DRAFT TECHNICAL MEMO

Date: January 16, 2018

To: Urban Stormwater Work Group

From: Tom Schueler
Chesapeake Stormwater Network

Re: Stormwater at the Edge of Town: Urban BMPs in a Sharing Economy

Important Caveat: This memo is a discussion document and the views and opinions expressed are solely those of the Chesapeake Stormwater Network. The memo will be revised based on comments received by ***February 9.***

1. Nature of the Problem

A majority of the developed land in the Chesapeake Bay watershed is located in small communities that are regulated by Phase 2 MS4 permits or not regulated at all (see Table 1). Projections of future growth in the watershed indicate that this kind of low density exurban development will continue in most Bay states in the future.

Table 1: Percent of Developed Land in Chesapeake Bay Watershed By Regulatory Category [1]

Bay State	*Non-Regulated* [2]		*MS4 Permittees* [3]		*Combined Sewer* [4]	
	%TC [5]	%IC [6]	%TC	%IC	%TC	%IC
DE	63	26	7	4	0	0
DC	5	6	22	30	8	27
MD	18	7	47	29	>1	>1
NY	54	32	6	5	1	1
PA	52	21	13	9	2	3
VA	48	22	16	15	>1	>1
WV	54	17	18	9	1	1
BAY Average [7]	42%	18%	18%	14%	2%	5%

Notes:

[1] Based on Phase 6 Model. 2013 progress runs, as Derived from CAST, percentages may not sum to 100% due to rounding errors

[2] Defined as a community that is not dense enough to be regulated by a Phase 2 stormwater permit, although stormwater BMPs may be required by local or state-wide regulations

[3] Includes large communities regulated under Phase 1 Ms4 permits (pop <100,000) and smaller communities regulated under Phase 2 MS4 permit (pop <10 to 25K).Area split is roughly 50:50

[4] Areas of older cities that are regulated as wastewater systems since they have combined sewer overflow systems

[5] Turf cover includes turf and tree canopy over turf

[6] Impervious cover includes buildings and other IC, roads, tree canopy over IC and construction

[7] arithmetic average; non-regulated TC and IC would be somewhat higher if it was an area-weighted estimate by state

These smaller communities (population 25,000 or less) often lack staff capacity, financial resources and technical understanding to develop pollutant reduction plans to restore local streams and help meet the Chesapeake Bay TMDL. In many cases, small communities do not even know how to report BMPs built within their jurisdiction to earn nutrient reduction credit. Table 2 outlines some of the many challenges that small communities face when it comes to doing their part to restore the Chesapeake Bay.

Table 2:
Bay Restoration Challenges Faced by Small Communities

Challenge	*Small MS4 Communities*	*Un-Regulated Communities*
Pollutant Reduction Mandate?	Only two Bay states have established numeric pollutant reduction requirements for existing development in Phase 2 MS4 permits to date (another state pending)	No legal requirement to compel them to reduce loads from existing development or operate a local stormwater program to reduce loads from new development
Stormwater Regulation	Need to operate a local post-construction stormwater program, but few specific requirements on how to inspect or maintain local BMPs	ESC and SWM may be required by state law or general permit, but locality generally has no authority to review or approve stormwater BMPs for new development
Stormwater BMP Reporting	Usually through annual MS4 reports, although some states have reporting databases that localities can submit data to. Usually a voluntary option.	No local requirement to report the BMPs that are implemented (by others) within their jurisdiction, nor an easy mechanism to do so, even if they wanted to
Stormwater BMP Tracking	May have a storm drain map and local BMP inventory, but lack the budget to track local BMPs in their community. May have limited GIS mapping capability	Tracking BMPs is not currently considered a standard DPW function. May consist of paper files only. Some tracking may be done by soil conservation districts or others
Urban BMP Verification	Most are not aware of BMP verification requirements and lack internal capacity to inspect or enforce privately-owned BMPs	State stormwater agencies have authority to inspect and verify BMPs, but lack staff resources to do so in small communities. Therefore, many legacy BMPs will be dropped because they cannot be verified
Available Staff Resources	Rarely more than 1 FT or PT staff are available to administer the MS4 stormwater permit.	Unstaffed function. Most municipal staff struggle to support basic public works functions.
Contractor Skill	Small local market for contractors with expertise to design, construct, maintain, verify or retrofit BMPs. Most small communities lack the budget to hire larger private sector firms that do have the expertise	

Table 2: Continued		
Challenges	*Small MS4 Communities*	*Un-Regulated Communities*
Understanding of Nutrient Accounting	Very limited understanding of technical tools and BMP removal rates -- need intensive training	Most staff don't have the time or the motive to learn these new skills
Availability of Local Data	Local data on land use, loads, BMPs and Bay delivery ratios may be available from CAST -- but localities find it hard to extract	
Ability to Prepare a PRP?	Limited, w/o better guidance and some outside help	No, need a simpler approach to make better local BMP decisions
Important Note: While the entries in this table are generally accurate, they do not include the efforts of several small communities that have chosen to go above and beyond the minimum requirements.		

