

# A NEW DAY FOR THE ANACOSTIA



A NATIONAL MODEL FOR  
URBAN RIVER REVITALIZATION

DC APPLESEED

2011



# PREFACE

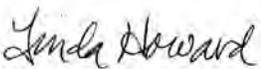
The Anacostia River has long been considered Washington’s “other” river—one that divides our city, our region, and our Nation’s Capital economically, geographically, racially, and socially. For more than 20 years, many individuals, organizations, and agencies have worked passionately and tirelessly in the face of huge challenges and much resignation to address these injustices and improve the condition of this River and its tributaries. Today, the once-forgotten Anacostia has been rediscovered and embraced as a precious resource by our community’s residents and by local and regional government leaders.

During these years much has been achieved. The discharge of raw sewage is being addressed, wetlands are being restored, and trash has been reduced. For the first time, a comprehensive restoration plan now exists. The Anacostia Waterfront Initiative has helped catalyze \$3 billion of investments along the Capitol Riverfront. New and improved riverside parks are providing new civic spaces for rest, relaxation, and recreation in the midst of a congested urban environment.

Through it all, DC Appleseed, its dedicated staff and extraordinary Board, have played a critical leadership role. Their 1999 report called for the District government to improve its stormwater management and administration and adopt an impervious surface fee. In 2003, they led the way in calling for the development of a comprehensive Anacostia restoration plan. And they have been—and continue to be—instrumental in bringing about improved regulations, policies, and environmental standards for waterfront development.

Yet DC Appleseed would be the first to acknowledge that much work remains to be done. Despite solid progress, the Anacostia remains one of the most degraded urban rivers in the nation. This report, then, is designed to assess the current state of the restoration effort, and to offer substantive recommendations that can accelerate the restoration process.

Over these past two decades, nearly every step forward has occurred despite claims that “it can’t be done,” “no one really cares,” and “it will always be the way it is.” While fully aware of the challenges ahead, DC Appleseed proudly stands for a new future: a clean and active Anacostia, with healthy recreational opportunities, a pristine shoreline uncluttered by trash, green jobs and economic development, revitalized neighborhoods, and a valuable resource for those who come from near and far to enjoy its contribution to a vital, improved, sustainable quality of life for the city and region. Imagine the day, 15 or 20 years from now, when our children swim in this beautiful River, fishermen pull their fresh, healthy catch from its waters, and we all reflect on the transformation that has occurred in the Anacostia and its watershed. This report will help bring that new day closer.



**LINDA HOWARD**, Executive Director  
Summit Fund of Washington

# ACKNOWLEDGEMENTS

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**CORNERSTONE RESEARCH** is a recognized leader in providing high-quality analysis of complex issues that arise in litigation, regulatory proceedings, business decisions, and public policy. We currently have a professional staff of over four hundred, and our prominent in-house and affiliated faculty and industry experts provide economic and financial consulting and testimony. The firm has built a strong tradition of community involvement through contributions of support from our employees, who continually coordinate volunteer activities and participate in charitable events that contribute to our local communities and promote national and global philanthropic initiatives. During the past year, our staff has volunteered on behalf of a range of charities, some of which include Habitat for Humanity, the International Rescue Committee, the Alzheimer's Association, the Capital Area Food Bank, the Susan G. Komen Global Race for the Cure, and National Public Lands Day.

**COVINGTON & BURLING, LLP** has had a strong commitment to public service since its founding over 90 years ago. Our pro bono program encompasses a wide range of areas, including freedom of expression and religion; civil rights and civil liberties; gay rights; family law; education; landlord/tenant; homelessness; employment; criminal and court-appointed cases; police misconduct; environmental law; fairness in government procurements and grants; intellectual property; veterans benefits claims, and nonprofit incorporation and tax. The firm is involved in systemic reform projects concerning prisons, public housing, and mental health and juvenile justice systems. *The American Lawyer* magazine noting the tens of thousands of hours of pro bono service has ranked Covington's pro bono practice among the top three firms for 15 of the past 19 years.

**ENVIRONMENTAL RESOURCES MANAGEMENT (ERM)** is a leading world provider of environmental, health and safety, risk, and social consulting services. ERM delivers innovative approaches to business and government clients, helping them understand and manage their impacts on the world through strategic planning and consultation, investigations and assessments, and the engineering and implementation of creative, sustainable solutions to complex environmental issues. Scientific and engineering pursuits are overlain by a commitment to sustainability and social responsibility in the corporate and personal arenas. The ERM worldwide footprint includes 137 offices in 39 countries and employs approximately 3,500 staff across the spectrum of technical and social skills. Its 38-year history and extensive industry knowledge and truly global footprint enable ERM to deliver world-class sustainable solutions. The ERM Foundation, through the contribution of time, capabilities, and resources of the ERM staff, promotes environmental and social projects around the world with financial grants and/or practical support. Causes receiving funding and other support from the ERM Foundation are local in scope and engage in carbon reduction, bio-diversity, water resources, and environmental education.

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for energy and excellence is the firm's commitment to public service. The firm believes that lawyers have a profound obligation to give back to their communities. Patton Boggs also believes that pro bono work is good for the firm: community service fosters social justice, improves the quality of a lawyer's life, has a positive effect on legal skills and enhances professionalism. The firm recommends that all lawyers do pro bono work, and requires that associates perform a minimum of 100 hours of pro bono service per year. In 2009, more than 600 Patton Boggs lawyers and professionals performed over 50,000 total pro bono hours and the firm consistently ranks among the best pro bono programs in the country, finishing among *American Lawyer's* and *Vault's* top-ranked firms each year. The firm has maintained its remarkable pro bono momentum by developing an incredibly diverse range of opportunities for its volunteers.

**THE SUMMIT FUND OF WASHINGTON** supports organizations working to bring about tangible and measurable improvement in the quality of life within the Washington, D.C. community. The Summit Fund's mission is to increase the health, vitality and sustainability of the community through two funding priorities: preventing teen pregnancy in the District of Columbia, and restoring and protecting the Anacostia River and watershed. Regarding the Anacostia, Summit's long-term goal is to ensure that the Anacostia becomes a biologically productive, socially viable river that is a source of pride for the national capital region. Since 1998 the Summit Fund has invested over \$8 million in organizations and initiatives designed to accelerate the restoration process.

**WEIL, GOTSHAL & MANGES, LLP** is a leader in the marketplace for sophisticated, international legal services. With more than 1200 lawyers across the U.S., Europe and Asia, the firm serves many of the most successful companies in the world in their high-stakes matters and transactions. Weil's Washington, D.C., office is home to approximately 70 lawyers, and their diverse practice areas provide clients with invaluable counsel in navigating an intricate and ever-changing business environmental and regulatory landscape. The firm's dedication to pro bono has been recognized both locally and nationally. This year, for the sixth year in a row, Weil was one of twenty firms listed as the best in the country on the *American Lawyer* magazine's A-List, which combines pro bono performance with other crucial metrics of law firm performance. The Pro Bono Institute honored the firm in 2008 with the John H. Pickering Award for its outstanding commitment to pro bono legal services, and in 2009 the American Bar Association recognized the firm with its Pro Bono Publico Award, making Weil the first firm to hold both honors concurrently.

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# EXECUTIVE SUMMARY

*“This report calls on the federal government to join with the state and local governments in the Anacostia watershed in an unprecedented effort to reclaim one of the country’s most polluted rivers as a regional asset and national model.”*



Centuries of degradation have cast the Anacostia River as a national symbol of environmental neglect. Yet the Anacostia can be reclaimed as a valuable resource to the national capital area and held up as an example of urban watershed restoration for the rest of the nation.

The Anacostia River and its stream network are important natural resources that, if cleaned up, can provide a variety of concrete benefits to communities throughout the region, and can serve as a source of national pride. A cleaner Anacostia River will yield improved recreational and entertainment options, a natural respite from the congestion of urban life, and a focal point for community revitalization and investment throughout the watershed. The River clean-up will create jobs, enhance economic development opportunities, and improve the quality of life in communities throughout the watershed.

Cleaning up the Anacostia River is not simply a lofty aspiration, but an endeavor to which all levels of government have already made a commitment. When Congress passed the 1972 Federal Water Pollution Control Act Amendments, it set a national goal of “water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water” by 1983.<sup>1</sup> Roughly four decades later, in April 2010, federal, state, and local officials gathered on the banks of the Anacostia River to unveil the Anacostia Restoration Plan.<sup>2</sup> The Plan is the result of a two-year, \$2.8 million planning process led by the Army Corps of Engineers in concert with other federal agencies and state and local governments, at the direction of Congress. It identifies over 3,000 restoration projects throughout the Anacostia watershed—the 176 square miles of land in Washington, D.C. and Montgomery and Prince George’s Counties, Maryland that drain into the Anacostia River. It is the first comprehensive, watershed-wide restoration plan for an urban river in the country.

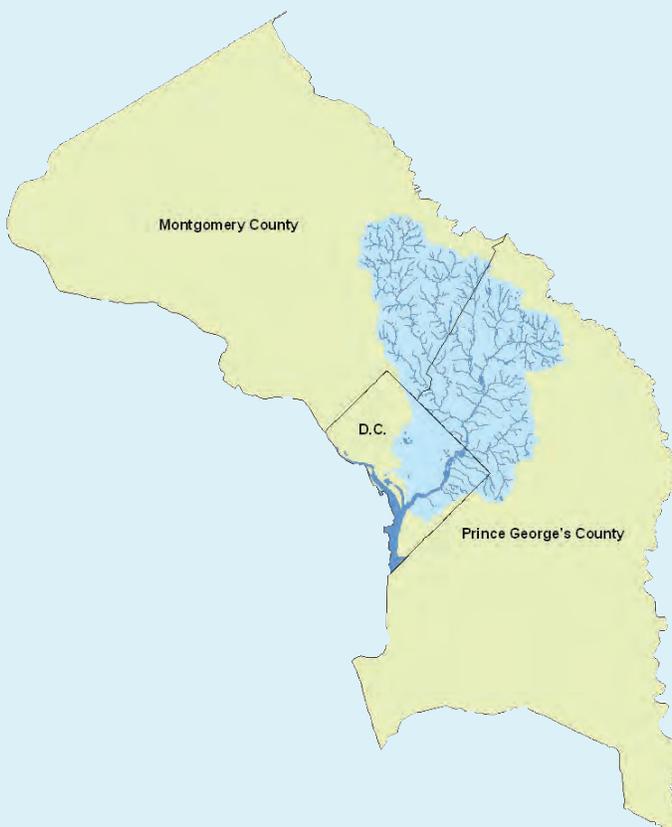
The Restoration Plan builds on commitments already made by state and local officials, such as stormwater control efforts to meet federally-required pollution limits and the District's massive effort to nearly eliminate sewage discharges into its waterways from its antiquated combined sewer system. Once implemented, the Plan will make considerable progress toward clean-up. However, as the Army Corps has explained, in order to clean up the Anacostia, the Restoration Plan must be implemented in conjunction with new strategies to mitigate stormwater pollution from private property in the watershed, as well as with efforts to remediate toxic contamination in the tidal River. This clean-up will require coordinated and sustained action, as well as more resources, from the Anacostia's stakeholders.

This report calls on the federal government to join with state and local governments in the Anacostia watershed in an unprecedented effort to reclaim one of the country's most polluted rivers as a regional asset and national model. With key clean-up plans now in hand, the federal government has

the opportunity to work with local governments, leveraging local funds, to reverse environmental damage done to the Anacostia. Building on restoration efforts already underway and the blueprint provided by the Anacostia Restoration Plan, this report sets forth a practical strategy for targeting federal and local actions and resources to address the Anacostia's major pollution problems.

If the recommended investments are made over the next 15 years, those who live in and visit the nation's capital could enjoy varied recreation and entertainment along the water's edge, safer and better boating, an urban nature refuge, and, potentially, a swimmable Anacostia River. Residents throughout the watershed will benefit from the employment opportunities and economic development that sustained green investment will generate. No less important, should the recommended clean-up strategy prove successful in the Anacostia watershed, it could be used as a national model for urban river restoration, and could be replicated in other urban watersheds throughout the country.

**Although the Anacostia River itself is mostly in D.C., the majority of its 176 square mile watershed is located in Maryland—in Montgomery and Prince George's Counties.**



The Anacostia Watershed is densely populated and heavily developed:

- Home to over 800,000 residents
- 70 percent developed
- 43 square miles of impervious surface area—an amount equivalent to the land area of the city of Boston

The Anacostia's major pollution problems are:

- Urban and suburban stormwater runoff
- Combined sewer overflows, which dump a mixture of stormwater and raw sewage into the River during moderate to heavy storms
- Sediment contaminated with toxic materials

A cleaner Anacostia will yield:

- Improved bankside recreation and entertainment options
- A natural respite from the congestion of the city
- A focal point for community revitalization and investment
- Enhanced economic development and job opportunities
- A higher quality of life in watershed communities
- A national model for urban river restoration

Map sources: U.S. Census Bureau and Metropolitan Washington Council of Government



Photo credit: D.C. Office of Planning

## The Federal Government Should Make Anacostia Restoration a Priority

There are four reasons for the federal government to take a leadership role in the Anacostia clean-up now.

**First, the Anacostia watershed provides the best test case for the federal government's new approach to urban watershed restoration, particularly in the Chesapeake Bay region.** Urban and suburban stormwater runoff is a primary stressor of urban watersheds throughout the country—including the Anacostia. The U.S. Environmental Protection Agency (EPA) is promoting green infrastructure techniques, such as green roofs, vegetated swales, rain cisterns and barrels, permeable pavements, and tree box filters, as a primary solution to stormwater pollution, particularly in the Chesapeake Bay watershed.<sup>3</sup> While there are plenty of good examples of individual buildings, residences, or streets that have used green infrastructure, an entire urban watershed has never been retrofitted using these techniques. The efficacy, costs, and benefits of wide-scale green infrastructure application should be tested, documented, and refined so that such techniques can be more easily applied watershed-wide throughout the country.

The Anacostia watershed is an ideal test case for these techniques. First, the Anacostia watershed is, to our knowledge, the only urban watershed in the country with an existing inventory of candidate green infrastructure projects systematically identified for implementation. More than one-third of the Anacostia Restoration Plan's 3,000 candidate projects are green stormwater retrofits that could be implemented throughout the watershed. Second, if these techniques work in the Anacostia watershed—the most densely populated

area of the Chesapeake Bay watershed—they are likely to work in other urban and suburban areas. Third, there is a range of development types in the Anacostia watershed (ultra-urban development in D.C., as well as old and new suburban development in Maryland), which provides the opportunity to apply and test green infrastructure in a variety of ways. Indeed, the EPA has already selected the Anacostia watershed as a testing ground for Chesapeake Bay “green streets” projects.<sup>4</sup>

By evaluating and refining techniques and costs in the Anacostia watershed, the federal government could apply these approaches to other urban watersheds in a more technically-refined, cost-effective, and efficient manner. In short, with the appropriate attention and resources, the Anacostia's green clean-up could provide a blueprint for the future of our urban rivers and watershed communities.

**Second, the federal government has a unique responsibility to remedy the damage done to the Anacostia River.** Historical actions of the federal government, including deforestation, weapons manufacturing, approval and installation of the combined sewer system, historic dredge-and-fill activities, and river and stream channelization, have heavily polluted the Anacostia River and compromised its ability to cleanse itself. While these actions were standard practice at the time they were undertaken, they resulted in unintended devastation of the Anacostia River. The federal government

continues to be one of the watershed's largest tenants, and as such continues to be a major source of pollution. The federal government now has the opportunity to reverse the negative effects of its past actions, and is in fact, the only entity capable of garnering the attention, resources, and authority necessary to lead the transformation of the Anacostia River into a healthy natural resource within the next two decades.

**Third, greening the Anacostia watershed provides the opportunity to bring jobs and investment to its communities.** Although the Anacostia watershed is located in a prosperous region, it is home to some economically distressed communities, and the River itself has long been recognized as a geographic boundary separating some of Washington's highest-poverty neighborhoods from the rest of the city. While the Washington region has weathered the recession better than most areas, pockets of D.C.'s and Maryland's "upstream" communities have been impacted by unemployment and foreclosures.

The Anacostia can be reclaimed as an economic asset and source of pride for the watershed's communities. With downtown D.C. mostly built out, and six Metro stops within walking distance of the River, the Anacostia waterfront is poised to capture some of the District's future growth. A

*"We have a wide and scenic urban river that is crying out to be restored, renewed, and reclaimed for the people of this region and its visitors. I believe we have a special responsibility to invest in this critical waterway for the surrounding neighborhoods, businesses, and visitors."*



Congressman Steny Hoyer

healthy Anacostia is at the heart of the waterfront's revitalization. A cleaner River would improve shore-side recreation and entertainment, provide safer and better boating opportunities, enhance development along the Anacostia's banks, and increase investment in nearby neighborhoods.

Although not at the River's edge, upstream communities would also benefit from the restoration through community investment, job creation, and increased property values, spurred by green infrastructure. The Anacostia watershed contains nine of Prince George's County's 15 Metro stops, some of which are the Washington region's best candidates for future transit-oriented development. Wide-scale implementation of green infrastructure throughout the watershed could enhance these upstream development opportunities by promoting the area's sustainable image, visibly enhancing locations' attractiveness, boosting property values, and signaling a commitment to a high quality of place to businesses, employees, and residents.

Equally important, the Anacostia restoration will create new jobs throughout the watershed. Increased demand for green products and the installation of green retrofits, generated by new stormwater requirements and incentives, will create new jobs and business growth. Jobs will be created at all skill levels, from landscapers to civil engineers, and will therefore provide career opportunities for residents in the watershed's communities.

**Fourth, retrofitting the Anacostia watershed in a coordinated and timely fashion will produce the most efficient, cost-effective, and environmentally beneficial results.** There are approximately 43 square miles of impervious surfaces, such as roofs, roads, parking lots, sidewalks, and driveways, in the Anacostia watershed—an area that is equivalent to the city of Boston.<sup>5</sup> This impervious area is estimated to involve as much as twenty million cubic yards of concrete—a volume similar to the volume of dirt excavated to build the Channel Tunnel, or "Chunnel," that links the United Kingdom to France. Much of this impervious surface area must be retrofitted with green infrastructure in order to address the Anacostia's main pollution problem—stormwater runoff. Without coordinated action and additional resources, these retrofits will occur in a piecemeal fashion over the next several decades, with potentially less environmentally and cost effective results.

Through the additional targeted investments in green infrastructure recommended by this report, the River's stewards could substantially mitigate stormwater pollution at an

*“We must use green infrastructure if we are to reduce pollutants in stormwater runoff effectively and in an environmentally safe manner. I look forward to biking around a cleaner and healthier watershed that will benefit the entire region and be a model for the country.”*

Congresswoman Donna Edwards

accelerated pace while reaping the rewards that would come from a cleaner River and greener watershed. A firm mandate and resources from the federal government to restore the Anacostia would ensure that investments are made toward achievement of the same goal in a coordinated way and in a reasonable time period, rather than in piecemeal fashion, over several decades. Indeed, the Anacostia Restoration Plan calls for implementing clusters of projects in targeted geographic areas at the same time to maximize environmental benefits and reduce costs. While investments in stormwater retrofits have an upfront capital cost, they have the potential to provide savings in terms of reduced costs on energy, water treatment, and traditional, or “gray” infrastructure, as well as through economies of scale. Retrofitting the Anacostia watershed in a coordinated and integrated way provides an opportunity to realize and document these savings.

## The Anacostia’s Pollution Problems

The Anacostia is one of the most polluted waterways in the nation. It is laden with trash, debris, oil and grease, sediment, bacteria, nutrients, and toxic chemicals. It is not safe for swimming or fishing. In some places, the Anacostia River is unattractive and foul-smelling. The River has three major sources of pollution:

**1. Urban and suburban stormwater runoff.** Stormwater falls on impervious surfaces like roofs, roads, driveways, sidewalks, and parking lots, picking up trash, oil, bacteria, and other pollutants. Polluted stormwater then runs directly into the Anacostia and its streams or into sewers that discharge directly into waterways. Stormwater runoff also erodes stream banks, depositing sediment into the River. It is the Anacostia’s primary stressor.

**2. Combined sewer overflows.** Combined sewers carry both stormwater and sanitary waste water, and serve one-third of the District of Columbia. On dry days, combined sewers carry sanitary waste directly to the Blue Plains Advanced

Wastewater Treatment Plant. However, moderate and heavy rainfalls exceed the capacity of combined sewers, causing them to overflow and dump a mixture of polluted stormwater and raw sewage into the Anacostia. Combined sewer overflows contribute to the Anacostia’s high bacteria levels, which prevent the River from being safe for swimming.

**3. Legacy toxics from historic sources.** Sediment in the Anacostia’s riverbed has excessive levels of toxic materials that, though mostly deposited decades ago, remain in the River. Sediment contaminated with toxic chemicals is the primary reason that the Anacostia’s fish are not safe for eating.

Through its role as historical developer, as well as current landlord and tenant, of the Anacostia watershed, the federal government heavily contributed to these pollution problems.

During the Civil War, the federal government denuded forests near the Anacostia River to provide lumber for barracks, medical facilities, bridges, animal pens, forts, trenches, and artillery batteries. Such deforestation damaged the Anacostia watershed’s natural hydrological system.

Throughout the 19<sup>th</sup> and 20<sup>th</sup> centuries, weapons manufacturing and defense activities at the Navy Yard and other federal installations near the River’s banks discharged toxic materials into the River and its streams, as well as into the adjacent shores from where they leach. Those hazardous substances are still trapped in the sediment today, and some continue to leach into the River from the shores.

In the late 1800s and early 1900s, the federal government built D.C.’s combined sewer system, standard at the time, to ameliorate problems associated with open sewers. This system, still in use today, overflows a mixture of polluted stormwater and raw sewage into the Anacostia River an average of 75 times a year.

Starting in the early 20<sup>th</sup> century, to control malaria-bearing mosquitoes and foul-smelling mud flats, the Army Corps dredged the River and reclaimed wetlands for other uses. The federal government continued dredging and wetlands reclamation through the 1950s, and reconfigured the River through the 1970s. It also channelized tributaries. These activities severely reduced the Anacostia's natural ability to assimilate pollution.

These actions by the federal government were standard engineering practice at the time, and were not meant to damage the Anacostia River, but to improve national defense, industry, and public health. Nonetheless, the problems plaguing today's Anacostia are in no small part a result of these past actions.

The development of the national capital region has further damaged the River. Washington's Maryland suburbs started to develop as early as the 1890s with the installation of commuter rails. After World War II, population ballooned in Prince George's and Montgomery Counties, following the national trend of suburbanization. More and more of the Anacostia watershed became covered in the impervious surfaces associated with development—roofs, roads, and parking lots—that cause stormwater runoff.

The Anacostia watershed is now home to over 800,000 people. It is the most densely populated area of the Chesapeake Bay watershed. Once covered in forests, 70 percent of the Anacostia watershed is now developed.<sup>6</sup> The majority of this development was built without systems in place to manage stormwater runoff and its pollutants. A quarter of the entire Anacostia watershed is now covered in impervious surfaces, and in many communities inside of the Beltway, impervious surfaces account for over half of the surface cover. Cleaning up the Anacostia watershed will require substantial mitigation of these impervious areas.

## Current Clean-Up Efforts are Insufficient

Implementation of existing initiatives will make progress in cleaning up the Anacostia, but will fall short of achieving comprehensive watershed restoration. To date, no efforts have substantially addressed the following critical issues: impervious surfaces on existing private land, legacy toxics in the tidal estuary, divided authority over clean-up actions, and long-term, consistent, and predictable funding needs.

The federal government has, since the passage of the Clean Water Act (CWA) in 1972,<sup>7</sup> taken steps to restore the nation's waters. Under the CWA and the strategy formulated in response to the Chesapeake Bay Executive Order issued by President Obama,<sup>8</sup> the federal government is requiring federal facilities and local governments to reduce stormwater runoff from existing publicly owned lands. The EPA also is advising local governments in the Chesapeake Bay watershed to require builders to use new green techniques to reduce stormwater runoff from newly developed and redeveloped sites—an effort that will curb pollution from some publicly and privately owned property in the future.<sup>9</sup>

The local watershed jurisdictions have made major financial commitments to cleaning up the Anacostia River and other waterways. Together, the three local jurisdictions in which the Anacostia watershed is located will spend roughly between \$35 and \$40 million in operating funds in Fiscal Year (FY) 2011 to meet CWA mandates related to stormwater management, a cost that could increase in future years.<sup>10</sup>



Photo credit: Anacostia Watershed Society

Moreover, the District of Columbia's water and sewer authority, DC Water, will virtually eliminate combined sewer overflows in the Anacostia and the city's other waterways through a consent decree entered in a lawsuit charging violations of the CWA.<sup>11</sup> The infrastructure plan required by consent decree will reduce overflows into the Anacostia by 98 percent by 2018. The Anacostia portion of this infrastructure plan will cost \$1.7 billion (to be paid through debt service on bonds over several years), and has a dedicated revenue stream.<sup>12</sup>

While these actions are all critical steps toward restoration, they are not enough to make the Anacostia healthy. There are four key areas where the current restoration effort falls short:

**First**, current regulations do not adequately address stormwater pollution from private property not undergoing new development or redevelopment, which accounts for over half of the Anacostia watershed's impervious surface area. Under current regulations, much of this private property is not subject to retrofits, nor will it be subject to new rules for stormwater management unless it is redeveloped, a process that takes, at a minimum, several decades.

**Second**, while there has been much discussion about remediating legacy toxics in the tidal Anacostia River, there is no agreed-upon, holistic remediation strategy for addressing contaminated sediment in the estuary. The EPA cannot require the clean-up of legacy toxics under the CWA because they are from historical sources rather than current discharges governed by that law.

**Third**, there are few incentives and no obligation to make coordinated clean-up a high priority across watershed jurisdictions. The creation of the Anacostia Restoration Plan was the result of unprecedented federal and multi-jurisdictional local collaboration, and the watershed's stakeholders continue to work together. However, restoration activities will continue to be piecemeal without a coordinating body with the authority and resources to prioritize actions across political boundaries, particularly during a challenging budget climate.

**Fourth**, local public resources are insufficient to cover the clean-up's cost. Implementing the Anacostia Restoration Plan, which is currently unfunded, over 15 years will cost about \$115 million annually.<sup>13</sup>

## An Urban River Pilot Program for the Anacostia Watershed

This report recommends that the federal government establish an urban river pilot program for the Anacostia watershed. The program would take key actions to address stormwater runoff—a major stressor to urban rivers throughout the country—on an Anacostia watershed-wide basis, by requiring improved federal and local stormwater controls that emphasize green infrastructure techniques in exchange for federal financial support. The program would also mitigate contaminated sediment in the tidal estuary through Superfund. We recommend that EPA administer this pilot program. The federal and local governments can begin to immediately adopt regulatory program components without separate appropriations. The recommended financial investment would garner support for regulatory action and would accelerate the clean-up process.

### EPA Authority to Administer the Anacostia Pilot Program

First, this report recommends that the federal government designate a high-level authority within EPA to supervise and coordinate the recommended clean-up actions. By coordinating clean-up activities between federal agencies and local governments, EPA could identify priority actions at the watershed level and direct resources toward those priorities. EPA could also look across federal and local programs, regulations, and funding streams to achieve efficiencies and synergies. Finally, EPA could document, evaluate, and refine stormwater mitigation approaches so that the model developed for the Anacostia could be applied to other urban rivers.

### Stormwater Policy and Financing

Second, this report calls for the adoption of rigorous requirements and incentives for controlling stormwater runoff, coupled with federal financial support. These stormwater recommendations consist of federal and local regulations, federal tax incentives, and federal and local funding as discussed below. While we recommend that the federal government use its strong regulatory authority to accelerate the Anacostia's clean-up, a serious federal financial commitment is also essential. An approach that relies on regulation alone (and therefore local government and private revenue sources alone) may be perceived as highly inequitable, particularly given the federal government's predominant role in degrading the River. By contrast, a financial contribution from the federal government to help remedy the



Photo credit: Derek Parks for Anacostia Watershed Society

problems created in substantial part by its past policies could help garner cooperation and support from local governments and private property owners.

### **Stormwater Requirements and Regulatory Incentives**

We recommend the adoption of consistent regulations across the watershed to control stormwater from new development, redevelopment, and roads, as well as regulations to retrofit existing impervious surfaces on commercial and federal land in the watershed over time. We also recommend that local watershed governments adopt regulatory incentives to remove administrative barriers to green infrastructure implementation, and to help private landowners make green stormwater upgrades on their properties. The federal and local governments could begin to pursue these regulatory recommendations without new federal legislation.

### **Federal Tax Incentives for Private Property Owners**

To more quickly increase stormwater retrofits on privately held lands, this report recommends that the federal government provide tax credits and accelerated depreciation until 2025 to private property owners in the Anacostia watershed who use and maintain green infrastructure to reduce stormwater runoff. Federal legislation would be necessary to offer such incentives. We estimate that these tax incentives could cost the federal government up to \$30 million a year in foregone tax revenue over a 15-year period.<sup>14</sup> We recommend that such tax incentives should be made available only if local watershed jurisdictions adopt a set of rigorous regulations for reducing stormwater runoff.

### **Funding the Implementation of the Anacostia Restoration Plan**

We also recommend that the federal government provide direct funding for the implementation of the Anacostia Restoration Plan's projects through a long-term grant program. A grant program that required a local match of two local dollars for each federal dollar would substantially leverage federal funds. Implemented over a 15-year period, such a program would cost the federal government \$35 to \$40 million annually, and would cost the local jurisdictions collectively \$75 to \$80 million annually. A multi-jurisdictional, federal-local matching grant program would allow EPA to direct funds to high priority projects across the watershed, and make investments where they are most needed. As with the federal tax incentives, federal grants should only be made to local jurisdictions that adopt more rigorous stormwater regulations.

As a less-preferred alternative to a federal-local matching grant program, the local jurisdictions could consider issuing tax-exempt municipal bonds to implement the Anacostia Restoration Plan. The only cost of this approach to the federal government would be in the form of forgone tax income on bond interest, as the local governments would be responsible for servicing the bonds' debt.<sup>15</sup> The local governments' ability to issue such bonds will depend on their current debt levels and future capital plans. Bonds would distribute the fiscal impact on the federal and local governments over a longer period of time than grants, resulting in a lower annual cost. However, because each local jurisdiction would be responsible for issuing bonds and servicing

their debt, this financing mechanism would not provide the federal government with the authority and flexibility to direct funding priorities across political boundaries within the watershed.

To ensure that the local governments have a dedicated revenue source for matching grants or debt service on bonds, we recommend the adoption of stormwater utility fees based on impervious surface areas and the imposition of an excise tax on certain impervious building materials and lawn care products—products that contribute to the Anacostia’s pollution problems—sold or installed in D.C. and the affected counties. D.C. already has an impervious area stormwater fee in place that the Maryland counties could use as a model.

This policy package of regulations, tax incentives, federal financial support, and financing mechanisms should be tested and perfected in the Anacostia watershed as a pilot program. If it substantially accelerates the Anacostia’s clean-up, as we expect it will, the package could serve as a model to be replicated in other urban watersheds.

### Toxics Remediation Through Superfund

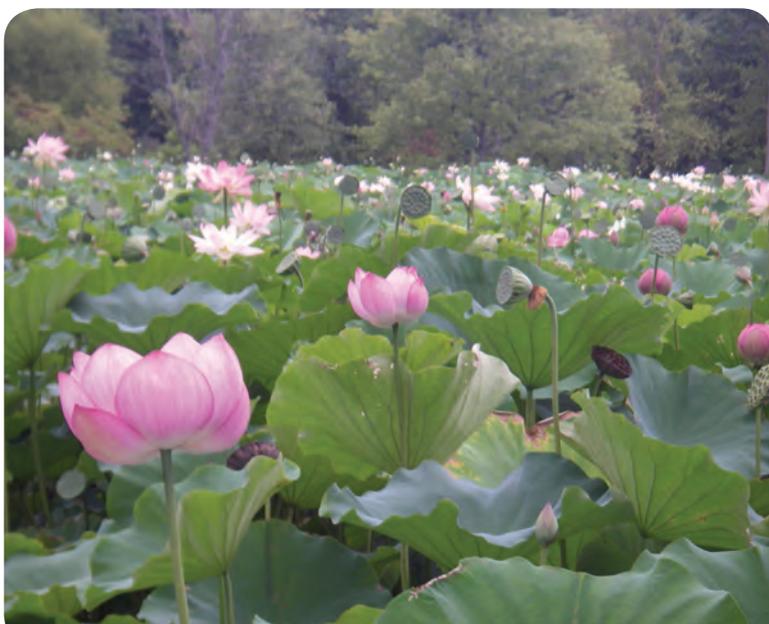
Third, this report recommends that the federal government use an efficient process within the Superfund program for comprehensive remediation of toxic sediment in the tidal River. Although designed to address onshore contamination posing imminent hazards to public health and safety, Superfund has been used to mitigate toxic contamination in estuaries. To expedite the Superfund process, this report recommends an accelerated remedial investigation and feasibility study, led by EPA, aimed at determining estuary-wide

measures for ecological risk and recovery. This estuary-wide effort can occur concurrently with efforts to remediate contaminated shore-side sites.

## Conclusion

This report lays out a practical strategy for the federal government, partnering with the local governments in the Anacostia watershed, to lead the clean-up of one of the country’s most polluted rivers. Congress has already laid the groundwork for this partnership by authorizing the development of the Anacostia Restoration Plan. It now has the opportunity to take the next step by committing the authority and resources necessary to reclaim the Anacostia River. In doing so, the federal government would meet its responsibility to remedy the damage it has done to the Anacostia River.

Equally important, the actions called for in this report would reclaim the Anacostia as a resource for the Washington region and would provide an example of urban watershed revitalization for the rest of the country. If made over the next 15 years, these investments would put in place by 2025 pollution controls necessary for improved shore-based recreation and entertainment, safer and better boating, an urban nature refuge, and, potentially, a swimmable Anacostia River. Green investments in communities throughout the watershed would help create new jobs and businesses, and more livable communities. And a healthy Anacostia River just 2,000 yards from the Capitol dome would serve as a symbol of our nation’s commitment to a cleaner environment and greener future.



*Wetlands along the Anacostia in the Kenilworth Park and Aquatic Gardens are home to lotuses, lilies, and other water plants.*

Photo credit: Anacostia Watershed Society





## INTRODUCTION & BACKGROUND

# A NEW DAY FOR THE ANACOSTIA

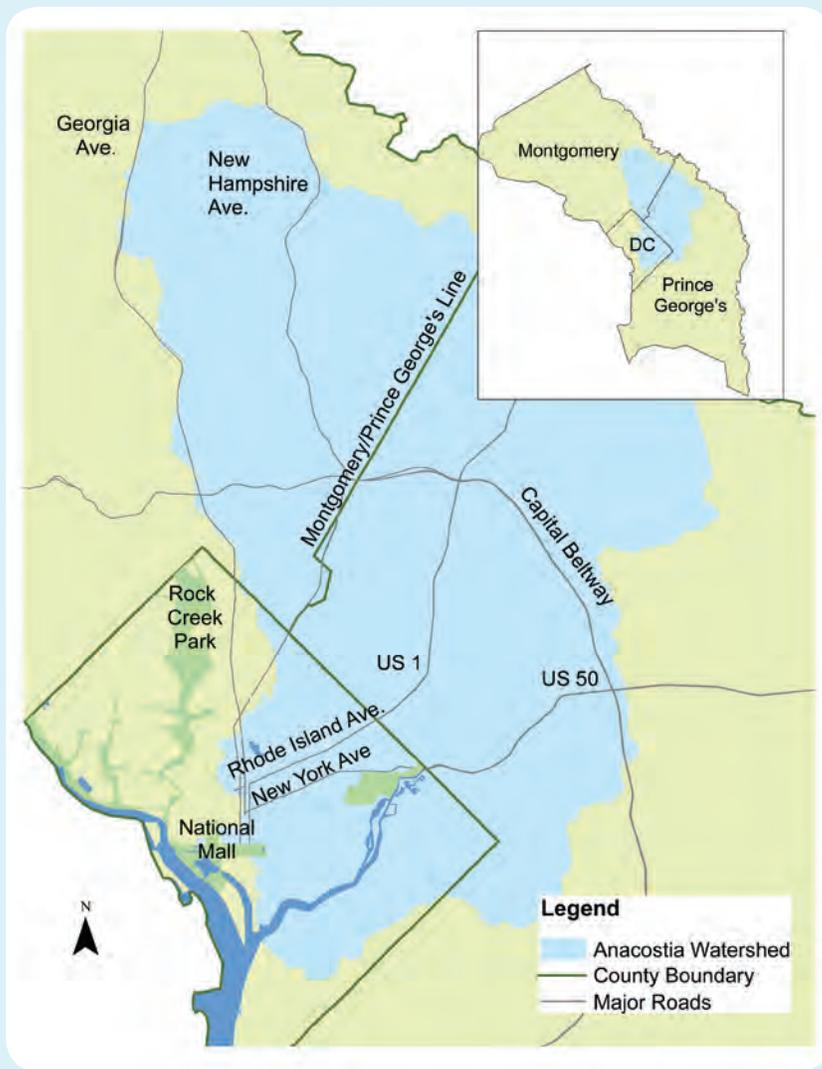
*“A healthier Anacostia River just 2,000 yards from the Capitol dome would serve as a symbol of our nation’s commitment to a cleaner environment and greener future.”*

The eight-mile Anacostia River starts just above Washington, D.C. in Bladensburg, Maryland and flows through the eastern half of the District of Columbia before it converges with the Potomac River, which then flows into the Chesapeake Bay. Ground and surface water from 176 square miles of land, called the Anacostia watershed, drains into the River. Approximately 80 percent of the Anacostia watershed is located in Maryland—in Prince George’s and Montgomery Counties. (*Map 1: Anacostia Watershed*).

The Anacostia River was once the natural and commercial lifeblood of Washington. In its natural state, the River and its tributaries were teeming with shad, perch, sunfish, catfish, and herring, and were surrounded by forests, wetlands, and

lush wildlife habitats.<sup>16</sup> European settlers transformed the Anacostia River into an early commercial anchor, and residential and agricultural communities were established near the banks of the Anacostia, as well as upstream, near the River’s tributaries.<sup>17</sup> When the once-thriving port of Bladensburg, Maryland was established, the River was over forty feet deep and easily accessible to ocean-going vessels.<sup>18</sup>

However, the development of the national capital area has stripped the Anacostia of its ability to provide the amenities that once made it such a highly valued resource. The Anacostia and its banks are now laden with trash, debris, and muck—particularly after big rain storms—compromising its visual appeal, its ability to provide a haven for



## Map 1 Anacostia Watershed

Map sources: D.C. GIS Data Catalog, Washington Metropolitan Council of Governments, and U.S. Census Bureau

development, and the opportunity to help ameliorate some of the Washington area's economic disparities. Just as important, the green infrastructure projects that will mitigate stormwater pollution in D.C. and Maryland, such as trees, rain gardens, vegetated street swales, and green roofs, will help create new jobs, more livable communities, reduced energy costs, and attractive economic development throughout the entire watershed. Finally, a cleaner Anacostia close to the monumental core of the Nation's Capital will serve as a symbol of our country's commitment to a cleaner environment. Indeed, the very process of Anacostia restoration can serve as a pilot project for cleaning up other urban watersheds.

