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IMPACT OF GREEN INFRASTRUCTURE AND LOW IMPACT DEVELOPMENT ON THE NATION'S WATER QUALITY, ECONOMY AND COMMUNITIES

(111–140)

HEARING

BEFORE THE

SUBCOMMITTEE ON
WATER RESOURCES AND ENVIRONMENT

OF THE

COMMITTEE ON
TRANSPORTATION AND
INFRASTRUCTURE
HOUSE OF REPRESENTATIVES

ONE HUNDRED ELEVENTH CONGRESS

SECOND SESSION

September 30, 2010

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CONTENTS

Page

Summary of Subject Matter vi

TESTIMONY

Becher, Drew, Executive Director, the Pennsylvania Horticultural Society, Philadelphia, Pennsylvania 18
Boncke, Bruce, P.E., Cheif Executive Officer, BME Associates, Fairport, New York 16
Neukrug, Howard, P.E., Deputy Commissioner, Philadelphia Water Department, Philadelphia, Pennsylvania 20
Ortiz, Hon. Adam, Mayor of Edmonston, Maryland 10
Richards, Timothy, P.E., Nafsma Director and Stormwater Committee Chair, Deputy City Engineer, City of Charlotte, North Carolina 14
Schwartz, Hon. Allyson Y., a Representative in Congress from the State of Pennsylvania 7
Yocca, David, Principal Landscape Architect/Planner, Conservation Design Forum, Elmhurst, Illinois 12

PREPARED STATEMENT SUBMITTED BY MEMBERS OF CONGRESS

Johnson, Hon. Eddie Bernice, of Texas 58
Mitchell, Hon. Harry E., of Arizona 66

PREPARED STATEMENTS SUBMITTED BY WITNESSES

Boncke, Bruce, P.E. 67
Neukrug, Howard, P.E. 79
Ortiz, Hon. Adam 92
Richards, Timothy, P.E. 109
Schwartz, Hon. Allyson Y. 128
Yocca, David 132

SUBMISSIONS FOR THE RECORD

Edwards, Hon. Donna E., a Representative in Congress from the State of Maryland, Environmental Council of the States, Resolution 07-10 5
Neukrug, Howard, P.E., Deputy Commissioner, Philadelphia Water Department, Philadelphia, Pennsylvania, "Green City Clean Waters, The City of Philadelphia's Program for Combined Sewer Overflow Control, A Long Term Control Plan Update, Summary Report" 90
Ortiz, Solomon P., a Representative in Congress from the State of Texas, American Rivers, "Putting Green to Work: Economic Recovery Investments for Clean and Reliable Water." 24

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September 28, 2010

SUMMARY OF SUBJECT MATTER

TO: Members of the Subcommittee on Water Resources and Environment

FROM: Subcommittee on Water Resources and Environment Staff

SUBJECT: Hearing on "Impact of Green Infrastructure and Low Impact Development on the Nation's Water Quality, Economy and Communities"

PURPOSE OF HEARING

The Subcommittee on Water Resources and Environment will meet on Thursday, September 30, 2010, at 10:00 a.m., in room 2167 of the Rayburn House Office Building to receive testimony from Representative Allyson Y. Schwartz; representatives from the business community; the City of Philadelphia, Pennsylvania; the Town of Edmonston, Maryland; the National Association of Flood and Stormwater Management Agencies; and the National Association of Home Builders on the use of green infrastructure and low impact development and its impact on water quality, the economy, and communities across the country.

BACKGROUND

This memorandum summarizes the impact of green infrastructure and low impact development on water quality, the economy, and communities. It also introduces green infrastructure and low impact development approaches and technologies.

I. Green Infrastructure and Low Impact Development

In general, "green infrastructure" or low impact development describes an array of technologies, approaches, and practices that use existing natural systems, or systems engineered to mimic natural processes, to enhance environmental quality and provide services, such as decreasing stormwater flows to alleviate overwhelming sewage systems.

Green infrastructure can take a variety of forms. Central to all technologies and approaches is the use of the natural environment to reduce the need for hard or traditional infrastructure to address pollution problems. Examples of green infrastructure include:

- Green roofs: Outfitting buildings with soil and vegetation on the roof can nullify the impervious nature of most roofs. Instead of immediately washing off a building's roof and into the stormwater system, precipitation is absorbed into the soil where it is absorbed by the vegetation or released slowly into the stormwater system. Precipitation is also evapotranspirated from the vegetation back into the atmosphere. Green roofs can help buildings stay cooler in the summer and warmer in the winter;

- Permeable Pavement: Roads or alleys can be designed and constructed with materials that allow for increased infiltration of water into the ground;

- Curb Cut-outs: Curb cut-outs are constructed gaps in street curbs that allow for some of the stormwater making its way along street gutters to enter into median strips where it can infiltrate into the ground;

- Rain Swales and Gardens: Rain swales and rain gardens are designed ditches or depressions that contain stormwater during wet weather events. These can hold larger volumes of stormwater than traditional street gutters, slow down the flow of stormwater, and promote infiltration;

- Increased Tree Cover: Planting street trees can reduce stormwater runoff because urban tree canopies intercept rainfall before it hits an impervious surface below (a sidewalk or road). This lessens the volume and rate of flow of stormwater entering the stormwater conveyance system. Trees with mature canopies can absorb the first half-inch of rainfall. Increased tree cover can help sequester carbon and can mitigate the urban heat island effect by cooling urban areas; and

- Green Space and Buffer Zones: Urban parks and the expansion of green space provide additional opportunities for infiltration to occur. This reduces the volume and flow of stormwater entering into the sewer system. Planting vegetation by urban and suburban water bodies can also help to slow stormwater runoff, and capture constituent pollutants contained within the stormwater.

II. Implications of Green Infrastructure and Low Impact Development

Green infrastructure or low impact development approaches can offer a number of benefits, including mitigation of urban heat island effects, reduction of energy demands, reduction of stormwater flows, protection from flooding, sequestration of carbon, and filtration of air and water pollutants. Green infrastructure can yield aesthetic improvements and other community, economic, and environmental benefits.

The cost-effectiveness and technical feasibility of incorporating these green infrastructure, or low impact development, approaches can vary. However, in particular circumstances, the incorporation of green infrastructure technologies may offer advantages to municipalities.

Decentralized mitigation options, like green infrastructure, can also provide city planners with options that may work in constrained urban spaces.

A. Water Quality

There has been an increased interest in green infrastructure and low impact development approaches recently. This has been driven by a number of perspectives, including: its applicability in ensuring the availability of water sources to meet future water supply needs; the expense of traditional water infrastructure; and the recognition of stormwater impacts on water quality. Growth in population and increasing environmental awareness are causing many communities to explore alternative water supplies through reclamation, reuse, and conservation.

An example of cost savings from the use of green infrastructure are the steps that New York City took to find an alternative to building an estimated $6 to $8 billion filtration plant. Faced with an order from the U.S. Environmental Protection Agency (EPA) to build a drinking water filtration plant, New York City identified a less expensive option: protecting the 2,000-square-mile Catskill/Delaware Watershed in upstate New York, the source of New York City's water. New York City spent $1.5 billion on land acquisition, the construction of new storm sewers and septic systems, and programs to help farmers limit their pollution in the Watershed. New York City purchased property around the reservoirs, which created buffers to let nature do its water-filtration work. New York City saved billions in construction costs for the new plant and is estimated to have saved many billions more in maintenance and repair costs.[1]

While the initial Clean Water Act construction grants program and the Clean Water State Revolving Funds (CWSRF) have been available for innovative activities, most expenditures to date have been for more traditional wastewater projects, and not for enhancing water supplies through wastewater reuse and water recycling.

To provide Federal assistance, in 2000, Congress amended the Clean Water Act to add section 220 (Title VI of P.L. 106-457). Section 220 authorized appropriations of $75 million for fiscal years 2002 through 2004 for EPA to make grants for alternative water source projects to entities with authority under State law to develop or provide water for municipal and industrial or agricultural uses in areas that are experiencing critical water supply needs, with a non-Federal cost share of 50 percent. This authorization has expired. If section 220 of the Clean Water Act was reauthorized, it would provide an authority to help meet some critical water supply needs around the nation.

The American Reinvestment and Recovery Act (Recovery Act)(P.L. 111-5) required that States spend 20 percent of the CWSRF and Drinking Water State Revolving Fund (DWSRF) funding received under Recovery Act on "green infrastructure, water and energy efficiency improvements or other environmentally innovative activities." Communities across the country have been able to work on innovative projects to reduce flows entering their wastewater treatment systems, thus improving the ability of systems to deal with surges of wastewater and stormwater during storm events. This could result in wastewater and stormwater being treated more effectively during storm events.

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[1] Mark A. Benedict and Edward T. McMahon, "Green Infrastructure: Linking Landscapes and Communities," *The Conservation Fund* (2006).

Although the Recovery Act required States to spend 20 percent of Recovery Act funds for green projects, nationally, 30 percent of clean water and 29 percent of drinking water funds were used for the Green Project Reserve.[2] Overall, six States used approximately half of their clean water infrastructure money on green projects.[3] These numbers indicate that there is a growing demand for programmatic and financial support for green infrastructure projects, especially related to clean water and drinking water infrastructure.

The EPA notes that it is generally less expensive to keep water clean than it is to clean it up.[4] By way of example, one study shows that tree cover in Atlanta has saved more than $883 million by preventing the need for stormwater retention facilities.[5] A study conducted by the American Water Works Association and Trust for Public Land found a correlation between water supply treatment costs and the amount of forest cover in a watershed.[6] In short, greater forest cover led to lower treatment costs for communities.

B. Cooling Effects and Air Pollution Abatement

Tree cover is essential to keeping cities cool and to help mitigate the urban heat island effect. Major shade trees have been shown to cool surface temperatures between nine and 13 degrees.[7] Lower temperatures are important for helping to ameliorate the production of hazardous air pollutants like ozone, which is harmful to those with asthma and other respiratory issues.

Tree cover can also help to abate the pollution that contributes to climate change. For example, according to the U.S. Forest Service, each year, Chicago's urban tree canopy is able to remove 15 metric tons of carbon monoxide, 84 metric tons of sulfide dioxide, 89 metric tons of nitrogen dioxide, 191 metric tons of ozone and 212 metric tons of particulates.[8] Further, according to David Nowak with the U.S. Forest Service, New York City's tree cover helps remove enough airborne pollution to save taxpayers up to $10 million each year in pollution mitigation costs.[9]

C. Impacts on Real Estate Values

Additional green space created by the implementation of green infrastructure approaches can increase real estate values. In a poll conducted by the National Association of Realtors, 57 percent of those surveyed said they would be more likely to purchase a home near green space, and 50 percent said they would be willing to pay 10 percent more for a home located near green space or protected areas.[10]

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[2] EPA, *Clean Water State Revolving Fund. Green Project Reserve Funding Status* (March 17, 2010). EPA, *Drinking Water State Revolving Fund, Green Project Reserve Funding Status* (March 26, 2010).
[3] *Id.*
[4] U.S. EPA, *Reducing Stormwater Costs Through Low Impact Development (LID) Strategies and Practices*, EPA 841-F-07-006, (December 2007).
[5] Trust for Public Land, *The Economic Benefits of Open Space*, Trust for Public Land (1999).
[6] Trust for Public Land and American Water Works Association, *Protecting the Source*, San Francisco, CA: Trust for Public Land (2004).
[7] Casey Trees News (June 2004).
[8] John Alderman, *Earthtalk: Do Urban trees really help reduce pollution and clean the air?* (August 31, 2004).
[9] *Id.*
[10] *Id.*

D. Flood Protection Benefits

Using green infrastructure and natural features in development may be beneficial in reducing flooding and saving resources for other projects, as opposed to stormwater retention. The conservation organization, American Forests, estimates that trees in our metropolitan areas may be worth $400 billion in stormwater retention alone, because they help reduce and eliminate the need for the stormwater retention facilities to be built.[11] Further, national studies indicate an eight to one dollar savings ratio when lands are preserved and used for flood storage versus man-made structures.[12] Additionally, the less flooding communities experience, the less they will have to spend in costs associated with damage to property and infrastructure.

E. Quality of Life and Health Impacts

There may be additional benefits to the presence of urban tree canopy and green space in general. A study by the University of Illinois at Urbana-Champaign looked at crime rates in inner cities and crime rates were lower in areas with greener surroundings than those with less green space and tree cover.[13]

In terms of health benefits, green spaces that result from preservation or the implementation of green infrastructure can have a positive impact. One study indicates that people living near parks and other types of green spaces live healthier lives with fewer hospital visits.[14]

Pending Green Infrastructure Legislation

A. H.R. 4202, the "Green Infrastructure for Clean Water Act of 2009"

On December 3, 2009, Representative Donna F. Edwards introduced H.R. 4202, the "Green Infrastructure for Clean Water Act of 2009". H.R. 4202 establishes a grant process through the EPA to establish and maintain between three and five centers of excellence for green infrastructure. One of these centers would be designated the national electronic clearinghouse center. Under H.R. 4202, the duties of each center include: researching green infrastructure; developing manuals and setting industry standards for low impact development and green infrastructure; providing information to the national electronic clearinghouse center; providing technical assistance and training; and evaluating regulatory and policy issues regarding green infrastructure. H.R. 4202 sets up a competitive grants program for eligible entities that manage stormwater, water resources, or waste water resources to implement green infrastructure projects. H.R. 4202 establishes a green infrastructure program within EPA's Office of Water to focus on green infrastructure and integrate it into EPA's other programs.

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[11] Steve Lerner and William Poole, *The Economic Benefits of Parks and Open Space: How Land Conservation Helps Communities Grow Smart and Protect the Bottom Line*, San Francisco: Trust for Public Land (1999).
[12] Community Open Space Partnership, *Paint the Town Green: Green Infrastructure for Tomorrow*, Madison, WI: Community Open Space Partnership (2003).
[13] "Green Streets, Not Mean Streets: Vegetation May Cut Crime in the Inner City," Vol. 1 No. 2, University of Illinois at Urbana-Champaign Human-Environment Research Laboratory.
[14] Mark A. Benedict and Edward T. McMahon, "Green Infrastructure: Linking Landscapes and Communities," *The Conservation Fund* (2006).

B. H.R. 2222, the "Green Communities Act"

On April 30, 2009, Representative Allyson Y. Schwartz introduced H.R. 2222, the "Green Communities Act". H.R. 2222 establishes a grant program for 80 municipalities to promote community greening initiatives. H.R. 2222 includes requirements for an eligible program partner to develop and plan such initiatives, including revitalizing public parks and spaces, tree plantings, and green roofs. H.R. 2222 establishes a grant program for five nonprofit organizations to provide technical assistance and training to eligible program partners in developing, planning, implementing and assessing initiatives.

WITNESSES

PANEL I

The Honorable Allyson Y. Schwartz
Member of Congress
Thirteenth District, Pennsylvania

PANEL II

The Honorable Adam Ortiz
Mayor of Edmonston, Maryland

Mr. David Yocca
Principal Landscape Architect/Planner
Conservation Design Forum
Elmhurst, Illinois

Mr. Timothy Richards, P.E.
NAFSMA Director and Stormwater Committee Chair
Deputy City Engineer
City of Charlotte, North Carolina
Testifying on behalf of the National Association for Flood and Stormwater Management Agencies

Mr. Bruce Boncke
BME Associates
Fairport, New York
Testifying on behalf of the National Association of Home Builders

Mr. Drew Becher
Executive Director
The Pennsylvania Horticultural Society
Philadelphia, Pennsylvania

Mr. Howard Neukrug, P.E.
Deputy Commissioner
Philadelphia Water Department

Philadelphia, Pennsylvania

IMPACT OF GREEN INFRASTRUCTURE AND LOW IMPACT DEVELOPMENT ON THE NATION'S WATER QUALITY, ECONOMY AND COMMUNITIES

Thursday, September 30, 2010

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT,
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE,
Washington, DC.

The Subcommittee met, pursuant to call, at 10:11 a.m., in room 2167, Rayburn House Office Building, Hon. Donna F. Edwards presiding.

Ms. EDWARDS. Good morning. This Subcommittee began and is ending the 111th Congress by holding hearings on very similar topics.

I have to say it is probably appropriate that we hold this hearing on this rainy morning on which we have received about 4 and a half inches of rain in the last 48 hours. And I know I sat in traffic, along with my colleagues and others this morning, watching as the oil is on the road, and we know that the runoff is happening. So it is probably an appropriate morning to hold this hearing.

In February of 2009, we held a hearing in this Subcommittee on sustainable water infrastructure. Today's hearing focuses on the impact of green infrastructure and on the Nation's water quality, economy and communities. As today's hearing will demonstrate, there are still many things we need to learn about green infrastructure and low-impact development.

But in the intervening year and a half, we have also come very close to learning a lot of the advantages of this innovative approach. For example, nationally 30 percent of clean water and 29 percent of drinking water funds provided through the Recovery Act were used for green infrastructure and water and energy efficiency improvements.

Six States used approximately half of their clean water infrastructure money on green projects. These numbers indicate that there is a growing demand for programmatic and financial support for green infrastructure projects, especially related to clean water and drinking water infrastructure.

Green infrastructure approaches take a very different view to stormwater control. Instead of engineering the stormwater system to deal with increasingly large amounts of stormwater, these low-impact development approaches use technologies that aim to re-

duce the amount of stormwater that even enters the system. This is achieved through processes that encourage stormwater to infiltrate the ground or evaporate.

Simple approaches such as green roofs, increased tree cover, disconnecting downspouts, and adding more green space can go a long way to reducing the amount of stormwater that enters the sewers. And in some circumstances, these technologies also can realize significant cost savings from municipalities and building owners. In this time of economic uncertainty and tight municipal budgets, it may behoove city planners to look in other directions for ways to deal with impacts of urban stormwater runoff than by solely falling back on traditional capital-intensive infrastructure approaches.

The fact remains, however, that many of the technologies are new. They haven't been applied in all conditions in cities. And today, I hope to hear testimony that will answer a few questions.

First, what barriers exist with regard to the increased adoption of green infrastructure technologies and approaches? Second, what can the Federal Government, both EPA and the Congress, do to reduce these barriers? And third, what processes do EPA and the States use, and should EPA and the States use, to balance the need to promote new technologies while at the same time protecting water quality?

And finally, I would like to note that as we think about our water infrastructure options and our water quality goals, we can do better. We can do better than to discuss policies and approaches as either this or either that. We need to look beyond the disturbing vision of just an impassive concrete landscape or the pastoral vision of an Eden-like urban utopia. Instead, we have to think about what that balance is and the various tools that we have and those that we might have to bring to bear site-specific water quality problems.

Not everything works in the same way and the same place. Increasing both options and information are two of the most vital tools we can provide for our State and municipal managers.

So I look forward to looking beyond where we are today so that we can do better. And with that, I want to welcome our two panels today, including Congresswoman Allyson Schwartz of Pennsylvania, who has been a leader and champion on these issues.

I will yield first to our Subcommittee's Ranking Member, Mr. Boozman.

Mr. BOOZMAN. Thank you, Madam Chair.

Today the Subcommittee will explore another new and important topic, green infrastructure and low-impact development, and how it might help address some of the deleterious impacts that stormwater runoff can have on our Nation's water quality.

One of the many factors that can affect the water quality of our lakes, rivers, bays and estuaries is stormwater runoff. The impervious surfaces found in the urban and suburban environment accelerate drainage through curb gutters and drains to nearby natural streams and water bodies. As it flows through the landscape, water can pick up pollutants and sediment and carry them into receiving waters. In a more naturally vegetated landscape, water tends to move more slowly and get soaked up by the soil and plants, and pollutants and sediment tend to be filtered out.

Some have suggested that urban areas need to mimic the natural landscape by employing more green technologies or limited-impact designs to reduce the quantity and rate of flow of stormwater, and thereby reduce the impacts of stormwater on the environment. These measures may include green roofs, rain barrels, permeable pavement, rain gardens, and buffer zones.

Green infrastructure can be expensive, and its effectiveness will vary depending on the characteristics of the areas where it is used. Green infrastructure, while effective at removing certain pollutants, may not be the optimal solution to each and every situation. Soil, hydrology, topography, weather, climate, and other conditions vary from region to region, from site to site, and over time.

Nevertheless, where the right conditions exist, new technologies and designs can be cost-effective and efficient in managing stormwater. Where they work, those innovative features can reduce the need for traditional stormwater infrastructure.

In our efforts to be more conscious of our environment, we must not lose sight of the cost and effectiveness of implementing new designs and technologies. We must not overprescribe remedies to address urban stormwater that will do little to improve the overall health of our waters.

Municipalities need a variety of tools in their toolboxes of best management practices to address stormwater management. It is the local officials, both elected and professional, who must decide what are the best solutions for their specific circumstances. One-size-fits-all solutions or regulatory schemes to deal with impairments will not work for water quality improvement. Green infrastructure should never be considered as the only tool for improving our Nation's water quality. And by no means should it be a requirement imposed by the government.

Municipalities and engineers need to stay educated on all the options, both traditional methods as well as new or green designs. Additional research and development of innovative technologies is also needed to help identify the most efficient and effective methods and add to the tools available to local officials.

We all want the same goal, which is clean water, as we at the Federal level look at the Nation's stormwater policy. We must be careful that we don't impose solutions on municipalities that may not be the best fit, either technically or economically.

I think we can accomplish a lot with education outreach to help local officials consider all options. Future solutions need to be science-based, economically feasible, and compatible with regional and site-specific conditions. Communities need to do a rigorous analysis of the cost and benefits of installing these technologies and decide for themselves the most appropriate course of action.

And I look forward to listening to our panels and hope to learn from today's expert witnesses and certainly look forward to their testimony.

With that, I yield back, Madam Chair.

Ms. EDWARDS. Thank you, Mr. Boozman.

Before we begin, I want to call attention to the resolution of the Environmental Council of the States, which was adopted in August 2010, that supports the use of green infrastructure. I ask unani-

mous consent that this resolution be made part of the record. Without objection.

[The information follows:]

ECOS

Resolution Number 07-10
Approved September 17, 2007
Sun Valley, Idaho

Revised August 29, 2010
Whitefield, New Hampshire

As certified by
R. Steven Brown
Executive Director

SUPPORTING GREEN INFRASTRUCTURE

WHEREAS, runoff from urban landscapes and associated Combined and Separate or Sanitary Sewer Overflows (CSO and SSO) during wet weather events cause substantial environmental, public health and economic impacts; and

WHEREAS, polluted runoff and associated groundwater transport of pollutants are major management challenges; and

WHEREAS, state environmental agencies contribute substantial effort and resources to mitigating the impacts of development, impervious cover, and sewer overflows in their communities; and

WHEREAS, the term "Green Infrastructure" includes green roofs, trees and tree boxes, rain gardens, vegetated swales, pocket wetlands, green parking, vegetated filter strips, reforestation, protection of natural features, and riparian buffers, many of which are also known as "Low-Impact Development," and these techniques may be used in combination with conventional infrastructure solutions to address or lessen impacts of runoff quality and quantity, including sewer overflows; and

WHEREAS, in 2008 the U.S. EPA with American Rivers, Association of State and Interstate Water Pollution Control Administrators, National Association of Clean Water Agencies, Natural Resources Defense Council, and Low Impact Development Center produced the *Managing Wet Weather With Green Infrastructure Action Strategy*; and

WHEREAS, green infrastructure techniques provide multiple water quality and environmental benefits, improve stormwater and nonpoint source runoff quality, mitigate overflows from CSOs and SSOs, provide wildlife habitat, and provide aesthetic benefits; and

WHEREAS, consistent, adequate and ongoing operation and maintenance of existing stormwater best management practices and clear minimum standards for pollution prevention at existing sites (together, "good housekeeping") minimize contributions to stormwater pollution; and

WHEREAS, green infrastructure can reduce energy-intensive wastewater treatment needs, help reduce municipal energy costs, and reduce associated greenhouse gas emissions, in addition to providing supplemental flood storage and capacity to accommodate precipitation from high-volume, high-intensity, and long-lasting storm events; and

WHEREAS, green infrastructure is a cost effective and environmentally friendly approach to mitigating environmental damage and improving ecosystem and human health by directing polluted runoff to areas where it can be infiltrated, evapotranspirated or re-used.

NOW, THEREFORE, BE IT RESOLVED THAT THE ENVIRONMENTAL COUNCIL OF THE STATES:

Continues to encourage the use of green infrastructure as an important and effective tool to mitigate the many and diverse impacts of runoff quality and quantity, including sewer overflows, and as a tool to protect public health and the environment;

Supports the objectives of the US EPA's efforts to promote green infrastructure and low impact development, including the 2008 *Managing Wet Weather with Green Infrastructure* action strategy, the 2007 *Green Infrastructure Statement of Intent*, and the 2007 *Stakeholder Statement of Support for Green Infrastructure,* all of which promote research, outreach and communication, tool development, Clean Water Act regulatory support, economic viability and funding, demonstration projects and recognition of success, and the state, federal and local partnerships essential to implementation of green infrastructure and its anticipated environmental and social benefits;

Recommends that as EPA and delegated states consider improvements to how they address stormwater, they consider promoting increased on site management and/or recharge of stormwater at new developments (e.g. incentives to retain the first inch of storm precipitation on-site), encouraging more on-site "best management practices" (BMPs) of both green infrastructure and "traditional" types and other alternative state stormwater strategies , which will reduce the regulatory and managerial burden on local governments operating separate storm sewer systems;

Recommends that as EPA and delegated states consider improvements to how they address stormwater, they consider promoting clear and efficient standards for the operation and maintenance of existing stormwater facilities and pollution prevention at sites, in addition to encouraging retrofits of existing structures, to ensure that existing stormwater facilities produce the environmental benefits they were designed to provide, and secure the full value of private and public funds used to construct stormwater facilities;

Urges EPA and the states to support communities proposing alternative green infrastructure components to their Long Term CSO Control Plans that also meet the goals of those Plans, in order to incorporate additional green infrastructure components, which may save the communities money while reaping the same or better environmental and water quality benefits; and

Suggests that, for purposes of federal funding eligibility (including ARRA-type funding), EPA allow monitoring devices and other efficient technology to measure green infrastructure effectiveness.

Ms. EDWARDS. With that, I would like to welcome the Honorable Allyson Schwartz, who is a Member of Congress from the 13th District of Pennsylvania, and look forward to hearing your testimony. Good morning.

TESTIMONY OF THE HON. ALLYSON Y. SCHWARTZ, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF PENNSYLVANIA

Ms. SCHWARTZ. Thank you, Madam Chairwoman. It is a pleasure to be back in this room.

I did serve on T&I in my first term, so I spent a few hours in this room, and it is good to be back.

So, good to see you.

And to Ranking Member Boozman, I appreciate your being here and holding this hearing.

I know you could have postponed it. But you are absolutely right; it is a good day to do it as we watch the heavy rains fall on us and fill our water system here.

I am particularly pleased to testify about green infrastructure and some of the proposals I put forward, and to also offer some of the experience and introduction to the experience that Philadelphia has had and is having in working to implement green infrastructure along with the aging infrastructure.

As you may know, Philadelphia is the home of the first public water system in the Nation. So we have a history of being innovative and trying to figure out how to make sure we have clean water for our population.

We also are known as one of the greenest cities by having one of the largest public park systems in a big city in the country. So proud of our rich history, and want to build on that and build it in a green way.

So I am pleased to testify on the importance of green infrastructure and my own proposal, the Green Communities Act.

And Ms. Edwards knows of this legislation. We will talk more about it, and your proposal as well, and your leadership in this area.

So I appreciate the opportunity to speak on this, and want to just start a bit by a little background on our Nation's infrastructure and the needs for green infrastructure. The water infrastructure needs of the United States are immense. And implementing green infrastructure solutions can enable municipal governments to better meet water quality standards while addressing other critical priorities in the communities.

Benjamin Grumbles, the EPA's Assistant Administrator for the Office of Water under the Bush administration, wrote in 2007, "Green infrastructure can both be a cost-effective and an environmentally preferable approach to reduce stormwater and other excess flows into combined and separated water systems in combination with, or in lieu of, centralized hard infrastructure solutions."

It is the capacity of green infrastructure to meet multiple goals, which makes its implementation such a worthwhile and cost-effective investment. In addition to improving water quality to ensure compliance with standards that protect our health and welfare, green infrastructure has been demonstrated to attract business, in-

crease property values, and improve people's perceptions about their communities. University of Pennsylvania research has shown that greening of vacant lots created a 37 percent increase in adjacent property values, while properties located next to a non-greened vacant lot saw their property values decrease by 20 percent.

In addition, University of Wisconsin research demonstrates that putting trees in streetscapes of a business district improved visitors' perception of the location and typically resulted in longer shopping visits. Surprised me, but that is what they showed, which is great.

Green infrastructure can create not only results in cleaner, safer water quality, but can also revitalize depressed economic areas and contribute to economic growth. It is a sensible and wise investment. In recent years, my home City of Philadelphia has been recognized as a national leader in implementing green infrastructure.

Mayor Michael Nutter's Greenworks, a vision and a plan to become the greenest big city in America by 2015, has put Philadelphia on the cutting edge. Specific goals of Greenworks is increasing tree coverage by 30 percent by 2025 by planting 300,000 trees; providing parks and recreation resources within 10 minutes of 75 percent of residents by expanding open space; and making a $1.6 billion commitment to managing the city's stormwater by using green infrastructure.

Philadelphia has used both private and public institutions to accomplish these goals. First, the mayor created the Office of Sustainability to promote sustainability efforts across all departments and agencies within city government. Their efforts include increasing the number of green roofs, expanding pervious pavement to additional 25.7 acres, and distributing more than 1,600 rain barrels. These efforts and other improvements to build efficiency, recycling, and alternative transportation have already led the city to be recognized nationally by the U.S. Chamber of Commerce for its commitment and achievements.

Second, Philadelphia has strong community and philanthropic institutions that care about this. This includes the Pennsylvania Horticultural Society, which will present later, and the William Penn Foundation. They can muster the much needed human and capital resources in the private sector.

And third, Philadelphia is fortunate to have a municipal water department—again, you will hear from them on the next panel—that is determined to find and implement the innovative solutions to address serious stormwater problems through green infrastructure.

So while Philadelphia takes pride in its national leadership in green infrastructure innovation, we don't want to keep it to ourselves. We want to share our knowledge and experience with other cities large and small. That is why I have introduced the Green Communities Act, which is House bill 2222, which aims to take the excellent work that we are doing in Philadelphia and disseminate it to communities across the country that are less experienced in the use and value of green infrastructure.

Specifically, my proposal would authorize the Secretary of Commerce, through the Economic Development Administration, to part-

ner with five nonprofit organizations with experience in implementing green infrastructure initiatives in order to work with 80 municipal governments across the country to build capacity in the implementation of green infrastructure.

The Secretary of Commerce would select the communities with input from nonprofits and with the sensitivity towards areas in need for economic revitalization. The bill would authorize $180 million over a 5-year period to accomplish this work. The proposal has received bipartisan and bicameral support in Congress. It has 24 cosponsors from many parts of the country and has companion legislation in the Senate.

In addition, many businesses, environmental, and water agency organizations have expressed support. I would provide the Committee with a long list of the supporters.

Just to highlight the support of this proposal that has come from business, the American Nursery & Landscape Association said of my bill, quote, "Investments in landscape systems, such as those found in House bill 2222, will yield visible and high returns in the form of employment, economic and social benefits, and will increase the monetary value over time."

So, in summary, green infrastructure can play a vital role across the country in meeting our water infrastructure needs. The City of Philadelphia has made a commitment to do this, and I believe the approach can serve as a model across the country. My legislation, and I would include Congresswoman Edwards' as well, can better enable the dissemination of information and training necessary to offer beneficial green alternatives to gray infrastructure to address our Nation's water infrastructure deficiencies. It will yield multiple benefits, improved water quality, a cleaner environment, and enhanced economic development.

Infrastructure investments can accomplish multiple goals and yield multiple public benefits. In tough financial times, the ability to meet multiple community needs with smart and targeted investments makes common sense.

Thank you for your time this morning. I would be happy to answer any questions you may have.

Ms. EDWARDS. Thank you, Congresswoman Schwartz.

As is the custom when Members appear before our Subcommittee, we tend not to ask questions, unless Mr. Boozman has any questions.

Mr. BOOZMAN. No, I don't have any questions. But I do appreciate you being here this morning.

Ms. SCHWARTZ. Absolutely.

Mr. BOOZMAN. I was an example of stormwater runoff when I came in.

But, again, your personal experience and your testimony has been very helpful.

