



**Policy and Position Statement by  
Stormwater Equipment  
Manufacturers Association (SWEMA)**

[www.stormwaterassociation.com](http://www.stormwaterassociation.com)

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# **Advancing a Performance-Based Future for Stormwater Management**

**Bridging Policy, Practice, and Technical Rigor**

## **Abstract**

This paper argues for a more transparent, equitable, and performance-based framework for post-construction stormwater management. It contends that current regulatory approaches often rely on prescriptive stormwater control measure (SCM) selection without sufficient consideration of site-specific constraints, verified treatment performance, or the technical assumptions that influence pollutant removal outcomes. In response, the paper advocates for science-based standards grounded in robust testing protocols, third-party verification, and clear hydrologic and water quality criteria applicable to all SCMs, including both non-proprietary practices and manufactured treatment devices (MTDs). By emphasizing consistent evaluation methods, technical rigor, and regulatory flexibility, the document presents a path toward improved water quality protection, broader innovation, and more practical stormwater solutions for redevelopment and urban environments.

## Introduction

The Stormwater Equipment Manufacturers Association (SWEMA) remains committed to advancing post-construction stormwater management frameworks that protect receiving waters, encourage innovation, and empower engineers to design effective, site-appropriate solutions. To achieve these goals, we must address shortcomings in current regulatory approaches and ensure that all stormwater control measures (SCMs), including both non-proprietary practices and manufactured treatment devices (MTDs), are evaluated and approved through transparent, consistent and science-based processes.

Over the last two decades, post-construction stormwater regulations and design guidance manuals implemented by permittees across the nation have included prescriptive approaches to SCM selection, specifying the use of preferred stormwater management technologies. Such prescriptive approaches overlook real-world constraints faced by engineers and ignore the advancements in technologies that have been extensively verified through nationally recognized protocols. The result is a regulatory environment that inadvertently suppresses innovation, restricts the varied design solutions needed for redevelopment in urban areas, and at times assumes SCM performance that has not been empirically validated.

To ensure a stormwater management framework that continues to protect our nation's natural water bodies, now and in the future, stormwater programs must integrate performance-based standards based on industry-accepted testing protocols over prescriptive SCM selection to meet water quality goals. These concepts are foundational in SWEMA's approach to improving water quality.

## The Need for Performance-Based Standards Rooted in Technical Clarity

A performance-based regulatory framework is the most reliable way to ensure that stormwater SCMs meet local water quality goals while allowing stormwater practitioners the flexibility to respond to site-specific constraints. This approach is already aligned with core elements of the United States Environmental Protection Agency's (EPA) Municipal Separate Storm Sewer System (MS4) program, which emphasizes permanent post-construction stormwater controls. Water quality and hydrologic impacts are managed through total maximum daily loads (TMDLs) and other pollutant and runoff reduction guidelines.

As an example of a gap in performance-based standards, the longstanding benchmark for stormwater treatment, 80% Total Suspended Solids (TSS) removal, is widely used to select appropriate SCMs. However, the benchmark is often cited without considering how the removal efficiency of an SCM is impacted by the characteristics of the influent stormwater, such as particle size distribution (PSD), rainfall runoff rates and pollutant concentration. It is well known that PSD and hydraulic sizing are critically impactful factors to pollutant removal performance. When regulators rely on assumed performance for SCMs without consideration for how the variability inherent in stormwater can impact the water quality at the "end of the pipe," the result is misplaced confidence in SCMs that have not been rigorously tested, and subsequent failure to perform as expected in the field.

Integrating consistent performance standards, transparent design assumptions, and hydrologic modeling best practices, creates a more defensible basis for the evaluation of all SCMs. This level of clarity is essential as jurisdictions seek to compare the performance of bioretention systems, hydrodynamic separators, media filters, infiltration facilities, and other SCM technologies and practices.