Since Anacostia restoration activities began in 1990, roughly \$250 million has been spent on restoration projects.<sup>19</sup> Despite this investment, the Anacostia River and its tributaries continue to be badly polluted, and will fall severely short of meeting the clean water goals of a fishable, swimmable river. The Anacostia River will not be cleaned up in the next few decades if the business of restoration continues as usual.

wildlife, and, in parts, its navigability by boats. High levels of bacteria, mostly from polluted stormwater and overflows from D.C.'s antiquated combined sewer system, pose health risks to boaters and make the Anacostia unsafe for swimming. And toxic chemicals attached to the River's sediment from historical industrial activities like federal weapons manufacturing make the Anacostia's fish unsafe to consume. Much of the shoreline along the Anacostia is underutilized, inaccessible, and unattractive, particularly on the River's eastern bank. Once the anchor of a thriving commercial community, the Anacostia is now too often recognized as a geographic boundary that divides some of Washington's highest-poverty neighborhoods from the rest of the city and region.

Yet the Anacostia River—along with its banks and stream network—can be reclaimed as a major asset to the Washington area. A cleaner River will yield improved and varied recreational options for residents throughout the city and region, enhanced shore-side community and economic

This report calls upon the federal government to lead a partnership with the watershed's local governments in an unprecedented effort to reclaim one of the country's most polluted rivers as a regional asset and national resource. Building on restoration efforts already underway, this report sets forth a practical strategy for using federal and local regulatory authority and resources in a targeted way to put in place by 2025 controls to address the Anacostia's major pollution problems. As a major developer, landlord, and tenant of the Anacostia watershed, the federal government has unintentionally, but nonetheless substantially, contributed to the River's degradation. Indeed, the single most expensive clean-up project—near-eradication of the combined sewer overflows—is required to reverse damage caused directly by the federal government. However, with key clean-up plans now in hand, the federal government has the opportunity to work with local governments to reverse the environmental damage done to the Anacostia.

Now is the right time for the federal government to take leadership on a cleaner Anacostia. First, the federal government has already made Anacostia restoration a priority. Through a congressional directive, the U.S. Army Corps of Engineers, in concert with local governments in the watershed, embarked on an unprecedented two-year, \$2.8 million planning process that resulted in a comprehensive Anacostia Restoration Plan. The Plan identifies over 3,000 restoration projects throughout the Anacostia watershed that, once implemented, will make considerable progress on the clean-up effort. Implementing the full array of projects over a 15-year period will cost roughly \$115 million annually. With the right authority and resources, many of the Plan's projects could be seen to fruition over the next 15 years. No other urban watershed in the country has an existing systematic inventory of candidate restoration projects.

The Anacostia Restoration Plan calls for implementing clusters of projects in targeted geographic areas simultaneously to maximize environmental benefits and reduce costs. Federal leadership and resources for restoring the Anacostia would ensure that investments are made efficiently toward

rain cisterns and barrels, permeable pavements, and tree box filters, as a primary solution to urban stormwater runoff.<sup>20</sup> While there are many examples of individual buildings, residences, or streets that have used green infrastructure, to our knowledge, an entire urban watershed has never been retrofitted using these techniques. Indeed, a recent National Research Council report on urban stormwater management promotes green infrastructure as a method for controlling stormwater, but also finds that more research is needed to determine the effectiveness of suites of stormwater management tools at the watershed scale.<sup>21</sup> The Anacostia watershed is an ideal proving ground to test and refine these techniques and their associated costs: it already has an existing inventory of green candidate projects, and it is the most densely populated area within the Chesapeake Bay watershed. With the appropriate attention and resources, the Anacostia's green clean-up can provide a model for urban river restoration, and, in fact, can be used as a pilot to be replicated in other urban watersheds.

Third, the federal government has a special responsibility to help clean up the Anacostia River and its tributaries. It

*“With the Action Plan released today, comprehensive clean-up of the Anacostia becomes a top environmental priority for the region and the federal government.”*

  
Congresswoman Eleanor Holmes Norton,  
on the release of the Army Corps of Engineers' Anacostia Restoration Plan

achievement of the same, overarching goal rather than in a piecemeal and uneconomical fashion over several decades. Investments made in a coordinated manner would likely be more efficient, would be more cost-effective by achieving efficiencies of scale, and would produce better environmental results than a patchwork of projects done bit by bit.

Second, cleaning up the Anacostia River provides the best opportunity to test the federal government's latest green approaches to urban watershed restoration at a large scale, and to document the benefits that flow from them. The EPA and the federal strategy developed in response to the President's Executive Order for the clean-up of the Chesapeake Bay are currently promoting green infrastructure techniques, such as rain gardens, green roofs, vegetated swales,

has been a chief player in the watershed for over 200 years, and undisputed historical and engineering facts demonstrate the federal government's role in degrading the River and its streams. Accordingly, the federal government should share responsibility for restoring the Anacostia to the standards of the federal CWA.

Finally, greening the Anacostia watershed will demonstrate how protecting our rivers also makes good business sense by creating new jobs and businesses, more attractive properties, enhanced regional investment, and more livable communities. A cleaner Anacostia will improve opportunities for shore-side recreation, entertainment, and development. Just as important, the wide-scale installation of green infrastructure throughout the watershed will bring economic growth

and investment to the watershed's communities, some of which have been hit particularly hard by the recession. It will create new jobs; new businesses will start or existing ones will expand to meet the need for green infrastructure products and services; and the region's new green image will attract forward-thinking businesses. These benefits will inevitably expand the tax base of the affected local jurisdictions.

The findings and recommendations of this report are based on an analysis of existing clean-up regulations and initiatives by an independent, pro bono team of engineers, economists, lawyers, and land-use experts. In order to evaluate the current restoration effort and make recommendations for accelerating the Anacostia's clean-up, the study team reviewed other studies on the Anacostia watershed, existing legal obligations, literature on best practices and policies, and studies on the economic effects of green infrastructure investment. The project team also conducted interviews with over 40 individuals representing federal and local government agencies, environmental and land-use non-governmental organizations, and real-estate development companies (please see appendix for list of organizations with which interviewed individuals were affiliated). In addition to gathering information on the accomplishments and shortfalls of existing clean-up obligations, the interviews were used to test and refine potential recommendations.

**Chapter One** sets forth a vision for a healthy Anacostia River. It identifies the benefits that would result from a successful restoration effort by recounting the variety of ways that the region's residents and visitors could use and enjoy a cleaner Anacostia. It also describes the benefits that communities throughout the Anacostia watershed would derive from the restoration effort, including enhanced economic development and investment, job creation, increased land and property values, avoided costs, and improved quality of life.

**Chapter Two** provides an overview of today's Anacostia watershed. It reviews the pollutants that plague the Anacostia and their impact on the River's health and uses, as well as major sources of pollution. It also explains how the Anacostia, once pristine, arrived at its severely polluted state and the extent of the federal government's responsibility in this transformation.

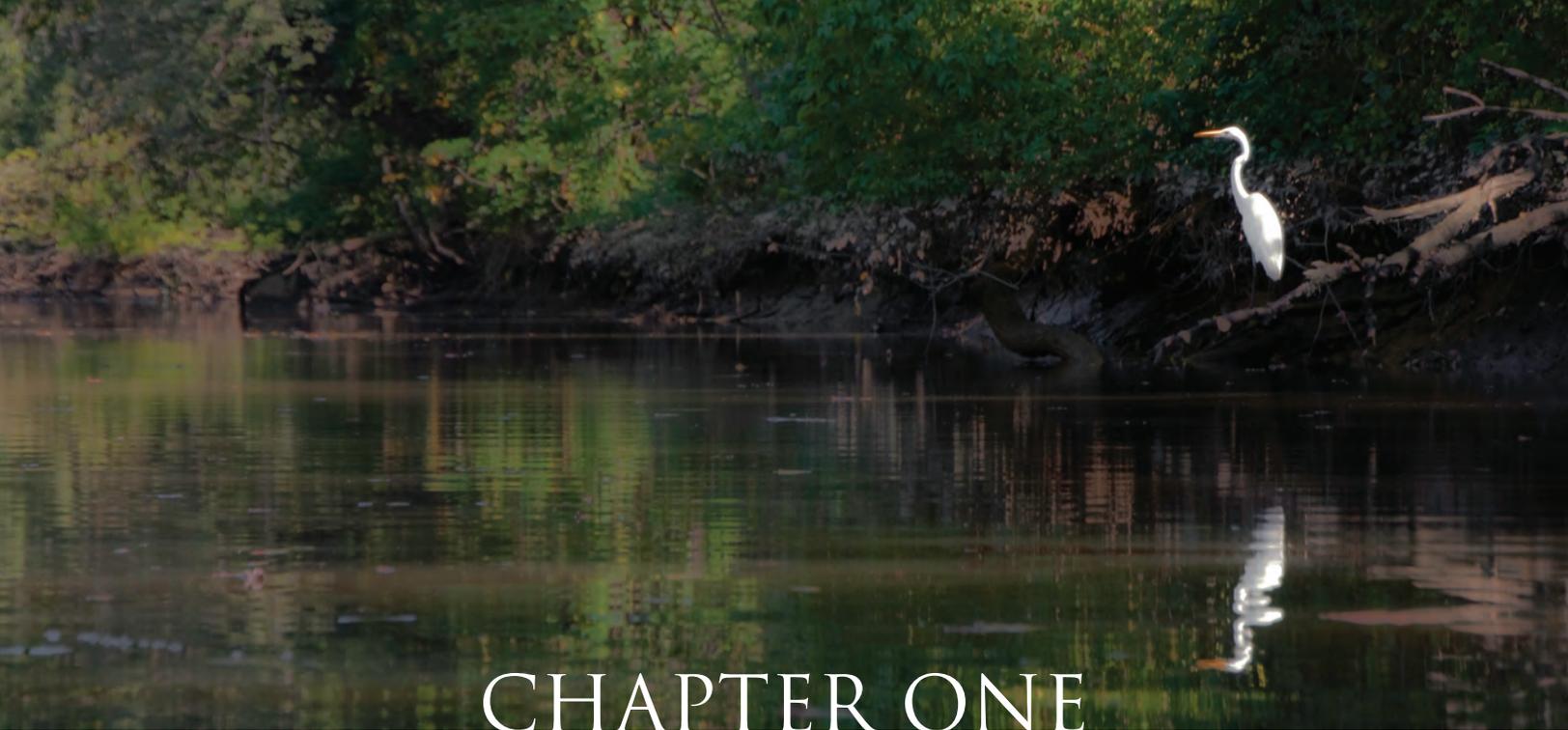
**Chapter Three** reviews clean-up obligations that currently exist through federal, state, and local laws and initiatives, outlining the progress that the current regulatory framework will make toward addressing major pollution sources.

**Chapter Four** explains why the current clean-up effort is insufficient to achieve a healthy Anacostia River. It assesses the limitations of current regulatory clean-up obligations and identifies additional regulatory, institutional, and financial problems that must be addressed in order to clean up the Anacostia within a reasonable timeframe.

**Chapter Five** makes key policy recommendations for accelerating the Anacostia River's restoration. It recommends that the federal government establish an urban river pilot program for the Anacostia watershed. It lays out a potential pilot program by recommending specific actions that the federal government should take in concert with local watershed jurisdictions to hasten remedial activities among the watershed's public and private stewards. It also suggests mechanisms for funding clean-up activities in this time of budget austerity.

Cleaning up the Anacostia River will be a long-term endeavor because we must repair over 300 years of environmental damage committed without regard to costs for future generations. Costs for the clean-up will not and should not rest with a single entity, but will be borne by the federal government, local governments, and the private sector. Currently, these entities are all making financial commitments to the Anacostia's clean-up. Yet, we estimate that a reasonable acceleration of the Anacostia's clean-up would require an annual public investment of federal and local funds totaling \$115 million over the next 15 years to implement the Anacostia Restoration Plan. Incentives to mitigate stormwater pollution from private property could result in foregone federal tax revenue in the order of \$30 million annually over the next 15 years.

As this report demonstrates, however, the Anacostia clean-up is an investment that will yield substantial environmental and economic returns for the watershed. Through targeted investments in the key clean-up efforts discussed in this report, the River's stewards could accelerate the pace of the Anacostia's restoration while reaping the rewards that will come from a cleaner River and greener watershed. Equally important, by serving as an urban river pilot project, this Anacostia River restoration could help perfect more cost-effective ways to clean up other degraded urban rivers in the United States.



# CHAPTER ONE

## A VISION FOR A REVITALIZED ANACOSTIA WATERSHED

*“The promise of a great river does run through Washington, but the Anacostia’s ecology and natural beauty must be restored to bring people back to its shores.”*

Anacostia Waterfront Initiative Framework Plan

Right now, far too few of the region’s residents have ever been to the banks of the Anacostia River, let alone used or enjoyed it. In fact, many residents’ only interaction with the River is driving over it on their way in and out of the District of Columbia.<sup>22</sup>

Yet the Anacostia River and its stream network is an important natural resource in an extraordinary location, one that can provide the setting for a variety of recreational and entertainment opportunities, a unique haven for fish and wildlife, a natural respite from the congestion of urban life, and a focal point for community revitalization and investment throughout the watershed. This vision is encapsulated by the Anacostia Waterfront Initiative (AWI)—a nationally recognized planning effort aimed at transforming the Anacostia River, its shoreline, and its communities—launched a

decade ago by the District of Columbia and the federal government.<sup>23</sup> A cleaner Anacostia River is central to transforming this vision into a reality. In addition to improving the waterfront, the process of cleaning up the Anacostia will provide economic and community benefits to neighborhoods and residents throughout the watershed.

### Reclaiming the River as a Resource

For over two decades, federal and local government agencies, nongovernmental organizations, and watershed residents have worked to restore the Anacostia. While these groups use different indicators to measure progress, a River healthy enough to be used and enjoyed by residents and visitors alike is widely recognized as the main mark of a successful Anacostia restoration effort.<sup>24</sup> Restoring the Anacostia to

a “swimmable and fishable” condition has been maintained as the ultimate restoration goal by the federal and D.C. governments, as well as by community and environmental advocates.<sup>25</sup> Transforming the Anacostia into a swimmable and fishable River will require a highly prioritized, resourced, and coordinated effort from those responsible for the Anacostia’s stewardship throughout the watershed—the federal government, the State of Maryland, Montgomery and Prince George’s Counties, the District of Columbia, local sewer utilities, and private property owners. Making the River clean enough to support subsistence fishing is a long-term endeavor. However, with the level of investment called for in this report, there is the potential to restore the Anacostia to the level necessary to support water and shore-based activities, including periodic swimming, by 2025, 42 years *after* the CWA’s target date.<sup>26</sup>

## Improved Shore-based Recreation and Entertainment

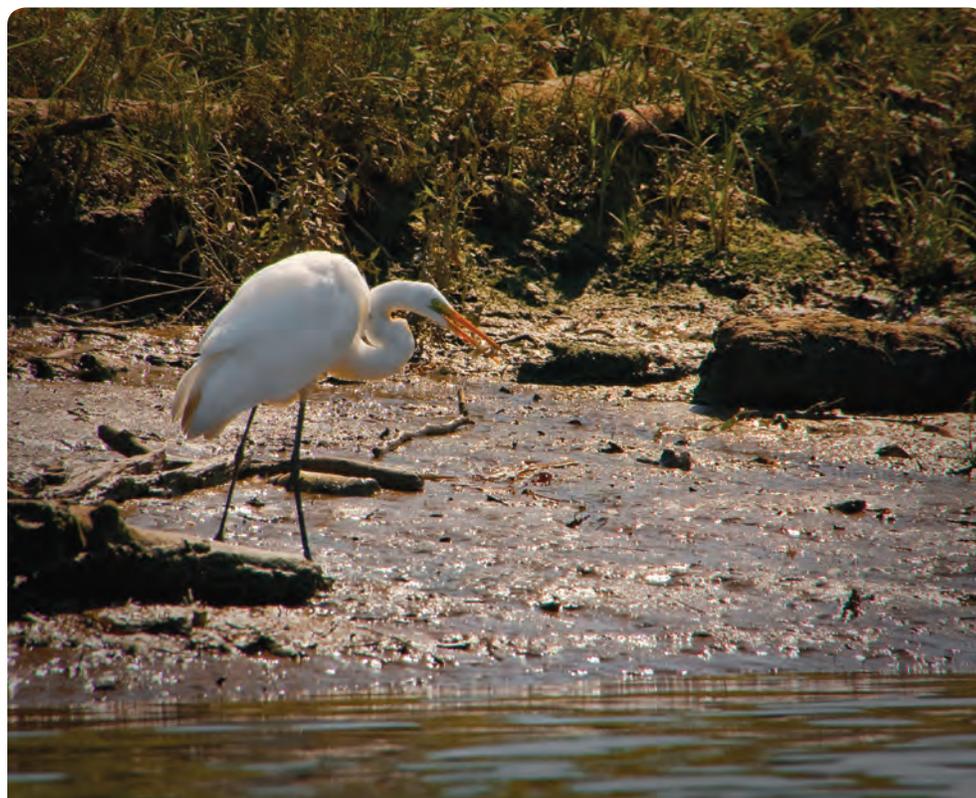
The AWI framework plan states that the waterfront presents an unprecedented opportunity to “attract Washington’s 20 million annual visitors off the Mall and to the water,” through the development of waterfront sites for museums, concert venues, fairs, and commemorative places.<sup>27</sup> The plan calls for waterfront parks, including cultural spaces with amphitheatres, gardens, festival grounds, recreation centers, and gathering spaces and plazas. It also calls for the development of 20 miles of new, continuous bicycle



Photo credit: Anacostia Watershed Society

and pedestrian trails along both banks of the River, some of which have already been built, with the potential to connect to trails in Maryland. Indeed, a cleaner and more attractive Anacostia watershed connected by trails could draw tourists to places of historic interest and natural beauty, such as Fort Dupont Park, Bladensburg Waterfront Park, and Montpelier Mansion.

In order for trails, parks, and cultural venues along the waterfront to be attractive, the Anacostia River must be largely free from trash and debris and must have far better water clarity.<sup>28</sup> Shore-based recreation and entertainment will also be more enjoyable without the foul odor produced by combined sewer overflows after storms.



**The Anacostia River supports 188 species of birds, such as these egrets.**

Photo credit: Derek Parks for Anacostia Watershed Society

## Safer and Better Boating

The Anacostia River currently is used for boating, but this capacity remains very much underutilized. The west side of the lower Anacostia hosts a few marinas and boat clubs, and more are planned for future developments. Accordingly, the AWI framework plan calls for new boat landings and rental concessions to expand opportunities for canoeing, kayaking, and paddle boating.

Boating on the Anacostia will be more appealing and safer when the River is free of navigation obstructions like large clusters of trash and debris, and when health risks posed by high bacteria levels are mitigated.<sup>29</sup>

## Natural Refuge for Fish, Wildlife, and People

The Anacostia River, its streams, and its banks can provide a refuge for fish, wildlife, and people who want respite from the congestion of city life. Those visiting the Anacostia's upper banks can still catch glimpses of the Anacostia's former natural beauty. The River is home to numerous species of birds, including great blue herons, bald eagles, ospreys, and red-tailed hawks, as well as a variety of fish, from white perch to largemouth bass. However, the River's extensive pollution, combined with the depletion of natural bank-side habitats like wetlands and forests, have harmed the health of fish populations and have left birds, mammals, and other wildlife with significantly diminished habitat.<sup>30</sup> The Anacostia will be restored as a thriving wildlife habitat when its pollution levels are low enough to support stable and healthy fish and animal populations. Restoring the Anacostia as a haven for native wildlife will require a significant reduction in stormwater pollution throughout the watershed and restoration of natural habitats.

## A Swimmable and Fishable River

Reestablishing the Anacostia as safe for swimming and subsistence fishing will be the capstone of the restoration effort. In order for the River to be safe and suitable for swimming, its levels of trash, debris, oil and grease, dissolved nitrogen and other nutrients, excess sediment, and, most critically, pathogens and bacteria from waste and organic matter in the water must be diminished. Improving the Anacostia's water conditions to the point that it can support safe swimming will require a substantial reduction in stormwater runoff throughout the watershed and the virtual elimination of sewer overflows.

Even when the Anacostia becomes swimmable, consumption of the Anacostia's fish will not be safe until toxic contaminants from historical sources are addressed. These "legacy" toxics have accumulated in the Anacostia over time and continue to be present at alarming levels even though most are no longer used in production or human activities.<sup>31</sup> In order for the River's fish to become safe for consumption, the Anacostia's legacy toxics must be remediated.

## Benefits to Communities Throughout the Watershed

The benefits of Anacostia restoration will not stop at the River's edge. Benefits also will flow to communities throughout the 176 square-mile Anacostia River watershed. For decades, the Anacostia River has been recognized as a geographic marker of Washington's economic divide. Neighborhoods east of the Anacostia River are home to some of the region's poorest residents. In 2009, median household income in the District's neighborhoods east of the Anacostia River (\$30,700) was less than half that of the D.C. metropolitan region, and the poverty rate (34 percent) was four-and-a-half times the region's rate.<sup>32</sup>

The Anacostia watershed as a whole, including parts located in Prince George's and Montgomery Counties, reflects the prosperity of the Washington region to a greater extent than D.C.'s neighborhoods east of the Anacostia River, and the Washington region has weathered the current recession better than many other major metropolitan areas. Nonetheless, some of the region's communities that were hit hardest by the recession are located in the Anacostia watershed. In 2009, the unemployment rate among working-age adults in the Washington region on the whole was approximately 7 percent.<sup>33</sup> By contrast, some areas in or near the Anacostia watershed (located in the eastern half of D.C. and inner-beltway Prince George's)—had unemployment rates at 11 percent or higher in 2009. And the unemployment rate among working-age adults in D.C. east of the Anacostia River was an astonishing 23 percent in 2009. Although the Washington area's foreclosure rate in June 2009 was 2.7 percent, the region's communities with the highest foreclosure rates (ranging from 7.4 to 9.3 percent)—Bladensburg, Riverdale, Adelphi, and Brentwood—are all located in the Anacostia watershed.<sup>34</sup> In short, although the Anacostia watershed as a whole shares in the region's prosperity, parts of the watershed suffer from inequities that have long plagued the Washington area.

These disparities are reflected in the condition of Washington's two rivers: the Potomac River, called a national disgrace by President Lyndon B. Johnson in 1965,<sup>35</sup> now represents environmental progress;<sup>36</sup> by contrast, the Anacostia River continues to serve as a symbol of distress. Yet the "greening" of the Anacostia watershed holds the potential to help drive the region's future growth. A healthy River—along with the green infrastructure investment throughout the watershed that will be necessary to achieve it—will foster job creation and economic development in the watershed, attract investment to watershed communities, and provide opportunities to ameliorate Washington's divide.

As this report describes in later chapters, cleaning up the Anacostia River requires the greening of communities throughout the watershed. EPA is promoting green infrastructure as a primary solution to urban and suburban stormwater pollution—the Anacostia's primary stressor. EPA explains that,

*at the site scale, green infrastructure mimics natural systems by absorbing stormwater back into the ground (infiltration), using trees and other natural vegetation to convert it to water vapor (evapotranspiration) and using rain barrels or cisterns to capture and reuse stormwater. These natural processes manage stormwater runoff in a way that maintains or restores the site's natural hydrology. Site-level green infrastructure is also referred to as low-impact development or LID, and can include rain gardens, porous pavements, green roofs, infiltration planters, trees and tree boxes and rainwater harvesting for non-potable uses such as toilet flushing and landscape irrigation.<sup>37</sup>*

Accordingly, as this report will demonstrate, solving the Anacostia's stormwater problem will require developing, redeveloping, or retrofitting much of the Anacostia watershed—including the portion in Maryland—with green infrastructure to drastically reduce stormwater runoff. In addition, one of the key findings of this report is that regular maintenance of green infrastructure—and sufficient funding for such maintenance—will be essential if this approach is to succeed.

A cleaner Anacostia and greener watershed will yield economic benefits. The economic benefits of a cleaner River are relatively clear and concrete for communities on or near the River—waterfront development, community investment, new jobs, better neighborhood amenities in adjacent neighborhoods, and expanded recreational areas along the

River. Yet the benefits of a cleaner Anacostia are not limited to the waterfront. Widespread installation of green infrastructure throughout the watershed will also yield concrete economic benefits to upstream communities.

While economic growth and development are important benefits of green infrastructure investment, it is impossible to predict the dollar amount of economic development or percentage of economic growth that will flow from the wide-scale implementation of green infrastructure throughout the Anacostia watershed. Experience in other regions, however, does allow us to say with confidence that economic development will flow—both directly and indirectly—from encouraging or requiring investment in green infrastructure:<sup>38</sup> new requirements and incentives for green infrastructure will create jobs; there will be growth in new businesses (and thus new jobs) to meet the demand for products and services to install the green improvements; and innovative businesses will be attracted to the region by its new green image.

Equally important, a healthy Anacostia River and greener watershed also will improve the quality of life for those who live in the watershed, and restore the River as a source of community pride. The Anacostia River has long served as a national symbol of the neglect too often experienced by our country's urban communities. In addition to creating jobs and bringing investment to neighborhoods near the River and throughout the watershed, the Anacostia clean-up will provide these communities with green spaces, new recreational opportunities, and the opportunity to fully enjoy and use the River and its streams.

## Enhanced Economic Development and Investment Opportunities

### Revitalizing Washington's Waterfront Communities

The Anacostia waterfront is positioned to capture much of the District of Columbia's growth and redevelopment over the next two decades, and a cleaner Anacostia River is at the heart of the waterfront's revitalization. With downtown and western portions of the city virtually built out, development in the District has started to move eastward toward underutilized pieces of land near the Anacostia River. The District has made substantial investments to transform once distressed blocks near Metro stations (Columbia Heights, Chinatown/Gallery Place, and New York Avenue, to name a few) into highly desirable, regional destinations—a trend that could move eastward toward the Anacostia. There are six Metro stops within walking distance (1/2 mile) of the Anacostia

## The Capitol Riverfront Neighborhood and Yards Waterfront Park

Development in the Capitol Riverfront neighborhood, which is anchored by the Navy Yard Metro station, is the first development to emerge from the Anacostia Waterfront Initiative, and clearly demonstrates the potential for transit-oriented, sustainable development on the Anacostia's banks. The neighborhood is the result of \$1.2 billion in public investments matched by \$1.8 billion in private investments. This investment will be matched in the future by \$7 billion in private investments or planned commitments. Over 10 million square feet of new office, retail, residential and hotel space has been constructed or planned for the neighborhood, along with 1,400 new affordable housing units. Development underway will result in waterfront parks, including the first fixed pier structure in D.C. since urban renewal, biking and jogging trails, and an outdoor venue for movies or concerts accommodated by an amphitheater.

The neighborhood's new tenants also showcase development practices that protect the natural environment and the River. The neighborhood is home to: the Nationals' baseball stadium, the first LEED-certified ballpark in the nation; the federal Department of Transportation headquarters, which boasts the city's largest green roof (65,000 square feet); and buildings and parks that use green infrastructure to reduce stormwater pollution—the Anacostia's primary stressor.



Photos of the Yards Waterfront Park

The Yards, the Capitol Riverfront's centerpiece development, is a mixed-use project that will eventually include 1.8 million square feet of office space, 2,800 residential units, and 400,000 square feet of retail space. The Yards Park along the water's edge will be at the heart of the new neighborhood, and is a prime example of how the Anacostia will be used as a focal point for waterfront recreation and development. The park was developed through a public-private partnership of Forest City, the U.S. government, and the District of Columbia. Opened in September 2010, the park includes grassy areas, a terraced performance venue, a waterfall and canal-like feature, and a riverfront boardwalk. The park's developers aimed to create a popular destination that will draw visitors to the Anacostia Riverfront.

The park also helps protect the Anacostia from stormwater pollution through the use of green infrastructure. Forest City designed The Yards Park with planter boxes that capture the first inch of stormwater runoff from three streets. The Development Manager for Forest City believes that a cleaner River will make the park and the surrounding neighborhood more desirable, potentially improving opportunities to lease nearby apartments and offices.



Sources: Gov't of the Dist. Of Colum.,  
Anacostia Waterfront Initiative: 10 Years of Progress (2010).  
Capital Riverfront BID website,  
<http://www.capitolriverfront.org/go/the-yards-park.com>

Photo credits: Joe Mauro



## Map 2 Metro Stations in the Anacostia Watershed

Source: D.C. GIS Data Catalog, Metropolitan Washington Council of Governments

clean. A waterfront café is more charming if the passing breeze doesn't carry an odor from nearby sewer outfalls. And a waterfront pier with boating and fishing venues is a more attractive prospect without signs warning users against direct contact with the water. As illustrated by these examples, a cleaner Anacostia will enhance the economic development planned for the shorefront.

### Enhancing Investment Opportunities Throughout the Watershed

Many of the Anacostia watershed communities in the District and in Maryland are not at the River's edge and will therefore not have the same waterfront redevelopment opportunities as the District's waterfront areas. However, a cleaner Anacostia River and stream network—and in particular the large-scale implementation of green infrastructure throughout the watershed necessary to restore it—will create more attractive economic development opportunities in communities throughout the watershed while protecting the River and its streams from further degradation.

The Anacostia watershed contains nine of Prince George's County's 15 Metro stops, some of which are the Washington region's best candidates for future transit-oriented development. Of the nine stations in the watershed, three—Greenbelt, Cheverly, and New Carrollton—have a significant amount of undeveloped land adjacent to or surrounding them, and are therefore prime candidates for transit-oriented development.<sup>41</sup> An additional three Metro stops—West Hyattsville, Addison Road-Seat Pleasant, and Landover—have a significant amount of underutilized space nearby that could be used for a variety of different development opportunities.<sup>42</sup> The prevalence of undeveloped land and underutilized space poises the Metro station areas in the Prince George's portion of the watershed to capture a good deal of the region's future growth, particularly if development is attractive and cutting-edge.<sup>43</sup>

Investment in the Anacostia watershed's green infrastructure can enhance these development opportunities by promoting the area's environmentally sustainable image.<sup>44</sup> When state and local governments invest in green infrastructure and watershed restoration, they demonstrate to businesses that they are forward-thinking. Further, it sends a signal to businesses seeking to relocate that the government will

River: Navy Yard, Stadium/Armory, Potomac, Deanwood, Minnesota Avenue, and Anacostia; the latter three stations are located on the Anacostia's east bank, and land near these Metro stops is underutilized (*Map 2: Metro Stations in the Anacostia Watershed*).

The Anacostia Waterfront Initiative provides the framework for the redevelopment of neighborhoods near these Metro stops on both banks of the River. In addition to the trails, parks, cultural venues, and boating opportunities described in the previous section, the AWI framework plan outlines several economic development initiatives. They include 15,000 to 20,000 new housing units, new mixed-use neighborhoods, and over 20 million square feet of commercial, retail, and service-oriented space. In order to ensure that current residents benefit from this economic development, D.C. law requires that 30 percent of all new housing units be affordable and 51 percent of all new jobs created by AWI projects be filled with D.C. residents, with a preference for 20 percent of those jobs to go to residents who live in Ward 8—the city's highest-poverty ward, east of the Anacostia River.<sup>39</sup>

The success of the Anacostia waterfront's development will hinge on its ability to deliver a unique experience to those who live, work, and play there—and such experiences are inherently tied to the appeal of the River itself.<sup>40</sup> A building with a waterfront view is more appealing if the River looks

maintain a high quality of place for businesses and residents. Watershed restoration enhances natural amenities, thereby making a location more attractive for businesses and their employees.<sup>45</sup> Many businesses want to be associated with green practices, which are currently seen as innovative and progressive, and therefore wish to locate in a place that has invested in green infrastructure. New green investment in the watershed not only will bring jobs, but may also attract new residents who buy and furnish homes, an important driver of economic growth, and an important source of neighborhood revitalization in communities that have been impacted by the foreclosure crisis.

## Jobs and Business Opportunities for Watershed Communities

Economic development flowing from the Anacostia restoration will also occur through increased job and business opportunities. By requiring or encouraging investment in green infrastructure, the restoration would generate construction and landscaping jobs. In addition, by generating demand on an ongoing basis for the products and services necessary to install and maintain the green infrastructure improvements, river restoration will attract business to the area—and will entice entrepreneurs to start new businesses—to cater to that demand, and these new businesses will bring new jobs.

A substantial number of jobs will likely be directly generated by a wide-scale, green infrastructure retrofit of the watershed. The U.S. Green Building Council (“USGBC”) estimates that between 2000 and 2008, green construction spending alone directly supported 2.4 million jobs nationwide. And it is estimated that green construction will directly support over 7.9 million jobs between 2009 and 2013.<sup>46</sup> While we cannot use these numbers to draw a precise estimate of the number of construction, landscaping, and related jobs that would be created by Anacostia restoration, the data clearly show that a substantial number of new jobs could be expected to flow directly from these green infrastructure investments.

In addition, for every job directly created by a green infrastructure investment, there would be even more jobs indirectly flowing from that investment.<sup>47</sup> To illustrate:

- “Direct effects” of a green infrastructure project include the initial economic impacts, such as the general contractor who oversees and constructs the project and the workers the contractor employs.<sup>48</sup>

- “Indirect effects” of the same project include the secondary economic impacts, such as the general contractor purchasing more supplies from greenhouses and permeable pavement companies, which then hire more workers to handle the increased business.
- “Induced effects” are the tertiary economic impacts, such as the employees of the general contractor, the greenhouse, and the permeable pavement company using their additional income derived from the green infrastructure spending to purchase products and services, from food to healthcare.<sup>49</sup>

The Political Economy Research Institute at the University of Massachusetts-Amherst conducted a study on how traditional infrastructure investments support the economy, and calculated how many direct, indirect, and induced jobs would be created per \$1 million investment in different sectors. Even though this study focused on traditional infrastructure, two examples seem the most analogous to the type of green infrastructure investments this report recommends:

- Every \$1 million investment in reforestation, land and watershed restoration, and sustainable forest management resulted in 17.55 direct, 12.95 indirect and 9.2 induced jobs, for a total of 39.7 new jobs.<sup>50</sup>
- For every \$1 million spent for building retrofits, 7.7 direct jobs, 4.7 indirect jobs and 4.96 induced jobs were created, for a total of 17.36 new jobs.<sup>51</sup>

Another study by the University of Oregon focused directly on contracting for forest and watershed restoration projects, and found that for \$1 million invested, about 15.7 jobs could be created, including direct, indirect, and induced jobs.<sup>52</sup> While these are, of course, only rough analogies, these studies make clear that the green infrastructure investment required to clean up the Anacostia could be expected to create substantial job opportunities in the Anacostia watershed and throughout the Washington metropolitan region.

Residents in the watershed will benefit from the types of jobs these projects would generate, as they would be at all skills levels, from civil engineers, to ecologists, to landscape designers, to the laborers planting trees or constructing roadside swales to collect and filter storm water runoff.<sup>53</sup> Green infrastructure projects could create opportunities for less-skilled, low-income residents to move out of poverty<sup>54</sup>

*“Sustainable properties are the future of the real estate industry. Consumer demand, residential builders, federal government incentives, and local government policy are making this happen.”*

Green Resource Council of the National Association of Realtors

through career ladders that connect entry-level landscaping and restoration jobs to middle-skill jobs that require more than a high school education yet less than a four-year college degree.<sup>55</sup> With training programs and appropriate support services, which are available in the Anacostia watershed and throughout the Washington metropolitan area, these career opportunities would be within reach for the watershed's less-skilled and low-income residents. Significantly, these jobs also have long-term potential. For example, jobs that include the initial design and installation of green infrastructure projects, such as green roofs and permeable pavements, also include continuing operation and maintenance of this infrastructure. These new career opportunities could lead to an increased economic vitality and improved quality of life in watershed communities.

In addition, investment in green infrastructure would create new business opportunities. Businesses would start or expand to respond to the substantial demand for products and services necessary to install and maintain green improvements, both for commercial properties and for homes. This demand would attract suppliers and businesses that specialize in green products and services – and they would bring jobs. Existing construction, building/home supply businesses, and landscaping companies in the region would expand their inventory and services – and their payrolls – to meet the new demand. This has been the case, for example, with solar panel manufacturers, who, with the incentives programs that have popularized solar panels and raised public awareness of the benefits of the alternative energy source, can barely supply the burgeoning demand.<sup>56</sup> A spokesperson for Sanyo North America Corporation, an Oregon supplier of green technology, recently stated, “We’ve been doing all we can to expand our facilities and bring production closer to our markets.”<sup>57</sup> The Arizona-based company, First Solar, which also produces solar panels, announced that it could not produce enough units to meet demand in 2010.<sup>58</sup> It is clear that the market for certain green goods and services has ample demand that leads to opportunities for businesses.

The increased demand for goods and services in the green sector – and, in particular, green infrastructure – also helps to foster entrepreneurship, which is central to healthy economic growth in today’s economy, and which in turn creates more jobs.<sup>59</sup> Encouraging green infrastructure creates new niches, new demand, and new industries to supply those needs, many of which may involve small business owners and workers in creative sectors.<sup>60</sup>

### Increased Land and Property Values

Property values are derived from a multitude of local, regional and national factors – including the size and features of the property, the perceived desirability of the property and the area in which it is located, the property’s aesthetic appeal, the quality of the local school system, proximity to public transportation, the nearby economic infrastructure, the strength of the regional economy, and the national economic outlook, to name a few. Isolating and assessing the effect of green infrastructure improvements on residential and commercial property values in the Anacostia watershed is, therefore, necessarily a speculative undertaking. It seems clear, however, that green infrastructure projects would have a positive effect on property values – at a minimum, they improve the aesthetic appeal of the property on which improvements are made, and prevent property damage and erosion that result from heavy rainfall and poor drainage systems. As the Anacostia watershed is greened, over time the aesthetic appeal of entire neighborhoods, and even the entire region, will be enhanced – which in turn will positively affect property values throughout the region.