Ms. SCHWARTZ. Thank you. And, again, thank you for the Committee's willingness to hear from some experts from Philadelphia who are doing this work on the ground. And both of your comments, both the Chairwoman and the Ranking Member, really speak to the fact that we could and should move ahead on mixing green infrastructure with that gray infrastructure that is going to get done as a more cost-effective, more innovative way to meet the

water quality needs and to address some of the other economic and environmental goals that we all share. Thank you very much.

Mr. BOOZMAN. And Madam Chair, hopefully, maybe, at some point, we will get to go to Philadelphia, and she can show us some of these things firsthand.

Ms. SCHWARTZ. We would be delighted to have a field hearing in Philadelphia.

Ms. EDWARDS. I am sure we could take a field trip to Philadelphia.

Thank you, Congresswoman Schwartz, for your testimony this morning.

And let's welcome the next panel. And if we want to make a shorter trip, I know that Mayor Ortiz from Prince Georges County in Maryland is here. We could take a drive down the road and take a look at some green infrastructure. I welcome the next panel.

Joining us in this next panel is the Honorable Adam Ortiz, who is the mayor of Edmonston, Maryland. And joining us also, Mr. David Yocca, principal landscape architect and planner with the Conservation Design Forum in Elmhurst, Illinois; Mr. Timothy Richards, the NAFSMA director and Stormwater Committee Chair, and deputy city manager of the City of Charlotte, North Carolina, who is testifying today on behalf of the National Association for Flood and Stormwater Management Agencies; Mr. Bruce Boncke, CEO of BME Associates, in Fairport, New York, who is testifying today on behalf of the National Association of Home Builders; and Mr. Drew Becher, executive director of the Pennsylvania Horticultural Society from Philadelphia, Pennsylvania; and Mr. Howard Neukrug, Deputy Commissioner, Philadelphia Water Department in Philadelphia, Pennsylvania.

With that, I welcome our panel, and I look forward to being corrected on the pronunciation of anyone's name as you give your testimony.

TESTIMONY OF THE HONORABLE ADAM ORTIZ, MAYOR OF EDMONSTON, MARYLAND; DAVID YOCCA, PRINCIPAL LANDSCAPE ARCHITECT/PLANNER, CONSERVATION DESIGN FORUM, ELMHURST, ILLINOIS; TIMOTHY RICHARDS, P.E., NAFSMA DIRECTOR AND STORMWATER COMMITTEE CHAIR, DEPUTY CITY ENGINEER, CITY OF CHARLOTTE, NORTH CAROLINA; BRUCE BONCKE, P.E., CEO, BME ASSOCIATES, FAIRPORT, NEW YORK; DREW BECHER, EXECUTIVE DIRECTOR, THE PENNSYLVANIA HORTICULTURAL SOCIETY, PHILADELPHIA, PENNSYLVANIA; AND HOWARD NEUKRUG, P.E., DEPUTY COMMISSIONER, PHILADELPHIA WATER DEPARTMENT, PHILADELPHIA, PENNSYLVANIA

Ms. EDWARDS. Mayor Ortiz.

Mr. ORTIZ. Madam Chair, thank you very much for having me here today. I appreciate it.

And also, thank you, Ranking Member Boozman.

It is my pleasure to be here on behalf of the Town of Edmonston to talk about our experience implementing green infrastructure.

Ms. EDWARDS. Excuse me, Mayor Ortiz, can you pull your microphone a little bit closer? Thank you.

Mr. ORTIZ. Is this better? OK. Thank you.

It is a pleasure to be here today to talk about our experience in the small town of Edmonston. We are a small working class town about 7 miles from here located on the Anacostia River. We are very diverse. We are about equal parts white, black, and Hispanic. And I like to say that we are diverse in every way except that we don't have any rich people.

In the last decade, our small town flooded four times. One time, 56 homes were underwater. The damages were substantial. Families lost everything in some cases. Furniture, books, important documents, and even automobiles were lost. In some cases, families lost absolutely everything except the clothes that they were wearing.

Although we straddle the Anacostia River, we did not flood from it. We flooded from parking lots. We flooded from highways, roads, shopping centers, and roofs. We flooded from millions of raindrops that were collected from hard surfaces, then funneled down through storm drains through the underground concrete stormwater system to our little tiny town.

We were overwhelmed. Two things conspired against us: the increasing severity of storms, and decades of bad stormwater planning and practice.

In time, however, we were able to secure a $7 million flood control facility to help keep us dry. And we haven't flooded since.

Through this ordeal, we learned that environmental neglect comes at a cost, and that cost is always paid by someone, somewhere, at some time. As we learned this lesson firsthand, we decided to take our responsibility for our own impact on the world around us.

As Members of this Committee, you well know that all streets have an expiration date, a time when they must be restructured or resurfaced. The date for our main street, Decatur Street, was coming due, and we decided to do it right. We decided to build the most sustainable and responsible street we possibly could.

We also realized that a street is much more than just a place for cars. Streets are public spaces. They belong to the neighborhood, just like a community center or a park. Therefore, it should do more than just serve cars. It should serve the community as a whole as fully as possible.

From top to bottom, in this way, we attempted to reshape our main street. But as a small town with a very small tax base and a working class community, we didn't have the resources on our own. We were lucky to establish partnerships with a number of nonprofit organizations, the Chesapeake Bay Trust, and ultimately, we received help through the Recovery Act and the EPA's State Revolving Fund to help us accomplish what we needed to accomplish to keep us dry.

So, from top to bottom, we rebuilt our street. At the top we planted native canopy trees, large canopy trees. We replaced our streetlights with light emitting diode fixtures, LED fixtures, powered by clean wind energy from the Midwest that we purchased.

At street level, we narrowed the street to slow traffic. We added bike lanes and sidewalks to promote community participation and interaction, health, and wellness. And most importantly, at the bottom, we built natural bioretention tree boxes, or rain gardens,

along the street to naturally filter water into the ground, mimicking the way it was in the age before strip malls.

And there is a rendering of it here. And it is a simple curb cut with a slightly engineered, just kind of typical rain box.

We had read about this technology used in Portland, Oregon, and we wanted it here in our town. In addition to providing a beautiful landscape feature, these rain gardens prevent pollution and flooding downstream, as 90 percent of the stormwater from the street is diverted from the storm drain and into areas like this.

In the process, we created 50 jobs for local contractors.

Our goal, in addition to staying dry and being responsible, is to encourage other communities to also take their responsibility for their impact on the environment and on the communities downstream from them. We want them to steal our ideas. We stole ideas from other people. We have made some modifications, and we hope that people steal ours and make modifications still.

So we have placed all of our engineering drawings on the Internet on our Web site. And we are building an interpretive walking tour of the streets so others can visit and see firsthand what we did and think about how they could do it even better. We don't need or want any credit. We just want more environmental responsibility.

In terms of cost, the stormwater improvements added little additional construction cost. In the long term, we expect to see savings in maintenance of the underground stormwater system and from cleanup of the Anacostia River and the Chesapeake Bay.

We expect to see increased revenues from increased property values and greater commerce from sightseeing. As of this morning, I have four delegations from different parts of the region coming to see our street.

Also, our ribbon cutting and dedication is on October 25th, and you are all welcome to come. We have been told that Edmonston is the greenest street in the United States. And I am not sure if that is true, but I am very grateful to at least be in the running.

And we don't fit the stereotype. We are not a wealthy, liberal area. We are a working class community. We are the little guys. And if our little town can build a responsible, sustainable street like this, anybody can. Again, I thank you for this opportunity to speak to you today about green infrastructure, and I applaud your consideration of this issue.

Ms. EDWARDS. Thank you, Mayor Ortiz.

Mr. Yocca.

Mr. YOCCA. Good morning Chairwoman Edwards, Ranking Member Boozman, and other Members and staff of the——

Ms. EDWARDS. Is your microphone on?

Mr. YOCCA. Sorry—and other Members of the Subcommittee on Water Resources and the Environment. Again, my name is David Yocca. I am the principal landscape architect at Conservation Design Forum, an Illinois-based planning, design, engineering, and ecological services small business.

Today I am representing the American Society of Landscape Architects, many of whose members, like me, are trained to incorporate multiple benefit green infrastructure strategies that address stormwater management, water quality, and a host of other issues

into our neighborhoods and cities. Thank you for inviting me today to discuss a few of my professional experiences with green infrastructure applications in cities large and small. Ten years ago, the City of Chicago asked my firm to lead the design process to convert the city hall rooftop into the Nation's first green roof demonstration project. Our scope for this unique project included the design of the green roof system, as well as grading and drainage design, plant selection, and construction oversight.

Back in 1999, when construction began on the green roof, there were no local contractors with experience building and maintaining green roof systems. Today I work with over two dozen local, mostly small business, contractors and suppliers of green roof systems, components, materials, and plants. These specialized companies make the green roof components, stage the materials, install, and then maintain green infrastructure systems designed to ensure optimal performance.

What we are seeing in Chicago is the creation of an industry that did not exist 10 years ago. We are not only creating sustainable buildings, alleys, streets, and neighborhoods, we are creating good-paying, local jobs that capitalize upon the talents and expertise of local workers. Today the City of Chicago is currently one of the shining examples of how greening a city has yielded tremendous ecological and economic benefits at the same time.

Green infrastructure and the low-impact development approaches are equally effective in small towns like West Union, Iowa. The Iowa Department of Economic Development called upon my firm to plan and implement the Green Streets pilot program to demonstrate the application of green infrastructure strategies appropriate for small Iowa towns and to support and stimulate local business in the downtown district. The benefits of green streets extend beyond curbside appeal. This project showcases state of the art sustainable streetscape strategies, including permeable pavement, rain gardens, energy efficient lighting, and a district-wide geothermal heating and cooling system that is projected to save millions of dollars over its design life.

Small businesses in West Union will directly benefit from the streetscape improvements through increased foot traffic and retail sales, higher real estate values, lower utility costs, which will also serve to attract new local businesses. Further, the improvements of the local hydrology will also have a positive on Otter Creek, a destination trout stream for Midwest anglers, who spend tourism dollars in West Union and the surrounding area.

Charles City, Iowa, also retained us to develop a comprehensive plan to address their stormwater issues and decaying streets. We designed a green streets plan for a 16-block area of that city that features permeable paving, parkway biosoils, infiltration beds, and curb extensions with integrated bioretention. We modeled the hydrologic design to capture stormwater runoff from streets, yards, and alleys, and provide for the complete infiltration of a 2-year storm event, and nearly 90 percent of a 10-year rain event. This project is now about 90 percent complete as of today, and we are seeing already virtually zero stormwater runoff even in very heavy rains that we have experienced recently. After implementing and

integrating our green strategies, a neighborhood susceptible to periodic localized flooding has seen no flooding.

So why green infrastructure or low-impact development? Simply put, when properly conceived and designed, these are better performing, longer lasting, and cost-effective resources that provide a wide range of multiple benefits. Integrated green infrastructure strategies combine leading edge living technology with local design, craft, and skill to restore neighborhoods and cities to be healthier, more beautiful, and ultimately more economically and ecologically sustainable over time.

I encourage the Members of this Subcommittee and their staffs to visit the green roof at ASLA's headquarters located here in D.C. There you can see firsthand a local example of a successful green infrastructure project that is helping the District to address its combined sewer overflow problem, as well as cleaning the air and providing energy cost savings for our organization.

I thank you for the opportunity to testify in front of this Subcommittee, and I especially want to thank you for convening a hearing on this very important issue.

I also want to thank Congresswoman Allyson Schwartz and Congressman Russ Carnahan, both of whom are honorary members of the ASLA, for their work on these issues, and to Congresswoman Donna Edwards, Chairwoman, for taking a leadership role in highlighting the varied ways that green infrastructure can help our communities. Thank you very much.

Ms. EDWARDS. Thank you for your testimony.

Mr. Richards.

Mr. RICHARDS. Yes. Thank you, Madam Chair and Member Boozman for having us here today.

NAFSMA is a national organization that represents about 100 local and State flood and stormwater management agencies, most in large urban areas. We represent about 76 million citizens. And it is important to note that many of our members are Phase I and Phase II jurisdictions falling under the Clean Water Act. NAFSMA testified in spring 2009 on the effects of urban stormwater, where we focused on green infrastructure. Today's testimony reflects some updated information since spring 2009, and it clearly shows that our 2009 testimony was on point and is supported by the new data.

NAFSMA endorses approaches like mentioned in H.R. 4202 to encourage further research on green infrastructure that is relevant to different geographic regions and to provide Federal funding and support for that research. We also urge the Committee to look at expanding this research effort to other best management practices for management of stormwater runoff as well.

NAFSMA is concerned, however, with some direction that we see through the U.S. EPA's current rulemaking effort, which appears to be headed towards the creation of mandatory Federal requirements for nationwide implementation of green infrastructure practices to the exclusion of other effective stormwater BMPs. We continue to believe, as we have stated in the past, that green infrastructure is an appropriate tool in the toolbox. However, it should never be considered as the only tool for improving the Nation's water quality.

One of our most significant concerns continues to be that there is currently no activity, practice, or method that we know of, including green infrastructure, that has proven to be effective in restoring an impaired watershed to an unimpaired state for all sources of pollutants. Charlotte, North Carolina worked with the consultant Tetra Tech in September 2005 as part of producing our Post Construction Controls Ordinance and found that green infrastructure techniques were no more effective at achieving certain instream goals than less expensive practices. Charlotte now has an ordinance that prefers green infrastructure but does not mandate that it be the only choice or even the first choice for meeting water quality needs.

A recent study jointly sponsored by the Urban Drainage and Flood Control District in Colorado and Urban Watersheds Research Institute evaluated the relative effectiveness of both community-based and green infrastructure BMPs in terms of reduction of pollutant loads, surface runoff volumes, and the long-term economics of keeping the BMPs in operation. It found that BMPs that infiltrate water into the ground did not have dramatically different pollutant removal abilities than BMPs with underdrains that discharged captured runoff back to the surface or underground conveyance systems.

And this brings us to the consideration of the impact of green infrastructure on the economy. Not only has green infrastructure not been proven to be the best solution for improving water quality of receiving waters in all cases, it has shown to be one of the most expensive options sometimes for trying to improve water quality. The Denver study mentioned above found that the unit cost per pound of pollutant removal was significantly higher for rain gardens and porous pavements than it was for community-based BMPs, such as retention ponds and extended detention basins. In addition, Denver has shown that the total cost for construction, administration, maintenance, and rehabilitation of rain gardens to be over four times the costs for conventional stormwater management techniques in a 50-year lifecycle for new development.

Charlotte, even though we have a more limited base of information, found similar results of the average cost of installing bioretention and rain gardens at over $35,000 per acre treated. Improving wetlands and ponds on the other hand, came in much lower, with costs of approximately $10,000 and $5,000 per treated acre respectively. That can be shown on the chart that you are seeing in front of you.

This chart was produced to show that using retrofits of existing facilities could be a much less expensive option for treating pollutants.

We also have another—actually, this chart. And then we have another chart, chart two, which shows the annual cost of units of pollution removed. And this also shows that the cost is higher for bioretention and rain gardens than it is for some other methods.

We have a chart, number three, which also shows that if you look at the annual maintenance costs and capital costs, they were much higher for bioretention than wet ponds and wetlands.

This brings us to the effect of green infrastructure on our communities. NAFSMA continues to say that MS4s must compete with

many other local service demands, not the least of which are public safety, transportation, and solid waste services to fund and manage water quality programs. Local government agencies are especially capable of making the best decisions for their community given all competing interests. We continue to hear from our development community and those particularly interested in affordable housing that increasing costs for development, including permitting and construction, are hurting their ability to provide low-cost housing.

We can often get more pounds of pollutant removed and more acres treated through near-site or off-site regional BMPs for far less money spent.

In summary, green infrastructure can be effective and is effective in removing certain pollutants, though not proven to be effective in restoring watersheds. Given other choices, we would hope the Committee and Congress would realize the need for using these options and don't support mandating green infrastructure as a one size fits all. Thank you.

Ms. EDWARDS. Thank you, Mr. Richards.

Mr. Boncke.

Mr. BONCKE. Thank you.

Chairman Edwards, Ranking Member Boozman, and Members of the Subcommittee, thank you for the opportunity to testify on behalf of the National Association of Home Builders, a Washington, D.C.-based trade association, representing 175,000 members.

I am currently the chief executive officer of BME Associates, located near Rochester, New York. We provide site engineering, land planning, surveying, environmental services, and construction services. Our firm has earned a reputation for well-designed projects that balance environmental sustainability, community vision, and the developer's market needs.

I have been working on land development projects for nearly 40 years, and have seen the transition from developers and home buyers wanting large-scale lot developments and homes into communities focused on smaller lots and efficient use of resources surrounding the development. In fact, home builders' experience and support for voluntary energy efficiency and green techniques predates many of the available green ratings systems today.

Long before green building and low-impact development were part of the construction industry vocabulary, BME and NAHB members alike were actively engaged in sustainable development as part of an evolving process that has significantly reshaped residential construction. Beginning in 2007, I represented NAHB on the American National Standards Institute Consensus Committee that developed the National Green Building Standard for the home building industry. The development of the NGBS is the most recent and most dynamic effort undertaken by the industry to set compliance markers for green building in the various aspects that comprise residential construction: single family, multi-family, remodeling, and land development. This standard is the first standard submitted to ANSI for green residential construction and remodeling in the United States.

I believe the most important aspect of this standard is that it is performance-based, not prescriptive. Although NAHB, its members, and BME are invested in the approach taken in the development

and outcome of the NGBS, each State and region has their own approach to sustainable development. As such, I believe it is important to support regulations that are flexible enough to allow different regions to prepare localized guidance based on that region's particular needs. Whether it is the physical characteristics of the land or the population's housing demands, it is important to avoid implementing a style of development that is not possible in a particular region.

For example, low-impact development does not work on every individual site, and LID is only one component of the big picture. To successfully implement LID, a property needs the right kinds of natural features, such as soils and topography, and must have enough land area to accommodate the various LID techniques. Therefore, properties that have impermeable soils, high water tables, or steep slopes are generally not good candidates for LID.

Additionally, sometimes a regional approach to land-use sustainability has better results than site by site regulation. It is very difficult to go from extensive years of developing our communities in a certain way and then switch gears overnight. I would caution that rushing to judgment would subdue the creativity we need.

A good way to ensure regulations are in tune with the uniqueness of a region is to install a collaborative and education-based approach that addresses all stakeholders and considers the feasibility of regulations that are most effective to make the progress needed to implement sustainable development.

For example, in New York, where BME is located, we have provided training to municipal officials throughout the State because we have found it is much easier to educate community decision makers on the front end, before the project details are discussed.

Additionally, often local zoning ordinances and construction standards lag behind the new innovative planning principles. NAHB members often find they cannot implement innovative environmental design on a timely basis because the local codes have not caught up.

Builders, developers, and communities need room to be creative and find new ways to reach common environmental goals. If officials do not understand the challenges of site planning and design, it becomes more difficult, more time-consuming, and more expensive to implement more sustainable design practices. For this reason, we place a very high priority on real-life, real-time education and getting information down to the working community level.

My career path 10 years ago found me as president of our State home builders association and president of the local planning federation at the same time, representing a development-based membership and a community official education-based membership simultaneously. After finding that we were 90 percent on the same page, it was obvious that the environment was best served by a collaborative and education best effort.

I am very excited how far we have come in a short period of time. While we have much further to go, this collaborative approach can only serve the home building industry and the environment as we work and continue towards sustainable developments. Thank you very much for your time.

Ms. EDWARDS. Thank you, Mr. Boncke.

Mr. Becher.

Mr. BECHER. Good morning, Chairwoman Edwards, Ranking Member Boozman, and other Members of the Committee.

First of all, my name is Drew Becher. I am the president of Pennsylvania Horticultural Society. And you all mentioned that you would like to visit Philadelphia. I am going to do some shameless promotion here. March 6th through the 13th is the Philadelphia International Flower Show, the world's largest indoor flower show. And you can come see all of our great stormwater techniques that my friend Howard and PHS have implemented, along with the largest indoor flower show in the world. So you can be my guest. Thank you.

My testimony today will cover basically five areas: greening as part of urban revitalization; trees: restoring the urban forest and scaling up the plantings; redeveloping parks as center of communities; stormwater scapes and green infrastructure; and then basically scaling up, building that capacity we have been talking about through State and national partnerships.

For more than 30 years, the Horticulture Society has helped community revitalization in Philadelphia. PHS has been working, cleaning and greening vacant land with significant impact to the economics of Philadelphia. As Congresswoman Schwartz pointed out earlier, there was a study from the University of Pennsylvania that mentioned that a 37 percent increase in home values adjacent to neglected land was happening.

I also want to point out another study that happened in Chicago. It was Dr. Frances Kuo from the University of Illinois that was actually focused on public housing, where they tore up asphalt around all the public housing developments and replaced it with trees and just simple grass. Not only is that good for stormwater, but actually crime was reduced by half, which actually started the transformation initiative in Chicago's Housing Authority.

It should also be known that all of these green infrastructure components create jobs. And jobs are really important. As part of our urban greening program, Philadelphia Land Care, we have created over 230 jobs in the City of Philadelphia cleaning and greening vacant lots and corridors throughout the city. These are good-paying jobs that actually are training people to go on to get jobs with the private sector.

Out of this has spawned our Roots to Re-Entry program, which also trains ex-offenders. We have a 65 percent placement rate in this particular program with our landscape contractors earning $12 to $15 an hour. Many similar programs are going on in other cities like Chicago and New York. And it is really quite impressive. It is all based on the green economy.

Trees. Trees are probably one of the simplest forms of stormwater management. They are natural and they are beautiful at the same time. But we are losing a lot of them in our urban areas. We know from the research that also Congresswoman Schwartz said, Kathy Wolf of the University of Washington, that people actually spend more money when streets have trees on them. And that goes directly to the pocketbooks of municipalities, to allow them to put more money back into stormwater management techniques.

In New York, Mayor Bloomberg focused on this and created MillionTreesNYC, which is by any accounts one of the most successful urban tree-planting programs in the country. In just over 3.5 years, has gone to plant about 400,000 trees, where they were only planting about 8,000 before, and losing 12,000 at the time, so there was a net loss. And now there is a huge net gain in the trees.

Mayor Daley in Chicago has done the same over the past couple decades, planting hundreds of thousands of trees. And I think, by the time he leaves office, about 800,000 trees will have been planted.

In the coming months, PHS will launch TreeVitalize One Million. Building on our existing regional efforts, this will be a three-State, 11-county regional approach to tree planting, one of the largest in the United States. And when you are there in March, you can come and see how we are doing on that as well. We will have that big launch.

Also redeveloping parks as center of communities. This has been something that has not been focused on a lot over the past couple decades. During the City Beautiful Movement, when the Olmsted brothers, Frederick Olmsted, created Central Park, it not only was a place of beauty, but also economic development. And we are getting back into that effort with Chicago Millennium Park, New York's Highline, Houston's bog parks, and LA's Great Park Initiative.

Parks also create construction jobs. They create planning jobs, professional jobs. The maintenance workers at the end. And it is a really good investment. I think I would much rather be sitting in a park than sitting on I-95 looking at the greenscape and the stormwater runoff happen.

Stormwater scapes as green infrastructure. I worked closely with Mayor Daley in Chicago when I was assistant to the mayor to support the green roof that was built on Chicago's City Hall. It has become an iconic landscape that has ushered in support for green roofs and other forms of these stormwater scapes throughout the country.

But that is a big project. And these projects don't always have to be massive and large. Programs such as this, such as disconnecting downspouts, rain barrels, rain gardens, different types of landscaping in people's yards are what it is about and where it is.

To that end, we have at PHS forged a great partisanship with Keep America Beautiful and their 600 affiliates across the country to introduce this type of landscaping, greening, and stormwater management to millions and millions of households. And this is all about being able to scale up rather quickly to make sure that this infrastructure and everything that we are talking about here can actually happen at the community level.

So with that, I would just like to thank you all, and I appreciate your leadership and your interest and support, and thank you for the opportunity to speak to you today. And we look forward to working with you in the future to implement what your dreams are. Thank you so much.

Ms. EDWARDS. Thank you, Mr. Becher.

Mr. Neukrug.

Mr. NEUKRUG. Good morning.

And welcome to a beautiful rainy day in Washington, Philadelphia, and New York. It is rain that is well needed. And we should all be happy about it.

My name is Howard Neukrug, and I am the deputy water commissioner for the City of Philadelphia. I am honored to be here today to testify on behalf of my utility, the City of Philadelphia and NACWA, the National Association of Clean Water Agencies. I am happy to report to you that experts all over the world now fully embrace green infrastructure as a wise and sustainable approach for urban reinvestment. The benefits are clear: cleaner water and improved economies and public health.

Now is the time that the policies and rules that govern our water resources nationally be adjusted. A major shift is needed in investment toward sustainable cities, an economical, holistic approach to meet our environmental responsibilities for air, land, and water.

Philadelphia attaches immense importance to its rivers and streams, and we seek not just fishable/swimmable goals of the Clean Water Act, but accessible and beautiful rivers and streams as well.

I would like to thank the U.S. EPA and the Pennsylvania DEP for their support as we seek final approval of perhaps the Nation's most ambitious green approach to cleaning our water supply. Our program is called Green City, Clean Waters. It is a $2 billion, 25-year plan which seeks to achieve a host of environmental, social, and economic benefits, while also meeting our responsibility toward clean water.

Our plan will manage one-third of the city's impervious cover, one-third of the city's impervious cover, with greened infrastructure, and restore nearly 20 miles of urban stream corridor. We are essentially demonstrating a whole new way of doing business in Philadelphia.

We have conducted watershed and triple bottom line analyses, balanced the full cost of service accounting with what our citizens can afford, and created new rules for governing our city. We are committed to this program, and we are working with all our city agencies, local nonprofits, like PHS, and the business community to ensure our success.

A large part of this new way of doing business is to work in our diverse communities, many of which are low-income and minority. We are constantly looking for ways to integrating our mission of conserving rain water with capital projects on our roadways, in our schools, recreation centers, so that every dollar spent on green infrastructure and water management also provides a double bonus to our city's sustainability and livability.

There are key congressional proposals that would help pave the way for us and other cities to invest wisely. The Green Communities Act legislation provides greatly needed funding for community-based greening programs. The Green Infrastructure for Clean Water Act would create Centers of Excellence for green infrastructure, and Philadelphia would be honored to be so designated. And the work of the Livable Communities Task Force is key to paving the way to integrating green stormwater infrastructure into transportation, housing, and economic development projects. We thank

Congress Members Edwards, Schwartz, and Blumenauer for their leadership in this area.

Congresswoman Schwartz and Mr. Becher both invited you to Philadelphia. Well, I would like to invite you also. We have an event coming up, on December 6th and 7th, which is called the Urban Water Sustainability Leadership Conference. We will be showcasing U.S. cities from all over the United States that embrace these strategies to enhance environmental stewardship, economic development, and overall quality of life.

The changes toward a green approach to water management are everywhere. Mayors everywhere are trying to understand the relationship between an array of water-related issues and the growth and sustainability of their cities.

Mr. NEUKRUG. This is our time. This is our opportunity, we are so close to realizing a new, green ethic for our cities. Getting the water dialogue in all its forms into the process is crucial for the success of our cities and their water supplies.

In closing, Mayor Nutter spoke before a large audience a few weeks ago in D.C. on the issue of a call to action for addressing U.S. freshwater challenges, and he said, We don't have the luxury to ignore this most fundamental of issues that will so dramatically impact our Nation's future.

Thank you for this opportunity to testify.

Ms. EDWARDS. Thank you to all of our witnesses.

At this time, although it is usually the custom of the Committee to enter our Members' statements into the record or have them use their time for questions for statements, since there are so few of us today on this rainy day, I would like to offer Mr. Johnson an opportunity to offer his statement.

Mr. JOHNSON OF GEORGIA. Thank you, Madam Chairwoman. Thanks to the Chairwoman and the Ranking Member for holding this important hearing on the impact of green infrastructure and low impact development on the Nation's water quality, economy and communities.

Green infrastructure holds enormous promise in its potential to help reduce the cost of ensuring access of cleaning drinking water for all Americans. Not only are green projects often cheaper to build, they can also save on future maintenance costs by relying on nature's own cleaning system. For several decades, our country has grown at an unprecedented pace, and in doing so, has too often paved and built over our streams, forests, farms and wetlands. These natural buffers reduce the impact of storms and help to filter pollutants out of our water. It is time to grow smarter by building a strong economy on a foundation of sustainable infrastructure.

For example, one example of how green infrastructure is currently addressing stormwater runoff and water quality is the Atlanta BeltLine project in the City of Atlanta. The Atlanta BeltLine is a $2.8 billion redevelopment project that would shape the way that Atlanta grows throughout the next several decades.

The project provides a network of public parks, multi-use trails and transit along a historic 22-mile railroad corridor circling down town and connecting 45 neighborhoods directly to each other. The Atlanta BeltLine will increase Atlanta's green space by nearly 40 percent as the project adds nearly 1,300 acres of new parks and

green space throughout 25 years. It will create a linear park with 33 miles of multi-use trails connecting 40 parks including approximately 700 acres of existing parks.

I recently had the pleasure of accompanying Chairman Oberstar on a visit to the Atlanta BeltLine project to see firsthand how the investment in urban parks and green space is addressing these water quality issues in Atlanta. During that trip, we had the opportunity to visit the historic fourth ward park, which incorporates a stormwater basin into a green space and uses a natural setting to retain 9 million gallons of stormwater and reduce flooding in the surrounding area.

This park is located on a former industrial site that had a paved concrete parking lot and abandoned, dilapidated structures. The site was remediated of contamination and transformed into a park adding more than 100 trees, spurring investment in housing adjacent to the site, and it will also assist in mitigating storm damage that has prevented a 2 million square foot historic building from being developed.

This project will create a 17-acre park in an urban area that will be complete in early 2011.

I look forward to the day when green infrastructure is no longer a subset of infrastructure building but standard practice. As we work to provide funding for our Nation's water infrastructure, we must consider how best to promote green sustainable infrastructure building.

Thank you, again, Madam Chairwoman, for allowing me to make an opening statement, and I look forward to the questions that I hear from Members.

Ms. EDWARDS. Thank you, Mr. Johnson. I will begin with questions. Let me begin with Mayor Ortiz.

Mayor Ortiz, in your testimony, you indicated obviously that you are from a small town, a small municipality, and you noted the number of green infrastructure stormwater improvements that were made to your Main Street, but you also noted the stormwater improvements added little additional construction costs. And so I wonder if you could speak in a little more detail about those costs and about the choices that you made because you, it seems that you had some flexibility about what you were choosing to do in order to manage your stormwater.

And in your response, I wonder if you could also speak to your reference again to the Recovery Act and the importance that you seem to indicate about it bringing about the work on the Decatur Street and whether that set aside, that 20 percent set aside in the Recovery Act was important to addressing some of the concerns and costs in implementing the technologies on Decatur Street.

Mr. ORTIZ. Thank you, Madam Chair. I am very happy to answer those questions.

We are an older community. In some parts of the town, the stormwater infrastructure is over a century old, so the cost of digging up and replacing that infrastructure, which is falling apart, is extremely high. By—instead of digging up and replacing the entire structure that has to be done sooner or later by building these rain gardens, which, depending on size can cost from, I don't know, $1,000 up to 12- or $15,000. That is a very, very small drop in the

bucket for reducing substantial stormwater volume from going into the regular system.

So compared to that, if you look at it that way in terms of the whole system, it is a tremendous savings. But for us, it was, our project altogether, and we did an entire streetscape and that includes replacing streetlights and everything on about two-thirds of a mile was $1.3 million. But we went whole hog on it. We wanted it to be an beautiful street and an important economic engine.

The stormwater features alone, maybe 5 to maybe 10 percent of that cost, that is just on that cost, but compared to actually digging up and replacing the entire stormwater system which needs to be done, a fraction of the cost.

I would also like to go back to the portion of my testimony where I mentioned the $7 million flood control facility that was put in. That is a tremendous cost that is borne by the taxpayers of our region. And that is not enough. Engineers tell us we need probably another $7 million facility to control more of the stormwater throughout the region but Cussler is not low impact development.

On the recovery side, that funding was absolutely extremely helpful. As I mentioned, we were able to benefit from a number of stars aligning for us. We had a number of partners in the community in the State of Maryland with a big interest in the Chesapeake Bay, and the time was just kind of right with the new awareness that we have of low impact development and green infrastructure, and they saw us as a pilot project. We were a good risk for their grant dollars and investment.