On one hand, the prevalence of small MS4s and non-regulated areas in the Bay watershed (Table 1), combined with the severity of restoration challenges they face, *seem to make it difficult, if not impossible, for many Bay states to install enough BMPs to meet their current nutrient reduction goals for the urban sector*. Clearly, new BMP implementation strategies are needed to meet the unique needs of these smaller communities.

On the other hand, small un-regulated communities are often attractive locations to install BMPs. These low density areas offer considerable space suitable for cost-effective restoration practices, such as tree planting, roadside ditch management, pond retrofits, stream restoration and urban nutrient management. The challenge is devising a mechanism to import the expertise and financing from larger communities to find and build restoration practices in un-regulated communities.

2. Key Implications for Bay Managers

The bottom line is that most states rely heavily on small communities to help reduce the overall load from the urban sector -- yet many communities lack the internal capacity to install and maintain urban BMPs.

States and NGOs need to critically assess whether the current level of education, outreach, training, technical assistance and financial support devoted to small communities is sufficient to overcome the many capacity challenges they face.

In addition, Bay managers need to explore how existing BMP reporting and verification systems can be simplified and streamlined to enable small communities to more fully participate in the Bay restoration effort.

It also evident that the traditional model for pollutant reduction planning developed for larger Phase 1 MS4 communities (population 100,000 or above) needs to be adapted and re-tooled for small communities. The planning process is simply too difficult, complex, time-consuming and expensive for most small communities to follow. In particular, small communities do not need to master the intricacies of nutrient accounting to do their part to restore the Bay.

The most effective solution for many small communities to band together and share resources to craft a regional pollutant reduction plan. The York County/Lancaster region is a great example of where this approach has worked effectively, due in large part to strong political leadership and tireless inter-municipal outreach.

3. Proposed Approaches to Solve the Problem

Three possible approaches are suggested to solve the problem:

1. Rapid Municipal Assessments for Non-Regulated Communities
2. An EZ-PRP Option for Small MS4s
3. Inter-Sector BMP "Trading" Between Small and Large Communities

3.1. Rapid Municipal Assessment

This approach emphasizes a rapid desktop assessment of local land development regulations, municipal operations and public land management to determine whether any of them are generating "creditable" BMPs, both now and in the past ten years. A critical feature is a local team meeting of appropriate staff to ground truth the desktop BMP assessment (e.g., planners, public works, parks, SCD, town engineer or consultant).

The Rapid Municipal Assessment (RMA) is intended to do two things:

- Help organize a community to clean up local waters and restore the Bay,
- Serve as a "prospectus" for larger communities to decide whether there are advantageous BMP investments to be made in the smaller community.

If a non-regulated community finds that it is indeed generating BMPs, it could then contact a third party technical service provider, who in turn, would report them to appropriate state reporting agency for credit. The community might also be offered a mini-grant (e.g., $5,000) to install new restoration projects to recognize the time and effort expended by the community to perform the BMP assessment.

3.2 EZ-Pollutant Reduction Protocol

This approach entails a slightly more detailed assessment for MS4 Phase 2 communities. The protocol is intended to develop simple pollutant reduction plans to guide BMP implementation and develop an internal system to report them to the appropriate state agency for credit.

The goal is to enable a local staff person (presumably the MS4 Permit manager) to draft a local pollutant reduction strategy with key members of a local team in less than a week's time. This leaves more time and staff resources available for actual BMP implementation or reporting.

