April 30, 2013

Rebecca Stack
Low Impact Development Specialist
Watershed Protection Division DDOE
1200 First Street, NE, 5th Floor
Washington DC 20002

Re: Filterra's comments on the revised Draft Stormwater Management Guidebook

Ms. Stack:

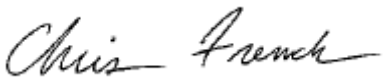
Filterra is pleased to have this occasion to provide additional comments to the District Department of Environment (DDOE) regarding the Revised Draft Stormwater Management Guidebook (dated 04-02-13) (Guidebook).

Several changes have been made to the Guidebook since its initial release for public comment last year. Many of these changes are good and make the Guidebook more understandable and/or provide clarity on technical issues which were previously unclear.

Filterra offers our comments on the following pages. As before, our comments are identified by chapter headings.

We look forward to our continued interactions with the DDOE. Should you have any questions or concerns regarding our statements, I am happy to make myself and other Filterra staff available to discuss them with you and other DDOE staff.

Respectfully submitted,



Chris French
Stormwater Regulatory Manager
Filterra Bioretention Systems

Filterra's comments regarding DDOE's Draft Stormwater Management Guidebook

General Comment

Filterra commends DDOE for revising the Appendix T to incorporate the use of the revised New Jersey Department of Environmental Protection (NJDEP) laboratory protocols for approving manufactured stormwater treatment systems in the District. This is a much needed improvement over the proposed testing and evaluation protocol in the previous Guidebook version.

Section 3.4. Permeable Pavement Systems

1. Design variants. Thank you for creating a separate category for plastic grid pavers. However, we must reiterate concrete grid pavers not the same as Permeable Interlocking Concrete Pavement (PICP). Concrete grid pavers lack the interlocking features PICP have and are a separate technology as a result. Each of these should be classified by DDOE as a separate design variant.

2. Thank you for removing reference to "…*low-grade longitudinal slopes on the bottom and the underdrain (i.e. 0.5%) are required to ensure the system drains"* in Section 3.4.1 as requested in our last set of comments.

3. Section 3.4.4 – Filterra has concerns regarding the language Internal Geometry and Drawdowns, Rapid Drawdown heading. While well intended, water storage under a heavy wearing surface over prolonged time periods can contribute to structural undermining of pervious pavement through pumping and blowing of the aggregate subbase. Shorter drawdown times should be considered in the design pervious pavement. Filterra recommends DDOE consult with load bearing engineers at the District Department of Transportation and other highway engineers to discuss these issues and include discussion and/or references within the Guidebook for design engineers to address such system structural integrity concerns.

Chapter 3.5. Bioretention

1. Section 3.5.4. As noted in previous comments, DDOE should include a process in the Bioretention Design Criteria, Filter Media section to allow the use of alternative bioretention media mixtures. This is especially important where nutrients are a pollutant of concern. Several BMP studies have recently come to light which show both nutrient and metal leaching (primarily dissolved copper) from bioretention systems (please see the attached fact sheet from the Washington State Department of Ecology as one example of this concern). The most probable source of the leaching is from compost used in the bioretention media. Alternative bioretention media that does not utilize compost should be considered as a result.

   High flow bioretention media which has been verified through 3rd party laboratory and field studies should be allowed for use in bioretention systems as an acceptable alternative to the proposed bioretention specification. High flow bioretention media provides flexibility for the use of micro-bioretention systems in areas where space limitations will not allow the use of traditional bioretention design. Filterra has recently been classified by the Maryland Department of the Environment (MDE) as a micro-bioretention system with designs for systems enclosed in concrete vaults and new

"boxless" designs which allow for onsite infiltration when that option is required for meeting onsite retention requirements.

There is scientific merit in allowing the use of alternative bioretention media mixtures. Filterra respectfully requests DDOE develop a process for the evaluation of these alternative media mixtures given the benefit they can provide for greater use of Low Impact Development stormwater BMPs within the District.

2. Thank you for updating the Guidebook to allow limited irrigation during the establishment period for bioretention systems.

3. Section 3.5.1 (Required Space). Filterra would like to reiterate that the contributing drainage area to both small-scale, micro-bioretention and traditional bioretention systems can function adequately with smaller filter surface areas provided these systems have high hydraulic conductivity associated with the bioretention media. Alternative bioretention mixtures - such as high flow bioretention media – allows for smaller filter surface areas to be utilized in rain garden and bioretention systems.

   Filterra is a recognized ESD micro-bioretention system and traditional bioretention system by the Maryland Department of the Environment. This designation is based upon the Filterra media's high hydraulic conductivity rates, rigorous laboratories studies, and thorough 3rd party water quality field studies conducted under the 2003 Technology Acceptance Reciprocity Protocol (TARP); which MDE uses for BMP evaluations and approvals.

