

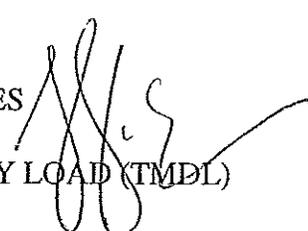
City of Alexandria, Virginia

MEMORANDUM

DATE: FEBRUARY 16, 2012

TO: THE HONORABLE MAYOR AND MEMBERS OF THE CITY COUNCIL

THROUGH: RASHAD M. YOUNG, CITY MANAGER 

FROM: RICHARD J. BAIER, P.E., LEED AP, DIRECTOR, T&ES 

SUBJECT: NEW CHESAPEAKE BAY TOTAL MAXIMUM DAILY LOAD (TMDL)
STORMWATER REGULATIONS

The purpose of this memorandum is to provide you an overview of the City's letter (Attachment) in response to the Virginia Department of Conservation and Recreation's (DCR) request for information from Chesapeake Bay localities in Virginia (DCR Letter, November 9, 2011) concerning implementation of the Chesapeake Bay TMDL, as well as to flag the very high costs to meet this new mandate.

The technical information requested by DCR, and provided in the City's letter, includes: current inventory of stormwater quality best management practices (BMP) in the City; an evaluation of local land use and land cover; potential BMP scenarios and strategies to meet the Phase I Watershed Implementation Plan (WIP) to meet Chesapeake Bay TMDL; and resources needed for implementation.

The analysis conducted by staff shows that one of the most cost effective strategies to meet the WIP goals is retrofitting existing wet ponds, followed by constructing new ponds, even though opportunities in the City are fairly limited. In addition, redevelopment of sites that presently do not have any stormwater management also presents excellent opportunities to incorporate stormwater management facilities. Examples include sites such as Landmark Mall and Potomac Yard. Other retrofits opportunities include retrofitting City right of way and facilities. Staff's analysis shows that multiple strategies, including the ones outlined above, are needed to meet the WIP goals which will be enforced through future stormwater permits.

The WIP reduction goals, which in effect are mandates by the state as a result of the agreement with the Federal Environmental Protection Agency (EPA), are phased in over time. Of the total reductions required, 5% reductions are to be achieved within the first five-year period, 35% in the second five-year period, and remaining 60% by the end of the third five-year period. This allows for the City to plan and identify its resource needs accordingly (see table below). The total preliminary order of magnitude costs to meet WIP targets through 2028 are approaching \$150 million to \$200 million. Other cities and counties in the Chesapeake Bay watershed will also have substantial capital and operating costs in meeting this new mandate. Funding needs for years 2013-2018 represent a small fraction of the total, estimated to be approximately \$5 million

to \$6 million. Staff will continue refining this evaluation and develop potential funding strategies that can be considered as part of the FY 2014 budget process.

Background: On Dec. 29, 2010, the U.S. Environmental Protection Agency established the Chesapeake Bay Total Maximum Daily Load (TMDL), a comprehensive “pollution diet” with rigorous accountability measures to meet pollution reductions from major sources of nitrogen, phosphorus and sediment (i.e., urban stormwater, agricultural runoff, and wastewater treatment plant discharges). Watershed Implementation Plans (WIPs) being developed by the six Bay states and the District of Columbia detail how and when the jurisdictions will meet pollution allocations by the 2025 deadline.

The WIP reduction goals are likely to be incorporated in the City’s future stormwater permits. For this reason the City has followed the development of the Bay TMDL and the WIP, provided comments on draft documents, and coordinated with other localities through NVRC and COG.

City Response: The response was not a commitment to implement, was technical in nature, and was primarily meant to provide possible strategies and resource needs to meet WIP goals. Other information, such as an accurate BMP inventory and local land use/land cover, was provided to better inform EPA’s future modeling. The letter did not constitute any future commitments on the City’s part. There were important findings of this planning-level evaluation based on our more accurate local data; which formed the basis of our response, and are summarized below.

Inaccuracies in DCR’s BMP and land use/land cover modeling data, as compared to requested local data, was also discussed in the response. Due to these serious errors in DCR data, staff requested that the City’s data be used in future model runs.

The City’s evaluation included the development of preferred BMP scenarios, with the following strategies being the most cost effective:

1. Retrofits of existing wet ponds to treat more land, or to be converted from detention to water quality ponds. Lake Cook and Cameron Lake were considered among the possible scenarios for such retrofits. Additionally, locations were considered for scenarios that included new wet ponds;
2. Stormwater retrofits incorporated into redevelopment through 2025. Potential and projected redevelopment and infill sites were considered as having been retrofitted with stormwater management facilities;
3. Retrofits of BMPs on City rights-of-way; and
4. Retrofits on City properties that do not currently have BMPs.

Based on the analyses, a substantial gap remains even after considering reductions from the above items. Bridging the gap will require additional resources beyond existing programs and budgets, and pose serious regulatory and financial challenges:

1. Local targets and associated future mandates come without any identified or dedicated federal or state funding; and
2. Retrofits may be needed on private properties, even if these properties were developed in conformance with regulations at the time. The existing State and City regulatory framework does not allow imposition of such measures.

The draft Phase II WIP identifies three 5-year MS4 permit cycles of as the mechanism to enforce the required retrofits. The first permit cycle (2013 – 2018) requires reductions of 5%, the second permit cycle requires an additional 35%, and the remaining 60% reductions must be implemented by the end of the third permit cycle. Based on preliminarily identified possible pond retrofits that could be funded through future CIP and an evaluation of the above practices, the table below provides order of magnitude costs estimates (2011 costs) for three MS4 permit cycles. Please note that these order of magnitude costs do not include increased staffing for planning, engineering, contract management, administration, etc.

