

Alternative Strategies for Managing Nutrients in Stormwater



- Doug Howie, Washington State Department of Ecology - Emerging Stormwater Treatment Technology Testing Program: Structural Controls
- Jason Sorenson, United States Geological Survey – Street Solids and Leaf Litter
- Jamie Houle, University of New Hampshire Stormwater Center – Riparian Buffers
- Tom Schueler, Chesapeake Stormwater Network – Sediment and Nutrient Reduction Crediting for the Chesapeake Bay TMDL

Clean Charles River Initiative

- The EPA and MassDEP established Total Maximum Daily Load (TMDL) for all discharges
 - 2007, Final TMDL for Nutrients in the Lower Charles River Basin (Lower TMDL)
 - 2011, TMDL for Nutrients in the Upper/Middle Charles River (Upper TMDL)
- TMDL Requirements:
 - Phosphorus WWTF discharge limits for summer/winter at 0.1/0.3 mg/L
 - Stormwater phosphorus reductions are significant!

Low/Medium Density Residential
5,819 kg/yr

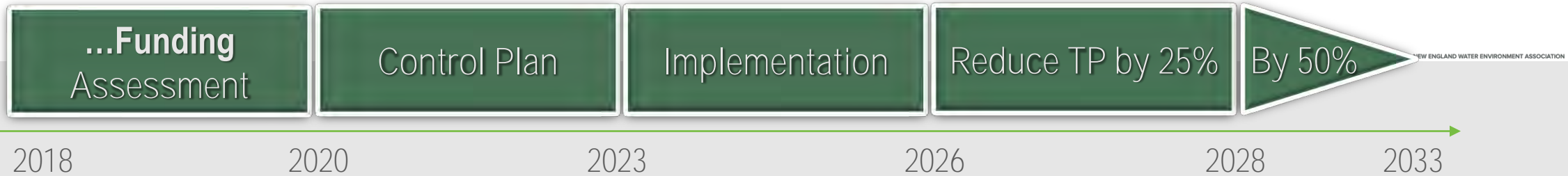
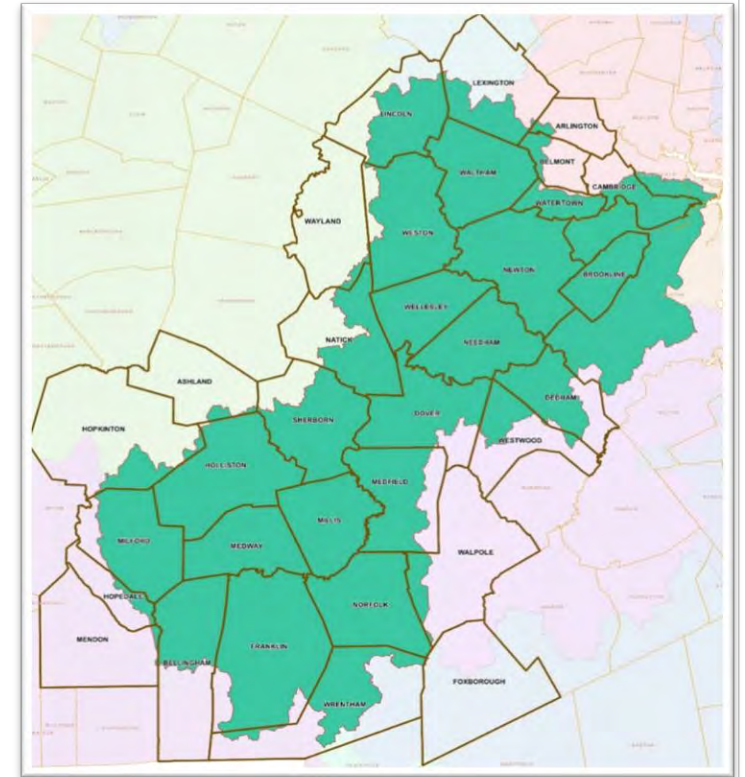
High Density Residential
3,877 kg/yr

Commercial / Transportation
5,500 kg/yr

~15,000 kg/yr
reduction from
stormwater
sources

MS4 Discharger Obligations

- 2016 Massachusetts Small Municipal Separate Storm Sewer System General Permit (MS4 General Permit) effective July 1, 2018
- The MS4 General Permit defines load reduction targets for individual communities
- 34 regulated communities will be required to meet the Load Reduction Requirement **by 20% in the first eight years of the permit term (2018-2026)**...and by 25% in the first ten years



“Creditable” Activities in EPA – Region 1

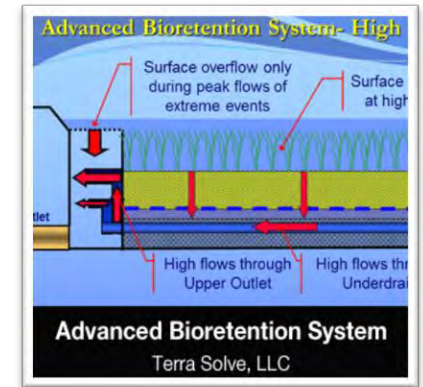
- Structural Controls

- Infiltration Practices
- Biofiltration Practices
- Sand Filter
- Gravel Wetland
- Impervious Area Conversion