4. Section 3.5.3. As noted in our previous comments, DDOE should recognize the pretreatment role the mulch layer in bioretention systems has. Peer reviewed bioretention – including that of Dr. Allen Davis at the University of Maryland – describes the pretreatment role of mulch in preventing bioretention system occlusion. Proper maintenance of bioretention systems with annual reports provided to DDOE will ensure bioretention systems are properly maintained without the need to provide additional pretreatment.

5. Filterra concurs with the addition of drop structures to Section 3.5.4 under the Inlets and Energy Dissipation heading.

6. Section 3.5.4 – Geotextile. Filterra noted in our earlier comments bioretention research throughout the United States have shown the use of geotextile fabric can contribute to premature BMP failure. Filterra recommends the language for geotextile use mimic that found in Section 3.4.4 (Permeable Pavement Design Criteria). Section 3.4.4 states the use of geotextile is considered optional. This should also apply to bioretention standards and specifications.

7. Section 3.5.4 – Underdrains. Filterra recommends the following sentence be altered to allow greater flexibility for bioretention design. "The underdrain must be encased in a layer of clean, washed ASTM D448 No.57 *or smaller (No. 68, 8, or 89)* stone."

8. Table 3.21 states Underdrain stone should be a minimum of 9 inches deep. This depth is overly restrictive and it is unclear why the stone depth is this thick as no references are provided. Filterra recommends reducing this depth in order to provide greater flexibility when site limitations might restrict bioretention depth.

9. 3.5.6 Bioretention Construction Sequence. Filterra requests DDOE define "good vegetative cover" under Step 12 and "qualified professional" under Step 13.

Chapter 3.12 Proprietary Practices

1. Filterra wants to thank DDOE for amending the description of off-line systems under Section 3.12.2 (Proprietary Practice Conveyance Criteria). This change better describes the range of off-line BMP systems available for engineers and designers to consider.

2. Filterra concurs with the changes made to Chapter 3.12, which moves all references of proprietary system verification and required data submittal to Appendix T.

Appendix T. Proprietary Practices Approval Process

1. Filterra is pleased to see the Guidebook referring to the revised New Jersey Department of Environmental Protection (NJDEP) laboratory protocols for approving manufactured stormwater treatment systems in the District. This is a substantial improvement over the proposed testing and evaluation protocol in the previous version.

   The NJDEP protocols were finalized January 25th, 2013. However, the field protocol is not yet finalized. Until such time, Filterra recommends DDOE utilize the 2003 Technology Acceptance Reciprocity Protocol (TARP) for any verification of a field monitoring study with water quality measurements. As noted previously, TARP studies continue to be used by the Maryland Department of the Environment for evaluating and approving proprietary systems. TARP studies are also reviewed by the Massachusetts Stormwater Technology Evaluation Project (MASTEP), which is used by several jurisdictions as the basis of their BMP approval process (e.g. Pennsylvania Department of the Environment). Information about MASTEP can be found at http://www.mastep.net/

2. The text in Appendix T is inaccurate in stating NJDEP and New Jersey Corporation for Advanced Technology (NJCAT) is the only state to have developed a formal evaluation and acceptance process for proprietary stormwater BMPs. There are other TARP participant jurisdictions – noted above - which approve proprietary systems based on TARP studies (Maryland being the closest state to the District; see http://www.mde.maryland.gov/programs/water/stormwatermanagementprogram/documents/www.mde.state.md.us/assets/document/proprietary%202005.pdf). Filterra recommends DDOE replace this inaccurate language with the information provided.

3. Filterra believes it is premature to include any reference to the Virginia Technology Acceptance Protocol (VTAP) in Appendix T. The VTAP is focused specifically on Total Phosphorus while the District's regulations address sediment as the pollutant of concern. In addition, the VTAP is a draft regulation which has not yet been completed and likely will not be completed until the Stormwater Rule and Guidebook are adopted. If DDOE desires to use a field protocol prior to the adoption of the optional NJDEP protocol, Filterra recommends DDOE rely upon the 2003 TARP protocol. Filterra also recommends DDOE give consideration to the use of the State of Washington Department of Ecology's Technology Assessment Protocol - Ecology (TAPE). As previously stated in past comments, the TAPE program is considered the industry's most rigorous field testing protocol and has been updated four times since its creation. As a result, TAPE incorporates the breadth of current stormwater BMP monitoring protocols available.

4. The Guidebook needs further clarification on the balance of water quality treatment and on-site retention/infiltration requirements; especially given the emphasis DDOE is placing on the successful implementation of a stormwater offset program and establishing criteria for providing relief of "Extraordinarily Difficult Sites" (Appendix E.). Filterra concurs with comments provided by the Stormwater Equipment Manufacturers Association that water quality treatment should be provided to the maximum extent possible for all sites; even if on-site retention/infiltration is not possible. There should be a greater recognition of the

role water quality treatment systems have to offer in the Guidebook when retention/infiltration is not possible due to site condition limitations.