Even though quantifying an increase in property value is a difficult exercise, several studies provide some guidance. A study by St. Mary’s College of Maryland and the U.S. Department of Housing and Urban Development of 1,400 home prices in southern Maryland’s St. Mary’s River watershed is particularly useful. This study looked at a variety of pollution sources including stormwater runoff and found a

decrease in property values when water pollution, including sediment and nitrogen, increased.<sup>61</sup> The study found that home values decreased \$1,086 for every milligram per liter increase in total suspended solids (sediment) and decreased \$17,642 for every milligram per liter increase in dissolved inorganic nitrogen.<sup>62</sup> If property values decrease as these pollutants increase, then values should be positively affected when these pollutants are reduced. The study's conclusion that ambient water quality within a local watershed can significantly influence residential property values, even when 98 percent of the homes analyzed were not waterfront properties, strongly supports the conclusion that Anacostia clean-up will translate to increased property values across the entire Anacostia watershed.<sup>63</sup>

In addition, green infrastructure improvements will result in increased tree cover, the use of rain gardens, and other bioretention techniques that make use of vegetated rather than impervious surfaces. Several studies have found property value increases associated with greener properties and neighborhoods with more tree cover:

- American and British studies have shown that good tree cover enhances the value of a home by 6 to 15 percent.<sup>64</sup>
- A study of Seattle's Natural Drainage System Program, which funded a series of green drainage projects starting in 2005, found that these kinds of green modifications can add up to 6 percent to the value of a property.<sup>65</sup>
- The National Resources Defense Council (NRDC) cites anecdotal studies indicating that real estate developers were able to sell residential properties developed with green techniques—such as vegetated swales rather than curbs and gutters—for more than similar properties without such improvements.<sup>66</sup>

We do not suggest that these kinds of green improvements in the Anacostia watershed necessarily would lead to property value increases of those percentages, because the studies are not sufficiently analogous to the conditions of the Anacostia watershed. Clearly, however, the studies show that green infrastructure improvements would increase property values.

Generally, green investments also would lead to more energy-efficient properties, which should, in turn, lead to a higher market value of properties, as shown by several studies.<sup>67</sup> A green roof, for example, allows property owners to increase the overall aesthetic desirability of their lot, adds a tangible amenity to the property, and improves the building's energy efficiency and the lot's air quality – all enhancements that should lead to an increase in the property's value. Higher property values would, of course, increase the tax base of the affected local jurisdictions. In that respect, the resources devoted by those jurisdictions, and the federal government, to the restoration of the watershed may be seen as an investment in the jurisdictions' future fiscal health.

## Avoided Costs

The benefits that flow from green infrastructure investment include the many costs that would be avoided as a result of reduced stormwater runoff. For example, one green infrastructure practice, water harvesting (capturing and storing rainwater onsite for future use), could avoid costs in four ways. First, the property owner who uses the rainwater for future non-potable purposes, such as watering a garden, saves on water costs. Second, by releasing less water into the public sewer system, the owner could incur lower sewer charges. Third, if many properties harvest rainwater rather than drawing water from the public water system, then the water utility is likely to incur reduced operating costs because it will be processing less water. Fourth, if the utility is processing less water, then it is likely to save over the long term because it will have lower maintenance costs and will be required to invest less in new infrastructure.



*Permeable pavers manage stormwater runoff in a parking lot.*

Photo credit: ©istockphoto.com/EKSpansio

## Edmonston Green Street

Located in Prince George’s County, Maryland in the Anacostia River watershed, Edmonston is one of the area’s lowest-lying communities. The town has suffered serious floods four times in the past decade — not from the Anacostia River, which runs through the town, overflowing its banks, however, but from stormwater runoff from parking lots, roads, and other impervious surfaces draining toward the River. The repeated flooding of Edmonston’s homes caused the relocation of families and extensive and expensive property damage. The town lobbied the county government to spend \$7 million to install a new pumping station and rebuild its traditional “gray” storm water drainage and control system. These experiences, however, taught the town and its mayor, Adam Ortiz, a valuable lesson about the need for sustainable development that reduces stormwater runoff. So when Decatur Street, the town’s main street, needed to be rebuilt, Edmonston decided to set an example and refurbish the street in a responsible, sustainable way, including “green” stormwater controls that would mitigate future flooding.

That decision resulted in the Edmonston Green Street Project, which was in part federally funded through the American Recovery and Reinvestment Act. Designed both to supplement the town’s use of more conventional flood control measures, and to implement sustainable development for its own sake, the Green Street Project

made use of specially landscaped areas along the street and permeable pavement that, together, absorb and filter 90 percent of the stormwater that otherwise would flow off of Decatur Street into the Anacostia. The project also includes increased tree canopy, wind energy powered street lighting, bioretention gardens and treeboxes, and utilizes recycled materials for the street and sidewalks. The green practices implemented on Decatur Street include many of those recommended in this report. Mayor Ortiz explained that once they determined to rebuild the street, the incremental cost of designing and building these green features was not significant.

According to Mayor Ortiz, construction of the Edmonston Street project created over 50 jobs. Significantly, 75 percent of the spending went to businesses within 10 miles of Edmonston, 60 percent of the contractors were minority-owned businesses, and all the materials purchased for the project were made in America. But there also were unique economic benefits associated with this green infrastructure project. For example, the town hired civil contractors and engineers that had never constructed stormwater bioretention and filtration systems or used certain sustainable building materials before. As Mayor Ortiz explained, however, the project “greened” these companies. Now these local companies have valuable and marketable expertise in implementing green infrastructure. Another novel economic benefit as a result of the green infrastructure is that the town plans to have “walking tours” that describe the environmental features of the street to educate residents, students, and the public, and are expected to increase foot traffic to the commercial businesses along the street. The town itself also expects to save money in the future through lower energy costs to light and maintain Decatur Street, lower flood control expenses, and, of course, avoiding the recovery cost of devastating floods.



Artist Rendering provided by the Town of Edmonston

A public dedication ceremony for the Decatur Street project was held on November 9, 2010. In a press release announcing his attendance at the dedication, United States Senator Benjamin Cardin said that “Decatur Street is now a showcase of best sustainability practices from across the country – from the tree canopy overhead to the storm water system underground... The reconstruction of Decatur Street will make a positive contribution to the regional environment, improving air quality, saving energy, and reducing water pollution to the Anacostia River and Chesapeake Bay.” In the same press release, United States Representative Donna Edwards stated, “Decatur Street is a great example of how the Recovery Act promotes environmental stewardship and job creation through green infrastructure and low impact development.” Other elected officials who spoke at the dedication ceremony echoed these thoughts, and also emphasized that the new Decatur Street is creating a stronger community and drawing green businesses to Edmonston.

The Green Street Project has already attracted new businesses to the town, such as the commercial urban farm ECO (“Engaged Community Offshoots”), seeking a community with the “right priorities.” Another “green” business is Community Forklift, a thrift store for sustainable building materials also located in the town. These businesses are attracted to Edmonston because they want to locate in communities that are receptive to green ideas, as those communities are where their customers are likely to live.

Although not yet realized in today’s difficult economy, property values along Decatur Street are expected to increase over time with the beautified roadway and the additional native tree canopy that was also a part of the project. According to Mayor Ortiz, property owners along the street have been caught up in the new “green” spirit and are making a concerted effort to “green” their properties, such as, for example, by working with the town to plant additional trees on their land. There is a raised “green conscience” among the Decatur Street residents, explained the mayor, with increased demands

*“Decatur Street is now a showcase of best sustainability practices from across the country – from the tree canopy overhead to the storm water system underground”*

United States Senator Benjamin Cardin

for recycling containers and a movement toward utilizing more wind power and other sustainable practices. Finally, Mayor Ortiz was very pleased to see a new community spirit in the Decatur Street neighborhood — many more people on the street walking, jogging, and biking; neighbors getting to know each other better; and an increased sense of community identity and pride in the neighborhood. As 12 year-old Stephanie Duarte, a member of the Green Team, a group of residents who helped get the project completed, explained at the dedication ceremony, “I’m so amazed to have a safe community with speed bumps, bicycle lanes and wider sidewalks... Now my friends and I can play outside without any danger.”

Photo credits: Town of Edmonston





Photo credit: Bruce McNeil for Anacostia Watershed Society

To take another example, green infrastructure components in a building have an insulating effect that reduces energy costs. As previously explained, green infrastructure elements such as green roofs, increased green surface, more tree cover, and the like directly reduce building energy use. The U.S. Department of Energy and EPA, which jointly administer the ENERGY STAR program, find that one of the strongest selling points for green construction is the reduced operating costs from increases in energy efficiency.<sup>68</sup> EPA's ENERGY STAR program and the U.S. Green Building Council's (USGBC) LEED program, both of which support green construction, have shown significant overhead cost reductions and improved energy performance in green buildings. In fact, a recent USGBC report estimated that from 2000-2008, green construction and renovation generated \$1.3 billion in energy savings.<sup>69</sup> Because many of the green interventions discussed in this report are also part of the ENERGY STAR and LEED strategies, some of the same benefits could be expected to accrue.

To take just one example of green infrastructure, green roofs provide better insulation than conventional roofs, reducing the solar radiation that reaches the surface of the roof, and lowering surface temperatures because of evaporative cooling. Models of the impact of green roofs on office building energy consumption show a 2 percent decrease in electricity consumption in Chicago and Houston, a 9 percent decrease in natural gas consumption in Chicago, and an 11 percent reduction in natural gas consumption in Houston.<sup>70</sup> Although the net cumulative energy cost savings over the

life of the initial Anacostia green infrastructure investment cannot be quantified at this point in the process, these data suggest quite clearly that this category of avoided cost is likely to be substantial.

In the same vein, widespread green infrastructure practices also are likely to reduce the urban "heat island" effect, which in turn also would reduce overall energy costs.<sup>71</sup> For example, one study conducted a simulation that found a reduction of 1.4 degrees Fahrenheit in the heat island differential based on greening 50 percent of the available flat roofs in New York City.<sup>72</sup> A reduction of the heat island effect in the Anacostia watershed of a similar magnitude would likely generate considerable reduction in aggregate energy costs over the life of the green infrastructure investment.

Of course, there are many categories of avoided costs for which the savings are likely significant, but essentially unquantifiable, due to the lack of data. For example, reduced stormwater runoff would result in fewer and less severe floods and therefore less flood damage. Allowing rainfall to infiltrate the ground where it falls (rather than running off into the river and eventually the ocean) would enhance groundwater recharge, potentially reducing the cost of obtaining water for irrigation and potable uses. It also would result in reduction in health care costs due to improved water and air quality. These avoided costs unquestionably would be substantial – but are impossible to quantify for the Anacostia project specifically.

## Improved Quality of Life

Improved access to natural recreational amenities and green space will also improve the quality of life and place for watershed residents. Elements of green infrastructure, such as trees, waterways, gardens, parks, paths, accessible green roofs, and the like enable individuals to spend more time outdoors in natural surroundings. Increased interaction with nature has been shown to enhance people's overall enjoyment of their surroundings and overall sense of well-being.<sup>73</sup>

Additionally, concrete individual health benefits are associated with green infrastructure that brings green spaces close to home, including a decrease in respiratory ailments due to air quality improvements, a reduction in stress levels, and a lower incidence of heart disease and physical pain.<sup>74</sup> Put simply, individual residents are happier and healthier when surrounded by well-developed green infrastructure, as a number of studies have shown. For example, in a 2009 Dutch study, researchers identified a powerful link between green space and mental and physical health, and determined that the occurrence rate for a host of physical and mental diseases was significantly lower for those living in greener areas than for those living in areas with less green space.<sup>75</sup> The study indicated, for instance, that the prevalence of anxiety

disorders was 44 percent higher among people living in a residential area with 10 percent green space within a 1-kilometer radius of their homes than for those living in an area with 90 percent green space within the same radius.<sup>76</sup> The researchers also found that there were fewer cases of depression, heart disease, back pain, and asthma among those living in greener areas.<sup>77</sup> In Washington, D.C., chronic health conditions are more common among adults who live in neighborhoods located in the Anacostia watershed than in the western part of the city,<sup>78</sup> and green infrastructure could provide health benefits to these communities.

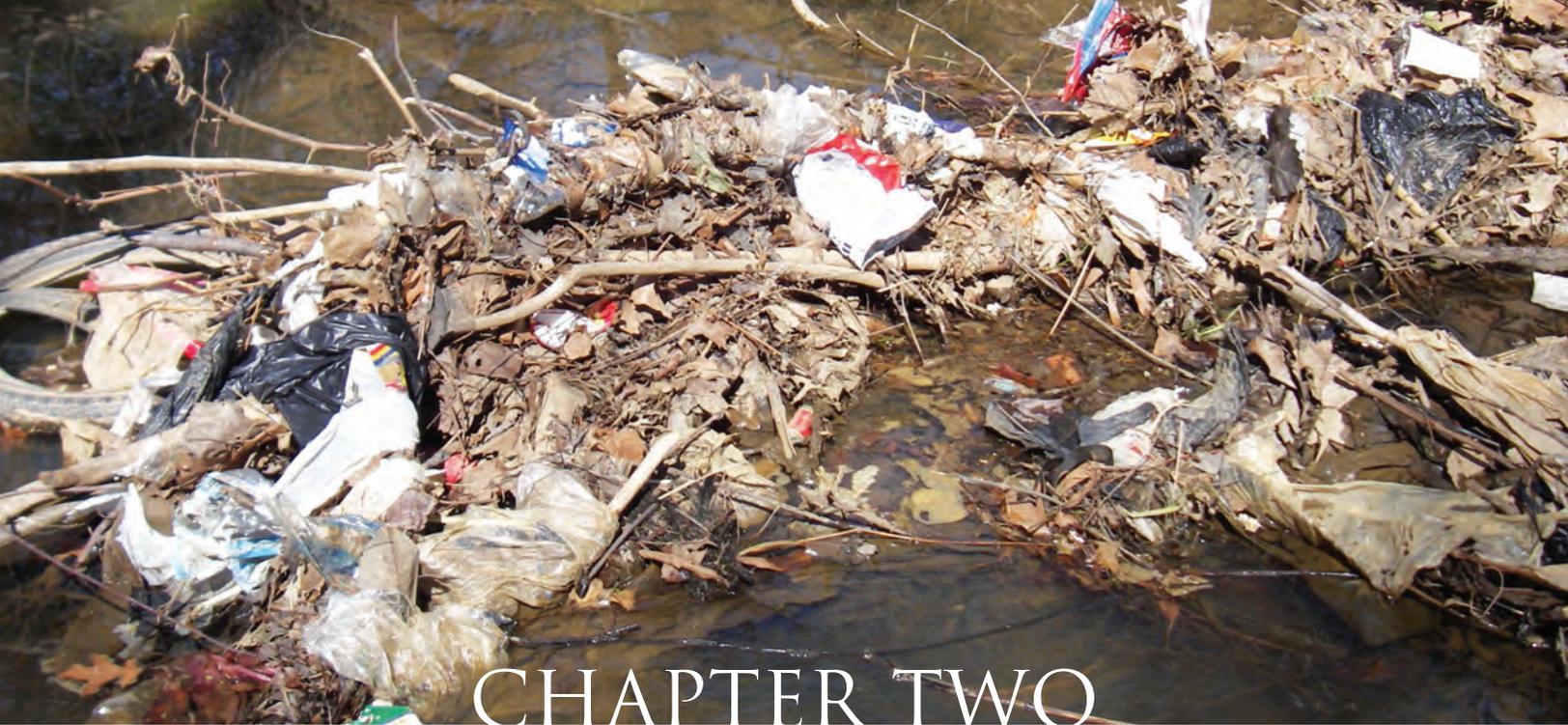
Moreover, the presence and development of green infrastructure can help to instill a sense of community among residents, and a sense of pride in the River and local streams. Green infrastructure provides a region with a unique identity.<sup>79</sup> As residents more keenly develop this sense of identity and become more engaged with the green infrastructure around them, they place a higher value on the green features of their community and are in turn more likely to care about the protection and maintenance of those features.<sup>80</sup> When jurisdictions invest in green infrastructure and watershed restoration, they send a signal to businesses and residents that they will maintain a high quality of life.

## Community Greenspaces Program – New Haven, Connecticut

Where community residents participate in developing green infrastructure from the outset, they have an opportunity to get to know their neighbors better, to experience an increased sense of community ownership, and to develop more pride in the neighborhood in which they live. This has been the experience, for residents of New Haven, Connecticut who have participated in the Community Greenspaces Program facilitated through a partnership between Yale University's School of Forestry and Environmental Studies and the non-profit organization, New Haven Urban Resources Inc. (URI). The Yale/URI program provides local residents with materials, hands-on training and technical advice in order to complete urban restoration/green infrastructure projects such as designing parks, planting trees and shrubbery and restoring streetscapes. One participant explained the community-building benefits of the project she worked on by stating that it, "brought neighbors into contact with each other who don't normally interact ... [and] brought about a cohesiveness that did not previously exist." This sense of community pride and investment can lead to more attractive neighborhoods, better schools, higher property values, and a more engaged and energized electorate and workforce – the building blocks of political and economic empowerment for a community.

Source: Community Greenspaces Program, Yale.edu, <http://www.yale.edu/uri/programs/greenspaces.html> (last visited Sept. 30, 2010).





## CHAPTER TWO

# THE ANACOSTIA'S POLLUTION PROBLEMS

*“The Anacostia River was once a major part of Washington’s natural and commercial lifeblood. Development of the national capital region, however, had a detrimental effect on the Anacostia River and its watershed.”*

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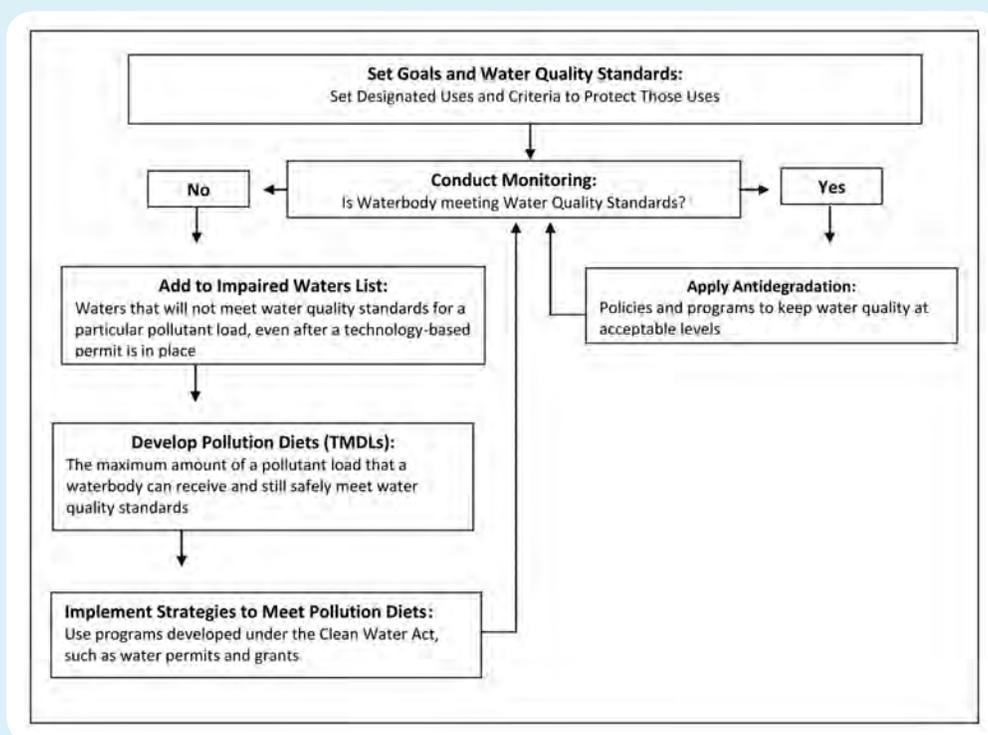
### Pollutants

The benefits of a clean Anacostia are currently unrealized due to high and varied pollution. The federal CWA establishes the basic structure for regulating surface water quality (*Figure 1. Overview of the Clean Water Act*). Under the CWA, activities like fishing, swimming, and boating, termed “designated uses,” are established for rivers and streams. Water quality standards are also set to establish the acceptable amount of pollution that can be present in a waterbody while allowing it to safely support its designated uses. Rivers and streams that do not meet these water quality standards are deemed “impaired.”

The Anacostia has long failed to meet several of its required water quality standards, and is therefore impaired. For a variety of pollutants, the amount currently in the Anacostia

and its tributaries exceeds the allowable amount, impeding the public’s ability to fully use, enjoy, and benefit from the River. Under the CWA, Total Maximum Daily Loads (TMDLs), or “pollution diets” have been established for the Anacostia watershed for pollutants described in this chapter.<sup>81</sup> Overall, the Anacostia’s pollution problems are exacerbated by the physical reality that the River is a slow-moving, shallow tidal estuary with very little present capacity to move trash, cleanse itself, or absorb excess pollutants like nutrients and sediments. Indeed, water in the tidal portion of the River moves very slowly, taking as much as 30 days to move from the head of the estuary near Bladensburg to the mouth of the River near Hains Point, and causing sediments from stormwater to deposit on the River bottom.

Figure 1. Overview of the Clean Water Act



## Trash

As one of the Anacostia's most visible pollutants, trash makes the Anacostia River and its banks unappealing for shore-based recreation, economic development, boating, swimming, and fishing. It also harms plants and animals, and can leach toxic materials.<sup>82</sup> Recent estimates suggest that, at least 600 tons of trash enter the Anacostia River each year.<sup>83</sup>

## Oil and grease

Prevalent in an urban and suburban environment, oil and grease from cars and other sources ends up in the Anacostia's waterways. Too much oil and grease creates an unattractive sheen on the River's surface, and is harmful to wildlife.<sup>84</sup>

## Excess sediment

Excess sediment—loose particles of clay, silt, and sand—makes the Anacostia appear murky, brown, and dirty. It covers wildlife habitat, clogs fish gills, suffocates fish eggs and insect larvae, and blocks sunlight from reaching aquatic vegetation.<sup>85</sup> Nutrients and chemicals also can bind to sediments and spread throughout the water. Approximately 50,000 tons of sediment enter the Anacostia each year.<sup>86</sup>

## Organic Matter and Biochemical Oxygen Demand (BOD)

Most aquatic animals depend on oxygen dissolved in the water for respiration. If there is too little dissolved oxygen in the water, fish and other marine creatures will die. While oxygen is replenished in the water from the atmosphere, this replenishment occurs most efficiently in cold, turbulent, fast-moving waters. The Anacostia is shallow, tidal, and slow-moving.

Organic matter discharged in water is consumed by microbial action, and that consumption in turn consumes dissolved oxygen in the water. The pollution potential of organic material discharged into water is often measured as biochemical oxygen demand or BOD. If too much organic matter is discharged too quickly for the microbial life in the water to consume it, as is the case when combined sewers overflow, the level of dissolved oxygen drops, sometimes to zero. The last documented fish kill occurred in the Anacostia in 2001.<sup>87</sup>

## Nutrients: Nitrogen and Phosphorus

Nutrients like nitrogen and phosphorus are common in fertilizers, human and animal waste, automotive exhaust, organic

matter, and soil.<sup>88</sup> Nitrogen oxide air pollution also acts as a nutrient. Excessive nutrients trigger algae blooms, which deplete oxygen, and, in turn, degrade aquatic habitats and make it difficult for plants and fish to survive. Algae blooms may become more common once sediments are reduced and water clarity improves.

## Bacteria

Indicated by high levels of enterococci bacteria, other bacteria, and other pathogens in the Anacostia can cause life-threatening human illnesses.<sup>89</sup> High levels of bacteria can pose a health threat to boaters, and are the main reason the Anacostia is not safe for swimmers.

## Toxics

The tidal portion of the Anacostia – the estuary – contains some sediment significantly contaminated with polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), some long-banned pesticides (chlordane, DDT, dieldrin), and some metals (copper, lead, and cadmium).<sup>90</sup> These are highly persistent pollutants, meaning they break down very slowly, over years or decades in the case of PCBs, or not at all in the case of metals. These pollutants also bio-accumulate, such that the levels found in fish and wildlife increase significantly up the food chain. Accordingly game fish and raptors (such as ospreys) can accumulate hazardous levels from diffuse concentrations in the environment. Because water in the tidal portion of the River moves very slowly, sediment from stormwater tends to deposit on the River bottom, and with it, toxic pollutants that are bound onto sediment particles.

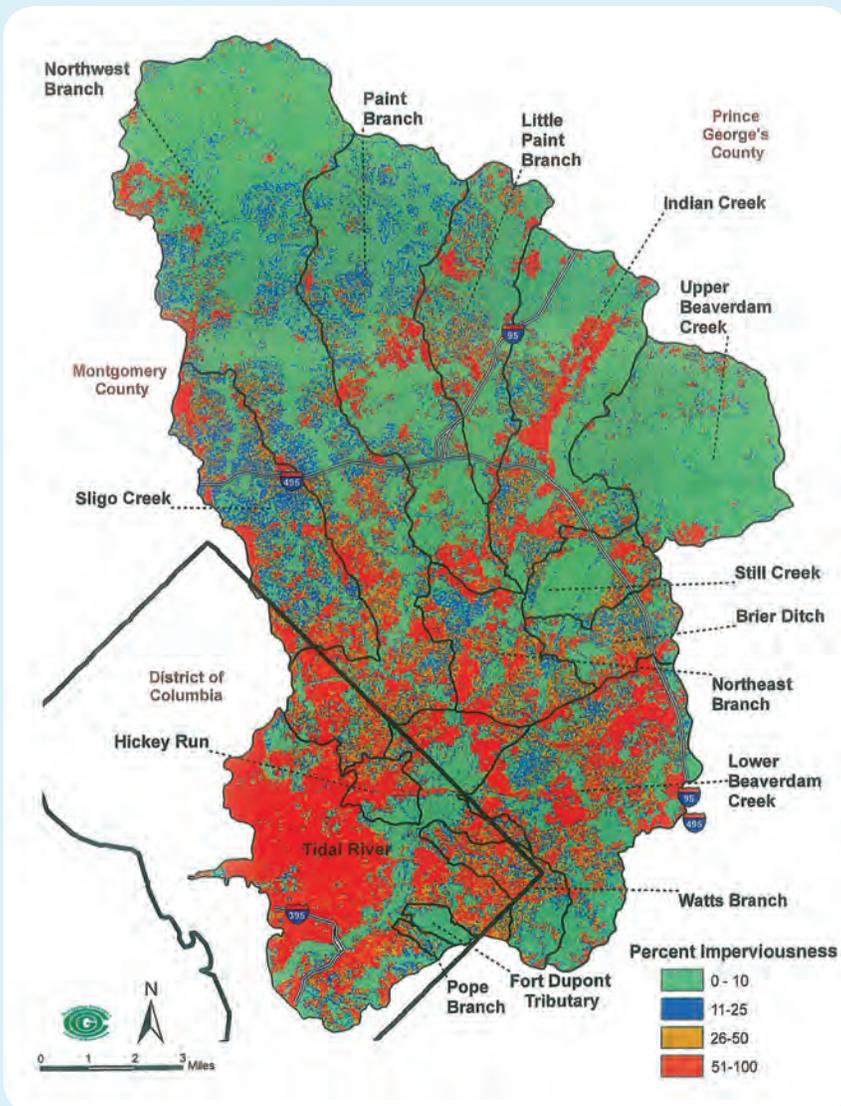
Bottom dwelling fish such as bull-head catfish in the Anacostia have an alarming tumor incidence; over half of these catfish showed liver tumors in a survey by the Fish and Wildlife Service.<sup>91</sup> Scientists say that even much lower tumor rates mean the water body is significantly impaired; the reported Anacostia rates are equivalent to the highest ever reported in the Great Lakes, where such surveys have been conducted for over 25 years.<sup>92</sup> Since 1989, the District has regularly issued public health advisories, warning people not to eat fish caught in the Anacostia.<sup>93</sup>

## Pollution Sources

There are three main sources of pollution in the Anacostia: 1) stormwater runoff, 2) inadequate sewer infrastructure, and 3) historic sources of legacy toxics. Any concerted effort to clean up the Anacostia must address these three sources of pollution.

**Map 3 Impervious Surface Cover in the Anacostia Watershed**

Source: Metropolitan Washington Council of Governments



## Stormwater Runoff

Stormwater runoff is one of the Anacostia's biggest pollution sources, and carries every kind of pollutant at issue into the River. Stormwater runoff is a result of the Anacostia watershed's high level of urban and suburban development and its lack of stormwater controls.

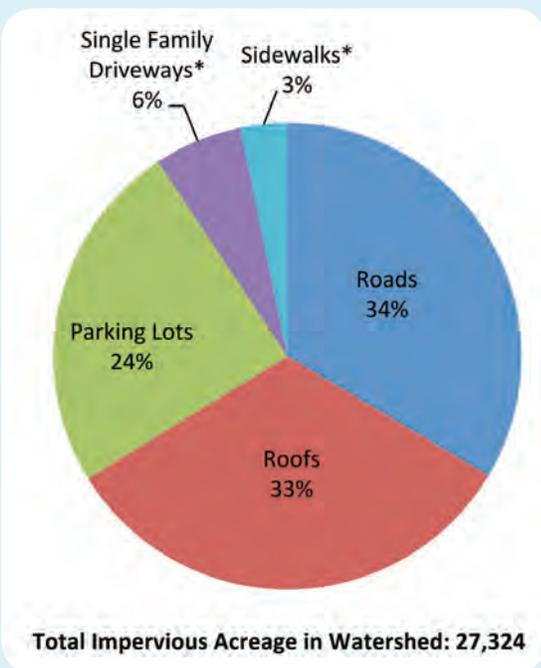
Roads, parking lots, sidewalks, and rooftops—the impervious surfaces common to urban and suburban development—have dramatically altered the Anacostia watershed's natural water, or “hydrologic,” system. The natural hydrologic system relies on trees, vegetation, and soil to capture and filter rainwater. To a great extent, urbanization has replaced these natural filters with impervious surfaces. In areas without stormwater controls in place, stormwater runs off of impervious surfaces—picking up sediment, nutrients, chemicals, oil, grease, bacteria, and trash on the way—and directly into waterways or sewers that dump polluted runoff into waterways.

Approximately 43 square miles, one-quarter of the entire Anacostia watershed, is covered by impervious surfaces (*Map 3. Impervious Surface Cover in the Anacostia Watershed*).<sup>94</sup>

This impervious surface area is roughly equivalent to the square mileage of the entire City of Boston. It is also approximately equivalent to more than 20 million cubic yards of concrete, roughly the volume of material excavated to build the “Chunnel,” the tunnel between Great Britain and France under the English Channel. These figures give some idea of the scale of redevelopment and retrofits required to fix the Anacostia watershed's stormwater problem.

Watersheds where impervious areas make up more than a quarter of the total land cover are usually impaired. In many of the Anacostia watershed communities in the District of Columbia and inside-the-beltway Montgomery and Prince George's Counties, impervious surfaces account for over half of the surface cover. Roads and roofs are the largest contributors to the Anacostia watershed's impervious surfaces, each accounting for roughly one-third of the impervious acreage, followed by parking lots, which account for one-quarter (*Figure 2. Distribution of Impervious Surface Acreage in Anacostia Watershed by Type*).<sup>95</sup> The runoff problem created by the watershed's high level of imperviousness is exacerbated by its lack of stormwater controls. Nearly two-thirds of the watershed was built out before developments were required to manage stormwater and its pollutants.<sup>96</sup>

**Figure 2** Distribution of Impervious Surface Acreage in Anacostia Watershed by Type



\*Estimated

Source: Metropolitan Washington Council of Governments, 2009

The bulk of the trash, oil, and grease in the Anacostia are conveyed by stormwater runoff. Additionally, stormwater runoff from developed land accounts for 67 percent of the tidal Anacostia's total phosphorus load and 80 percent of its total nitrogen load.<sup>97</sup> Research has also suggested that stormwater runoff transports additional PAHs and PCBs to the Anacostia.<sup>98</sup>

In addition to conveying pollutants from the urban environment into the Anacostia and its tributaries, the volume, rate, and velocity of uncontrolled runoff erodes stream banks, increasing sedimentation. Because impervious surfaces do not filter water or provide any resistance, they increase the peak volume of stormwater runoff, as well as its speed.

Uncontrolled stormwater has caused severe stream channel erosion in the Anacostia's non-tidal watershed. The Anacostia's tributaries are “flashy,” meaning that they flow quickly downstream, delivering large sediment loads to the sluggish Anacostia.<sup>99</sup> Indeed, roughly three-quarters of the delivered sediment load in the Anacostia come from tributary stream channel erosion.<sup>100</sup> Due to the River's slow-moving quality, 85 percent of delivered sediment becomes trapped in the Anacostia.<sup>101</sup> According to the EPA, the Anacostia's sediment loads must be reduced by 85 percent to achieve water quality

standards. To meet this requirement, watershed communities will have to dramatically alter the way they presently handle stormwater runoff.

## Sewer Infrastructure

The District of Columbia, Montgomery County, and Prince George's County all have old or deteriorating sewer infrastructure that is a main source of bacteria in the River.

### D.C.'s combined sewer system

Combined sewers carry stormwater runoff and sanitary sewage in the same pipes, and serve one-third of the District (*Map 4. D.C.'s Combined Sewer Area*). During dry days, the combined sewer carries wastewater directly to the Blue Plains Advanced Wastewater Treatment Plant for processing. However, during rainstorms, the capacity of the combined sewer is exceeded, and the system overflows, dumping a mixture of polluted stormwater and untreated sewage directly into the Anacostia, the Potomac, and Rock Creek.

Although combined sewer overflows (CSOs) are a challenge for all of the District's waterways, they are a particularly acute problem for the Anacostia, which receives roughly 1.3 billion gallons of combined sewer overflow a year—one-and-a-half times the volume discharged into the Potomac River.<sup>102</sup> On average, there are 75 combined sewer overflow events a

year in the Anacostia.<sup>103</sup> CSOs account for approximately 61 percent of the River's bacteria load, and 14 percent of the biochemical oxygen demand load, which is caused when organic matter is consumed by biological activity that depletes dissolved oxygen.<sup>104</sup>

### Separate sewer systems

Separate sewers serve the other two-thirds of the District of Columbia, as well as the entirety of Montgomery and Prince George's Counties. In separate sewer systems, sanitary sewers transport wastewater alone while an individual stormwater sewer conveys stormwater runoff to waterways. Blockages in sewer mains from debris and grease discharged illegally or improperly by restaurants and homes, as well as deferred maintenance, have caused sanitary sewers to leak and overflow periodically into the Anacostia's tributaries—contributing to high bacteria levels.<sup>105</sup>

## Historic Sources of Legacy Toxics

Under the water quality provisions of the CWA, EPA and the District have determined that the tidal estuary is excessively polluted with certain toxic materials, including PCBs, PAHs, certain pesticides, and some metals.<sup>106</sup> EPA has imposed stringent rules limiting or prohibiting ongoing discharges of toxic pollutants from industrial operations and municipal wastewater treatment plants, but these rules are of little help in addressing the Anacostia's problem with contaminated sediments because most of the contamination was deposited decades ago. Most uses of PCBs were banned or phased out nearly 30 years ago: EPA terminated all approved uses of chlordane in 1988, and for Dieldrin in 1987; DDT was banned in the early 1970s.<sup>107</sup> However, all of these toxic materials presently exist in river sediment.

The historic sources of the toxic materials in the sediment appear to include the Washington Navy Yard, the Southeast Federal Center, the former gasification works operated by Washington Gas Light, the former Kenilworth Dump (now owned by the National Park Service), and PEPCO's Benning Road installation. Federal land at Poplar Point, scheduled for transfer to the District, may also be a source;<sup>108</sup> historical sources of metals and PAHs may also include other military manufacturing facilities that operated near the estuary in the late 1800s and early 1900s.

### Map 4 D.C.'s Combined Sewer Area

Source: DC Water

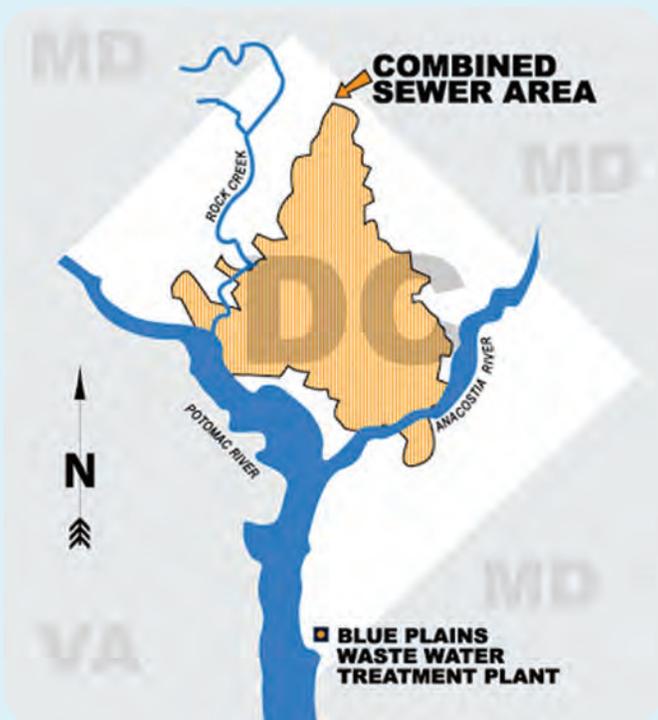




Photo credit: Joe Mauro

Elevated PCB contamination has been found in sediment near the Navy Yard, including PEPCO's Benning Road installation, and Southeast Federal Center. Elevated PCB levels have also been found in some upstream locations, though they apparently are less extensive than those detected near the Navy Yard and Federal Center.<sup>109</sup>

Elevated PAH levels have been found near the Washington Gas Light location, as well as more widely through much of the estuary.<sup>110</sup> Because the estuary has been extensively dredged and filled in the past, it may be difficult to tie specific sediment contamination to a particular past shore-side activity. Tidal action also complicates the situation, because water moves both upstream and downstream.

## How Did the Anacostia Get So Polluted?

The Anacostia River was once a major part of Washington's natural beauty and commercial bloodlife. Until the 1600s, the Anacostia River and its network of streams provided a pristine home to aquatic life, and the watershed was covered by forests. European settlers readily used the Anacostia River for fishing, trade, and transport, transforming Bladensburg into the primary port for the Washington area through much of the 18<sup>th</sup> century. The River became an early commercial anchor, and residential and agricultural communities were established near the banks of the Anacostia, as well as upstream. In fact, some of D.C.'s land on the eastern side of the Anacostia River was farmland that remained under agricultural production through World War II.<sup>111</sup>

Development of the national capital region, however, had a detrimental effect on the Anacostia River and its watershed.