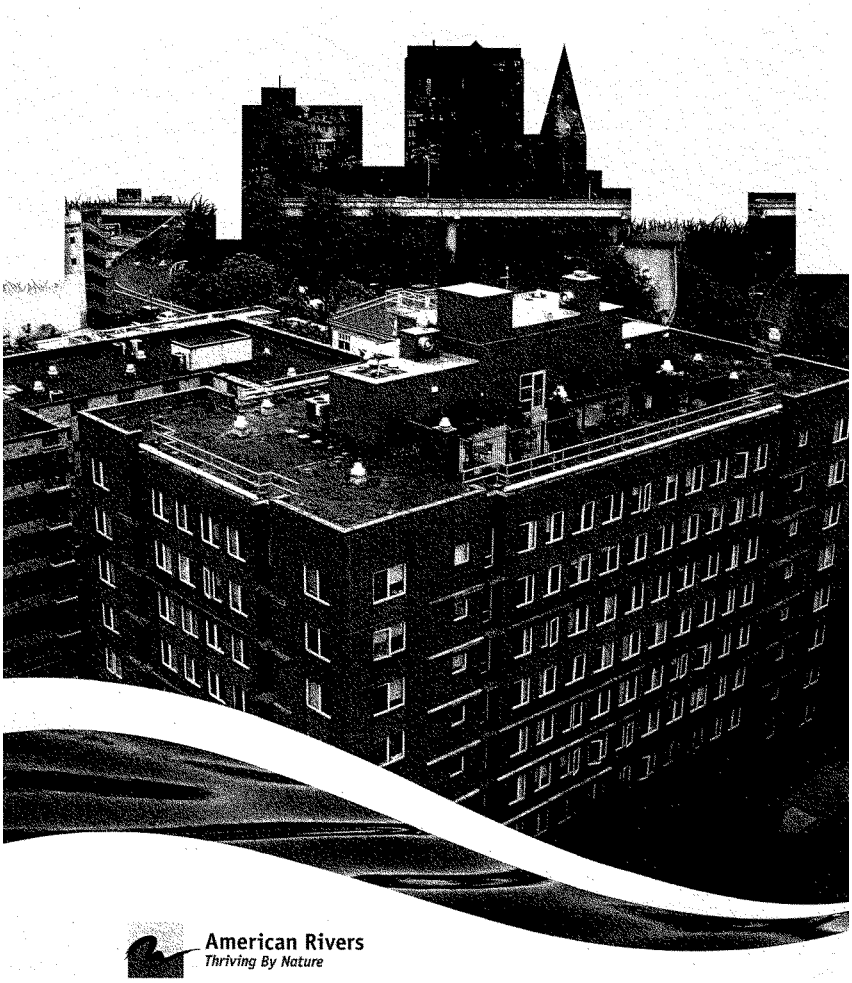
The SRF money was absolutely, absolutely helpful. And just kind of zooming out for a second, there is a lot of money that the Federal Government gives back to communities and the residents. Very little of that money is for older streets and older communities. A lot of that is, as you know, highway moneys, interchanges, expansions, that sort of thing. So this is a way for us to capture some of those dollars and really kind of enhance and bring back the historic character of our older communities and to make them livable and beautiful.

And Madam Chair, also, I just wanted to reference American Rivers put out a fantastic report analyzing that set aside, and its impact on green infrastructure, so with your permission, I would like to enter that with my testimony into the record. It is called Putting Green to Work.

[The information follows:]

Putting **Green** to Work

Economic Recovery Investments for Clean and Reliable Water



American Rivers
Thriving By Nature

We must move from old 19th century infrastructure to a wiser combination of green and traditional infrastructure that will meet the needs of the 21st century.

Contents

1 Executive Summary

4 Introduction

8 Methodology

10 Green Project Reserve Findings and Analysis

14 From Green to Bright Green: Effective State Models

18 Recommendations

19 Conclusions

20 Appendix

21 Endnotes

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Photo credit for front and back covers: Portland Bureau of Environmental Services / Emily Hauth

For more information:
www.americanrivers.org/greenfunding

Putting **Green** to Work

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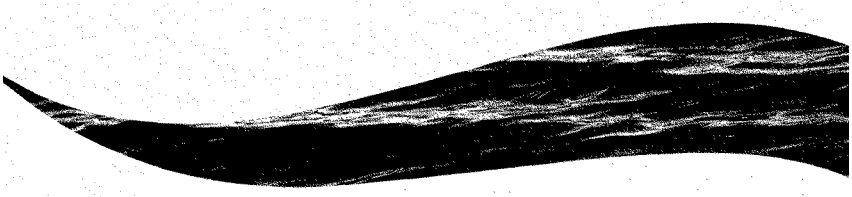


Executive Summary

Only a few days after taking office, President Obama signed the American Recovery and Reinvestment Act of 2009 (ARRA), the largest government public works package since the New Deal. ARRA included a much-needed $6 billion for clean water and drinking water infrastructure.

Like much of the nation's infrastructure, our water systems are crumbling. After several decades of inadequate investment and unmanaged sprawl, America's water and wastewater systems now receive the lowest grade, a D-, of all infrastructure rated by the American Society of Civil Engineers. EPA already estimates capital investment needs for clean water and drinking water infrastructure at more than $600 billion over 20 years[1]. Forecasts for greater extremes due to climate change will make the problem worse, as more frequent and intense storms will increase flooding and produce corresponding sewer overflows and stormwater pollution. And more frequent and intense droughts will cause water shortages and higher concentrations of water pollution.

At the same time, we are in dire need of a new approach to investing in America's clean water and drinking water infrastructure. We are at a crossroads today in how we manage our water systems. Traditional water infrastructure will continue to play a role, but much of it is static, solves only a single problem, and requires a huge expense to build and maintain. We must move from old 19th century infrastructure to a wiser combination of green and traditional infrastructure that will meet the needs of the 21st century.

We are in dire need of a new approach to investing in America's clean water and drinking water infrastructure.

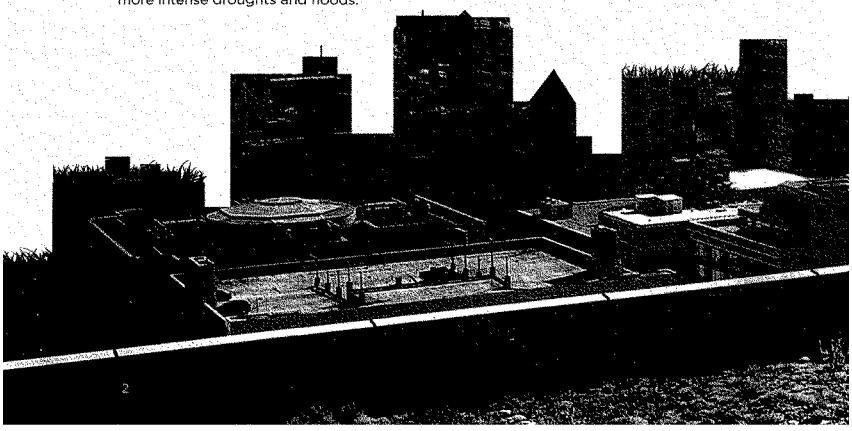
The American Recovery and Reinvestment Act (ARRA) took a groundbreaking step in the right direction, dedicating twenty percent ($1.2 billion) of water infrastructure funding to programs for green infrastructure, water and energy efficiency and environmental innovation (collectively called the Green Project Reserve). This effort represented the first, decisive step in a much needed shift away from solely "gray," inflexible water infrastructure towards innovative approaches that will bring our water management into the 21st century.

More communities are beginning to understand that economic vitality and resilience to climate change rest on adaptation strategies that provide multiple benefits for every public dollar invested. By dedicating 20 percent of water infrastructure funding for the Green Project Reserve, ARRA provided states with the resources to repair and rebuild their water and sewer systems to protect communities for a future marked by more frequent and more intense droughts and floods.

Just as we continue to reap the benefits of the New Deal more than sixty years later, the Green Project Reserve will result in lasting changes toward environmental sustainability for years to come. This report examines the implementation of this Green Project Reserve.

AMONG THE KEY FINDINGS:

- The need for funding for "green" projects is far greater than the 20 percent provided through this effort. States have substantial lists of "shovel-ready" green projects that simply lack funding;
- Within the overall category of "green," we identified a group of "bright green" projects that provide a comprehensive set of environmental and economic benefits. Future investments should be targeted toward these bright green projects;



- Some states, such as Maryland and New York, are clearly leaders and should be used as models for other state programs.

The report also builds on nearly a decade of work by American Rivers to reform the nation's primary public water infrastructure fund, the federal State Revolving Fund (SRF) program, and includes a series of recommendations on how to sustain the progress begun under ARRA.

AMONG THE KEY RECOMMENDATIONS:

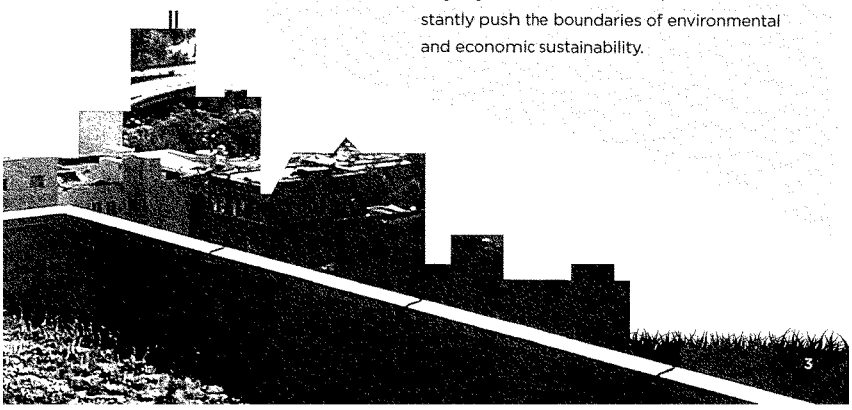
NATIONAL

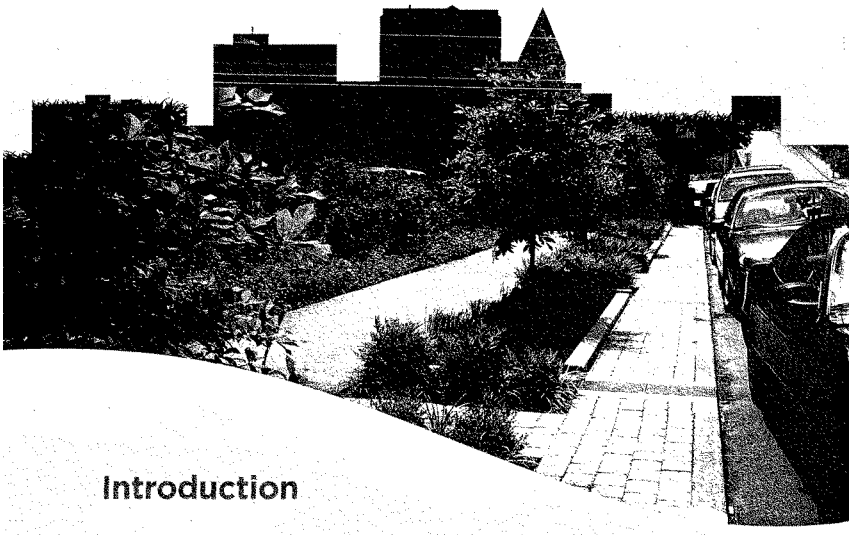
- Federal water infrastructure funding should be continued and increased to support state demand for bright green projects. Congress should reauthorize the Clean Water and Drinking Water State Revolving Funds to include dedicated funding for bright green projects;
- Federal water infrastructure funding should provide incentives for states to fund bright green projects such as waiving state match requirements;
- EPA must continue to improve its funding guidance to states and provide additional technical assistance to ensure the best use of limited funds;
- Funding for water infrastructure and climate adaptation should be aligned to promote bright green approaches to create resilient communities.

STATES

- States must act quickly to remove statutes, regulations or policies that stand in the way of pursuing integrated approaches to bright green infrastructure;
- Project evaluation criteria should be revised to reflect and prioritize multiple environmental benefits;
- Vigorous outreach for new Green Reserve Projects to a range of traditional and non-traditional partners should be required in order to result in a wide range of strong projects;
- States should promote loan-payback mechanisms for green projects to ensure that communities can integrate these approaches as part of regular financial planning for clean and safe water.

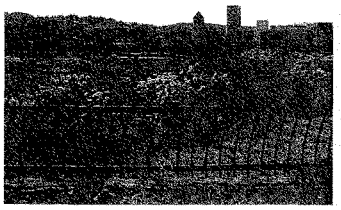
ARRA marked a bold step forward for our nation, but it was only a first step. Now we *must continue* to accelerate our progress toward 21st century bright green infrastructure to ensure long-term reliable clean water supplies. The challenge is to make today's bright green tomorrow's norm, and to constantly push the boundaries of environmental and economic sustainability.





Introduction

Only a few days after taking office, President Obama signed the American Recovery and Reinvestment Act of 2009 (ARRA), the largest government public works package since the New Deal. ARRA included a much-needed $6 billion for clean water and drinking water infrastructure through the State Revolving Fund, the biggest federal infusion of water infrastructure money through the fund ever. As part of this package, 20 percent ($1.2 billion) of this water infrastructure funding was dedicated to programs for green infrastructure, water and energy efficiency, and environmental innovation (called the Green Project Reserve). This effort was groundbreaking because it represents the first step in a much needed shift away from solely "gray," inflexible water infrastructure towards innovative approaches that will bring our water management into the 21st century. These innovative solutions work with nature, instead of against it, to meet the needs of people and rivers in a future marked by more extreme and frequent floods and droughts. This sea change in the way we direct infrastructure dollars was achieved due to a strong coalition of industry, utility and environmental supporters working with select states and communities to make a compelling case that green infrastructure and water efficiency are wise investments to create jobs, protect clean water and deliver a wide variety of other benefits.



The publicly accessible Amy Joslin Memorial Eco-Roof on the Multnomah Building in Portland, Oregon is a 12,000 square foot green roof designed to control runoff, reduce pollutant loads, and add green space to the local community. Credit for both photos above: Portland Bureau of Environmental Services / Emily Hauth

In this report, American Rivers analyzed Green Project Reserve spending in 19 states for demand, project type and projected environmental benefit. We also looked at summary national data as reported by states to EPA, and compared this to our in-depth analysis of these 19 states.

Across the country, EPA and the states did a tremendous job at distributing and prioritizing these funds under the significant time pressure required by ARRA. We found first that demand for this type of funding is high and far exceeds the amount of funding currently available. Second, some of the specific projects funded and some of the state funding programs catalyzed by the Green Project Reserve reflect a more sustainable approach to water

The green roof on the EcoCenter at Heron's Head Park is an integral part of San Francisco's first "off-the-grid" building that won't use city sewer or electricity services or burden existing infrastructure. Instead, this environmental education center uses native landscaping, wetlands, rainwater capture and alternative energy sources to reduce water use and provide clean energy and water. Photo credit: Literacy for Environmental Justice / Laurie Schoeman

Climate Change Impacts to Freshwater Resources and Water Infrastructure

Water resources in the U.S. face a range of threats in a warming climate. Many communities will see their water supplies shrink as temperatures rise and precipitation patterns shift. A rise in severe storms will degrade water quality and increase the risk of catastrophic floods. Changes in the timing and location of precipitation combined with rising levels of water pollution will strain ecosystems and threaten the survival of many fish and wildlife species. These shifts will have dramatic impacts on communities, threatening public health, weakening economies and decreasing the quality of life in many places.

Water Quantity. Rising temperatures will have a profound effect on water availability. Communities already struggling to meet rising demands may be unable to meet the needs of agriculture, industry, ecosystems and rising populations. Every part of the country will struggle as weather patterns become more unpredictable and render historical climate records obsolete. Climate change threatens to fundamentally alter where and when water is available across the nation. Precipitation patterns are shifting, benefiting some regions with additional water while reducing snow and rainfall in other areas.

Water Quality. The same climate shifts that will challenge water availability will also pose a number of threats to the quality of the nation's water resources. Warming temperatures and changing precipitation patterns could make some water bodies unsuitable for recreation, water supply and other purposes. At a minimum, water management will be more difficult and more costly due to rising pollution levels.

Much of the debate related to climate change focuses on reducing greenhouse gases — rightfully so considering that unabated emissions would have catastrophic consequences for the planet. Yet, many communities and policy makers have largely ignored the changes that will need to be made to our water infrastructure systems to provide the flexible solutions that can adapt well to the volatile conditions we are already seeing from a changing climate.

"Green infrastructure allows a city to evolve into a sustainable place over time; softening its future path for sound water management while providing multiple benefits to its above-ground infrastructure with every new building developed, tree planted and wetland re-born."

HOWARD M. NEUKRUG, DIRECTOR, OFFICE OF WATERSHEDS, PHILADELPHIA WATER DEPARTMENT

infrastructure, signaling a transformation. Third and finally, there is both the need to continue to improve the types of projects funded to better maximize environmental benefits in a move towards bright green, and the need to reduce the portion of limited water infrastructure dollars used for standard energy efficiency upgrades.

These findings are significant given that the Green Project Reserve has been extended, with another $700 million in FY10 dedicated to these more sustainable approaches. This creates additional opportunities to effectively transform our water infrastructure under a regular funding cycle for state SRF programs, without the time pressures associated with the economic stimulus. The initial $1.2 billion investment for greener and more efficient water infrastructure across the nation has set the stage for a broader federal commitment to these approaches, while providing the impetus for states and communities to commit to addressing their water needs in a more cost-effective, sustainable manner.

Water Infrastructure Funding: State Revolving Funds

The nation's water infrastructure is outdated and repeatedly receives a D- grade from the American Society of Civil Engineers — the lowest rating of any infrastructure category[2]. Meanwhile, despite growing need, federal funding for water infrastructure has declined sharply. The American Recovery and Reinvestment Act (ARRA) of 2009 provided $6 billion for investment in water infrastructure via the Clean Water and Drinking Water State Revolving Funds (SRF). These funds represent a downpayment on water infrastructure investment needs, estimated for clean water alone at almost $300 billion over 20 years[3]. The SRF is administered by the Environmental Protection Agency (EPA) through the states, and provides low-interest loans to communities for a variety of water infrastructure projects[4]. For the first time, twenty percent of this money was reserved for green infrastructure, water or energy efficiency and environmentally innovative projects, collectively referred to as the "Green Project Reserve." While these innovative methods have long been eligible for federal SRF funding, few states have used any of their SRF funds for such projects. In an era of limited resources, directing federal water infrastructure dollars to achieve and leverage the greatest and widest range of environmental benefits, as highlighted by the best, bright green use of the Green Project Reserve, must be a priority.

Green, Efficient, and Innovative Water Infrastructure Explained

Faced with crumbling urban infrastructure, decades of poorly planned development and forecasts for more extreme floods and droughts due to climate change, we are in dire need of a new approach to investing in America's water treatment and drinking water infrastructure. More frequent and intense storms will increase flooding and produce corresponding sewer overflows and stormwater pollution. More frequent and intense droughts will cause water shortages and higher concentrations of water pollution. Green infrastructure approaches to clean water management include using rooftop vegetation to control stormwater and reduce energy use, restoring wetlands to retain floodwater, installing permeable pavement to mimic natural hydrology, and using water more efficiently. Water efficiency improvements help communities accomplish more with less, using the best available technology to utilize water in smarter and more innovative ways.

Such smart infrastructure approaches have far-reaching benefits — they reduce stormwater runoff and sewage overflows, recharge drinking water supplies, and create valuable natural spaces for community enjoyment. They also cost less than traditional pipes, treatment plants and reservoirs, and create domestic jobs. By treating water on-site and reducing water use, green stormwater controls and water efficiency reduce energy costs and corresponding greenhouse gas emissions by decreasing the amount of water that must be pumped, distributed and treated. Moreover, these green approaches are flexible in terms of scale and can be integrated at the building and neighborhood scale as well as across watersheds and river basins. The

Rain barrels are installed to help reduce flooding and stormwater pollution as part of a neighborhood revitalization plan in Landsdowne, Pennsylvania. Rain barrels collect water that can be used for oudoor water use, reducing the need for highly treated municipal water.
Photo credit: American Rivers / Sara Strassman

multiple benefits of these approaches and the reliability and flexibility that they provide make them a perfect response to the uncertainties and volatility of a changing climate. Finally, these approaches create jobs across diverse sectors such as plumbing, landscaping, and engineering. Covering even one percent of large buildings in America's medium- to large-sized cities with vegetated roofs could create over 190,000 jobs and provide billions in revenue to suppliers and manufacturers that produce or distribute green-roof related materials. A $10 billion investment in water efficiency projects would produce a total economic output of $25-28 billion and create 150,000 to 220,000 jobs[5].

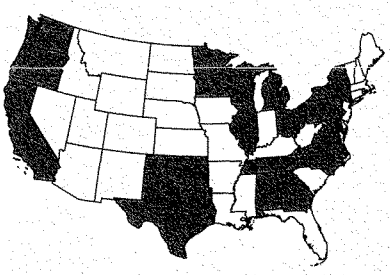
In this report, the approaches described here are collectively referred to as bright green strategies to distinguish them from other eligible green projects with fewer environmental benefits (see in the pages that follow).

Methodology

This study focused on a subset of 19 states (AL, CA, GA, IL, MD, MI, MN, NC, NY, OH, OK, OR, PA, RI, TN, TX, VA, WA, and WI) targeting some of the most populated regions of the country (see Figure 1). These states are primarily places where American Rivers staff or our conservation partners are actively engaged in on-the-ground work.

A copy of each state's data compiled by American Rivers was sent to appropriate clean water and drinking water state officials for their review. American Rivers analyzed the data for demand, project type and projected environmental benefit. Funded projects were those projects on the state's final list submitted to EPA. The unfunded projects were those projects that were submitted and eligible for funding, but for some reason or combination of reasons (e.g. not shovel-ready), were not selected for funding. As part of the ARRA process, EPA created guidance for the states on the types of projects that were eligible for Green Project Reserve funding for each Congressionally designated category (green infrastructure, water efficiency, energy efficiency, and environmental innovation). For projects where eligibility was unclear, EPA required development of a "business case" to show substantial green project reserve benefits[6]. Projects could be either stand-alone projects or integrated into existing water infrastructure systems.

FIGURE 1: 19 Study States



American Rivers compiled Green Project Reserve information from each state's Clean Water and Drinking Water SRF Intended Use Plans, U.S. EPA reports, and personal communication with state and federal agency staff. Based on this information, American Rivers compiled a database of 1,468 funded and unfunded green projects in the 19 states. To our knowledge, this is the only comprehensive database of this kind. Projects deemed ineligible for Green Project Reserve funds and those voluntarily withdrawn by the applicant were not included in American Rivers' green project database.

Bright Green Projects

Traditional water management often relies solely on engineered infrastructure like pipes, pumps, dams, and treatment plants, that only attempt to solve a single problem. It requires a huge expense to build and maintain, consumes large amounts of energy, damages the environment, and is not well-suited to meet the needs of an unpredicatable and changing climate.

21st century green infrastructure solutions preserve and restore natural landscapes, prevent wasteful water use, and work with nature rather than against it. While traditional water infrastructure will continue to have a role, communities that invest in a broad suite of green infrastructure approaches like the ones described above will lessen the impacts of an increasingly volatile climate by improving the health of valuable ecosystems, providing flexibility to handle a wide range of conditions and uncertainty, and providing other community benefits at the same time.

As part of this analysis, American Rivers further refined EPA's broad categories of eligible projects. We defined a subset of project types

that, in our view and experience, best replicate, enhance or leverage nature's sustainable strategies for water management, achieve the greatest degree of water savings, and create the widest range of environmental benefits. We called these "bright green" projects to distinguish them from more traditional water infrastructure projects (see Table 1 below). We believe that these bright green projects show the greatest promise and potential for the future of clean water and drinking water infrastructure. Throughout this report we provide examples of these projects and strategies as well as recommendations for how EPA and states can do more to promote and fund this kind of transformative, sustainable infrastructure. In the context of ARRA funding, we did not consider basic energy efficiency investments to be bright green for these key reasons: energy efficiency does not provide direct water quality benefits and other bright green practices also reduce energy use (see Table 1 below). Additionally, there are many other funding sources (including ARRA funds) for energy investments and many of these investments pay back quickly in reduced costs to the utility, making them less important for scarce federal water infrastructure dollars.

TABLE 1: Bright Green* Project Types that Best Leverage Sustainable Strategies to Achieve Clean Water and Reduce Water Use as a Subset of All Eligible Green Project Reserve Project Types compared to "Green" Project Types**

Project Types Bright Green Green	Improves water quality	Traps/slows runoff	Reduces water demand & increases reliable water supply	Recharges groundwater	Improves habitat	Reduces flooding	Reduces energy use	Other
Green roof	✔	✔				✔	✔	(1,3)
Pervious surface	✔	✔		✔		✔		
Stormwater bioretention (e.g. swales, green streets, raingardens, green walls)	✔	✔	(2)	✔	✔	✔	✔	(3)
Riparian habitat restoration	✔	✔		✔	✔	✔		(3)
Stormwater capture, reuse	✔	✔	✔			✔	✔	
Stream restoration, erosion control	✔	✔			✔	✔		
Wetland restoration	✔	✔		✔	✔	✔		
Install water meters (first-time)			✔		(4)		✔	
Leak detection/control			✔		(4)		✔	
Install low flow fixtures			✔		(4)		✔	
Drinking water treatment plant upgrade			✔					
Water supply distribution pipes, pumps, wells			✔					
Energy efficient equipment							✔	
SCADA (computer-controlled processes)	✔						✔	
Sewer pipe upgrade	✔							(5)
Stormwater retention	✔	✔				✔		
Replace water meters								(6)
Water recycling	✔					✔		

* Projects that protect, restore or replicate natural function or that create real reductions in water use, in addition to other benefits.

** Other types of projects eligible under EPA Green Project Reserve Guidance providing fewer multiple, sustainable environmental benefits

(1) Reduces urban heat island, extends roof life
(2) Can reduce demand for outdoor water use
(3) Aesthetic, quality of life increases
(4) When water savings returned to river
(5) Reduces likelihood of SSOs
(6) Ensures accurate billing

Green Project Reserve: Findings and Analysis

Our findings and analysis show that demand for the Green Project Reserve well outstripped availability of funds, and that many states used over the required 20 percent for these projects. Within this funding, it is critical to shift to more spending on bright green projects and we analyze some initial models for how to do so.

Demand for Green Project Funding Exceeded Availability.

- Despite skepticism and concern that there was insufficient demand, all 50 states were able to use nearly 50 percent more than required of water infrastructure funds for green infrastructure, water and energy efficiency, and environmentally innovative projects as required under ARRA. Although ARRA only required states to utilize 20 percent of funds for green projects, nationally, 30 percent of clean water and 29 percent of drinking water funds were used for the Green Project Reserve[7]. Similarly, the 19 states we analyzed spent an average of 28 percent of their clean water and drinking water funds combined for green projects. Six states nationally used almost half or more of their clean water infrastructure money on green projects[8].
- Cities, utilities and partner groups aggressively pursued green funding, and as a result demand far exceeded supply for Green Project Reserve funding. The number of Green Project Reserve projects left unfunded (821) exceeded the number of funded Green Project Reserve projects (647) by at least 27 percent in the 19 study states (see Figure 2). This is all the more remarkable given that states and communities were under extreme time pressure to fund projects they had rarely, if ever, considered before (loan applicants' projects were required to be under contract within one year from the time the ARRA bill was signed).

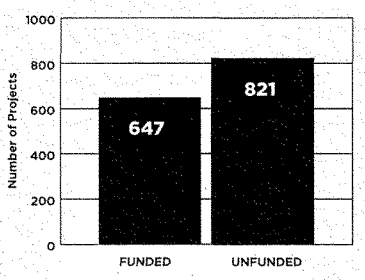


FIGURE 2: Number of green projects funded vs requested but unfunded in 19 study states

Even the 821 unfunded projects we compiled in the 19 study states are likely a significant underestimate of the demand for green reserve funding for two reasons. First, some study states did not have these data on unfunded green projects readily available to share publicly, and thus the unfunded projects are not represented. Second, states achieved what they did under immense time pressures — under a regular SRF funding cycle, states will have more time to fully solicit and review potential green projects. Therefore, the 821 unfunded green projects are, without question, a significant underestimate of the true demand for continued Green Project Reserve funding.

From Green to Bright Green: Green Project Reserve funding must be better deployed to maximize environmental and community benefits.

A number of states funded exemplary, bright green projects that represent a real shift in approaches to clean and reliable water, some of which are highlighted throughout this report. Even so, only about one quarter of all

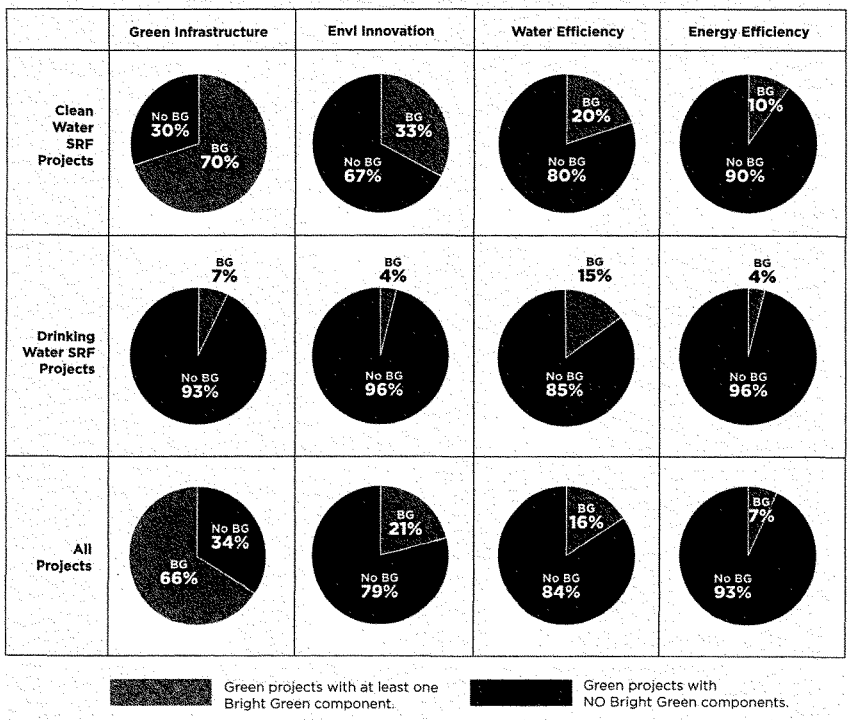
funded green projects in the 19 study states included at least one project component that American Rivers ranked as bright green for best leveraging sustainable strategies for water management (see Appendix Table A). Clean water SRF projects included more bright green components (36 percent) than did drinking water SRF projects (10 percent) (see Table 2).

The green infrastructure category projects utilized the greatest number of bright green components, followed by environmental innovation, water efficiency projects and finally energy efficiency (see Figure 3). Stormwater using natural filtration (bioinfiltration), pervious pavements, and wetland restoration and creation account for the highest number of funded projects with bright green components (see Appendix Table A). Energy efficiency projects received the most funding and yet had the fewest bright green components for transforming water infrastructure.

TABLE 2: Number of funded Green Project Reserve projects with at least one bright green component in 19 study states

	Clean Water SRF	Drinking Water SRF	Combined
Number of projects with at least one bright green, sustainable component	142	26	168
Total number of funded projects	393	254	647
Percentage of projects with at least one bright green, sustainable component	36%	10%	26%

FIGURE 3: Percent of projects in 19 study states with at least one bright green component



"There is a transition taking place here. With this [green street] project, the civil engineers now can design a bioretention bed, these laborers now can set porous pavement, these electricians can install LED lighting. These planners and tradesmen and women are the bedrock of our emerging green economy – we're a small town – if we can do it anyone can."

MAYOR ADAM ORTIZ, EDMONSTON, MARYLAND

Water efficiency projects were funded for the first time in many states with State Revolving Funds, but future funding should be directed to projects that achieve real water savings.

For the 19 study states, water efficiency projects accounted for nearly half of all drinking water projects funded through the Green Project Reserve. Demand remains high as 45 percent of unfunded Green Project Reserve drinking water and clean water projects fall under EPA's water efficiency category. However, many of the water efficiency projects funded, while eligible under EPA's guidance, do not result in significant new water savings because they simply replace existing meters. The low percentage of bright green projects in the drinking water category reflects this fact (see Figure 3). Future funding should prioritize water efficiency projects that achieve the greatest, real water savings, such as residential retrofits with low-flow fixtures, sub-metering apartment buildings, leak detection, and other water saving strategies (see box, "Re-Metering: Good Business Practice But Not Necessarily Bright Green").

