

# Streamlining Integrated Infrastructure Implementation

## “Dig Once” Strategy Development Workshop

June 9, 2016

### Workshop Report

February 2017

**Sponsored By:**

Alliance for the Chesapeake Bay

Local Government Advisory Committee (LGAC)

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National Fish & Wildlife Foundation (NFWF)



**Prepared By:**

Alliance for the Chesapeake Bay

Hirschman Water & Environment, LLC



# 1. Workshop Overview and Focus

The focus of this workshop was to explore better ways to integrate green infrastructure (GI) into other infrastructure projects, such as roads, school and park improvements, and other capital projects. The workshop was hosted by the Alliance for the Chesapeake Bay (ACB) in conjunction with the Local Government Advisory Committee to the Chesapeake Executive Council (LGAC), with funding from the National Fish & Wildlife Foundation (NFWF). Mary Gattis, Director of Local Government Programs for ACB, was the lead facilitator for the workshop.

The workshop was held on June 9, 2016 at the Eisenhower Hotel in Gettysburg, Pennsylvania. The organizers targeted certain sector representatives for attendance in order to achieve the necessary cross-section of experiences and points of view. **Figure 1** shows the breakdown of attendees by type of organization. A total of 58 individuals attended the 1-day workshop, 52 participants and six staff representatives. See **Appendix A** for a list of workshop participants.

Prior to the workshop, the following problem statement and workshop goal were sent to attendees as part of the agenda. This was done in order to maintain a clear focus for the workshop, as the topic of green infrastructure has many facets, each of which could fill the entire agenda for a one-day event.

Problem Statement: *Only recently has stormwater infrastructure (e.g., pipes, inlets, quality and quantity treatment practices) begun to be considered a full part of municipal infrastructure, alongside roads, water lines, sewer systems, utilities (gas, electric), etc. This recognition of stormwater infrastructure is quite variable among Chesapeake Bay localities. However, as communities across the watershed face the challenge of complying with Municipal Separate Storm Sewer System (MS4) permits and Total Maximum Daily Load (TMDL) plans, among other pollution reduction requirements, significant capital investments in stormwater infrastructure will be required. One option to address these challenges is to integrate stormwater infrastructure (especially green infrastructure) with other capital projects for roads, utilities, parks, schools, and other projects, in order to streamline the process and achieve more cost-effective solutions. However, before this approach can be successful, administrative, procurement, funding and financing, staffing, and operational systems need to be adapted to optimize the process.*

Workshop Goal: *Develop recommendations for streamlining implementation of capital and maintenance projects that incorporate green stormwater infrastructure.*

This report provides a summary of the workshop, and addresses the key issues and challenges with GI integration, potential solutions, and resources and case studies noted during the workshop.

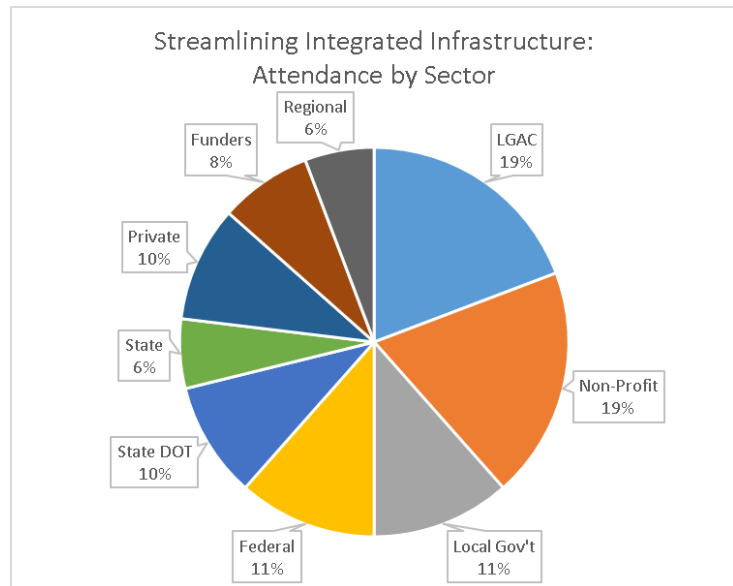


Figure 1. Representation of 52 Workshop Attendees

## 2. Issues Identified by Participants

The morning session allowed participants to brainstorm the major issues that affect the integration of GI into other infrastructure projects. The six topics below are a consolidation of the issues discussed during that session.

### 2.1. Funding & Financing

The availability and timing of grants do not always line up with integrated GI project timelines. For some projects, the grants must be completed before the often lengthy process of integration with other infrastructure projects. Several participants also noted that grants do not often pay for critical project stages, such as feasibility, planning, and prioritizing among candidate projects. Without these “early” steps, many projects can meet significant challenges with feasibility. Long-term maintenance was discussed as a significant funding challenge, but the general sentiment of the group was that the responsibility for funding long-term maintenance must fall on the local government. Some expressed the need for more balance and diversity in funding and financing to move away from the current reliance on grants.

### 2.2. Qualified Personnel & Available Guidance

Successful implementation of GI projects requires qualified personnel and adequate technical guidance. Guidance is needed at all levels – federal, state, and local – because each has a role to play in funding, authorizing, implementing, and allocating pollutant removal credits for GI projects. The following categories represent needed expertise at the local level:

- Municipal program and project management (e.g., procurement and managing hired consultants)
- Design (including planting/landscaping plans)
- Installation
- Long-term maintenance

The latter is particularly critical, as there seems to be a disconnect between the available maintenance resources and what is actually required to meet even a basic level-of-service standard. Frequent turnover at the local level also plays a role in the lack of successful project execution.