- Porous Pavement
- Wet Pond
- Dry Pond
- Dry Water Quality Swale
- Disconnection through Storage

- Non-structural Controls

- Enhanced Sweeping Program
- Catch Basin Cleaning
- Organic Waste and Leaf Litter Collection Program



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Emerging Stormwater Treatment Technology

Testing Program: Structural Controls

- TAPE Program Background and Overview
<https://www.wastormwatercenter.org/tape-program>
- TAPE Outside of Washington State
- Phosphorus Certified Systems
 - What we are seeing for Innovations and New Technology?
- STEPP (Stormwater Testing and Evaluation for Products and Practices)
The National Stormwater Testing and Evaluation for Products and Practices (STEPP) Initiative seeks to improve water quality by accelerating the implementation and adoption of innovative stormwater management technologies by removing current barriers to innovation, creating regulatory confidence, minimizing duplicative performance evaluation efforts, and establishing a common framework for testing and evaluating both public domain and proprietary stormwater control measures.
<https://wefstormwaterinstitute.org/programs/stepp/>

Street Solids and Leaf Litter

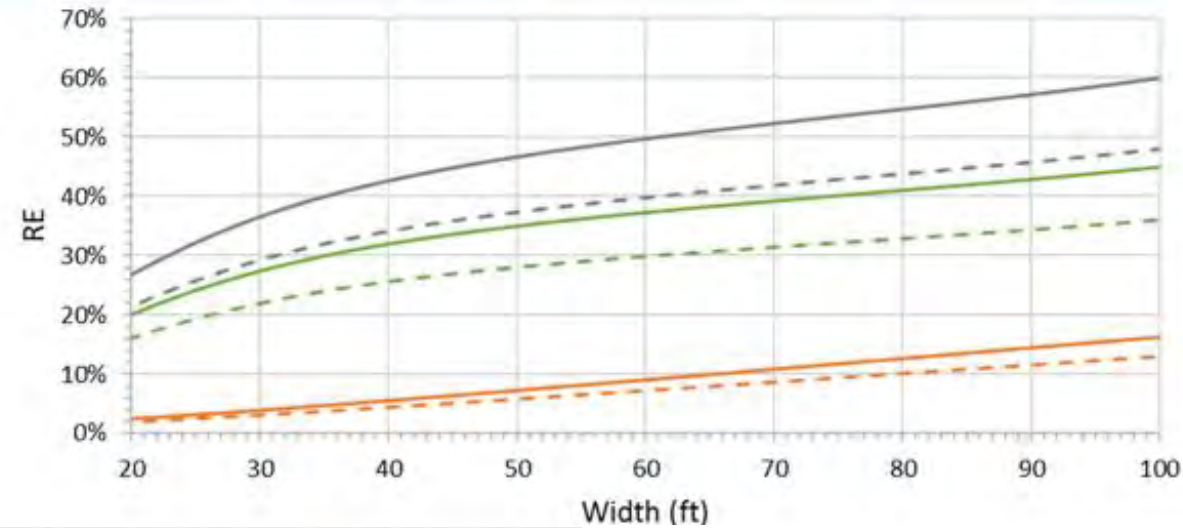
- USGS, in cooperation with State, Federal, Municipal, Tribal, and other partner organizations, conduct many studies of pollutant loading, urban runoff and BMP performance across the country
- Recent work shows large potential nutrient-load reductions possible through aggressive leaf management in curb and gutter systems
- USGS New England Water Science Center:
<https://www.usgs.gov/centers/new-england-water/>
- Wisconsin leaf litter research:
<https://www.usgs.gov/news/removal-fallen-leaves-can-improve-urban-water-quality>
- USGS-Vermont leaf litter study (ongoing):



CREDIT FOR GOING GREEN

Meeting Water Quality Standards with Buffers

Restored or constructed buffers can be used as water quality best management practices (BMPs) in development, redevelopment, restoration, or other land use change projects. This science-based tool provides pollutant reduction performance curves that can be used to receive pollutant removal credits under regulatory permits issued by the NPDES Stormwater Permit Program for municipal separate storm sewer system (MS4) communities. Municipal staff and boards can promote this tool as a way to protect water quality, while achieving other benefits like habitat provision and flood mitigation.