## Establishing a Consistent, Science-Based Evaluation and Verification Framework

Towards this pursuit, one of the most significant weaknesses in our current stormwater regulatory environment is the lack of a transparent evaluation pathway for all SCM types. Prescribed practices are often mandated with minimal performance documentation, while other, innovative SCMs face complex, redundant, and resource-intensive approval processes. This imbalance discourages innovation and prevents regulators from accessing the data needed for making fully informed, science-based decisions.

Additionally, prescriptive mandates fail to address the complex, site-specific challenges that engineers face. Practices which rely heavily on infiltration or retention are often infeasible on sites with shallow groundwater, low-permeability native soils, limited footprint, utility conflicts, or steep hydraulic grade lines. Complications can arise when prescriptive policies are applied without consideration of these site conditions, ultimately resulting in significant negative impacts to downstream water quality. For example, when an SCM is installed in a location where infiltration is infeasible, the water in the practice must be discharged through an underdrain—at which point the quality of the effluent water is important. This can be especially concerning when compost is used in the engineered filtration media, as numerous studies now show that improper compost selection leaches nutrients out of the media and causes negative water quality impacts to the receiving water body. Such challenging conditions are especially common in dense, urban, new development and redevelopment scenarios where modern stormwater infrastructure is essential.

To address the need for scientifically valid data and transparent evaluation, the stormwater research community relies upon proven, high-quality performance testing protocols and standards to provide defensible, repeatable evaluations of stormwater technologies. Primary examples of industry-accepted protocols and standards are those provided by New Jersey Department of Environmental Protection (NJDEP) for MTD certification, Technology Assessment Protocol – Ecology (TAPE) program for the Washington State Department of Ecology, and ASTM International. The tests conducted using standard protocols created by these programs assess SCM performance under controlled conditions, while verification programs like Stormwater Testing and Evaluation for Products and Practices (STEPP) and New Jersey Corporation for Advanced Technology (NJCAT) ensure that the data produced during the testing processes is gathered in accordance with a pre-approved Quality Assurance Project Plan (QAPP) and accurately represented in the final report.

A performance-based regulatory framework for the selection and design of post-construction SCMs rejects design guidance that prescribes the use of certain SCMs assumed to achieve the desired water quality benefits. Rather, it sets a performance standard based on the water quality and quantity requirements and uses verified performance data to support SCM selection and design. Wide application of performance-based frameworks across the country allows engineers to select the most prudent combination of SCMs using a broad toolkit of MTDs, bioretention, or multi-step treatment trains. Such flexibility ensures pollutant removal goals are met without unintended environmental or economic consequences.

## Promoting Innovation and Expanding the Pathway for New Solutions

To address our growing environmental challenges, the future of stormwater management depends on continued innovation: new filtration media, modular systems, integrated treatment trains, digital monitoring technologies, and hybrid approaches that combine green stormwater infrastructure with high-efficiency manufactured treatment devices or more traditional storage solutions. This innovation can only flourish when there is a clear, predictable pathway for evaluation and acceptance of new practices.

By adopting national, unified performance standards and expanding the use of third-party verification programs, regulators can create an environment conducive to research, development, and investment. This will lower long-term costs, expand options for engineers, and ultimately deliver better protection for receiving waters.

## Conclusion: A Path Forward

To strengthen national post-construction stormwater management policy and address longstanding inconsistencies in the implementation and enforcement of stormwater regulations, SWEMA urges other stormwater practitioners to support a comprehensive SCM evaluation framework that includes:

- Performance-based pollutant removal standards built on robust and transparent technical understanding rather than presumed function.
- Consistent and equitable application of third-party verification protocols (ASTM, NJDEP, TAPE) to all SCMs, not just manufactured systems.
- Recognition that a broad, technically justified compliance toolbox is needed in urbanizing environments due to site constraints that can limit the pollutant removal effectiveness of some SCM types.
- Replacing prescriptive criteria that fail to account for hydrologic, soil, and geographic variability impacts on SCM design and selection with performance-based standards.

By integrating the technical rigor of contemporary engineering practice with a fair, flexible, and science-based regulatory structure, we can advance stormwater management that truly protects water quality, supports innovation, and addresses the challenges of modern development.