By the time of the Civil War, eroded soil from crop fields made the River too shallow for navigation and rendered the Port of Bladensburg useless.<sup>112</sup> The River, which was 40 feet deep at the time of Bladensburg's founding, is now only inches deep at low tide.<sup>113</sup>

The federal government played a major role in the Anacostia's degradation through its role as developer, landlord, and tenant in the Anacostia watershed. Throughout the 19<sup>th</sup> and 20<sup>th</sup> centuries, the federal government directly engaged in or authorized activities that, although standard practice at the time, severely polluted the Anacostia and compromised its ability to manage pollution. The following actions by the federal government degraded the Anacostia River and its tributaries:

- **Filling in over half of the tidal Anacostia's acreage:** When maps of the River in 1794 are compared with current maps, it is easy to see that over half the tidal river has been eliminated by filling. Almost all of this fill work was conducted or approved by the federal government.<sup>114</sup> This fill work has substantially reduced the River's assimilative capacity, or its ability to receive organic matter. Filling of the tidal estuary reduced surface area, which in turn reduces the natural reaeration of water, and results in less oxygen in the water. With less oxygen, the River's natural capacity to break down organic pollutants, whether they consist of sewage or leaf litter, is compromised. As explained earlier, excess organic matter depletes dissolved oxygen, which most aquatic animals depend on for respiration. If too much dissolved oxygen is depleted by the decomposition of organic matter, fish and other creatures can be killed.
- **Filling or authorizing filling of most of the watershed's wetlands:** The federal government's action in filling much of the estuary not only physically reduced the reaeration capacity of the estuary, but also destroyed almost all of the tidal wetlands in the estuary. The destruction of these wetlands not only reduced fish and wildlife habitat, but substantially reduced the estuary's natural ability to break down organic wastes, something that tidal wetlands are well suited to do. Additionally, the Army Corps of Engineers authorized the filling of some upstream wetlands. These non-tidal wetlands reduced sedimentation and nutrient flows to the River, and also slowed the velocity and volume of stormwater runoff, thereby reducing stream bank erosion and sedimentation.

Without these non-tidal wetlands, such erosion has increased. According to the National Oceanic and Atmospheric Administration (NOAA), over 95 percent of the wetlands in the watershed have been destroyed, most of them by federal action or with federal approval.<sup>115</sup>

- **Designing, constructing, and operating for some years the District’s combined sewer system:** The District’s combined sewer system serves roughly one-third of the land area in the District. This system was designed and built by the Army Corps of Engineers, and operated by the Corps for a number of years.<sup>116</sup> That design has proven significantly defective because these sewers overflow an average of 75 times a year into the Anacostia, discharging over a billion gallons a year of a mixture of raw sewage and pollutants from untreated stormwater runoff, including nutrients, oil and grease, and untreated toxic pollutants ranging from PAH’s from roads to metals. These “slug” discharges—high volume, heavily polluted, episodic discharges—are very damaging to the ecosystem as they tend to deplete oxygen for fish and threaten fish kills. They also prevent safe swimming in the River.

The cost of reducing combined sewer overflows in the Anacostia River is currently estimated at \$1.7 billion, a cost imposed on the District’s water and sewer authority by federal consent decree to meet federal water quality standards. Under Superfund, the U.S. Department of Justice has successfully argued that a public entity which has defectively designed, constructed, and operated a stormwater system with actual knowledge of its discharges is jointly and severally liable for the clean-up of toxic materials in the affected water body.<sup>117</sup> In other words, the public entity is responsible for the entire clean-up cost, regardless of fault, the cost of which will be shared with other liable parties as determined by subsequent litigation. By that logic, the United States bears substantial financial responsibility to fix the combined sewer system.

- **Channelizing streams:** The Anacostia Restoration Plan includes 342 stream restoration projects for 72 stream miles; these include a number of

projects to reverse channelization of streams undertaken by the federal government or with federal approval.<sup>118</sup> Channelization and other structural changes have increased peak flows and stream erosion from unprotected banks. The Anacostia, according to the Anacostia Watershed Restoration Partnership, is the most sediment-choked estuary in the entire Chesapeake, in part because of this continual stream bank erosion.

- **Discharging toxic materials from federal operations:** Historically, the federal government has engaged in the manufacture of munitions at the Navy Yard, as well as at the Army’s Arsenal (now Fort McNair), and subcontracted with the Firth Sterling Steel plant at Giesboro Point for the manufacture of armor piercing shells from the early 1900s until 1922.<sup>119</sup> It also constructed and operated various installations engaged in aircraft and vessel maintenance. These activities generated persistent toxic contaminants, including lead, mercury, other metallic contaminants, PAHs and PCBs, among others. These toxics found their way into the streams and sediments and now contribute to a toxic contamination of sediments in the tidal Anacostia.
- **Developing federal installations, which increased erosion and impervious acreage:** The federal government developed significant acreage in the watershed in ways that maximized sediment deposits in the River, as well as the volume and velocity of stormwater runoff. Historically, the federal government engaged in large scale land clearing in the watershed



Photo credit: ©istockphoto.com/FernandoAH

for defense purposes in building Civil War fortifications,<sup>120</sup> and in World War I, World War II, and Cold War era installations. This work denuded much of the forest and farmland in the area of the tidal estuary and many of its tributaries, and very little of it was done with any attention to controlling soil erosion. That sediment eventually found its way into the streams in the watershed and into the tidal Anacostia.

The federal government remains the largest single landowner in the watershed. Eight federal entities together own approximately 14 percent of the land in the Anacostia watershed.<sup>121</sup> The River's shoreline is dominated by federally owned land, and major facilities, including the National Arboretum, the Washington Navy Yard, and Fort McNair.<sup>122</sup> Federal development types range from forest and parkland (Beltsville Agricultural Center and Arboretum) to highly developed (Navy Yard). Like any similar property, federal properties with large amounts of impervious surface—parking lots, roofs, and airstrips—and few stormwater controls contribute to the watershed's stormwater pollution. Little, if any, of the impervious areas owned by the federal government have been retrofitted to conform to volume-based stormwater standards.

The development of the national capital region further degraded the Anacostia River. Suburban development in Montgomery and Prince George's Counties started as early as 1890, but population ballooned in Washington's suburbs

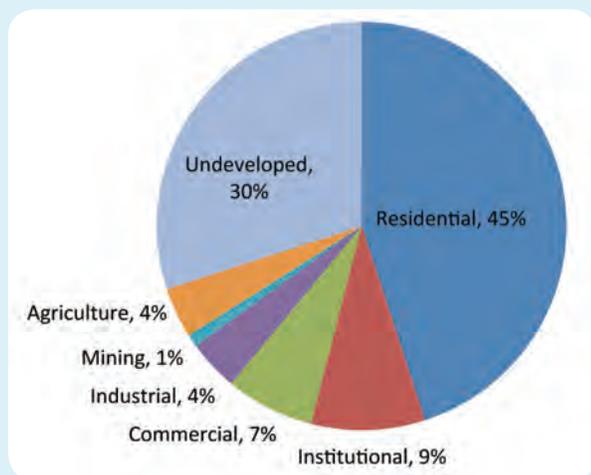
after World War II. While the District of Columbia experienced population loss after its peak of 800,000 residents in 1950, the Maryland suburbs exploded. From 1950 to 2000, Montgomery and Prince George's Counties experienced 7-fold and 6-fold increases in their populations, respectively.<sup>123</sup> This development of the watershed replaced agricultural fields with apartments, office buildings, residential developments, and shopping centers—and impervious surfaces, such as roads, parking lots, sidewalks, and rooftops—that accompany such development. By 2000, 70 percent of the land in the Anacostia watershed was developed. (*Figure 3. Land Use in the Anacostia Watershed by Development Type*).<sup>124</sup>

The Anacostia watershed—now home to over 800,000 people—is a mix of urban and suburban communities situated in one of the nation's largest metropolitan areas.<sup>125</sup> Residential development (single family homes, townhouses, and apartment buildings) covers 45 percent of the Anacostia watershed. Together, institutional and commercial development account for 16 percent of the watershed's land use. Once heavily farmed, only 4 percent of the Anacostia watershed is now used for agricultural purposes. Less than a third of the watershed remains undeveloped. Parkland accounts for half of the Anacostia watershed's undeveloped land, with forests and wetlands comprising the other half. The highly impervious environment caused by urban and suburban development has made stormwater runoff the Anacostia's primary stressor.

Although the Anacostia watershed is mostly developed, commercial redevelopment is almost certain to occur over the next few decades. Forecasts predict that together, D.C., Montgomery County, and Prince George's County will gain 180,000 new households in the next 20 years—growth that will put redevelopment pressures on the watershed.<sup>126</sup>

Cleaning up the Anacostia will require a major effort to right problems created by past actions carried out without regard to environmental impact. Big ticket clean-up activities, including the eradication of combined sewer overflows, are required to reverse damage caused directly by the federal government. Moreover, much of the 27,300 acres of existing impervious area throughout the watershed—a result of urban and suburban land use patterns—must be retrofitted to mitigate stormwater runoff. To prevent further degradation to the Anacostia, redevelopment techniques used in the future must protect rather than further stress the River and its streams.

**Figure 3. Land Use in the Anacostia Watershed by Development Type**



Source: U.S. Army Corps of Engineers, Anacostia River Watershed Restoration Plan and Report, 2010.



## CHAPTER THREE CURRENT CLEAN-UP EFFORTS

*“Any concerted effort to clean up the Anacostia must address stormwater runoff, inadequate sewer infrastructure, and legacy toxics.”*

The public policy context for cleaning up the Anacostia is a complicated mix of federal, state, and local laws. Although the Anacostia watershed’s communities and towns are environmentally connected to one another through the River and its tributaries, they are divided among multiple political jurisdictions—two counties in the State of Maryland, and the District of Columbia. In addition, 14 percent of the watershed’s land is owned by the federal government. After providing an overview of the regulatory context for the Anacostia clean-up, this chapter reviews existing legal obligations and policy initiatives for addressing the Anacostia’s major pollution sources, stormwater runoff, sewer overflows, and legacy toxics, to see what they will accomplish toward restoring the Anacostia.

### Overview of the Regulatory Framework

Like all U.S. regions, the Anacostia watershed area operates within the federal system of national, state, and local governments. The federal government provides the general framework for regulating the health of the nation’s rivers and streams through the CWA. In most cases, the federal government authorizes states to implement federal water programs. States also sometimes set their own laws and policies to guide local governments. County and city governments also set laws, particularly relative to land use issues (*Table 1. Major Existing Clean-Up Obligations and Policies for the Anacostia Watershed*).

Accordingly, the federal government, the State of Maryland, the local governments of Montgomery and Prince George’s Counties, and the government of the District of Columbia all set the policy context for the Anacostia’s restoration. The federal government plays a distinct role in the Anacostia watershed due to its unique relationship with the Nation’s Capital and its presence as a major landowner.

### Clean Water Act

Under the CWA, pollution currently entering the Anacostia River and its tributaries is mainly regulated through discharge permits issued to municipal sources and through consent decrees (i.e., court orders that have resulted from negotiated settlements of lawsuits alleging violations of the CWA). The federal strategy for the Chesapeake Bay clean-up, which was directed by a Presidential Executive Order as furtherance of the CWA’s purposes, will also impact the Anacostia watershed.

### MS4 Permits

Local governments are issued discharge permits, called MS4 permits, in order to regulate pollution from municipal separate storm sewer systems. Each of the Anacostia watershed’s three major local jurisdictions—Montgomery County, Prince George’s County, and the District of Columbia—has an MS4 permit. While the CWA authorizes the EPA to issue permits to local governments and other facilities that discharge pollution, EPA can authorize states to issue and enforce water permits. The State of Maryland, via the Maryland Department of the Environment (MDE), issues MS4 permits to Montgomery and Prince George’s Counties, while EPA is the permitting authority for the District

of Columbia. Permits are reissued every five years (*Table 2. MS4 Permits for the Three Major Jurisdictions in the Anacostia Watershed*).

### Consent Decrees

DC Water, which controls D.C.’s combined sewer system, and the Washington Suburban Sanitary Commission (WSSC), which provides sanitary sewer services to Montgomery and Prince George’s Counties, have both entered into consent decrees with the U.S. Government due to alleged violations of the CWA caused by sewer overflows.

### The Federal Strategy for the Chesapeake Bay

As a tributary of the Potomac River, the Anacostia River and its watershed are part of the Chesapeake Bay watershed, and will be affected by the new strategy for restoring the Chesapeake Bay, developed as directed by Presidential Executive Order 13508—Chesapeake Bay Protection and Restoration—issued in May 2009.<sup>127</sup>

The Chesapeake Bay’s major pollution problems are excess nutrients, mainly nitrogen and phosphorus, as well as excess sediment. Excess nutrients and sediment reach the Bay from four principal sources: agriculture, urban and suburban stormwater runoff, wastewater, and atmospheric deposition.<sup>128</sup> In contrast to the highly developed Anacostia watershed, 58 percent of the Bay’s watershed is undeveloped and mostly forested.<sup>129</sup> Agriculture is the largest developed land use, accounting for 22 percent of the Chesapeake watershed, and is also the largest single-sector source of nitrogen, phosphorus, and sediment pollution in the Bay. Although urban/suburban development makes up only 9 percent of the

**Table 1. Major Existing Clean-Up Obligations and Policies for the Anacostia Watershed**

Pollution Problem	Federal Obligations	State/Local Obligations	Voluntary Programs
Stormwater Runoff	<ul style="list-style-type: none"> <li>MS4 Permits</li> <li>Chesapeake Bay Executive Order and Related Actions</li> </ul>	Regulations for New Development and Redevelopment	Anacostia Restoration Plan
Sewer Overflows	DC Water and WSSC Consent Decrees	None	None
Legacy Toxics	CERCLA (Superfund)	DDOE Settlements	None

Source: DC Appleseed

**Table 2. MS4 Permits for the Three Major Jurisdictions in the Anacostia Watershed**

Jurisdiction	Initial Permit Issue Date	Current Permit Issue Date*
Montgomery Co, MD	March 15, 1996	February 16, 2010
Prince George's Co, MD	November 17, 1993	October 13, 2004
District of Columbia	April 19, 2000	August 19, 2004

\*As of January 2011.

Source: MD Department of the Environment and the D.C. Department of the Environment.

watershed, it is the fastest growing land use in the Chesapeake region. Moreover, urban and suburban stormwater runoff is the only major source of pollution that is *increasing* in the watershed.<sup>130</sup> From 1990-2000, impervious cover increased by 250,000 acres—41 percent—while the watershed’s population grew just 8 percent.<sup>131</sup>

The final federal Chesapeake Bay strategy, released in May 2010, outlines the steps that the federal government, six watershed states, and the District of Columbia will take to implement measures necessary to restore water quality by 2025.<sup>132</sup> A Chesapeake Bay-wide TMDL, or “pollution diet,” for nitrogen, phosphorus, and sediment, released in December 2010, is a keystone commitment of the Bay strategy.<sup>133</sup> EPA has the authority to impose consequences for missed TMDL targets.

While the TMDL sets forth certain required decreases, it does not necessarily mandate what policies must be implemented to achieve them. The decision as to how the TMDL will be achieved is set forth in, watershed states’ Watershed Implementation Plans (WIPs), which will be developed in three phases. So far, only Phase I WIPs have been promulgated.

Of all the policies outlined in the Bay strategy, those regarding urban and suburban stormwater runoff will have the greatest impact on the Anacostia watershed’s restoration.<sup>134</sup> It is hoped that the TMDL process will contribute to this. However, the Phase I Maryland and D.C. WIPs appear to achieve reductions primarily through upgrades to waste water treatment plants. Indeed, present WIPs will not

significantly impact stormwater runoff.<sup>135</sup> As the Phase II WIPs are adopted in 2011—specifically implementing the TMDLs on the local level rather than the state level—there may be more progress on local stormwater programs. Moreover, the Bay strategy outlines specific federal actions around stormwater runoff that are intended to support the Bay TMDL and WIP accountability framework. As one of the most developed and impervious areas of the Bay watershed, the Anacostia watershed is a potential testing ground for new federal policies around urban and suburban stormwater runoff in the Chesapeake Bay watershed.

### State and Local Regulations

State and local jurisdictions also set their own environmental rules. In terms of state and local regulations, rules for controlling stormwater runoff from development and redevelopment projects on public and private land may have the largest impact on the Anacostia watershed’s health. The State of Maryland issued new stormwater regulations in accordance with the Maryland Stormwater Management Act of 2007.<sup>136</sup> Montgomery and Prince George’s Counties must adopt ordinances that conform to the state regulations. As analogous to a state, the District of Columbia typically sets its own stormwater regulations for new development or redevelopment projects in the city.

### Voluntary Efforts

The Anacostia’s public stewards also work together on restoration issues through the Anacostia Watershed Restoration Partnership (the Anacostia Partnership). The Anacostia Partnership grew out of a voluntary cooperative restoration

agreement initiated in 1987, and includes representatives from federal, state, and local governments, nongovernmental organizations, citizen stewardship groups, and regional businesses.<sup>137</sup> In the Water Resources Development Act of 2007, Congress directed the Army Corps of Engineers, in consultation with the D.C., Maryland, Montgomery and Prince George’s County governments to develop the Anacostia Restoration Plan.<sup>138</sup> The Plan’s purpose is to provide a comprehensive road map for restoring the environmental and ecological integrity of the Anacostia watershed over 10 years. Accordingly, the Anacostia Partnership worked with the U.S. Army Corps of Engineers to produce the Anacostia Restoration Plan and its inventory of more than 3,000 candidate restoration projects, as described earlier in this report. Nearly 1,900—63 percent—of the potential restoration projects listed are stormwater retrofits. The other 1,100 projects consist of stream restorations, wetland creation and restoration, fish blockage removal, riparian reforestation, trash reduction, and parkland acquisition (*Table 3. Candidate Projects from the Anacostia Restoration Plan by Type*).

## Stormwater Runoff

Before examining specific regulatory requirements for managing stormwater runoff, we provide an overview of stormwater management practices and issues that inform federal and local regulations. We then review stormwater

clean-up obligations for new development, redevelopment, and existing development as required by stormwater regulations for new development and redevelopment, MS4 permit programs, and federal initiatives, as well as projects called for in the Anacostia Restoration Plan.

## Volume-Based Stormwater Controls and Green Infrastructure Techniques

Until recently, urban stormwater management focused on two major goals<sup>139</sup>:

- Controlling the *peak flow and velocity* of stormwater runoff. Stormwater management practices like detention ponds focus on controlling peak flow by assuring that the maximum rate of stormwater runoff is no greater after development than before.
- Controlling the *quality* of stormwater runoff. Stormwater quality practices like filtering systems focus on treating stormwater to reduce pollutants.

Stormwater management practices, however, have shifted from a focus on peak flows and pollution treatment to a focus on volume control. Volume-based control standards attempt to mimic, as closely as possible, predevelopment, natural hydrologic characteristics, thus minimizing the impact of development on waterways. In particular, federal

**Table 3. Candidate Projects from the Anacostia Watershed Restoration Plan by Type**  
(Ordered by project type with the largest to smallest number of projects)

Project Type	Number of Projects	Annual Cost Over a 15-Year Time Period (in thousands)
Stormwater Retrofit	1,892	\$83,493.6
Stream Restoration	342	\$11,979.2
Wetland Creation/Restoration	116	\$453.8
Fish Blockage Removal/Modification	146	\$2,344.8
Riparian Reforestation, Meadow Creation, Street Tree and Invasive Management	15	\$183.5
Trash Reduction	181	\$47.4
Parkland Acquisition	189	\$16,746.9
<b>TOTAL</b>	<b>3,018</b>	<b>\$115,249.3</b>

Source: Army Corp of Engineers, Anacostia River Watershed Restoration Plan and Report, 2010.

## Vegetation on a green roof helps manage stormwater runoff.

Photo credit: ©istockphoto.com/pancaketom

Practices that infiltrate, evapotranspire, and/or capture and reuse stormwater are referred to by use of the inter-changeable terms “low impact development,” “green infrastructure,” and “environmental site design.”<sup>146</sup> At the site scale, these practices include rain gardens, green roofs, vegetated swales, rain cisterns and barrels, permeable pavements, tree box filters, bioretention facilities, and the re-use of stormwater in buildings for non-potable purposes like cooling and toilet flushing. Such practices are often used in conjunction with one another to minimize runoff. This report refers to such practices as “green infrastructure.”

Green infrastructure can be applied in three different scenarios:<sup>147</sup>

- 1. New Development:** development on land that was never covered with buildings or pavement, such as forests, greenfields, or farmland, often referred to as “greenfield” development;
- 2. Redevelopment:** fully or partially rebuilding on a site where buildings or pavement already exist;
- 3. Existing development:** built urban or suburban land that is not currently changing through redevelopment.

Green infrastructure is more complex in redevelopment and retrofitting of existing development due to the need to work with existing infrastructure, the limited availability and affordability of land, and complications caused by existing zoning laws.<sup>148</sup> For example, if a new office building is being built on a lot in a dense downtown, the developer will have to contend with existing site constraints, such as limited lot space, neighboring properties, underground utilities, and sidewalks and streets, which could potentially make challenging the use of vegetated swales, underground rain cisterns, or tree box filters. By contrast, green infrastructure practices can be easily integrated into new developments at the design phase because such site constraints usually don’t yet exist. While the challenges posed in a redevelopment scenario may potentially make installing green infrastructure more expensive relative to new development, we could not find strong data on the size of such cost differentials.

guidance on volume-based control standards requires development or redevelopment to “maintain or restore, to the maximum extent...[practicable], the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow [using onsite infiltration, evapotranspiration, and reuse approaches.]”<sup>140</sup> By reducing runoff volumes, the other problems associated with stormwater runoff—pollutants, peak flow, erosion, and flooding—are also better controlled.<sup>141</sup> Indeed, a 2008 National Research Council study found that management controls that harvest, infiltrate, and evapotranspire stormwater are critical to reducing pollutant loads, erosion, and sedimentation.<sup>142</sup>

Often such approaches practically translate to requirements to control a certain volume of rainfall measured in inches. For example, Section 438 of the federal Energy Independence Security Act of 2007 (EISA) requires new development or redevelopment involving a federal facility with a footprint larger than 5,000 square feet to maintain or restore the predevelopment hydrology of the site.<sup>143</sup> EPA guidance indicates that EISA requirements can be met by controlling the volume of stormwater from a 95th percentile rainfall event, or in other words, the volume of stormwater from 95 percent of all rainfall events on-site through infiltration, evapotranspiration, or re-use.<sup>144</sup> In the Anacostia watershed, that means controlling the first 1.7 inches of stormwater.<sup>145</sup> Stormwater regulations that require a certain volume of stormwater to be retained on-site are referred to as “on-site retention” or “volume-based” standards.

*“Green infrastructure practices include rain gardens, porous pavements, green roofs, infiltration planters, trees and tree boxes, and rainwater harvesting for non-potable uses such as toilet flushing and landscape irrigation.”*

U.S. EPA

Some smart growth proponents are concerned that regulations requiring the use of green infrastructure to control high volumes of stormwater on-site in redevelopment situations could unintentionally promote sprawl, or the development of formerly undeveloped land. The concern is expressed as follows: if it is too expensive to meet volume-based stormwater requirements at a redevelopment site, developers will opt to build their projects at greenfield sites, which in turn increases the development of new impervious surfaces.<sup>149</sup> While the smart growth concern is a valid one, rules for controlling stormwater are normally just one of several decisive factors that determine where a developer will build (others include access to desired markets, proximity to transportation, taxes, and other land use regulations), and it appears from interviews conducted for this report, are seldom the most important.

The existing legal obligations for controlling stormwater reviewed in this section of the report reflect a shift to volume-based control practices in new development and redevelopment, as well as existing development. Concerns

about balancing volume-based stormwater standards for redevelopment with smart growth goals have also informed some existing legal obligations, such as the State of Maryland’s stormwater regulations.

### Stormwater Standards for New Development and Redevelopment

Government entities set regulations for managing stormwater on development and redevelopment projects. These standards apply to both public and private projects. Since 70 percent of the Anacostia watershed is already developed, stormwater standards for redevelopment projects will have the largest impact on the health of the River and its tributaries. In D.C. and Maryland, projects that do not disturb over 5,000 square feet of land area are not held to stormwater standards.

### State and Local Stormwater Standards

The new stormwater regulations issued in accordance with the Maryland Stormwater Management Act of 2007 have different volume control standards for development and redevelopment, respectively.<sup>150</sup> Montgomery and Prince George’s Counties are currently in the process of adopting local ordinances that conform to the state regulations.

The Maryland stormwater regulations require new development projects *at a minimum* to capture and treat the first inch of stormwater runoff using green infrastructure (comparable to the 90<sup>th</sup> percentile rainfall event). They also require new development projects to control the channel protection volume (the volume used to control stream channel erosion, which is 2.6 and 2.7 inches in Montgomery

### Parking lot with permeable pavement and bio-swale.

Photo credit: Abby Hall, U.S. E.P.A.





Photo credit: Joe Mauro

and Prince George's Counties, respectively) to the maximum extent practicable using green infrastructure. In other words, green infrastructure must be used to control the first inch of stormwater, and non-green stormwater control techniques can only be used to control the additional 1.6 to 1.7 inches of stormwater necessary for meeting the channel protection volume after all potential green infrastructure options have been exhausted.<sup>151</sup>

Maryland has established different standards for redevelopment.<sup>152</sup> In terms of controlling existing impervious area, redevelopment projects can do one of the following:<sup>153</sup>

- Reduce existing impervious area by at least 50 percent;
- Implement green infrastructure to provide water quality treatment for at least 50 percent of the existing impervious area; or
- Use a combination of the above two techniques for at least 50 percent of the existing impervious area.

However, the Maryland regulations allow local agencies to develop separate policies for redevelopment water quality treatment if the above requirements cannot be met. Such policies may include filtering practices, implementation of green infrastructure off-site, participation in a stream restoration project, pollution trading, payment of a fee-in-lieu, or a partial waiver of treatment requirements. Moreover, to address smart growth concerns, the Maryland regulations allow local jurisdictions to reduce volume-based requirements for existing impervious cover in redevelopment projects located in certain areas if the project's economic feasibility is tied to a planned density level that would be compromised by the installation of green infrastructure.<sup>154</sup> For any net increase in impervious area in redevelopment scenarios, runoff must be reduced according to the criteria for new development.

In short, Maryland's stormwater regulations for new development, which require at a minimum on-site control of the stormwater volume from 90 percent of all rainfall events through green infrastructure, will substantially reduce runoff and its associated damage. However, it is the state's less stringent volume control requirements for redevelopment, along with its flexible alternatives to on-site volume control, which will apply to the vast majority of the Anacostia watershed.

In order to significantly affect the Anacostia's water quality, Montgomery and Prince George's Counties must adopt more stringent regulations for redevelopment than those required by state law. Montgomery County recently adopted an ordinance that goes beyond the redevelopment requirements set by Maryland by applying the state's standards for new development to redevelopment as well.<sup>155</sup> Montgomery County's ordinance offers flexibility for redevelopment projects that cannot meet the standards, but options for off-site mitigation and waivers are more rigorous than what is required by the state's law. At the time this report went to print, Prince George's County—in which most of the Anacostia watershed is located—had not yet adopted a new stormwater ordinance.

The District of Columbia's current stormwater regulations for new development and redevelopment are outdated and lack volume-based controls. In D.C., new development and redevelopment projects are held to the same standard. Projects are required to treat 1/4 inch of runoff from parking lots, city streets, and high-speed roads, and 1/3 inch from rooftops, sidewalks, and pedestrian plazas using conventional practices, such as filtering systems, infiltration practices, storage practices, stormwater ponds, stormwater wetlands, and open channels.<sup>156</sup>

In March 2008, the District of Columbia codified new standards for public and publicly financed projects in a development zone along the Anacostia River. Those standards require the first inch of stormwater to be retained and reused onsite and an additional two inches to be treated with preference for vegetated filtering media. However, despite a local legal requirement for their implementation by September 2008, these standards had not been implemented at the release of this report.<sup>157</sup> Even if implemented, they would only affect a small area of the watershed.

However, D.C. may change its standards soon. EPA's draft MS4 permit for D.C., proposed in spring 2010, would require the District of Columbia to adopt new,

volume-based stormwater standards for new development and redevelopment. According to the draft MS4 permit, both newly built and redeveloped federal facilities would be required to meet EISA guidance by achieving on-site retention of 1.7 inches of stormwater through infiltration, evapotranspiration, or re-use. The draft MS4 permit would hold non-federal development and redevelopment projects to a 1.2 inch on-site retention standard. The permit's stormwater standards would be particularly effective because they require high on-site retention volumes for redevelopment, which will make up the majority of future development in the District. However, some D.C. officials have expressed concerns that, by requiring the District to adopt a 1.2 inch on-site retention standard for non-federal new development and redevelopment, the permit would raise the costs of development in the city and encourage developers to locate in the surrounding suburbs, where stormwater standards are less stringent and compliance is more affordable.<sup>158</sup> These concerns are similar to those of smart growth proponents, described earlier.

### Federal Stormwater Standards

The Chesapeake Bay Strategy may also affect stormwater standards for new development and redevelopment in the Anacostia watershed. The strategy states that EPA will initiate national stormwater rulemaking to control pollution from new development and redevelopment, with specific provisions for the Chesapeake Bay watershed. EPA is currently in the process of developing this rulemaking. This rulemaking could benefit the Anacostia watershed if the rules promulgated—particularly for redevelopment—are more stringent than D.C.'s and Prince George's County's existing local stormwater regulations.

Finally, the Chesapeake Bay strategy may significantly mitigate stormwater runoff from newly developed or re-developed federal facilities. EPA Guidance for Federal Land Management in the Chesapeake Bay Watershed, required by the Bay Executive Order, reinforces the stormwater requirements for

new development and redevelopment projects involving a federal facility in Section 438 of EISA, and promotes the use of EPA guidance in its implementation.<sup>159</sup>

### Stormwater Improvements to Existing Development

Stormwater improvements to existing development are critical in the Anacostia watershed, where nearly two-thirds of the existing built environment lacks stormwater controls. MS4 permits, along with the Chesapeake Bay Strategy, lay out regulatory requirements for restoring existing development in the Anacostia watershed, while the Anacostia Restoration Plan identifies stormwater retrofit candidate projects that the local jurisdictions can voluntarily implement.

### MS4 Permits

In 2010, Montgomery County received a new MS4 permit, which requires it to take several actions by the end of the permit term (2015) to control stormwater runoff.<sup>160</sup> Among other requirements, the County must restore 20 percent of impervious surfaces not currently controlled and complete a 10 percent restoration requirement from its previous permit term for a total of 30 percent of newly controlled impervious surfaces. In effect, this requires restoration or retrofitting of existing development.

Montgomery County officials reported that they will meet the requirement of restoring 30 percent of their existing impervious surface through several different types of projects: stream restoration, stormwater pond retrofits, green infrastructure projects, and grants to homeowners to install green infrastructure. Aside from grants to homeowners, the vast majority of these projects will focus on public facilities. The Anacostia watershed is one of seven watersheds located in the County. However, Montgomery County plans to treat over 1,400 impervious acres in the Anacostia watershed during its current permit term—an effort that will account for one-third of all impervious acres treated in the County.

*“In April 2010, EPA issued for public comment the District of Columbia MS4 permit. The provisions of this draft permit may serve as a model for MS4 permits throughout the Bay watershed jurisdictions.”*



Federal Leadership Committee for the Chesapeake Bay

Montgomery County officials have demonstrated that they are committed to carrying out the requirements of their MS4 permit even though they are challenging. Montgomery County's Capital Improvement Plan includes \$86 million to fund stormwater projects over the five-year permit term. In order to raise the revenue necessary to meet this cost, the County has decided to issue bonds—the debt service of which will be paid by the revenue from the County's Water Quality Protection Charge (WQPC), which is its stormwater utility fee.

Prince George's County is currently operating on an extended permit issued in 2004 as it awaits the issuance of a new permit from MDE. MDE is likely to propose a permit for Prince George's County similar to that of Montgomery County. It is unclear whether Prince George's County has the financial resources necessary to carry out the terms of an MS4 permit similar to Montgomery County's permit.



In May 2010, EPA issued a draft MS4 permit to the District of Columbia, which is currently being revised based on public comment. While not final, the proposed permit is one of the strictest in the nation and serves as a blueprint for EPA's future regulatory framework for stormwater control, particularly in the Chesapeake Bay.<sup>161</sup> The proposed permit requires the District of Columbia to take several actions for controlling stormwater on existing land during the five-year permit term, including, but not limited to, the following:

- Developing a retrofit program for existing discharges by managing runoff from 18 million square feet of impervious surfaces, 3.6 million of which must be in transportation rights-of-way.
- Planting at least 4,150 trees annually.
- Identifying all District-owned buildings where green roof projects are technically feasible and installing 350,000 square feet of green roofs.

If implemented as proposed, the D.C. MS4 permit would substantially reduce stormwater runoff from existing development through retrofits of public buildings, streets, and sidewalks. However, it is unclear whether D.C. currently has the capacity to carry out the permit. The District of Columbia funds its MS4 permit activities through a stormwater fee based on a property's impervious surface area, and currently collects about \$13 million annually through this fee.

In short, these three major MS4 permits in the Anacostia watershed will improve stormwater controls, mostly on publicly owned, existing developed land. However, EPA's recently published guidance on an MS4 stormwater permitting approach for the Chesapeake Bay watershed suggests that MS4 Permits could broaden retrofit requirements to include privately owned, existing development that is not undergoing redevelopment. The permitting guidance states that MS4 permits in the Bay area should include measurable and enforceable provisions for retrofitting stormwater management practices at existing sources of discharges where sufficient controls are lacking.<sup>162</sup> This guidance could potentially impact the Prince George's County MS4 permit, which is scheduled for issuance in 2011, and future permits for Montgomery County and D.C.

Photo credit: Derek Parks for Anacostia Watershed Society

## Chesapeake Bay Strategy

The Bay strategy could spur retrofits of federal property by requiring federal agencies to reduce pollution at existing facilities, either by participating in state WIPs or by developing their own Federal Facility Implementation Plan. If federal agencies develop their own implementation plans, they must consider the feasibility of the following:

- Installing urban retrofit practices and implementing non-structural control measures that reduce volume and improve quality of stormwater runoff;
- Aligning cost-effective urban stormwater retrofits and erosion repairs with TMDL goals and states' two-year pollution reduction milestones; and
- Assessing and implementing appropriate nonstructural practices to control stormwater runoff from developed areas and to reduce, prevent, or control erosion from unpaved roads, trails and ditches.

These policies could have a substantial impact on the Anacostia watershed, where 14 percent of the land is controlled by federal agencies.

## Anacostia Restoration Plan

The Anacostia Restoration Plan identifies 1,900 candidate stormwater retrofit projects in the Anacostia watershed. The majority of these projects will use green infrastructure techniques to control stormwater, including bioretention, permeable pavement, green roofs, downspout disconnection, rainbarrels, rain gardens, and swales. Most, but not all, of the stormwater retrofit projects are on public land, such as schools, colleges and universities, federal buildings, parks, and highways and roads. Together, the candidate stormwater retrofit projects would control stormwater runoff on 10,600 acres of impervious surface area—30 percent of the total impervious surface area in the Anacostia watershed.<sup>163</sup> The Plan has a 10-year timeframe, although implementation of thousands of projects is more likely to occur in a 15-to-20 year timeframe. The stormwater retrofit projects are estimated to cost \$85 million annually over 15 years, and account for nearly three-quarters of the Plan's total price tag. Implementation of the Restoration Plan is voluntary, and currently falls upon the local watershed jurisdictions. Unless substantial new funds are found, it will not be fully implemented due to insufficient resources.

*A downspout releases rooftop rainfall into a bio-swale.*

Photo credit: Abby Hall, U.S. E.P.A.

## Stormwater Summary

In sum, the combination of stormwater policies and programs reviewed for new development, redevelopment, and retrofitting existing development will make gains in reducing stormwater runoff and its negative effects on the Anacostia watershed. Both Montgomery and Prince George's Counties will have strong stormwater standards for new development in compliance with the Maryland Stormwater Act of 2007. If the proposed MS4 permit for D.C. is finalized in its current form, D.C. will also be required to adopt similarly stringent standards.

Since most of the Anacostia watershed is already developed, stormwater controls for redevelopment will have a bigger environmental impact than regulations for new development. Of the three watershed jurisdictions, however, only Montgomery County adopted stringent on-site stormwater retention standards for redevelopment at the time this report went to press. Possible future federal actions, such as D.C.'s MS4 permit, EPA's national stormwater rulemaking, and EPA's Bay permitting guidance, may induce D.C. and Prince George's County to adopt rigorous on-site retention standards for redevelopment.

Stormwater improvements to existing development are also critical to cleaning up the Anacostia. Implementation of new MS4 permits will reduce stormwater runoff from mostly county and city properties by requiring local jurisdictions to carry out substantial stormwater retrofits.



*“CSOs can adversely affect the quality of rivers and streams by contributing to high bacterial levels and low dissolved oxygen levels, which is harmful to fish and other aquatic life.”*

DC Water

Pollution reduction plans for federal facilities under the Chesapeake Bay Strategy will also likely reduce stormwater pollution from public properties. Finally, the stormwater retrofit projects identified in the Anacostia Restoration Plan hold the potential to further reduce stormwater pollution if they are implemented. Nonetheless, stormwater retrofits for privately owned land are largely missing from current stormwater programs.

## Sewer Infrastructure

DC Water, which controls D.C.’s combined sewer system, and the Washington Suburban Sanitary Commission (WSSC), which provides sanitary sewer services to Montgomery and Prince George’s Counties, are both under consent decrees to upgrade their sewer systems due to alleged violations of the CWA.

## DC Water Consent Decree

In 2005, DC Water entered into a consent decree that established a judicially enforceable schedule for implementation of a long term control plan (LTCP) to reduce combined sewers overflows. Among other requirements, the LTCP requires DC Water to build three large, underground storage tunnels to provide additional capacity to the combined sewer system. In total, DC Water reports that it will reduce combined sewer overflows in the Anacostia River from 82 events a year to two—a 98 percent reduction.<sup>164</sup> DC Water reports that it has already implemented projects under the LTCP that have reduced the number of events to 75. The Anacostia River Tunnel System, which will achieve the near-elimination of sewer overflows, is slated for completion in 2018, with the entire project for the Potomac and Rock Creek slated for completion in 2025.<sup>165</sup>

Once implemented, the LTCP will have a substantial positive impact on the Anacostia through reductions in concentrations of bacteria. DC Water finds that the LTCP could reduce the frequency and magnitude of fecal coliform

exceedances attributable to the CSO that keep the Anacostia from meeting standards for primary contact recreation (swimming);<sup>166</sup> however, even after the LTCP is implemented, the Anacostia River will not meet water quality standards for bacteria much of the time due to pollution sources from upstream and stormwater runoff.<sup>167</sup> Reductions in organic matter would also mitigate fish kills, but may not entirely remedy conditions that create fish kills due to other sources of pollution, including stormwater runoff.<sup>168</sup>

DC Water has indicated that it is on track to meet the consent decree’s deadlines for implementing the LTCP. Indeed, DC Water reports that it has already implemented nine minimum controls, such as inflatable dams and pump station rehabilitations, required by the consent decree—reducing the volume of combined sewer overflows into the Anacostia River by 40 percent.<sup>169</sup>

The LTCP’s scheduled implementation is dependent on DC Water’s ability to raise revenue in a timely manner. Overall, the LTCP is projected to cost \$2.6 billion—of which \$1.7 billion will be spent on controls for the Anacostia River.<sup>170</sup> DC Water will finance the project through the issuance of bonds, and the cost will therefore be spread over decades. As of February 2011, DC Water has received \$150.6 million in federal funds for the entire project.<sup>171</sup> The bulk of debt service for the LTCP is being funded through an impervious area charge that DC Water collects from its commercial ratepayers in D.C. (This fee is separate from the D.C. Department of Environment stormwater fee, which is also based on impervious surface area). Fees are projected to increase steeply to cover the high costs of implementing the LTCP. DC Water has projected rates through FY2019. The annual impervious area charge for the average single-family homeowner will increase from \$41.40 in FY2011 to \$357.12 in FY2019—over an eight-fold increase.<sup>172</sup> In order to implement the Anacostia portion of the LTCP by 2018, as scheduled, D.C. ratepayers must bear these increases in DC Water’s impervious area charge.