As for technical resources, the group expressed that a one-size-fits-all approach is not appropriate, and design guidelines should be flexible enough to address context (e.g., urban, suburban, rural, roads, public facilities).

### 2.3. Municipal Processes & Commitment

The phrase “Dig Once” was used on the workshop agenda and in the morning discussion. “Dig Once” refers to the objective that GI projects be installed while the ground is already disturbed or excavated for other projects, such as road or other public infrastructure improvements.

This approach has efficiency and overall cost benefits, but also requires a high level of collaboration and integration between municipal departments, especially those involved in capital project planning, design, and implementation. This streamlining does not occur overnight, but requires a level of commitment (state to local) and willingness to make some mistakes along the way; to learn and change using an adaptive management approach in order to improve the processes and relationships. Often, a higher

level of collaboration and additional partners will inevitably slow the process down, which can be an issue with the timing of grants, as noted above.

Integration also includes addressing barriers or excessive burdens to GI implementation often embedded in local and state codes and regulations. This is an important planning-level issue that may determine whether GI is even a viable option in some communities.

It was made clear at the workshop that even the best collaboration and technical know-how is no substitute for an important intangible for project success – local government commitment to see projects through from concept to construction to long-term maintenance, including the willingness to make mistakes and improve the process by learning from experience. This is a keen insight as it acknowledges the inherent risks and uncertainties with GI and signifies the importance of adaptive management.

As defined by the Chesapeake Bay Program, **adaptive management** is an ongoing, science-based process through which the Chesapeake Bay Program plans, implements and evaluates its restoration efforts. In simple terms, adaptive management is *learning by doing*: taking action with acknowledged uncertainties, carefully monitoring outcomes, transparently assessing progress and redirecting efforts when necessary.

#### 2.4. Planning, Prioritizing & Feasibility

This category is related to the one above (2.3), but deserves its own section, namely because there are often important steps in the early stages of GI planning that are not funded or considered, and skipping these steps can jeopardize successful implementation down the road.

To realize cost efficiencies, GI projects must be envisioned, evaluated, and planned long before they are actually implemented. Much of this upfront work has to do with integrating GI into the capital project planning process, ensuring that GI is at least considered with other capital projects, and that candidate projects are prioritized on the basis of feasibility, cost/benefit (e.g., pollutant removal and TMDL credits), and other factors.

Some of this upfront work can be time-consuming and expensive. Therefore, a balance must be struck between doing extensive early planning (e.g., mapping of utilities and municipal infrastructure) and meeting cost and schedule expectations. The flip side is that some of these issues can turn into “project killers” if not identified at the planning stage. An example would be unmapped utilities that end up being extremely expensive or even infeasible to relocate.

Another important step for planning and prioritizing is identifying (and scoring) the “co-benefits” of candidate GI projects. Local government implementers often realize that elected officials, public works directors, planners, ratepayers, taxpayers, community groups, and citizens are motivated more by issues other than pollution reduction. Such issues include flooding and drainage, drinking water protection, creating community green spaces and health benefits, or providing new green jobs. Emphasizing these benefits of GI may garner more project support than technical data on the pounds of nutrient removed. This also points to the need for more outreach and education on the benefits of GI.

All of these issues can be summarized as creating a cogent “project pipeline” that has early buy-in and foresees problems that may come up in the future. Some attendees pointed out a related issue concerning prioritization: many GI projects may never get prioritized (*vis-à-vis* stream restoration or street sweeping) due to current Chesapeake Bay Program (CBP) and State best management practice

(BMP) crediting protocols. These protocols send strong signals to local governments who must meet specific TMDL targets with limited budgets.

### 2.5. Regional Collaboration & Peer-to-Peer Networking

As workshop attendees can attest, implementing GI is not a simple process, and many rural or underserved areas (or even more sophisticated places) may not have the staffing or project management capacity to sustain the effort. There is a need to look to regional collaboration and systems to bundle projects and cost-share among multiple municipalities. There is also a role for regional coordinating agencies and design guidance, as well as peer-to-peer networking and sharing of lessons learned.

## 3. Strategies and Recommendations for Selected GI Issues

The afternoon session involved participants working in small groups to develop recommendations for certain issue categories. Participants were given the opportunity to work with two of five available issue groups (see Section 1), and then recommendations were presented and discussed by the whole group.

This section outlines several of the key findings and recommendations from the groups. The information is presented in three overarching categories that consolidate much of the small group discussion. These categories are not precisely the same as those outlined in **Section 2** or the specific topic areas assigned to each group. The reason for this is that the group discussions ranged rather freely, addressing multiple topics with various overlapping ideas and recommendations. This is not unexpected for this type of workshop, and is emblematic of the energy and creativity that participants brought to the discussions. The three categories listed below are an effort to consolidate and categorize in order to present the group discussions in a more orderly fashion:

### 3.1. Municipal processes and planning

### 3.2. Pooling resources and regional collaboration

### 3.3. Funding and financing

Each subsection below provides a general overview of the recommendations as well as a table that lists specific recommendations in increasing order of complexity or the level of effort required to implement the idea. The intent of these tables is to convey that all of the recommendations are valid, but that some may be able to be implemented early or as incremental steps toward a larger goal.

#### 3.1. Municipal Processes and Planning

*(Addresses Section 2 Issue Areas 2.2, 2.3 and 2.4)*

The groups identified a range of strategies to enhance municipal processes and planning that lead to successful GI implementation. Much of this concerns early planning, better communication between departments, and identifying key partners. Other solutions involve actually changing codes, developing new plans, adding staff, and working at higher levels to send the right signals to local governments that the hard work of implementing GI will be rewarded through the TMDL and MS4 compliance programs.