Table: Order of Magnitude Costs

	1st Permit (2013-2018)	2nd Permit (2018-2023)	3rd Permit (2023-2028)	Total
Capital 5-yr Total	\$5M	\$45M	\$100M	\$150M
Operating 5-yr Total	\$5M	\$10M	\$20-25M	\$35-40M
Operating Yearly	\$1M/year	\$2M/year	\$4-6M/year	

Next Steps: Staff will continue refining this evaluation and develop potential funding strategies that can be considered as part of the FY 2014 budget process.

Please feel free to contact me or Bill Skrabak at 703-746-4065 if you have any questions.

Attachment

- cc: Bruce Johnson, Chief of Staff
 Mark Jinks, Deputy City Manager
 Bernard Caton, Legislative Liaison
 Laura Triggs, Acting Chief Financial Officer
 Christopher Bever, Budget Coordinator, Office of Management and Budget
 William J. Skrabak, Deputy Director, T&ES, Office of Environmental Quality
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February 1, 2012

David A. Johnson, Director
Commonwealth of Virginia
Department of Conservation and Recreation
203 Governor Street
Richmond, VA 23219-2010

Subject: City of Alexandria Response to Request for Local Conservation Information

Mr. Johnson:

The City of Alexandria (City) appreciates the opportunity to provide the following information by the February 1, 2012 deadline as requested by the Virginia Department of Conservation and Recreation (DCR) in your letter of November 9, 2011, as part of the planning process for development of the Chesapeake Bay Total Maximum Daily Load (Bay TMDL) Phase II Watershed Implementation Plan (WIP).

The City has been involved in the process and followed the development of the Bay TMDL and the Phase I WIP, provided comments on the drafts at every available opportunity, attended trainings and meetings led by DCR, and interacted with other localities through the Northern Virginia Regional Commission's (NVRC) Stormwater Workgroup and various forums with the Metropolitan Washington Council of Governments (COG). The City is committed to restoring the Chesapeake Bay, but wants to ensure that any requirements are based on sound scientific principles and accurate data, which result in tangible benefits.

DCR has asked the City to evaluate local land use / land cover information used in the Bay Model and provide more accurate local information if available. The City's evaluation shows that there are serious errors in the land use / land cover data used in the model. While the City is providing accurate land use / land cover information via the Virginia Assessment and Scenario Tool (VAST), the land use / land cover errors will be compounded should the City use the current version of VAST to develop 2017 and 2025 BMP scenarios. Any scenarios developed using VAST will be based on erroneous land use / land cover information and hence not be meaningful and accurate. Therefore, the City is providing the requested scenarios information, within this submittal, but outside of VAST.

The City maintains an accurate BMP inventory resubmitted herein, and continues an aggressive BMP inspection and enforcement program. This information is. The City requests that any

future model runs use accurate land use / land cover and BMP data. The City has evaluated future BMP strategies and scenarios that will conform to draft Phase II WIP, and it is ever more apparent that there are serious regulatory and financial challenges:

- The City shares the goals of the draft Phase II WIP, but the local targets and associated future mandates come without any identified or dedicated federal or state funding.
- The City's evaluation of scenarios shows that even if there were no fiscal restraints, additional BMPs may be needed on private properties even if these properties were developed in conformance with regulations at the time. The existing State and City regulatory framework does not allow imposition of such measures.

The City's evaluation of scenarios and strategies shows that the City's main strategies to meet to meet the draft Phase II WIP goals will likely be:

- Retrofits of existing wet ponds so they may treat more land, or be converted from detention to water quality ponds
- Redevelopment of appropriate sites without BMPs through 2025 that are subject to new stormwater regulations
- Retrofits of BMPs on City rights-of-way
- Retrofits on City properties that do not currently have BMPs.

A substantial gap remains after considering reductions from the above items, which will require overcoming serious regulatory and fiscal challenges. The measures outlined above require additional resources beyond existing programs and budgets. These needs are discussed in more detail later in this letter.

The City continues to have concerns about the current approach and has identified discrepancies with the input data and assumptions from the Bay Model output that are incorporated in the 5.3.2 Local Goal Data (October 17, 2011) and VAST. The model's applicability at the city/county scale to provide accurate local targets is something that the U.S. Environmental Protection Agency (EPA) recognized by stating that "confidence in outputs...increase[s] as the scale becomes larger" (EPA October 2011).

The City provides the following technical discussion, data, and concerns in response to each of the five (bulleted and italicized) items, in conjunction with information provided online via VAST. **This response is technical in nature and does not reflect any of the ongoing discussions with the City's elected officials.**

- *Develop a current BMP inventory – this information will be used to update implementation progress data in the Chesapeake Bay model;*

The City has been proactive its approach to water quality through a vigorous stormwater management program that maintains compliance through portions of the Clean Water Act, Chesapeake Bay Act, Virginia Stormwater Act, the Erosion and Sediment Control Law, and attendant regulations, through the requirement of structural stormwater best management practices (BMPs) as part of the development process. The City complies with its Municipal Separate Sewer System (MS4) General Permit requirement of controlling Post-Construction

stormwater discharges by means of its plan review process and a robust BMP inspection and enforcement program. While the MS4 General Permit did not require inspection of BMPs prior to the current 5-year permit (2008-2013), the City proactively started its inspection and enforcement program during its first 5-year permit (2003-2008) and continues to strengthen this program.

Pursuant to the current MS4 General Permit (4VAC50-60-1240) requirements, the City included a full inventory of BMPs in the format requested by DCR with the 2008-2009 Annual Report, and subsequent reports have contained new BMPs that have come online during each reporting period. Although the City has provided the number of BMPs and acres treated, it appears these data were not used to run the Bay Model since it is not reflected in the 1985-2005 model calibration of DCR's Local Goal Data nor the VAST 2009 Progress Run (Table 1). Due to these discrepancies, the equity of the Bay Model, and in turn the Local Goal Data and VAST, is questionable if it is based upon incorrect assumptions and inaccurate BMP data. The City has raised this issue a number of times and has not received an adequate explanation for the discrepancies. The City has made great progress toward water quality that should be considered in the modeling.