The simplified protocol has four primary elements:

1. Simple Pollutant Load Analysis
2. Desktop Evaluation of Past and Current BMP Generation
3. Field Evaluation of Tree Planting, Retrofit and Stream Restoration Opportunities on Public Lands
4. Internal Procedures for Local BMP Tracking, Reporting and Verification

More detail on each element are provided below:

1. Simple Pollutant Load Analysis

This task helps answers the following scoping questions in a community:

- What is the current land use and land cover in my jurisdiction and where can I quickly access this data?
- How do I find specific growth projections for various 2025 development scenarios for my community?
- How much is our community expected to grow over the next decade and do I need to offset this growth with additional pollutant reductions?
- How much sediment or phosphorus load is our community committed to reduce in the next ten years?
- How much of this reduction is voluntary and how much is mandated under our local MS4 stormwater permit?
- How much pollutant reduction do we achieve each year with BMPs generated under our current and past MS4 stormwater permits?
- Can we earn additional pollutant reduction credits due to our local planning and zoning efforts and land development regulations?
- Going forward, how much additional pollutant load will my community need to reduce from existing lands to meet our final goals?
- What does this reduction translate in terms of my communities "treatment footprint"? (i.e., approximately how many acres of urban land cover will need to be treated with some form of urban BMP?)

Several CBP tools and resources, such as CAST, can provide initial answers to most of these key question. The problem, however, is that many small communities find it hard to quickly access good local data on current and future

land use, or estimate existing pollutant loads and BMP coverage across the community.

One possible solution would be to create a CBP "help desk" where small communities can request initial answers on these questions in the form of a short data report. If this cannot be done, states may need to develop simple step by step guidance documents (and associated training) to help small communities get the answers they need to manage their local watersheds.

2. Desktop BMP Evaluation

Under this task, a community creates an internal staff team to quickly review current and past MS4 permit outputs. The assessment focuses on how to find current and past BMP credits that the community is already earning through:

- Past stormwater BMP implementation due to local land development, stream buffer and land conservation regulations.
- BMPs implemented under existing MS4 permit conditions, such as:
  - Public education and stormwater outreach
  - Post-construction BMPs for new development or redevelopment projects (as shown in local storm drain maps and legacy BMP inventories)
  - Erosion and sediment control practices at construction sites
  - Illicit discharge detection and elimination programs
  - Stormwater BMP maintenance
- Ongoing municipal operations that can reduce pollution, such as:
  - Roadside ditch management
  - Street cleaning
  - Fall leaf pick-up
  - Landscape maintenance and urban nutrient management plans on public lands
  - Municipal good housekeeping practices

Much of the desktop BMP assessment can be done by interviewing municipal staff, reviewing annual MS4 reports and analyzing local databases and GIS systems. The basic goal of this effort is to get more precise estimates of past and current local BMP implementation developed in Step 1.

3. Field Evaluation of Future Restoration Projects

This task involves a series of site investigations at public lands and buildings to determine the feasibility of building new stormwater retrofits and other restoration practices to help reduce pollutant loads. Municipal staff would rapidly

investigate public lands and buildings, stream corridors and legacy stormwater ponds to generate a list of candidates projects suitable for:

- Pond Retrofits
- Green Building Retrofits
- Tree Planting on Municipal Land and Riparian Areas
- Stream Restoration Projects

These field investigations can take several months to complete and use simple techniques for rapid project reconnaissance and evaluation (CWP, 2002, and USA/USSR). The surveys generate initial concept designs for feasible restoration projects, along with notes on permitting and construction costs.

The most cost-effective projects from this BMP inventory are constructed over time, based on existing funds from local operating and capital budgets. A small community may also agree to "trade" the right to construct, inspect, maintain or verify some or all of the restoration BMPs to a larger regulated community (see Section 3.3).

4. Internal BMP Quality Control

The last step of the EZ-PRP protocol is to establish an internal quality control system to ensure BMPs are accurately reported, tracked and verified in the community over time. Most small communities are not used to this new role, so some start-up efforts are needed to:

- Identify staff responsible for reporting BMP data to the local MS4 permit manager each year (and the specific contacts at state agencies to send it to).

- Create internal BMP reporting spreadsheets and databases which are compatible with existing municipal information networks and state BMP reporting databases.

- Appoint a local liaison to interact with state BMP reporting agencies and other communities who are interested in possible BMP trades.

3.3 "Air-BMP": Concept for Inter-sector BMP Trading

Note to reader: if you have gotten this far in the memo, you are quickly realizing that Schueler is wandering into uncharted and dangerous territory, so take his ideas on new BMP sharing economy with a grain of salt!

