

Title: Delivering Urban Green Stormwater Infrastructure: Lessons from Planning, Design, and Construction

Abstract:

Municipal utilities and stormwater authorities are increasingly relying on green stormwater infrastructure (GSI) to meet regulatory water quality goals and manage stormwater in highly developed urban watersheds. Our team has worked with multiple municipal partners to plan, design, and implement GSI projects that reduce pollutant loads, mitigate stormwater runoff, and decrease flows to combined sewer systems and receiving waters. This presentation presents an integrated framework for delivering urban GSI projects, from watershed planning and site selection through engineering design and construction.

This presentation will describe an integrated framework for implementing GSI in dense urban environments, including watershed screening and site selection methodologies, stakeholder engagement strategies, engineering design considerations, and structured project delivery. The program prioritizes projects that maximize stormwater capture and water quality benefits while fitting within existing urban land uses and community spaces.

The presentation will highlight constructed GSI projects in Harrisburg and other urban areas that illustrate the transition from planning through design and construction. These case studies will demonstrate practical engineering solutions used to address common urban challenges such as limited right-of-way, utility conflicts, subsurface constraints, and coordination with existing infrastructure. Emphasis will be placed on developing context-sensitive GSI solutions that complement surrounding land uses, maintain site functionality, and enhance community aesthetics.

Lessons learned from project implementation, including design adaptations, constructability considerations, stakeholder coordination, and performance outcomes, will be discussed. The presentation will also summarize measurable program benefits such as stormwater volume reduction, pollutant load reduction, and contributions toward combined sewer overflow mitigation goals.

By sharing implementation experiences and programmatic strategies, this presentation will provide practical guidance for municipalities and utilities seeking to deploy GSI on a large scale. The approaches discussed demonstrate how coordinated planning, engineering design, and community-sensitive implementation can improve urban water quality, increase watershed resilience, and support regulatory compliance.

Subsurface Gravel Wetlands: Lessons Learned 2+ Years After Construction

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What I will be presenting:

Subsurface gravel wetlands (SGWs) are an emerging best management practice (BMP) that have been implemented in growing numbers across the United States. Tetra Tech has designed two SGWs, one for the NC DOT Hydraulics Unit and one for the City of Raleigh. The first was designed to intercept, treat, and store stormwater runoff from the interchange on I-85 and Gate 1 Road prior to discharge into Falls Lake. Falls Lake is classified as an impaired water; therefore, nutrient reduction was a particular emphasis of the design. The second was integrated into Lions Park in Raleigh, N.C., in the Neuse River Watershed, and was designed to treat runoff from the parking lot and surrounding roadways. The Neuse River is impaired for Total Nitrogen making a subsurface gravel wetland an effective BMP option. Both locations had the constraint of an elevated water table while standing water required for a conventional constructed wetland was not feasible due to waterfowl concerns and an active public presence. Four years after construction of the SGW at I-85 and Gate 1 road and after two growing seasons for the SGW in Lions Park have provided a number of lessons learned for general design considerations and maintenance.

What the audience will learn:

This presentation will provide an overview of lessons learned from these projects that can be applied for future implementation including design and long-term maintenance. The audience will learn a general overview of maintenance practices implemented at both SGWs. In particular, the presentation will highlight some unique considerations for the highway environment, benefits of integrating subsurface gravel wetlands in parks, maintenance requirements and practices, and advantages and disadvantages for sites with high water tables and soils with low infiltration rates as subsurface gravel wetlands gain popularity as a suitable practice for meeting stormwater regulatory requirements.

VUSP Stormwater Symposium 2026 Abstract

Green Stormwater Infrastructure Management: The Design/Maintenance Connection

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What we will be presenting:

Green stormwater infrastructure (GSI) maintenance is often an afterthought, but successful long-term management hinges on multiple interconnected factors: a need to prioritize and contextualize specific practices; balancing functional, ecological, and aesthetic considerations; recruiting, training, and maintaining a workforce; and acceptance about the critical role of maintenance among decision-makers and funders. The Chesapeake Conservation Landscaping Council (CCLC), with funding from Chesapeake Bay Trust, developed a white paper to address these GSI maintenance challenges. This session will present key concepts from the white paper, based on results from stakeholder surveys and focus group interviews.

Some of these concepts are most relevant for those with a direct role in GSI maintenance, but other lessons reach also to those whose role may be more indirect, such as those working on GSI planning, grant writing, advocacy, regulatory issues, or technical assistance. In this way, the lessons are relevant across the practitioner, programmatic, regulatory, and advocacy sectors.

Of note, CCLC, through its core Chesapeake Bay Landscape Professional training and certification program, conducts training across the Chesapeake Bay Watershed and has certified more than 1850 practitioners in the design, installation, and maintenance of GSI practices. Through this work, instructors and course participants have assessed the performance and function of thousands of practices, and the accrued knowledge is an asset to share with the wider GSI world.

What the audience will learn:

Participants will learn critical links between GSI planning/design and long-term maintenance. Aspects of this include considering site context, the maintenance capabilities and skills of the responsible party, and especially the planting plan in terms of complexity and ecosystem function. Participants will also gain insights into innovative models for partnering with NGOs, successful use of volunteers, and recruiting and training a skilled workforce. Other topics covered include the maintenance implications of changing climate and rainfall patterns, building in cues to care and adaptive management, and typical GSI maintenance costs.

The GSI guidance we will share is nothing but practical, as it is based on the experiences and lessons learned of multiple practitioners working in several Chesapeake Bay states. The white paper provides

information that many have been asking for, such as costs for specific maintenance tasks and how to incorporate adaptive management into design and maintenance plans.