



**pennsylvania**

DEPARTMENT OF ENVIRONMENTAL PROTECTION

Office of Water Management



# Revisiting the BMP Removal Rate Adjustor Curves

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# BMP Enhancements

## Recommendations of the Expert Panel to Define Removal Rates for Urban Stormwater Retrofit Projects (pgs. 8-9)

- BMP enhancements utilize the original stormwater treatment mechanism, but improve removal by increasing storage volume or hydraulic residence time.
- Example: an upgrade to an older stormwater pond built under less stringent sizing and design standards.
- Upgrades may:
  - increase treatment volume,
  - prevent short circuiting,
  - extend flow path or hydraulic residence time,
  - add internal design features to enhance overall nutrient and/or sediment reduction

# PA MS4s in the Chesapeake Bay

- PA is currently finalizing the MS4 General Permit effective from 2018-2023
- The draft requires that all MS4s in the Bay Watershed reduce sediment by 10% and P by 5%
- PA needs to be able to provide every able tool to municipalities in order to obtain these reductions
- Retrofitting basins could be a financially viable mechanism to achieve reductions

# Retrofit Activity

## Recommendations of the Expert Panel to Define Removal Rates for Urban Stormwater Retrofit Projects (pg. 6)

- PA states:
  - The scope of retrofit activity will expand in the coming years as communities implement their new PAG-13 MS4 permits which require localities to develop strategies in the form of a local Chesapeake Bay Pollutant Reduction Plan by 2013.