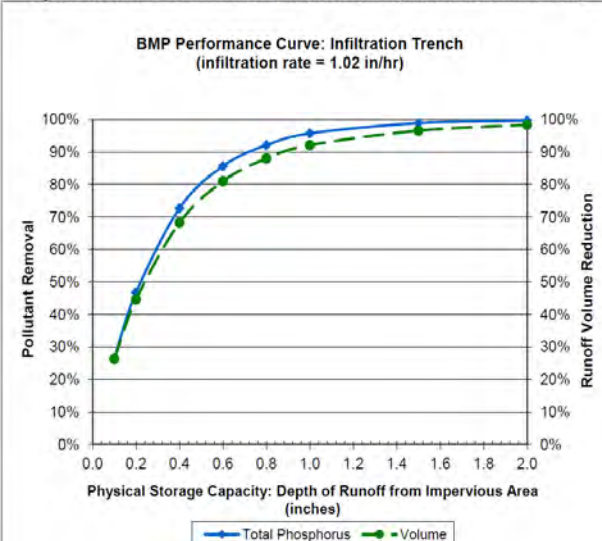


WHAT'S NEW	WHY IT'S IMPORTANT	WHEN TO APPLY
<ul style="list-style-type: none"> • Science-based approach to assigning pollutant removal credits for buffer restoration or construction • Ability to compare the performance of restored or constructed buffers to other water quality BMPs • Tool to enhance water quality protection in development, redevelopment, restoration, and other projects involving land use change • Opportunity to meet water quality standards while getting additional benefits 	<ul style="list-style-type: none"> • Helps communities meet municipal separate storm sewer systems (MS4) permit requirements • Offers a statewide framework to account for pollutant removal credits for restored or constructed buffers • Restored or constructed buffers reduce the pollution flowing into wetlands and water bodies • Leverages the many opportunities for buffer restoration in New Hampshire <p>Restored or constructed buffers help communities meet regulatory requirements.</p>	<ul style="list-style-type: none"> • You are engaged in development or redevelopment projects with opportunities for buffer restoration or construction • Your community is considering new or updated ordinances related to restored or constructed buffers • You are collaborating on a watershed management plan and want to identify structural BMPs that will help meet pollution reduction targets • Your community is creating a nitrogen management budget <p>There are many opportunities to use this.</p>

Infiltration Trench (IR = 1.02 in/hr) BMP Performance Table:
Long-Term Phosphorus Load Reduction

BMP Capacity: Depth of Runoff Treated from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2
Runoff Volume Reduction	26.3%	44.6%	68.2%	81.0%	88.0%	92.1%	96.5%	98
Cumulative Phosphorus Load Reduction	27%	47%	73%	86%	92%	96%	99%	10

Figure 3-4: BMP Performance Curve: Infiltration Trench (infiltration rate = 1.02 in/hr)



Considering Additional Expert Elicitation Strategies for:

Enhanced Street Sweeping

Catch Basin Cleaning

Leaf Collection Programs

Fertilizer Ordinances

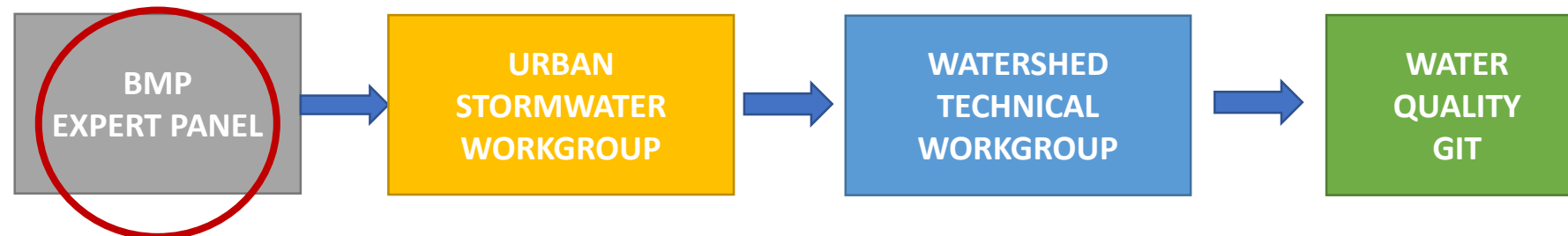
Others

Sediment and Nutrient Reduction Crediting for the Chesapeake Bay TMDL

- Chesapeake Stormwater Network: www.chesapeakestormwater.net
- More than a dozen expert panels for BMPS since 2013
- Complex, consensus-based, multi-state approval process (i.e., the Bay partnership)
- Ongoing issues: BMP reporting and verification, un-intended environmental consequences, fragile male egos, definitions and qualifying conditions, providing regulatory certainty in an era of changing science



- BMPs for New and Redevelopment Projects
- Urban Stream Restoration
- Stormwater Retrofits
- Urban Nutrient Management
- Street Cleaning
- Nutrient Discharges from Grey Infrastructure
- Residential Stewardship Practices
- Enhanced Erosion and Sediment Control
- Floating Treatment Wetlands
- Septic System Upgrades
- Impervious Cover Disconnection
- Urban Tree Planting/Canopy Expansion
- Conservation Landscaping
- Shoreline Management Practices



Panelists Contact Information

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