## Washington Suburban Sanitary Commission Consent Decree

In late June 2005, WSSC settled claims by EPA, the State of Maryland on behalf of MDE, and four conservation groups<sup>173</sup> regarding overflows in WSSC's wastewater collection system.<sup>174</sup>

The consent decree established a multi-year action plan under which WSSC agreed to undertake \$350 million in improvements to its wastewater collection system to significantly minimize and, where possible, eliminate sewer overflows. In its most recent annual financial report for the year ending June 30, 2010, WSSC indicated that the costs of these remedial measures “are estimated at \$763 million and are to be expended over 12 years, \$673 million of which is expected to be incurred after fiscal year 2010.” The agreement also required WSSC to pay civil penalties totaling \$1.1 million. WSSC also agreed to complete additional environmental projects valued at \$4.4 million.<sup>175</sup>

WSSC's proposed budget for fiscal year 2011 includes an 86 percent increase over the 2010 budget for engineering services to support administration of the consent decree requirements. WSSC continues to conduct comprehensive sewer surveys for the purpose of identifying and eliminating extraneous flows. It has awarded three contracts for sewer system evaluation surveys and has included funds in the 2011 budget for the award of a fourth contract.<sup>176</sup>

Since grease blockages are a major cause of sewer overflows, WSSC is also implementing its Fats, Oils and Grease (FOG) program to reduce illegal or improper grease discharges at restaurants and fast food establishments. In fiscal years 2008 and 2009, WSSC completed 3,531 Fat, Oil and Grease (FOG) inspections of food establishments located within the WSSC service area. WSSC plans to conduct an additional 2,160 inspections in fiscal years 2010 and 2011.<sup>177</sup> WSSC also continues to educate the public on consent decree issues, including the FOG program.

In sum, when implemented, actions required by consent decrees to reduce combined and sanitary sewer overflows will substantially reduce bacteria loads in the Anacostia River—helping to address one of the major pollution sources that keep it from being safe for boaters, swimmers, and fishers. The near-elimination of annual sewer overflow events will also eliminate odors, making shore-based recreation, entertainment, and living more appealing.



Photo credit: Joe Mauro

## Historic Sources of Legacy Toxics

EPA and the District have determined under the CWA's water quality provisions that the tidal estuary of the Anacostia is excessively polluted with certain toxic materials including PCBs, PAHs, certain pesticides, and metals.<sup>178</sup> Under the CWA generally, where waters are impaired because of ongoing discharges, the approach is to reduce the discharges sufficiently so that standards can be met. There are few significant current industrial dischargers to the Anacostia, however, and these are not a significant source of the toxic materials at issue here. Reduction of stormwater discharges and combined sewer overflows (CSOs) will help keep some toxic contaminants from entering the River and its sediment, but EPA has forecast that such improvements will not fully resolve the problem. This is particularly true with respect to PCBs and PAHs already in the bottom sediment.

Because the great bulk of the toxic contamination in the River sediment does not come from ongoing specific discharges, there is no clear authority under the CWA to compel private parties – or municipalities – to clean up the contaminated sediment. Without action to address the sediment, the tidal estuary will likely remain significantly impaired for fishing even after the LTCP is implemented and stringent stormwater controls cut the discharge of sediment, nutrients, and bacteria in the watershed.

The federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, can provide the legal means for EPA and the District to help control these toxic sediments. Although CERCLA is being used to address some estuaries contaminated with toxics, it was designed more to deal with onshore problems posing imminent hazards to public health and safety than with chronic ecological risks and risks to people by ingestion of fish contaminated by toxic sediment.

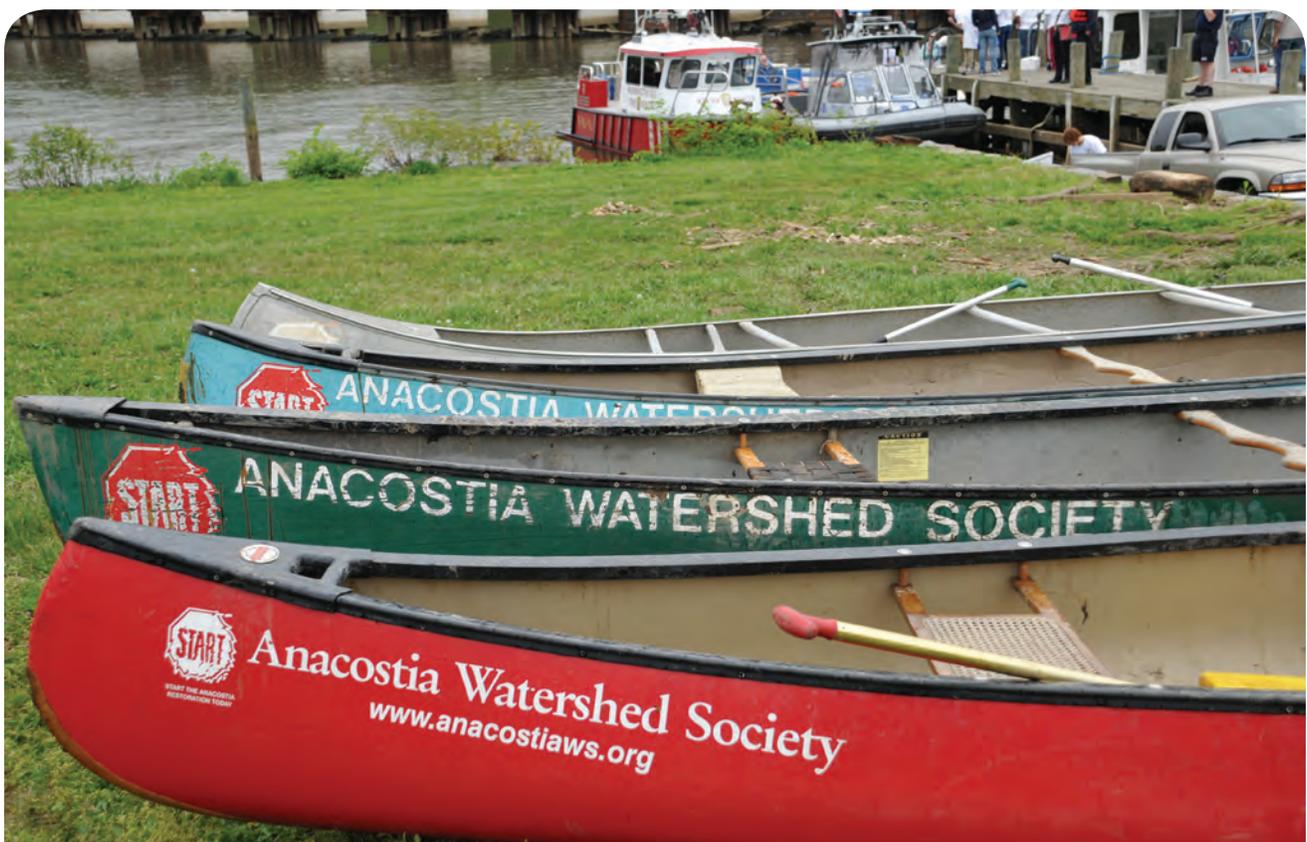
Controlling contaminated sediment is costly even by Superfund standards. In general, the options are to remove it by dredging, to cap it thickly to prevent flora and fauna and water movement from dislodging the cap and exposing the toxic sediments, or to leave it in place and let natural attenuation address the issue. According to EPA's TMDL decision on toxics and other government estimates, a remedy other than natural attenuation will be needed in the Anacostia if the estuary is to stop being significantly impaired by PCBs and PAHs.<sup>179</sup> Those substances are estimated to continue to endanger fish and wildlife for several decades or longer unless the most toxic areas are capped or removed. Dredging and capping will inevitably re-entrain some of the contaminants and spread them more widely. Removal of contaminated sediments tends to be the most costly step, as it ordinarily requires costly disposal of sediments; capping presents

problems in shallow tidal water, such as is found in much of the Anacostia, because the cap may create dry land or tidal flats. Superfund remedies of contaminated sediment are often a combination of the three methods, leaving the most lightly contaminated sediments alone, capping some, and removing the most heavily contaminated materials.

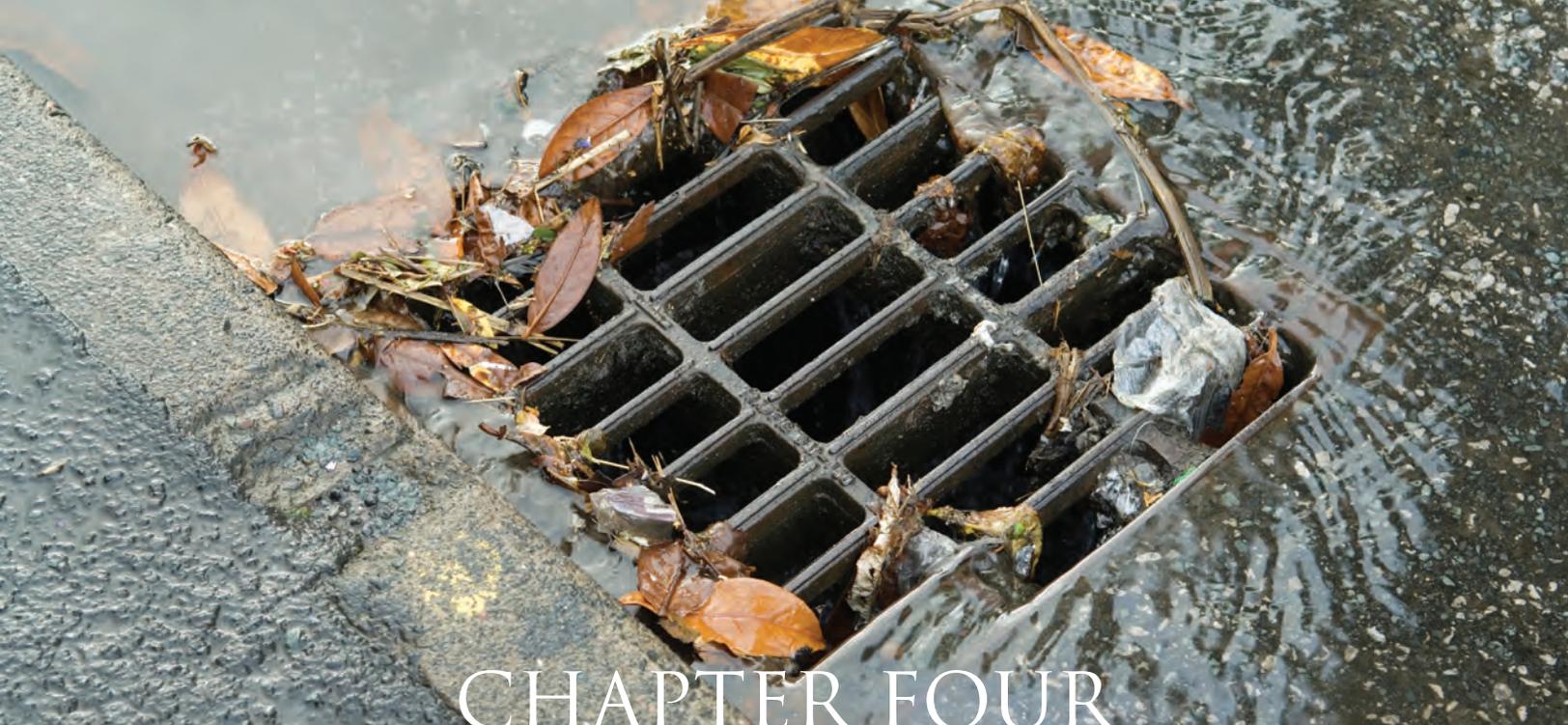
To address this issue of sediment contamination, EPA formed the Anacostia Watershed Toxics Alliance in 1999, a group consisting of 25 representatives from government, nonprofit, and private organizations. The Toxics Alliance was asked to investigate toxic contamination and to identify potential actions associated with waste sites.<sup>180</sup>

This effort has not yet led to any agreement to remedy the contaminated sediments, nor does it seem likely to do so any time in the next several years. Draft work from early 2009 that assessed sand capping of toxic sediments as a potential solution has been criticized by some stakeholders;<sup>181</sup> problems apparently include inadequate data about the extent of PCB and PAH contamination, potential difficulties with using a sand cap (which may not be sufficient to keep bottom creatures and water movement from uncovering toxic material beneath the cap), and significant underestimation of the remedial cost.

Photo credit: Po Chi Fung for Anacostia Watershed Society







## CHAPTER FOUR CURRENT CLEAN-UP EFFORTS ARE INSUFFICIENT

*“Implementation of existing initiatives will make progress in cleaning up the Anacostia, but will fall short of achieving comprehensive watershed restoration.”*



### Privately-Owned Impervious Surfaces in Need of Stormwater Upgrades

Even after most of D.C.’s combined sewer overflows are eliminated and sewer line infrastructure is upgraded in the Maryland portion of the watershed, the River will continue to be unhealthy due to pollution from stormwater runoff. Indeed, DC Water projects that once the LTCP is in place, pollution from stormwater and other upstream sources will keep the Anacostia River from meeting water quality standards necessary for swimming much of the time.<sup>182</sup> Likewise, the Army Corps of Engineers believes that upstream stormwater runoff must be addressed concurrently with efforts to limit combined sewer overflows in order to make significant progress in improving the Anacostia’s water quality.<sup>183</sup>

As reviewed in the previous chapter, several regulatory efforts are underway that, if implemented, will reduce stormwater runoff and its negative effects on the Anacostia watershed. In particular, stormwater runoff from existing public properties will be significantly reduced through retrofit requirements of MS4 permits and implementation of stormwater projects identified in the Anacostia Restoration Plan. Meanwhile, stormwater runoff from newly developed and redeveloped privately owned land will be mitigated in the future if volume-based stormwater retention regulations are adopted for such properties.

While these efforts will reduce stormwater pollution in the Anacostia, they are not likely—in and of themselves—to achieve the changes needed to make the Anacostia River and its watershed healthy in the reasonably foreseeable future.

First, although there is certainly movement toward the adoption of local stormwater regulations requiring on-site volume controls for new development and redevelopment, only Montgomery County had actually passed new standards at the time this report went to print. EPA’s promulgation of Chesapeake Bay stormwater regulations for new development and redevelopment could provide consistency across the watershed if D.C. and Maryland are required to adopt the regulations. EPA’s stormwater work thus far indicates that these regulations are likely to require volume-based stormwater retention standards, although there is no assurance, as the rules have not yet been issued.

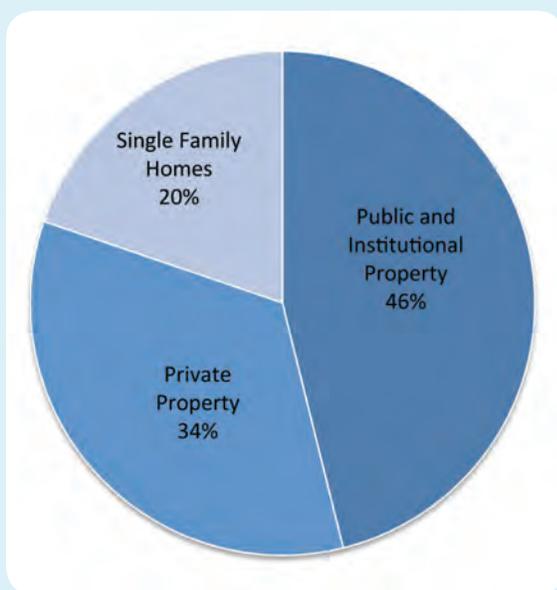
Second, redevelopment of commercial and mixed-use areas of the Anacostia watershed is likely to be a process that unfolds over several generations. Although rigorous volume-based requirements for redevelopment (if adopted) would significantly reduce stormwater runoff in areas that currently have no stormwater controls, the pace of these

changes is dependent on the pace of redevelopment. It is unlikely that the two-thirds of the Anacostia watershed without stormwater controls will be completely redeveloped in the foreseeable future, meaning that large portions of the watershed will go without stormwater controls over the next several decades. Moreover, polluted stormwater will continue to run off of residential areas of the watershed that were built without stormwater controls and are not likely to undergo redevelopment in the foreseeable future. Unlike commercial or institutional buildings, areas that are heavily residential—particularly in developments with single-family homes—are not typically redeveloped. Home restoration typically occurs on a single-lot basis, which in almost all communities is not large enough to trigger stormwater regulations for redevelopment. There are 118,400 single-family homes in the watershed, and approximately 20 percent of the Anacostia watershed’s impervious surface acreage belongs to single family homes;<sup>184</sup> it is unlikely that the majority of these homes will be subject to stormwater standards for redevelopment.

The limitations of redevelopment regulations suggest that retrofitting land that is developed but uncontrolled for stormwater will be an important component of accelerating the Anacostia clean-up effort. Montgomery County’s MS4 permit requirement to restore 30 percent of the County’s uncontrolled impervious areas will help to the extent that the County meets the requirement through stormwater retrofits in the Anacostia watershed. If finalized, the retrofit program proposed in the draft D.C. MS4 permit—along with requirements to plant trees and install green roofs—will also improve stormwater management on existing uncontrolled impervious surfaces. Since MS4 permit terms are five years, these retrofits would occur in a relatively short timeframe.

While an important step and an ambitious endeavor for local jurisdictions, these retrofit requirements do not fully meet retrofit needs. The bulk of retrofit requirements and activities required and/or proposed by these MS4 permits are likely to be applied to publicly owned land and facilities because it is easier for local governments to apply retrofits on their own properties than on private properties. Privately owned impervious surfaces, which account for over half of the Anacostia watershed’s total impervious surface acreage, may not be affected much by these retrofit requirements (*Figure 4. Distribution of Impervious Surface Acreage in the Anacostia Watershed by Ownership Type*).

**Figure 4. Distribution of Impervious Surface Acreage in the Anacostia Watershed by Ownership Type**



Source: Metropolitan Washington Council of Governments, 2009

*“With the amount of private property, primarily single-family homes, and its corresponding surfaces, restoration of the Anacostia River watershed cannot occur without addressing private property stormwater in some fashion.”*

U.S. Army Corps of Engineers, Anacostia Restoration Plan

In sum, the current regulatory requirements for stormwater will reduce runoff pollution by controlling future development and redevelopment, while MS4 permit requirements will promote retrofits mostly on public land. However, existing regulatory requirements fall short of accomplishing substantial and timely upgrades of impervious surfaces on existing privately-held properties—a key action required for the Anacostia clean-up.

### Limited Options for Prompt Remediation of Legacy Toxics

As explained in the previous section of the report, the CWA does not compel private parties or municipalities to clean up toxic sediments because most of the contamination is from historic sources that pre-date CWA. Instead, CERCLA must be used as the legal vehicle to control toxic sediments.<sup>185</sup> As this section describes, CERCLA is a lengthy and expensive approach.

Absent unusual circumstances not present here, under CERCLA, in order for EPA to compel long-term remediation of the kind needed to address toxic sediments, a site (or sites) including the affected portions of the estuary must first be placed on the National Priorities List (NPL). The NPL is a list of the most contaminated sites in the United States, determined according to EPA’s elaborate scoring process under the Hazard Ranking System (HRS). The scoring and listing processes are arduous and lengthy. EPA seldom assumes the cost of clean-up, instead preferring to “make the polluter pay.” Because of the strict liability rules under Superfund, this approach can lead to harsh results, as parties with little involvement in a contaminated site can be forced to pay shares far in excess of any equitable division of liability.

At present, of the six potential source sites discussed earlier in the report, only the Washington Navy Yard is on the NPL. The Navy has performed substantial work onshore to address potential sources of contaminants; however, it

has not yet undertaken to remedy contaminated sediments in the adjoining estuary. While data so far suggest that some of the worst sediment contamination is adjacent to the Navy Yard, there are other potential contributors nearby, including the Southeast Federal Center, the Washington Gas Light property (now owned by the National Park Service), and possibly Poplar Point, owned and controlled by the federal government but scheduled for transfer to the District of Columbia, and the former location of a Navy base.

While the Navy Yard may be a significant contributor to the sediment contamination, it is far downstream from other detected PCB and PAH contamination, which appears likely to have originated at least in part from other locations, including the Kenilworth Dump, formerly owned by the District and now owned by the National Park Service, as well as PEPCO’s Benning Road installation.

In order to proceed under CERCLA, EPA will have to decide whether to list a number of shore-side locations as individual sites (with adjacent sediments) and seek to place them on the NPL, or to list the entire estuary, seeking to address contaminated sediment the entire length of the estuary. Serious problems exist with both approaches.

Listing more sites on the banks of the estuary will be a substantial effort and may lead to inconsistent clean-up decisions concerning ecological risk, as well as to a fragmented and ineffective approach to contaminated sediment clean-up. It is unclear whether all the shore-side installations claimed to have contributed to contaminating the sediment are sufficiently contaminated to warrant placement on the NPL. Proceeding in a piecemeal fashion may result in clean sediment placed at one location being re-contaminated by sediment from another, unless remedial work is carefully coordinated.

At the time this report went to print, DDOE had reportedly reached two settlements under either CERCLA or under oil pollution control authority providing not only for



Photo credit: Anacostia Watershed Society

shore-side remedial investigation, but also sediment investigation. DDOE was also believed to be close to reaching at least one more settlement under CERCLA to address another unlisted site. While these signed or likely settlements are encouraging signs of progress, the problem of coordination among sediment investigations is real. If such investigations follow the standard approach, despite the undeniable hydrologic connection among the contaminated sediments in these tidal waters, there will be no review of their collective approach to remediation to determine if they are the wisest overall solution.

By the same token, listing the entire estuary through the usual means will also be arduous, and while ecological risk assessments and remedy decisions are likely to be made in a more consistent and effective way for the estuary, the sheer size of the undertaking, together with experience with other sediment clean-up “megasites,” suggest the remedial cost for addressing contaminated sediment in the River could easily exceed \$100 million, and that the effort could take 10 or 15 years before remedial work is started. This is true even though the Anacostia estuary may be less contaminated than the portions of the Passaic or Hudson Rivers or Puget Sound now being addressed under CERCLA.

Regardless of whether EPA proceeds by listing the estuary on the NPL, or by listing specific shore-side locations, CERCLA requires that a Remedial Investigation/Feasibility Study (RI/

FS) be conducted before EPA can choose its remedial action. That RI/FS is to evaluate the degree of contamination and the potential remedies according to CERCLA criteria so that EPA can legally support the remedial action it decides to take. EPA strongly prefers to force others to carry out the remedy at their expense rather than to carry out the chosen remedy itself using Superfund money.

Many of the Anacostia’s stewards share a sense of urgency around the need to address toxics. However, there is little public understanding of how slowly Superfund works, how long such studies take, and how very expensive they are. Even with the numerous studies previously done, it will optimistically take EPA three or more years to conduct an RI/FS for the estuary. Costly studies on the Passaic have taken more than a decade and little remedial work has yet been done. Despite understandable frustration over the slow pace, the RI/FS is not optional under Superfund, though there are ways to streamline it.

Institutional and political factors also discourage prompt remediation of contaminated sediment. Most of the potential sources of the contamination are owned and operated by the federal government, making the federal government strictly liable for the clean-up. The river bottom is also owned by the federal government, further complicating the liability picture under CERCLA.

EPA cannot sue another federal agency to compel it to pay for a Superfund clean-up, and EPA’s authority to order another agency to act is much disputed. In cases involving federal facilities, agencies often delay for years because there is no court to force a final decision and because the funding to pay for the clean-up usually comes out of that agency’s budget. (In court cases, the settlement for federal agencies is usually paid from the Judgment Fund controlled by the Justice Department, not the agency’s budget.) Thus, federal agencies have little or no incentive to take the lead in any comprehensive study or clean-up of the sediments.

While Washington Gas Light and PEPCO apparently have some responsibility and have reportedly taken some remedial action at their shore-side locations, it is not reasonable to expect these parties to take the lead in clean-up given the substantial federal responsibility for the toxic contaminants in the sediment.

The District also has substantial potential liability exposure under CERCLA as a result of its past and current land ownership by and near the estuary and as a result of the District’s

past operation of the Kenilworth Landfill. If the District sues the federal government for remediation under CERCLA, the District is also likely to face a substantial counterclaim for liability, a potent disincentive against bringing an enforcement action. A potential suit to clean up the Kenilworth Landfill may result in most major commercial entities whose trash was disposed there in the 1960s – and most federal agencies in the area – having to pay a significant clean-up cost as well and being dragged into litigation lasting many years. Because liability under CERCLA can be strict, joint, and several, the potential liability facing many parties could put them into bankruptcy, even though their contribution to the contamination may be miniscule. There is little incentive for the District to kick a political hornet’s nest of that kind. Additionally, some in the District’s leadership could be opposed to any listing of the estuary on the NPL, as that would discourage waterfront development along the Anacostia, as well as critically needed private investment on the east side of the River. This investment is important to bring jobs and improve the quality of life in a part of the District that has lagged behind the rest of the city economically.

## Divided Authority Over Key Restoration and Land Use Decisions

Divided authority over key restoration and land use decisions throughout the watershed impedes restoration in two ways. First, authority and responsibility for environmental and land use policies central to controlling stormwater are often divided between different agencies within the same government. For example, in the District of Columbia, the Department of the Environment is the main agency responsible for managing the District’s stormwater program, but at least seven additional agencies—including the Departments of Transportation, Public Works, Planning, Public Education Facilities Modernization, Real Estate Services, Parks and Recreation, and DC Water—have key responsibilities for stormwater management practices. Likewise, in Prince George’s and Montgomery Counties, the Departments of Environmental Resources/Protection are responsible for managing the Counties’ MS4 permits while the Departments of Transportation and/or Public Works are responsible for updating, implementing, and enforcing stormwater regulations for new development and redevelopment. Different agencies sometimes use memoranda of understanding to coordinate restoration activities. Nonetheless, the different missions, priorities, staff, and budgetary constraints across agencies can sometimes cause them to work at cross purposes, and inevitably make coordination and accountability around key restoration priorities challenging.

Second, as with many regional policy issues, divided jurisdictional control presents a barrier to achieving a healthy Anacostia. The watershed is spread across two counties, each with its own jurisdictional context, as well as the State of Maryland’s policy context, and the District of Columbia. This lack of unified jurisdictional authority is further complicated by the presence of the federal government as a landowner of 14 percent of the watershed.

Accordingly, the Anacostia watershed suffers from fragmented decision-making and divided authority over key restoration and land use decisions. The local jurisdictions, the State of Maryland, and several federal agencies have made voluntary agreements to restore the watershed and participate in the Anacostia Watershed Restoration Partnership.<sup>186</sup> However, the jurisdictions have no binding obligation to work together and few incentives to make coordinated Anacostia clean-up a high policy priority across jurisdictions.<sup>187</sup> Moreover, there is a lack of accountability for clean-up results across jurisdictions because the parties responsible for enforcing legal clean-up obligations vary across the watershed. (For example, as noted in the previous chapter, stormwater permits are written and enforced by the State of Maryland in Prince George’s and Montgomery Counties, while EPA writes and enforces the permit in the District of Columbia.)

These problems, typical situations of divided control, are exacerbated by the perception that the benefits of a healthy Anacostia will be enjoyed by people other than those paying the price of restoration measures. For example, although 80 percent of the Anacostia watershed is in Maryland, the actual River is located almost entirely in the District of Columbia. Stormwater controls, which need to be implemented on a large scale throughout the Maryland portion of the watershed, may not seem like an immediate funding and regulatory priority for constituents in Montgomery and Prince George’s Counties because they will not experience the immediate benefits of a clean tidal River in their own communities. Moreover, Maryland policymakers may be reluctant to prioritize additional resources for Anacostia clean-up until the combined sewer overflows are substantially reduced, given that such overflows are a significant barrier to achieving a healthy River. Likewise, D.C. officials and stakeholders have expressed concerns about the equity of clean-up responsibilities across the watershed since many of the negative impacts of polluted stormwater runoff on the Anacostia River come from upstream Maryland sources over which D.C. has no control.

**Table 4. Candidate Restoration Projects from the Anacostia Restoration Plan by Jurisdiction**

Jurisdiction	Number of Projects	Percent of Total	Percent of Total Cost
District of Columbia	373	12%	10%
Montgomery County	897	30%	27%
Prince George's County	1,748	58%	63%
<b>Total</b>	<b>3,018</b>	<b>100%</b>	<b>100%</b>

Source: Army Corp of Engineers, Anacostia River Watershed Restoration Plan and Report, 2010.

Despite these long-standing issues of divided jurisdiction, the two watershed counties, the District of Columbia, the State of Maryland, and several federal agencies produced the Anacostia Restoration Plan in partnership with the Army Corps. The Plan is an unparalleled initiative in regional cooperation—no other U.S. river restoration plan has developed a similar multi-jurisdiction road map for restoring an urban watershed. The Restoration Plan is a major contribution to the restoration effort; in addition to providing a systematic inventory of restoration projects throughout the watershed, the Plan also provides a new framework for setting shared priorities and increasing cooperation and accountability across jurisdictions.

However, the Plan's 3,000 projects are not evenly distributed across jurisdictions: 58 percent of all projects are located in Prince George's County, 30 percent are located in Montgomery County, and 12 percent are located in the District (Table 4. Candidate Projects from the Anacostia Restoration Plan by Jurisdiction). Nor are the costs of the projects distributed evenly. Under current circumstances, the local jurisdictions are responsible for funding and implementing the projects identified in the Plan, and a challenging budget climate, divided decision-making, and fragmented authority could serve as barriers to the plan's implementation.

## Insufficient Local Resources for the High Cost of Clean-Up

Insufficient local financial resources are also a major impediment to Anacostia clean-up. The Anacostia Restoration Plan's implementation is severely inhibited by a lack of dedicated funding. Currently, there are no identified sources of funding for the Plan's projects other than revenues that local jurisdictions are already raising for their existing stormwater programs.

Local stormwater budgets are currently too small to fully fund implementation of the Anacostia Restoration Plan. As discussed in the previous chapter, the Maryland counties and the District are concerned that it will be financially challenging to meet the requirements of their stormwater permits with existing resources, let alone the additional, voluntary projects identified by the Anacostia Restoration Plan.

D.C. and Montgomery County have reported that it is likely that some of the projects identified in the Anacostia Restoration Plan will be integrated into their efforts to meet MS4 permit requirements. However, they will not implement all of the Plan's projects through their permits, and will therefore need additional resources to fully implement the Anacostia Restoration Plan. Indeed, the authors of the Anacostia Restoration Plan clearly state in regard to funding the full plan that,

*even with increased fees, plus any small amount of general revenue that they may be able to devote to the restoration...supplemented by whatever federal and state grants they will be able to get (and these are not a continuous and reliable source of funding), the local jurisdictions will not have enough resources. They will work to implement the [plan] but they will not be able to implement the [plan] in 10 years. A new source of funding is needed.<sup>188</sup>*

In addition to lacking funds necessary to implement the Anacostia Restoration Plan's projects, the local jurisdictions lack resources to provide the level of financial grants and incentives necessary to encourage stormwater retrofit upgrades on private lands. Both Montgomery County and the District of Columbia have grant programs to help homeowners install green infrastructure on their properties to reduce stormwater runoff, called RainScapes and RiverSmart

Homes, respectively. Over the past two years, Montgomery County processed 300 applications to its RiverScapes program. In FY 2008 and 2009, Montgomery County’s RainScapes program budget was sufficient to meet demand. However, 10 months into FY 2010, Montgomery County had spent its entire RainScapes program budget and had stopped taking applications.<sup>189</sup> Likewise, the District of Columbia has processed 1,083, or 50 percent, of the 2,139 request for stormwater audits through its RiverSmart Homes process since the inception in 2008. Approximately 500 homeowners are on the RiverSmart Homes audit waitlist.<sup>190</sup>

In sum, current clean-up efforts will fall short of restoring the Anacostia in four ways. (Table 5. *Summary of Expected Accomplishments and Limitations of Existing Clean-Up Obligations*). First, the large amount of impervious surface on private property suggests that consistent and strong stormwater rules across the watershed are essential, as are incentives to encourage private property owners to make stormwater upgrades. Second, the inability to clean up legacy toxics using the tools of the CWA requires EPA and D.C. to use CERCLA to control toxic sediments; since Superfund clean-ups are lengthy and expensive, accelerating



Photo credit: Anacostia Watershed Society

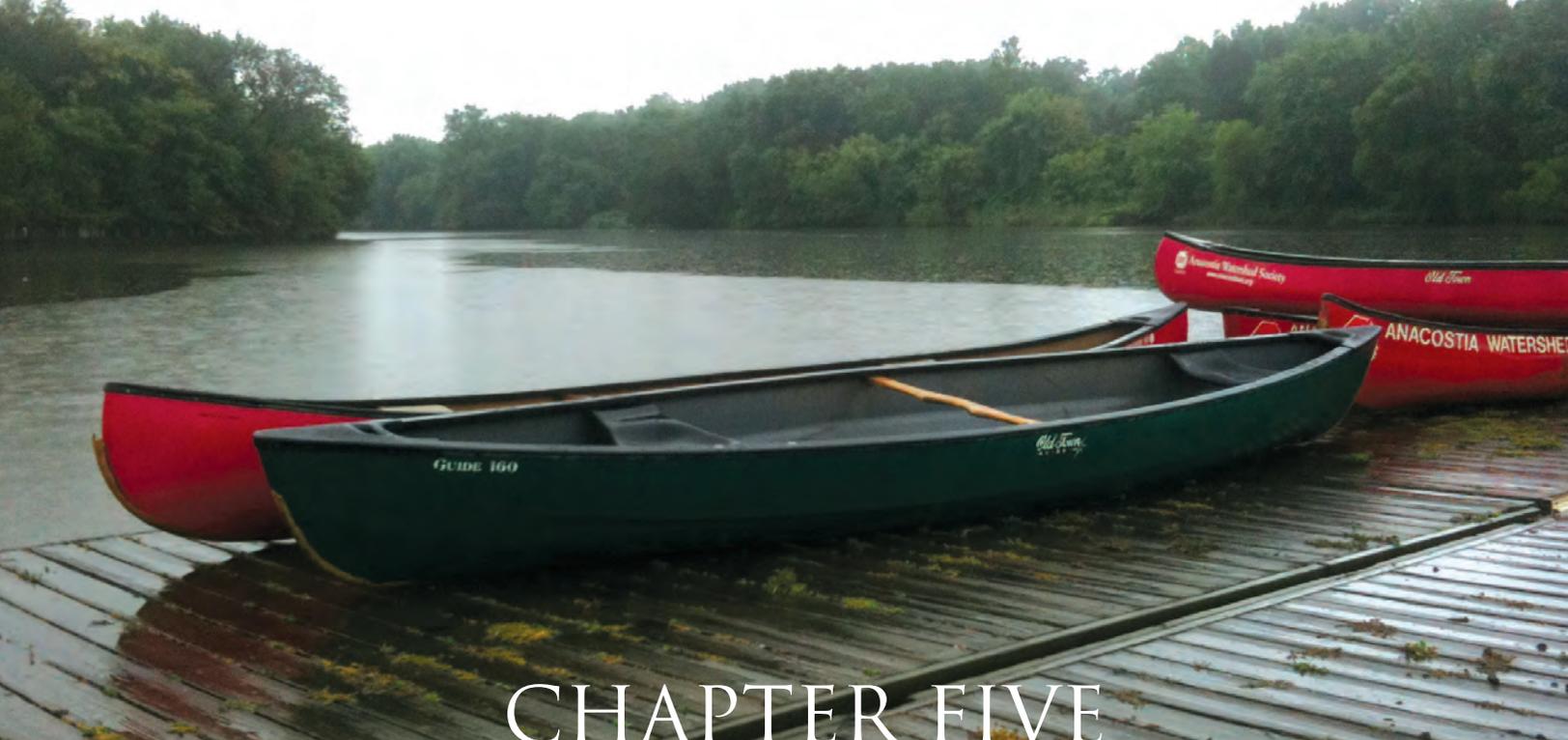
the Anacostia’s clean-up will require the adoption of an efficient approach within the CERCLA framework. Third, decentralized responsibility across the watershed suggests that a central coordinator must be given the authority and resources necessary to lead the clean-up process. Finally, the gap between the high estimated cost of the Anacostia Restoration Plan and the availability of local funds suggests that federal resources will be necessary.

**Table 5. Summary of Expected Accomplishments and Limitations of Existing Clean-Up Obligations**

Pollution Problem	Expected Accomplishments	Remaining Limitations
<i>Stormwater</i>	<ul style="list-style-type: none"> <li>Increased retrofits on federal and local public properties and facilities</li> <li>Improved volume controls on newly developed or re-developed public and private properties</li> </ul>	<ul style="list-style-type: none"> <li>Consistent volume-based stormwater rules for new development and redevelopment have not yet been adopted across the watershed</li> <li>Private land that will not undergo redevelopment in the immediate future needs to be retrofitted</li> <li>Local funds are insufficient to implement the Anacostia Restoration Plan</li> </ul>
<i>Sewer Overflows</i>	Sewer overflows will be nearly eliminated by CSO long-term control plan and SSO action plan	<ul style="list-style-type: none"> <li>Fees paid by DC ratepayers are the only dedicated funding source for implementing the CSO long-term control plan</li> </ul>
<i>Legacy Toxics</i>	Progress on some shore-side sites with potential related sediment investigation	<ul style="list-style-type: none"> <li>Clean Water Act can’t be used to remediate legacy toxics</li> <li>Traditional CERCLA process is arduous and expensive</li> <li>No collective remediation approach for contaminated sediments</li> </ul>

Source: DC Appleseed





## CHAPTER FIVE

# RECOMMENDATIONS FOR ACCELERATING THE CLEAN-UP

*“In order to clean up the Anacostia, the Restoration Plan must be implemented in conjunction with new strategies to mitigate stormwater pollution from private property in the watershed and efforts to remediate toxic contamination in the tidal River.”*

### Overview

We recommend that the federal government establish an urban river pilot program for the Anacostia watershed. The program would take key actions to address stormwater runoff—a major stressor to urban rivers throughout the country—on a watershed-wide basis, by requiring improved federal and local stormwater controls that emphasize green infrastructure techniques in exchange for federal financial support. The program would also remedy contaminated sediment in the tidal estuary through using existing federal authority under Superfund. We recommend that EPA administer this pilot program (*Figure 5. Key Components of the Proposed Urban River Pilot Program for the Anacostia Watershed*). The federal and local governments can begin to adopt regulatory program components immediately without separate appropriations. However, the recommended financial investments would garner support for regulatory action, and would accelerate

the clean-up process. Before describing the pilot program, we explain why the federal government should lead the clean-up effort during a time of budget austerity.