**Table 3.1** presents the strategies divided into categories that generally represent increasing commitment, complexity, or level of effort.

<p>1. Increase Communication and Coordination</p> <p><i>These actions can likely be implemented with existing staff resources, interns, organization partners, or other means.</i></p>	<ul style="list-style-type: none"> <li>• Identify a “GI champion” within the local government (or at a regional agency) to serve as a point person for GI project coordination.</li> <li>• Identify and engage partners (utilities, public works, Capital Improvement Plan (CIP) administration, parks, schools, etc.) very early in the process, starting with CIP planning.</li> <li>• When communicating, clearly establish purpose, need, and context for GI. Be sure to identify and perhaps quantify co-benefits for drainage, drinking water, community health, employment opportunities, etc.</li> <li>• Educate elected officials, keeping the message simple and compelling.<sup>1</sup></li> <li>• Develop “plug and play” tool that makes it simple to understand and communicate to public works or CIP staff how GI can be integrated when infrastructure is built or repaired.</li> <li>• Add GI sites to GIS and infrastructure layers and maps available to the public (potentially done regionally).</li> </ul>
<p>2. Enhance Municipal Codes, Policies &amp; Processes</p> <p><i>These actions require a more involved process to develop new plans and change or add policies, perhaps involving more staff time and institutional commitment.</i></p>	<ul style="list-style-type: none"> <li>• Review local codes and policies that present impediments for GI and amend as needed.</li> <li>• Adopt policies to consider GI with all departmental concept and CIP planning.</li> <li>• Develop a watershed plan that identifies and prioritizes specific GI projects; this enhances chances for funding (grants and CIP).</li> <li>• Develop and implement a process to identify and prioritize candidate GI projects.</li> <li>• Build a feasibility step into project planning. This should include (among other items) utility mapping, infiltration/soil/geotechnical testing, analysis of constraints, and, importantly, ranking and prioritizing candidate projects. The feasibility step can also identify parts of a project that do not have to be full GI, such as handicap ramps and walkways, certain parking areas, etc.</li> <li>• Ensure that all projects have maintenance agreements with a duration of at least 10 years.</li> </ul>
<p>3. Enhance Staffing</p> <p><i>These actions require further commitment to add staff and fund ongoing training programs.</i></p>	<ul style="list-style-type: none"> <li>• Provide ongoing training to deal with staff turnover.</li> <li>• Provide in-house training, career advancement, and other incentives to build capacity for long-term GI maintenance. Alternately, this function could be outsourced to help create green jobs in the community. Utilize appropriate certification programs such as Chesapeake Bay Landscape Professional (CBLP) and certifications for permeable pavement installers.</li> </ul>

<sup>1</sup> Utilize the [Forum Report](#) from the *Green Infrastructure Forum: A Dialogue about Dealing with Stormwater in the Lower Susquehanna*, held June 26, 2013 at the Penn State Harrisburg Campus by the Penn State Center for Green Infrastructure and Stormwater Management.

<b>Table 3.1. Recommendations for Municipal Processes and Planning</b>	
	<ul style="list-style-type: none"> <li>• Conceivably, develop or integrate regional position to manage functions listed above.</li> </ul>
<p>4. Advocate for GI at Higher Levels of Government</p> <p><i>This action is needed to influence change outside the control of local government.</i></p>	<ul style="list-style-type: none"> <li>• Work with the CBP and states to garner more support and rewards for local GI implementation. Current BMP crediting system may be a disincentive for GI.</li> </ul>

Many examples of exceptional municipal processes were mentioned by the groups, including: City of Lancaster, PA and Lancaster County Planning Commission, City of Takoma Park, MD (green streets), Berkley Springs, WV, and Riversmart in the District of Columbia (DC), among others. Other valuable resources were identified at the workshop related to processes and methods for incorporating other infrastructure elements, such as on-road bike lanes, into infrastructure projects, as well as tools and checklists that have been developed for other applications (e.g., Environmental Protection Agency Flood Resilience Checklist). These topical examples provide valuable lessons and models for GI integration. Other technical resources from the U.S. Army Corps of Engineers and American Public Works Association (APWA) state chapters were also noted.

See **Appendix B** for specific resources and examples mentioned by these groups, including technical resources, available certifications, and other materials.

**3.2. Pooling Resources and Regional Collaboration**

*(Addresses Section 2 Issue Area 2.5)*

The group was quite unanimous that parties involved in GI implementation have much to learn from each other, and that resources of staff time, funds, and technical assistance are often inadequate within any one jurisdiction. The group promoted a range of strategies that involved varying levels of collaboration between local governments and other regional entities, ranging from peer-to-peer learning opportunities to actual cooperative program management.

**Table 3.2** presents three levels of increasing collaboration, and it may be possible to start with the “simple” information exchange level and evolve to more advanced levels as the programs mature.