While DCR has requested the current BMP inventory be submitted online via VAST, the discrepancies in the land use / land cover data (discussed next) do not allow us to accurately provide our current BMP inventory using VAST. Data for BMP treatment related to land use in VAST can only be edited by changing the percentages of the land use category that a practice treats. Providing our BMP inventory as a percentage of the inaccurate land use instead of the actual land use would yield inaccurate BMP data. The functionality of VAST must be revised to allow localities to use local land use data related to the percent BMP coverage so that the BMP coverage is based on the actual land use.

Given this inherent issue in VAST, the BMP inventory is attached (Table 1) in a format that mimics the format found when downloading data from VAST, so it can be input if/when our locally-generated, more accurate land use data is available for recall in VAST. At your request, the City can also provide this data (hardcopy, electronically or via VAST) for the major timeframes used in the Bay Model: 1985-2005 to coincide with the Bay Model calibration period, 2006-2009 to inform the 2009 Progress, and 2009-present to show additional facilities to receive nutrient and sediment reduction credits.

The City compared DCR's Local Goal Data (mirrored in VAST) to local BMP data (Table 2) for the timeframes mentioned above. Comparing columns "DCR 2005 Progress" to "City Actual BMPs Through 2005" shows that DCR's BMP data for the 1985-2005 calibration period was overestimated by approximately 426 acres; and therefore the model calibration was based on inaccurate data. The "DCR 2009 Progress" column should reflect BMPs added from 2006-2009 (after 2005) to existing BMPs in "DCR 2005 Progress".

Comparing these columns would suggest DCR assumed that approximately 1,816 acres of BMPs were added during that three year timeframe, or a 139% increase. The City's actual BMP coverage up to 2005 was approximately 882 acres. A more reasonable, yet aggressive increase in BMP coverage of approximately 397 acres actually occurred after 2005 for the more accurate

2009 Progress ("City Actual BMP 2005 Progress" vs. "City Actual 2009 Progress"). The City had a 45% increase in BMP coverage. The City requests that our accurate BMP inventory be used for modeling purposes, especially if these requirements may be incorporated in the Phase II WIP or the MS4 permit.

- *Evaluate the land use / land cover information included in the model and provide more accurate land cover information you may have – this will be of tremendous assistance in ensuring that model revisions made in the future will more accurately reflect land use information in your locality;*

Although Section 5.8.3 of the Bay TMDL (EPA, December 2010) states that "the best and final definition of an MS4 is delineated [storm] sewersheds (drainage area served by a sewer system), most jurisdictions could provide only municipal boundaries as an estimated MS4 area." The TMDL did not use local "GIS data and topographic information to delineate the sewershed." Because of this, the City's MS4 delineation in the Bay Model (and its outputs – DCR Local Goal Data and VAST) "includes all land in the municipal boundaries".

Additionally, the land use / land cover used in the Bay Model loses varying degrees of accuracy when reduced to the city/county scale (EPA, October 2011). In this response, the City analyzed local GIS data with respect to regulated / unregulated areas and impervious / pervious surfaces to better determine local land use / land cover information.

The Small MS4 General Permit authorizes the City to "discharge stormwater from the regulated small MS4 to surface waters" (4VAC50-60-1220 A.) . Therefore, our land use / land cover delineation included a close examination of regulated / nonregulated outfalls and parcels that drain directly to surface waters without flows entering the regulated MS4. Also, according to the MS4 General Permit, "portions of the regulated MS4 that are covered under a VPDES permit for industrial stormwater discharges...shall follow the conditions established under the VPDES permits" and other MS4 permittees must comply with VSMP permits, these land areas were considered unregulated in the analysis since they are not regulated under the City's MS4 permit.

The analysis focused on delineating sewersheds using DCR and Bay Model land use categories. To perform this analysis, the City utilized local GIS data and tools (the compressed schedule did not allow for field verification), a review of state stormwater permits under the VSMP and VPDES programs, and discussions with regulating agencies. This approach rendered a delineation of impervious versus pervious areas within the regulated and unregulated (MS4 and non-MS4) areas. Unregulated impervious and pervious areas included land with direct drainage to surface waters and no connection to the MS4, stream corridors, and areas covered under their own state stormwater permit. Federal lands not covered under a stormwater permit were categorized as regulated or unregulated based on the storm sewershed. However, there are other land use categories included in the Local Goal Data and VAST data that posed some issues during our initial analysis and were not included.

DCR Local Goal Data included "Forest" as a land use category, while VAST expanded on this and also included "Harvested Forest". According to the land use section of the 5.3 model

documentation (U.S. EPA 2010), the “*forest, woodlots and wooded* land use includes woodlands, woodlots, and usually any wooded area of 30 meters by 30 meters remotely sensed by spectral analysis.” Non-tidal wetlands were also included in this category. The *harvested forest* area is estimated to be about 0.33 percent of the *forest, woodlot, and wooded* land use” for the model. The land use “Water” was only found in VAST. This is most likely the “Open Water” category discussed in the model documentation (U.S. EPA 2010), which was “estimated directly from the 2000 RESAC land use data” and only included non-tidal waters. Note that while these land uses were included in the VAST data output, they are not present in the Local Goal Data.

The resolution of the tool used to delineate forest may have captured parkland with direct drainage (unregulated) or other contiguous riparian areas for the Forest land use. If this assumption is correct, Forest would be captured in our analysis as unregulated. Similarly, it is possible that wet ponds being utilized for water quality or quantity are included in the water category, since there are no natural ponds, and other water is associated with streams. Our analysis appropriately captures these features based on our delineation of the storm sewersheds. Therefore, our land use analysis captured these areas but did provide separate categories for Forest and Water.