### Why the Federal Government Should Make Anacostia Restoration a Priority

Why should the federal government pick this degraded urban river for this pilot program and use federal funds raised from taxpayers across the country to demonstrate an effective and innovative clean-up here? The short-term, practical answer is that the Anacostia Restoration Plan conducted by the Army Corps of Engineers has now presented a systematic inventory of projects (mostly slated for public property) to address the Anacostia’s major stressor—stormwater runoff. To our knowledge, no other urban watershed has

anything close to this pre-screened list of projects, already reviewed by the Army Corps. This preliminary work makes the Anacostia clean-up an excellent place to test innovative stormwater control efforts, including green infrastructure approaches promoted by EPA on a large scale.

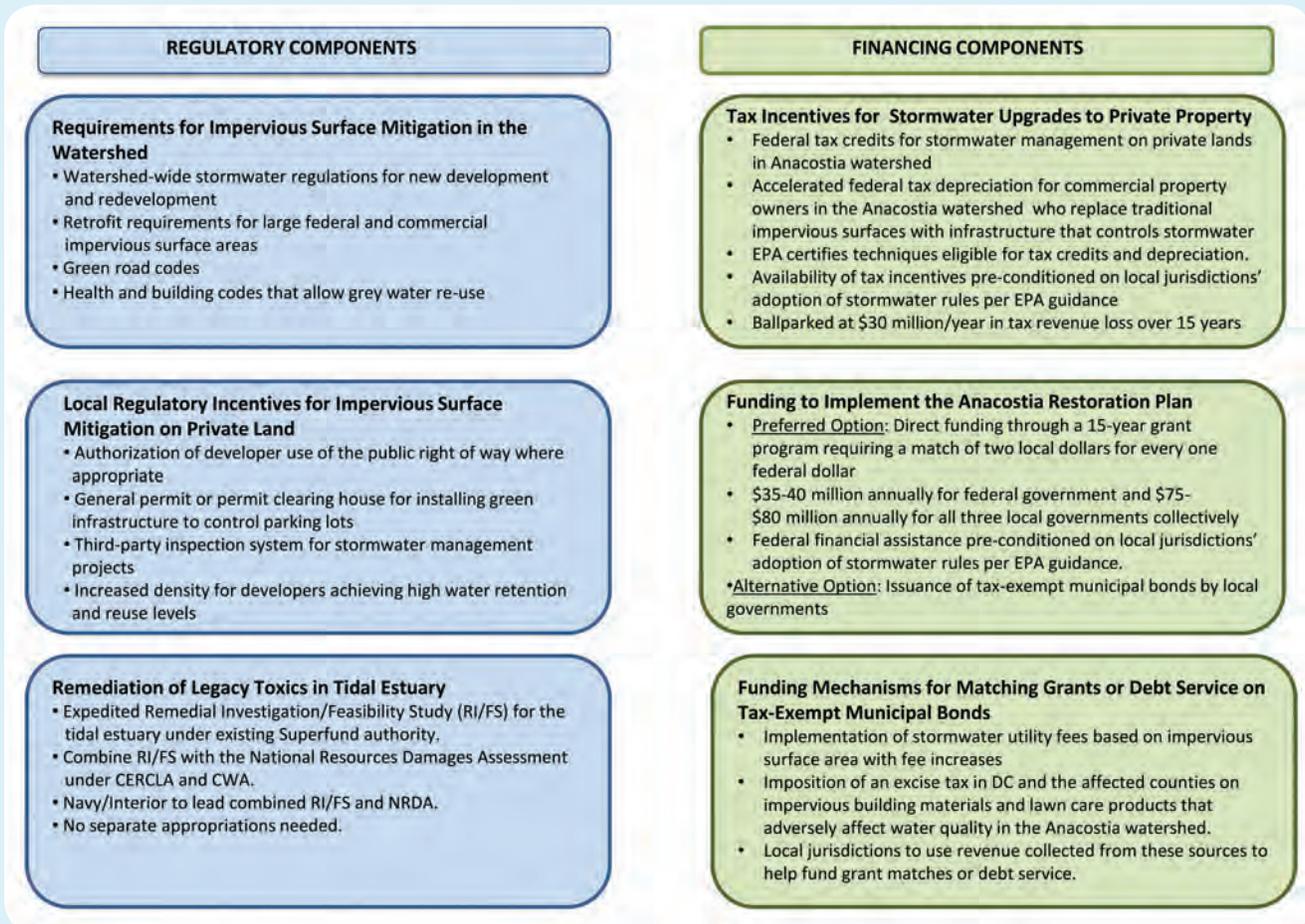
The more fundamental reason is that the federal government has been the predominant player in the watershed for over two centuries, and because of its actions degrading the River and the watershed, bears by far the largest share of the responsibility to restore it to the statutory minimum of fishable, swimmable water quality set by Congress in the Clean Water Act nearly four decades ago. As explained in Chapter 2, undisputed historical and engineering facts demonstrate the federal government's predominant responsibility for this degraded watershed and estuary. The federal government has the responsibility to help remedy this well-documented

damage, which it caused to the Anacostia River and its tributaries through its role as the watershed's principal developer and landlord.

Cleaning up the Anacostia River will require adding a combination of rigorous stormwater regulations and new dedicated funding to existing efforts. Most of the recommendations contained in this report are regulatory recommendations directed at the federal government, as well as the District of Columbia, and Montgomery and Prince George's Counties. The federal and local governments can begin to adopt these regulatory recommendations immediately without new large budget outlays.

However, the long-term project of cleaning up the Anacostia River, including efforts by local governments, utilities, and private property owners to meet clean water regulations, will

**Figure 5. Key Components of the Proposed Urban River Pilot Program for the Anacostia Watershed**



Source: DC Appleseed

*“A focused, holistic, and comprehensive approach to restoration must be pursued because water quality goals will be not achieved with the current level of funding or with sporadic restoration projects implemented by various parties acting independently under different jurisdictions and authorities.”*

U.S. Army Corps of Engineers, Anacostia Restoration Plan

not be without cost. As demonstrated in previous chapters, the local jurisdictions and water utilities are making significant financial commitments to the Anacostia’s clean up. Private landowners are also funding clean-up actions, either in an effort to meet regulatory requirements during development or redevelopment or through voluntary commitments. While these activities are critical, the restoration process will continue in a slow and piecemeal manner if it relies only on existing local government funding and revenue from private sources. As explained in the last chapter, efficient, coordinated, and cost-effective implementation of the Anacostia Restoration Plan’s projects will require a new funding mechanism capable of providing predictable and dedicated revenue over a period of 15 to 20 years. Likewise, a combination of financial and regulatory incentives will be necessary to achieve substantial and timely upgrades of privately owned impervious surfaces.

Although the federal government has strong regulatory authority that we recommend be used to accelerate the Anacostia’s restoration, without a serious federal financial contribution, more stringent regulation alone will likely generate more resistance than water quality improvement. Particularly given the federal government’s predominant historical role in degrading the tidal River and much of the watershed upstream, an approach that relies only on regulation may be perceived as highly inequitable. By the same token, if the federal government partners equitably with other stakeholders to help remedy the problems that past federal policies have helped create, local governments and private parties are likely to prove far more cooperative.

Although only the federal government has the capacity to lead an effective restoration effort, we do not recommend that the federal government bear the bulk of the clean-up’s cost. As previously explained, implementation of the Anacostia Restoration Plan will require an annual total public investment of \$115 million over the next 15 years.

We recommend the judicious use of federal funding to help implement these restoration projects, through direct grant funding with a high local match. To address stormwater runoff from private property, we also recommend the provision of federal tax credits to homeowners and accelerated depreciation for commercial property owners who install green infrastructure on their property. Such federal tax incentives could affect the federal government in the form of foregone tax revenue, which we roughly estimate to be in the order of \$30 million annually over the next 15 years. In our view, it will be essential to begin providing both tax credits and matching grants over the next several years, in order to leverage private and local government resources efficiently and to make regulatory steps more effective. However, if a federal matching grant program cannot be established in the near-term, local jurisdictions could consider issuing tax-exempt municipal bonds to implement high-priority public projects from the Anacostia Restoration Plan. Because local governments are also facing budget challenges, we make specific recommendations about how to raise local funds by implementing impervious surface stormwater fees and taxing the sale of certain items that significantly affect water quality in the District and the affected counties.

### **EPA Authority to Administer the Anacostia Pilot Program**

Because the Anacostia watershed’s boundaries do not neatly align with political boundaries or property lines, the context for the Anacostia clean-up is a complicated mix of federal, state, and local laws, and public and private landowners. In order to carry out a watershed-wide clean-up in the most efficient, cost-effective, and environmentally-beneficial manner, there must be a central authority charged with working with local watershed governments to identify priorities on a watershed-wide basis, coordinate inter-governmental efforts in support of priorities, and to collect, direct, and disperse funding toward the implementation of priority actions. A

central authority could look across federal, state, and local silos to achieve synergies among programs, regulations, and funding streams. Similarly, such coordination could eliminate duplicative efforts, resulting in cost savings.

The amount of federal investment called for in this proposal, combined with the inherent limitations posed by divided jurisdictional authority at the local level, suggests that this central authority should reside with the federal government. Because of EPA's pervasive statutory role under the CWA and Superfund, as well as its long experience in administering grant programs, we recommend that EPA be charged with supervising and coordinating actions recommended in this report.

We propose that, either by statute or by direction of the EPA Administrator, the pilot program laid out in this chapter be assigned at the Assistant Administrator level within EPA. This office should be charged with working with the high-level officials in the State of Maryland, Montgomery and Prince George's Counties, the District of Columbia, and other federal agencies to implement the recommended clean-up strategies, although we would ask EPA to decide upon the particular administrative structure used to work with the various governmental entities. We suggest that the EPA authority be responsible for the following activities:

- Establishing the specific slate of stormwater rules that local jurisdictions must adopt for the Anacostia watershed as a pre-condition for federal financial support, providing guidance and resources for their administration, and certifying and enforcing their implementation.

- Setting priorities for investments and administering funds to local jurisdictions, across political boundaries, in support of priorities.
- Facilitating communication and actions between federal agencies, particularly those with land-holdings and facilities in the watershed, such as the Departments of Interior, Agriculture, Defense, and Transportation, and the Army Corps of Engineers.
- Working with the Internal Revenue Service (IRS) to implement federal tax incentives for green infrastructure implementation and maintenance.
- Keeping a data and evaluation depository on the efficacy, costs, and benefits of green stormwater techniques, and other investments.

Local governments are currently responsible for implementing stormwater permits, regulations, and projects, and would continue to hold this responsibility, but with a greater focus on coordinated watershed clean-up with guidance from EPA, and with additional resources. For example, the Army Corps of Engineers recommends that the stormwater retrofit projects in the Anacostia Restoration Plan be implemented under the direction of EPA or state and local agencies.<sup>191</sup>

Legislation introduced by Congresswoman Eleanor Holmes Norton in 2005 to restore the Anacostia sets a precedent for establishing the program within EPA.<sup>192</sup> That proposal charged EPA with planning and funding restoration improvements in the Anacostia watershed, including the implementation of a comprehensive restoration plan, in partnership with local governments and other federal agencies. The comprehensive restoration plan has now been completed by the Army Corps, and it is time for EPA to direct its implementation, along with the other critical restoration strategies identified in this report.



**The mission of EPA is to protect human health and the environment.**

Photo credit: @istockphoto.com/skyhobo

## Stormwater Policy and Financing

We propose a four-part policy and incentive package to address the Anacostia's primary stressor – urban and suburban stormwater runoff:

1. Improved local and federal facility requirements to control stormwater and reduce, over time, the impervious surface area on commercial and federal land in the Anacostia watershed;
2. Improved local regulatory incentives for private landowners to make such upgrades;
3. Federal tax incentives for private property stormwater upgrades in the Anacostia watershed, conditioned on the adoption of more rigorous stormwater requirements, including retrofits, by local governments; and
4. Federal and local funding for the implementation of the Anacostia Restoration Plan, with federal funding conditioned on the adoption of rigorous local requirements. We recommend that funding take the form of direct federal grants with a requirement for a high local match. If a federal matching grant program, which is preferable, cannot be developed, local jurisdictions could consider issuing tax-exempt municipal bonds.<sup>193</sup> Local governments could use stormwater utility fees based on impervious surface area and excise taxes on certain impervious building materials and lawn care products to help raise dedicated revenue for matching grants or debt service on bonds.

Regulatory requirements for handling stormwater and local incentives (Items 1 and 2) could begin to be pursued without federal legislation. Federal tax incentives and grants would require federal legislation.

### 1 Requirements for Impervious Surface Mitigation in the Watershed

We recommend that some combination of new regulatory provisions described below be adopted by local jurisdictions and applied to areas within the Anacostia watershed. Adoption of such regulations should be a prerequisite for increased federal financial aid, including federal tax incentives to private landowners located in the watershed. While we would ask EPA to decide upon the actual mix of local stormwater requirements required in exchange for federal financial assistance, any such requirements should

reduce stormwater runoff by maintaining or restoring the predevelopment hydrology of the site to the maximum extent practicable, using green infrastructure techniques that infiltrate, evapotranspire, or re-use stormwater. We recommend that EPA be responsible for providing guidance on stormwater volume standards and green infrastructure techniques, and for certifying a local jurisdiction's adoption of adequate requirements to accomplish significant reductions in stormwater discharges, determined according to specified statutory criteria. Such certification by the EPA Administrator should be subject to judicial review in order to assure that such progress is enforceable by citizens and by the other affected jurisdictions.

The regulatory recommendations below do not radically differ from the approach that EPA is already advising local jurisdictions to take in terms of moving toward volume-based stormwater controls. Indeed, some of the local watershed jurisdictions are already adopting some version of regulatory requirements recommended below. The purpose of requiring the local jurisdictions to adopt a common set of regulations is to provide a consistent regulatory framework for stormwater control in the Anacostia watershed across jurisdictions, rather than the existing patchwork of rules and codes. A consistent set of rules will level the playing field across the watershed and advance a watershed-wide approach to clean-up in order to achieve more environmentally beneficial and efficient results.

### Watershed-wide Stormwater Regulations for New Development and Redevelopment

The local jurisdictions should adopt consistent watershed-wide regulations for new development and redevelopment within the Anacostia watershed. These regulations should require onsite retention of a high volume of stormwater, as defined by EPA, through infiltration, evapotranspiration, and reuse. Rules for new developments being built in the Anacostia watershed should require driveways, parking areas, and subdivision streets to use sufficient permeable pavement and appropriate curbing to provide for on-site retention of annual precipitation, as defined by EPA. Such rules could also require stormwater management systems for buildings and homes in new subdivisions to be designed so that runoff is conveyed from buildings to planted swales or other green infrastructure techniques in the public right of way.

Regulations for new development and redevelopment in the Anacostia watershed are already moving in this direction. Indeed, the newly passed Montgomery County stormwater

ordinance and the stormwater standards proposed by EPA for the District of Columbia both provide examples of volume-based standards for new development and redevelopment.

In some cases, it may be technically impossible or inappropriate to manage full stormwater volumes on site. For example, on some properties, soil types may not allow for infiltration of stormwater, while on other sites, infiltration could cause problems with neighbors' basements, underground utilities, or Metro tunnels. Such technical difficulties are more likely to occur in ultra-urban environments like downtown D.C., where high density levels make it more difficult to incorporate green infrastructure into redevelopment designs.

Accordingly, we recommend establishing a green infrastructure, off-site mitigation program for development projects that cannot fully meet volume-based, on-site stormwater standards due to site constraints. An off-site mitigation program would allow developers to build green infrastructure stormwater management systems on another site to address the difference between the stormwater volume that can be reasonably managed on their site and the volume that must be managed to comply with the standard. The off-site mitigation program could be contained within a subwatershed or in other words, within the drainage area of a given tributary. For example, if a development in the Sligo Creek sub-watershed could not meet stormwater standards on-site, they could build a green infrastructure project somewhere else in the Sligo Creek subwatershed. The Anacostia watershed is composed of 14 primary subwatersheds in addition to the tidal River.

Off-site stormwater projects do not have to be a one-to-one offset. Instead, offset projects could be required to manage one-and-a-half or two times the stormwater required by the standard, similar to offsets in clean air non-attainment areas. By allowing off-site mitigation projects to cross-jurisdictional boundaries within the same sub-watershed, the program provides more off-site options to developers who cannot meet volume requirements on-site. Because the off-site mitigation program would require the installation of green infrastructure, sites chosen for off-site mitigation would receive green infrastructure and its benefits.

Since most of the watershed is already developed, high volume-based standards for redevelopment are essential to clean up the Anacostia. We do not believe that adoption of such standards for redevelopment as part of our larger policy package will undermine smart growth objectives.<sup>194</sup> First,

EPA is moving in the direction of requiring all local jurisdictions within the Chesapeake Bay watershed to adopt high volume-based standards for redevelopment, as evidenced by the D.C. MS4 permit and the Bay strategy. We expect that the requirements we recommend for the Anacostia watershed will eventually become standard throughout the region. Second, the requirements that we recommend are to be adopted in exchange for local incentives (notably greater density allowances) and federal tax incentives to help private property owners meet standards in a cost-effective way, as discussed later in this chapter. Third, as indicated earlier, interviews conducted for this report suggest that the costs of meeting volume-based, on-site retention standards are just one of many cost factors that developers face. Thus, while we cannot preclude the possibility that, in some instances, retention standards could be a material consideration in the choice between a developed and a greenfield site, smart growth goals should not be significantly affected by the recommended standards.

Stormwater rules for new development and redevelopment of federal facilities should also be enforced. As described earlier, new development or redevelopment of federal installations are subject to the stormwater requirements of section 438 of EISA of 2007, which according to EPA guidance, requires on-site management of the 95<sup>th</sup> percentile storm (equivalent to 1.7 inches in the Anacostia watershed). However, EISA did not provide an enforcement mechanism for section 438. Therefore, for federal installations in the Anacostia watershed, we recommend that these requirements be made enforceable by administrative consent agreements among each such agency, the EPA, DDOE, and MDE, under authority of both the federal Clean Water Act and RCRA section 6001(b).<sup>195</sup> This consent agreement approach does not require legislative action, but would allow enforceable orders to be issued to recalcitrant federal agencies. It would also allow citizen suits under sections 505 of the Clean Water Act and 7002 of RCRA to enforce such orders.<sup>196</sup> This is an issue on which the President can take action by Executive Order to require federal agencies to enter into such agreements without delay.

### **Retrofit Requirements for Large Impervious Surface Areas**

Local jurisdictions should adopt rules requiring all commercial properties with an impervious footprint of two acres or larger to be retrofitted with permeable pavement and other green infrastructure measures to provide for and maintain on-site stormwater retention at a high volume, to be defined by EPA, with a phase in period of seven to ten years,

similar to that used in the federal underground storage tank program under the Resource Conservation and Recovery Act (RCRA).<sup>197</sup> Two acres corresponds to the impervious area threshold EPA has reportedly used in parts of the Charles River watershed in Massachusetts for similar retrofit requirements under the Clean Water Act's permit program, which EPA administers both in Massachusetts and the District.<sup>198</sup> Where such retrofits are infeasible for environmental reasons, potential threats to underground utilities or neighboring property, or because of undue expense, the landowner would have to fund equivalent stormwater reductions nearby in the watershed. As explained in Section 3 on tax incentives later in this chapter, properties subject to such retrofit requirements should qualify for accelerated depreciation for the fixtures to be replaced, as well as the newer replacement fixtures. Accelerated depreciation of existing fixtures would be needed so that the landowner would recover the full tax benefit of taking the item out of service before the end of its useful life, as these rules would require.

Since EISA's stormwater requirements apply only to new development and redevelopment, the local stormwater retrofit requirements described above should also apply to federal facilities. As with the EISA enforcement discussed previously, retrofits of federal facilities should be made enforceable through administrative consent agreements. For the purposes of these orders, these retrofit requirements would be deemed to be an "effluent limitation" under the CWA, helping to assure enforceability of the requirements by judicial action.

### Green Road Codes

Federal, state, and local roads make up one-third of the existing impervious surfaces in the Anacostia watershed. The State of Maryland and local jurisdictions should adopt road codes requiring use, where feasible, of permeable pavement, permeable sidewalks, permeable parking areas, tree boxes, bioretention strips, and vegetated swales to accomplish retention of annual precipitation as defined by EPA. Such codes would apply when new roads are built in the

## Seattle SEA Streets

Seattle's Street Edge Alternatives Project (SEA Streets) retrofitted a suburban street in northern Seattle with green infrastructure. Completed in the spring of 2001, the project aimed to mimic the street's pre-development stormwater drainage. Two years after the project was completed, the SEA Streets project had reduced stormwater runoff by 99 percent from the drainage area, which included the street right-of-way and the properties along the east side of the street.

SEA Streets restored the land's natural drainage capacity by reducing 11 percent of impervious surface cover, providing surface detention in swales, and planting 100 evergreen trees and 1,100 shrubs. A landscape architect was highly involved in SEA Streets because the project relied on landscape design techniques – including grading, soil engineering, plant selection, and layout – to mimic a natural ecosystem.

The project uses retention and detention to reduce peak runoff rate and volume from 2-year, 24-hour storm events (1.68-inches) to pre-developed conditions. Because some homes on the street suffered from preexisting groundwater intrusion, the project designers lined some of the swales with impermeable clay that prevents excessive infiltration.

SEA Streets illustrates the many benefits of implementing LID in suburban settings. The project drastically reduced stormwater runoff and accompanying pollutants. In addition to stormwater benefits, the project created an aesthetically pleasing streetscape that attracts neighborhood residents. The tree plantings also help to reduce air pollution and temperatures during the summer.

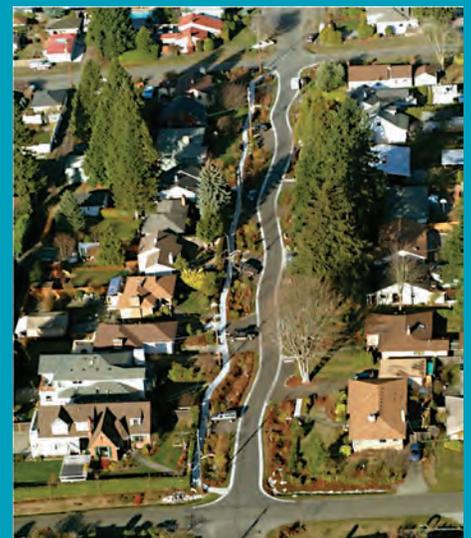


Photo credit: Seattle Public Utilities

Source: Seattle Public Utilities website, [http://seattle.gov/util/About\\_SPU/Drainage\\_&\\_Sewer\\_System/GreenStormwaterInfrastructure/NaturalDrainageProjects/StreetEdgeAlternatives/](http://seattle.gov/util/About_SPU/Drainage_&_Sewer_System/GreenStormwaterInfrastructure/NaturalDrainageProjects/StreetEdgeAlternatives/).

*“Both innovative zoning and development incentives, along with the careful selection stormwater control measures, are needed to achieve fair and effective storm-water management in [urban] areas.”*

National Research Council Report on Urban Stormwater Management in the United States,  
on retrofitting urban areas

Anacostia watershed or when existing roads are substantially rehabilitated. Local governments should also identify opportunities to retrofit existing roads. Prince George’s County has a Green Streets program that retrofits roads with bioretention systems to retain and treat stormwater pollution—a model that D.C. and Montgomery County could follow.

Federal road rules and national codes and guidance should also be adjusted to assure that such techniques are encouraged rather than forbidden or discouraged. The Safe Treatment of Polluted Stormwater Runoff Act, introduced by Senator Benjamin Cardin, would help “green” federal highways by requiring the U.S. Department of Transportation to apply volume-based stormwater standards to new federal-aid highway construction and major highway rehabilitation projects.<sup>199</sup> The Anacostia watershed could be used as a proving ground for these techniques, allowing their rapid adoption in the field here.

### **Health and Building Codes That Allow Grey Water Re-Use**

Re-using rainwater for non-potable purposes, such as toilet flushing, heating and cooling systems, and irrigation, is an ideal option for buildings in dense development scenarios where limited room exists for rain gardens and other landscaping features. Rainwater re-use can also be cost effective as it reduces a building’s water bill. However, local jurisdictions sometimes have outdated health and building codes that prohibit rainwater re-use for non-potable purposes. If necessary, local jurisdictions should revise their health and building codes to approve use of stormwater, including stored water, in buildings for non-potable purposes.

## **2 Local Regulatory Incentives for Impervious Surface Mitigation on Private Land**

Local governments may not have the resources necessary to provide direct financial incentives to private property owners who reduce their impervious surface area. However, our

interviews with developers and private landowners revealed four regulatory incentives that local governments could offer to encourage on-site retention of high volumes of stormwater without large budgetary increases. Accordingly, we recommend that the federal government encourage local governments to provide these incentives so that private landowners and developers can more easily carry out required stormwater upgrades discussed in the previous section. Such incentives would help change development and construction practices more quickly. As with the adoption of new regulatory requirements, adoption of some level of local incentives would be required in order for local residents and governments to qualify for increased federal financial help. The local incentives discussed below should be viewed as a suggested menu from which EPA can choose, in consultation with the local governments.

### **Authorization of Developer Use of the Public Right of Way**

Developers who are constructing or rehabilitating buildings in densely developed areas often build properties across the entire lot and have limited room for rain gardens, tree boxes and planters, cisterns, and other green infrastructure necessary for retaining stormwater on their own site. Moreover, due to the federal limitation on building height in the District of Columbia, D.C. developers often use their roofs and underground spaces—areas that could typically be used for green infrastructure techniques—for other uses, such as heating and cooling systems and parking.

To help these properties achieve volume-based retention standards, local jurisdictions should consider authorizing developer use of the public right of way—in particular, sidewalk areas directly in front of buildings, areas below the sidewalk, and possibly the street, for onsite stormwater storage—where appropriate. The availability of the public right of way for private green infrastructure features must be balanced with the use of the public right of way for utility lines, other public space uses, and green infrastructure to control public impervious installations, such as sidewalks

and streets. The local jurisdictions could hold developers responsible for maintenance of green infrastructure in the public right of way.

### **General Permit or Permit Clearinghouse for Installing Green Infrastructure on Parking Lots**

Parking lots make up one-quarter of the Anacostia watershed's existing impervious surfaces.<sup>200</sup> Currently, there is a disincentive to apply green infrastructure to parking lots or driveways when the “useful life” of the lot or driveway ends. When a parking lot nears the end of its useful life cycle, the owner can choose to add green infrastructure techniques to the parking lot to control stormwater runoff volumes or to simply repave the surface. Since parking lot repaving is not a land-disturbing activity, it is exempt from stormwater requirements for redevelopment, and does not typically require any type of permit. By contrast, constructing new green infrastructure features in a parking lot requires a set of permits from different local agencies, and the time and money that goes into obtaining those permits serves as a disincentive to incorporate green infrastructure into the parking lot.

To promote implementation of green infrastructure techniques on impervious surfaces like parking lots and driveways, local jurisdictions could develop and adopt a general permit. The general permit would essentially identify green infrastructure practices, engineering details, and certified product types that could be used to retrofit impervious surface types like parking lots and driveways. Alternatively, local jurisdictions could implement a permit clearinghouse for such green infrastructure projects, assuring that local utilities will not be damaged while expediting approvals. The clearinghouse would essentially act as a “one-stop shop” for applying for and obtaining required permits to retrofit impervious surface types like parking lots and driveways, thereby expediting the process. The permit fee could even be waived or reduced for property owners seeking these permits.

### **Third-Party Inspection System for Stormwater Management Projects**

Developers have noted that the permit and inspection process for stormwater management projects could be more efficient. In particular, developers note that, because green infrastructure techniques are very new, engineers and inspectors who must sign off on stormwater plans are not always familiar with techniques being proposed, and sometimes deny plans. Local jurisdictions should consider adopting a third-party inspector system that would allow certified private inspectors or registered professional engineers to review stormwater plans on the local jurisdiction's behalf. This would help break the bottleneck on timely approval of appropriate projects.

### **Increased Density for Developers Achieving High Water Retention and Reuse Levels**

Developers currently can build new or redeveloped projects only at density levels allowed by zoning regulations. However, local jurisdictions can increase the maximum allowable density on a site in exchange for certain public amenities, such as preservation of green space or affordable housing.<sup>201</sup> Increased density is a strong incentive in places where land is expensive and limited because it allows developers to extract more value from their land by building more units than would otherwise be allowed.<sup>202</sup> The District of Columbia currently provides such “density bonuses” for developers who build affordable housing into their projects.<sup>203</sup>

Local jurisdictions could allow increased density for developments that achieve on-site stormwater retention and reuse volumes beyond required levels. In order to receive bonus density for on-site stormwater management, developers

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### **Volunteers build a rain garden in the Anacostia watershed.**

Photo credit: Anacostia Watershed Society



## 1050 K Street Case Study

When developing the new office building at 1050 K Street, The Tower Companies and The Lenkin Company – two developers that tend to be long-term owners of their properties – wanted to build the most dynamic and environmentally-responsible property in downtown Washington, D.C. Designed by Hickok Cole Architects and described as an “11-story jewel-box office building,” 1050 K Street not only is certified LEED Gold, but employs cutting-edge techniques to control stormwater and reduce the need to draw from the public water supply.

The building uses a sophisticated combination of bioretention planters, a green roof, a condensate capture system, a large underground cistern, and water reuse. A bioretention system consisting of three large, attractive planters in the front of the building creates a sustainable drainage system that captures both rainwater and run-off from the sidewalks (which were re-graded to flow toward the planters). To install the planters, the owners were required, at their own expense, to move the underground utilities in the public right of way. The bioretention system allows the water either to be absorbed

back into the ground or to drain into a 5,000-gallon cistern in the basement of the building. The building also has an attractive green roof, consisting of a roof garden with a glass-sheltered open space. The roof thus absorbs and captures rainwater, and also serves as an attractive function space with great views of the city. Any water that is not absorbed by the green roof plantings drains into the cistern. The owners also installed a state-of-the-art system for capturing the condensation that is produced from the building’s heating and cooling system, which generates about 255 gallons of water per day on average, and as much as 680 gallons a day during the summer. This condensation also drains into the cistern, rather than the city’s stormwater sewer system.

The water collected in the cistern from these three sources is then re-circulated in the building’s non-potable uses, such as a water feature outside the lobby and additional irrigation for the green roof and the street planters. The cistern provides a double environmental benefit because it decreases the building’s need to draw water from the city supply, while also drastically decreasing the amount of water that would otherwise enter the city’s combined sewer system. (The building releases stormwater into the public sewer only when the cistern is full – an infrequent occurrence. The original plan had been to install a 7,500 gallon cistern underground in the public right of way, but the builder was unable to obtain a permit authorizing placement of the cistern in the right of way.) 1050 K Street’s green stormwater management system collects 100 percent of the building’s roof runoff, as well as runoff from sidewalks and condensation from the heating and cooling system. In total, the system controls runoff from 90 percent of all storms, substantially reducing the volume of stormwater and the amount of pollution discharged into the sewer system. In fact, when stormwater is released into the sewer system, the building’s stormwater management system reduces sediment discharge by 80 percent and removes over 40 percent of phosphorus.

According to the project architect, Jason Wright,



Photo Credits: Ron Blunt Photography



1050 K Street's green roof (shown in top left and bottom photos) captures rainwater and serves as an attractive function space with great city views.

the building would have been able to meet District of Columbia Department of the Environment's stormwater management targets at the time through the building's green roof alone; however, the owners installed the additional stormwater controls, such as the planters and the condensation capture system, as a feature. Beyond the stormwater controls, the building includes many other "green" features, including (to name a few) the use of non-toxic building materials to improve indoor air quality, an air handling system that replaces 100 percent of the air in the building every 55 minutes, a high-tech glass system that assures thermal comfort and reduces energy consumption, and local sourcing of over 40 percent of the building materials. Despite the higher cost necessary to implement these features, the owners were committed to building green, confident in their belief that this kind of sustainable approach to office building construction not only is the wave of the future, but projects an image with which many forward-looking businesses want to be identified. Indeed, even in the current tepid real estate market, 1050 K Street leased more quickly than other projects in close proximity; its tenant list now includes GlaxoSmithKline, Knoll Furniture, Phillips Electronics, Shell Oil Company, and Tesla Motors, among others. Base rents in this sustainable building sometimes are

slightly higher than comparable (but less green) buildings, but utility costs are lower, making the fully loaded rental cost comparable.

The developers and architects of 1050 K Street gained some useful insights as a result of their experience with 1050 K Street. For example, reflecting on the difficulties they had in placing the cistern, David Borchardt of the Tower Companies proposed that a clear policy by the District government and by DC Water on the use of the public right away for features that would control stormwater – as well as incentives for businesses to implement such green features – would ease the way for developers who want to build green and "do the right thing." Mr. Borchardt also suggested that it would be useful to develop a process for property developers, property owners, and property managers to work together to think creatively about green retrofits and improvements – such as, for instance, placing a large cistern under one of the alleyways that often run behind downtown buildings – and sharing the costs and benefits of such common green investments. He also believes one way to encourage developers to implement storm water controls is by discounting their stormwater bill, which in the District is based on a building's impervious surface area.

should provide a bond requirement to assure performance of their on-site stormwater techniques over the first three to five years.<sup>204</sup>

Increased density may be a more practical incentive in mixed-use areas of the Maryland counties than in D.C. due to the federal height limitation placed on D.C.'s buildings. However, the D.C. government is currently revising its zoning regulations with an eye toward revising the Planned Unit Development (PUD) process (which is used for large, multi-use development projects) to include density bonuses in exchange for certain public benefits and amenities.<sup>205</sup> The D.C. government could make on-site, high-volume stormwater retention a factor included in the density bonus formula in its PUD process.

### **3 Federal Tax Incentives to Accelerate Installation of Green Stormwater Controls**

Private landowners will need real financial incentives to install green infrastructure practices, particularly on properties that are not being redeveloped and are therefore not subject to new codes governing stormwater handling in redevelopment situations. Such financial incentives will also help build a wide constituency of support for the adoption of the local regulations that we recommend, and will ensure that the Anacostia watershed is not put at a disadvantage when it comes to economic development. Tax incentives for landowners within the Anacostia watershed should be conditioned on adoption of standards recommended in this report by local jurisdictions, and should be revoked if the codes containing those standards are repealed.

Federal tax benefits targeted at property owners in the Anacostia watershed would serve as a strong incentive because landowners could quickly quantify the financial benefits of installing green infrastructure, particularly if the incentives are in an easily understood form, such as the energy tax credit upgrades recently made available to homeowners. Property owners' geographic eligibility could be determined by address to assure that the improvements occur within the Anacostia watershed. Under the assumption that stormwater upgrades to private land will cost as much as upgrades to public land, we estimate that federal tax incentives could cost the federal government somewhere in the order of \$30 million a year in foregone tax revenue for 15 years, if they are used to the fullest extent.<sup>206</sup> This estimate is only an "order-of-magnitude" estimate and could be further refined.

### **Federal Tax Credits**

The federal government should provide tax credits, modeled on energy tax credits for property-owners, for the installation of green roofs, permeable pavement, rain barrels and similar green stormwater management improvements, for both residential and commercial property. EPA should set guidelines and certify the techniques that qualify for a tax credit. The installation of these techniques should be certified by roofers and other installers, similar to the thermal window arrangement now in force, in order to prevent fraud, and to assure that improvements are performed as advertised. They should also be recorded in land records. Since green infrastructure is effective only if it is properly maintained, the federal government should also provide a tax credit for approved maintenance. Homeowners could then apply periodically for the maintenance tax credit, which would have to be supported by adequate documentation.

The cost of improvements and maintenance relative to the amount of tax credits must be considered, and could be structured similarly to federal tax credits for energy efficiency, in which the credit is equal to a certain percentage of the total cost of installation and maintenance, with a cap on the total credit amount. Emphasis should be placed on low-maintenance, high-volume control techniques, as determined by EPA.

### **Accelerated Federal Tax Depreciation**

While we expect that the federal tax credits would be most attractive to residential property owners, who ordinarily do not depreciate their property for tax reasons, we believe that accelerated depreciation could be a greater incentive to commercial property owners. (We would recommend requiring the property owner to elect between accelerated depreciation and tax credits.) The federal government should also provide accelerated federal tax depreciation, within the affected watershed, for the replacement of impervious surfaces – conventional roofs, driveways, sidewalks, parking lots, and private roads – with green roofs, permeable pavement, and similar measures to control stormwater onsite.

Typically, commercial property owners can achieve tax deductions by deducting the depreciation (or loss in value) of a particular asset, like a commercial building or parking lot, over a long period of time. Accelerated depreciation allows property owners to take advantage of depreciation deductions early on instead of spreading the depreciation deduction across the useful life of a product. This type of tax treatment would allow property owners to write off the remaining un-depreciated cost of an impervious surface,

like a parking lot, before the parking lot's useful life ends, if the lot's replacement uses sufficient green infrastructure, thereby encouraging property owners to replace impervious surfaces with green infrastructure in a timely manner. We also recommend providing accelerated depreciation for the new green fixture. Since green techniques often involve new engineering and product types, property owners may have some uncertainty about investing in them. Providing accelerated depreciation for new green fixtures would help offset any perceived risk in investing in such product types. As most state income tax rules follow federal rules, D.C. and Maryland might need to adopt conforming changes.

## 4 Funding the Implementation of the Anacostia Restoration Plan

### *Preferred Option: Federal grant program requiring a high local match*

Over the next 15 years, the local jurisdictions and water utilities will commit substantial financial resources to meeting mandates under the Clean Water Act. While some of the projects identified in the Anacostia Restoration Plan may be implemented with existing funding, resources will fall short of meeting the cost of implementing the full slate of projects, most of which are to be built on public land. These projects need federal coordination if they are to address water quality problems in the most orderly and cost-effective fashion. If the federal government can assist the local jurisdictions in financing these projects, timely and effective cooperation among the numerous jurisdictions is likely to prove far easier to obtain. Federal financial assistance would allow all parties to compromise more easily, knowing they will all come out ahead.

Federal financial assistance to help implement these projects would be most effective if it was provided directly through a grant program. EPA has a long history of successfully administering federal grants in the wastewater treatment area, as well as in other environmental programs. If this approach was used, and a local match was required in the range of two local dollars for each federal dollar, the federal grant could substantially leverage its investment. If the Anacostia Restoration Plan was implemented over 15 years, the federal share would be around \$35-40 million per year and the collective local share would be around \$75-\$80 million, in constant dollars. A multi-jurisdictional, federal-local matching grant program would allow EPA to direct funds to high priority projects across the watershed. The difficulty of such grants,



Photo credit: Abby Hall, U.S. E.P.A.

however, is that the federal appropriation process can make the amounts and timing of such expenditures uncertain.