**Table 3.2. Recommendations for Pooling Resources and Regional Collaboration**

<p>1. Utilize Peer-to-Peer Forums</p> <p><i>These actions can likely be handled with an incremental level of coordination by existing regional agencies with local cooperation.</i></p>	<ul style="list-style-type: none"><li>• Develop a platform for practitioners to share case studies, lessons learned, credible guidance, and other resources. Some prefer that this NOT be another website.</li><li>• Offer regional tours, awards and recognitions.</li><li>• Develop shared GIS and data platforms (example: DC’s open data platform).</li></ul>
<p>2. Employ Regional GI Expert</p> <p><i>This action will likely require supplemental funding and local buy-in to authorize enhanced coordination.</i></p>	<ul style="list-style-type: none"><li>• Pool resources to hire a regional GI expert. There is some precedent for this “circuit rider” model in the Bay watershed. A regional expert could also be identified through an existing regional entity, such as a soil &amp; water district, regional planning agency, or similar consortium. This model already exists for other governmental functions.</li></ul>
<p>3. Employ Cooperative, Regional Programming</p> <p><i>This action requires actual programmatic shifts and some surrender of local autonomy.</i></p>	<ul style="list-style-type: none"><li>• Develop or enhance cooperative programming for funding, GIS, project identification and prioritization, CIP planning, procurement and purchasing, project management, and other functions directly related to implementation.</li></ul>

The groups were also very constructive in providing existing examples of regional collaboration: the Upper Susquehanna Coalition, Carroll County, MD, York County, PA Consortium, 4-Mile Run, Anacostia Restoration Plan, and the Healthy Waters Roundtable on the Eastern Shore of MD. The groups also noted other possible partners or sources of assistance: Chesapeake Bay Commission, Metro Washington Council of Governments, U.S. Communities, Chesapeake Legal Alliance, the National Association of Regional Councils (NARC), Government Finance Officers Association (GFOA), American Planning Association (APA), and the International Municipal Lawyers Association (IMLA, model codes). This list is not exhaustive, but provides some resources with which participants may not have been familiar.

**Appendix B** contains brief descriptions and web links for many of these resources.

### 3.3. Funding and Financing

*(Addresses Section 2 Issue Area 2.1)*

All participants were fully aware of the limitations posed by inadequate funding and cognizant of the need to diversify funding and financing sources. Many projects have relied heavily on grants, as this is still the early stage of GI implementation. Stable, local funding sources are available in some cases, but are generally not adequate to address all the needs and strategies noted in this report. In addition, grants have helped local GI champions tackle “proof of concept” projects as a way to build support within their own organizations. In this way, grants have been extremely helpful to move the ball forward, but obviously inadequate for GI implementation to reach the next level of sustained project implementation.



**Table 3.3** presents two categories related to funding and financing; the first involving local options and the second concerning how funding agencies can better align programs with local GI implementation needs.

<p>1. Local Options</p> <p><i>These options involve local discretion and strategic partners.</i></p>	<ul style="list-style-type: none"> <li>• Establish dedicated funding mechanisms for GI implementation. Some communities have dedicated funding through stormwater utilities, but many do not, nor do they have the political capital at present to adopt one. Some communities have opted to dedicate a certain percentage of general fund revenues to a stormwater fund (e.g., Fairfax County, VA).</li> <li>• Pursue state revolving funds, e.g., Pennsylvania Infrastructure Investment Authority (PENNVEST) to supplement grants.</li> <li>• Partner with state transportation departments (DOTs) to jointly fund projects of mutual benefit.</li> <li>• Utilize Community Based Public Private Partnerships (CBP3) and other strategies to leverage private investment. This can also be used to gain access to federal funds through Housing and Urban Development (HUD) and other agencies.</li> <li>• Research other financing options through resources such as the Government Finance Officers Association, Environmental Finance Center at the University of Maryland (EFC) and others (see <b>Appendix B</b>).</li> </ul>
<p>2. Funding Agencies Options</p> <p><i>These actions are outside the control of local government.</i></p>	<ul style="list-style-type: none"> <li>• Examine current funding programs to achieve better alignment with local CIP cycles. Enable use of <i>some</i> funds for feasibility and watershed planning to ensure that the funded projects are worth the effort.</li> <li>• Many infrastructure grant programs exist at the state and federal levels (e.g., DOT Tiger, PA Parks), but could be better “weighted” to provide extra incentives for infrastructure projects that incorporate GI.</li> </ul>

## 4. Additional Issues to be Addressed by the Broader Stormwater Community

This workshop had a specific focus on the strategies and processes for integrating GI into other municipal infrastructure projects. As with all such workshops, the discussions can inevitably range to other topics that are relevant to the original focus, but reference a wider universe of causes, players, and potential solutions. This report attempts to address the original focus. However, the purpose of this section is to at least document broader issues that were discussed, as they are all important and critical for the long-term success of stormwater management and GI in their broader contexts.

- **Maintenance:** There are obviously many deficiencies and challenges in maintaining all stormwater BMPs. It is certainly acknowledged that the stormwater community must increase capacity, commitment, and institutional structures for maintaining public and private BMPs across the Chesapeake Bay Watershed. In this context, the participants stressed that BMP maintenance associated with infrastructure projects must be considered very early in the planning process, as this will influence design choices and ultimately costs and resources for the responsible agency.
- **BMP Design Standards and Planting Guidelines:** This is another broad topic that covers all categories of BMPs. The Bay states have all updated or are in the process of updating stormwater design

specifications. There is a large and ongoing learning curve with discovering which plants do well in various BMPs, are most appreciated by the public, and meet site distance and other public safety requirements. The learning process is also about experimenting with the maintenance regimes for different planting palettes. There are many fine AND poor examples in the Bay Watershed to learn from. A number of newly-minted certification programs (e.g. Chesapeake Bay Landscape Professional) are attempting to address this issue.