Spotlight Projects: In Douglasville, Georgia a $300,000 rebate program for homeowners was developed using clean water Green Project Reserve funding to replace older toilets with newer, efficient models. An estimated 1,500 homeowners are expected to benefit from this program and each can earn up to $200[9]. As Pete Frost, the Executive Director of the Douglasville-Douglas County Water Sewer Authority said, "Not only does the program save our customers money, but it saves us money in the long run because we won't have to expand facilities. There are also the added environmental benefits from eliminating the need to build and expand reservoirs and saving the energy no longer needed to pipe, treat and pump the water."

Re-Metering: Good Business Practice, but Not Necessarily Bright Green

Metering is defined as the installation of a device that measures the actual amount of water used by a customer, building or process. Installation of new and replacement water meters were very popular projects under the Green Project Reserve. Georgia alone funded five metering projects and they were the only type of project funded under Georgia's drinking water portion of the Green Project Reserve.

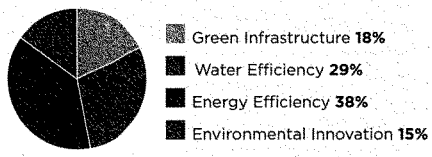
While first-time water metering projects have been proven to secure upwards of 15 percent water savings, re-metering has not been proven to secure additional savings[10]. Re-metering is a good business practice for water utilities as it captures "paper" water losses, water that is not billed although it is still consumed. However, given the lack of real water savings from re-metering, any Green Project Reserve funded metering projects should focus on first-time metering projects only.

Energy efficiency projects comprised the largest category of funded Green Project Reserve projects, and dollars spent, without clear direct benefits to clean and safe water.

TABLE 3: Funded dollars distribution and percentage among Green Project Reserve categories for 19 study states*

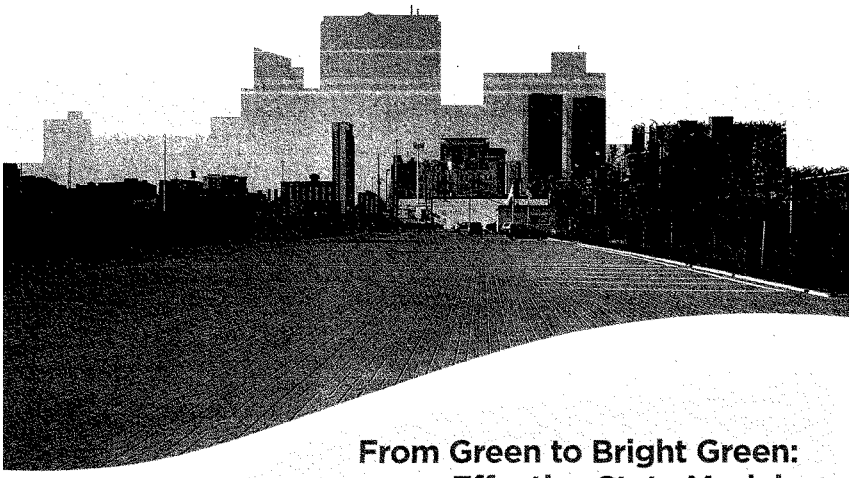
Project	Green Infrastructure	Water Efficiency	Energy Efficiency	Environmental Innovation
Clean Water Projects	$179,194,094	$67,387,356	$295,948,968	$114,779,206
Drinking Water Projects	$6,200	$216,673,298	$66,759,344	$28,808,232
Total/percentage	$179,200,294/18%	$284,060,654/29%	$362,708,312/38%	$143,587,438/15%

*Dollars per category per project were taken directly from EPA's 3/25/2010 file sent to American Rivers.



The largest portion of Green Project Reserve funded projects in the 19 study states were energy efficiency projects by both dollars spent and by number of funded projects (see Table 3), and in some states, almost all water infrastructure money was used for energy efficiency (see Appendix Figure A). This is consistent with EPA data on national spending where energy efficiency was also the lead category. The large amount of funding for energy efficiency under ARRA may be due to the relative engineering ease of making such improvements under time pressure[11]. While energy efficiency is a critical environmental goal and there is a strong water-energy nexus, in many cases, it is not clear what direct water quality benefits, if any, were realized through these projects. American Rivers has consistently urged that limited federal clean water funds not be used for basic energy efficiency purposes, both because many of these investments easily provide an adequate return on investment in a short time period and should be part of a utility's regular operating practices, and because other funding sources exist for this purpose. Further, other bright green practices such as water efficiency and stormwater reuse also reduce energy demand.

Thus, although the Green Project Reserve represents a shift in the direction of federal funding to more sustainable water infrastructure, we must better deploy these resources to fund more bright green water infrastructure projects that are more flexible and cost-effective, and provide a much broader array of community and environmental benefits. The demand for projects with bright green components is strong: in the 19 study states, there were as many documented projects with bright green components (168) waiting for funding as there were funded projects with at least one bright green component (see Appendix Table B). Current demand for future funding for bright green projects is led by wetland restoration and construction projects, stormwater bioinfiltration, and installation of first-time meters (see Appendix Table A).



From Green to Bright Green: Effective State Models

Effective Outreach

State programs that American Rivers considered exemplary had strong outreach efforts, which in turn generated a robust list of potential green and bright green projects, allowing those states to invest their limited dollars in the very best projects. Some common characteristics of these state programs included active outreach to traditional and non-traditional SRF recipients, state policy that allowed funding of the full range of federally eligible projects and innovation, and a commitment to using funding incentives for bright green projects.

Of the 19 states, Maryland stands out as exemplary, with the highest percentage (64 percent) of green projects with at least one bright green component. Other strong states include New York and Rhode Island, where over 40 percent of green reserve-funded projects contained at

Photo above: Permeable pavement allows rain to filter through to soil below instead of washing off paved surfaces and polluting nearby waterways. This parking lot at Chicago's Maxwell Market used permeable pavers and an adjacent vegetated area to reduce stormwater runoff, flooding, and the urban heat island effect while still maintaining the functionality of the area as an outdoor market. Photo credit: American Rivers / Kathryn Swartz

Spotlight State — Maryland: In Maryland, the state chose to provide additional subsidization to projects that received funding under the Green Project Reserve that ranged from wetland restoration, to creating "living shorelines," to improving water efficiency through water appliance retrofit programs. For example, the town of Edmonston received over $1 million to construct a 'green street' that will create or preserve 50 jobs[12]. Thirty maple, elm, sycamore and oak trees will line the street, and energy-efficient streetlights will be powered by wind. Permeable concrete and moisture-loving plants will absorb and filter 90 percent of the polluted stormwater that typically flows into the Anacostia River to reduce flooding and pollution. In Anne Arundel County, several towns received funding to protect and construct new wetlands as living shorelines to safeguard existing habitat and prevent erosion, consistent with the state's climate adaptation priorities. The City of Baltimore received more than $2 million to retrofit wasteful and outdated plumbing fixtures with new water efficient devices that will save the City water, energy and money.

least one bright green component. For example, the Narragansett Bay Commission in Rhode Island is constructing a new LEED silver certified operations building that will include a green roof, pervious payment, vegetated swales, and drought tolerant landscaping.

Active outreach to non-traditional funding applicants was essential to broaden the type and scale of projects funded. New York, for example, promoted the Green Project Reserve broadly through their Green Innovation Grants program, and hosted webinars and local presentations. Pennsylvania had a separate solicitation for green projects and hosted informational meetings. California funded a broad range of projects and non-traditional recipients, including the Los Angeles and San Gabriel Rivers Watershed Council, Santa Monica Baykeeper and the Truckee Watershed Council, who are all implementing bright green projects[15].

State Spotlight — New York's Green Innovation Grant Program: New York took a unique approach to the Green Project Reserve by using a significant portion of this funding to create a new program — the Green Innovation Grant Program[13]. Under this program, New York was able to separately solicit and evaluate green projects, ultimately funding 57 projects for just under $45 million, with the balance of state Green Project Reserve funds used to integrate existing gray and green infrastructure. Projects included the Green City Homes project in Syracuse, a solution to housing needs and a demonstration of green homes that save water and energy and manage stormwater with green infrastructure solutions. Green City Homes will utilize pervious roadways and sidewalks to manage over one million gallons of stormwater that would otherwise contribute to combined sewer overflows. The Lindenhurst Memorial Library in Suffolk County used grant funds to install a new green parking lot using permeable pavers and vegetation to reduce stormwater impacts from the municipal library. Designed to infiltrate more than 150,000 gallons of stormwater from the site, the project's benefits are already being reported in the local paper: "The rain sloshing down on Long Island Tuesday flooded roads and turned driveways into lakes. But no water pooled in the new lot at Lindenhurst Memorial Library — even during the worst of the storm[14]."

Integrating green and gray solutions and moving toward more bright green projects

While "active solicitation" for Green Project Reserve projects was required of all states, time pressure led some states to choose to

Spotlight Projects: The City of Spokane, Washington received funding to install "storm gardens" that use low impact development techniques to reduce the amount of stormwater runoff. As part of the West Broadway Spokane Urban Runoff Greenway Experiment (SURGE) project, 37 planters will be installed between the curb and sidewalk to detain stormwater and allow it to infiltrate into the ground, reducing the amount of polluted stormwater runoff discharged into the Spokane River. In Seattle, the Ballard Green Streets project received $1.54 million to install 10 blocks of swales in order to control stormwater runoff from 2.6 acres of impervious surface[16]. This will reduce the amount of stormwater runoff that flows into the City's combined sewer overflow system and decrease pollution in the Lake Washington Ship Canal which is a key migration corridor for salmon[17]. The Yauger Park project in Olympia, Washington will increase stormwater storage and reduce erosion by constructing wetlands, a 5,000 square foot rain garden, bio-swales, and a new parking lot using pervious pavement.

focus on adding green elements to existing, centralized water infrastructure projects instead of seeking out innovative projects that provide multiple community benefits and more cost-effective environmental solutions than traditional infrastructure. American Rivers favors both integrating bright green elements into existing water infrastructure as well as expanding the concept of water infrastructure to ensure funding for a range of more non-traditional, decentralized projects (such as rain gardens and green streets) that collectively achieve clean and reliable water supplies[18]. We believe that a larger share of federal infrastructure investments should be directed in the future toward bright green strategies that help communities and utilities transition toward less costly and more resilient water management.

Removing Administrative Barriers

Removing state-based barriers to funding green infrastructure, water efficiency and other environmentally innovative activities is another important key to funding more bright green projects under the Green Project Reserve. Some states have legislative, regulatory or policy barriers to funding a full range

State Spotlight — Green Project Reserve Spurs First Green Loan in Pennsylvania: Pennsylvania used Green Project Reserve funds for innovative grant projects throughout the Commonwealth including $1.2 million in Pittsburgh to the non-profit organization, Friends of the Pittsburgh Urban Forests, to plant trees and install permeable pavers to reduce polluted stormwater runoff from parking lots into the City's combined sewer system. Importantly, the shift to funding green projects catalyzed the state funding agency (PENNVEST) to make the state's first low-interest green loan for $30 million to Philadelphia as part of that city's ambitious plan to maximize the use of green infrastructure to reduce stormwater and combined sewer overflows. As described in the Philadelphia's Green City, Clean Waters combined sewer overflow control plan, investing in converting 4,000 acres of cityscape to green infrastructure will not only reduce sewage pollution, but also provide multiple benefits to the community including: reducing annual heat-related fatalities, saving millions of kilowatt hours of electricity, reducing the city's cooling needs, improving air quality and increasing recreational opportunities. Philadelphia will pay back the loan through existing fee structures and other sources[19].

Spotlight on Cost-Effectiveness

One of the most important benefits of green infrastructure and water efficiency practices are their ability to save money by offering less expensive solutions to common water management problems. For instance, the city of Portland, Oregon spent $8 million to subsidize downspout disconnections for homeowners and saved the city $250 million in traditional gray infrastructure fixes to reduce sewer overflows. By committing to water efficiency, the city of Boston, Massachusetts was able to reduce its water consumption by one third, increase its customer base by two million people, and save $500 million by eliminating the need to build a new water supply dam.

By investing in land protection, cities like New York are finding huge savings in water treatment costs. The city saved an estimated $6 billion in capital costs to construct a new water filtration plant by investing $600 million in land protection and restoration. A study by the Center for Urban Forest Research at the University of California-Davis found that for every 1,000 deciduous trees in California's Central Valley, stormwater runoff would be reduced by an estimated one million gallons, saving thousands in gray infrastructure costs.

By treating stormwater where it falls and using the water we have more efficiently, these practices relieve pressure on aging traditional infrastructure, protecting our clean water supplies and saving communities money.

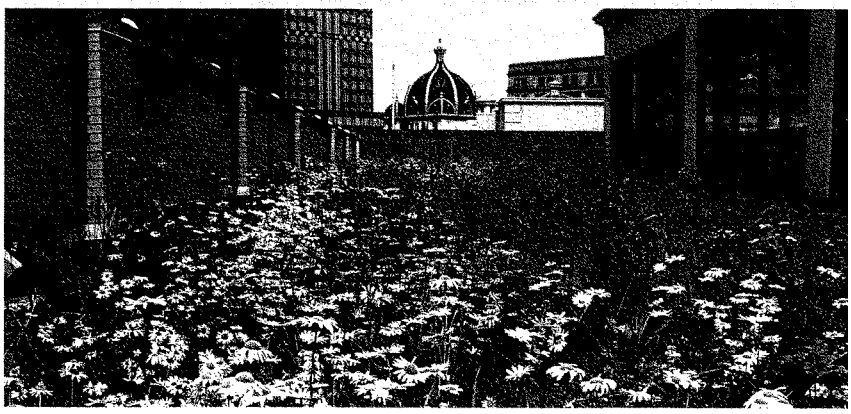
"The Broadway storm garden project is an excellent opportunity for our City to fix failing infrastructure in a way that is cost-effective and preserves dwindling water supplies." MAYOR MARY VERNER, SPOKANE, WASHINGTON

of green infrastructure or environmentally innovative projects and were unable to take full advantage of Green Project Reserve funding. State law in Virginia, for example, prevented funding of green infrastructure stormwater projects[20]. Given that these bright green projects are already eligible for funding under federal law, removing such state barriers should be a priority[21].

Grants, Not Loans

Finally, some states chose to provide grants instead of loans for Green Project Reserve projects making it much easier for non-traditional partners, such as watershed groups, to take an active role in achieving cleaner water (ARRA required that states distribute at least 50 percent of their SRF funds as "grants")[22]. Although ultimately, green infrastructure and water efficiency should be integrated into utility and community planning to the point that grants are not necessary, providing initial incentives for bright green, innovative projects where there is financial need and where these projects warrant further demonstration is a wise use of federal dollars.

Spotlight Project: In North Carolina, the City of Raleigh and Wake County partnered to retrofit 10 firehouses and one Emergency Medical Service station with cisterns with a capacity of 2,000-4,000 gallons that will allow the stations to reuse rainwater for vehicle maintenance, irrigation, and fighting fires. The funds received by the city and county will not only employ local people for the installation, but are building the North Carolina green economy by contracting with firms based in the state. As Amy Hathaway, Project Engineer with the City of Raleigh states, "this represents another excellent opportunity for North Carolina to utilize innovative techniques to reduce the demand on our drinking water supplies by investing in cost-effective solutions."



Completed in the fall of 2001, the Heinz 57 Center was the first vegetated roof in downtown Pittsburgh. More than 18,000 plants cover the green roof retaining 55% of the yearly rainfall, cooling the building, and providing sweeping views for office residents. Photo credit: Roofscapes, Inc.

Recommendations

The Green Project Reserve represents a critical start to transforming our water infrastructure towards more sustainable approaches. Federal water infrastructure under the SRF programs can lead the way to provide multiple benefits and help communities achieve clean and safe water while also preparing for climate change. The lessons learned as part of the ARRA experience must guide future investments.

NATIONAL

- **Fund and provide incentives for bright green approaches to clean and reliable water** — As illustrated by the unmet demand for the Green Project Reserve, there is a need to continue and increase funding for sustainable water infrastructure that uses bright green, innovative and water saving approaches to achieve safe and clean water and begin to better integrate these approaches into the front end of infrastructure planning. Congress should reauthorize the Clean Water and Drinking Water State Revolving Funds to include dedicated funding and incentives for the best bright green approaches. For instance, states that fund bright green projects with SRF funds should be able to waive their state match for those projects. Congress should continue to appropriate dedicated funds for green infrastructure and water efficiency and begin to emphasize brighter green approaches and specifically allow states to use additional subsidization for bright green projects. Finally, incentives for utilities that apply the bright green approaches as the backbone of climate adaptation planning should be established.
- **Continue to improve EPA guidance for the Green Project Reserve** — Following an evaluation by EPA's Inspector General[23], EPA has released revised guidance for spending Green Project Reserve money in FY10[24]. In addition to the good emphasis on prioritizing reinvestment in existing infrastructure over sprawl in its "fix it first" policy, the revised guidance improves on the explanation of green infrastructure and makes clear that source water protection for drinking water supplies is eligible for Green Project Reserve funding. However, the guidance must be further updated to require that investment in energy efficiency be linked to the goals of the Clean Water and Drinking Water SRF. If this isn't changed then we run the risk that even more water infrastructure funding will be directed away from projects that fulfill the core goals of ensuring clean, safe, reliable water. Similarly, EPA needs to limit funds from being used to replace water meters and instead focus on installing first-time meters and on retrofit programs that will achieve real water savings.
- **Provide additional technical assistance and outreach** — Many states would benefit from additional technical assistance and outreach from EPA's staff with expertise in green infrastructure and water efficiency. Additionally, dedicating some of EPA's existing planning funds with the Green Project Reserve would assist communities in developing strong proposals ready for funding.

STATES

- **Remove state barriers to funding a full range of sustainable approaches and adopt bright green project ranking criteria** — While the revised EPA guidance makes clear that state level prohibitions based on statute, regulation or policy cannot be used to justify insufficient Green Project Reserve applica-

tions, some state barriers clearly exist and prevent those states from achieving the full potential and Congressional intent of the Green Project Reserve. Some efforts are being made to remove such barriers[25], but thorough review and targeting of state policies that prevent integrated infrastructure should be a priority. Additionally, many states are revising their project evaluation procedures and should adopt criteria that reflect broad environmental benefit, like restoring natural hydrology and achieving real water savings[26]. Already, EPA is working with several states as part of a multi-agency sustainability partnership to improve state project ranking criteria to ensure it better matches with sustainability principles, and this should be expanded.

- **Actively solicit new green reserve projects** — Vigorous outreach for new green reserve projects to a range of traditional and non-traditional partners will result in a wide range of strong projects, allowing states to select the most environmentally beneficial ones. States should receive additional money to administer the SRF programs if they are used for Green Project Reserve outreach.

- **Establish loan payback mechanisms for green projects** — Although many states chose to subsidize green projects under ARRA minimum subsidy requirements, the long-term ability to fund green projects depends on valuing these projects and creating loan payback mechanisms. In Pennsylvania, for example, the Green Project Reserve catalyzed the state's first green loan of $30 million to Philadelphia, in part because the City could repay part of the loan out of its stormwater utility. A number of options for paying back loans for green projects exist, including park and recreation fees, linked deposit programs, and stormwater fees, and states should look to use these and other financing options[27].

- **Transparency and consistency** — States should be required to clearly and publicly demonstrate how Green Project Reserve money is being used given that there is currently much variability between states. For instance, in states that relied on business case projects, there were challenges determining the nature of the project[28]. In contrast, states like New York posted every project with a project description on their website.

Conclusions

We must continue to transform our water infrastructure by using techniques that best leverage nature's abilities and use innovative technologies to ensure clean and safe water for people and rivers. The Green Project Reserve was an excellent first step in creating this change. States and EPA did a tremendous job under time pressure in shifting the approach to achieving clean and reliable water. Moving forward, the challenge is to make the best bright green projects and policies into normal, mainstream projects and policies. Such changes are necessary to help communities prepare for the impacts of a changing climate, including more frequents droughts and floods, and to ensure reliable clean water supplies for years to come.

Appendix

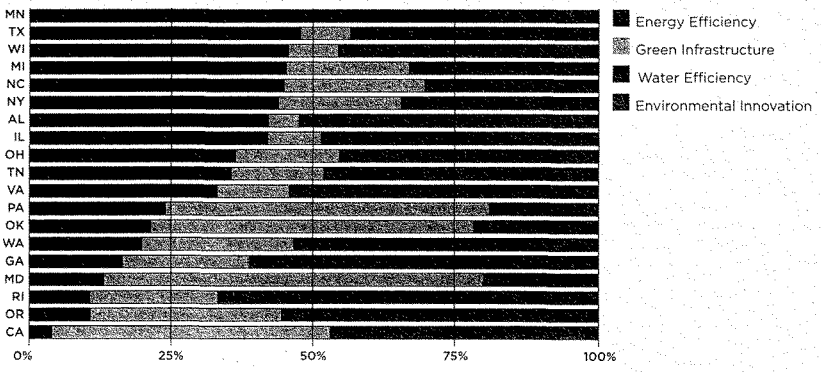
TABLE A: Number and type of Green Project Reserve projects with bright green components in 19 states

Bright Green Component	Type of Project					
	Clean Water		Drinking Water		All projects	
	funded	unfunded	funded	unfunded	funded	unfunded
Stormwater bioretention	42	29	0	0	42	29
Pervious surface	29	13	1	0	30	13
Wetland restore/construct/other	29	33	0	2	29	35
Streamy creek restoration	23	25	0	0	23	25
Install first time meters	1	0	19	26	20	26
Riparian habitat restoration	16	15	0	0	16	15
Green roof	14	8	0	0	14	8
Streamy river bank erosion control	13	5	0	0	13	5
Leak detection/control	5	2	6	17	11	19
Low flow fixtures	4	5	1	7	5	12

TABLE B: Number of funded Green Project Reserve projects with at least one bright green component in 19 states

	Type of Project							
	Clean Water			Drinking Water			All projects	
	total	funded	un-funded	total	funded	un-funded	funded	un-funded
Number of projects with at least one Bright Green component	259	142	117	77	26	51	168	168
Total number of projects	757	393	364	711	254	457	647	821
Percent of projects with at least one Bright Green component	34%	36%	32%	11%	10%	11%	26%	20%

FIGURE A: Distribution of EPA project types among funded projects in 19 states (Clean Water and Drinking Water SRF)



Footnotes

[1] U.S. Environmental Protection Agency, Clean Watersheds Needs Survey (2008) http://www.epa.gov/owm/mtb/cwns/2008reportdata.htm (last accessed Jun 4, 2010) and U.S. Environmental Protection Agency, Drinking Water Needs Survey and Assessment (2007) http://www.epa.gov/safewater/needssurvey/index.html (last accessed June 28, 2010).

[2] American Society of Civil Engineers, Report Card for America's Infrastructure. http://www.infrastructurereportcard.org/ (2009).

[3] See note 1

[4] For more about the State Revolving Loan Funds, see U.S EPA http://www.epa.gov/owm/cwfinance/cwsrf/ and http://www.epa.gov/safewater/dwsrf/index.html.

[5] American Rivers and Alliance for Water Efficiency, Creating Jobs and Stimulating the Economy through Investment in Green Water Infrastructure, American Rivers and Alliance for Water Efficiency (2008).

[6] U.S. Environmental Protection Agency, Final Guidance for Award of Capitalization Grants by Funds Appropriated through ARRA, http://www.epa.gov/water/eparecovery/docs/2009-03-02_Final_ARRA_SRF_Guidance.pdf (March 2009).

[7] U.S. Environmental Protection Agency, Clean Water State Revolving Fund, Green Project Reserve Funding Status, March 17, 2010 Update, Appendix Table 1, and EPA, Drinking Water State Revolving Fund, Green Project Reserve Funding Status, March 26, 2010.

[8] Id. Note that Kansas spent over 80% of its CWSRF funds on the green reserve.

[9] Winston Jones, WSA Gets $300,000 for Toilet Rebate Program, Times-Georgian.com, http://www.times-georgian.com/pages/full_story/push?article-WSA+gets+-300-000-+for+toilet+rebate+program%20&id=4671251-WSA+gets+-300-000+for+toilet+rebate+program&instance=west_ga_news

[10] Mayer, Peter, et. al. National Submetering and Allocation Billing Program Study (2004).

[11] See e.g. David C. Trimble, Government Accountability Office, Recovery Act: Clean Water Projects are Underway, but Procedures May Not Be in Place to Ensure Adequate Oversight, Presented to House Committee on Transportation and Infrastructure (May 26, 2010). Noting that Mississippi funded three large, high-cost energy efficiency projects to meet the Green Project Reserve.

[12] Aleksandra Robinson, Capital News Service, "Green Street" to Sop Up Tiny Towns Flood Problem http://chesapeakebay.umd.edu/article/green-street-sop-tiny-towns-flood-problem (Nov. 24, 2009).

[13] New York State Environmental Facilities Corporation, Green Innovation Grant Program http://www.nysefc.org/home/index.asp?page=687 (last accessed May 18, 2010).

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[20] Virginia DEQ, VCWRLF Loan Program Announcement, March 25, 2009.

[21] See e.g. U.S. EPA, Green Infrastructure Approaches to Managing Wet Weather Using Clean Water State Revolving Funds, http://www.epa.gov/npdes/pubs/gi_cwsrf.pdf (July 2008) and Funding Water Efficiency Through the State Revolving Fund Programs, http://www.epa.gov/owm/cwfinance/cwsrf/we_factsheet.pdf (August 2003).

[22] David C. Trimble, Government Accountability Office, Recovery Act: Clean Water Projects are Underway, but Procedures May Not Be in Place to Ensure Adequate Oversight, Presented to House Committee on Transportation and Infrastructure (May 26, 2010). In a review of 12 states (some overlap with 19 states reviewed in this analysis), the Government Accountability Office found that 93% of the Green Project Reserve projects were awarded additional subsidization.

[23] U.S. Environmental Protection Agency, Office of Inspector General, EPA Needs Definitive Guidance for Recovery Act and Future Green Reserve Projects, Report No. 10-R-0057 (Feb. 2010).

[24] U.S. EPA Guidance documents were not available on EPA's website at the time of publication and are instead available at: www.americanrivers.org/greenfunding.

[25] See e.g. Virginia House Bill 1221, allowing state SRF funds to be used for stormwater. The bill was amended to ensure that stormwater would be funded only after all wastewater treatment plants were funded http://leg1.state.va.us/cgi-bin/legp504.exe?101+sum+HB1221 (last accessed May 10, 2010).

[26] See e.g. Northbridge Environmental Management, Alabama Clean Water State Revolving Fund, American Recovery and Reinvestment Act Lessons Learned: CWSRF Priority System Changes Needed to Address Green Project Reserve Funding (May 2010).

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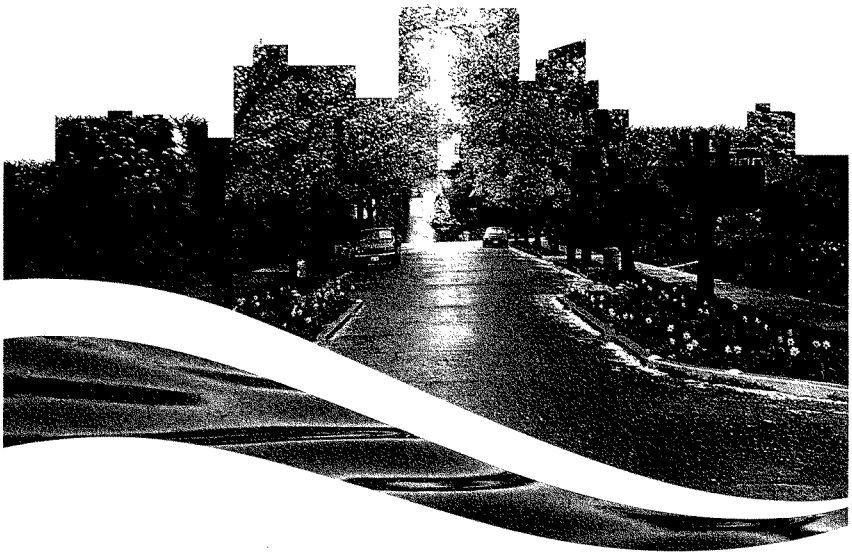

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Ms. EDWARDS. Thank you. We will accept that for the record.

I wonder, Mr. Boncke, you know when we passed the American Recovery and Reinvestment Act, I recall that there was actually some bit of pushback about the set-aside minimum of 20 percent for the clean water, State revolving funds to address green infrastructure water, energy efficiency improvements, and other innovative activities. And in multiple hearings on the Recovery Act, it seemed that most accounts of the green reserve actually view it as a success, there were more applications than could be funded with that 20 percent.

Did the National Association of Home Builders actually support the reserve?

And do you agree that the growing consensus of the approach for Federal encouragement of green technologies was beneficial to the green technologies industry?

Mr. BONCKE. Thank you very much for the question.

There were a few questions in the question that you have asked, but as it relates to the set aside in the Recovery Act, promoting green technology, absolutely, our support is there. We also stick to a fairly firm position that this is also evolving technology and we need time to work on it and time to develop best management practices. And very often those best management practices are found in the field, in the trenches and very often, quite frankly, in a private sector nature. So we do encourage obviously funding and resources to further these thoughts. But we also very much encourage volunteer and voluntary methods to come to these same means at the end of the day.

Ms. EDWARDS. Do you have some sense though, I am just curious as to whether the numbers of the experiments that were going on with the Recovery Act, and I describe them as experiments because we are learning a lot from these technologies, that those are helpful as we try to figure out the questions that are raised regarding efficiencies, regarding savings and regarding the impact to the environment.

Mr. BONCKE. I would say that unfortunately at this juncture, we actually don't have enough empirical data. It is, to some extent, too soon. You may also be aware of the industry itself has not been where it was a couple of years ago in the actual construction of facilities. There are actually, quite frankly, a lot of projects that are laying fallow right now because of the economy.

So with that being much of the reason, it is hard for us to gather empirical data. Likewise, a lot of the technologies that we are using are very exciting. They are very new. And the efficiencies and cost aspect and, quite frankly, the success of innovative technologies that we are using will take a long time to see quite frankly if they are working. So we are in a period of time where we just don't have enough empirical data probably to get a good enough answer back to you.

Ms. EDWARDS. Before I turn it over to the Ranking Member, I do have a couple of questions for you, Mr. Richards. I am having a little bit of difficulty understanding your position on the value of low impact development projects. And part of the reason is because many of us who have been interested in these issues have read about, thought about, and been celebrating Charlotte, North Caro-

lina that was recognized last year by the EPA for adopting nationally renowned smart growth policies and ordinances that incorporate low impact development concepts in your master plan.

And during the formation of these policies, the former mayor recognized that "without smart growth we have no growth in the future." And if I am not mistaken your city's efforts to develop the policies and ordinances were actually spearheaded by your boss, city engineer Jim Shoemaker.

So I wonder if you could explain in your testimony that you seem to suggest that the benefits of the policies are unproven and have no more benefit than less expensive practices by which I assume you mean traditional gray infrastructure.

Can you tell me whether you agree or disagree with the position of your city on the potential benefit of smart growth and low impact development policies?

Mr. RICHARDS. Sure, thank you very much for the question. Yes, I would say we, NAFSMA, and also the City of Charlotte both agree that green infrastructure and smart growth both are very good practices, and they are things that we want to be a part of, they are things that we want to continue to pursue.

I will say from my testimony's perspective, one of the things that I want to highlight, and I can do this best from Charlotte's perspective, that is where I am from, is that when we were developing our post construction controls ordinance, we spent a lot of time with our consultant and with our stakeholders, over 36 meetings, almost 2 years worth of work, where we looked at our impaired waters.

Now for Charlotte, North Carolina, in Mecklenburg County in which we reside, probably 75 percent of our streams are impaired. Most of our impairments, if not just about all of them, are impaired for sediment and bacteria. Now when we looked at what were our options for addressing these impairments, our consultant and also the work that we were doing was showing us that green infrastructure, while it was a good option, and a preferred option in some instances, was not the only option, and, in fact, it was not the less expensive option for treating our impaired waters.

That is one of the reasons I believe that NAFSMA says that, you know, we recognize this is a great tool, and it fits right in the toolbox and should be used where appropriate but sometimes it is not the best option. So for Charlotte, with smart growth and with green infrastructure while we prefer that in our ordinance, we don't require people to use it because really, if we are trying to restore our watersheds then some of our other methods are a little less expensive.

Ms. EDWARDS. But for the record, you acknowledge also that Allyson Schwartz earlier testified about the measures that she is proposing around green infrastructure, again in the nature of experimentation investment and nonprofit organizations to work with municipalities, with communities and the legislation that I proposed as well, don't have mandates in them. And your testimony, though, reflected some concern about a mandate when that is not something that we have actually seen.