As suggested, the City’s findings show that the 5.3.2 Local Goal Data and related VAST data are not accurate at the local level. The City provided these data via VAST as requested. Table 3 provides a comparison of DCR Local Goal Data, VAST, and City Actual Data, and highlights the discrepancies. For instance, DCR and VAST data give the unregulated urban pervious (nonregulated impervious developed) area as approximately 7 acres, while our analysis shows that the City has approximately 452 acres of unregulated impervious area (Table 3).

Our data has also been entered into VAST per your request, and Table 3 provides a comparison for convenience. The City understands that our more accurate local land use data is currently not available in VAST to enable scenarios based on this data.

- *Review the 2017 and 2025 BMP scenarios as identified in the Phase I WIP and develop preferred local BMP scenarios that provide a similar level of treatment – identified local BMP scenarios will be aggregated and incorporated into the Phase II WIP;*

Given the reliance on inaccurate land use and BMP data for the Bay Model calibration, progress runs, and subsequent outputs that were used to create VAST and DCR’s 5.3.2 Local Goal Data – on which all of our responses to this information request is to be based – the City has major concerns with data in columns “DCR 2025 WIP I Proposed BMPs”, “DCR New BMPs Proposed 2025”, and “DCR 2017 BMPs 60% of New” of Table 2. This precludes the City from being able to provide BMP scenarios in VAST that reflect actual conditions.

The level of effort in the 2017 and 2025 BMP scenarios identified in the Phase I WIP column of the Local Goal Data, or any comparable local BMP strategies as has been suggested by DCR, will require more in depth analysis, predicated on valid local data, to identify any meaningful scenarios.

Currently, the City is using local data to perform a planning-level exercise that considers a range of scenarios to meet the draft Phase II WIP scoping strategies, by considering the following:

- Retrofits of existing wet ponds so they may treat more land, or be converted from detention to water quality ponds
- Redevelopment projections through 2025 that would be subject to new stormwater regulations
- Retrofits on City rights-of-way using bioretention
- Retrofits on City properties that do not currently have BMPs
- Calculating the Gap that remains after considering reductions from the above items

Our preliminary planning analysis suggests that in order to bridge the remaining Gap, the City would not only be required to retrofit additional existing public property, but would also have to design, construct and maintain costly retrofits on privately-owned. This brings up significant concerns with regulatory authority and especially cost to implement and maintain BMPs on private property.

The City understands that in lieu of receiving BMP scenarios from localities as VAST inputs, DCR will input the default scenarios from the Local Goal Data into VAST as part of its aggregate Phase II WIP submittal to satisfy EPA's request for an input deck (EPA, October 2011). **While the City understands DCR's need to meet this request, the City does not endorse these BMP scenarios as accurate at the local level nor does the City consent to implementing these scenarios in light of our submission of more accurate land use and current BMP data that should supplant the assumptions and data in VAST.**

- *Develop strategies to implement the preferred BMP scenarios – strategies will also be aggregated and used in the development of Virginia's Phase II WIP; and*

The City is an historic, highly urbanized area located at the bottom of several larger drainage areas that converge on the middle Potomac River basin. As such, available land area for retrofit opportunities in this region is limited and costly (Virginia Senate Finance Committee, November 2011.). This translates to increased financial ramifications of treating areas that were in compliance with existing regulations at the time of development (prior to 1992). In addition, water entering our jurisdiction may already be seriously impacted by upstream sources prior to becoming part of our local waterways and the Potomac River. Regardless, the City values its water resources and continues to work with regional partners through NVRC's Stormwater Workgroup at the planning district commission level and COG's Water Resources Technical Committee at the interstate level to find innovative and cost-effective strategies to protect and enhance water quality. The City is committed to enhancing and protecting its local waterways in supporting the health of the Chesapeake Bay. **The strategies presented are for discussion purposes are not exhaustive, and presentation of these strategies does not create a hierarchy of importance nor constitute a full or partial agreement that these all or part of these strategies will be pursued by the City.**

The City used the provided "Strategies Template" for responses that fit the required format and predetermined entries (Table 4). Some of these strategies are discussed in further detail below,

as well as potential strategies that are not currently available to localities through the Bay Program. The City feels these potential strategies should be pursued further and incorporated into the suite of practices available to meet the required reductions. The City understands that the Bay Program has enlisted stormwater professionals as members of three Urban Stormwater Expert Panels to consider revising current assumptions and vet potential practices. The tenants of Adaptive Management that have been espoused in the final Bay TMDL (EPA December 2010) and elsewhere throughout this process, should continually be under consideration through 2025 and beyond so that the future prospect of better technologies, practices, research, and processes that will be spurred by the jurisdictions trying to meet the Bay TMDL can be utilized by localities.

Based on the initial analysis, Pond Retrofits will likely be one of the main strategies the City implements, since installation and maintenance of small BMPs can be costly in a highly urbanized area like Alexandria. This would also maximize economies of scale for reductions. The City is currently engaged in a planning level exercise to determine probable locations and possible costs.

Redevelopment within the City will be another main strategy to reduce loads on the Bay. As an older City, much of Alexandria was developed prior to 1992 stormwater regulations. There will be a significant amount of redevelopment within the City by 2025. As a result, much of the existing impervious areas that are not currently being treated by BMPs will be redeveloped and incorporate stormwater management BMPs. Also under consideration is the possibility of adopting more stringent local stormwater ordinances to get increased reductions from projected development in order to meet these aggressive reductions. However, this option may provide a disincentive for urban infill redevelopment and create an incentive for developers to transform acres outside of the City in greenfields, which is not consistent with smart growth principles.