- Technical Expertise in Design, Construction and Maintenance: Stormwater is certainly an expanding field, and expertise continues to build in the government, private, non-profit, and academic sectors. Many participants at the workshop stressed the importance of peer-to-peer learning, and this will continue to be an important strategy for all stormwater applications.
- Regulatory Drivers, BMP Pollutant Removal Crediting, and Bay Program Policies: This workshop focused on processes at the local level. However, every local agency or organization is influenced profoundly by the policies and directives that originate at the Bay Program and Bay State levels. These policies send signals down to the local level about which BMPs will be the most cost-effective in achieving reduction targets, how BMPs should be tracked, and what actions constitute compliance with permit conditions. In this context, some GI projects associated with local infrastructure may be “downgraded” as a local priority, given limited budgets and resources and the relative advantage of other options (at least as measured by the narrow metric of pollutant removal versus a broader suite of co-benefits). This is obviously more content than can be considered in a one-day workshop, and many hands are needed to continuously improve the overall process for selecting and crediting restoration strategies.

## 5. Resources & Case Studies

During the workshop discussions, many examples were provided, some good and some emblematic of key issues that must be addressed. **Appendix B** catalogues these resources and provides brief descriptions and web links (as available).

## 6. Conclusion

There are a number of opportunities to bolster the use of GI within each of the three overarching categories (municipal processes and planning, pooling resources and regional collaboration, funding and financing) that should be considered locally, regionally, and at higher levels. Many of the **local** recommendations focus on educating staff and elected officials about the importance of GI implementation, and the efficiency that can be gained by integrating GI into existing CIP projects. Continual training for local staff is essential given the high turnover and changing priorities within local governments. The **regional** opportunities, some that exist using current resources and others that will require pooling additional resources, will require greater coordination amongst a collection of local governments. There are many existing examples of collaborative efforts being undertaken, and those should be used as models for others looking to have a greater impact on the Chesapeake Bay watershed. Lastly, **state and federal** governments play a critical role in providing guidance, incentives, and resources to support local and regional entities in their efforts to improve GI implementation.

### ***Recommended Next Steps***

Given the complexity of integrating GI into other infrastructure projects, there are some immediate next steps that will help address the current problem of fragmented infrastructure projects that result in cost

inefficiencies and neglected infrastructure systems. Integrating stormwater infrastructure into other municipal infrastructure systems is a long-term goal that requires coordination across local, regional, state, and federal agencies, and should begin with incremental steps to create lasting change.

**Table 6.1** lays out recommended next steps that will lead to greater integration of GI and should be pursued as soon as possible.

The recommendations contained in this report may take years to implement. This report can and should be used as a guide for local governments and partners to begin integrating GI into existing capital and maintenance projects. It should be continually referenced by those seeking to assist local governments in establishing long-term processes for undertaking new and innovative strategies to improve local water quality and the Chesapeake Bay.

<b>Table 6.1 Recommended Next Steps</b>			
<b>Recommendation Category</b>	<b>Action Item</b>	<b>Responsible Entity</b>	<b>Additional or Existing Resources</b>
Municipal processes and planning; pooling resources and regional collaboration; funding and financing	1a. Distribute report to Workshop participants and other interested parties and seek their assistance with implementing the recommendations contained herein.	LGAC	Existing
	1b. Approach the Environmental Finance Center about developing an Online Course on integrating GI into a community's CIP.	LGAC	Existing
Municipal processes and planning	2a. Encourage funders to share recommendations with local governments who are seeking funding for GI projects.	LGAC	Existing
	2b. Develop a presentation to be delivered at municipal association conferences and/or other local leader trainings.	TBD	Additional
	2c. Approach American Planning Association about conducting training on Capital Improvement Planning that addresses recommendations 3.1.1 and 3.1.2.	LGAC	Existing
Pooling resources and regional collaboration	3a. Present recommendations to Peer-to-Peer Forums (3.2.1) and Regional GI Experts (3.2.2) to Chesapeake Bay Program Local Leadership Workgroup and seek their input on how to advance this recommendation.	LGAC	Additional

<b>Table 6.1 Recommended Next Steps</b>			
<b>Recommendation Category</b>	<b>Action Item</b>	<b>Responsible Entity</b>	<b>Additional or Existing Resources</b>
	3b. Secure resources to develop and promote case studies showing various approaches to employing shared staff, e.g. regional GI expert, and pursuing cooperative programming.	TBD	Additional
Funding and financing	4a. Promote the establishment of dedicated funding mechanisms for GI implementation by providing training through the MOST Center.	EFC	Existing
	4b. Assist local governments with accessing state revolving funds for GI projects (3.3.1).	PENNVEST	Existing
	4c. Continue to work with local governments to jointly fund GI projects of mutual benefit.	State DOTs	Additional
	4d. Encourage local governments to explore financing assistance through GFOA, EFC and others (3.3.1).	CBP Local Leadership Workgroup	Existing
	4e. Present recommendations related to funding agencies (3.3.2) to the Chesapeake Bay Program Budget and Finance Workgroup and seek their input on how to advance this recommendation.	LGAC	Existing

