

Making stormwater retrofits pay

Creating a market for stormwater retrofits to harness self-interest, leverage river protections, and promote sustainable development in the District of Columbia

Brian Van Wye

If retrofitting your property with a stormwater best management practice (BMP) paid dividends, either in terms of actual income or costs avoided, would you do it? How about someone who's not particularly environmentally conscious or concerned about the impacts of stormwater on local waterbodies?

In a highly urban area such as Washington, D.C., vast impervious surfaces shed massive volumes of stormwater every time it rains. Stormwater retrofits that retain stormwater onsite have the potential to make D.C. "spongier," that is, more closely mimicking a natural area where rainfall is captured by vegetation and soaks into the ground. However, getting retrofits installed to serve the 43% of D.C.'s land area that is impervious is a difficult challenge. The majority of this impervious surface achieves little or no retention, is not required to retrofit, and does not have financing available to support a retrofit.

Against this backdrop, the D.C. Department of the Environment (DDOE) drafted revised stormwater management regulations with a new requirement for regulated development projects to retain the volume from a 1.2-in. (31-mm) storm, which is the area's 90th-percentile storm. This new retention standard is a requirement of the municipal separate storm sewer system (MS4) permit issued to D.C. by the U.S. Environmental Protection Agency. The permit requires that the new standard be in effect by July 22, 2013. Several jurisdictions have implemented or are in the process of implementing similar retention standards, but DDOE is taking a different approach.

DDOE recognized it will be relatively difficult or costly for some regulated projects to achieve the 1.2-in. retention standard onsite, so it set out to provide meaningful and reasonable offsite options.

DDOE saw the potential for a win-win between these regulated projects and the vast areas of D.C. that need stormwater retrofits and soon embraced two key ideas. The first is that allowing regulated projects to achieve a portion of their obligation offsite not only maximizes flexibility but also significantly increases benefits for D.C. waterbodies and provides other sustainability wins. The second is that a private market that pays dividends to property owners for retrofits may optimize these benefits and yield additional ones.

Tapping into market forces

Logically, low-cost retrofits will tend to be the most competitive in the private market. Regulated projects can take advantage of that, and so can D.C. Faced with Clean Water Act obligations, such as complying with total maximum daily loads for Chesapeake Bay and local waterbodies, D.C. may choose to meet its pollutant-reduction obligations by paying for private-market stormwater retrofits at a lower price than it would cost to conduct those retrofits itself. This is an opportunity for the government to do more with less and restore D.C.'s waterbodies faster. Given the need and cost – estimates are in the billions of dollars – for stormwater retrofits in D.C., an opportunity to leverage resources through a private market for stormwater retrofits would be a welcome development.

The regulations enabling this private market are part of a comprehensive revision of D.C.'s stormwater management regulations that DDOE plans to issue for public comment this summer.

Planned stormwater regulations

D.C.'s existing stormwater management regulations are triggered by the disturbance of 5000 ft² (465 m²) or more of soil. These projects do not currently have retention obligations, but they are required to treat (*i.e.*, filter) the volume from up to a 0.5-in. (13-mm) storm, as well as meet detention requirements for the purposes of channel protection and flood control. In highly impervious D.C., these requirements have been beneficial for waterbodies but inadequate, particularly in terms of controlling stormwater volume.

Under the planned regulations, projects that disturb 5000 ft² (465 m²) or more ("major land-disturbing" projects) effectively will provide treatment and also control erosive volume by retaining the 1.2-in. (30.5-mm) storm. Retention will be achieved through infiltration, evapotranspiration, and/or storage onsite for nonpotable uses. These projects also will face detention requirements that are similar to those currently in place.

The planned regulations also establish a new regulatory trigger for renovation projects in a building or multiple buildings with a total footprint of 5000 ft² (465 m²) or more if the cost of the renovation exceeds 50% of the value of the structure. These "major substantial improvement" projects are not subject to the detention requirements but are subject to a 0.8-in. (20.3-mm) retention standard.

Stormwater retention credits offer a new choice

Under D.C.'s planned regulatory framework, a regulated project would have to retain onsite at least 50% of the volume associated with its applicable retention standard.

To give a simple example, a major land-disturbing project with a single 0.1-ha (0.25-ac) impervious drainage area would have a net obligation for roughly 29,145 L (7700 gal) – that's the volume of runoff from a 30.5-mm (1.2-in.) storm. The project would have the option of retaining the entire volume onsite or retaining 14,570 L (3850 gal) onsite and achieving the rest offsite. The portion of the volume that is retained offsite is termed "offsite retention volume" (OSRv). A project would be able to use offsite retention without having to first prove that it cannot achieve that retention onsite.