### *Alternative Option: Issuance of Tax-Exempt Municipal Bonds*

An alternative, but less preferable approach would be for the local jurisdictions to issue tax-exempt municipal bonds to pay for capital projects on public lands identified in the Anacostia Restoration Plan. Bond repayment, or debt service, would occur over a long period of time. In this case, the only cost to the federal government would be in the form of forgone tax income on bond interest, as local jurisdictions would be responsible for paying debt service on the bonds (principal and interest payments). This approach might provide a more stable funding stream, as it would not be subject to the Congressional appropriation process. Bonds might also allow the local governments to make smaller annual payments over a longer period of time than would annual matching grants. However, local governments' ability to issue such bonds can depend on their current debt



Photo credit: Joe Mauro

levels and capital spending planned for the future, and the cost-effectiveness of such bonds can depend on their interest rates. Just as important, because local jurisdictions would directly issue bonds and service debt, the federal government would have little ability to coordinate these funds across political boundaries and direct them toward priorities and projects that will do the most to improve the watershed.

### Local Revenue Sources

A new revenue source for local governments will likely be necessary in the case of either a federal grant program that requires a local match or the issuance of tax-exempt municipal bonds. Local governments may not currently have the funds available to collectively make matching grants on the order of \$75-\$80 million a year from their general operating budgets. And in order to issue tax-exempt municipal bonds, local governments may need to find a stable and dedicated revenue stream with which to pay debt service. To help raise the required revenue, we make two recommendations: 1) implementation of stormwater utility fees based on impervious surface area with rate levels that more closely reflect the cost of managing stormwater; and 2) the imposition of an excise tax on particular building and lawn products that contribute to the Anacostia's degradation. To ensure that these funds are used on Anacostia restoration, revenues raised through both these sources should be kept in a fund or trust separate from the jurisdiction's general fund.

### Stormwater Utility Fees Based on Impervious Surface Area

The local jurisdictions could use revenue from stormwater utility fees to help pay grant matches or debt service. We recommend that local jurisdictions base their stormwater fees on the amount of impervious surface area present at any given property. Stormwater utility fees based on impervious area are an equitable and effective way to charge property owners for stormwater management services because the fee reflects the property's impact on the public stormwater

system. Since stormwater landing on an impervious surface drains into the public stormwater system, a property's impervious surface area can be used to approximate the amount of stormwater runoff it generates. Through this type of fee structure, multifamily residences and businesses with little impervious surface area will pay a smaller fee than properties with parking lots and other large impervious areas. Stormwater fees should therefore be discounted for ratepayers who physically reduce their impervious surface area, for example, by replacing a driveway made of conventional asphalt with permeable pavement, or for those who use green infrastructure practices to reduce their "effective" impervious surface area.

The District of Columbia and DC Water both recently adopted stormwater utility fees based on an impervious area assessment of each property with a complementary discount program. Montgomery County currently collects a flat fee from single family homes based on the median impervious surface area for residences, and a charged based on impervious surface from commercial properties that drain into a residential pond, while Prince George's County collects a tax based on a property's assessed value.<sup>207</sup> D.C.'s fee structure could be used as a model for Montgomery and Prince George's Counties. If Montgomery and Prince George's Counties moved to a stormwater fee structure like D.C.'s, they could collect fees from federal installations and other tax-exempt properties. Indeed, the federal government has just amended the CWA to make it clear that the federal government is to pay stormwater fees that are, "based on some fair approximation of the proportionate contribution of the property or facility to stormwater pollution," the revenues of which are to be used to pay for costs associated with stormwater management programs.<sup>208</sup>

If priced high enough, a fee based on impervious surface area—combined with discounts for installing on-site green infrastructure techniques—provides an automatic incentive for property owners to reduce their effective impervious area. Current stormwater fee levels may be too low to change property owner behavior. Currently, Montgomery County charges single family homes only \$45.50 a year.<sup>209</sup> In D.C., the average single-family homeowner pays \$32.04 a year for the city's stormwater fee, and \$41.50 for DC Water's impervious area charge, although the latter will increase substantially with the implementation of the LTCP.<sup>210</sup>

The cost of matching grants or debt service to implement the Anacostia Restoration Plan is too large to be entirely paid for by local ratepayers, especially since some of the

revenue raised must be used to pay for other existing clean water mandates, such as implementation of MS4 permits, and in the District, the CSO LTCP. Additionally, upgraded nitrogen removal at the Blue Plains Advanced Wastewater Treatment Plant will require substantial additional revenue from DC Water's ratepayers for a program that will benefit the Chesapeake Bay, but have no effect on the Anacostia.

However, the discrepancy between the local jurisdictions' current very low rate levels and the high cost of stormwater projects demonstrates that current stormwater fees significantly under-value the cost of managing stormwater runoff. By implementing stormwater utility fees based on imperviousness, and by increasing fee rates, local jurisdictions would raise more funds for stormwater management projects while also providing an incentive for property owners to reduce their impervious surface area. The local jurisdictions should consider how relief or grant programs can be used to balance necessary fee increases with important concerns about overburdening low-income residents with high fees.

### **Excise Tax Funding**

While stormwater fees could help cover some costs, the local jurisdictions will likely need another dedicated revenue source. The continued water quality problems in the Anacostia watershed, as well as the Chesapeake Bay, help demonstrate that the use of certain kinds of products and building techniques impose environmental costs not accounted for in their pricing. Thus, for example, the use of fertilizers and some pesticides in lawns and gardens has a significant negative impact on the Anacostia watershed, encouraging algal growth and also adversely affecting the Chesapeake Bay. As compared to farmers, homeowners tend to over-fertilize substantially. Consequently, an excise tax on fertilizers and other lawn care products in the District, Montgomery, and Prince George's Counties could be well justified, as could the additional taxation of certain kinds of lawn care services.

Similarly, the installation of impervious surfaces, such as driveways, sidewalks, parking lots, and roofs, increases stormwater runoff, velocity, erosion and sediment problems in the watershed. Once again, an excise tax on the purchase and installation of such materials can be justified, particularly if rebates are provided for building materials used in stormwater control projects

certified by EPA and the local jurisdiction as appropriate. Thus, for example, the purchase of permeable concrete pavers for stormwater control would be exempt from the excise tax; the use of flagstone pavers would not be exempt, because the material is impervious.

An excise tax would have two helpful effects: first, it would discourage the use of these environmentally unfriendly products or their installation in environmentally damaging ways. Second, the tax revenue could help pay for stormwater control improvements on public property, either by helping to service debt on municipal bonds or by helping to offset the cost of federal grants.

The basis for such an excise tax is similar to D.C.'s fee on disposable carryout bags. Under the Anacostia River Clean-Up and Protection Act of 2009, consumers who use a disposable carryout bag from restaurants, grocery stores, and other certain retailers must pay five cents for each bag at the time of their purchase.<sup>211</sup> Funds are then deposited in an Anacostia Clean Up and Protection Fund to be used for certain clean-up activities for the River. The "bag fee" has the dual benefit of raising dedicated funds for Anacostia River clean-up and discouraging consumers from using disposable bags, which make up a significant amount of the River's trash pollution.



Photo credit: Joe Mauro

*“At stake has been a fundamental issue of equity: polluters should be financially responsible for the pollution that they cause, including the federal government.”*

Senator Benjamin L. Cardin on S. 3481, which requires the federal government to comply with local stormwater fees that are used pay for the treatment and management of polluted stormwater runoff.

We recommend that excise taxes on certain impervious building materials and lawn care products be imposed and collected by the local jurisdictions. If this tax is considered a “sales and use” tax under Maryland code, Montgomery and Prince George’s Counties will require state legislation in order to levy the tax. These taxes would be collected at the point of sale in the three main jurisdictions. At the time building and occupancy permits were sought in these jurisdictions, the builder would have to produce the documentation to demonstrate that the excise tax had been paid, or the tax would have to be paid with interest and penalties.

### **Anacostia Watershed Stormwater Policy Package as a Pilot Program**

The stormwater policy package that we recommend could be used as a model for addressing runoff in other distressed urban watersheds. In order to test and perfect this combination of stormwater regulations, federal tax incentives, and a federal grant program, we recommend using the Anacostia watershed as a 7-10 year pilot project. Once it is tested and revised, the approach could be applied to other distressed watersheds.

Piloting a comprehensive clean-up of the Anacostia watershed would produce better results in a more efficient and cost-effective manner. Right now, a patchwork of stormwater policies governs the Anacostia watershed, and local watershed jurisdictions are implementing clean-up projects on a case-by-case basis. A firm mandate for restoring the Anacostia would ensure that investments are made efficiently toward achievement of a single, overarching goal rather than in piecemeal and uneconomical fashion. Since investments would be made in a coordinated manner, they would likely be more efficient and produce better results. In fact, the Anacostia Restoration Plan calls for implementing clusters of projects in targeted geographic areas simultaneously

to maximize environmental benefits and reduce costs. An Anacostia pilot program would provide the opportunity to test and refine green infrastructure techniques on a substantial scale, develop and refine financing mechanisms, and evaluate the costs of retrofitting an entire urban watershed so that the federal government could apply this approach to other urban watersheds in a more cost-effective and efficient manner.

### **Toxics Remediation Through Superfund**

As explained in previous chapters, the toxic sediment problems in the tidal riverbed of the Anacostia are not tied to current point source discharges of pollutants and have not been effectively remedied under the CWA or related programs. As a result, bottom-feeding fish like catfish show significant toxic effects, such as liver tumors, and are unsafe for human consumption, even though some subsistence fishermen fish in the Anacostia and are believed to eat their catch. These persistent toxics also pose a threat to birds and other predators who feed on the fish, as the concentration of toxics tends to increase up the food chain. In order for the River to recover reasonable ecological health, these legacy toxics must be addressed. We recommend the following steps, using Superfund as the best available legal framework.

#### **1 Focus on the Estuary for a Separate Remedial Investigation/Feasibility Study (RI/FS)**

As explained in Chapter Four, if the ordinary Superfund processes are followed, there will likely be several additional shore-side sites listed or addressed under equivalent D.C. law. EPA’s Region 3 office in Philadelphia has reportedly been considering such listings at several sites, in addition

to the currently listed Washington Navy Yard. That listing would start the RI/FS process previously described, which must be completed before EPA can choose a remedial action for addressing toxics. EPA makes such a choice in its Record of Decision (ROD).

The initial focus of listed Superfund sites will be on shore-side contamination; the study of the estuary and of potential natural resource damages will likely be deferred until late in the clean-up process and will not address the whole estuary. The Navy Yard's experience is illustrative. It was listed over 12 years ago. Despite a considerable amount of work on shore-side contamination, no sediment remediation has yet taken place and additional study is still needed of the near shore sediments before such remediation can occur.

If EPA follows its usual model, serious efforts to address the toxic sediments may not occur for more than another decade. There will be no coordinated RI/FS of the estuary; remediation may be inconsistent and uncoordinated; and remedial work at one site will risk contaminating other locations already cleaned up.

As noted in Chapter 4, DDOE has made encouraging progress in reaching settlements with two private parties for remedial investigations, including remedial investigations of the sediment; DDOE may have an additional settlement for such work finalized in spring 2011. But whether the District or the EPA is the lead agency, approaching the sediment issues on a site-by-site basis rather than an estuary-wide basis raises serious problems of disjointedness and inefficiency.

In order to avoid these problems, we recommend that EPA separate its efforts to address shore-side sites from the conduct of the RI/FS for the estuary. EPA is empowered to create separate "operable units" of NPL sites. We suggest that EPA do so in the case of the tidal Anacostia estuary. EPA could create a separate operable unit as part of the current Navy Yard site (and one or more other sites if such have been proposed). That separate operable unit would encompass the tidal estuary for the purpose of conducting the RI/FS.

We also recommend that EPA address the shore-side sites based on their own merits. If the shore-side sites can be linked to the tidal estuary contamination, EPA can pursue these parties for the sediment remediation, as well as work to address shore-side contamination.

## 2 Carry Out an Expedited RI/FS

We recommend that the federal government carry out an RI/FS for the tidal estuary in order to characterize the extent of toxic contamination, the ecological impacts, and the viable remedial techniques. We recommend that EPA undertake this work as a "fund lead" site, or in other words, that EPA pay for this work directly from the Superfund rather than follow its usual "polluter pays" approach. Alternatively, designating the Anacostia tidal estuary as a separate "operable unit" of the Navy Yard site may be a basis to require the Navy and the Department of Interior (which owns the river bottom) to undertake such an RI/FS. Given the magnitude of the needed study and the size of the estuary, it is unlikely that any party or group of parties will voluntarily undertake such work in the next few years.

In the event the parties cannot negotiate a financial resolution of these costs once the study is complete, EPA can refer an enforcement action to the Justice Department to bring against private parties to recover the costs of performing the RI/FS. And if federal agencies are uncooperative in paying their share, the affected private parties, as well as the District



Photo credit: Bruce McNeil for Anacostia Watershed Society

*“Bottom dwelling fish, such as bullhead catfish, in the Anacostia have an alarming tumor incidence: over half of these catfish showed liver tumors in a survey by the Fish and Wildlife Service.”*



of Columbia, can bring an action against the federal government to compel the federal agencies to pay their share of such an effort.

We also recommend that this RI/FS be combined with the Natural Resource Damages Assessment (NRDA), under CERCLA and the CWA, also on an expedited basis. Ordinarily, the NRDA does not begin until after implementation of remedial work. If that pattern were followed in this case, it could be 10-15 years before the NRDA even begins. At least in the case of the Anacostia tidal estuary, that is a prescription for duplication within the RI/FS and avoidable delay. This is because the remedy for toxic sediment contamination here is most likely to be chosen primarily to reduce significant ecological risks rather than the apparently small human health risks.

By law, the natural resource trustees must make this assessment. The trustees in this case are the Department of the Interior (also a party with substantial liability exposure) and the National Oceanic and Atmospheric Administration (NOAA). Combining the RI/FS with the NRDA and the resulting ROD with the NRDA may cut as much as a decade off the process of determining the best approach to addressing the toxic sediments.

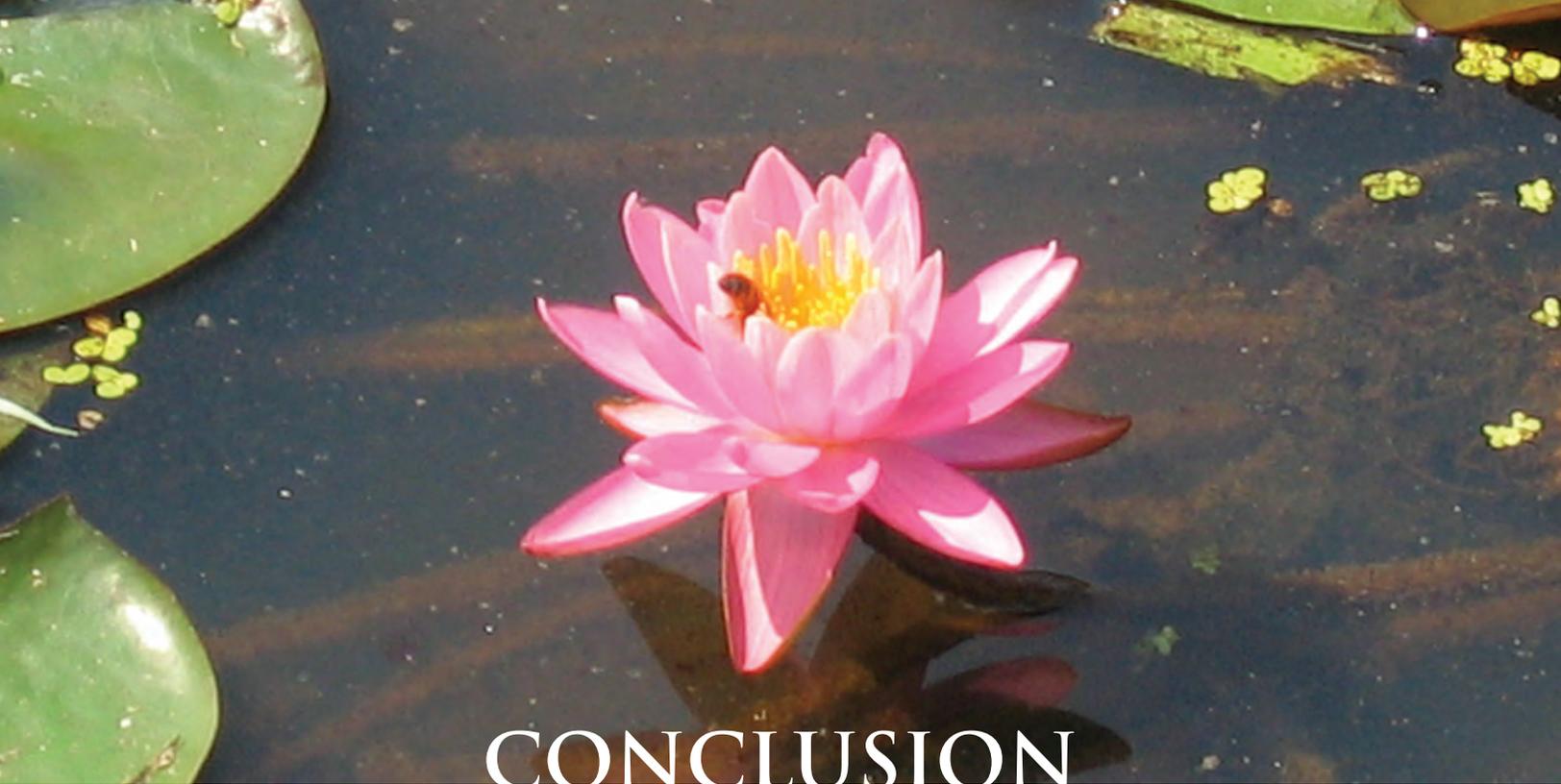
The study results would allow the federal natural resource trustees to decide what natural resource damages have occurred and what damages will not be cured by the proposed remedial work. These remaining natural resource damages would be the basis for environmental projects to help restore those environmental amenities, and could include projects like clearing fish barriers upstream.

These combined studies would avoid the risks of inconsistent, piecemeal, and ineffective remedial plans; the results would allow EPA to determine the remedial measures for sediments in the ROD. Because there have been multiple prior studies, this RI/FS can be used to fill data gaps, help validate prior data, and produce a consistent and coherent risk assessment and remedial recommendations.

By having the federal government lead the tidal estuary RI/FS, and by having that work proceed in parallel with shore-side efforts (led either by EPA or by the District of Columbia), both the shore-side installations and the tidal estuary should be sufficiently characterized by 2015 or 2016 to estimate clean-up costs and to allocate financial responsibility for clean-up efforts (or start court proceedings to determine such liability). With both the ROD and the NRDA completed for the estuary, there would be an integrated plan to address toxic sediments and to help foster the recovery of the natural resources adversely affected by the contamination. By proceeding in parallel, it is much more realistic to expect serious sediment remediation to begin by the time the CSO LTCP is finished in 2018, and for serious progress to be made towards having pollution controls in place by 2025 for a fishable, swimmable River.

Despite considerable EPA effort to force offsite federal agency clean-ups, these often take many more years than clean-ups where private parties are the main players. The presence of credible state enforcement action is very important in keeping these efforts on track, because the state (or in this case the District of Columbia) has the statutory right to participate in many of the key decisions and because the state is a credible litigation threat against a potentially recalcitrant federal agency.

Consequently, we recommend that the District government play an active role in this clean-up effort, both to assure that the local residents' interests are not lost in any "horse trading" between EPA and other agencies, and to provide a credible threat of court intervention. It is unlikely that any other party will have the capacity and incentive to keep the study and clean-up efforts moving forward, and to provide an independent review of the course of action proposed by various federal agency players in this remedial effort. If the tidal estuary is designated as an operable unit of the Navy Yard site, the District can go to federal court to enforce the resulting federal facility agreement under section 120 of CERCLA to study and clean up the estuary.



*“The actions called for in this report would reclaim the Anacostia as a resource for the Washington region and would provide an example of urban watershed restoration for the rest of the country.”*



The policies recommended by this report could potentially be used to clean up urban watersheds throughout the country. However, this policy approach must first be proved. A pilot program is necessary to test and refine technical and funding approaches, evaluate costs, and document economic benefits. The Anacostia watershed provides the best opportunity for testing our recommendations for four reasons.



First, while the federal government has directly impaired other urban watersheds, its historical and current footprint is particularly wide in the Anacostia watershed due to the watershed’s location in the national capital region. The clean-up program recommended in this report is, in large part, an effort to reverse environmental degradation unintentionally caused by the federal government. Accordingly, it is logical to pilot such a program in a watershed where the federal government has done substantial damage—the Anacostia watershed.

Second, the Anacostia watershed is the only urban watershed in the country with an existing, watershed-wide inventory of candidate restoration projects endorsed by the federal

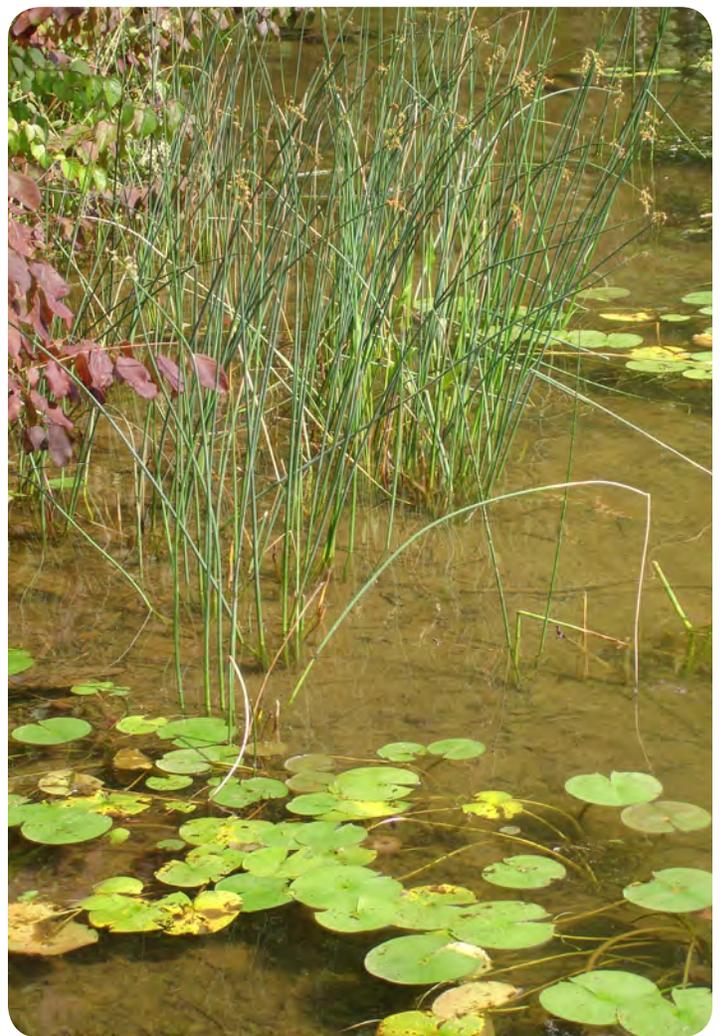
Photo credit: Joe Mauro

government. Indeed, the Anacostia Restoration Plan is the result of a Congressional directive, and it is therefore appropriate for the federal government to help fund its implementation. Moreover, since the Anacostia Restoration Plan was developed by the Army Corps of Engineers in partnership with the watershed jurisdictions, the candidate projects already have the requisite backing from the local governments that will be responsible for their implementation. By implementing projects in a coordinated fashion, the restoration will be achieved in a more environmentally effective and cost-efficient manner.

Third, the Anacostia watershed provides a unique opportunity to test the stormwater policies and green infrastructure techniques being promoted by EPA, particularly as part of the Chesapeake Bay strategy. The Anacostia watershed is the most densely populated and most urban sub-watershed in the Chesapeake Bay watershed. As such, it is an ideal proving ground for testing green infrastructure techniques on a watershed-wide scale. The Anacostia watershed contains a range of land use types, from ultra-urban, mixed-use development in D.C. to large-lot single-family home subdivisions in Maryland, to which different green infrastructure techniques can be applied and tested. Techniques that work in the Anacostia watershed's urban and suburban landscapes can be replicated in other urban sub-watersheds of the Chesapeake Bay watershed, and throughout the nation.

Finally, cleaning up the Anacostia provides the occasion to restore a valuable resource to communities throughout the region, and to re-establish the River as a source of national pride. The Anacostia River has long served as a national symbol of disinvestment too often experienced by our country's urban communities. Cleaning up the Anacostia will create much-needed new jobs and bring new investment to neighborhoods near the River and throughout the watershed. It will also improve the quality of life for watershed residents by providing green spaces, new recreational opportunities, and the opportunity to fully enjoy and use the River and its streams.

Congress has already laid the groundwork for comprehensive restoration of the Anacostia watershed by authorizing the Anacostia Restoration Plan. It's now time for the federal government to take the next step by committing the leadership and resources necessary to revitalize the Anacostia River. In doing so, the federal government would be testing a framework that, once shown to be effective, could be used to restore urban rivers and watershed communities throughout the country.



Top photo credit: Anacostia Watershed Society  
Lower photo credit: Stephanie Sobchak

# APPENDICES & ENDNOTES

## Appendix 1: List of Acronyms Used

AWI: Anacostia Waterfront Initiative  
BOD: Biological Oxygen Demand  
CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act  
CIP: Capital Improvement Plan  
CSO: Combined Sewer Overflow  
CWA: Clean Water Act  
DDOE: D.C. Department of Environment  
EISA: Energy Independence and Security Act  
EPA: Environmental Protection Agency  
FOG: Fats, Oils, and Grease  
FY: Fiscal Year  
HRS: Hazard Ranking System  
IRS: Internal Revenue Service  
LTCP: Long Term Control Plan  
MDE: Maryland Department of the Environment  
MS4: Municipal Separate Storm Sewer System  
NOAA: National Oceanic and Atmospheric Administration  
NPL: National Priorities List  
NRDA: National Resources Damage Assessment  
PAH: Polycyclic Aromatic Biphenyls  
PCB: Polychlorinated Biphenyls  
PUD: Planned Unit Development  
RI/FS: Remedial Investigation/Feasibility Study  
ROD: Record of Decision  
SEA Streets: Street Edge Alternatives Project  
TMDL: Total Maximum Daily Load  
WASA: D.C. Water and Sewer Authority, also referred to as “DC Water”  
WIP: Watershed Implementation Plan  
WSSC: Washington Suburban Sanitary Commission

## Appendix 2: List of Affiliations of Individuals Interviewed by D.C. Appleaseed, 2010

*Note: Interviews were conducted with a confidentiality policy to ensure that interviewees could freely discuss issues. It was agreed that interviewees would not be identified by name in the report and analysis, and that they would only be quoted with permission. In many cases, multiple individuals affiliated with the same organization were interviewed. Interview requests were extended to some additional stakeholder organizations not listed below, but were declined.*

Akridge  
Anacostia Watershed Restoration Partnership  
Anacostia Watershed Society  
Anacostia Riverkeeper  
Audubon Naturalist Society  
Casey Trees  
Clean Water Action  
Coalition for Smarter Growth  
Cohen Companies  
Council of the District of Columbia  
D.C. Environmental Network  
D.C. Water  
District of Columbia Department of Environment  
District of Columbia Department of Transportation  
District of Columbia Office of Planning  
e3bank  
Environmental Protection Agency  
Forest City Washington  
Louis Dreyfus Property Group  
Montgomery County Department of Environmental Protection  
Montgomery County Planning Department, Maryland-National Capital Park and Planning Commission  
Metropolitan Washington Council of Governments  
National Resources Defense Council (NRDC)  
Prince George’s County Planning Department, Maryland-National Capital Park and Planning Commission  
Prince George’s County Department of Environmental Resources  
Tower Companies  
Town of Edmonston  
Washington Suburban Sanitary Sewer Commission

## Endnotes

- <sup>1</sup> 33 U.S.C. § 1251 (a)(2).
- <sup>2</sup> U.S. Army Corps of Eng'rs Balt. Dist. (CENAB PL-P), *Anacostia River Watershed Restoration Plan and Report* (2010) [hereinafter U.S. Army Report].
- <sup>3</sup> *Low Impact Development (LID)*, EPA, <http://www.epa.gov/owow/NPS/lid/> (last visited Oct. 14, 2010). (EPA states that, "Green infrastructure" is a relatively new and flexible term, and it has been used differently in different contexts. EPA intends the term "green infrastructure" to generally refer to systems and practices that use or mimic natural processes to infiltrate, evapotranspire (the return of water to the atmosphere either through evaporation or by plants), or reuse stormwater or runoff on the site where it is generated). See also EPA, *Green Infrastructure Case Studies: Municipal Policies for Managing Stormwater with Green Infrastructure*, (2010), available at [http://www.epa.gov/owow/NPS/lid/gi\\_case\\_studies\\_2010.pdf](http://www.epa.gov/owow/NPS/lid/gi_case_studies_2010.pdf). (EPA states that, "at the site scale, green infrastructure mimics natural systems by absorbing stormwater back into the ground (infiltration), using trees and other natural vegetation to convert it to water vapor (evapotranspiration) and using rain barrels or cisterns to capture and reuse stormwater. These natural processes manage stormwater runoff in a way that maintains or restores the site's natural hydrology. Site-level green infrastructure is also referred to as low-impact development or LID, and can include rain gardens, porous pavements, green roofs, infiltration planters, trees and tree boxes and rainwater harvesting for non-potable uses such as toilet flushing and landscape irrigation.")
- <sup>4</sup> Fed. Leadership Comm. For the Chesapeake Bay, *Strategy for Protecting and Restoring the Chesapeake Bay Watershed* (2010) [hereinafter Fed. Leadership Strategy] available at <http://executiveorder.chesapeakebay.net/file.axd?file=2010%2F5%2FChesapeake+EO+Strategy%20.pdf>
- <sup>5</sup> Metro. Wash. Council of Gov'ts, *MWCOG Data Sheet on Impervious Surface* (2009) (provided data on number of square miles of impervious surface area in the Anacostia watershed).
- <sup>6</sup> U.S. Army Report, *supra* note 2, at 19.
- <sup>7</sup> Clean Water Act of 1972, 33 U.S.C. § 1254 (2006).
- <sup>8</sup> Exec. Order No. 13508, 75 Fed. Reg. 26,055, 26,226 (May 11, 2010).
- <sup>9</sup> EPA, *Urban Stormwater Approach for the Mid-Atlantic Region and the Chesapeake Bay Watershed* (2010).
- <sup>10</sup> These funds will not be spent solely on projects in the Anacostia watershed, but on projects throughout the District, and Montgomery and Prince George's Counties. Montgomery County will raise \$11.8 million in FY2011 from its Water Quality Protection Charge to cover its watershed management responsibilities, and the District of Columbia will raise \$13 million in FY2011 from its stormwater fee to cover MS4 permit obligations, although D.C. expects the cost of meeting permit obligations to increase in the next few years. Budget data from Prince George's County was unavailable. Assuming that Prince George's spends the same amount as Montgomery County, the three jurisdictions together will spend, at a minimum, \$36.6 million per year on meeting federal clean water mandates.
- <sup>11</sup> Consent Decree, *Anacostia Watershed Restoration Soc'y v. D.C. Water & Sewer Auth.*, No. 1:00CV00183TFH, (D.D.C. June 25, 2003), available at <http://www.epa.gov/compliance/resources/cases/civil/cwa/D.C.wasa.html>.
- <sup>12</sup> E-mail from Yvette Downs, Dir., Fin. and Budget, D.C. Water & Sewer Auth., to Brooke DeRenzis, Project Dir., D.C. Appleseed (Feb. 9, 2011, 9:59 EST).
- <sup>13</sup> Full implementation of the Anacostia Restoration Plan is estimated to cost \$1.7 billion. By annualizing this cost over 15 years, we arrive at an estimate of roughly \$115 million/year.
- <sup>14</sup> This estimate is a rough order-of-magnitude estimate that should be refined when access to better data becomes available. Our calculation assumes that stormwater retrofits on private lands will have a total cost \$1 billion (see note 205 for an explanation of how we derived a cost of \$1 billion). This calculation also assumes that maintenance over the useful life of the upgrade will cost at least 50 percent of the installation cost, for a total of \$500 million. Based on these assumptions, green infrastructure installation and maintenance on private properties in the watershed, in total, would cost \$1.5 billion, or \$100 million a year over 15 years. Assuming that the federal government provides tax incentives worth up to 30 percent of the total installation and maintenance cost, we estimate that such tax incentives would cost the federal government about \$30 million a year (assuming all the incentives are fully utilized).
- <sup>15</sup> Costs to the federal government would depend on the marginal federal income tax rates of bondholders, as well as the interest rates and length of maturity of the bonds.
- <sup>16</sup> *The Anacostia: River of Recovery*, State of Md. Dep't of Natural Res., <http://www.dnr.state.md.us/forests/anacostia/history.html> (last visited Oct. 6, 2010).
- <sup>17</sup> *Anacostia Watershed History*, Anacostia Watershed Restoration P'ship, <http://www.anacostia.net/history/history.html>, (last visited, Oct. 14, 2010).
- <sup>18</sup> John R. Wennersten, *Anacostia: The Death and Life of An American River* (2008).
- <sup>19</sup> U.S. Army Report, *supra* note 2, at 105.
- <sup>20</sup> EPA, *Guidance for Federal Land Management in the Chesapeake Bay Watershed* 3-6 (2010). (This guidance is required by Exec. Order No. 13508. It states that, "the primary approaches recommended in this chapter to protect the Chesapeake Bay and its tributaries from the effects of development are to use green infrastructure/low impact development (LID) approaches" See *supra* note 3 for EPA discussion of green infrastructure.

- <sup>21</sup> Comm. on Reducing Stormwater Discharge Contributions to Water Pollution, Nat'l Research Council, *Urban Stormwater Management in the United States* 457-58 (2008)[hereinafter Nat'l Research Council].
- <sup>22</sup> Lake Snell Perry & Assocs. for The Summit Fund of Washington, The Morris & Gwendolyn Cafritz Found. & The Prince Charitable Trusts, *Building Support for Restoring the Anacostia River: Insights from Focus Groups* 7 (2004) [hereinafter Lake Snell Perry & Assocs.].
- <sup>23</sup> *Office of Planning: What is the AWI?*, D.C. Office of Planning, [http://planning.D.C..gov/planning/cwp/view,q,581773,planningNav\\_GID,1708.asp](http://planning.D.C..gov/planning/cwp/view,q,581773,planningNav_GID,1708.asp) (last visited Oct. 14, 2010).
- <sup>24</sup> *Anacostia Watershed Society: Home, Anacostia Watershed Soc'y*, [www.anacostiaws.org](http://www.anacostiaws.org) (last visited Oct. 12, 2010); D.C. Office of Planning, *Anacostia Waterfront Initiative Framework Plan* (2003), available at [http://planning.D.C..gov/planning/frames.asp?doc=/planning/LIB/planning/project/anacostia\\_waterfront/framework-pdf/8\\_Destinations.pdf&planningNav\\_GID=1708](http://planning.D.C..gov/planning/frames.asp?doc=/planning/LIB/planning/project/anacostia_waterfront/framework-pdf/8_Destinations.pdf&planningNav_GID=1708); D.C. Dep't of the Env't, *Anacostia 2032: Plan for a Fishable and Swimmable Anacostia River* (2008); Anacostia Watershed Restoration P'ship, *Building Bridges Action Agenda* (2008); Lake Snell Perry & Assocs., *supra* note 22.
- <sup>25</sup> 33 U.S.C. § 1251 (a)(2); *see also* Uwe Steven Brandes, *Bankside, Washington, D.C., Rivertown: Rethinking Urban Rivers* 47, 53 (Paul Stanton Kibel ed., 2007). (explaining that a fishable, swimmable river has been a goal of community and environmental advocates).
- <sup>26</sup> Even after significant clean-up, the Anacostia River will not be safe for swimming all days of the year.
- <sup>27</sup> D.C. Office of Planning, *Anacostia Waterfront Initiative Framework Plan* (2003), available at [http://planning.D.C..gov/planning/frames.asp?doc=/planning/LIB/planning/project/anacostia\\_waterfront/framework-pdf/8\\_Destinations.pdf&planningNav\\_GID=1708](http://planning.D.C..gov/planning/frames.asp?doc=/planning/LIB/planning/project/anacostia_waterfront/framework-pdf/8_Destinations.pdf&planningNav_GID=1708).
- <sup>28</sup> D.C. Dep't of the Env't, *Anacostia 2032: Plan for a Fishable and Swimmable Anacostia River* 21 (2008).
- <sup>29</sup> *Id.*
- <sup>30</sup> *Id.*
- <sup>31</sup> *Id.*
- <sup>32</sup> Data from the U.S. Census Bureau's 2009 American Community Survey (ACS), 1-Year Estimates. "East of the River" neighborhoods are characterized by data for D.C. Public Use Microdata Area (PUMA) 104. Differences between estimates of median household incomes and poverty rates for D.C. PUMA 104 and the Washington Metropolitan Area are statistically significant at the 90 percent confidence level.
- <sup>33</sup> All unemployment data for working-age adults (ages 18-64) is from the U.S. Census Bureau's 2009 American Community Survey, 1-Year Estimates for PUMAs. Differences between unemployment rates of D.C. and Prince George's PUMAs with unemployment rates of 11 percent or higher and the Washington Metro area rate of 7 percent were statistically significant at the 90 percent confidence level.
- <sup>34</sup> Kathryn L.S. Pettit et al., Urban Institute, *Housing in the Nation's Capital 2009* (2009), available at <http://www.urban.org/publications/1001340.html> (last visited, Dec 3, 2010).
- <sup>35</sup> President Lyndon B. Johnson, Remarks at a Meeting of the Water Emergency Conference (August 11, 1965).
- <sup>36</sup> David A. Fahrenthold, *Potomac River's Health Rebounds*, Wash. Post (Sept 8, 2010), at A4.
- <sup>37</sup> *Low Impact Development (LID)*, EPA, *supra* note 3.
- <sup>38</sup> There are many studies of the economic benefits of green interventions in a variety of circumstances, but none are exactly analogous to the Anacostia watershed. Where appropriate, therefore, we have attempted to extrapolate from these studies to draw informed inferences about the nature and scope of the economic benefits likely to result upstream from the green infrastructure investment proposed in this report.
- <sup>39</sup> National Capital Revitalization Corporation and Anacostia Waterfront Corporation Reorganization Act of 2008, D.C. Law 17-138, § 402(a)(2), 55 D.C. Reg. 1689 (Feb. 22, 2008) (codified at D.C. Code § 2-1226-02(a)(2)).
- <sup>40</sup> D.C. Office of Planning, *supra* note 27, at 18.
- <sup>41</sup> Coalition for Smart Growth, *Invest in Prince George's: Discover the Potential of Prince George's 15 Metro Stations*, available at <http://www.smartergrowth.net/anx/ass/library/13/invest-prince-georges.pdf>, (last visited Jan. 20, 2011).
- <sup>42</sup> *Id.*
- <sup>43</sup> Shyam Kannan, Robert Charles Lesser & Co., *Here's to the Future: The Next Decade of Development in the D.C. Region*, [http://www.rlco.com/generalpdf/general\\_Sep232010939\\_Kannan\\_Presentation.pdf](http://www.rlco.com/generalpdf/general_Sep232010939_Kannan_Presentation.pdf) (last visited Jan. 20, 2011) (This presentation demonstrates that over the next decade, consumer demand, demographic drivers, and smart-growth policies will converge to promote growth in walkable, transit-oriented, mixed-used communities). Greater Wash. 2050 Coalition, *Region Forward: A Comprehensive Guide for Regional Planning and Measuring Progress in the 21st Century* (2010), available at <http://www.mwcog.org/uploads/pub-documents/p15fX1g20100407104951.pdf> (This plan, endorsed by the Metropolitan Washington Council of Governments, demonstrates that the Washington region's policymakers, and its business and civic leaders, have also adopted a vision focused on transit-oriented communities).
- <sup>44</sup> Natural Economy Northwest, *The Economic Value of Green Infrastructure* 8 (2008), available at <http://www.nwda.co.uk/PDF/EconomicValueofGreenInfrastructure.pdf>
- <sup>45</sup> Josh Hurd, *Economic Benefits of Watershed Restoration* 15 (2009), available at [http://www.wildlandscpr.org/files/Economic\\_Benefits.pdf](http://www.wildlandscpr.org/files/Economic_Benefits.pdf) (citing Natural Resource Council, *Restoration of Aquatic Ecosystems* (1992), available at <http://www.nap.edu/openbook.php?isbn=0309045347>).
- <sup>46</sup> Booz Allen Hamilton, *U.S. Green Building Council: Green Jobs Study ii* (2009), available at <http://www.usgbc.org/ShowFile.aspx?DocumentID=6435>.
- <sup>47</sup> *See id.* at 1-2 (showing the direct, indirect, and induced effects on the GDP, jobs and wages.).