## Appendix A: Workshop Participant List

Richard Baugh, LGAC Member	Jenna Mitchell, Alliance for the Chesapeake Bay
Carin Bisland, EPA CBPO	Brianne Nadeau, LGAC Member
Philip Briddell, LGAC Emeritus Member	Elizabeth Nellums, NFWF
David Bulova, Amec Foster Wheeler	Philip Pannell, LGAC Member
Allison Campbell, Alliance for the Chesapeake Bay	Matt Pennington, WV Region 9
Jon Crum, FHWA/PA Division	Chris Pomeroy, Aqualaw/VAMSA
Alex Darr, EcoLogix	Kelly Porter, LGAC Member
Frank Dawson, Montgomery County, MD	Jake Reilly, NFWF
Nissa Dean, Alliance for the Chesapeake Bay	Liz Richardson, MD DOT
Sadie Drescher, Chesapeake Bay Trust	Mary Roman, MAFSM and AECOM
Lou Etgen, Alliance for the Chesapeake Bay	Steve Saari, District of Columbia
Andrew Fellows, Environmental Finance Center	Joan Salvati, VA DEQ
Sheila Finlayson, LGAC Member	Sonal Sanghavi, MD DOT
Mary Gattis, Alliance for the Chesapeake Bay	Larry Shifflet, PennDOT
Penelope Gross, LGAC Member	Ann Simonetti, LGAC Member
Amy Guise, US Army Corps of Engineers	Philip Stafford, MD DNR
Richard Heineman, PennDOT	Jennifer Starr, Alliance for the Chesapeake Bay
David Hirschman, Hirschman Water & Env LLC	Dan Sweet, PLA, Charlottesville, VA
Ruth Hocker, City of Lancaster, PA	Shannon Sylte, Alliance for the Chesapeake Bay
Marita Kelley, PA DCED and GFOA	John Thomas, EPA Sustainable Communities Program
Marel King, Chesapeake Bay Commission	John Thomas, LGAC Member
Megan LeBoon, Amec Foster Wheeler	Al Todd, Alliance for the Chesapeake Bay
Pete Littleton, Corvias/Prince George's County, MD	Tim Toohey, Corvias/Prince George's County, MD
Leo Lutz, LGAC Member	Matt Ward, Sustainable Strategies DC
Jeff MacKay, PennDOT	James Wheeler, LGAC Member
Paul Marchetti, PENNVEST	Bob Willey, LGAC Member
Cindy McCormick, City of Lancaster, PA	Bruce Williams, LGAC Member
Erik Michelson, Anne Arundel County, MD	Julie Winters, EPA CBPO
Dave Mills, Charlestown, WV	

## Appendix B: Integrated Infrastructure Resource List

Resource Type:  
 (MPP) Municipal Processes and Planning  
 (R) Pooling Resources and Regional Collaboration  
 (F) Funding and Financing  
 (O) Other

Resource	Resource Type	Summary	Link
VA DEQ Stormwater Local Assistance Fund (SLAF)	F	The purpose of the SLAF is to provide matching grants to local governments across Virginia for the planning, design, and implementation of stormwater BMPS that address cost efficiency and commitments related to approved guidelines.	<a href="#">VA SLAF Website</a>
PENNVEST Clean Water State Revolving Fund (CWSRF)	F	PENNVEST's CWSRF program provides funding to projects throughout Pennsylvania for the construction and maintenance of wastewater treatment facilities, stormwater management projects, nonpoint source pollution controls, and watershed and estuary management. This program offers low interest loans with flexible terms to assist a variety of borrowers that include local governments, municipalities, and privately owned entities and to establish partnerships to leverage other funding sources.	<a href="#">PENNVEST CWSRF Webpage</a>
Anne Arundel County, MD Watershed Restoration Grant Program	F	The Watershed Restoration Grant Program aims to improve water quality in Anne Arundel County's local streams and waterways. Although the grant program is funded entirely through the Anne Arundel County Watershed Restoration and Protection Fund, the County has partnered with the Chesapeake Bay Trust to administer the program.	<a href="#">Anne Arundel Watershed Restoration Grant Program Webpage</a>

Resource	Resource Type	Summary	Link
Fairfax County, VA Stormwater Service District	F	The Stormwater Service District was established by the Fairfax County Board in FY 2010, prompted by stricter regulatory requirements and essential reinvestment in the County's aging infrastructure. The District includes Fairfax County and the towns of Clifton, Herndon and Vienna. Dedicated stormwater funding is used to improve, operate and maintain the County's stormwater system; meet state and federal regulatory requirements; meet state dam safety regulations; and meet state and federal water quality requirements and standards.	<a href="#">Fairfax County Stormwater Service District Webpage</a>
Government Finance Officers Association (GFOA)	F	GFOA, founded in 1906, represents public finance officials throughout the United States and Canada. The association's more than 18,000 members are federal, state/provincial, and local finance officials deeply involved in planning, financing, and implementing thousands of governmental operations in each of their jurisdictions. To meet the many needs of its members, the organization provides best practice guidance, consulting, networking opportunities, publications including books, e-books, and periodicals, recognition programs, research, and training opportunities for those in the profession.	<a href="#">GFOA Website</a>
University of Maryland Environmental Finance Center (EFC)	F	EFC is one of ten University-based centers across the country providing communities with the tools and information necessary to manage change for a healthy environment and an enhanced quality of life. EFC's work is founded on direct community engagement and capacity development. Though every project is as unique as the communities they serve, they provide local leaders with targeted financial policy analysis and decision support processes, providing each community with the resources they need to make informed financing and policy decisions.	<a href="#">EFC Website</a>
Great Lakes Protection Fund (GLPF)	F	Funded by the Great Lakes Protection Fund (GLPF), a report was developed synthesizing the findings of an initiative to enable private financing and/or private delivery to expand the use of green infrastructure in the Great Lakes Basin.	<a href="#">GLPF Report</a>