The offsite retention options would be either to pay DDOE's in-lieu fee or use a privately generated (and tradable) stormwater retention credit (SRC). The cost of the in-lieu fee corresponds to 3.8 L (1 gal) of retention for 1 year, and 1 SRC equals 3.8 L (1 gal) of retention for 1 year.

Just as the owner of the regulated site must maintain onsite BMPs on an ongoing basis, the owner also is responsible for the site's OSRv on an ongoing basis. In achieving its OSRv, the site owner may pay multiple years' worth of in-lieu fee at once or purchase multiple years'

worth of SRCs from the market. SRCs may be banked indefinitely. The clock starts on an SRC's 1-year life span once that SRC is used to satisfy an OSRv.

Referring to the above example, if the project elects to use offsite retention for a 14,570-L (3850-gal) OSRv, the site owner will have to use 3850 SRCs per year or annually pay D.C. an amount equal to 3850 times the in-lieu fee (set in the proposed rule at \$3.50/gal, or \$0.92/L). If the site owner would like to satisfy the site's obligation for 10 years, the owner could purchase 38,500 SRCs or pay \$134,750 – an amount equal to 38,500 times the in-lieu fee.

Benefits to waterbodies and regulated projects

A comparison of strict onsite retention to trading illustrates the potential benefit to D.C. waterbodies and cost savings for regulated projects. In Scenario A, a 0.10-ha (0.25-ac) regulated site that is 100% impervious installs retention practices to retain onsite the volume from a 30.5-mm (1.2-in.) storm – that's approximately 29,145 L (7700 gal). In Scenario B, the same site installs onsite practices with half the capacity, and, through trading, purchases SRCs from another site (same size and surface cover) that installs practices to retain the remaining volume.

During a 30.5-mm (1.2-in.) storm, the two scenarios retain equal volumes. However, the 30.5-mm (1.2-in.) storm is the 90th-percentile rainfall event in D.C., meaning it happens relatively infrequently. So, during the many smaller storms that occur in a year, Scenario B, with smaller practices serving a greater land area, results in greater retention. In fact, using 2009 rainfall data, DDOE calculated the annual retention for each scenario and found that Scenario B results in a 57% increase (see table, below).

In addition to providing more overall retention, Scenario B also captures more first-flush volume, meaning that more of the most polluted stormwater is kept from entering D.C. waterbodies.

Another benefit for D.C. waterbodies is a likely shift in retention from the tidal Anacostia and Potomac rivers to their relatively vulnerable tributaries. DDOE assumes a typical offsite retention scenario would shift retention from regulated sites with high retention costs in the densely developed downtown to retrofit sites outside of the downtown core, where the cost of retention is significantly lower. These outlying sites typically drain into the tributaries. By contrast, much of D.C.'s downtown core drains into the Anacostia and Potomac.

It is important to note that, with or without offsite retention, all regulated sites will achieve more retention than is required now. In addition, since the overwhelming majority of regulated projects involve redevelopment of existing developed areas, rather than natural areas, these sites typically will achieve much more retention than they do now.

DDOE also evaluated cost savings under the scenarios discussed above. The calculation assumed that the regulated site – probably a downtown area – incurs relatively high capital costs for retention (\$0.86/L [\$3.25/gal]) while the cost offsite – potentially outside the downtown core – would be lower (\$0.17/L [\$0.65/gal]). DDOE

Comparison of retention and cost savings

	Scenario A (Onsite only)	Scenario B (Onsite and offsite)	Change via Scenario B
1.2-in. storm volume retained (gal)	7739	7739	0
Annual volume retained (gal)	280,280	440,605	57%
Estimated retention cost	\$25,152	\$15,087	-40%

calculated overall retention costs of approximately \$25,000 for Scenario A and \$15,000 for Scenario B – a savings of 40%. Regulated projects may be able to realize this savings and enjoy greater flexibility by engaging in SRC trading.

This analysis does not account for opportunity cost or the value of the forgone next-best alternative, which may significantly increase the cost savings for some regulated sites. For example, a regulated project that forgoes installation of a pool to install a green roof and achieve retention onsite cannot charge the higher rents associated with that amenity. Also, this analysis does not consider transaction costs, which would reduce cost savings. DDOE has worked to minimize transaction costs in developing this program.

Social and economic benefits to D.C. communities

SRC trading's potential benefits also include improved environmental justice outcomes, increased green jobs, and broad economic and social benefits of sustainable development.

For the reasons discussed above, DDOE expects that high-cost retention sites in the densely developed and relatively affluent parts of the downtown business district would be relatively likely to forgo onsite retention in favor of purchasing SRCs from low-cost retrofit sites in less densely developed and less affluent areas. This could increase aesthetically pleasing green infrastructure in less affluent parts of D.C. Additionally, these BMPs would provide more protection for the waterbodies in those communities, helping to make them better resources for community members.