Two of the remaining main strategies likely to be implemented include Retrofits on City Properties and Rights-of-Way that are not currently being treated. While siting BMPs on public property will help avert the high costs of land acquisition, a gap will likely remain after these main strategies have been implemented. Aside from facing the regulatory and cost issues associated with implementing these practices on private property, the City would ask DCR to consider incorporating the below strategies into the suite of practices available to localities for meeting the aggressive reductions of the Bay TMDL and the WIP.

The City continues to encourage DCR and the Bay Program to consider the water quality benefits from changed behavior realized through Public Education and Outreach that is mandated by EPA and DCR in the MS4 General Permit. These programmatic efforts require staff and financial resources to perform. The City participates in regional clean water efforts that have generated survey numbers which suggests that our efforts are changing behavior. Rightfully so, environmental education is heavily emphasized on EPA's website. These provide every indication that these efforts are valuable and produce substantial water quality benefits through changed behavior. Given limited resources and the huge fiscal impact of the Bay TMDL, the expert panels should consider these and provide reduction efficiencies for these practices or consider allowing localities the option of scaling back these efforts by revising the MS4 General Permit.

The City's existing Green Building Policy, which requires developers to comply with LEED or equivalent standards, encourages developers to use better stormwater management and conservation techniques for new development and redevelopment.

The City encourages DCR to petition the Bay Program to evaluate the Transfer of Reductions that may occur through practices implemented in unregulated areas to regulated areas that are located within the same jurisdictional boundaries. These water quality benefits may provide more viable and cost effective opportunities that ultimately register a positive impact realized on the Bay. Also, since funding for these projects may be in direct competition with other less beneficial projects, this would allow for equal consideration within a suite of practices for implementation.

The City encourages DCR to lead the exploration of increased removal efficiencies for Urban Stream Restoration above current levels. Ancillary habitat and quality of life benefits derived from this practice should be considered along with the reductions in sediment and associated phosphorus. The City is fortunate in that stream restoration is currently one of the tools available through the Environmental Management Ordinance; however, the Bay's current efficiency and related load reduction for urban stream restoration may ensure that this practice is cost-prohibitive for most local jurisdictions concerned with water quality benefits and quality of life for its residents. Among the benefits are increased dissolved oxygen within the water, increased habitat for aquatic organisms, decreased erosion and thus reduced sediment transport, increased water quality, decreased maintenance activities and more efficient flow through the system. Urban stream restoration practices stabilize the banks against erosion and incision; enhance the biological community, decrease velocities, and the increase hydraulic capacity of waterways. These practices prevent not only the transport of sediment to the Bay, but also phosphorus which is adsorbed to the sediment particles.

The City would strongly urge DCR to endorse the inclusion of Sediment Removal in the suite of BMPs for Bay restoration. Flood channels trap and accumulate sediment originating from impervious and pervious areas in the developed portions of watershed, and thus prevent this material from being delivered to the Bay. Since this area is highly urbanized, the natural courses of these flood channels have been greatly altered and the banks have been armored to prevent bank scour. For these reasons and others, the sediment removed from the streams should be counted towards sediment reductions, as well as the associated phosphorus and nitrogen. (There is also the related benefit of removing other pollutants that may adsorb to sediment or reside in the sediment layer through settling.) Sediment may serve as phosphorus sinks in some cases, and the accumulation of sediments over time, without periodic removal, may release soluble phosphorus back into the water column and subsequently downstream. Sediment removal is a viable, cost effective measure that is a sensible and reasonable alternative to the stark impracticality associated with retrofitting private lands. It prevents this sediment from entering the Bay system, while restoring the hydraulic capacity of the flood channels.

Source reduction programs such as the City's Residential Curbside Fall Leaf Collection program should also be considered for inclusion in the suite of BMPs. The City's Department of Transportation and Environmental Services, Solid Waste Division encourages residents to

compost leaves and yard waste onsite, or to take advantage of the collection program. During this time, City crews collect leaf debris from residences that is bagged or raked out per scheduled time by homeowners just prior to collection. This guarantees that the material is removed in a timely fashion. All of the collected material is processed into mulch and is available free of charge to residents during the Spring Mulch Program. In concert, these programs remove leaf material that would rot and release nutrients during the rainy season, and potentially reintroduce the materials (if the resident participates in the Spring Mulch Program) in a form that is more readily accessible to uptake by plants and incorporation into the soil matrix.

Additional research into the effectiveness of Street Sweeping as a BMP should also be considered to access the greater pollutant removal efficiency of this practice (Sansalone, et al. 2011). Addressing pollution in the streets (at the source) instead of installing structural practices closer to the discharge point leads to removal of more particulates for a fraction of the cost. The cost of equipment, operators, and logistical tools to coordinate with citizens for access to the streets currently outweigh the benefit of street sweeping under the current removal efficiency/load reduction.

Unfortunately, findings from the preliminary analysis indicates that a large gap in required reductions exists after the City considered efforts to retrofit regional ponds, retrofit City properties and rights-of-way, and accounted for redevelopment projections. It appears retrofits may have to be implemented on private lands. Without the regulatory or financial ability to pursue this option, it remains uncertain how this gap can be closed without receiving reductions from some of the other practices mentioned above. Availing localities of the above strategies, in addition to the current list of Bay-approved strategies would increase the collection of viable alternatives that localities could consider. More alternatives translate to better fiscal responsibility for a locality when considering budget implications and resource needs for possible reduction scenarios. Yet this would still fail to address the issues surrounding retrofits on private property.

- *Identify any resource needs to implement the strategies and BMP scenarios – this information will be used in drafting Virginia's Phase II WIP and developing of cost estimates for the implementation of the WIP.*

Like many localities throughout the US, the City has felt the impact of the continued economic downturn. Departments have been forced to cut budgets and/or personnel to make up for shortfalls. Budget discussions include the tough and unfortunate task of allocating monies for competing priorities that include: schools with ever-increasing enrollment, emergency personnel and equipment to protect property and lives, social services to serve our needs-based and at-risk community, aging infrastructure with increased demands, and basic services to our residents.