Ecology Begins Review of Bioretention Monitoring Data

Ecology has begun reviewing local, preliminary monitoring data from the city of Redmond, city of Tacoma, and Washington State University (WSU). Ecology is reviewing the data to determine if an addendum to Ecology's bioretention guidance is necessary.

Role of bioretention in stormwater management

Infiltrating stormwater onsite helps achieve the objective of low impact development (LID) – to more closely mimic pre-disturbance hydrology. Bioretention and rain gardens are two of the most common onsite best management practices (BMPs) used to meet the objectives of LID due to their hydrologic benefits. Early research from the east coast also indicated that these BMPs provide pollutant reduction benefits. Consequently, Ecology has acknowledged a dual role – hydrologic and treatment benefits – for bioretention in its Municipal Stormwater Permits and guidance documents.
Ecology has:

- Supported the development of bioretention and rain garden design criteria.
- Given grants to fund the monitoring of bioretention BMPs.
- In the 2012 Western Washington Stormwater Management Manual (2012 SWMMWW):
    - Included bioretention and rain gardens into its lists of LID practices to consider at new and redevelopment sites.
    - Published criteria to identify situations in which bioretention and rain gardens can be considered infeasible.
- Incorporated new features within its Western Washington Hydrology Model to estimate the hydrologic benefits of bioretention.

Performance of bioretention in reducing stormwater pollutants

Similar to all treatment BMPs cited within the Stormwater Management Manual for Western Washington, until recently very little to no local data existed concerning bioretention pollutant

WHY IT MATTERS

Bioretention and rain gardens are two of the most common onsite BMPs used to meet the objectives of low impact development (LID) due to their hydrologic benefits.

The 2012 SWMMWW and new five year Western Washington Municipal Stormwater Permits include increased requirements to manage stormwater onsite through either use of listed LID BMPs (such as bioretention and rain gardens) or the achievement of an LID performance standard.

MORE INFORMATION

2012 SWMMWW Webpage:

www.ecy.wa.gov/programs/wq/stormwater/manual.html

2012 Permit Reissuance Webpage:

www.ecy.wa.gov/programs/wq/stormwater/municipal/2012Reissuance.html

Contact information:

Carrie Graul
360-407-7221
carrie.graul@ecy.wa.gov

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removal performance. We now have results – some preliminarily – from three ongoing local monitoring projects:

- City of Redmond: a bioretention swale along 185th Avenue NE.
- City of Tacoma: a bioretention cell and a bioretention swale serving a new residential area.
- WSU Puyallup: mesocosms (four soil types with multiple replicates) serving site runoff, and additional laboratory columns.

General observations of the preliminary data from the project sites above include:

- TSS, dissolved zinc, and fecal coliform decrease significantly.
- PAHs and phthalates decrease.
- Phosphorus and dissolved copper increase significantly.
- Short-term significant increases in nitrate also possible.

Proposed change in Ecology guidance – short-term strategy

Ecology plans to do a more thorough review of the Tacoma and WSU-Puyallup data, which have not yet been officially released, and any other pertinent available information. Upon completion of that review, Ecology will issue an addendum to the bioretention "Applications and Limitations" guidance in Chapter 7, Volume V of the SWMMWW. We hope to complete that review within a couple months. Unless that review reveals yet-unnoticed trends and facts that influence our opinion of an appropriate response, Ecology is considering the following revised guidance:

- Do not install bioretention systems with under-drains that will discharge to surface waters.
- Conduct a more detailed assessment of potential groundwater quality impacts where multiple bioretention facilities would discharge over public drinking water supplies.

Meanwhile, Ecology reminds municipalities and others of the current guidance within the SWMMWW:

- Do not use bioretention within one-quarter mile of phosphorus-sensitive water bodies if the underlying native soil does not meet the soil suitability criteria for treatment in Chapter 3, Volume III of the SWMMWW.
- Do not install an under-drain if the under-drained water would be routed to a phosphorus-sensitive receiving water.
- Do not use bioretention within 100 feet of a drinking water well or a spring used for a drinking water supply.

Long-term strategy

Because of the substantial hydrologic benefits and the capability to reduce the concentrations of some key stormwater pollutants, Ecology sees a continued role for bioretention systems in stormwater management. However, unless the apparent increases in phosphorus and dissolved copper are resolved, Ecology will have to consider additional restrictions to prevent cumulative impacts where bioretention system effluents could eventually comprise a significant source of groundwater recharge. Ecology will look for ways to provide additional financial support for research into treatment and source control solutions that will allow bioretention to provide adequate control of stormwater pollutants of concern.