We have actually been looking at some of these techniques and the nature of adding to the toolbox just as you described.

Mr. RICHARDS. Yes, ma'am. That is a reflection of what our NAFSMA members are seeing across the Nation. I guess what I am trying to reflect is whether there is actual, actually a mandate or not. What we are seeing in permit renewals, is language that says, you are going to use green infrastructure, and you are going to show us how you are proposing that this is your first choice, and if that choice doesn't work then you might look at something else. And I am just, that is what NAFSMA is seeing through our membership. So we are concerned about that.

Ms. EDWARDS. Thank you. Mr. Boozman.

Mr. BOOZMAN. So you are talking about permit renewals through the EPA?

Mr. RICHARDS. Yes, sir.

Mr. BOOZMAN. Very good.

Mr. Ortiz, what sorts of operating O&M costs does your community have for the green infrastructure compared to the traditional gray?

Mr. ORTIZ. I am sorry, sir, you said operating costs?

Mr. BOOZMAN. Yes, in other words, once you put the structure in, there is more, I would assume that there is more maintenance regarding that concept versus the traditional gray infrastructure.

Mr. ORTIZ. That is an excellent question. Primarily it is pulling weeds in the rain gardens and in the tree boxes. So we have a public work staff that we already have, it is a little more work for them, but we think it is a priority, and we have also hired a landscape firm more on the beautification side, but, of course, there is overlap and I think we budgeted $3,000 to bring them on board in the fiscal year.

Mr. BOOZMAN. It sounds like you have got some drainage problems in the area and things. Have you changed your zoning so that you wouldn't get yourself in the same situation? Are you zoned now for low impact?

Mr. ORTIZ. We have rezoned. We don't have power over our own zoning, but we have been working with our county and regional partners who do have authority over that. There is some, and there have been some changes in that way, but in the State of Maryland, we have been coming to a consensus through a long process on stormwater management and requiring some waivers and exceptions that all new development and redevelopment have to meet certain thresholds for better stormwater management. And we hope that that will make a difference in the long term.

Mr. BOOZMAN. So you are in the process of doing that? You haven't done it yet or?

Mr. ORTIZ. The law was recently passed in 2007. It was passed in the recent State general assembly session the grandfathering was extended so it actually hasn't gone into force. I don't believe it will begin going into force until 2013.

Mr. BOOZMAN. Mr. Yocca, again, along the same line, can you describe the difference between gray infrastructure and green infrastructure in terms of cost to water, again, water benefits, employment numbers, with O&M?

Mr. YOCCA. Yes. Thank you, Mr. Boozman. A couple of things. Generally, as part of the integrated planning process in designing a green infrastructure project, we look at life cycle costs, both cap-

ital costs and long-term operations and maintenance costs, and for every case, whether it is a private development or a public infrastructure project have to demonstrate that there is appropriate budget and resources to implement and manage that project over time, and oftentimes, that is sitting within either existing or even shrinking budgets.

In the case of the West Union project that I mentioned, we went through that analysis and looked at each aspect, or each element of the green infrastructure and evaluated the combination of capital costs and operations and maintenance costs, and the end result is that the capital costs, for some of the items are actually more than conventional materials, other things are less.

The aggregate is actually, of the total project, was more than what the conventional approach was with additional qualities and benefits added in. So it is costing more, but there are more elements and attributes of the project. In terms of operations and maintenance, the aggregate cost is actually less over time. Some of the elements are much more durable and require albeit different but less costly maintenance. And so, for the example of the porous paving, for example, it is estimated to be a 50-year street without repavement. There needs to be annual vacuuming and a few other maintenance items, but those are less costly than what the city was spending in maintaining its asphalt street in the same area.

There is an additional cost in terms of the bio retention and landscape elements. And in the case of West Union, they didn't have the staff, it is a very small town, only 2,500 people they didn't have public works staff that were capable of maintaining that landscaping so we actually worked with a group of local master gardeners who agreed to take responsibility for that.

So several of you mentioned the fact that it is not a one-size-fits-all solution, and that is very much what has been our experience, that part of the design process has to identify what are the resources, both for capital costs and for long-term maintenance and operations and fitting the design to those conditions.

Mr. BOOZMAN. Mr. Richards, you mentioned that the mandate without the mandate situation that you are in. Do you think the EPA has the authority to do that?

I know they are doing it.

Mr. RICHARDS. I think it is our opinion that they do not have the authority to do that.

Mr. BOOZMAN. Very good.

And again, I keep going on about the, I would agree with that. I keep coming back to the cost, and I think that is important because we have had the stimulus and that money has essentially been spent or allocated so there is not going to be any more money. We are running almost a trillion and a half dollar deficit right now, so money is tight and I think everybody would agree with that. So I think the cost really is important as far as the practicality of moving forward.

Mr. Boncke, can you comment on that also about the difference in cost to water quality benefits from your perspective?

Mr. BONCKE. Certainly, and thank you for the question.

I would like to try and answer it quickly in a couple of ways. First, in the absence of certain empirical data as whether some of

these techniques are working and all, the costs per individual home of the stormwater regulations as they have evolved over the last few years are costing somewhere in the neighborhood of $3,500 to $10,000 per home depending on regions you live in. That is very significant as a starting number. But more specific to your question, it is very interesting if we allow our creative and technical juices to work properly. And I would like to just give you a scenario on that.

Incrementally, site by site, item by item, the costs can, in fact, be significant and out of proportion. And I very much appreciate some of the comments from Mr. Richards. We also have to look at the future of maintenance costs. Ultimately, we can design things that nature can be the maintainer of a situation rather than trucks and bulldozers. That is very significant to our communities. So while the upfront costs may be and are proving to be a little bit more, we can also see benefit to the down-the-road cost for our communities.

But a very quick scenario if I could, I started my career designing narrow streets without gutters, very practical, put the water in the ground type of solutions. I also watched neighborhoods, as I was a youngster, drain the oil out of their cars and walk out to the street and dump it into the inlet. That may be why I ended up being a civil engineer, I don't know. But over a 40-year career, I have watched our communities build codes and standards that ultimately we are building the Roman empire. Streets got wider, gutters got put in, we spent a lot of money having to then create pipes to send the water away, then 10 years later, we worried about uh-oh, too much quantity, and we got to knock it down.

We started to do that site by site. This is a wonderful period of time for me. We are coming full circle to many of the principles I had 40 years ago with the water quality aspect of things. But I would also submit that incrementally, I think the costs right now are often too high when we treat them item by item, site by site. If you take a regional detention facility that was built 20 years ago solely for the purpose of detention, of volume, and now go back and spend some money wisely in the development process to go back and retrofit that facility for the greater good of quality rather than go back incrementally site by site, those dollars can be far more cost effective than site by site. Also, the maintenance of that one larger facility can be far less than incrementally.

So while not giving you empirical numbers, this is what we are seeing evolving, but we need to be very careful that there is, as chairperson said, there is no one answer to all solutions. But I am very excited at the balance between looking at initial cost and saving our communities money.

And when the developer walks away from the site and sold his site, he necessary doesn't have to maintain that for the next 20, 30 years, it is the community that does. And I will say we are developing a lot more sensitivity within our industry, the maintenance, than the actual up front construction. I hope I have come close to the question without numbers.

Mr. BOOZMAN. Thank you, Madam Chair.

Ms. EDWARDS. Thank you. Mr. Johnson.

Mr. JOHNSON OF GEORGIA. Thank you Madam Chair.

Anyone familiar with the National Urban Runoff Program that would talk about specific methods and design tools for stormwater runoff that was formulated in the 1970's, as I understand it? Is anyone familiar with that program? Well, tell me something, is there anyone who thinks that the Federal Government should have the foresight to fund studies that could recommend, or at least highlight specific methods, design tools and even software to deal with the issue of stormwater runoff, suggested methods those kinds of things? Is that something that should be a Federal pursuit or should it be left more to local authorities to impose standards?

And I guess that question is somewhat, does the Federal Government have a role here is what I am trying to ask? And if everyone could respond if you desire that is fine. Starting with Mr. Ortiz.

Mr. ORTIZ. Thank you for the question, Congressman. And I am not familiar with the program, so I plead a little bit of ignorance. But in general, as we all know, a number of these issues go across State borders and it requires a solution, depending on the region, depending on the waterway or estuary or bay or river, so it has to be site specific, but I think absolutely. These, in a lot of ways, what we have talked about here, are not new technologies that have been dreamt up in the hauls of academia somewhere. They are actually fixing problems that we have created over the last 40 to 60 years in trying to restore natural processes. We are actually going back and trying to mimic the natural processes that worked very well for many millennia before we paved over too much of our lands.

So I do think that there is a role for the Federal Government. I believe it should be regionalized and contextualized as appropriate, and I do think it is much more of a restoration than really doing something entirely new.

Mr. JOHNSON OF GEORGIA. All right thank you. And I would remind you I have got a short period of time left for responses so if you could condense them, that would be great.

Yes, sir.

Mr. YOCCA. Thank you, Congressman. I would say that there are certainly things that the Federal Government can do to continue to assist in the exploration and promotion of green infrastructure practices to the benefit of local communities.

One of the things that has been, one of the obstacles I think, some of the panelists have already shared in terms of the implementation of the sustainable strategies is having the performance statistics to back up how to implement these systems in the most efficient way. A lot of times, some of the costs that are incurred are because of redundancy, and the only way to eliminate that redundancy is to have confidence in the performance within a particular area or geographic location of the perform of these green infrastructure standards.

That is why a lot of the work that we do and others are on demonstration projects that are set up to monitor that performance and then to fine-tune and adjust and inform the models and other tools that are used to design and implement and ensure that the systems are proper.

And just one other quick point along those lines. The American Society of Landscape Architects, along with other partners, includ-

ing EPA, has developed a tool called the Sustainable Sites Initiative, which is geared toward this very thing. It is to identify one of those ecosystem services that green infrastructure can provide and to encourage monitoring and measurement in reporting back in different geographic locations on the performance of those tools. Thank you.

Mr. RICHARDS. Yes, sir, thank you for the question.

I will say that NAFSMA has recommended on the record several times in our discussions a NIRP II program which would be kind of a second look at urban runoff. We believe science is so important to this decision for new regulations that we know EPA is pursuing over the next couple of years and so we believe there should be some type of scientific forum to look at this and a NIRP II-type program would be appropriate for that, and Federal funding to support that would be good.

Mr. BONCKE. Thank you. We will be very brief. Actually, from the National Home Builders perspective, we believe the Federal Government should encourage, to the best extent possible, incentivize, but not mandate or regulate these issues.

We do believe that through that encouragement and incentive, we should leave it to regional and local to develop their own standards. New York State has very successfully, with the engineering, building and many other communities and stakeholders, developed an excellent best management practices manual as a working document. But we believe it should be regional and local, and that is also importantly not a political view or statement. It is really an engineering view, geology, hydrology, all of the factors that go into these issues are very, very localized and regionalized throughout the country. Thank you.

Mr. BECHER. I agree. I think local control, regional control is always good. However, I do think there is a place for the Federal Government, much like the Energy Star program and others, as long as the Federal Government sets, I think, a very straightforward sort of framework and program for it, I think it could be, actually, quite successful.

Mr. NEUKRUG. I am unfortunately old enough to remember NIRP, and I remember the engineers running out trying to capture that first cup of rainfall to be able to bring it back to the labs and analyze it. It became the basis of everything we really know today about pollution in stormwater. And without that NIRP program, we in the United States and throughout the world would be at a loss of quite a bit of data. So it was very valuable then.

Is there still a role for the Federal Government? Yes there certainly is. And I think I have heard the words already, incentivize, leverage, support, but both private investment, public investment, research along the lines of what EPA does in Edison, New Jersey and elsewhere and support through programs like the two Acts that have been discussed today where both of them provide funding to encourage folks back home to figure out how green infrastructure can be made to work appropriately.

Mr. JOHNSON OF GEORGIA. Thank you for that response or for those responses. And it just seems to me that with runoff from creeks, streams into rivers which flow through and between States which capture that runoff, it seems that certainly, and some of

those rivers may even are navigable, and I think they are, many navigable waters, I think that certainly the Federal Government has a role to play in making sure that our rivers contain as few contaminants as is possible. And we can certainly get to that through standards and incentives that States and local governments can follow. So I think we simply have to start paying attention to smart growth and ways in which we can exist with growth along with protecting our environment. So I thank you. Thank you, Madam Chair.

Ms. EDWARDS. Thank you, Mr. Johnson. I just have a couple of additional questions. A real follow-up for Mr. Neukrug. We focus a lot here on cost effectiveness, on whether investing in or what is the balance of gray infrastructure versus green infrastructure some combination of both, and as you know, Mr. Neukrug, many cities are considering low impact development and green infrastructure approaches and technology, and those cities are also under consent decrees, I believe Philadelphia has been under a consent decree around its discharges. And so the advantage of pure gray infrastructure approach is that we know, with a high degree of certainty, that the installation of pipe Y is doing to result in the decrease of X number of gallons and so it is certain, you know what you have to do, and you know what the result is going to be.

I think green infrastructure, on the other hand, we are learning a lot about, and it doesn't give us the same degree of certainty. But I wonder, if you could discuss when Philadelphia decided, when Philadelphia had a choice about how it was going to comply, find itself into compliance under the consent decree and could have chosen purely a gray infrastructure approach or a green infrastructure approach and made some decisions there, can you tell me how those decisions came to be and what the relative consideration was with respect to cost and then how you demonstrate then to the enforcement authorities that you are meeting your compliance requirements?

Mr. NEUKRUG. Thank you for that question.

I think Mr. Boncke addressed a bit of this earlier on when he talked about the way we have designed our cities for the past 200 years and how it made sense to take water and move it away from the houses and the businesses and move it into our rivers and streams, and then through sewers into our rivers and streams. And as we went along, it still made sense to harden our land.

Today, it doesn't make any more sense. We have this incredible infrastructure that is in place in Philadelphia and throughout the country dealing with stormwater, dealing with waste and then sewage. And the question is, what is the next step? Is this the approach that we are going to take for the next 200 years? And we are at this turning point now where either we take this system that was placed in here and hardened our cities from the environment and do we continue that, and is that our approach for the next 200 years by building on to those systems? Or do we now take this more soft approach, use the basis of what is there, and manage our water in a different way that also creates other benefits for our cities?

So that is kind of where we are looking at, in terms of the amount of money we are spending, it is Congress and EPA who

have decided that the priority for our cities in environmental legislation is water. And there is a desire for all of us to move down this road to reduce as much as possible the amount of overflows going into our rivers and streams. And the question becomes what is the best way to spend that money?

And every time that we build a new tank or a tunnel in the city of Philadelphia, we are helping that one cause. But we are doing nothing about climate change, we are not bringing more people into Philadelphia, we are not making the quality of life for Philadelphians better, we are not improving or protecting public health from issues other than someone swimming in the water.

So if you look at the green infrastructure approach, what we found is that for the same dollar, we can achieve that same first goal of water protection and add to that this other layer of sustainable cities.

And the last thing I want to say is that as a water utility in a city that doesn't have a lot of money, when we look at the amount of money, we are talking about spending which is $2 billion and we looked at we need to recover that from our ratepayers, and we looked down the road and see what is Philadelphia going to look like in 10 years, in 20 years in 50 years, it is very critical for the water utility and for the ratepayers every dollar we spend to spend it in a way that promotes the growth and sustainability of our city.

So to sustain our utility, we are sustaining the city of Philadelphia and managing the water issues. The cost benefits of any one piece is judgmental and is up for discussion. But the triple bottom line analysis is very clear, just about all of this, that green infrastructure really is the approach. I won't speak for every city in the country, but certainly for the city of Philadelphia and other mayors and other water utility managers, I am speaking to, it is also very clear that this is the way to move. And the next question for all of us is just how do we help this along? And how do we not miss this opportunity that we have in front of us?

Ms. EDWARDS. And so just to follow up, again, in your view, it was the ability to consider green infrastructure as part of the approach that you were taking, but you are not aware of any mandate for green infrastructure, is that correct?

Mr. NEUKRUG. I have been very curious hearing that today because I am feeling just the opposite. I feel like the mandate is for gray infrastructure. The easiest thing for a city to do, for a utility to do, for EPA to approve, is a tunnel, a tank or other concrete system to deal with the issues at hand.

The complicated part that takes leadership from a mayor, like Mayor Nutter, is to accept this new approach that takes more work and more energy by the city governments to allow for this green infrastructure to happen. What we are looking for is for some understanding, and I don't know how you we are going to get there, whether it is the Clean Water Act or some other entity to eventually allow all of us to be thinking once again more holistically about what our real goals are here for environmentally for our cities and for our country.

Ms. EDWARDS. Am I correct in recalling that at in fact, at least in the instance of Philadelphia, the EPA would have been much

more quick actually to approve the pipe as opposed to some of the green infrastructure techniques——

Mr. NEUKRUG. I don't want to put words in EPA's mouth, but it is hard for EPA to approve a green infrastructure program today because there are metrics that are needed. There are some uncertainties out there. And all parties, the cities, the Congress, the EPA, all need to take some level of risk as we move to this new way of looking at infrastructure in our urban centers, so going from this very hard approach to this very soft approach.

Ms. EDWARDS. And it does speak to Mr. Richards' concern there that we make sure that we do the science the right way as well so that we can strike the appropriate balance.

With that, I would like to thank all of our witnesses today. I look forward to continuing this discussion in this Committee making sure that we come up with a framework that allows our cities, municipalities, the tools and flexibility that they need to incorporate green infrastructure techniques and the array of ways in which we need to protect our stormwater and our clean water. Thank you very much for your testimony today. And with that, we are adjourned.

[Whereupon, at 11:50 a.m., the Subcommittee was adjourned]

SENIOR DEMOCRATIC WHIP

COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE
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STATEMENT OF
CHAIRWOMAN EDDIE BERNICE JOHNSON
SUBCOMMITTEE ON WATER RESOURCES & ENVIRONMENT
HEARING – IMPACT OF GREEN INFRASTRUCTURE AND LOW IMPACT DEVELOPMENT ON THE NATION'S WATER QUALITY, ECONOMY, AND COMMUNITIES
SEPTEMBER 30, 2010, 10AM
2167 RAYBURN HOUSE OFFICE BUILDING

This Subcommittee began and is ending the 111th Congress by holding hearings on very similar topics.

In February of 2009, I presided over a hearing on Sustainable Water Infrastructure.

Today's hearing focuses on the impact of green infrastructure on the nation's water quality, economy, and communities.

As today's hearing will demonstrate, there are still many things we need to learn about green infrastructure and low impact development. But in the intervening year and a half, we have also come to learn of the advantages of this innovative approach.

For example, nationally, 30 percent of clean water and 29 percent of drinking water funds provided through the Recovery Act were used for green infrastructure, and water and energy efficiency improvements.

Six states used approximately half of their clean water infrastructure money on green projects. These numbers indicate that there is a growing demand for programmatic and financial support for green infrastructure projects, especially related to clean water and drinking water infrastructure.

Green infrastructure approaches take a very different view to stormwater control. Instead of engineering the stormwater system to deal with increasingly large amounts of stormwater, these low impact development approaches utilize technologies that aim to reduce the amount of stormwater that even enters the system.

This is achieved through processes that encourage stormwater to infiltrate the ground or evaporate. Simple approaches such as green roofs, increased tree cover, disconnecting downspouts, and adding more green space can go a long way to reducing the amount of stormwater that enters sewers.

And in some circumstances, these technologies can realize significant cost savings for municipalities and building owners.

In this time of economic uncertainty and tight municipal budgets, it may behoove city planners to look in other directions for ways to deal with the impacts of urban stormwater runoff than by solely falling back on traditional, capital-intensive infrastructure approaches.

The fact remains, however, that many of these technologies are new and have not been applied in all conditions and cities.

I hope to hear testimony today that will answer a few key questions:

First, what barriers exist with regard to the increased adoption of green infrastructure technologies and approaches?

Second, what can the federal government – both EPA and the Congress – do to reduce those barriers?

And third, what processes do EPA and the states use, and should EPA and the states use, to balance the need to promote new technologies, while at the same time protecting water quality?

Finally, I'd like to note that as we think about our water infrastructure options and our water quality goals – we can do better. We can do better than to discuss policies and approaches as 'either this' or 'that.'

We need to look beyond the disturbing vision of just an impassive concrete landscape, or the pastoral vision of an Eden-like urban utopia. Instead, we must think of the various tools that we have – and those which we might have – to bring to bear site-specific water quality problems. Increasing both options and information are two of the most vital tools we can provide for our state and municipal managers.

Therefore, I look forward to looking beyond where we are today, so that we might do better.

Statement of Rep. Harry Mitchell
House Transportation and Infrastructure Committee
Subcommittee on Water Resources and Environment
9/30/10

--Thank you Madame Chairwoman.

--Green infrastructure offers the potential to reduce the heat island effect in urban areas and save on energy costs.

--As you can imagine, this is of particular interest in my district where today's high temperature is once again well over 100 degrees.

--The City of Tempe drew heavily upon green infrastructure concepts when designing its new transportation center. The multi-modal facility that includes a light rail station, a bus station and a full-service bicycle commuter facility was specifically constructed to reduce energy demands by including a green vegetated desert roof as well as a window system that allows maximum use of natural light.

--I look forward to hearing from today's witnesses.

--At this time, I yield back.

TESTIMONY OF BRUCE BONCKE ON BEHALF OF THE
NATIONAL ASSOCIATION OF HOME BUILDERS

IMPACT OF GREEN INFRASTRUCTURE AND LOW IMPACT DEVELOPMENT ON THE NATION'S WATER QUALITY, ECONOMY AND COMMUNITIES

HEARING BEFORE THE HOUSE TRANSPORTATION &
INFRASTRUCTURE SUBCOMMITTEE ON
WATER RESOURCES AND ENVIRONMENT

SEPTEMBER 30, 2010

Chairman Johnson, Ranking Member Boozman, and members of the Subcommittee, thank you for the opportunity to testify on behalf of the National Association of Home Builders (NAHB), a Washington, D.C.-based trade association representing 175,000 members. I am currently the chief executive officer of BME Associates located in Rochester, New York. BME Associates (BME) provides site engineering, land planning, surveying, environmental services and construction services. We also develop functional design solutions for land planning and site development projects within the residential, commercial, institutional, office, recreational, municipal and mixed use industries. BME has earned a reputation for well-designed projects that balance environmental sustainability and what the developer wants to create.

My experiences with land development projects span nearly forty years. I was part of the team that originally developed the training program for the Monroe County, New York, Planning Council and have served on its faculty for over 20 years. I have trained program faculty for the New York Planning Federation, the Associations of Towns, the New York State Bar Association and the Rochester, State and National Home Builders Associations University of Housing. I am also the past President and Director of the New York Planning Federal and a past President of the Rochester Section of the American Society of Civil Engineers. I served as a member of the Lieutenant Governor's appointed New York State Quality Communities Task Force Advisory Committee. In 2004, as chair of the New York State Home Builders Association's Environmental Committee, I worked with the New York State Department of Environmental Conservation (NYDEC) to set up a Stormwater Working Group (Group) of stakeholders. The Group helped the NYDEC craft the Phase 1 Permit regulations and the components of that permit.

Building on my career experiences, I have also been very involved with NAHB. I currently serve on NAHB's Environmental Issues Committee and am a past member of the Land Development Committee. I represented NAHB on the American National Standards Institute (ANSI) Consensus Committee that developed the National Green

Building Standard (NGBS) for the home building industry. In 2008, I was NAHB's Green Developer Advocate of the Year.

As I stated above, I have been working with land development projects for many years. I have been in a position to see the transition from developers and home buyers wanting big developments on big tracts of land to communities focused on small lots and efficient use of the resources surrounding the development. In my testimony I will highlight the changes in land development over the years and where I think the process needs attention and possible course corrections.

THE GREEN BUILDING MOVEMENT

Home builders' experiences and support for voluntary energy efficiency and green predates many of the available green ratings systems today. Long before "green building" and "Low Impact Development" were part of the construction industry lexicon, BME and NAHB members alike were actively engaged in sustainable development as part of an organic process that has significantly reshaped residential construction.

In tracking the national trends, in the early 1990's, builders began focusing on sustainable residential construction that incorporates a flexible framework to accommodate geography, resources, and energy efficiency. As the movement grew, NAHB members became more engaged; and in 1998, NAHB established a special subcommittee at the national level to work specifically on green building issues. By 2004, the industry, including over sixty stakeholders, was developing a set of national guidelines to direct builders on how to incorporate ever-increasing sustainability benchmarks for compliance with green criteria. This became known as the National Green Home Building Guidelines. However, as the need to develop a more reliable verification methodology became apparent, the members of NAHB agreed to work collaboratively with the International Code Council (ICC) to undergo a rigorous standards-developing process that would ultimately produce the first standard submitted to ANSI for green residential construction and remodeling in the United States – the National Green Building Standard™ (NGBS).

The development of the NGBS is the most recent, and most robust, effort undertaken by the industry to set compliance markers for green building in the various aspects that comprise residential construction – single family, multifamily, remodeling, and land development. The process began in early 2007 when a group of 42 stakeholders, including myself as a representative of NAHB, convened in Washington, D.C. The group represented federal (U.S. EPA, DOE), state, and local governments, building code officials, design professionals, building supplier manufacturers, sustainable building interest groups (including the U.S. Green Building Council), utilities, builders, and energy efficiency consultants.

The stakeholders worked together for over a year to develop rigorous, environmentally-sound, and defensible criteria for green residential construction incorporating the seven primary principles of sustainability: energy efficiency, water efficiency, resource efficiency, lot and site development, indoor environmental quality, global impact, and home owner education. The standard was published and approved in January 2009 after a full year review by the ANSI. To date the NGBS is the only residential green standard to carry the ANSI approval and is thus compliant with the Federal government's National Technology Transfer and Advancement (NTTA) Act of 1996 (PL 104-113), requiring federal agencies to recognize and incorporate existing public consensus standards whenever possible. In addition to its approval by ANSI, the credibility of the NGBS can be attributed in large part to the diversity of the groups involved in its creation including: the Department of Energy (DOE); the Environmental Protection Agency; the U.S. Navy; Building Code Officials, the U.S. Green Building Council (creators of the LEED program), Sustainable Building Industry Council and the Green Building Institute (creators of the Green Globes program, which just received ANSI approval for green commercial construction). The criteria developed through this process were included as an appendix to the NAHB Green Building Guidelines, which has been used by home builders and developers for many years.

I believe the most significant achievement of my involvement was to get the land development criteria into the body of the NGBS, in two chapters; one for overall site design and one for individual lot design and construction. These chapters cover such

issues as: site selection, project team, site design, resource conservation, solar orientation, slope disturbance, stormwater, density, mixed uses, construction activity and innovative practices. In sum, I was able to use my experiences and things I have learned through my career to help craft a set of standards that is useful, realistic and based on the general concept of continually building on our understanding of land use.

NAHB, and those of us involved with the development of the NGBS, understood the importance of providing a viable, rigorous, and consensus-based alternative to the plethora of privately developed green rating systems flooding the market, and NAHB believes the federal government similarly understands the importance of this concept. Therefore, we point to the NGBS as a very sound basis for building and development standards.

GREEN DEVELOPMENT IN PRACTICE

Although NAHB, its members, and BME, are invested in the approach taken in the development and outcome of the NGBS, each state and region has their own approach to sustainable development. As such, I will highlight some successful efforts to bring together all the stakeholders in a community – the builder/developer, the elected official and the citizens. I will also outline some of the problems that can arise when builders try to incorporate certain green building techniques, especially Low Impact Development (LID).

Successful Partnerships

First, I would like to highlight the progress that BME has made in the Rochester, New York, and in Monroe County generally. For over 20 years, staff from BME has provided training in land use, site planning, stormwater management, and sustainable design practices to municipal officials throughout New York State. This includes training programs for planning and zoning board members, code enforcement officers and municipal planners.

The training programs focus on providing real life examples to the principles of planning and design that they must apply to fulfill their duties. BME's goal is for the trainees to receive a base understanding of the constantly evolving regulatory

environment and the latest information regarding sustainable planning practices. BME believes an educated municipal board is critical to successful planning and land use development.

For site planning and sustainable design, we structure our training to show municipal board members how sustainable practices such as conservation subdivision design or "coving/clustering" can protect natural features of a property, result in less infrastructure for municipal maintenance, and yield development densities that make economic sense. What usually results are communities that have higher property values than typical conventional subdivision design. Additionally, application of these principles results in a smaller development footprint and reduced impacts from stormwater runoff and impervious areas. The key of the training is to demonstrate that by modifying the typically outdated municipal codes and standards, and applying sustainable design principles, the community will be better equipped to move into the future. We have found that the municipal officials that participate in these training programs come away energized to implement these planning principles and look to modify their local codes to adopt the appropriate ordinances.

Often local zoning ordinances lag behind new and innovative planning principles. Sustainable design requires a change in the approach to land development, and the local government's involvement is imperative in managing this change. Thus if these officials do not totally understand the ins and outs of site planning and design, it becomes more difficult, more time consuming and more expensive, and thus less enticing to implement these creative design practices.

For example, over the past the decade, there have been significant changes to the regulation of stormwater runoff from construction activities from land development. These regulations began at the federal level and have been passed down from the states to the local municipal level. The result is local officials being charged with implementing a federal regulation program; a program that requires them to have a base knowledge of stormwater runoff principles in order for them to understand the regulations they need to enforce.

BME has provided training for local municipal officials in basic stormwater runoff to provide them an understanding of basic terms and principles, and how these apply to land development projects. The training is structured so the officials learn what to look for on plans and in reports, including the basics of how to read grading plans and define drainage patterns. Once they have a basic understanding of stormwater runoff issues, we then provide training on the stormwater regulations. We have increased the scope of this training as the regulations have been constantly updated to encompass more areas of stormwater management. We educate the municipalities on the current regulations, the responsibilities of the municipality in enforcing the regulations, and the responsibility of the developer and land owner in implementing their stormwater management plan.

Those of us at BME believe it is important for the local government officials to receive this training because we have found that successful compliance with the regulations is the mutual responsibility of both the local government and the land owner. We have worked closely with state and county stormwater officials to develop our training program to ensure we are presenting the most current philosophies of stormwater management regulation. We also provide feedback to the county and state officials on what we are seeing at the local level from both a municipal regulatory standpoint and from a construction implementation view. Through this process we identify those portions of the regulations that are a challenge to apply, and in turn begin to work towards actual solutions to the challenges.

For example, recent training sessions have demonstrated that portions of the new regulations, specifically those dealing with green infrastructure design, are not compatible with local codes. As a result, the municipalities realize they have a responsibility to update their local codes so that design initiatives contained in the new regulations can be actually be implemented in developments within their communities. Ultimately, we find it is much easier to move forward with a project when there is education on the front end before any disagreements arise. BME's experiences have taught us that once the contentious situation arises, there is no chance to educate and possibly come to a concurrence. For this reason, BME places a tremendous amount of

importance on these training sessions. In fact, I am just arriving from teaching a program on behalf of the New York Planning Federation.

Another state that tried to use a collaborative process in regard to regulations is Maryland. Although the state's activities are outside my expertise, I wanted to highlight this state to reinforce the need for regulators to work with communities when establishing limits on development. As you may know, over the past decade, Maryland has been focused on new and stricter building standards. In turn, home builders in the state have taken proactive steps to be part of the solution to restore and maintain the Chesapeake Bay. In 2002, the Alliance for the Chesapeake Bay, the Center for Watershed Protection, and the National Association of Home Builders launched "Builders for the Bay", a new partnership encouraging the use of Bay-friendly site design principles that reduce the environmental effects of residential and commercial development. Because many local codes and ordinances are out of date and/or do not incorporate the lessons learned over the last 25 years, the heart of this program was working with local governments and developers to assess the current codes and ordinances and provide a platform for change so that the "new" environmentally sensitive design principles and practices could be used.

Through this process, the Builders for the Bay program was ultimately able to identify and remove impediments, such as mandates for wider streets and sidewalks on both sides of the road, and facilitate the use of practices and principles that reduce environmental stresses on the watershed. Since 2002, the Builders for the Bay program is responsible for getting these principles adopted in six municipal or county jurisdictions in the Chesapeake Bay watershed. Unfortunately, funding challenges have put a hold on any further activity, but the program clearly succeeded in creating a lasting effect on how developments are regulated at the local level in certain areas of the watershed.