According to the draft Phase II WIP, the state will use a localities MS4 permit to “ensure BMP implementation on existing developed lands”. The Federal National Pollutant Discharge Elimination System (NDPES) stormwater permitting program delegates the state VSMP MS4 permit program to the Commonwealth as a largely unfunded mandate. Aside from the small, very specific grants that often target more esoteric topics outside the realm of construction and

maintenance of stormwater infrastructure, there is a lack of funding from the federal or state level. Virginia agrees that the implementation, operation, and maintenance of BMPs “will be costly and likely borne by local government” (Virginia Senate Finance Committee, November 2011). Since this is an unfunded mandate, the enormous costs associated with these efforts will in turn be passed along to residents and businesses, and will compete with other priorities during these austere times.

The DCR-provided Strategies Template contains a column for Resource Needs in a narrative format (Table 4). The City included narrative information in this format as requested; however, it is appropriate to highlight some of the resource needs and share rough order of magnitude costs estimates for the broad BMP retrofit strategies being discussed: retrofitting existing ponds, retrofitting City-owned rights-of-way, opportunities on City property, and development projections. There remains a gap in the expected level of effort after all of these projects. Please continue to bear in mind that this is only a planning level exercise and that the feasibility for any of these retrofits will require in depth cost and engineering analyses.

The City’s planning exercise assumed that the retrofits implemented prior to reaching the gap (ponds, rights-of-way and other City property) would be sited on public land. However, this may or may not hold true. For the remaining Gap, no assumptions were made as whether retrofits needed to fill the gap were hypothetically sited on public or private property. Therefore, the City’s cost estimates for meeting the Phase II WIP level of effort does not include the cost of acquiring land or purchasing easements. Cost assumptions per practice were based on based on best engineering practices, local assumptions, discussions with regional partners, and a draft report researching the costs of BMPs (King and Hagan, 2011). For this planning level exercise, without the consideration of barriers to implementation that may exists and based solely on a similar level of effort as described in the draft Phase II WIP, the estimated capital costs alone will be on an order of magnitude from \$140 – 150M. **This is an additional \$140 -150M above and beyond the City’s existing CIP budget and does not include operating and maintenance costs that would be incurred for the life of the retrofit.**

The highly urbanized nature of the City and its location translates to higher costs for land, services, and staff. This means the City would pay more per pound reduction in nutrients or sediment than other Bay localities that may have to provide a similar level of effort to meet the planning targets of the Phase II WIP.

The City of Alexandria was founded as a waterfront community and values its rich history based on its relationship between land and water. The City’s connection to the Potomac River and Chesapeake Bay through its local water resources provides a basis for responsible stewardship to protect and enhance the water environment. Alexandria has committed itself to its water resources through drafting of proactive regulations, while strictly adhering to and incorporating state and federal regulations to create a holistic watershed approach to protecting and enhancing water quality. This attribute is embodied in the targets and goals of the Eco-City Action Plan’s Water Resources principle and evident in our objective to remain a leader in proactively implementing water quality initiatives in our community.

Mr. David A. Johnson
Response to DCR Information Request
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Again, thank you for this opportunity to provide this information in support of the Chesapeake Bay TMDL and the Phase II WIP process. Please feel free to contact me or Jesse Maines at 703-746-4065.

Sincerely,



William J. Skrabak, Deputy Director
Department of Transportation and Environmental Services
Office of Environmental Quality

C: Mark Jinks, Deputy City Manager
Richard J. Baier, P.E., LEED AP, Director, Transportation and Environmental Services
Lalit K. Sharma, P.E., Division Chief, T&ES, Office of Environmental Quality

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Table 2. BMP Acres Comparison: DCR Local Goal Data vs. City of Alexandria Actual Data

Construction	Unregulated Urban	DCR 2005 Progress BMPs	City Actual BMPs through 2005	DCR 2009 Progress BMPs	City Actual BMPs through 2009	City Actual BMPs Post 2009	City Actual Total BMPs to Date	DCR 2025 WIP 1 Proposed BMPs	DCR New BMPs Proposed by 2025	DCR 2017 BMPs 60% of New	
											Ends (Acres) (Annual)
	StreetSweep (Acres) (Annual)	49		0.2					4.2	4.2	2.5
	UrbanNutMan (Acres) (Annual)	0	0.0	0.1				22.0	22.0	22.0	13.2
	Impervious Urban Surface Reduction (Acres)		2.7		2.7				0.4	0.4	0.2
	UrbanSturmRest (Inlet)	0		0.1				1.0	0.9	0.9	0.5
	ExtDryPonds (Acres Treated)	0	6.7	1.3	7.8			0.5			
	DryPonds (and Hydrodynamic) (Acres Treated)	0	125.3	1.6	125.3			1.4			
	WetPond/Wetland (Acres Treated)	0	10.9	0.0	10.9			0.5	0.5	0.5	0.3
	Infiltration (C/D no sand or veg)* (Acres Treated)	0	4.3	0.5	16.7			0.5	0.0	0.0	0.0
	Filter (Acres Treated)										
	StreetSweep (Acres) (Annual)		137.4	137.4				362.2	224.9	134.9	
	UrbanNutMan (Acres) (Annual)	169		65.9				198.8	132.8	79.7	
	Impervious Urban Surface Reduction (Acres)		6.3		8.1	0.4	8.5	327.0	327.0	196.2	
	ExtDryPonds (Acres Treated)	73	34.7	87.2	34.7		34.7	772.2	685.0	411.0	
	DryPonds (and Hydrodynamic) (Acres Treated)	537	202.7	1,038.8	263.2	1.2	264.4	369.5			
	WetPond/Wetland (Acres Treated)	432	258.5	1,219.3	535.3		535.3	1,052.7			
	Infiltration (C/D no sand or veg)* (Acres Treated)	6	78.0	15.6	92.7	0.9	93.6	402.5		232.2	
	Filter (Acres Treated)	41	135.1	372.9	159.3	1.6	160.9	362.8			
	StreetSweep (Acres) (Annual)			10.0							
	UrbanNutMan (Acres) (Annual)	10		3.3							
	Ends (Acres) (Annual)	2			0.6	0.0	0.6				
	Impervious Urban Surface Reduction (Acres)		0.5								
	ExtDryPonds (Acres Treated)	3		5.3							
	DryPonds (and Hydrodynamic) (Acres Treated)	16	8.6	64.0	13.9		13.9				
	WetPond/Wetland (Acres Treated)	16		75.2							
	Infiltration (C/D no sand or veg)* (Acres Treated)	0	0.4	0.9	0.4	0.0	0.4				
	Filter (Acres Treated)	2	6.8	23.0	6.9	2.0	8.9				
		1307	881.5	3,122.5	1,278.5	7.7	1,286.3	3,878.1	1,780.6	1,070.7	