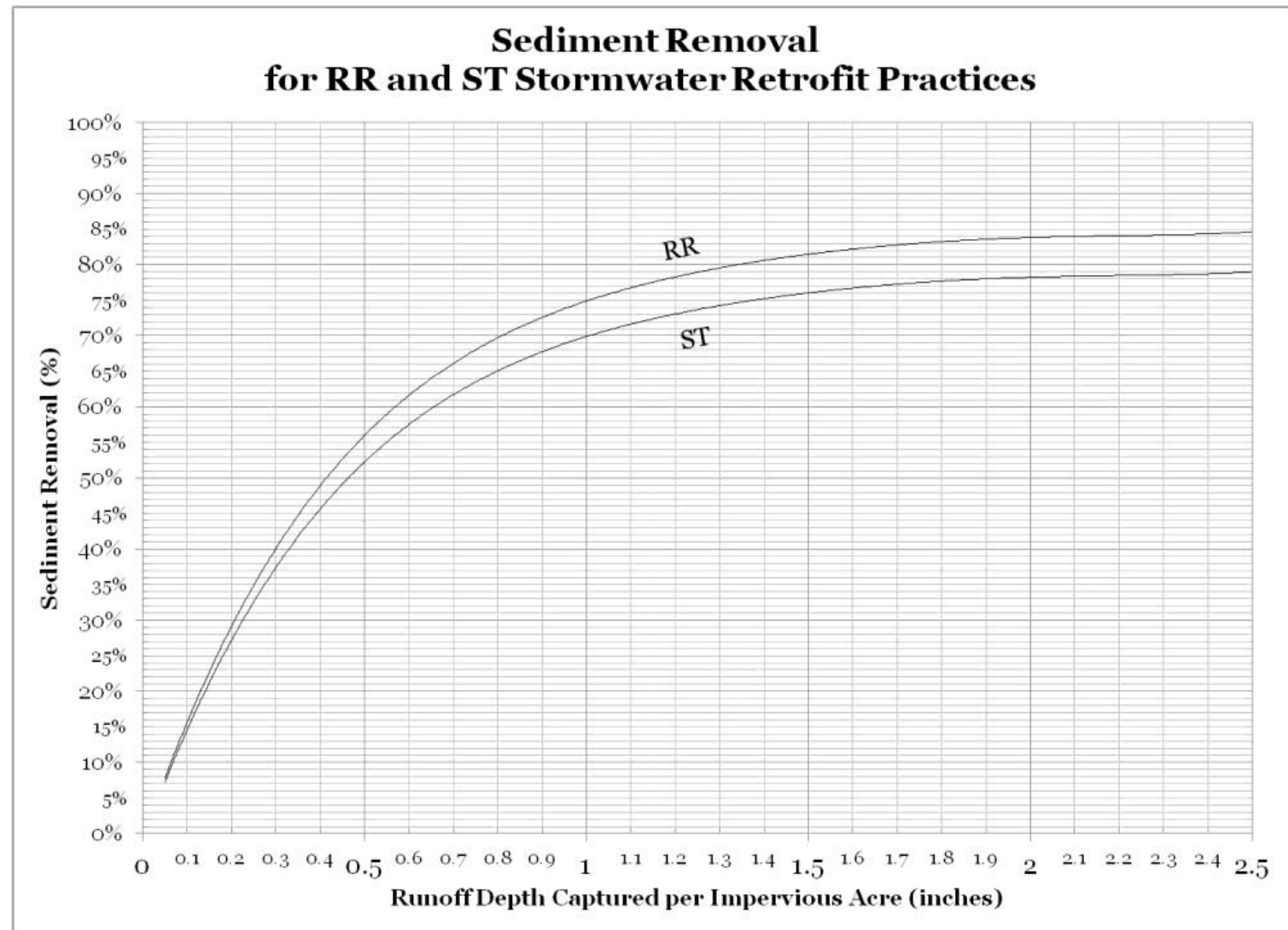
# PA PCSM Design Criteria

- After November 19, 2010, PCSM permittees have been required to manage the net change in pre to post runoff volume and water quality for storms up to and including the 2-year/24-hour storm event
- In PA the 2-year/24-hour storm event is approximately **2.8 inches**
- By the time the new MS4 requirements will become effective 8 years will have passed since infiltration basins would have been designed to this criteria

# Retrofit Pollutant Removal Calculation

- In order to determine the runoff volume treated by a retrofit practice (pgs. 13-15), the designer uses the following equation to determine the amount of runoff volume in inches treated at the site:
- $(RS * 12) / IA$ 
  - Where:
    - RS = Runoff Storage Volume (acre-feet)
    - IA = Impervious Area (acres)
- The result of the calculation is then applied to the retrofit removal adjustor curves

# Retrofit Pollutant Removal Calculation



# Retrofit Pollutant Removal Calculation

- Recommendations of the Expert Panel to Define Removal Rates for Urban Stormwater Retrofit Projects (pg. 17)
  - BMP Enhancement: The sediment and nutrient removal rates for individual BMP enhancement retrofits are also expressed as an incremental removal rate (enhanced BMP - existing BMP).
  - The removal rate for the BMP enhancement is then defined as the difference between the enhanced rate and the existing rate.



# Retrofit Pollutant Removal Calculation

- The Runoff Storage (RS) Volume (in acre-feet) is a function of drainage area size, land use within the drainage area, and hydrologic soil type.
- Calculations demonstrate that given the 2.8 inch PCSM design criteria, the existing BMP removal rate will either be very near or above the high end of the curve which stops at 2.5 inches
- Any further enhancement will only further go off of the graph with no defined removal rate

# Retrofit Pollutant Removal Curves

## Recommendations of the Expert Panel to Define Removal Rates for Urban Stormwater Retrofit Projects Appendix B (pgs. 33-37)

- Discusses that the pollutant removal percentages were derived up to the 2.5 inch storm event.
- In general, no BMP performance monitoring data is available in the literature to evaluate removal for runoff treatment depths beyond 1.5 inches, so this conservative approach was used for the extrapolation.
- The Panel had limited confidence in removal rates in the 1.5 to 2.5 inch range, although it was not overly concerned with this limitation, since few of any retrofits are sized to capture that much runoff.
- A spreadsheet that defines how the anchor rates and bypass adjustments were derived can be obtained from CSN.

# Retrofit Pollutant Removal Curves

- PA requested the spreadsheet from CSN in order to understand what the pollutant removal efficiencies would be once the curves were extended further
- Treating more runoff (than the 2.5 inch value) will remove pollutants from stormwater flows and decrease pollutants from streambank erosion
- PA wants to find a viable mechanism to give credit for such efforts
- Once we obtain the spreadsheet and extend the curves, PA can provide a more precise recommendation to the group