Challenges with Green Building Techniques

Although the home building industry, specifically BME and NAHB's other members, is invested in the NGBS and green building generally, problems often arise with green development and LID. I will outline three specific challenges:

1. Data Collection

Stormwater management technologies continue to evolve and grow. Often there is an effort to contain all of the stormwater runoff on a construction site because in theory, fewer pollutants will leave the site; however, there is little data available regarding the effectiveness of most LID devices that contain stormwater in such a way. Most builders and developers want scientifically-based information as to the effectiveness of various LID devices. We believe the more information builders and developers have, the more likely they will incorporate green building techniques into their projects. Because of the performance differences associated with various soil types, topography, rainfall, etc., it is extremely difficult to find specific techniques that will work universally across the country. NAHB members have expressed concern that LID is not always less expensive than traditional stormwater controls, especially not for small building projects.

2. Impact of Site Location

LID does not work on every site. To successfully implement LID, a property needs the right kinds of natural features, such as soils and topography, and must have enough land area to accommodate the various LID devices. Each development site is examined to integrate site planning with techniques that conserve the existing natural systems and hydrological functions of the site. Common LID controls include bioretention devices such as rain gardens, permeable pavers, green roofs, rain catchment devices such as barrels or underground chambers, "reverse slope sidewalks" which drain away from the road into vegetated areas, and many other techniques. Because the effectiveness of these methods depends on the soils, hydrology, and slope of the site, properties that have impermeable soils, high water tables, or steep slopes are not good candidates for LID.

For example, the experiences of my colleagues in Maryland offer a cautionary tale for the one-size-fits-all approach to regulating land

development. LID is a tenet underlying Maryland's regulations to lessen the impact of construction and new infrastructure on the Chesapeake Bay. LID is incorporated into stormwater management. These controls that can prove to be beneficial in other parts of the country are proving difficult in for NAHB members working in Maryland because they have found that LID does not work on every site. The right kinds of soils, and in many cases, low density development are needed for successful LID. The home building industry in Maryland has not had an opportunity to provide input on their experiences with LID and yet there are efforts to move forward with certain aspects of LID at the state level, especially in regards to improving the water quality in the Chesapeake Bay. Builders and developers in the Chesapeake Bay region are cognizant of the problems with the Bay, but by not heeding the cautions from the builders actually developing land in the region, Maryland may be on track to promulgate regulations that are unobtainable.

3. Urban Challenges

   Increasingly, LID is the preferred means of managing stormwater runoff from new and redevelopment projects. Local, state, and federal regulations are encouraging or requiring LID approaches, but the requirements vary considerably across the nation. In many of those regulations, redevelopment projects are required to reduce the amount of imperviousness by as much as 50%. The concern is that there are so many limitations associated with urban infill and redevelopment (i.e., existing land use, limited land area, potential to damage nearby building footings and/or underground infrastructure or flooding to nearby basements or other structures), many of these regulations will discourage redevelopment in urban areas. Additionally, the requirements could raise the costs substantially, making LID difficult, if not impossible, to implement.

As demonstrated with the successful efforts in Monroe County, partnerships and education are very useful in implementing sustainable development. The ability of green infrastructure and LID to effectively reduce stormwater flows and pollutant

loadings is dependent on a number of physical and regulatory factors including site conditions, adjacent land use, amount of space available for best management practices, zoning and subdivision requirements, and public acceptance. These factors will differ greatly from region to region and is one of the main reasons for highlighting two particular parts of the country in my testimony. Regulations need to reflect the capabilities of an individual region – whether it is soil, population density needs or general demand for types of housing. I point to the problems in Maryland, and other parts of the country struggling with LID techniques, as support for collaborative efforts that address all stakeholders and consider the feasibility of regulations that are most effective to make the progress needed to implement sustainable development.

Conclusion

To conclude, the home building industry is a steward of the environment and most of NAHB's members, BME in particular, have been implementing "green building" techniques for many years – before the techniques were even classified as sustainable development. Now, when BME, and similar companies throughout the country, sit down with potential clients, there is an effort to instill in our clients the mindset that the developer will be using more land for storm water controls compared with five years ago. However, I am also able to demonstrate to them through our knowledge of sustainable development, it probably won't be an additional cost to protect the environment and they may actually recoup some of their cost by being environmentally focused.

In moving forward, I urge Congress to support regulations, especially in the area of green building, that are flexible enough to allow for adjustments based on a region's unique characteristics (physical properties of the land, housing needs of the population, etc), and to avoid the pitfalls with attempting to implement a style of development that is not possible in a particular region. I encourage municipalities to learn from the collaborative approach used in Monroe County, New York, where BME Associates has the opportunity to share its expertise and demonstrate what it has learned over the years to new planners coming into the community. I point out that accurate data needs

to be collected on the effectiveness of LID, different characteristics of a region will impact the effectiveness of some green development techniques, and urban areas have difficulty implementing LID in urban areas. In turn, I encourage Congress to use entities like BME for the wealth of information they have gleaned over the years from continually striving to improve their development techniques to better situate a development in its planned location. I also urge Congress to provide for stakeholder input, specifically the building and development industry, when proposing legislation that will have an impact on the industry.

All in all, one of the most satisfying things I have seen in Monroe County is that although communities may struggle with updating their regulations to better implement some of the green initiatives, I see the silver lining to the problem: forcing communities and the home building industry to work together to move a community into the future. This collaborative approach can only serve the industry – and the environment – as we all continue to work towards sustainable developments.

September 30, 2010
U.S. House of Representatives
Transportation and Infrastructure
Subcommittee on Water Resources and Environment

The Benefits of Green Infrastructure and Low Impact Development on the Nation's Water Quality, Economy and Communities

Good morning, Chairwoman Johnson, Ranking Member Boozman, and members of the committee. My name is Howard Neukrug and I am Deputy Commissioner in charge of Environmental Services and Planning for the City of Philadelphia Water Department (PWD). I am honored to be here today to testify on behalf of my water utility, the City of Philadelphia and the National Association of Clean Water Agencies (NACWA), which represents the interests of municipal wastewater treatment agencies throughout the nation.

We are collectively at a time of great urgency in managing our water resources. The confluence of threats to our water supplies and the opportunities created by mandated investments means that we must invest wisely, starting now. Among leading water practitioners and researchers, the understanding of what constitutes wise investment now fully embraces green infrastructure, an approach that I look forward to sharing with you today.

Currently, however, the regulations promulgated to implement the Clean Water Act (CWA) do not recognize the essential linkage between land use, land management and water quality. The National Combined Sewer Overflow Policy (National CSO Policy) was developed at a time when little was known about the benefits of green infrastructure. Now that its benefits – to clean water, urban economies and public health – are clear, and compellingly superior to fully grey approaches, the National CSO Policy must be revised to require municipal adoption of stormwater regulations and to encourage use of green infrastructure for water management. Alternatively, Congress can amend the CWA to legislate for those modifications. Those changes could be a hallmark of a major shift in investment toward sustainable cites and an economical, holistic approach to meeting our responsibilities.

PWD attaches immense importance to its role as steward of our rivers, streams and watersheds. We seek to be a leader in sustainable water resource management and go beyond the *fishable/swimmable* goals of the Clean Water Act to additionally include, *"accessible and beautiful"* rivers and streams. Philadelphia is currently seeking state and federal regulatory approval for perhaps the nation's most ambitious green infrastructure-based approach to meeting clean water mandates. We call our program ***Green City, Clean Waters***[1]. Through implementing this $2 billion, 25 year plan, we seek to achieve a host of environmental, social and economic benefits, while also meeting our responsibilities toward clean water. Our plan is to manage one third of the city's impervious cover draining to our combined sewers with greened infrastructure and restore nearly 20 miles of urban stream corridor.

No, we have not taken a traditional approach to controlling combined sewer overflow – we have developed this innovative route that has required considerable watershed

[1] The City of Philadelphia's Long Term Control Plan Update – *Green City, Clean Waters*: www.phillywatersheds.org/ltcpu

analysis and planning, triple bottom line analysis, balancing full cost of service accounting with what our citizens can afford, creation of new regulations and interagency coordination – essentially demonstrating a whole new way of doing business in Philadelphia. The City is committed to this program and the Water Department is working with other city agencies, NGOs and the business communities to ensure the program's success.

A large part of this new way of doing business has been to pilot approaches that work for our diverse communities – many of which are low income and minority. We are constantly working on finding ways of integrating capital projects on our roadways, in our schools and our recreation centers. We are using education and dialogue that work within existing patterns of life and that encourage our citizens to become long term stewards and to enjoy the benefits of their participation. It is our goal that those benefits include meaningful and sustaining jobs and a higher quality of life for all residents.

At the federal level, there are key congressional proposals that align with the work Philadelphia is modeling and that would pave the way for other cities to invest wisely. The Office of Congresswoman Donna Edwards, the National Association of Clean Water Agencies and others have worked together to develop the *Green Infrastructure for Clean Water Act of 2010*. The bill would establish important new federal tools to advance green infrastructure approaches to stormwater management. The bill would also create "Centers of Excellence" for green infrastructure that will provide critical research and information coordination services, and Philadelphia would be honored to be one of the designated centers. Congresswoman Schwartz has introduced the Green Communities Act that would include $120 Million of greatly needed funding for community based greening programs in cities. This program will encourage public-private partnerships by contracting with five nationally recognized non-profit organizations to provide technical assistance to 80 municipalities across the United States, which would then be eligible for additional implementation funding. The City of Philadelphia would relish the opportunity to be one of those communities. Additionally, the work of Congresswoman Schwartz and Congressman Blumenauer's Livable Communities Task Force in developing the Livable Communities Acts of 2009 and 2010 could help pave the way to incorporate green stormwater infrastructure into transportation, housing, and economic development projects. These integrated capital investments will encourage growth of existing communities and promote inter-agency partnerships for the sustainability of our environmental and economic resources. NACWA, its partners and I thank Congresspeople Edwards, Schwartz and Blumenauer for their leadership.

I would be thrilled to host you at any time to see the green infrastructure projects and partnerships we are cultivating in Philadelphia, so that you can see how public and private investments in green infrastructure are key to our city's regeneration. A wonderful time to come to Philadelphia would be December 6th thru 8th for the *Urban Water Sustainability Leadership Conference*. The conference, organized by the Urban

Water Sustainability Council of the Clean Water America Alliance, will showcase U.S. cities that are embracing green infrastructure strategies to enhance environmental stewardship, economic development, and overall quality of life.

Indeed, just last week I spent 3 days with the mayors of Chicopee, MA, Camden, NJ, York, Pa, Torrington CT, Edison NJ, Brockton MA, Lancaster PA and Newport RI. The event was called the Mayor's Institute of City Design and it was funded by the National Endowment of the Arts, The American Architectural Foundation and the US Conference of Mayors. Each mayor was dealing with issues of water - waterfronts, storm drainage systems, CSOs, infrastructure - and trying to understand the relation between the array of solutions to their water issues and the growth and sustainability of their city.

This is our opportunity. We are so close to realizing a new, green ethic for our cities. Getting the water dialogue - in all its forms - into this process is crucial for the success of our cities and their water supplies.

Finally, as Mayor Nutter said in DC a few short weeks ago to the Johnson Foundation gathering for A *Call to Action to Address U.S. Freshwater Challenges,*

"...we don't have the luxury to ignore this most fundamental issue that will dramatically impact our nation's future."

A TIME OF GREAT OPPORUNITY AND URGENCY

The fundamental connections between reliable and clean sources of water, economic security and opportunity, and quality of life are clear. We, at all levels of leadership, are stakeholders in ensuring high quality and abundant water supplies. And while our issues may differ in different parts of the country, we all have significant challenges ahead. We need to encourage new approaches to solving some old problems - - such as sewer overflows, our nations aging infrastructure systems, frequent droughts and floods -- while also acknowledging the new concerns of climate change and sustainability. We need to re-look at how we value our water and how we pay, as a society, for their restoration and protection. We need to do this even in these times of significant fiscal constraints.

At the same time, we must strive to put the best possible complement of regulations and policies in place – *regulations that allow us to get the utmost benefits for every investment, that ensure access to basic needs such as clean water and that promote a holistic approach to achieving multiple water related goals through strategic and integrated action*. Currently, our federal, state and municipal water regulations are not fully aligned to effect best outcomes. Given the urgency of current threats to clean water and urban sustainability, it is critical that we work together to address this issue.

CONSTRAINTS OF EXISTING REGULATIONS

Every day as I, and my colleagues in other cities, seek to achieve clean water and support 21st century sustainable cities, we are faced with the challenge to make these programs work within a 20th century interpretation of the goals of the Clean Water Act. We now recognize that green infrastructure solutions to water quality problems can achieve so much more, but are inextricably linked to other environmental, ecological and financial realities.

In Philadelphia and other cities, mayors and directors of local water utilities are working on solutions that embrace a more holistic approach to watershed management and stormwater control. This approach has been embraced by State and Federal agencies as well. Yet these approaches, while encouraged by the USEPA, are still hampered by current regulatory practices which apply standards of construction scheduling and water quality goals that still favor hard, grey, single-goal oriented infrastructure as the only solution to their regulatory environmental programs.

These legacy regulatory practices of the National Combined Sewer Overflow Policy represented a compromise among stakeholders that provided what, at the time, was regarded as the most reasonable approach to solving to the nation's combined sewer overflow problems. However, recognition of the benefits to stormwater control afforded by low impact development and redevelopment techniques was not widespread at that time. As a result, the National CSO Policy was formed around the expectations that traditional, or "grey" infrastructure approaches should be the preferred approach to stormwater - and combined sewage - control. Only very recently have any of these regulatory actions recognized or attempted to incorporate the green infrastructure concepts to stormwater at its source.

Additionally, interpretation of the National CSO Policy in regulations has resulted in the expectation that violations of the water quality requirements of the CWA caused by combined sewers must be eliminated in 15-to-20 years. While not explicitly stated in the National CSO Policy, that time frame has become the de facto expectation of the Federal regulatory agencies. Clearly that time frame reflects the national experience of the time needed to plan, design and construct traditional infrastructure projects such as tanks and tunnels. That time frame does not reflect what would be needed to rebuild the stormwater drainage system of the American city using green infrastructure approaches for low impact development and redevelopment. Like it or not, the reality is that implementing a sustainable approach takes a lot of time. It took 150 years of land development and sewer construction to create the conditions that exist today. It will take 30 or 40 years to undo that damage and evolve our cities into fully sustainable green urban centers.

It is evident that much of what I discuss here is understood by and is under debate within the EPA and elsewhere within and among agencies of the Federal Government. We look forward to working with Congress and these agencies to incorporate green

stormwater infrastructure into the water planning process and to evolve new, forward-looking NPDES permits for American cities. We are VERY CLOSE TO OUR GOAL!

URGING CHANGES TO OUR URBAN STORMWATER MANAGEMENT APPROACH

In 2008, the National Research Council (NRC) issued *Urban Stormwater Management in the United States*[2], reviewing the Phase I and Phase II stormwater programs, addressing the challenges municipalities face in managing their stormwater, and recommending options for USEPA to consider. The report cited a number of problems and inefficiencies with the stormwater program that need to be corrected in order to pave the way for any noticeable improvements our nation's waterways.

Federal laws mandating stormwater control for water quality improvements are often incomplete or conflict with state and local programs focused primarily on the flood control aspects of stormwater management. A more effective and holistic approach recommended by NRC for regulating stormwater discharges would include direct controls on land use, limits on the quantity and quality of stormwater runoff into surface waters and rigorous monitoring of adjacent waterbodies. Moreover, NRC recommends that EPA focus on green infrastructure strategies that reduce impervious surfaces and stormwater flow volume.

GREEN CITY, CLEAN WATER: PHILADELPHIA'S PLAN

Since 1997, Philadelphia has been pioneering some of the innovative approaches identified in the NRC report. PWD's Department of Environmental Services and Planning is the department charged with ensuring optimal compliance with the City's federal Clean Water Act (CWA) permit and is defining a watershed based infrastructure program that seeks to meet our responsibilities while making the most of our water investments.

As I noted before, Philadelphia is currently seeking state and federal regulatory approval for perhaps the nation's most ambitious green infrastructure-based approach to meeting clean water mandates. Our plan protects and enhances our region's waterways and overall health by managing stormwater runoff in a way that significantly reduces our reliance on underground infrastructure. We call our program ***Green City, Clean Waters***. Through implementing this $2 billion, 25 year plan, we seek to achieve a host of environmental, social and economic benefits, while also meeting our responsibilities toward clean water. Our plan is to manage the 1st inch of runoff on one

[2] National Research Council. *Urban Stormwater Management in the United States.* The National Academies Press, Washington, D.C., October 2008.
(http://www.epa.gov/npdes/pubs/nrc_stormwaterreport.pdf)

third of the impervious cover within the City's combined sewer drainage area and restore nearly 20 miles of urban stream corridor.

Philadelphia has developed a watershed management-based approach that integrates land uses, waterways, infrastructure, and sustainability practices – for the protection of the city's drinking water supply, the restoration of its green spaces, and the enhancement of its wildlife habitat. Our approach includes a complementary mix of grey and green infrastructure approaches to manage stormwater. The approach promotes use of tree trenches, street/sidewalk planters, bioswales, rain gardens, porous pavement, green roofs, living walls and infiltration beds on both public and private land. As these green stormwater infrastructure practices manage the first inch of rainfall that would normally flow into storm drains, they also enhance the visual, recreational and ecological assets of our community. We firmly believe that money spent on stormwater management and the attainment of CWA goals should also improve natural resources and allow us to realize a new standard of sustainable urban design.

Philadelphia's green stormwater infrastructure approaches include:

- Some of the nation's strongest stormwater regulations that require developers to manage stormwater on-site. This reduces the collective costs for managing stormwater in Philadelphia.
- A "cost of service" stormwater charge which encourages land owners to use their properties in a sustainable manner—using pervious pavement in parking lots, carving out green space on the site, or planting trees, for example—or pay for the privilege of the city collecting their rain water for them.
- Encouraging developers and property owners to use green infrastructure approaches like green roofs to meet their stormwater requirements. This guidance already has made Philadelphia # 2 in the nation's race to construct green roofs, behind our friendly rival Chicago.
- A first-in-the-nation urban in-lieu fee program to help developers identify sites for remediation as a trade-off for water takings or wetland losses due to construction activities. This encourages the re-development of our industrialized riverfront properties by expediting an often arduous process with federal agencies for wetlands protection. In addition, we have developed an evaluative tool to allow mitigation funds to be used to improve urban streams and wetlands in areas of the city often overlooked and underfunded for such activities.
- Best-in-nation regional and statewide partnerships to manage our water resources. We are working together with our up-state and out-of-state partners to limit the impact our individual plans and actions can have on the greater environment.

The innovations in Philadelphia are just a few examples of how municipalities are demonstrating leadership on this critical issue. Other NACWA member agencies across the country have also advanced environmentally sustainable programs aimed at reducing the amount of stormwater entering storm drains and overtaxing our systems. A few examples include:

- Portland, Oregon, has created nearly 500 blocks of green streets, using vegetated curb extensions or street-side planters that collect stormwater runoff from streets, and is a leader in building eco-roofs to absorb stormwater and reduce the heat-island effect;
- In Milwaukee's GreenSeams program, more than 1,600 acres of land have been purchased along area streams and shorelines, including wetlands, that will be preserved and serve to protect water by providing the ability to store rain and melting snow;
- Chicago, St. Louis, Kansas City and others are employing the use of wetlands as storage areas for stormwater that also provide valuable habitat for migrating birds and wildlife.

These examples represent a growing trend among U.S. cities applying innovative green infrastructure approaches to address their water quality and other environmental issues.

GREENEST CITY IN AMERICA: ALIGNMENT OF LOCAL INVESTMENTS AND PRACTICES
PWD's ***Green City, Clean Waters*** plan has been proposed at an opportune time in Philadelphia history. Mayor Michael Nutter of Philadelphia has made it his administration's goal for Philadelphia to become the "Greenest City in America". A remarkable alignment of new policies, practices and regulations has created a fully supportive context. The city is concurrently developing a comprehensive plan, new "sustainable" zoning codes, stormwater regulations and sustainability strategies.

In April 2009, Mayor Nutter announced an innovative strategy aimed at making Philadelphia the greenest city in America. The strategy, called ***Greenworks Philadelphia***[3], was developed in the belief that a big city like Philadelphia, which lost population, jobs and industry in the era of cheap 20th Century energy, can reposition itself as a preferred location in this Century. Meeting federal stormwater standards is among the 15 major sustainability goals identified in Greenworks.

PROPOSED NEW INTERPRETATIONS, INITIATIVES AND LEGISLATION
It is time for the Clean Water Act to acknowledge the linkage between land use and water resource protection and to set cities on a course towards a sustainable future. If we are going to rebuild the drainage systems of America's cities, to harvest rain water, and prevent stormwater from commingling with sanitary sewage in the first place, then the CWA needs to recognize the linkage between the land and its waterways. This will require a change in the way the National CSO Policy is applied.

The efforts of NACWA, Philadelphia and other cities to promote innovative solutions and take a more holistic view of water resource management will result in significantly greater environmental benefits than current approaches allow. Cities across America are committed to spend up to their affordability limits to solve this significant pollution

[3] Greenworks Philadelphia Report: http://www.phila.gov/green/greenworks/2009-greenworks-report.html

issue. The question then becomes how to balance a positive, proactive program to reduce sewage overflows to rivers and streams, while making the most of this opportunity to move our cities and towns forward to be more green and sustainable.

To promote the sustainable, green approach USEPA needs to revise the National CSO Control Policy to require municipalities to adopt stormwater regulations and to encourage the use of green infrastructure solutions to water management. If they don't, it is up to Congress to amend the CWA to legislate this outcome. When the CWA is reauthorized, it should not incorporate the National CSO Policy until it has been changed to allow and encourage the use of green solutions.

We believe that it is incumbent upon USEPA to develop ways to incorporate these ideas into their regulatory and enforcement framework. When cities invest in green infrastructure and other innovative, cost-saving strategies to manage their stormwater, they need to know they're going to get credit for it.

Congress should:

- Recognize that the Clean Water Act does not fully address the needs of 21st century urban waterways. A fundamental shift in how we view and manage the urban landscape is needed.
- Clarify its desire for utilities to implement watershed based, green infrastructure solutions to stormwater management. This will require the acceptance of the innovative nature of these approaches and the ability to apply adaptive management approaches to their implementation.
- Direct the USEPA to reconsider how the CSO Policy is applied to provide flexibility that will allow cities to evolve to green, sustainable urban centers. Strict overflow targets must be balanced against the impacts of other impairments. An integrated solution that uses Triple Bottom Line accounting (to balance ecology, social and financial needs) would favor solutions that address open space, habitat restoration, and other approaches that will achieve the best environmental result for the dollars spent and, ultimately, best meet the CWA.
- Recognize that stormwater control solutions can and should address more than a simple reduction in intermittent pollutant loads, but can be structured to improve the triple bottom line i.e., air quality, aquatic habitat, human health and the urban living environment.
- Support spending for research to measure the effectiveness of non-traditional techniques and to fund implementation effective stormwater control program as called for in the NRC report in cash-strapped communities.

In 2007, NACWA, USEPA, the Natural Resources Defense Council (NRDC), American Rivers, and the Low-Impact Development Center signed a ***Statement of Intent on Green Infrastructure*** , which calls for a collaborative effort among the signatory organizations in order to promote the benefits of using green infrastructure; outlines a number of steps to be taken in this regard such as development of models for all components of

green infrastructure; and explores regulatory incentives for the use of green infrastructure. The ***Statement*** provides an excellent reference for future tools.

The Office of Congresswoman Donna Edwards, the National Association of Clean Water Agencies, American Rivers, the Natural Resources Defense Council have worked together to develop the *Green Infrastructure for Clean Water Act of 2010.* The bill would establish important new federal tools to advance green infrastructure approaches to stormwater management. Specifically, the legislation would establish 3-5 Centers for Excellence to undertake research, serve as information clearinghouses on best management practices, and provide technical assistance to communities interested in implementing green infrastructure techniques. The legislation would also provide small amounts of incentive funding for community demonstration projects, and require EPA to explore how to better integrate green infrastructure approaches into enforcement actions. All members of this subcommittee are encouraged to join this legislation as co-sponsors if you have not already done so.

Additionally, the work of Congresswoman Schwartz and Congressman Blumenauer's Livable Communities Task Force in developing the Livable Communities Acts of 2009 and 2010 could help pave the way to incorporation of green stormwater infrastructure in to capital project planning for a number of agencies. The Livable Communities Acts of 2009 and 2010 seek to provide affordable, energy-efficient, and location-efficient housing choices for people of all ages, incomes, races, and ethnicities; supports, revitalizes, and encourages the growth of existing communities and maximizes the cost effectiveness of existing infrastructure; promotes economic development and economic competitiveness; and preserves the environment and natural resources.

All these initiatives provide encouragement that our approach is the right one, and that the time is right to make green infrastructure approaches to stormwater and CSO control the preferred solution to water quality impairment.

AN INVITATION

In closing, thank you for inviting me here today. I look forward to working with all of you to create a more sustainable America. I hope you can come visit us and see some of the work we are doing throughout city government to make this vision a reality.

NACWA's Clean Water America Alliance (Alliance), of which I am a board member and Chair of the Alliance's Urban Water Sustainability Council, will be holding an important leadership conference in Philadelphia in December. The *Urban Water Sustainability Leadership Conference* will be held December 6th thru 8th at the University of Pennsylvania. It will showcase U.S. cities that are embracing green infrastructure strategies as a way of improving environmental stewardship, economic development, and the overall quality of life for their residents. I hope you will able to join us. If you are not, I will make sure the conference proceedings will be available for your review.

The opportunities and the benefits of green stormwater programs are too great for us to fail to act. Your help to frame policy and enforcement strategies that meet the goals of the CWA while promoting green and sustainable cities is needed. Madam Chair, I look forward to working with you and the other members of Congress to accomplish these important goals.

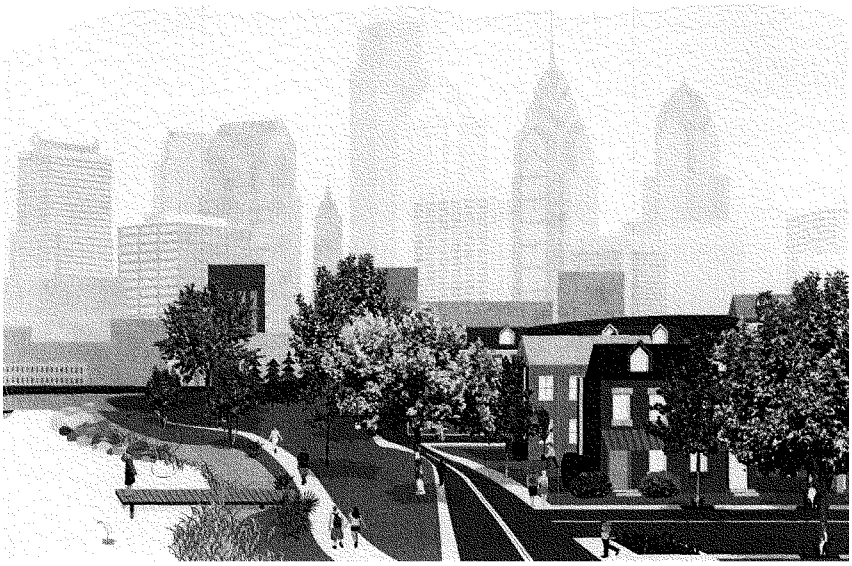
Green City Clean Waters

The City of Philadelphia's Program for Combined Sewer Overflow Control

A Long Term Control Plan Update

Summary Report

Submitted by the Philadelphia Water Department
September 1, 2009



Link for Green City Clean Waters Report
http://www.phillywatersheds.org/ltcpu/LTCPU—Summary—HiRes.pdf

Testimony of
Adam Ortiz, Mayor
Edmonston Maryland

United States House of Representatives
Committee on Transportation and Infrastructure
Subcommittee on Water Resources and Environment

September 30, 2010

Madame Chairwoman and distinguished members of the Subcommittee,

I am Adam Ortiz, Mayor of Edmonston, Maryland. It is a pleasure to be be here today to share the experience of our Town implementing low impact development.

The Town of Edmonston is a small working class town about seven miles from here located on the Anacostia River. We are very diverse, about equal parts white, black and hispanic. I like to say that we are diverse in every way, except we don't have any rich people.

In the last decade, our little town flooded four times. One year, 56 homes were affected. The damages were substantial: furniture, books and even automobiles were lost. In some cases, families lost absolutely everything except the clothes they were wearing.

Although we straddle the Anacostia River, we did not flood from it. We flooded from parking lots. We flooded from highways, roads, shopping centers, roofs. We flooded from millions of raindrops collected from thousands of hard surfaces, then funneled down storm grates and through the underground concrete stormwater system to little' Edmonston.

In time, we were able to secure a $7million dollar flood control facility to keep us dry. We haven't flooded since.

Through this ordeal we learned that environmental neglect comes at a cost -- and that cost is always paid by someone, somewhere, at some time. As we learned this lesson firsthand, we decided to take responsibility for our own impact on the world around us.

As members of this committee, you well know that all streets have an expiration date, a time when they must be resurfaced and or restructured. The date for our main street, Decatur Street, was coming due, and we decided to do it right. We decided to build the most sustainable and responsible street we possibly could.

We also realized that a street is really much more than a place for cars to get somewhere. Streets are public spaces. They belong to the neighborhood, just like a community center or park. Therefore, it should do more than just serve cars, it should serve the community as fully as possible. From top to bottom we attempted to reshape Main Street.

For the top, we planted native large canopy trees. We replaced our streetlights with light emitting diode (LED) fixtures, powered by clean wind energy purchased from the Midwest. At street level, we have narrowed the street to slow traffic, added bike lanes and sidewalks to promote community interaction, health and wellness.

And most importantly, at the bottom we built natural bioretention treeboxes, or raingardens, along the street to naturally filter the water into the ground, mimicking the way it was in the age before strip malls. We had read about this technology being used in Portland, Oregon, and wanted it here. In addition to providing a beautiful landscape feature, these raingardens prevent pollution and flooding downstream, as 90% of the stormwater from the street is diverted from the storm drain into natural filtration.

Our goal is to encourage other communities to also take responsibility for their impact. We want them to steal our ideas. So, we have placed all of our engineering drawings on our website, and are building an interpretive walking tour of the street so others can visit, learn and improve upon our Green Street project. We don't want or need any credit, we just want more environmental responsibility.

In terms of cost, the stormwater improvements added little additional construction cost. In the long term, we expect to see savings in maintenance of the underground stormwater system and from cleanup of the Anacostia River and Chesapeake Bay. We expect to see increased revenues from increased property values and greater commerce from sightseeing. Already, four delegations from different places are scheduled to tour our Green Street. Also, our ribboncutting and dedication is scheduled for October 25th, and you are all welcome to join us.

We have been told that Edmonston has the greenest street in the United States. I'm not sure if that's true, but I'm proud that we are at least in the running. I'm also proud because we did this with our very modest tax base. We do not fit the stereotype, we are not a wealthy liberal area. We are working class, the little guys.

And if our little town can build a responsible, sustainable street like this, anybody can and everybody should.

Again, thank you for this opportunity to speak to you today.