Notes:

*Infiltration Includes: Urban Infiltration, Bioretention and Permeable Pavers (C/D Soils, No underdrain per 5.3 Model Documentation)

**Street Sweeping is "Mechanical Monthly" with units of Linear Miles. This number is for calendar year 2010.

Table 3. Summary of Land Use / Land Cover Comparison: DCR Local Goal Data / VAST Output / City of Alexandria Actual Data

subsource	2009 LU/LC (acres)	Sector	Landuse	PreBMP Acres	PostBMP Acres	Leaduse Acres	Land Use	Difference**	DCR Data Compared to City
Pasture									
Nurseries									
Unregulated Urban Impervious	7	Urban	nonregulated impervious developed	7	7	452.17	Unregulated Urban Impervious	445.17	under represented
Unregulated Urban PerVIOUS	5	Urban	nonregulated pervious developed	4.5	4.5	1387.68	Unregulated Urban PerVIOUS	-1383.18	under represented
Regulated Urban Impervious	4,267	Urban	regulated impervious developed	4267.3	4267.3	3417.24	Regulated Urban Impervious	850.06	over represented
Regulated Urban PerVIOUS	4,433	Urban	regulated pervious developed	4433.1	4433.1	3991.57	Regulated Urban PerVIOUS	441.53	over represented
Construction		Urban	regulated construction	0	0		Construction	0	not represented
Combined Sewer System	537	Urban	CSS pervious developed	224	224	398.75	CSS pervious developed	-174.75	under represented
		Urban	CSS impervious developed	312.8	312.8	177.85	CSS impervious developed	134.95	under represented
Septic									
Surface Mine									
Unmanaged Grass									
Forest	416	Forest	Forest	411.7	411.7				
		Forest	harvested Forest	4.2	4.2				
		Water	water	24.5	24.5				
Grand Total	9,669		Grand Total (w/ water)	9669.1	9669.1	9625.26	Total***		
			Grand Total w/out "Water"	9664.6	9664.6				

*Local GIS data and tools (the compressed schedule did not allow for field verification that will occur at a later date) were used to delineate watersheds. We also conducted a review of these permits. Therefore, unregulated areas include land with direct drainage and no connection to the MSA, stream corridors, and areas covered under their own state stormwater permit. Federal lands not covered under a stormwater permit were categorized as regulated or unregulated based on the storm sewerage.

**City Landuse Acres was subtracted from DCR VAST PostBMP Acres. Positive numbers mean the Actual was greater, negative numbers mean the DCR VAST data was greater. Negative results provide the amount DCR under reported, while positive numbers give the amount DCR over reported.

***Total includes any landuse that would possibly be considered Forest, harvested forest, or Water from the DCR VAST data. (These are not included in the DCR Local Goal Data.)

Virginia Phase II WIP Strategies Document

Introduction

EPA is requesting that states develop a Phase II Watershed Implementation Plan (WIP) that further articulates the Phase I WIP strategies employed locally to meet local implementation scenarios for 2025. As Virginia and local stakeholders move forward in Phase II this document has been developed to provide examples of acceptable strategies for BMP implementation and capacity building efforts that may be considered for submission by localities. The strategies presented in this document are examples, not requirements, and provide a format for building and submitting local Phase II strategies. Localities will meet submission requests for revised or enhanced BMP data and scenarios through the Virginia Assessment and Scenario Tool (VAST). Strategies and resources, like the examples provided, will be submitted through the DCB local engagement team staff using this formatted spreadsheet. While scenarios and strategies will not be shared with EPA on a locality-by-locality basis, it is important that they are provided to DCB in order to develop a Phase II plan showing local involvement and input.

The table below provides a format for selecting the "Type" of strategy being developed, "Implementation", "Capacity" building, or "New BMP", the "Source" sector this BMP strategy can be applied on, the "BMP", and a field for entering the "Strategy" for implementing the BMP. The final column is for entering "Resource Needs" to successfully implement the proposed strategy. There is a drop down menu in each cell except for "Strategy" and "Resource Needs". Please select the appropriate item in each cell and then enter in a brief sentence describing the "Strategy" and "Resources needed". A couple of examples have been entered in the green shaded cells below.