- <sup>48</sup> See *id.* at 2.
- <sup>49</sup> See *id.*
- <sup>50</sup> Heidi Garrett-Peltier & Robert Pollin, *Jobs Creation per \$1 Million Investment*, Univ. of Mass. Political Economy & Research Inst. (2009), available at [http://adpartners.org/tables/Job\\_Creation\\_for\\_Investment\\_-\\_Garrett-Peltier.pdf](http://adpartners.org/tables/Job_Creation_for_Investment_-_Garrett-Peltier.pdf).
- <sup>51</sup> *Id.*
- <sup>52</sup> See Max Nielsen-Pincus & Cassandra Moseley, *Economic and Employment Impacts of Forest and Watershed Restoration in Oregon* 8 (2010).
- <sup>53</sup> See Sigalle Rosner, *Job Implications in Los Angeles' Green Building Sector* 20-21 (2006) (citing examples of new opportunities include jobs in landscaping, heavy machinery, LID retrofitting and construction, LEED certifiers, energy auditors and recyclers to name a few).
- <sup>54</sup> See Stratus Consulting Inc., *A Triple Bottom Line Assessment of Traditional and Green Infrastructure Options for Controlling CSO Events in Philadelphia's Watersheds Final Report* 4.6 (2009). (The study states that, "[t]hese 'green infrastructure jobs' therefore have the unique capability to provide not just employment, but a crucial stepping stone to help people escape from poverty").
- <sup>55</sup> See Green For All, *Green-Collar Jobs Overview*, <http://www.greenforall.org/resources/green-collar-jobs-overview> (last visited Sept. 30, 2010).
- <sup>56</sup> Nathalie Weinstein, *Solar Manufacturers Struggle to Meet Demand*, Daily Journal of Commerce, Jul. 28, 2010, available at <http://djcoregon.com/news/2010/07/28/solar-manufacturers-struggle-to-meet-demand/>.
- <sup>57</sup> *Id.*
- <sup>58</sup> *Id.*
- <sup>59</sup> Stephen K. Callaway & David D. Dobrzykowski, *Service-Oriented Entrepreneurship: Service-Dominant Logic in Green Design and Healthcare*, Winter 2009, at 225, 227 (2009), available at <http://www.sersci.com/ServiceScience/upload/12529574870.pdf>. An example of a thriving business that is benefitting from the boom in green infrastructure, Green Depot, Inc. has become the "leading supplier of environmentally friendly and sustainable building products, services and home solutions." *About Green Depot*, Green Depot [http://www.greendepot.com/greendepot/about.asp?&ts\\_id=0](http://www.greendepot.com/greendepot/about.asp?&ts_id=0). The company, which was founded by green entrepreneur Sarah Beatty in 2005, already has expanded locations in nine areas and ten distribution centers throughout the Northeast, Id. Green Depot is only one of many examples of businesses that have been able to promote green practices in a profitable manner.
- <sup>60</sup> Callaway & Dobrzykowski, *supra* note 59, at 231. (explaining that federal tax incentive programs and the popularity of green infrastructure programs, entrepreneurial activity in green infrastructure has been increasing.).
- <sup>61</sup> See P. Joan Poor, Keri L. Pessagno & Robert W. Paul, *Exploring the hedonic value of ambient water quality: A local watershed based study*, 60 *Ecological Economics* 797, 799 (2007).
- <sup>62</sup> See *id.* at 805. Using a hedonic property value model, these scientists estimated the relationship between property values and ambient water quality. A hedonic property value model estimates the price consumers would place on a certain characteristic. See *id.* at 799-80. A survey of literature shows that "hedonic property valuation studies have been used to estimate the marginal implicit prices of numerous environmental amenities." *Id.* at 798.
- <sup>63</sup> See *id.* at 799.
- <sup>64</sup> See Canada Mortg. & Hous. Corp., *Greenbacks from Green Roofs: Forging A New Industry in Canada* 35 (1999), available at <http://ohio.sierraclub.org/miami/images/files/Greenbacks.pdf>.
- <sup>65</sup> Ed MacMullan, *Assessing Low Impact Developments Using a Benefit-Cost Approach* 15 (EcoNorthwest) (2007), available at [http://www.econw.com/reports/Low-Impact-Development\\_Benefit-Cost.pdf](http://www.econw.com/reports/Low-Impact-Development_Benefit-Cost.pdf).
- <sup>66</sup> Natural Res. Def. Council, *Stormwater Strategies, Community Responses to Runoff Pollution*, <http://www.nrdc.org/water/pollution/storm/chap12.asp#note39> (last visited Sept. 30, 2010) (citing Ron Tyne, *Bridging the Gap: Developers Can See Green, Economic Benefits of Sustainable Site Design and Low-Impact Development* 27-30 (Land Development 2000) (2010).
- <sup>67</sup> See NRDC: *Building Green, Increase the Market Value of Your Project*, Natural Res. Def. Council, [http://www.nrdc.org/buildinggreen/bizcase/own\\_value.asp](http://www.nrdc.org/buildinggreen/bizcase/own_value.asp) (last visited Sept. 30, 2010). (citing the USAA Realty Company, which "invested \$110,000 in energy efficiency measures in its 170,000-square-foot office plaza in La Paz, California, and achieved an increase in market value of \$1.5 million upon sale of the building."); see also Piet Eichholtz et al., *Doing Well by Doing Good? Green Office Buildings* 1 (2009), available at [http://www.jetsongreen.com/files/doing\\_well\\_by\\_doing\\_good\\_green\\_office\\_buildings.pdf](http://www.jetsongreen.com/files/doing_well_by_doing_good_green_office_buildings.pdf). (explaining that one study concluded that green buildings sell for a premium in the marketplace, finding that "[b]eyond the direct effects of energy savings, further evidence suggests that the intangible effects of the label itself also play a role in determining the value of green buildings in the marketplace," and that a 2009 Bloomberg study estimated that selling prices of "green buildings" were higher by about 16% than comparable buildings in a market); see also Chris Palmieri, *Green Buildings: Fewer Sick Days, Higher Rents*, Bloomberg Businessweek, Nov. 19, 2009, available at [http://www.businessweek.com/the\\_thread/the\\_thread/hotproperty/archives/2009/11/green\\_buildings.html](http://www.businessweek.com/the_thread/the_thread/hotproperty/archives/2009/11/green_buildings.html) (explaining that a recent year-long study of green buildings conducted by the University of San Diego in conjunction with the commercial real estate firm CB Richard Ellis ("CBRE") determined that rental rates in green buildings were approximately 13% higher than market rates, and that vacancy rates were 3.5% lower.).

- <sup>68</sup> See EPA, *Green Buildings and Energy Efficiency: Diligence Pays, Off the Charts*, Summer 2006, at 8 (citing that, in 2006, the EPA estimated that a combined \$350 million in savings had accrued to the “2,500 buildings that [had] earned the ENERGY STAR label for energy efficiency through 2005...when compared with similar buildings having average energy consumption.”); see also EPA, *History of ENERGY STAR*, [http://www.energystar.gov/index.cfm?c=about.ab\\_history](http://www.energystar.gov/index.cfm?c=about.ab_history) (last visited Sept. 30, 2010) (noting that ENERGY STAR has “successfully delivered energy and cost savings across the country, [which saved] businesses, organizations, and consumers about \$17 billion in 2009 alone.”).
- <sup>69</sup> Booz Allen Hamilton, *supra* note 46, at 6.
- <sup>70</sup> David Sailor, *A Green Roof Model For Building Energy Simulation Programs*, 40 *Energy and Buildings* 1466, 1476 (2008).
- <sup>71</sup> EPA, *Heat Island Effect*, <http://www.epa.gov/heatisld/> (“The term “heat island” describes built-up areas that are hotter than nearby rural areas. The annual mean air temperature of a city with 1 million people or more can be 1.8–5.4°F (1–3°C) warmer than its surroundings. In the evening, the difference can be as high as 22°F (12°C). Heat islands can affect communities by increasing summertime peak energy demand, air conditioning costs, air pollution and greenhouse gas emissions, heat-related illness and mortality, and water quality.”).
- <sup>72</sup> Colum. Univ. Ctr for Climate Sys. Research & NASA Goddard Inst. for Space Studies, *Green Roofs in the New York Metropolitan Region: Research Report* v, 21, 45 (Cynthia Rosenzweig et al., eds., 2006).
- <sup>73</sup> HM Gov’t, *World Class Places: The Government’s Strategy for Improving Quality of Place* 15 (2009), available at <http://www.communities.gov.uk/documents/planningandbuilding/pdf/1229344.pdf>.
- <sup>74</sup> 63 Jolanda Maas et al., *Morbidity is related to a green living environment* 967, 971 (J. Epidemiology Cmty. Health 12th ed. 2009).
- <sup>75</sup> *Id.*
- <sup>76</sup> *Id.*
- <sup>77</sup> *Id.*
- <sup>78</sup> Nicole Lurie et al., *Assessing Health and Health Care in the District of Columbia* (2008). (This study found that Wards 2 and 3, which are located almost entirely outside of the Anacostia Watershed, had lower rates of hypertension, heart disease, and cerebrovascular disease than other parts of the city).
- <sup>79</sup> Ted Weber, *Maryland’s Green Infrastructure Assessment: A Comprehensive Strategy for Land Conservation and Restoration* 3 (2003).
- <sup>80</sup> See generally Ronald J. Sutherland & Richard Walsh, *Effect of Distance on the Preservation Value of Water Quality*, 61 *Land Economics* 281-291 (1985).
- <sup>81</sup> EPA, *Anacostia River Basin*, available at [http://www.epa.gov/reg3wapd/tmdl/D.C.\\_tmdl/AnacostiaRiver/index.html](http://www.epa.gov/reg3wapd/tmdl/D.C._tmdl/AnacostiaRiver/index.html) (last updated Nov. 1, 2010).
- <sup>82</sup> U.S. Army Report, *supra* note 2, at 32.
- <sup>83</sup> Md. Dep’t of the Env’t & D.C. Dep’t of the Env’t, *Total Maximum Daily Loads of Trash for the Anacostia River Watershed, Montgomery and Prince George’s Counties, Maryland and the District of Columbia—Draft*, (2010). Previous estimates by Prince George’s County placed this figure at 20,000 tons a year so 600 tons may be a low estimate.
- <sup>84</sup> Dist. Dep’t of the Env’t, *supra* note 28, at 17, 21.
- <sup>85</sup> *Id.* at 18
- <sup>86</sup> *Id.* at 23
- <sup>87</sup> U.S. Army Report, *supra* note 2, at 30.
- <sup>88</sup> *Id.*
- <sup>89</sup> Dist. Dep’t of the Env’t, *supra* note 28, at 16
- <sup>90</sup> U.S. Army Report, *supra* note 2, at 33.
- <sup>91</sup> Chesapeake Bay Field Office, U.S. Fish and Wildlife Serv. *Update on the Anacostia*, available at <http://www.fws.gov/chesapeakebay/pdf/AnacostiaUpdate.pdf>.
- <sup>92</sup> *Id.*
- <sup>93</sup> Anacostia Watershed Toxics Alliance, *White Paper on PCB and PAH Contaminated Sediment in the Anacostia River 2*, (Feb. 23, 2009) (draft final), available at <http://www.anacostia.net/Archives/AWSC/documents/WhitePaper.pdf>.
- <sup>94</sup> Metro. Wash. Council of Gov’ts, *supra* note 5.
- <sup>95</sup> *Id.*
- <sup>96</sup> U.S. Army Report, *supra* note 2, at 28.
- <sup>97</sup> U.S. Army Report, *supra* note 2, at 30.
- <sup>98</sup> U.S. Army Report, *supra* note 2, at 33.
- <sup>99</sup> U.S. Army Report, *supra* note 2, at 29.
- <sup>100</sup> *Id.*

- 101 *Id.*
- 102 E-mail from Mohsin R. Siddique, Supervisor, Envtl. Planning, D.C. Water & Sewer Auth., to Brooke DeRenzis, Project Dir., DC Appleseed (Oct. 7, 2010, 13:32 EST). (According to DC Water officials, the Anacostia River in year 2010 receives on average 1,282 million gallons of overflow annually. The Potomac receives on average 850 million gallons of overflow annually).
- 103 D.C. Water & Sewer Auth., *WASA's Recommended Combined Sewer System Long Term Control Plan: Control Plan Highlights 4* (2002), available at [http://www.DCwater.com/workzones/projects/pdfs/ltcp/Control\\_Plan\\_Highlights.pdf](http://www.DCwater.com/workzones/projects/pdfs/ltcp/Control_Plan_Highlights.pdf). Figure confirmed in E-mail from Mohsin R. Siddique, *supra* note 102.
- 104 D.C. Water & Sewer Auth., *Combined Sewer System Long Term Control Plan: Final Report* (2002), available at <http://www.DCwater.com/workzones/projects/pdfs/ltcp/Complete%20LTCP%20For%20CD.pdf>
- 105 *Wastewater Treatment*, Wash. Suburban Sanitary Comm'n, <http://www.wsscwater.com/home/jsp/content/ww-treat-index.faces> (last visited Oct. 14, 2010).
- 106 Dist. of the Env't, *supra* note 28, at 13, 19-20
- 107 Toxic Substances Control Act, Pub. L. No. 94-469, § 6(e), 90 Stat. 2003 (1976), 2025, (codified at 15 U.S.C. § 2605 (e)) (PCB phase-out beginning 1977). The only approved commercial use of chlordane is in the control of fire ants in power transformers, U.S. Envtl Prot. Agency, *Basic Information about Chlordane in Drinking Water*, <http://water.epa.gov/drink/contaminants/basicinformation/chlordane.cfm>, (last visited Jan. 20, 2011). Manufacture for most uses was ordered to stop July 30, 1975. Press Release, U.S. Envtl Prot. Agency, EPA 822-R-03-001, Train Stops Manufacture of Heptachlor/Chlordane, Cites Imminent Cancer Risk (July 30, 1975), available at <http://www.epa.gov/history/topics/legal/01.htm>. EPA cancelled most dieldrin uses in 1972; the manufacturer voluntarily cancelled the remaining uses in 1987, U.S. Envtl Prot. Agency, *Health Effects Support Document for Aldrin/Dieldrin*, p.1-1 (February 2003), available at [http://water.epa.gov/action/advisories/drinking/upload/2004\\_1\\_16\\_support\\_ccl\\_aldrin-dieldrin\\_healtheffects.pdf](http://water.epa.gov/action/advisories/drinking/upload/2004_1_16_support_ccl_aldrin-dieldrin_healtheffects.pdf).
- 108 Memorandum from Frank Fritz & Cindy Weiss, Assistant Reg'l Counsels, EPA Region III, to Jon Capacasa, Dir., Water Prot. Div., EPA Region III (Oct.21, 2009), available at [http://www.anacostia.net/Archives/AWSC/documents/AWSC\\_23\\_Summary\\_Sources\\_Sediment\\_Contamination.pdf](http://www.anacostia.net/Archives/AWSC/documents/AWSC_23_Summary_Sources_Sediment_Contamination.pdf)
- 109 Dist. Dep't of the Env't, *supra* note 28, at 20 fig. 10; Anacostia Watershed Toxics Alliance, *supra* note 93, figs. 3, 7.
- 110 Anacostia Watershed Toxics Alliance, *supra* note 93, figs. 4, 7.
- 111 E.g., Brandes, *supra* note 25, at 50; see also U.S. Army Report, *supra* note 2, at 4.
- 112 *Anacostia Watershed History*, Anacostia Watershed Restoration P'ship, <http://www.anacostia.net/history/history.html>, (last visited, Oct. 14, 2010).
- 113 Wennersten, *supra* note 18.
- 114 *Id.*
- 115 *Anacostia River Watershed*, Damage Assessment, Remediation, & Restoration Program, Nat'l Oceanic & Atmospheric Admin., <http://www.darrp.noaa.gov/partner/anacostia/index.html> (last updated Dec. 13, 2010).
- 116 See *The Tiber Creek Sewer Flush Gates, Washington, D.C.*, Engineering News & Am. Ry. J. (Feb. 8, 1894), available at [http://www.sewerhistory.org/articles/compon/1894\\_aen03/article.pdf](http://www.sewerhistory.org/articles/compon/1894_aen03/article.pdf). This article discusses changes in the D.C. sewer system initiated by the Corps to deal with flushing untreated sewage into the tidal estuary.
- 117 See, e.g., U.S. v. Wash. State Dep't. of Transp., 716 F. Supp. 2d 1009 (W.D. Wash. 2010)
- 118 Wennersten, *supra* note 18.
- 119 *Id.*
- 120 See *Civil War Defenses of Washington: Historical Resource Study*, National Park Service, [http://www.nps.gov/history/history/online\\_books/civilwar/hrst.htm](http://www.nps.gov/history/history/online_books/civilwar/hrst.htm) (last updated Oct. 29, 2004).
- 121 U.S. Army Report, *supra* note 2, at 21. (The following Federal entities are landowners in the Anacostia Watershed: U.S. Department of Treasury, U.S. Department of Agriculture, U.S. Department of the Interior, U.S. Army, U.S. Navy, U.S. Marine Corps, U.S. Air Force, and National Aeronautics and Space Administration).
- 122 E.g., Brandes, *supra* note 25, at 49.
- 123 U.S. Census Bureau, *Decennial Census* (1940); see also U.S. Census Bureau, *Decennial Census* (2000).
- 124 U.S. Army Report, *supra* note 2.
- 125 *Id.* at 19. (All information on land use types and owners is from this source).
- 126 Metro. Wash. Council of Gov'ts, *Growth Trends to 2030: Cooperative Forecasting in the Washington Region 5* (2007).
- 127 Exec. Order No. 13508, 75 Fed. Reg. 26,055,26,266 (May 11, 2010).
- 128 EPA, *The Next Generation of Tools and Actions to Restore Water Quality in the Chesapeake Bay: A Revised Report Fulfilling Section 202a of Executive Order 135089* (2009).
- 129 *Land Use-Bay Pressures*, Chesapeake Bay Program, <http://www.chesapeakebay.net/landuse.aspx?menuitem=14671> (last visited Oct 14, 2010). (All figures on Chesapeake Bay Land Use Types are from this source).

- <sup>130</sup> Chesapeake Bay Program, *Bay Barometer: A Health and Restoration Assessment of the Chesapeake Bay and Watershed in 2008* (2009), available at [http://www.chesapeakebay.net/content/publications/cbp\\_34915.pdf](http://www.chesapeakebay.net/content/publications/cbp_34915.pdf).
- <sup>131</sup> *Id.*
- <sup>132</sup> Fed. Leadership Strategy, *supra* note 4, at 28. The Bay strategy could also be complemented by the Chesapeake Clean Water and Ecosystem Restoration Act of 2009, which has not yet been enacted as legislation. S. 1816 was introduced by Senator Benjamin Cardin (MD-D), and was placed on the Senate Legislative Calendar under General Orders on September 28, 2010. A companion bill, HR 3852 was introduced in September 2009 by Representative Elijah Cummings and referred to committee. U.S. Library of Congress, Bill Summary and Status: S. 1816, <http://thomas.loc.gov/cgi-bin/bdquery/D?d111:1:./temp/-bddZwU:@@@L&summ2=m&/home/LegislativeData.p> Bill Summary and Status: H.R. 3852, <http://thomas.loc.gov/cgi-bin/bdquery/D?d111:1:./temp/-bdSrD7:@@@L&summ2=m&/home/LegislativeData.php?n=BSS;c=111> (last visited Jan. 20, 2011). The proposed Act would establish legal obligations and provide financial resources for many of the recommendations made by the Bay Strategy. S. 1816, 111th Cong. (2009); H.R. 3852, 111th Cong. (2009).
- <sup>133</sup> Four of the 92 impaired waterways segments subject to the Chesapeake Bay TMDL relate to the Anacostia.
- <sup>134</sup> Fed. Leadership Strategy, *supra* note 4, at 21. (The Chesapeake strategy is focused on significantly reducing nitrogen, phosphorus, and sediment loads by substantially mitigating the following: runoff from urban/suburban lands and farmland; discharges of nutrient pollution from municipal and industrial wastewater facilities; leaching to surface waters from on-site septic systems; and atmospheric deposition of nitrogen to the Bay and its watershed.)
- <sup>135</sup> MD Final WIP at ES-4, (December 3, 2010) (“Completing upgrades of the major municipal treatment plants will substantially close [2017 Interim Target] gaps.”); D.C. Final WIP at 23 (November 29, 2010) (“The District is expecting to address most nutrient reductions through implementation of permit conditions for Blue Plains wastewater treatment plant and the combined sewer system, and sediment reductions through the permit conditions for the Washington Aqueduct.”). Nonetheless, the Maryland WIP does contain new stormwater proposals if proposed strategies fail to meet TMDL goals. If a funding mechanism for stormwater controls is not substantially agreed to by all Maryland counties in 2011, the State will enact legislation mandating state-wide rules. Moreover, if BMP goals are not attained, Maryland plans on making the use of cover crops mandatory on agricultural land starting in 2014. MD Final WIP at ES-27. D.C.’s WIP includes stormwater mitigation activities already proposed as part of its draft MS4 permit.
- <sup>136</sup> Md. Code Ann., Envir. §§ 4-201.1, 4-203 (LexisNexis 2007).
- <sup>137</sup> Anacostia Watershed Restoration P’ship, available at <http://www.anacostia.net/about.html> (last visited Oct. 19, 2010).
- <sup>138</sup> Water Resources Development Act of 2007, Pub. L. No. 110-114, § 5060, 101 Stat. 1215 (2007).
- <sup>139</sup> Andrew J. Reese, *Volume-Based Hydrology: Examining the shift in focus from peak flows and pollution treatment to mimicking predevelopment volumes*, Stormwater, Sept. 2009, available at <http://stormh20.com/forms/print-7447.aspx> (last visited on Oct. 13, 2009).
- <sup>140</sup> Energy Independence and Security Act of 2007, Pub. L. No. 110-140, § 438, 121 Stat. 1620 (to be codified at 42 U.S.C. § 17094).
- <sup>141</sup> Reese, *supra* note 139.
- <sup>142</sup> Nat’l Research Council, *supra* note 21, at 457-58.
- <sup>143</sup> Energy Independence and Security Act of 2007, Pub. L. No. 110-140, § 438, 121 Stat. 1620 (to be codified at 42 U.S.C. § 17094).
- <sup>144</sup> EPA, *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act 12* (2009), available at [http://www.epa.gov/ointrnt/documents/epa\\_swm\\_guidance.pdf](http://www.epa.gov/ointrnt/documents/epa_swm_guidance.pdf).
- <sup>145</sup> *Id.* at 14.
- <sup>146</sup> See *supra* note 3 in regard to green infrastructure terminology.
- <sup>147</sup> Nat’l Research Council, *supra* note 21, at 496.
- <sup>148</sup> Nat’l Research Council, *supra* note 21, at 459.
- <sup>149</sup> *Id.*
- <sup>150</sup> Md. Code Ann., Envir. §§ 4-201.1, 4-203 (LexisNexis 2007).
- <sup>151</sup> The State of Maryland uses the term “Environmental Site Design” (ESD) instead of green infrastructure. The regulations define ESD as, “using small-scale stormwater management practices, nonstructural techniques, and better site planning to mimic natural hydrologic runoff characteristics and minimize the impact of land development on water resources.” ESD treatment practices include several green practices that promote infiltration, evapotranspiration, and reuse, including rooftop disconnection, rainwater harvesting, landscape infiltration, rain gardens, swales, and bioretention. This report uses the terms “green infrastructure” interchangeably with “ESD.”
- <sup>152</sup> Redevelopment is defined as development of sites where existing land use is commercial, industrial, institutional, or multifamily residential and the existing impervious area exceeds 40 percent of the site.
- <sup>153</sup> Redevelopment designs that cannot meet these requirements after demonstrating that they have maximized impervious area reduction and used green infrastructure to the maximum extent practicable can use on-site and off-site structural controls.
- <sup>154</sup> Projects eligible for quantitative waivers must: be located in a Priority Funding Area; be on sites where public water and sewer and stormwater conveyance exists; implement ESD to the maximum extent practicable (MEP) to meet the full water quality treatment requirements for the entire development; use ESD to the MEP to provide full quantity control for all new impervious surfaces.
- <sup>155</sup> Montgomery Cnty., Md., Stormwater Mgmt., Expedited Bill No. 40-10 (Jul. 27, 2010), available at <http://www.montgomerycountymd.gov/csltmpl.asp?url=/content/council/leg/bill/2010.asp>.

- <sup>156</sup> Dist. Dep't of the Env't, *Stormwater Guidebook* tbl. 2.2, available at [http://ddoe.dc.gov/ddoe/frames.asp?doc=/ddoe/lib/ddoe/stormwater-div/2009.05.07\\_SWM\\_Chapter\\_2\\_-\\_D.C.\\_SWM\\_Criteria.pdf](http://ddoe.dc.gov/ddoe/frames.asp?doc=/ddoe/lib/ddoe/stormwater-div/2009.05.07_SWM_Chapter_2_-_D.C._SWM_Criteria.pdf).
- <sup>157</sup> National Capital Revitalization Corporation and Anacostia Waterfront Corporation Reorganization Act of 2008, D.C. Code §§ 2-1225.01-2-1226.41 (2008).
- <sup>158</sup> Letter from Hamid Karimi, Deputy Dir., D.C. Dep't of the Env't, to Garrison D. Miller, U.S. EPA Region III (June 21, 2010) (on file with the U.S. EPA Region III). (The letter states that, "Implementation of more stringent stormwater standards in the District than in surrounding jurisdictions could create more sprawl by establishing an unlevel playing field that will likely accelerate development and growth in D.C.'s neighboring suburban jurisdictions, rather than concentrating it in the urban, developed core.")
- <sup>159</sup> EPA, *Guidance for Federal Land Management in the Chesapeake Bay Watershed* 3-7 (2010).
- <sup>160</sup> The Montgomery County Permit applies to the entire County, including public schools, except areas covered under other MS4 Permits (Cities of Gaithersburg, Rockville, and Takoma Park, and lands under the control of State or Federal agencies).
- <sup>161</sup> Fed. Leadership Strategy, *supra* note 4, at 28. (The strategy states that the provisions of the draft D.C. MS4 permit may serve as a model for MS4 permits for jurisdictions throughout the Bay watershed).
- <sup>162</sup> EPA, *Urban Stormwater Approach for the Mid-Atlantic Region and the Chesapeake Bay Watershed* (2010).
- <sup>163</sup> U.S. Army Report, *supra* note 2, at 86.
- <sup>164</sup> D.C. Water and Sewer Auth., *supra* note 103, at 11 tbl. 4.
- <sup>165</sup> Consent Decree, *Anacostia Watershed Soc'y v. D.C. Water & Sewer Auth.*, No. 1:CV00183, (D.D.C. Mar. 23, 2005).
- <sup>166</sup> D.C. Water & Sewer Auth., *supra* note 104.
- <sup>167</sup> *Id.*
- <sup>168</sup> *Id.*
- <sup>169</sup> E-mail from Mohsin R. Siddique, Supervisor, Env'tl. Planning, D.C. Water & Sewer Auth., to Brooke DeRenzis, Project Dir., DC Appleseed (Oct. 7, 2010, 13:32 EST). (According to DC Water officials, the Anacostia River in year 2010 receives on average 1,282 million gallons of overflow annually, a 40 percent reduction from original average levels of 2,142 million gallons.)
- <sup>170</sup> E-mail from Yvette Downs, Dir., Fin. & Budget, D.C. Water & Sewer Auth., to Brooke DeRenzis, Project Dir., DC Appleseed (Feb. 9, 2011, 9:59 EST).
- <sup>171</sup> *Id.*
- <sup>172</sup> *Id.*
- <sup>173</sup> Consent Decree, *Anacostia Watershed Soc'y v. Washington Suburban Sanitary Commission*, No. PJM-04-3679, (D. Md. Dec. 7, 2005). These conservation groups are: (1) Anacostia Watershed Society; (2) Audubon Naturalist Society of the Central Atlantic States, Inc.; (3) Friends of Sligo Creek; and (4) Natural Resources Defense Council.
- <sup>174</sup> The lawsuit alleged that WSSC violated the federal CWA by failing to properly operate and maintain its sewage collection system, resulting in sanitary sewage overflows ("SSOs") into area streams and backups into buildings.
- <sup>175</sup> These projects, to be completed in a five-year timeframe, include:
- Enhancing existing source water protection efforts through the purchase of buffer property around WSSC's Patuxent River Reservoirs (\$3.3 million);
  - Enhancing existing nitrogen reduction efforts in colder months (Oct. 15 - March 30) at WSSC's Western Branch Wastewater Treatment Plant in Prince George's County (\$450,000); and
  - Reducing extraneous flow into the WSSC's wastewater collection system by identifying and removing private property area way drains, gutters/downspouts and sump pumps that are improperly connected to the sewer system (\$600,000).
- Press Release, Washington Suburban Sanitary Commission, *WSSC Reaches Agreement with EPA and Conservationists on Sewer Overflows* (July 26, 2005), available at <http://www.wsscwater.com/home/jsp/misc/genericNews.faces?pgurl=/Communication/NewsRelease/2005/2005-07-26.html>.
- <sup>176</sup> Washington Suburban Sanitation Commission, *Fiscal Year 2011 Budget*, at 3-9.
- <sup>177</sup> *Id.*
- <sup>178</sup> Dist. Dep't of the Env't, *supra* note 28, at 13, 19-20
- <sup>179</sup> "Looking at PCBs, modeling has indicated that even if 100 percent of the PCB loads were eliminated from streams feeding the Anacostia for 20 years, the tidal Anacostia would still violate water quality standards because of the persistence of pollutants in the river bottom sediment." Dist. Dep't of the Env't, *supra* note 28, at 20.
- <sup>180</sup> U.S. Army Report, *supra* note 2, at 34.
- <sup>181</sup> Anacostia Watershed Toxics Alliance, *supra* note 93.
- <sup>182</sup> D.C. Water & Sewer Auth., *supra* note 104.
- <sup>183</sup> U.S. Army Report, *supra* note 2, at 27.

- <sup>184</sup> Metro Wash Council of Gov'ts, *supra* note 5.
- <sup>185</sup> Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. §§ 9601 - 9675 (2006).
- <sup>186</sup> U.S. Army Report, *supra* note 2. (In 1987, the Anacostia Restoration Agreement was signed by local and state entities, and the Anacostia Watershed Restoration Committee (AWRC) was created. In 1991, a second restoration agreement established six guiding restoration goals. In 2001, the AWRC set 2010 restoration targets to indicate progress toward meeting the guiding restoration goals. In 2006, the Metropolitan Washington Council of Governments adopted a new structure that resulted in today's Anacostia Watershed Restoration Partnership.)
- <sup>187</sup> D.C. Office of Planning, *supra* note 27, at 23. (The AWI Framework Plan also notes that the lack of binding restoration benchmarks that require environmental clean-up by a certain date an inter-jurisdictional challenge).
- <sup>188</sup> U.S. Army Report, *supra* note 2, at 113.
- <sup>189</sup> E-mail from Steve Shofar, Div. Chief, Watershed Mngmt. Div., Montgomery Cty. Dep't of Env't Protection, to Brooke DeRenzis, Project Dir., D.C. Appleseed (Oct. 6, 2010, 13:40 EST).
- <sup>190</sup> E-mail from Jennifer Guillaume, Env'tl. Prot. Specialist, Watershed Prot. Div., D.C. Dep't of the Env't, to Brooke DeRenzis, Project Dir., D.C. Appleseed (Sept. 23, 2010, 17:07 EST).
- <sup>191</sup> U.S. Army Report, *supra* note 2.
- <sup>192</sup> Anacostia Watershed Initiative Act of 2005, H.R. 2509, 109th Cong. (2005).
- <sup>193</sup> Local governments can issue tax-exempt municipal bonds for activities that satisfy a public purpose. Projects in the Anacostia Restoration Plan could be financed with tax-exempt bonds if they meet the definition of "public purpose." Dennis Zimmerman, Tax-exempt bonds, *The Encyclopedia of Taxation and Tax Policy*, 404, 405 (Joseph J. Cordes, Robert D. Ebel, Jane G. Gravelle, eds., 2005).
- <sup>194</sup> As noted previously, "smart growth" policies seek to discourage development of greenfield areas, and to create incentives for more intensive and efficient use of existing developed areas.
- <sup>195</sup> 42 USC § 6961(b).
- <sup>196</sup> Clean Water Act, § 505, 33 U.S.C. § 1365; Resource Conservation and Recovery Act § 7003, 42 U.S.C. § 6972.
- <sup>197</sup> 42 USC § § 6991-6991 m. Under the underground tank program, Congress gave service station owners and others with underground storage tanks for petroleum and other liquids 10 years to install double walled tanks with various leak prevention and detection systems.
- <sup>198</sup> U.S. Env't Protection Agency, Fact Sheet for the General Permit for Designated Discharges in the Charles River Watershed in Milford, Bellingham, and Franklin Massachusetts, *available at* <http://www.epa.gov/region01/npdes/charlesriver/pdfs/RDFactSheet.pdf> (last visited January 31, 2011).
- <sup>199</sup> S. 3602, 111th Cong. (2010). This bill was introduced in the Senate on July 15, 2010. It was read twice and referred to the Committee on Environment and Public Works. Library of Congress, Bill Summary and Status: S. 3602, <http://thomas.loc.gov/cgi-bin/bdquery/D?d111:1:./temp/~bdX6U0:@@L&summ2=m&/home/LegislativeData.php?n=BSS;c=111> (last visited Jan. 20, 2011).
- <sup>200</sup> Metro Wash Council on Gov'ts, *supra* note 5.
- <sup>201</sup> Ctr for Land Use Educ., *Planning Implementation Tools: Density Bonus* (2005), *available at* <http://www.uwsp.edu/cnr/lanD.C.enter/pdffiles/implementation/densitybonus.pdf> (last visited Oct 18, 2010).
- <sup>202</sup> *Id.*
- <sup>203</sup> D.C. Mun. Regs. tit. 11, § 2604 (2010).
- <sup>204</sup> A bond should be in place until the building's stormwater control system passes a performance test over a full-year of operation. The local jurisdiction should also be able to impose a bond requirement or financial responsibility test based on several years of maintenance costs on building owners if they don't properly maintain their green infrastructure.
- <sup>205</sup> DC Zoning Update; *Planned Unit Development*, Office of Planning (PUD), DC Zoning Update, <http://www.dczoningupdate.org/pud.asp?area=pud> (last visited Jan. 20, 2011).
- <sup>206</sup> This calculation of the cost of tax incentives assumes that stormwater retrofits on private lands will have a cost \$1 billion. The \$1 billion is a rough order-of-magnitude estimate arrived at based on the following assumptions. There are approximately 14,700 acres of private impervious surfaces in the Anacostia watershed. Sixty-four percent of the total watershed is uncontrolled. Assuming that 64 percent of private impervious surfaces are uncontrolled, there are approximately 9,420 uncontrolled acres of private impervious surfaces. If we apply the per-acre cost of the Anacostia Restoration Plan stormwater retrofit projects to this figure, we estimate that it will cost roughly \$1 billion to control 9,420 acres of private impervious surfaces. This figure could be refined with more specific data. The calculation of the cost of tax incentives also assumes that maintenance over the useful life of the upgrade will cost at least 50 percent of the installation cost, for a total of \$500 million. Based on these assumptions, green infrastructure installation and maintenance on private properties in the watershed, in total, would cost \$1.5 billion, or \$100 million a year over 15 years. Assuming that the federal government provides tax incentives worth up to 30 percent of the total installation and maintenance cost, we estimate that such tax incentives would cost the federal government \$450 million during the span of 15 years, or \$30 million a year (assuming all the incentives are fully utilized).
- <sup>207</sup> US Army Report, *supra* note 2, at 60.
- <sup>208</sup> A bill to amend the Federal Water Pollution Control Act to clarify federal responsibility for stormwater pollution, Pub. L. No. 111-378, 124 Stat. 4128 (2010) (codified at 33 U.S.C. § 1323 (c)).

- <sup>209</sup> *Water Quality Protection Charge* (WQPC), Montgomery Cnty., Md., Dep't of Env'tl Prot., <http://www.montgomerycountymd.gov/apps/dep/wqpc/Explanation.asp> (last visited Jan. 20, 2011).
- <sup>210</sup> 57 D.C. Reg. 8419, 8420 (Sept. 17, 2010).
- <sup>211</sup> Anacostia River Clean Up and Protection Act of 2009, D.C. Act 18-134, 56 D.C. Reg. 5703 (July 17, 2009) (codified at D.C. Code §§ 8-102.01–.07).

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