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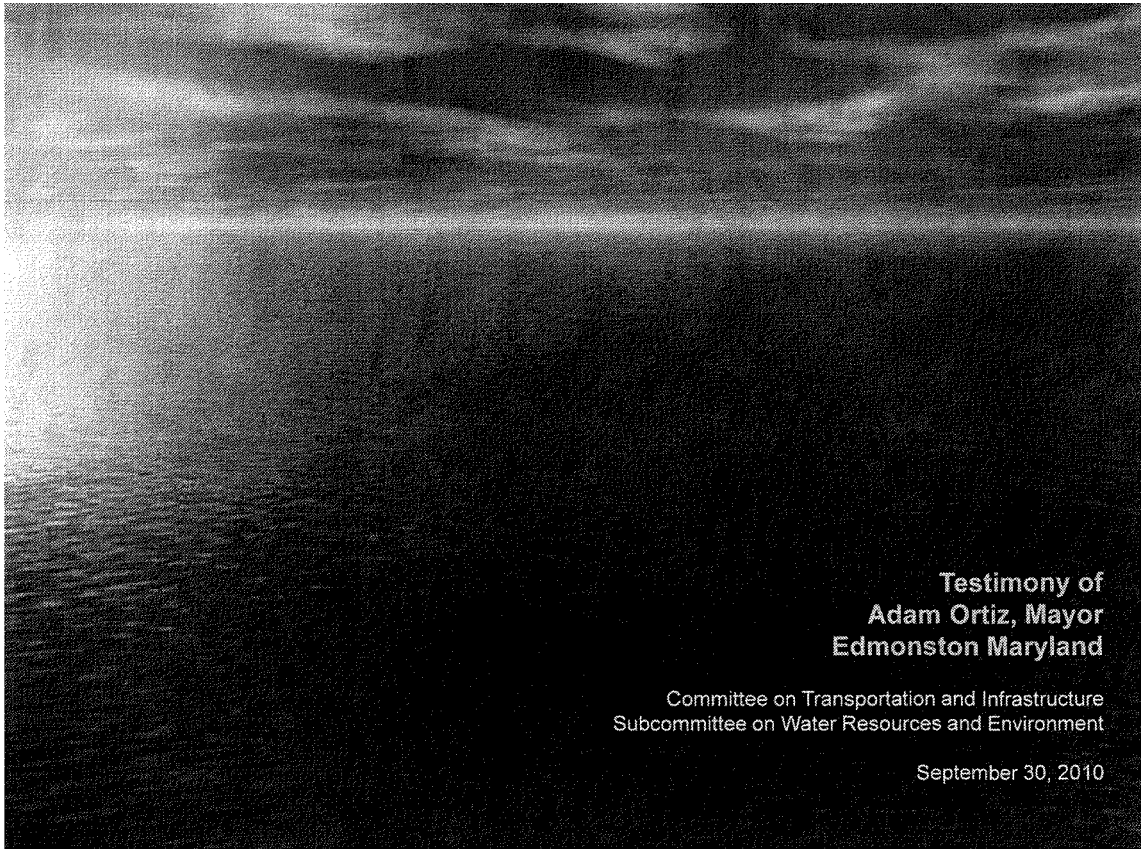
www.edmonstonmd.gov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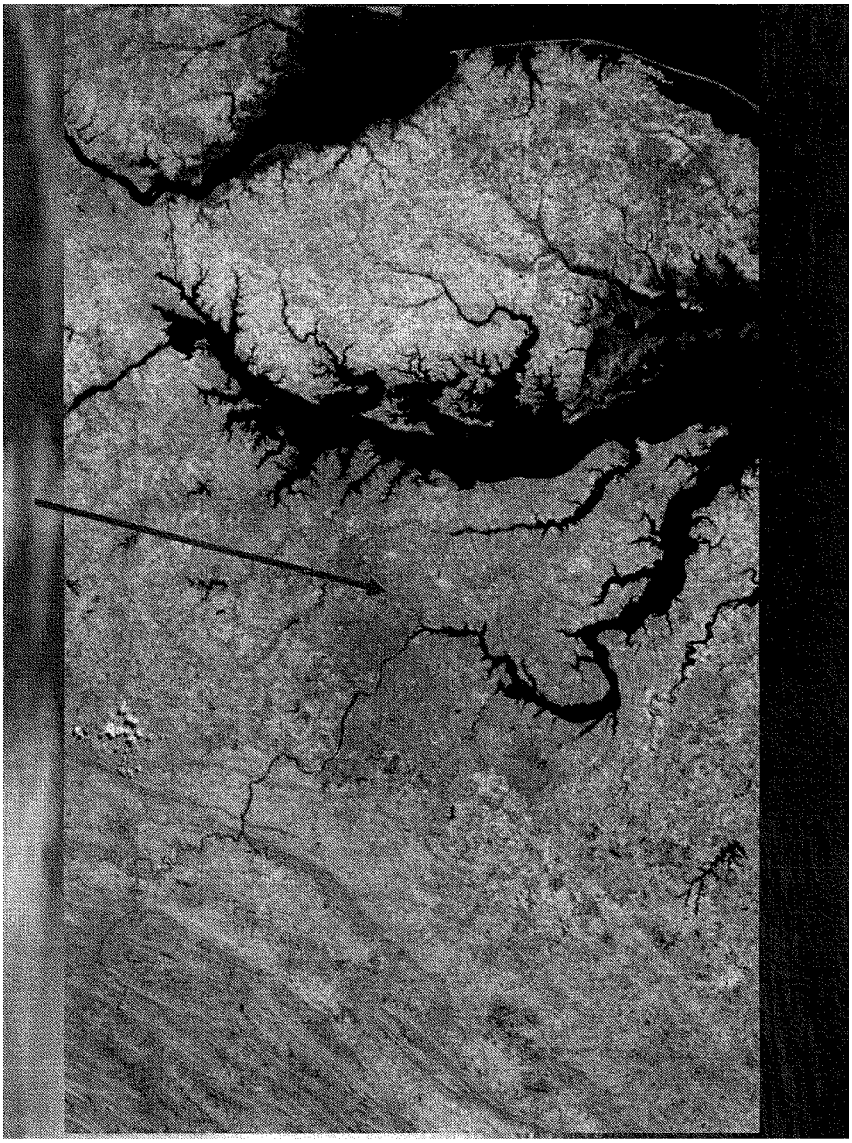
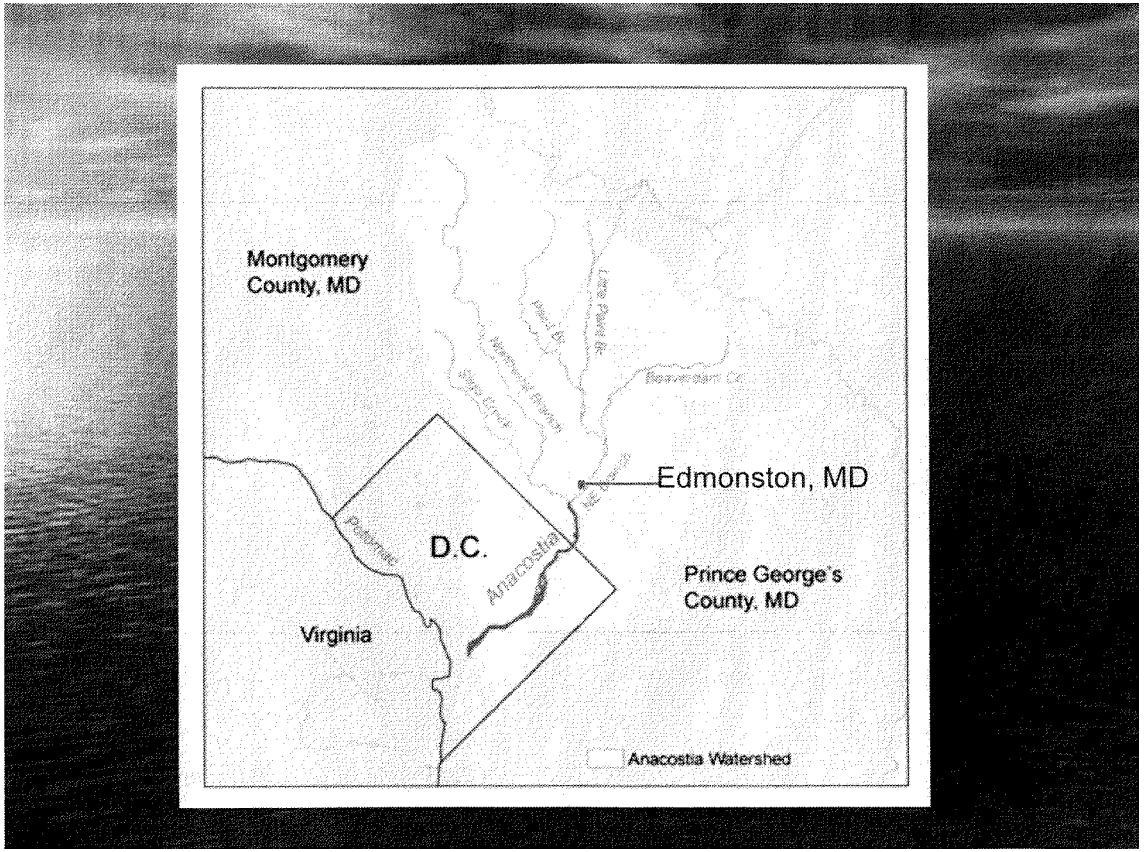
Committee on Transportation and Infrastructure
Subcommittee on Water Resources and Environment
September 30, 2010

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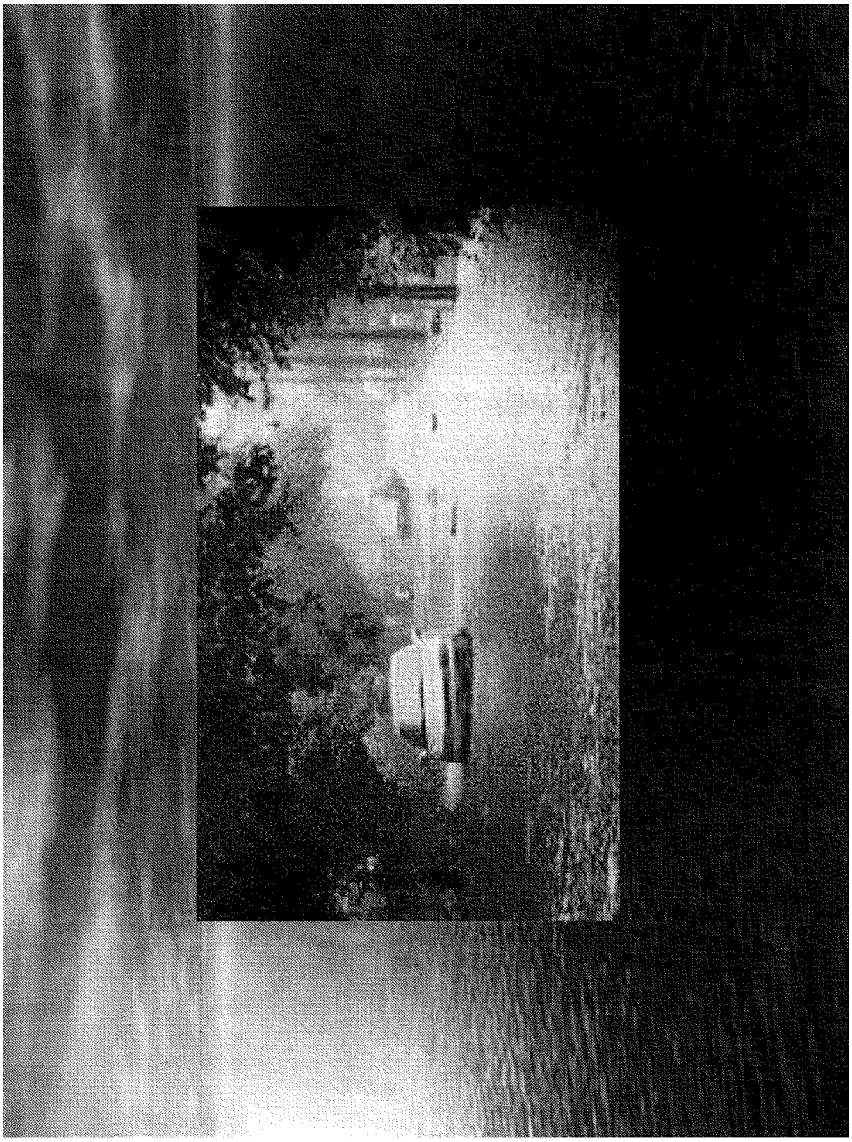

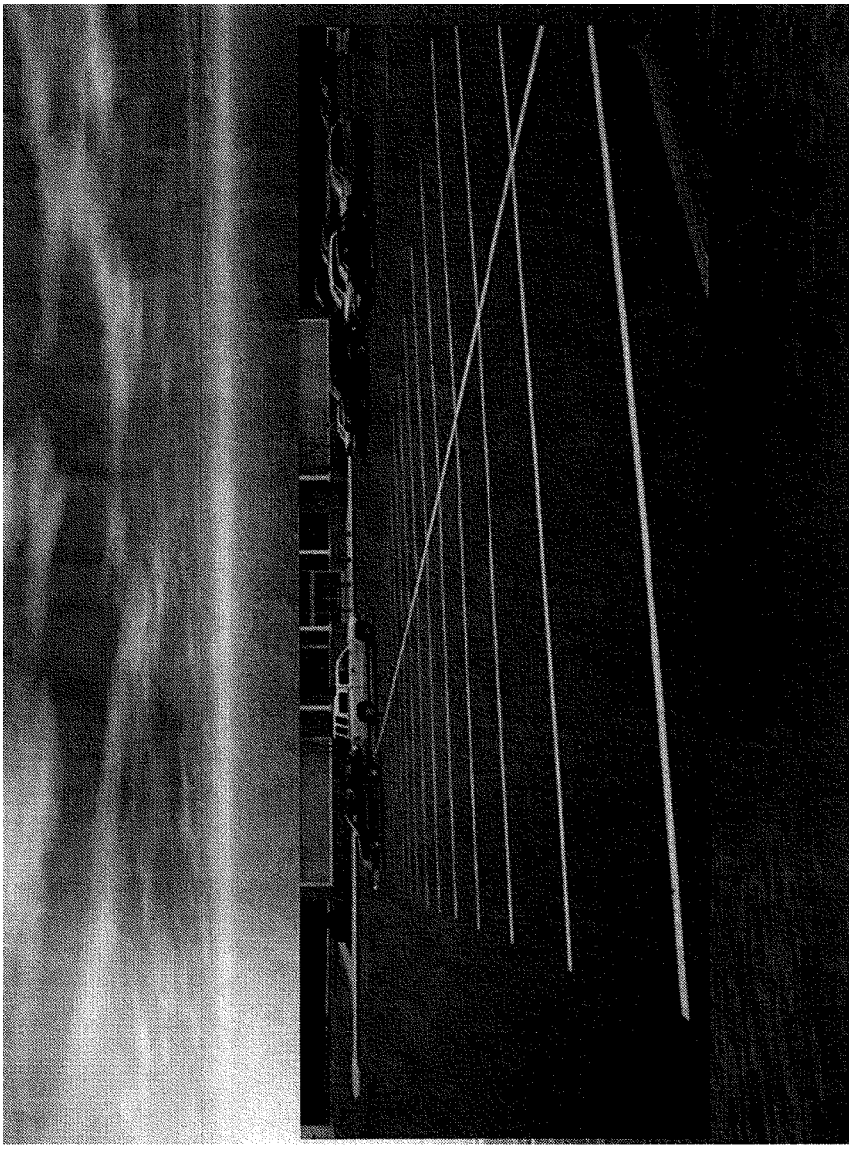

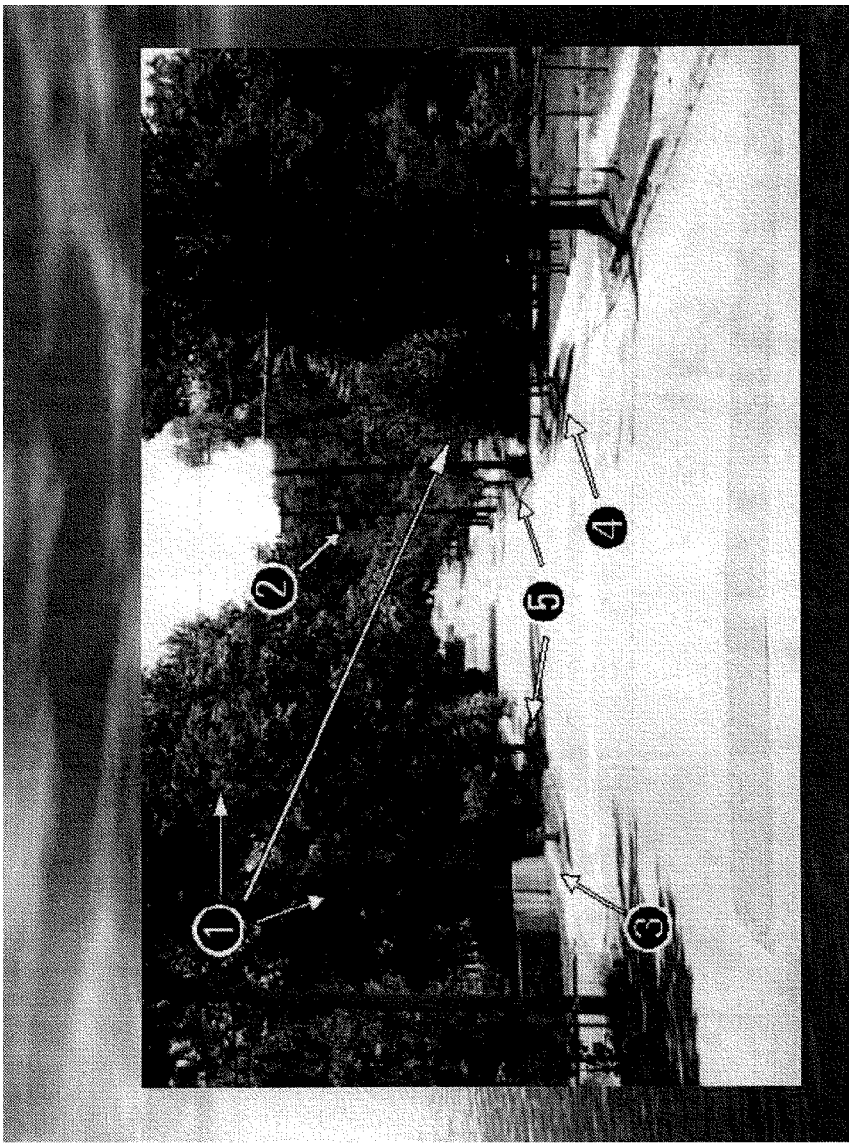
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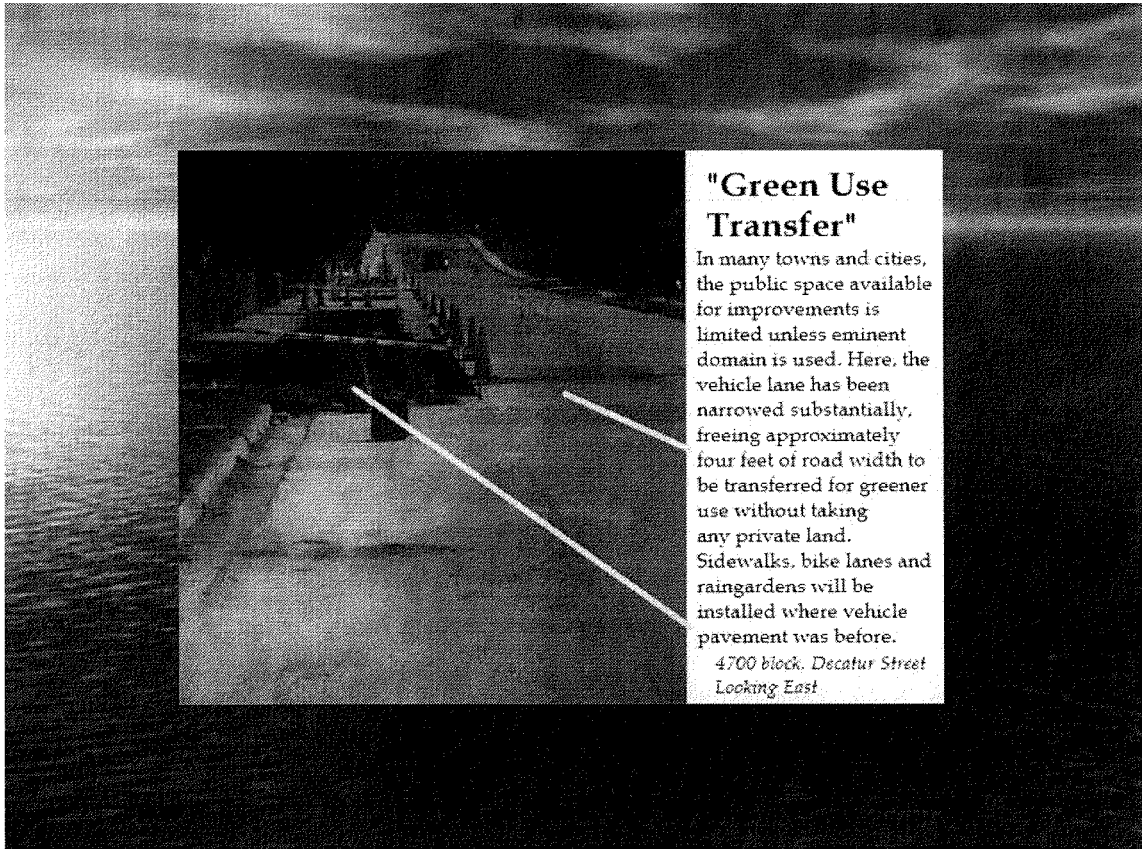
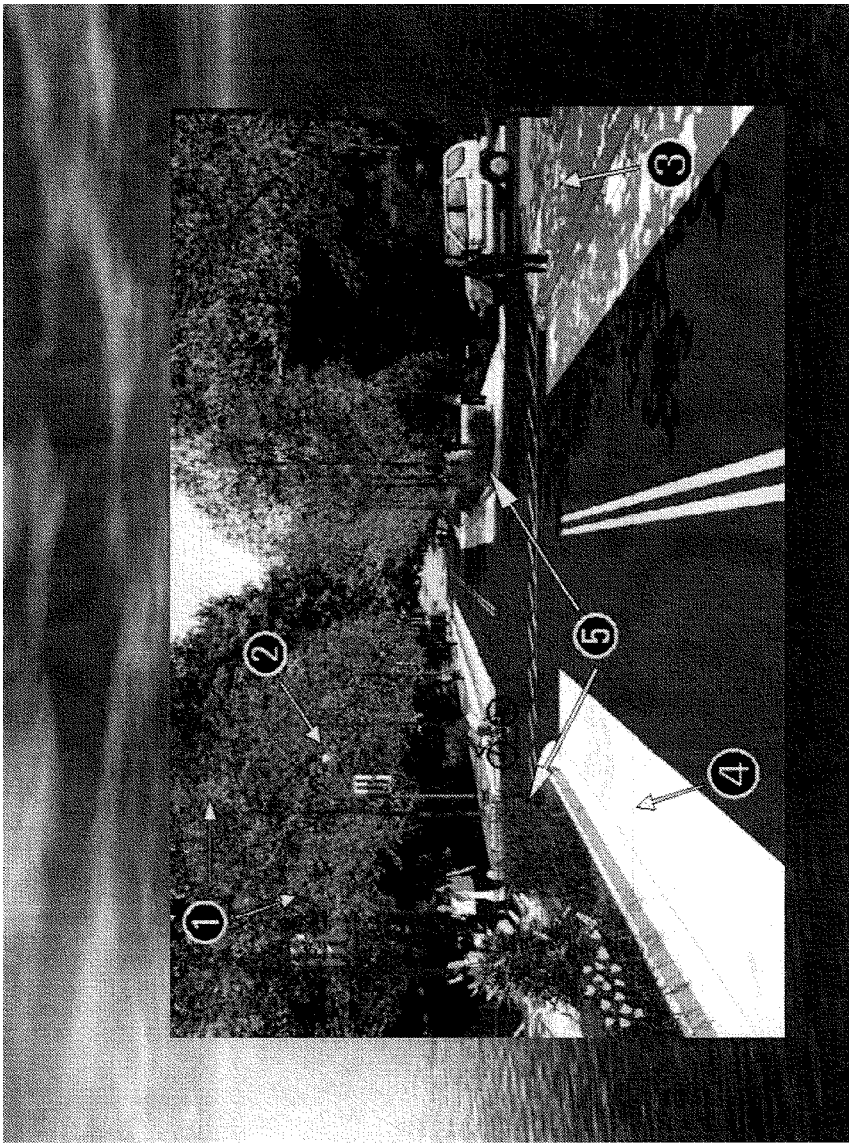


"Green Use Transfer"

In many towns and cities, the public space available for improvements is limited unless eminent domain is used. Here, the vehicle lane has been narrowed substantially, freeing approximately four feet of road width to be transferred for greener use without taking any private land. Sidewalks, bike lanes and raingardens will be installed where vehicle pavement was before.

4700 block, Decatur Street Looking East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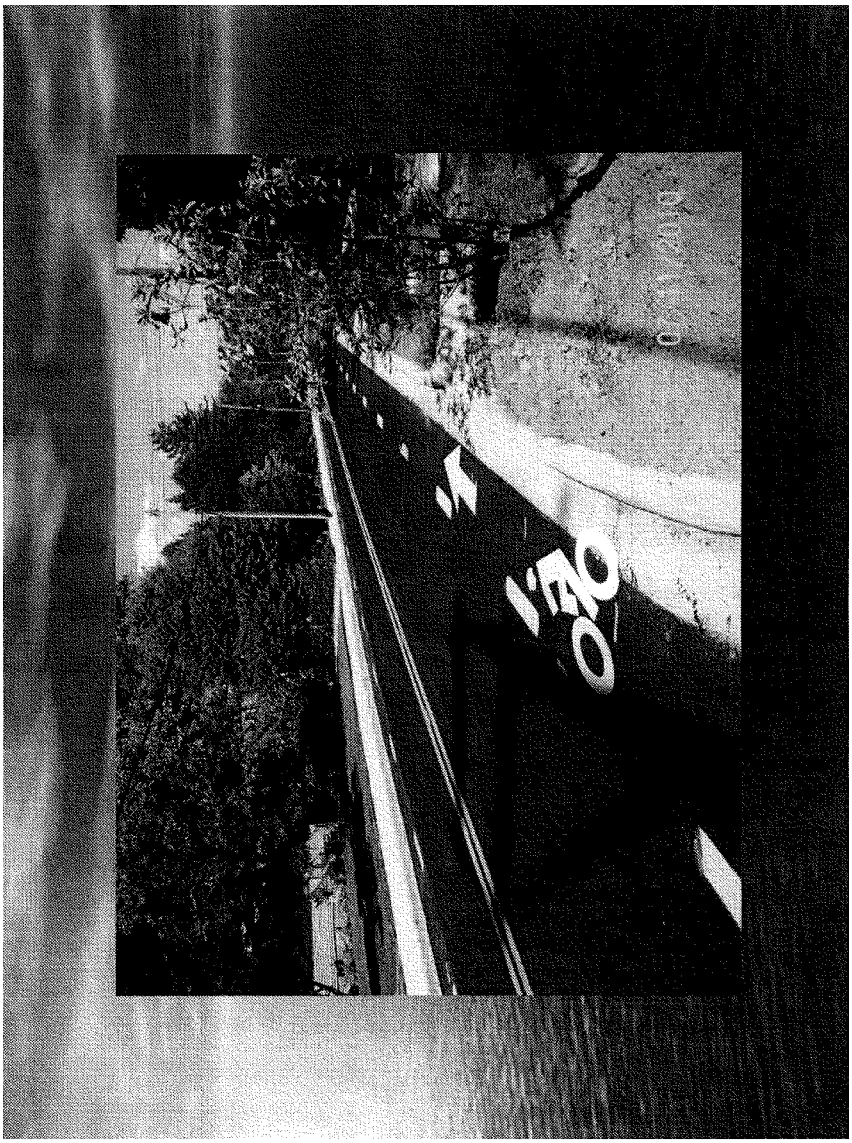
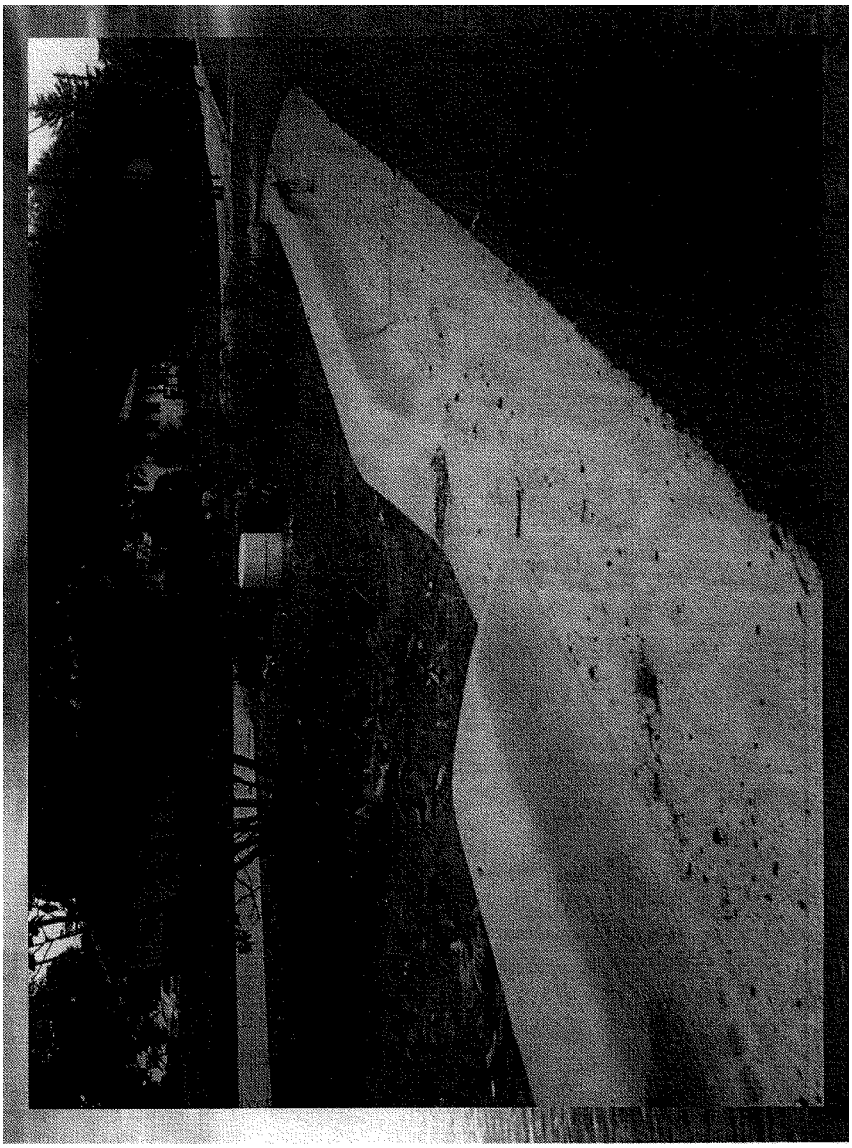
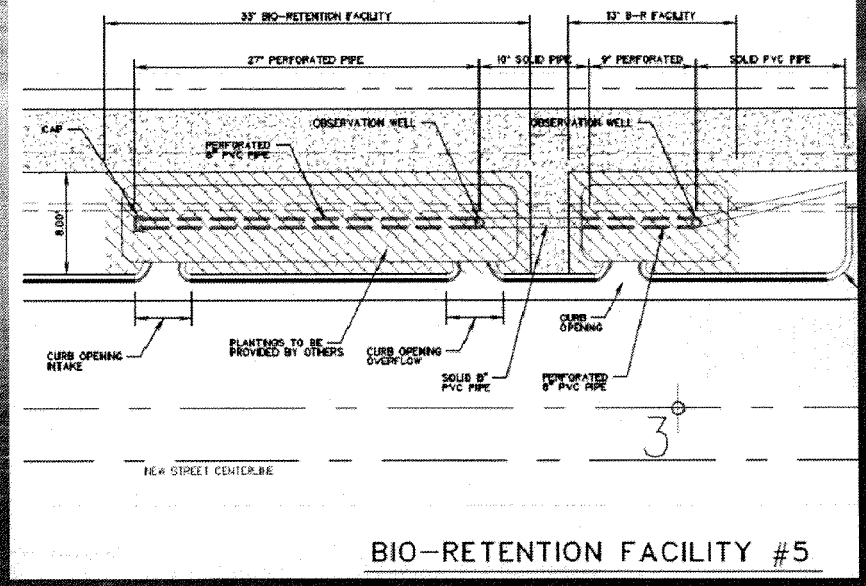
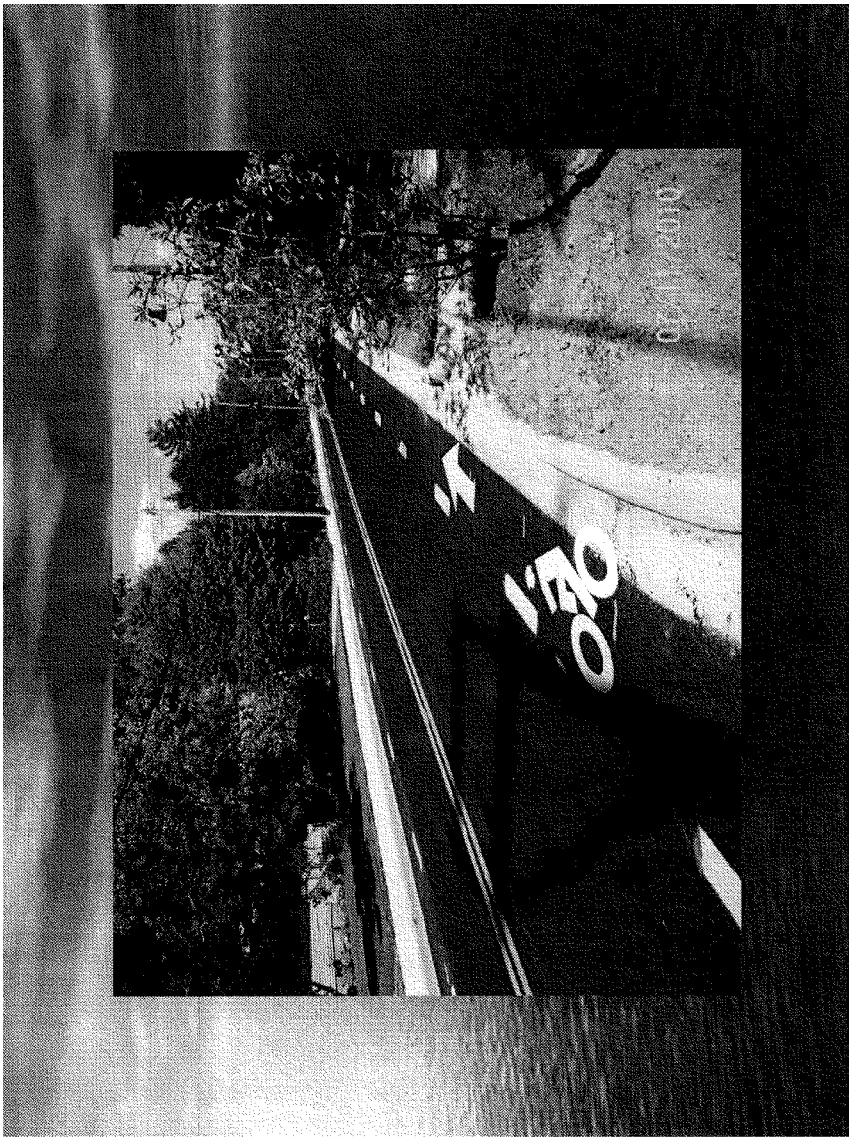






BIO-RETENTION FACILITY #5

www.edmonstonmd.gov



Steal our ideas at:
www.edmonstonmd.gov
mayorortiz@gmail.com
Thank you.