Table 4. City of Alexandria Strategy and Resources Response

STRATEGY TYPE	SOURCE	BMP	STRATEGY	RESOURCE NEEDS
Capacity Building	Urban	Multiple	Locality will work on the production of an analytical tool to inventory impervious/pervious area, regulated and unregulated areas, targets of opportunity for retrofits, location of current BMPs and projected development data.	Funding to create and maintain product.
BMP Implementation	Urban	Multiple	Locality will evaluate public lands to include parks, schools and rights-of-way, for the feasibility of retrofitting with various BMPs. Planning level exercise.	Funding for planning, research, feasibility design, and refining of analytical tool.
BMP Implementation	Urban	Multiple	Locality will consider retrofits for existing regional wet ponds.	Funding for the design, construction, operations and maintenance, easement acquisitions, public outreach.
BMP Implementation	Urban	Multiple	Locality will investigate and pursue grant opportunities to fund retrofits of existing stormwater quality control facilities to address water quality.	Funding for grant writing to compete with the limited resources among the various localities.
Capacity Building	Urban	Multiple	Stormwater Fund through a dedicated portion of the property tax should be restructured into a true Stormwater Utility, in order to provide more equitable charges and incentives.	Funding for refining most recent exercise and public outreach.
BMP Implementation	Urban	Impervious Urban Surface Reduction	Locality will continue its program of investigating feasibility and implementing green roofs retrofits on public facilities to demonstrate the efficiency of these practices to the public and to increase awareness of these types of practices.	Funding for, feasibility, design and construction, to include structural enhancements, in order to implement more green roofs on public facilities.
Capacity Building	Urban	Multiple	Locality will continue to implement our Green Building Policy, while increasing the awareness of the proper use of xeriscaping techniques, stormwater harvesting as a conservation practice, and LID techniques in meeting LEED or equivalent stormwater development standards.	Funding for increased awareness of these practices that would translate to increased implementation to meet the development standards for Green Buildings.
Capacity Building	Urban	Impervious Urban Surface Reduction	Locality will investigate developing materials (website and training) related to design and implementation of Low Impact Development practices and techniques to be implemented by homeowners.	Funding for development of these materials, staff to answer questions and maintain the web content.
Capacity Building	Urban	Multiple	Locality will provide interactive maps via the website that show the type and location of BMPs installed as part of the development process.	Funding to create the mapping product.
Capacity Building	Urban	Multiple	Locality will provide education for the proper installation and maintenance of BMPs via the website. Typical details, pictures, maintenance brochures, links to regional websites, and links to manufacturers will be provided.	Funding for development of these materials, staff to answer questions and maintain the web content.
BMP Implementation	Urban	Impervious Urban Surface Reduction	Locality will develop a database and tracking mechanism (program) for homeowner-installed practices not required as part of the plan development process.	Funding from partners to provide additional incentives to farmers to increase participation in cost-share program.
BMP Implementation	Urban	Urban Nutrient Management	Locality will work with elected officials, stakeholders and constituents to consider incentives for implementation of Urban Nutrient Management on private property.	Funding to provide educational workshops, educational materials and incentives.

Table 4. City of Alexandria Strategy and Resources Response

STRATEGY TYPE	SOURCE	BMP	STRATEGY	RESOURCE NEEDS
BMP Implementation	Urban	Urban Nutrient Management	Locality will work to implement recent regulations pertaining to the Application of Fertilizer to Non-Agricultural Lands. Locality will work to reduce excessive fertilizer application grass lawns and other urban areas by targeting residential and commercial property owners with public education and awareness messages.	Funding for developing nutrient management plans for public lands, training and certification of staff, and continuing education training requirements to maintain certification.
BMP Implementation	Urban	Urban Nutrient Management	Locality will investigate developing a demonstration project and a program that will utilize green infrastructure techniques, to include green streets and other similar practices, on publicly owned lands to demonstrate the efficiency of these practices and increase public awareness of not only the water quality benefit but the ancillary benefits to the public.	Funding for development and implementation of an education and awareness campaign to target residential and commercial properties owners.
BMP Implementation	Urban	Multiple	Locality will review existing landscaping or tree canopy ordinances, or develop new ones, to ensure they include BMPs that enhance the management of stormwater runoff.	Funding for planning, design and outreach.
BMP Implementation	Urban	Impervious Urban Surface Reduction	Locality will continue to implement our urban BMP inspection and enforcement program, with an emphasis on greater compliance with maintenance requirements.	Funding for research, ordinance changes, incentives and public outreach. Funding may be necessary to meet increased reporting and tracking requirements being proposed at the Bay level.
Capacity Building	Urban	Multiple		
BMP Implementation	Urban	Street Sweeping Mechanical Monthly	Locality will investigate expansion of the street sweeping program to include a larger portion of the MS4 area. However, the cost effectiveness of this practice is contingent upon DCR and the Bay adopting a greater removal efficiency for this practice by studying a available research by others that shows the efficacy of this practice beyond the current credits.	Funding for additional vehicles and operators to remove and dispose of the material. Given that the locality utilizes on-street parking for much of its residential and commercial uses, funding would be required for a public education campaign for residents and the creation and administration of a notification tool and hotline that would respond to concerns/complaints.
New BMP	Urban		Locality will work with state and Bay partners in developing a methodology that provides nutrient and sediment credits for the removal of sediment that originates from the urban watershed (not the stream channel) from flood channels covered under a VMRC and USACOE permit.	Funding for the research and develop of the methodology that provides credits. Funding for the removal of sediment flood channels.
Capacity Building	Urban	Multiple	Locality will evaluate resources/capacity, revise ordinances and make the necessary programmatic changes to adopt state stormwater regulations as a qualified local program on or before July, 2014.	Funding for staff needed for compressed review periods and increased inspection and reporting requirements. Funding for changes to the permit center.
Capacity Building	Urban	Multiple	Locality will investigate and consider enacting stormwater management regulations more stringent than the most current state regulations to address aggressive reductions required.	Funding to investigate the practicality of more stringent standards. Funding to hold stakeholder meetings and provide public education.
Capacity Building	Urban	Multiple	Locality will review and appropriately revise codes and ordinances to include water quality performance measures using DCR's regulations and worksheet methodology.	Funding for code revisions and changes to the program.