Both regulated and non-regulated communities have strong incentives to trade or share the rights to install, inspect, maintain and verify local BMPs. In concept, the market would work as follows:

- Un-regulated communities have both existing BMPs and potential sites for new BMPs, but lack the staff and financing to build or maintain them. Their BMPs have little economic value since they are under no regulatory mandate to remove pollutants, and have little motivation to do the paperwork to report or verify them. Non-regulated communities are the BMP "sellers" in the market place.

- Regulated communities are subject to numeric load reduction and/or impervious cover treatment requirements in their permits, and seek the least cost BMP solutions within their jurisdiction. They have gradually acquired a skilled work force that know how to design, permit, construct, maintain and verify urban BMPs. These workers may have capacity to cross municipal borders to find and earn BMP credits within the jurisdiction of their non-regulated neighbors. They are the primary BMP credit "buyers" in the market.

- Foundations are always seeking innovative ways to invest in the wider delivery of restoration practices across the watershed. They could conceivably be interested in funding a pilot project to create an experimental BMP trading market in a high priority land/river segment located in the Bay watershed. They are essentially the market "creators"

- Technical service providers are independent and can craft the specific "rules" for BMP crediting and inter-municipal trading. These organizations can organize and kick start the pilot BMP market and ensure trading rules are properly applied by all parties. They essentially act as the market "referee"

- State and federal regulators: State stormwater agencies want localities to build more urban BMPs to meet their stream habitat and water quality goals. Many states are also concerned about the slow pace of local BMP implementation, and could be receptive to a trading approach that is consistent with their MS4 regulatory framework. State leadership is critical to sanction and endorse a pilot inter-sector BMP trading market.

- Private sector consultants are often hired by larger communities to do most of the actual BMP implementation work, and can become actively engaged in BMP trades if they are an authorized agent for a public- private partnership (P3) established by a larger community in the Bay watershed.

Inter-sector BMP trading meets many economic criteria to establish a successful and efficient market in the real world:

- The BMP trades can be for several phases of BMP implementation -- initial credits for BMP construction, credits for ongoing BMP maintenance and especially for inspections to verify the BMP and extend credit duration.

- BMP trades are eligible between non-regulated and regulated communities (or their designated private sector P3 firms), and between Phase 1 and Phase 2 MS4 communities)

- BMP trades can be in cash for construction, or more commonly, as contributed staff or contracting services that larger communities provide to small communities for BMP construction, inspection, maintenance and verification.

- BMP trades can only occur within a small geographically-defined market that buyers and sellers can easily understand -- the land river segment boundaries established by the CBP for the Phase 6 Watershed Model.

- The BMP trades occur within the urban sector and follow common rules for urban BMP crediting previously approved by the CBP partnership (i.e., definitions, qualifying conditions, delivered loads, protocols to define removal rates, credit duration and BMP verification procedures).

- Most communities already engage in inter-municipal legal arrangements that allow them to collaborate to build and maintain restoration projects that are eligible for BMP trades. These pre-existing contractual provisions make it easier to administer and enforce BMP trades between two municipal parties and their contractual agents (and resolve any trading disputes).

- Most trading schemes that are proposed founder on the rocks of watershed equity, but this should not be a major issue for inter-sector BMP trades. This is because the trades all occur within the same sector and within a relatively small watershed area. The actual nutrient reduction produced by each individual BMP trade is very small in relation to the overall nutrient reductions needed in a regulated community. This reduces the perception that trades can make one community a water quality "winner" at the expense of another.

- If equity concerns are still a problem, the simple solution would be to establish a BMP trading cap within a regulated community. This would ensure a minimum percentage of all BMPs are installed locally (e.g., no more than 25% of local load reduction allocation can be traded out of the municipality).

3.4 Next Steps?

Some of the ideas in this memo may have merit, while others may deserve a quick and painless death. The next steps are suggested to engage the workgroup and other stormwater stakeholders to decide how best to serve the interests of small communities in each of the Bay states.

Stakeholders can submit written comments on the memo until February 9th. In particular, comments on other effective state or regional strategies to engage small communities in BMP implementation are solicited.

CSN intends to have further discussions to refine these concept with key stakeholders such as individual state stormwater agency staff, the U of MD Environmental Finance Center, the CBP Trading and Offset Workgroup, foundations and various MS4 leaders.

CSN will then revise the memo and continue discussions on the merits of simplified pollutant reduction protocols and potential BMP trading/sharing at future USWG meetings in February and March.

If any of the ideas gain traction, the next step would be to set up a special meeting to design a pilot program to assist small communities to implement BMPs in a test region of the Bay watershed.