the present be recorded with pollutant removal efficiencies of 80% for total suspended solids, 40% for total phosphorus, and 30% for total nitrogen.

Further changes to Maryland's Stormwater Management Law occurred in 2007 and promoted the use of environmental site design (ESD) to the maximum extent practicable (MEP). With a focus on stormwater planning during the conceptual stage of development and a reliance upon the use of vegetative non-structural practices, stormwater controls for new development will be designed to replicate forest runoff. It is anticipated that because 98% of the annual stormwater runoff volume (see Figure 2) will be captured through ESD to the MEP, pollutant removal rates will likely increase.

Figure 2. Stormwater Volume Required by Maryland's 2007 Stormwater Management Act



Based upon CBP efficiencies for similar BMPs, MDE conservatively estimates that ESD to the MEP will meet pollutant removal efficiencies of 90% for total suspended solids, 60% for total phosphorus, and 50% for total nitrogen.[4] Future monitoring of ESD to the MEP will be used to validate these estimates or to propose new pollutant removal efficiencies to the CBP for BMPs implemented beyond 2010.

Watershed restoration of older urban areas with little or no stormwater management is a primary target of Maryland's National Pollutant Discharge Elimination System (NPDES) municipal stormwater permits, and Maryland's Small Creeks and Estuaries and Stormwater Pollution Cost Share Programs. Because stormwater retrofits are a combination of newer BMPs as required by Maryland's 2000 stormwater management act and other BMP types similar to those implemented between 1985 - 2001, MDE has decided to pick the mean of these two stormwater management eras for reduction efficiencies. Thus pollutant removal efficiencies of 65% for total suspended solids, 35% for total phosphorus, and 25% for total nitrogen have been estimated. The land areas restored are a combination of pre-1985 development, where no stormwater management was required, and land developed between 1985 and 2002 where traditional flood control BMPs are often enhanced with water quality features. MDE proposes initially to evenly divide the data on acres restored between these two eras. As NPDES stormwater permittees begin to report data in a GIS format, restoration data and coverage will be more accurately defined and appropriated accordingly.

Bibliography

[1] Weammert, Sarah E. 2007. *The Mid-Atlantic Water Program (MAWP) reviewed BMP efficiencies implemented and reported by the Chesapeake Bay watershed jurisdictions prior to 2003.* University of Maryland, College Park, MD.

[2] A Survey by Baish, Alexander S. and Caliri, Marisa J., 2009. *Overall Average Stormwater Effluent Removal Efficiencies for TN, TP, and TSS in Maryland from 1984-2002.* Johns Hopkins University, School of Engineering, Baltimore, MD.

[3] Claytor, Rich, and Schueler, T.R., 1997. *Technical Support Document for the State of Maryland Stormwater Design Manual Project.* Water Management Administration, Maryland Department of the Environment, Baltimore, MD.

[4] 2000 Maryland Stormwater Design Manual, Supplement 1, 2008. Maryland Department of the Environment, Baltimore, Baltimore, MD.