Resource	Resource Type	Summary	Link
City of Lancaster, PA Stormwater Bureau	MPP	The City of Lancaster's Stormwater Bureau is in the Department of Public Works, which also includes the Bureaus of Water, Wastewater Operations, Engineering, Operations, Public Property, and Public Art. The Stormwater Bureau is responsible for overseeing the stormwater management and green infrastructure program, maintaining and repairing public stormwater infrastructure, complying with MS4 regulations, enforcing the stormwater ordinance, managing the stormwater fee, processing credits and appeals, reviewing site plans, inspecting and maintaining green infrastructure, and leading the City's bicycle and pedestrian planning and sustainability program.	<a href="#">Saveit! City of Lancaster's Stormwater Management Website</a>
			<a href="#">City of Lancaster Stormwater Management Webpage</a>
Lancaster County, PA Planning Commission Greenscapes	MPP	Greenscapes, the green infrastructure element of the Lancaster County Comprehensive Plan, defines a vision, goals and objectives, strategies, and tools to preserve, conserve, restore, and enhance natural resources through the establishment of a countywide, integrated green infrastructure system. Greenscapes provides a blueprint for accommodating appropriate growth and development while preserving the region's most valuable natural resources, native species, cultural assets, and agricultural economy.	<a href="#">Lancaster County Planning Commission Greenscapes Webpage</a>
City of Takoma Park, MD	MPP	The City of Takoma Park's Stormwater Management Program was established to achieve the following goals: (1) Maintain and replace stormwater infrastructure; (2) Perform stream restoration projects and other water quality improvement projects; (3) Add stormwater treatment facilities, such as green streets; and (4) Provide funding to study, design and construct stormwater management facilities. The Program is funded through the stormwater management utility fee, which is based on each property's actual contribution to stormwater runoff.	<a href="#">Takoma Park Stormwater Management Program Webpage</a>
			<a href="#">Takoma Park Sustainability Program Webpage</a>



<b>Resource</b>	<b>Resource Type</b>	<b>Summary</b>	<b>Link</b>
Washington, DC's RiverSmart Programs	MPP	Washington DC's Department of Energy & Environment's RiverSmart programs help to reduce stormwater runoff that harms the District's waterways and the Chesapeake Bay. RiverSmart programs provide financial incentives to help District property owners install green infrastructure such as rain barrels, green roofs, rain gardens, permeable pavement, shade trees, and more.	<a href="#">Get Riversmart! Webpage</a>
City of Richmond, VA Stormwater Utility	MPP	The City of Richmond's stormwater utility is managed through the Department of Public Utilities. For more information see the utility webpage link.	<a href="#">City of Richmond Stormwater Utility Webpage</a>
City of Martinsburg, WV Stormwater Management	MPP	The City of Martinsburg's stormwater management plans include a program to improve and expand drainage systems in the urban watershed, construction site runoff control and post-construction stormwater runoff management from new developments located in the watershed. For more informatoin see the stormwater management webpage link.	<a href="#">City of Martinsburg Stormwater Management Webpage</a>
International Municipal Lawyers Association (IMLA)	MPP	IMLA is a non-profit organization dedicated to advancing the interests and education of local government lawyers. IMLA champions the development of fair and realistic legal solutions, and assists members on the vast and cutting edge legal issues facing local government lawyers today.	<a href="#">IMLA Website</a>
Federal Highway Administration (FHWA) Bicycle and Pedestrian Program	MPP	Three offices within the FHWA focus on environmental protection and enhancement. The offices of Natural Environment and Human Environment primarily focus on environmental programs associated with air quality, climate change, sustainability, noise, and on programs associated with the built environment, including transportation enhancements, and bicycle and pedestrian facilities. The Office of Project Development and Environmental Review focuses on the National Environmental Policy Act (NEPA) project development process as a balanced and streamlined approach to transportation decisionmaking that takes into account the potential impacts on both human and natural resources and the public's need for safe and efficient transportation improvements.	<a href="#">FHWA Bicycle &amp; Pedestrian Program Guidance Webpage</a>

<b>Resource</b>	<b>Resource Type</b>	<b>Summary</b>	<b>Link</b>
U.S. Environmental Protection Agency's (EPA) Smart Growth Flood Resilience Checklist	MPP	EPA's Smart Growth Flood Resilience Checklist helps communities understand whether they are prepared for a possible flood. This checklist was developed as part of EPA's Smart Growth Implementation Assistance project in the state of Vermont.	<a href="#">U.S. EPA's Flood Resilience Checklist Webpage</a>
U.S. Army Corps of Engineers (USACE) Technical Project Planning	MPP	USACE's Engineer Manual (EM) 200-1-2 describes an improved Technical Project Planning (TPP) Process and provides related documentation tools. This TPP guidance is for project managers, engineers, scientists, attorneys, customers, regulators, and other stakeholders. The concepts of site closeout, project objectives, constraints/dependencies, data needs and data quality objectives are essential to all projects. Tremendous money and time savings can be realized by systematic upfront planning.	<a href="#">U.S. Army Corps of Engineers Website</a>
Green Infrastructure Plan for MD's Eastern Shore	R	The Conservation Fund developed a GI plan for Cecil County, MD that included four key products: (1) GI network design; (2) Water quality maintenance and enhancement analysis; (3) Ecosystem services assessment; and (4) Implementation quilt analysis. The Fund suggested a range of tools that Cecil County could use to protect more of its vital green infrastructure network, including land conservation and reforestation opportunities, reduction of nutrients entering the nearby Chesapeake Bay, and funding strategies.	<a href="#">The Conservation Fund's GI Plan for MD's Eastern Shore Webpage</a>
York County, PA Stormwater Consortium	R	The York County Planning Commission (YCPC) is leading the charge in developing a regional consortium across the County to manage stormwater more effectively through collaborative engagement. So far, the County has developed an Integrated Water Resources Plan and conducted a Stormwater Feasibility Study. To see more information about the other efforts taking place, see the link to the YCPC Stormwater Information webpage.	<a href="#">York County Stormwater Information Webpage</a>