Because SRC trading would lead to more retention practices on more sites, DDOE expects an associated increase in the number of green jobs in D.C., compared to the number created under strict onsite retention. These include professional design and engineering jobs, as well as lower-skill jobs installing and maintaining BMPs.

By minimizing the burden on development in complying with the new stormwater management regulations, SRC trading helps prevent those regulations from having a chilling impact on development and makes that development more sustainable. Sustainable development is important, not only environmentally but also from a social and economic perspective, providing retail, housing, and other amenities, as well as revitalizing blighted areas.

Finally, as noted above, D.C. may be able to purchase SRCs from the market to achieve retrofits at a lower cost than could otherwise be achieved. This may allow D.C. either to conserve public funds or to accelerate retrofit installation.

SRC-generating opportunities abound

D.C. has ample opportunities for retrofits, including the many sites under construction but not subject to the stormwater management regulations. For example, in 2009, approximately 1300 sites triggered D.C.'s soil erosion and sediment control regulations by disturbing 50 ft² (4.6 m²) or more of land but fell short of the 5000 ft² (465 m²) trigger for the stormwater management regulations. Also, D.C. issues roughly 40,000 building permits annually. Though one site may have multiple permits, there are many projects where construction personnel and equipment are at work and where it may be possible to incorporate stormwater retrofits relatively cost-effectively, given the right incentive.

In addition, roughly 125,000 properties pay D.C.'s stormwater utility fee (based on impervious surface). D.C. is establishing a discount that these properties will be eligible for if they install retention retrofits. In

some cases, these properties also may be eligible for certification of SRCs, so there will be a layering of incentives for installation of such retrofits.

DDOE certifies stormwater retention credits

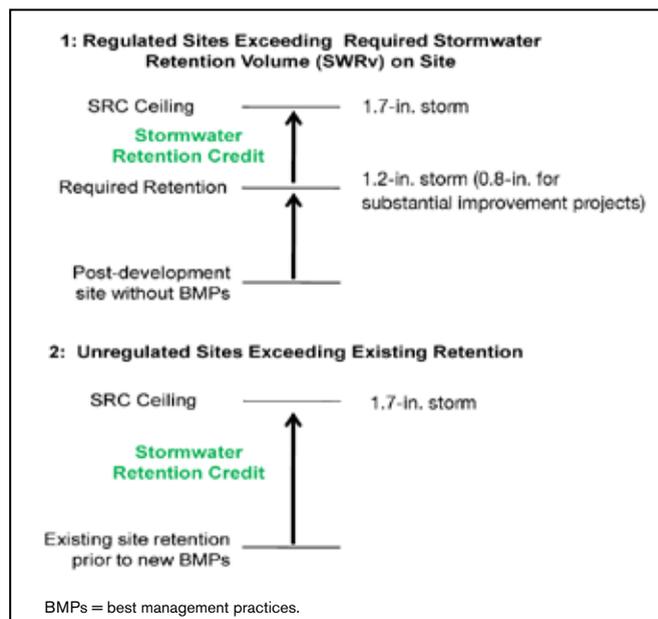
DDOE will certify SRCs for eligible BMPs and land cover changes that provide retention capacity. To be eligible, the retention capacity must

- achieve retention in excess of regulatory requirements or existing retention but less than the SRC ceiling, as shown in the figure (below);
- be designed and installed in accordance with a DDOE-approved stormwater management plan;
- pass a post-construction final inspection and ongoing inspections; and
- have a current maintenance agreement or contract in place.

Property owners may pursue SRC-generating retrofits on their own or in cooperation with SRC aggregators. These aggregators would enter into agreements with property owners to install retrofits in return for some or all of the SRCs that DDOE certifies.

To ensure the availability of SRCs to regulated projects once these regulations take effect and to incentivize proper maintenance, the regulations allow previously installed BMPs that meet the eligibility requirements to apply for and begin earning SRCs as of the date that the regulations are finalized. For sites regulated under DDOE's existing regulations, eligible retention volume is the volume retained in excess of the existing regulatory requirements. For example, for a regulated site

Retention volume eligible to earn stormwater retention credits



To ensure that stormwater retention credits (SRCs) provide actual benefits, the District of Columbia Department of the Environment has set an upper limit on eligible retention volume. The 1.7-in. (43.2-mm) storm is the 95th-percentile rainfall event in the district, meaning that 95% of rainfall events are smaller than this. A gallon (3.8 L) of retention capacity that is only used by storms larger than 1.7 in. will be used relatively infrequently and, therefore, provides less retention benefit on an annual basis than a gallon of retention capacity that is filled by smaller storms.

that provided treatment for the 13-mm (0.5-in.) storm by installing BMPs capable of retaining the 23-mm (0.9-in.) storm, the eligible retention volume would be the difference – the 10-mm (0.4-in.) storm volume. For unregulated sites, eligible retention volume is the volume achieved in excess of existing onsite retention prior to BMP installation.

