

FGI Webinar: Green Infrastructure & Stormwater Management



Presented by:

Terry Sheridan (Founder, DO Storage Corporation; PE in Pennsylvania and 12 other states)

Host:

Dr. Timothy D. Stark (Professor, University of Illinois; Technical Director, Flexible Geomembrane Institute)

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Introduction & Background

This webinar provided a comprehensive overview of the rapidly evolving field of green infrastructure within stormwater management, focusing specifically on water quality treatment. Terry Sheridan, drawing on decades of civil engineering experience, framed the stormwater market as divided into two distinct applications: quantity (flood control via detention ponds and underground systems) and quality (pollutant removal). The presentation highlighted a significant regulatory shift across the United States toward mandating green infrastructure practices to address water quality concerns. This movement emphasizes managing the "first flush" of stormwater, which carries the highest concentration of pollutants, through infiltration and filtration systems that mimic natural hydrological processes.

The Regulatory Landscape

- New regulations across multiple states are driving adoption of green infrastructure (GI) practices:
 - Pennsylvania: new rules effective December 8th, 2024.
 - New Jersey DEP: pioneering GI regulations since 2021.
 - Massachusetts: anticipating GI and LID regulations by end of 2024.
 - Connecticut: updated rules in March 2024 to include GI.

- California (Los Angeles/CalTrans): bio-infiltration, bio-filtration, and soil-based BMP programs.
 - Florida: Green Stormwater Infrastructure incorporated into DEP regulations in June 2024.
 - Focus on pollutant stripping, particularly nutrients (phosphorus and nitrogen) to reduce downstream algal blooms.
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Core Technology: Infiltration & Filtration Rain Gardens

- **Infiltration rain gardens (bio-infiltration):** receive runoff, temporarily pond it over vegetated area, filter pollutants, allow infiltration.
 - **Filtration rain gardens:** use geomembrane liners to collect treated water for piping downstream; used for contaminated soils, high water tables, or karst topography.
 - **Filter media functions:** sustain vegetation, maintain design flow rate, remove pollutants (TSS).
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Design Challenges & Material Specifications

- Lack of standardization in filter media composition across states:
 - Pennsylvania: ≥70% sand.
 - New Jersey: 85–95% sand, 3–7% organic material.
 - California: 60–80% fine sand, 20–40% compost.
- Maximum contributory drainage area varies:
 - New Jersey: 2.5 acres.

- Pennsylvania: 5 acres.
 - Goal: remove $\geq 80\%$ Total Suspended Solids (TSS).
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High-Performance Media & Testing Protocols

- High hydraulic conductivity (>100 in/hr) while meeting pollutant removal targets.
 - Examples: coarse sand/gravel mixes, Expanded Shale Clay and Slate (ESCS), Filtered Glass Aggregate (FGA).
 - Verification:
 - Washington State TAPE (field-based).
 - New Jersey NJCAT (lab-based, rigorous 2-phase testing).
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Geosynthetics: A Potential Future Opportunity

- Many state regulations discourage geotextiles/drainage composites due to historical clogging concerns.
 - Modern woven geotextiles and meshes can function as cleanable screens, offering potential for cost reduction and efficiency improvement.
 - Stormwater Centers of Excellence (funded by Infrastructure Investment and Jobs Act) provide a platform to demonstrate geosynthetic benefits.
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Conclusions & Future Directions

- Green infrastructure stormwater market is rapidly expanding.

- Core objectives: pollutant stripping ($\geq 80\%$ TSS), maintain high flow rate, support vegetation, integrate water storage, reduce costs.
 - Challenges: long-term maintenance, service life, spent filter media disposal.
 - Federal funding (\$1.2T Infrastructure Investment and Jobs Act; \$5M for Stormwater Centers of Excellence) and new ASCE stormwater committees indicate green infrastructure will remain a permanent civil engineering feature.
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Additional Information

- Full recording and presentation slides available on the FGI website.
 - Next webinar: “Contrast and Opportunities for Geosynthetics in the Americas” on October 10th.
 - Attendee questions addressed in a follow-up podcast.
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