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Anacostia River Watershed Restoration Plan	R	The Anacostia River Watershed Restoration Plan identifies problems in the Anacostia Watershed and opportunities for protecting and restoring the watershed. The Plan defines the existing conditions, identifies specific problems and recommends actions to restore the watershed.	<a href="#">Anacostia River Watershed Partnership's Restoration Plan Webpage</a>
Great Lakes Regional Collaboration Strategy	R	Securing a strong Great Lakes restoration plan has been a top priority for the Healing Our Waters-Great Lakes Coalition. Through the work of the Coalition, its members and partners throughout the region, the nation has a solid Great Lakes restoration action plan that addresses the most urgent threat to the Lakes—the “Great Lakes Regional Collaboration Strategy to Restore and Protect the Great Lakes.”	<a href="#">Healthy Lakes, Healthy Lives' Great Lakes Regional Collaboration Strategy Webpage</a>
City of Portland, OR Grey to Green	R	Grey to Green was a five-year Environmental Services initiative with other city bureaus and community partners to boost green infrastructure in the City of Portland. The Grey to Green initiative and Environmental Services’ ongoing investment in green infrastructure projects and programs helps implement the Portland Watershed Management Plan, protect existing sewer and stormwater infrastructure, and meet other city goals.	<a href="#">City of Portland Grey to Green Webpage</a>
Water Resource Coordination Council (WRCC), Carroll County, MD Regional Program	R	WRCC was formed in March 2007 by a non-binding joint resolution between the County, municipalities, and Carroll County Health Department. The committee provides a mechanism for cooperative problem solving of critical water resource management issues facing the County and municipalities.	<a href="#">Carroll County's WRCC Webpage</a>
Upper Susquehanna Coalition (USC)	R	The Upper Susquehanna Coalition is a network of 16 Soil and Water Conservation Districts in New York and 3 Conservation Districts in Pennsylvania. Its mission is to protect and improve water quality and natural resources in the Upper Susquehanna River Basin with the involvement of citizens and agencies through education, partnerships, planning, implementation and advocating for our water resources.	<a href="#">USC Website</a>

<b>Resource</b>	<b>Resource Type</b>	<b>Summary</b>	<b>Link</b>
American Planning Association (APA)	R	APA is comprised of a network of over 40,000 planning professionals, and offers opportunities and resources for everyone— planners, students, commissioners, educators, engaged citizens, and allied professionals alike. APA is committed to creating communities that thrive and prosper.	<a href="#">APA Website</a>
National Association of Regional Councils (NARC)	R	NARC serves as the national voice for regionalism by advocating for regional cooperation as the most effective way to address a variety of community planning and development opportunities and issues. NARC’s member organizations are composed of multiple local governments that work together to serve American communities – large and small, urban and rural. NARC provides its members valuable information and research on key national policy issues, federal policy developments, and best practices.	<a href="#">NARC Website</a>
Virginia Association of Planning District Commissions (VAPDC)	R	VAPDC is an organization comprised of the 21 Planning District Commissions/Regional Councils in Virginia. VAPDC works to bring diverse resources together at the regional level in partnership with local, state, and federal entities to strengthen regions and the Commonwealth. The purpose of the Association is to promote coordination and cooperation among the Commonwealth's Planning District Commissions/Regional Councils to heighten their effectiveness and efficiency; provide mutual assistance and the exchange of ideas; and otherwise promote understanding for how PDCs/RCs can help save their regions and the Commonwealth time and money.	<a href="#">VAPDC Website</a>
The Office of the Virginia State Inspector General (OSIG)	O	On behalf of the citizens of the Commonwealth of VA, the OSIG serves as a catalyst for positive change by: (1) Facilitating good stewardship of resources; (2) Deterring fraud, waste, abuse, and corruption; (3) Advocating efficiency and effectiveness; and (4) Promoting integrity and ethical conduct.	<a href="#">OSIG Website</a>

Resource	Resource Type	Summary	Link
Chesapeake Water Environment Association	O	The Chesapeake Water Environment Association is dedicated to improving water quality and protecting the water environment in Delaware, Maryland, and the District of Columbia. The Association strives to do this through public education, the exchange of technical and scientific information among water quality professionals, the training of wastewater and water treatment plant operators, and by offering technical expertise and advice to the law-making and regulatory processes.	<a href="#">Chesapeake Water Environment Association Website</a>
American Public Works Association (APWA)	O	APWA serves professionals in all aspects of public works, and comprises membership of over 28,500 strong. APWA includes not only personnel from local, county, state/province, and federal agencies, but also private sector personnel who supply products and services to those professionals. Membership in APWA is open to any individual, agency, or corporation with an interest in public works and infrastructure issues.	<a href="#">APWA Website</a>
			<a href="#">APWA State Chapter Website Links</a>
International City/County Management Association (ICMA)	O	ICMA advances professional local government worldwide. The organization's mission is to create excellence in local governance by developing and fostering professional management to build better communities. ICMA identifies leading practices to address the needs of local governments and professionals serving communities globally. Through membership, ICMA provides services, research, publications, data and information, peer and results-oriented assistance, and training and professional development to thousands of city, town, and county leaders and other individuals and organizations throughout the world.	<a href="#">ICMA Website</a>