Date: 12/9/21

To: Water Quality Goal Implementation Team

From: Urban Stormwater Workgroup

Re: Recommendations on Next Steps to Advance Efforts to Maintain Resilience of Stormwater BMPs

Context:

In 2019, the PSC and the Management Board of the Chesapeake Bay Program directed partners to focus resources on managing BMPs in the Chesapeake watershed in the context of future climate risk. They specifically requested that a long-term multi-agency partnership be formed to examine the vulnerability of BMPs to future climate conditions and accelerate adoption of stormwater management practices that are appropriately adapted or designed to be resilient in the face of increasing rainfall volumes and intensities expected in the future.

Over the past two years, the Urban Stormwater Workgroup (USWG), in coordination with the Climate Resiliency Workgroup (CRWG) and other partners, have made significant progress toward these objectives. Through the development of a series of reports and tools that help characterize the risks that climate change poses to stormwater infrastructure, several needs and specific initiatives have emerged as next steps to help local watershed managers affectively address their restoration and public safety functions under future climate conditions.

On October 18-19th, 2021, the USWG, CRWG and members of the Modeling Workgroup held a 2-day joint meeting to review and endorse the prior work and discuss how to build upon the synthesis products and scientific reviews to advance more resilient stormwater practice implementation. Following the meeting, CSN developed a menu of nine potential tools and collected extensive feedback from workgroup members on their greatest priorities. This memo represents the USWG's consensus recommendations on Next Steps to Advance Efforts to Maintain Resilience of Stormwater BMPs.

Recommendations:

1. **Develop Vulnerability Assessment Tools for Local Communities:** An estimated 40% of U.S. urban flood damage occurs outside of FEMA boundaries. It is important to know how to identify which neighborhoods and critical assets are most at risk from flooding in the community so that residents can be effectively targeted for outreach regarding their risks, and local investments can be efficiently distributed toward design and implementation of the most effective flood control strategies. Vulnerability assessments should have two prongs:

    a. A rapid desktop assessment to identify which neighborhoods, subwatersheds, and/or specific municipal assets (ponds, culverts, public buildings, etc.) are at most risk for flooding.
    b. A comprehensive review of local codes, ordinances and development regulations to reduce the vulnerability of future new and redevelopment projects in the community.

Vulnerability assessment tools should prioritize critical datasets and methods that are adaptable to local conditions and complimentary to existing tools. The tools should also emphasize principles of climate justice through analysis to determine the demographic and income characteristics of the at-risk neighborhoods in order to prioritize equity in community risk management decisions.

2. **Provide Enhanced Decision Support Tools to Choose Optimum Design Storms to Manage Different Local Infrastructure Assets:** Most communities have the authority to set engineering standards for infrastructure built in their community. While local planners and engineers appreciate the new wealth of detail on design storms and flood risk, many are unsure of which specific emissions scenarios, storm return intervals, future time horizons, and confidence intervals are most appropriate for each class of municipal assets they are managing. A decision support tool would provide communities with needed guidance on how to choose the specific combination of rainfall depths/design storms for each class to cost-effectively manage risk for each class of their municipal assets.

3. **Establish Resilient Design Adaptations for Stormwater Infrastructure and Restoration Practices:** New guidance is needed to promote longevity of stormwater practices, boost pollutant removal performance, handle increased extreme rainfall, and define more specific maintenance criteria. While the flexibility of local stormwater managers to adopt new local design specifications varies across the Chesapeake Bay watershed, there are opportunities to advance the menu of resilient design adaptations and provide incentives for implementation. Improved "plumbing" techniques can help better manage how water enters stormwater practices and is safely conveyed during overflow events. A better understanding of techniques for enhanced runoff reduction, including soil amendments and adaptive control shows potential for both flood reduction and improved pollutant removal performance. Finally, more guidance is needed on proper construction and maintenance of practices, to avoid vulnerabilities that are likely to be exacerbated under climate change conditions.

4. **Modeling to estimate the impact of future hydrology on simulated urban BMPs to estimate how removal efficiencies will respond, along with the estimates of uncertainty:** In the long term, more field and lab studies on BMP responses to climate change are needed to understand the how design adaptations, maintenance practices, and site conditions interact with climate pressures. However, in the short term, the USWG recognizes the value of being able to quantify the range of potential impacts on pollutant removal efficiencies due to changing hydrology. One possible approach is to run existing stormwater models under different hydrologic conditions to determine the relative change in pollutant removal efficiency. The specific purpose of this research would be to adjust current urban BMP load reductions in the context of the Chesapeake Bay Watershed Model. While the analysis may not be precise, if combined with uncertainty analysis and detailed discussion of potential variables that may impact the results of the assessment, it may provide a useful tool for Bay managers to determine the overall magnitude of climate change's impact.