After approving an application to certify SRCs, DDOE will certify up to 3 years' worth of SRCs for that capacity. The 3-year period is based on DDOE's typical 3-year inspection cycle. DDOE will assign each SRC a unique serial number for tracking purposes.

At the end of 3 years, DDOE will certify additional SRCs if the eligibility requirements are still being met.

If an applicant does not plan to maintain retention capacity in good working order for the entire 3-year period, the applicant should only apply for certification of SRCs corresponding to the period for which maintenance is planned.

Unlike regulated projects, SRC-generating sites do not need to file a covenant for the maintenance of retention capacity. However, the applicant commits to maintain the retention capacity for the period of SRC certification.

DDOE will take action for failure to maintain. First, DDOE will not certify additional SRCs for retention capacity that is not maintained. Second, it will require the owner of the capacity to compensate for the retention capacity that was not maintained during a given period by forfeiting a corresponding number of SRCs (if they have not been sold or used), purchasing replacement SRCs that DDOE will then retire, or paying the in-lieu fee.

An SRC can be banked indefinitely for future use, and its ownership can be transferred. For a transfer of ownership to be complete, DDOE must approve it. This process enables DDOE to track ownership and use and prevent fraud. The owner of an SRC also may retire it without using it.

Keeping an eye on the market

A market for trading SRCs in D.C. would harness self-interest to drive the installation of more retrofits in areas that currently have

little or no retention. The primary demand driving this market likely will be development projects subject to stormwater management regulations that choose to purchase SRCs to ease their burden. In addition, D.C. itself may fuel demand by purchasing SRCs from the market to more cost-effectively satisfy its own water protection and restoration goals and requirements. DDOE will further incentivize retrofits by allowing property owners who install them to generate SRCs and also earn a discount on their stormwater utility fee.

"More green jobs for district residents, increased flexibility for regulated sites, cleaner waterbodies – these are just some of the benefits of a regulatory structure that fosters the development of a private market for stormwater retrofits in D.C.," explains DDOE Director Christophe A.G. Tulou. "This is a key step toward realizing Mayor Gray's Sustainable D.C. Initiative to enhance sustainability's triple bottom line of social, economic, and environmental performance in the district."

Much remains to be seen about how well the district's market for stormwater retrofits will work and what the environmental, social, and economic outcomes will be. None of the potential benefits will be achieved if SRC buyers and SRC sellers do not participate. To encourage participation, DDOE has done its best to minimize transaction costs and keep the program simple. It plans to keep a close eye on the developing market and may purchase SRCs to help create demand certainty and otherwise foster the establishment of the market.

DDOE will evaluate how SRC trading shifts the spatial and temporal distribution of retention, compared to strict onsite retention, so that DDOE can adaptively manage the program as necessary and use its other programmatic tools to counteract any negative impacts on individual waterbodies.

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A price that's hard to beat

Cost of in-lieu fee likely to result in preference for stormwater retention credits

The District of Columbia Department of the Environment (DDOE) expects stormwater retention credits (SRCs), not DDOE's in-lieu fee, to be the preferred option for regulated projects to achieve offsite retention. DDOE bases this on its expectation that the private-market cost of an SRC will be considerably lower. This may seem intuitive, based on the conventional wisdom that the private sector is more efficient than the public sector, but there also are other factors driving that cost difference.

The fundamental objective of the in-lieu fee is to achieve 3.8 L (1 gal) of retention for a year in lieu of what would have been done on a regulated site, and the fee must be sufficient to cover DDOE's full costs in doing so. DDOE's experience with installation of retention retrofits includes the full subsidy of retrofits on D.C.'s facilities and the partial subsidy of voluntarily installed retrofits on private properties. Currently, these programs operate on a relatively small scale, compared to the scale of regulated development in D.C. If a substantial number of regulated sites

opt to pay the in-lieu fee, DDOE would have to scale up these programs dramatically.

Some of DDOE's retention retrofits are relatively low-cost, but others are not. Given the potential need to scale up installation of retrofits, it would not be reasonable to assume that DDOE would be able to satisfy all of the demand for in-lieu retention via only the low-cost opportunities. Furthermore, from an equity standpoint, DDOE must consistently charge the same in-lieu fee from one regulated site to another. Therefore, DDOE has based the in-lieu fee on an average of the cost data for a range of its projects.

By contrast, the price of an SRC on the private market is free to fluctuate over time as retrofit opportunities change. The private market is likely to make least-cost stormwater retrofits most competitive and will create an incentive for those interested in generating SRCs to seek out those opportunities. Also, whereas DDOE has limited ability to find and pursue opportunities on private land, the private sector has more capacity to capitalize on those opportunities.