National Association of Flood & Stormwater Management Agencies
1333 H Street, NW, 10th Floor West Tower
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Testimony of the National Association of Flood
And Stormwater Management Agencies

Presented by Timothy A. Richards, PE
NAFSMA Director and Stormwater Committee Chair
Deputy City Engineer, City of Charlotte, North Carolina

The Impact of Green Infrastructure and Low Impact Development
on the Nation's Water Quality, Economy and Communities

U.S. House of Representatives
Committee on Transportation and Infrastructure
Subcommittee on Water Resources and Environment

Rep. Eddie Bernice Johnson, Chairwoman

September 30, 2010

The National Association of Flood and Stormwater Management Agencies (NAFSMA) is very pleased to submit this testimony regarding "The Impact of Green Infrastructure and Low Impact Development on the Nation's Water Quality, Economy and Communities" on behalf of its membership.

Background on NAFSMA

NAFSMA is a 30-year old national organization based in the nation's capital that represents close to 100 local and state flood and stormwater management agencies, most of which are in large urban areas. Its members serve a total of more than 76 million citizens by providing flood and or stormwater management and as a result, the association has a strong interest in the proposed discussion on Green Infrastructure and Low Impact Development in urban areas.

The mission of the Association is to advocate public policy and encourage technologies in watershed management that focus on issues relating to flood protection, stormwater and floodplain management in order to enhance the ability of its members to protect lives, property, the environment and economic activity from the adverse impacts of storm and flood waters.

It is important to note that many of NAFSMA's member agencies are currently Phase I or II jurisdictions falling under the Clean Water Act's Stormwater NPDES Permit Program.

Formed in 1978, NAFSMA works closely with the U.S. Environmental Protection Agency, the Corps and the Federal Emergency Management Agency to carry out its mission. NAFSMA members are on the front line protecting their communities from loss of life and property, while protecting and if possible, improving the quality of the nation's surface and ground waters. Therefore, the organization is keenly aware that all options for mitigating damages that can be caused by urban stormwater runoff should be considered as tools to meet clean water goals.

NAFSMA is pleased to present these views and suggestions on the impact of Green Infrastructure and Low Impact Development on the nation's water quality, economy and communities. Our testimony will initially and succinctly focus on those specific areas, but we would also like the subcommittee to rely on our previous testimony from March, 2009, where we addressed urban stormwater runoff, with a focus on green infrastructure. The text from the 2009 testimony is attached, so that we do not repeat thoughts and suggestions already expressed to the subcommittee. Also, while this testimony reflects updated

information obtained since Spring 2009, it clearly shows that our 2009 testimony was on point and is supported by the new data .

Because green infrastructure is an emerging technology, NAFSMA endorses the approach taken in H.R. 4202 to encourage further research on green infrastructure that is relevant to different geographic regions, and to provide federal funding and support for that research. We urge the committee to look at expanding this research effort to other best management practices for the management of stormwater runoff as well. NAFSMA is concerned, however, with the apparent direction of U.S. EPA's current rulemaking effort, which appears to be headed towards the creation of mandatory federal requirements for nationwide implementation of green infrastructure practices to the exclusion of other effective stormwater BMPs.

Addressing the issue of the use of green infrastructure on water quality, NAFSMA continues to believe that green infrastructure is an appropriate tool in the toolbox of best management practices (BMPs) for use throughout the country. However, it should never be considered as the only tool for improving the nation's water quality.

Our members continue to be concerned that there is currently no activity, practice or method, including green infrastructure that has proven to be effective in restoring an impaired watershed to an unimpaired state for all sources of pollutants. We agree that green infrastructure should be encouraged in those areas where you have the opportunity, hydrology, climate, soil conditions and funding to effectively construct and maintain the measures while recognizing that the decision as to what type of approach is suitable for an individual community is one that is best made at the local level.

We have information from reputable consultants and academic institutions that shows that green infrastructure, while effective at removing certain pollutants, is not the optimal solution for treating or serving each situation. For instance, Charlotte, NC worked with Tetra Tech, Inc., in September, 2005, as part of the process of developing a Post Construction Controls Ordinance and found green infrastructure to be no more effective at achieving certain in-stream goals than less expensive practices. As a result of this study and more than 36 meetings with stakeholders, Charlotte now has an ordinance that prefers green infrastructure, but does not mandate that it be the only choice or even the first choice for meeting water quality needs.

A recent study jointly sponsored by the Urban Drainage and Flood Control District in Colorado and the Urban Watersheds Research Institute evaluated the relative effectiveness of both community-based and green infrastructure BMPs in terms of reduction in pollutant

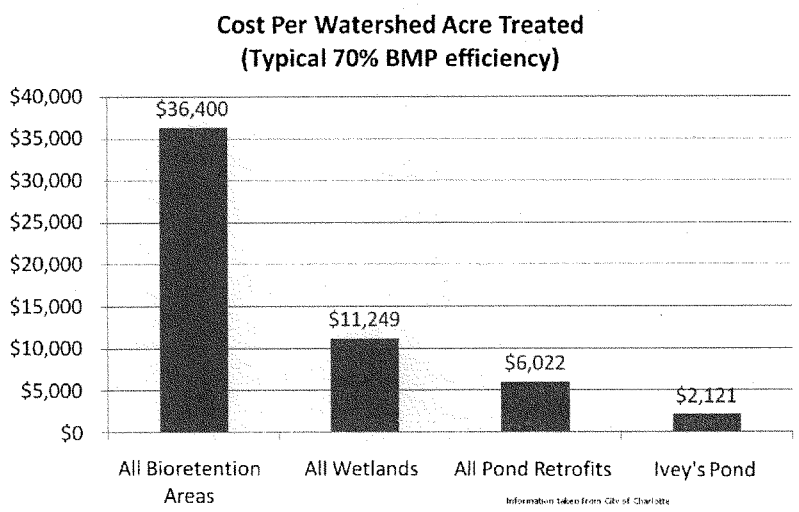
loads, surface runoff volumes and the long-term economics of keeping the BMPs in operation. The study compared the unit costs in dollars per pound of three pollutants removed by each of ten different BMPs – Total Suspended Solids (TSS), Total Phosphorus (TP) and Total Copper (TCu). It found that flow-through types of BMPs, such as inlet inserts and hydrodynamic devices have no reduction in runoff volumes and show the lowest levels of pollutant removals. BMPs that infiltrate water into the ground (sand filter basins, porous landscape detention (rain gardens), and porous interlocking concrete pavers) were compared with similar BMPs with underdrains that discharge captured runoff volume back to the surface or underground conveyance system where site conditions do not permit infiltration. It was found that most of these BMPs exhibited reductions in annual pollutant loads that were not dramatically different whether the BMP infiltrates water into the ground or not. Another important finding of the study was that consolidated community-based BMPs such as extended detention basins, retention ponds and sand filter basins are capable of intercepting runoff from large areas very effectively and with little bypass, more so than inlet or lot-based BMPs.

The second significant concern of NAFSMA relative to the mandatory implementation of green infrastructure techniques is the inability of such infrastructure to address water quality compliance objectives established in the stormwater NPDES permits. While green infrastructure methodologies are intended to reduce stormwater borne pollutant loads to receiving waters, these methodologies do not produce, and in some cases increase, the pollutant concentrations being discharged. Stormwater performance is increasingly being measured in terms of pollutant concentrations and the large scale mandating of green infrastructure methodologies in stormwater management systems could cause otherwise compliant permitted stormwater programs to be determined to be in violation of their permits and the Clean Water Act.

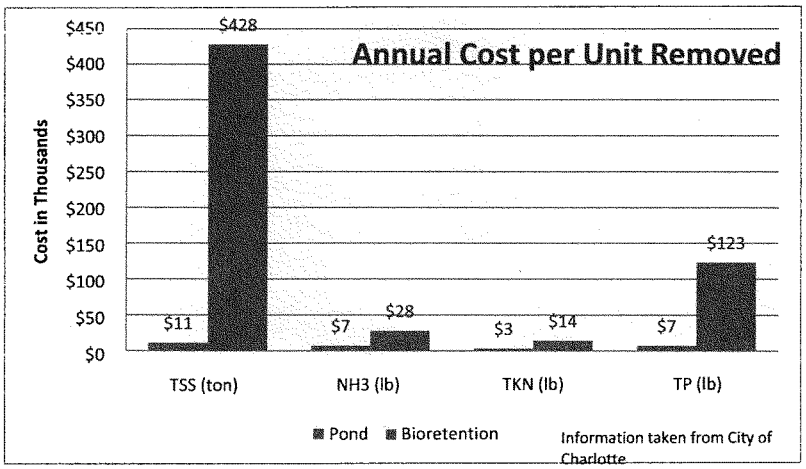
This brings us to the consideration of the impact of green infrastructure on the economy. Not only has green infrastructure not been proven to be the best solution for improving water quality of receiving waters in all cases, but it has been shown to be one of the most expensive options for trying to improve water quality. The Denver study mentioned above found that the unit cost per pound of pollutant removal was significantly higher for rain gardens and porous pavement than it was for sand filter basins and community-based BMPs such as retention ponds and extended detention basins. The study compared the unit costs in dollars per pound of three pollutants removed by each of ten different BMPs – Total Suspended Solids (TSS), Total Phosphorus (TP) and Total Copper (TCu).

Charlotte has found that the average cost of pervious concrete is approximately $490,000 per acre treated and bioretention (rain gardens) are over $35,000 per acre treated. Increasing

the capability or improving wetlands and ponds, on the other hand, came in much lower with costs of approximately $10,000 and $5,000 per treated acre respectively (see Chart 1). This chart was developed to show the value of a increasing the capability or upgrading an existing community-based pond program, rather than a cost analysis for newly constructed projects. The impact of this information is to show that using regional solutions, often on existing sites, is effective at removing certain pollutants (See Chart 1 below – Cost Per Watershed Acre Treated).



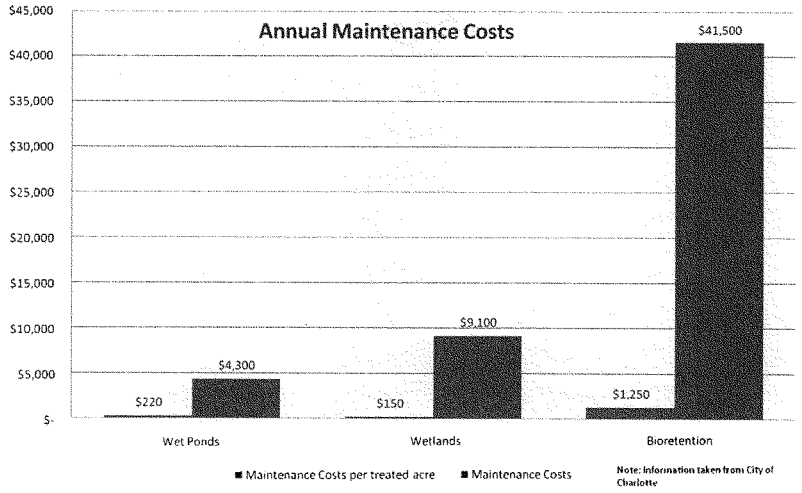
The cost per pound removed for TSS/TN/TP show similar relationships, as shown in Chart 2 below – Annual Cost per Unit Removed.



Based on information provided by MS4s like Denver and Charlotte, NAFSMA believes options involving new ponds and pond upgrades should be considered when developing stormwater rules.

In addition, Denver has shown that that total costs for construction, administration, maintenance and rehabilitation of rain gardens to be over four times the costs for conventional stormwater management techniques in a 50-year life cycle analysis for one-square mile of new development. The 50-year analysis showed the total net present costs for one square mile of mixed-use development to be approximately $26 million (green infrastructure or lot-by-lot design) compared to approximately $6 million (community-based measures).

Charlotte has a limited number of installations; however, our preliminary data shows the following for annual maintenance costs for various BMPs (See Chart 3 Below – Annual Maintenance Costs).



This brings us to the effect of green infrastructure on the community. NAFSMA continues to say that MS4s must compete with many other local service demands, not the least of which are public safety, transportation and solid waste services to fund and manage water quality programs. It is clear that the demands of aging infrastructure continue to be a drain on local communities as the roads, bridges and transit systems need continual maintenance and improvement. Local government is especially able to make the best decisions for their community given all competing interests.

Our communities are struggling with high unemployment and flat revenue sources, with project schedules continuing to creep further out as we try to find funding for infrastructure improvements and basic health and safety needs. We continue to hear from our development community and those particularly interested in affordable housing that increasing costs for development, including permitting and construction are hurting their ability to provide low cost housing. Given the experiences we have shown with effectiveness and costs of green infrastructure, it is clear that allowing local jurisdictions the opportunity to determine for their community which type of measure they use is vitally important. We can often get more pounds of pollutant removed and more acres treated through near-site or off-site regional BMPs (dry detention, wet detention, wetlands and ponds) for far less money spent.

In summary, green infrastructure can be effective in removing certain pollutants (though not proven to be effective in restoring watersheds) and in many circumstances, it is a good choice for addressing pollutant removal for new and to some extent redevelopment.

However, there are other choices, that for certain locations, are a better financial and water quality solution. NAFSMA hopes that Congress realizes the need for using these options and doesn't support mandating green infrastructure as a one size fits all approach.

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Testimony of the National Association of Flood
And Stormwater Management Agencies

Presented by Timothy A. Richards, PE
NAFSMA Director and Stormwater Committee Chair
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Efforts to Address Urban Stormwater Runoff

U.S. House of Representatives
Committee on Transportation and Infrastructure
Subcommittee on Water Resources and Environment

Rep. Eddie Bernice Johnson, Chairwoman

March 19, 2009

The National Association of Flood and Stormwater Management Agencies (NAFSMA) is very pleased to submit this testimony regarding "Efforts to Address Urban Stormwater Runoff" on behalf of its membership.

Background on NAFSMA

NAFSMA is a 30-year old national organization based in the nation's capital that represents close to 100 local and state flood and stormwater management agencies, most of which are in large urban areas. Its members serve a total of more than 76 million citizens by providing flood and or stormwater management and as a result, the association has a strong interest in the proposed discussion on urban stormwater runoff.

The mission of the Association is to advocate public policy and encourage technologies in watershed management that focus on issues relating to flood protection, stormwater and floodplain management in order to enhance the ability of its members to protect lives, property, the environment and economic activity from the adverse impacts of storm and flood waters.

It is important to note that many of NAFSMA's member agencies are currently Phase I or II jurisdictions falling under the Clean Water Act's NPDES Permit Program.

Formed in 1978, NAFSMA works closely with the U.S. Environmental Protection Agency, the Corps and the Federal Emergency Management Agency to carry out its mission. NAFSMA members are on the front line protecting their communities from loss of life and property, while protecting and if possible, improving the quality of the nation's surface and ground waters. Therefore, the organization is keenly aware that all options for mitigating damages that can be caused by urban stormwater runoff should be considered as tools to meet clean water goals.

NAFSMA is pleased to present these views and suggestions on efforts to address urban stormwater runoff and understand the focus of today's hearing is on Green Infrastructure and low impact design approaches. We will be sharing with you the opinions of our member agencies as they relate to general comments on these approaches, barriers to their implementation and recommendations for alleviating these barriers.

General Comments on Green Infrastructure and Low Impact Design Approaches

NAFSMA supports the spirit and intent of the Clean Water Act and the use of tools such as the NPDES Permit Program and adaptive management to help jurisdictions determine the appropriate activity towards protecting and cleaning the nation's waters.

Many agencies, represented by our members throughout the country, at their own expense and without Federal funding, are making significant improvements in managing stormwater quantity and quality and have been largely successful in awakening their residents, businesses and leaders to the importance of reducing pollution resulting from non-point sources. Non-point source pollution is caused by rainfall and snowmelt runoff that moves over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even our underground sources of drinking water.

NAFSMA believes that it must be recognized that non-point sources of pollution cannot be addressed the same way as point source pollution resulting from activities like industrial or municipal sewage treatment plants. It is impractical and most likely impossible for local jurisdictions to use end-of-pipe treatment techniques (treatment plants) to reduce pollution from non-point sources as is customarily done for point sources. Management of non-point sources is more appropriately performed through better site planning and design measures, as well as "best management practices" such as public education on non-point sources, public involvement in protecting and cleaning waterways, non-structural and structural solutions such as zoning and land use rules, Green Infrastructure and conventional stormwater management.

For purposes of this testimony, Green Infrastructure will be considered, as defined by the US EPA, "…An adaptable term used to describe an array of products, technologies, and practices that use natural systems – or engineered systems that mimic natural processes – to enhance overall environmental quality and provide utility services. As a general principal, Green Infrastructure techniques use soils and vegetation to infiltrate, evapotranspirate, and/or recycle stormwater runoff. When used as components of a stormwater management system, Green Infrastructure practices such as green roofs, porous pavement, rain gardens, and vegetated swales can produce a variety of environmental benefits."

Low Impact Design techniques are intended to produce a hydrologically functional site that mimics predevelopment conditions. For purposes of this testimony, we will consider low-impact design approaches to be a component of Green Infrastructure.

NAFSMA would like to acknowledge that many of the Green Infrastructure techniques are very successful in reducing the amount of runoff, as well as certain pollutants from stormwater runoff, such as total suspended solids, nitrogen, certain metals and even bacteria. However, data shows that in certain cases some of these practices actually cause increased levels of nutrients in runoff as well and we have to be careful of its wholesale application throughout the country without

further research. We encourage their use in those areas where site conditions are suitable, and should be considered an important strategy in managing stormwater runoff. Green infrastructure techniques should be considered along with other complimentary strategies to provide for flexibility and innovation. We by no means want to state an all encompassing opposition to the use of Green Infrastructure or low impact design techniques; rather, we propose a balanced approach to the use of Green Infrastructure together with, and as a supplement to conventional stormwater management.

As described by the EPA, NAFSMA considers Green Infrastructure to be a "component" of a stormwater management system, appropriate in certain situations, but by no means the sole solution or even generally preferred method of addressing the nation's water quantity and quality management. As such, we provide the following barriers to implementing Green Infrastructure.

Barriers to Implementing Green Infrastructure

NAFSMA believes Green Infrastructure should neither be prescribed as the preferred tool for addressing stormwater quality nor used in a regulatory fashion. The following information reflects our opinions as to why Green Infrastructure should remain simply a component of a stormwater management system and/or an optional mechanism for complying with the Clean Water Act's Permitting Program. Our opinions are listed in no particular priority order.

1. **Green Infrastructure is not more appropriate for some parts of the country, but not for others.**

   Green Infrastructure techniques such as rain gardens often rely on infiltration of stormwater runoff into the ground as a means of both filtering the pollutants out of the runoff as well as recharging the groundwater. In areas where ground infiltration occurs readily, this process works well. In other areas of the country, the naturally occurring clay and plastic soils limit infiltration measures, making them very difficult, ineffective and expensive to construct and maintain. These areas rely on modifications to Green Infrastructure techniques including, but not limited to providing pipe systems to drain the system artificially, thus providing treatment with minor reductions in runoff and little groundwater recharge. If Green Infrastructure is to be used in such areas, it will be necessary to supplement those techniques with conventional stormwater management techniques to achieve pollutant removal efficiencies necessary to meet regulatory requirements and accomplish clean water goals.

In this respect, it is important to note that different management techniques are available to address runoff at different spatial scales. Green Infrastructure techniques are designed to address the smallest scale at the parcel or neighborhood scale, and this is considered desirable from a point source control point of view. However, there are major efforts at watershed planning in our country where a system of integrated regional facilities are part of a system of controls that also can be cost effective in protecting our receiving waters.

Thus, Green Infrastructure may be an appropriate response to urbanization in some regions and communities, but not so for other locations. For example, in some parts of the country such as the Southeast, a primary degradation concern is stream bank erosion. In such areas of naturally erosive soils, a large contributor of pollutants to streams and rivers and the ponds and lakes they feed, is sediment generated from the streams themselves. In such situations, it is clearly necessary to control excess runoff through the utilization of techniques that control the quantity of runoff and may include conventional stormwater detention techniques, as well as Green Infrastructure. Again, the key is to provide planners and managers flexibility in selecting the most appropriate mix of management tools, taking into account the site conditions, planning opportunities, and beneficial uses of receiving waters subject to stormwater discharges.

In addition, infiltration of surface waters to groundwater has been shown to, in some instances, increase certain pollutant concentrations in groundwater. These potential risks must be considered when evaluating Green Infrastructure as a stormwater system component.

Frequent reference to incorporation and implementation of "LID principles" are made. A clear goal and definition of these LID principles as they apply to various climates, such as semi-arid Riverside County, California is needed to ensure a consistent understanding of compliance expectations. It is particularly important to ensure that these principles do not conflict with water conservation or urban density policies, objectives, or requirements. LID principles for coastal or wetter areas may not be applicable to the warmer and more arid climates. For example, use of green roofs in these areas needs the installation and use of lawn watering systems, increasing water consumption. We would like to emphasize that LID is a tool to achieving compliance, and it is not desirable or appropriate to require implementing LID as a compliance measure.

2. **Green Infrastructure may be appropriate for developments such as larger lot single-family development, but can be problematic for higher density development.**

Green Infrastructure techniques are commonly based on controlling stormwater at the source by the use of micro scale controls that are distributed throughout the site. Proponents often claim Green Infrastructure is useful for managing stormwater in high density development where a small development footprint on the landscape can be achieved. This may be true in certain situations; however, our experience is that in high density development, the land comes at a premium, available at all, and utility of the land for parking, buildings and pedestrian movement often prohibits even the small amount of property required for rain gardens, vegetated swales or infiltration trenches. Moreover, we are sensitive to geotechnical concerns regarding infiltration near foundations or steep slopes, which may limit the applicability of some Green Infrastructure techniques. Given this space limitation, it is often more prudent to allow higher density development to participate in paying for more conventional measures like dry and wet detention basins that serve a more regional function.

3. **The development market place has not shown broad support of Green Infrastructure techniques.**

Green Infrastructure, by its very nature, involves the use of systems which have to be placed on private home property and require perpetual property owner responsibility and expense. While this would appear to offer the benefit of nature up close and personal, many buyers want a cleaner, more well-defined streetscape and lawn area that offers close to maintenance-free assurance. In addition, Green Infrastructure application also requires extensive local government oversight and administration. Our position therefore is that we must educate our citizens and developers about the utilization of Green Infrastructure techniques, and when and under what circumstances they are appropriate, and that endorsement of Green Infrastructure strategy is not desirable in general, and certainly not at this somewhat early stage.

4. **Green Infrastructure could mean an exponential increase in the number of measures and facilities being implemented, operated and maintained in a municipality.**

Since the techniques employed in Green Infrastructure seek to mimic pre-development conditions, it is necessary to capture stormwater runoff at or near its source. In other words, the runoff cannot travel very far before it needs to be captured, slowed and infiltrated to appropriately mirror the pre-developed hydrology. This requirement creates the need to construct many small structural features, such as rain gardens to accomplish this. Conventional stormwater management allows the runoff to be carried further

downstream, into regional facilities. It is not unreasonable to expect an increase of 10 – 40 or more times the number of actual treatment facilities required by using Green Infrastructure versus conventional stormwater management. Being able to capture a larger drainage area in fewer structures (albeit larger ones) allows the construction, oversight by the permit holders, administration, maintenance and rehabilitation to be focused in fewer areas of the development. As a result, administration and maintenance is simplified, aesthetic and functional issues are more easily addressed, the inspection and logistics of repair are reduced, and effectiveness of performance is more easily maintained.

We have found that it is often very difficult to get private homeowners or Homeowner Associations to adequately maintain the many rain gardens and swales that invariably have to be constructed on or very near private property. It is even more challenging when these facilities on private properties will need to be rehabilitated. The decentralized approach conflicts with the homeowner's sense of what is their property, and what can or cannot be done in these areas, as well as creates issue over what *must* be done to keep the devices functional. This has the potential to become a significant administrative burden.

5. **The financial burden of Green Infrastructure has the capacity to be much greater than conventional stormwater management.**

Studies and actual results of programs run by our member agencies have shown that the costs of not only capital construction, but even more so, costs associated with administration, maintenance and rehabilitation of Green Infrastructure can be much higher than conventional stormwater management. A study in the Denver, Colorado area showed that total costs for construction, administration, maintenance and rehabilitation of rain gardens to be over six times the costs for conventional stormwater management techniques in a 50-year life cycle analysis of a given site. The 50-year analysis showed the total costs for a 100-acre multi-family development be approximately $38 million (Green Infrastructure) compared to approximately $6 million (conventional measures).

This cost has to be borne by both the private property owner, through individual costs or Homeowners Association dues, and the municipality providing administration of programs requiring the measures or the complete assumption of all these facilities by municipalities, which complicates their use even more. The home and/or business owner eventually pays, either through self financing or supportive funding of governmental stormwater programs through fees and/or taxes.

In Charlotte, North Carolina, we have shown that in some high density areas, a practical physical solution for managing water quality on-site is a Green Infrastructure technique called porous pavement. However, the construction costs alone for this measure are approximately $200,000 per acre, compared to $25,000 - $40,000 per acre for bio-retention ponds to a low of $10,000 per acre for conventional stormwater management ponds. It is clear that in even the most difficult of economic times, conventional measures can be affordable to build and maintain, while assuring continued performance. Conventional measures can also be as effective and attractive, while providing other ecological benefits (such as wildlife habitat and open space) as Green Infrastructure features.

That said, there are studies, including studies that indicate cost savings associated with Green Infrastructure. In some instances, comparing Green Infrastructure to conventional techniques in their pollutant removal role is valid; however, we must not forget that stormwater management also involves making sure the capacity of the system is adequate to handle flood waters and provide for public safety. Green Infrastructure inherently promotes the use of small structures to catch the "first flush" of runoff to treat the pollutants through infiltration. To make this happen, you have to have more structures capturing small amounts of water so that they are not overrun in larger runoff events. Even with Green Infrastructure being in place, there still needs to be a by-pass system large enough to keep our homes, businesses and streets from harm's way of flooding. As a result of this necessity, the claimed cost savings of Green Infrastructure approaches may be appropriate for water quality, but do not include the costs required for flood management.

6. **Lawsuits by environmental groups (claiming Green Infrastructure should be mandatory) is taking money away from, and delaying implementation of, effective stormwater management programs.**

In the State of Washington, a recent ruling by the Washington Pollution Control Hearings Board, ruled in favor of writing certain Phase II NPDES permits to make Low Impact Design (LID) "allowable when feasible", rather than "mandatory when feasible". The Board recognized that there are many issues to be resolved concerning the feasibility of LID, construction and performance standards, technical guidance and acknowledging that LID is still relatively new and should not be mandatory.

Many State agencies are requiring Green Infrastructure or LID to be used in all development regulations, despite concerns cited by the Washington Board.

The cost of defending lawsuits focused on making LID mandatory is taking away money that could be used for testing new Green Infrastructure techniques to learn what does and does not work best.

7. Technical and local barriers exist that will take time and education to overcome

Discrepancies and contradictions with new LID strategies exist in the existing local regulations such as building, fire, plumbing, or health codes. (For example: mosquito issues with rain barrels, turf requirements and incentives for drought tolerant planting, health concerns with stormwater reuse, etc.). Developers and design professionals have not yet transitioned from conventional site design practices to new LID design concept. Furthermore, LID designs have not been standardized for wide application and easy enforcement. Design reviewers or building plan checkers must have standard procedures in place and be trained in LID design concepts.

8. LID needs to complement and support Smart Growth (anti-sprawl) development concepts and other regional planning activities

It is important to think about scale when considering low impact development. Low Impact Development is often equated with local, distributed BMPs on individual sites. In fact in recent draft stormwater permits in California the overriding desire to mandate LID implementation through the use of limiting effective impervious areas will actually exacerbate urban sprawl. LID needs to be balanced with Smart Growth (transit friendly and anti-sprawl) development concepts and other regional planning activities such as Habitat Conservation Plans, Special Area Management Plans, etc. Both large and small scale activities need to be identified and credited.

9. LID cannot be defined as a specific or effective impervious area for permitting purposes.

Due to varying site soil, slope and rainfall character, it is not possible to standardize LID (Green Infrastructure) to equal an effective impervious area. Permittees support the concept of using a prioritization system to ensure that proposed LID BMPs promote infiltration, reuse and/or evapotranspiration and are encouraged prior to considering more traditional treatment control technologies where physically and financially feasible.

Recommendations for alleviating the barriers

1. **Increase funding for research and science for stormwater management.**

   It is clear that there is a real need for more study and research into the relationships between stormwater and receiving water quality. While there are opinions from all sides on what is most effective, the best strategy is one that allows one to develop an integrated control strategy in the context of site conditions and constraints, regional planning efforts, and institutional and political opportunities. Funding for pilot programs along with monitoring of both site-level and watershed-level effectiveness is needed to make good decisions. This monitoring is very expensive, requires significant amount of time and is often financially impossible for local jurisdictions to accomplish on their own. Federally-funded grants and supportive programs are needed to supplement what many of our member agencies are already trying to do on their own, which is utilize the EPA-recommended approach of adaptive management to improve on what we learn by trying different approaches, then monitoring their effectiveness before revising the approach. This takes many years and huge amounts of money to accomplish and if the responsibility continues to fall on the local jurisdictions, we will lose.

2. **Continue to educate and involve leaders, municipal officials, developers and the public on stormwater management issues.**

   One of the most useful best management practices for protecting and improving water quality is education and public involvement. We need to continue to highlight the need for educating everyone on known causes of water quality pollution and help them find ways to participate in protecting and cleaning the nation's waters. Each person plays a role in environmental stewardship, whether as a human being, resident, official or professional. Knowing how we can effectively support clean water goals in our role is the first step to meeting those goals.

3. **Congress should encourage, rather than mandate Green Infrastructure when and where feasible and economically sustainable.**

   NAFSMA supports the Washington Pollution Control Hearing Board ruling of encouraging rather than mandating Green Infrastructure and requests that in any Congressional considerations regarding the use of LID or Green Infrastructure requirements in the Phase I or II NPDES permit programs, that these techniques not be made mandatory, but remain optional or allowable.

> We believe this direction from the Federal government would go a long way in promoting what the EPA has stated as their goal of using an adaptive management philosophy of managing stormwater and related receiving water quality. It is this adaptive management process that will allow us to scientifically and procedurally remove methods that in the long run may turn out to be too costly, ineffective and infeasible, thus also not meeting the "Maximum Extent Practicable" basis of NPDES permitting.

NAFSMA very much appreciates this opportunity to testify. Please feel free to contact me at 704-336-4555 or Executive Director Susan Gilson at 202-289-8625 with any questions.

Green Infrastructure and the *Green Communities Act*
Allyson Y. Schwartz
Testimony before the Subcommittee on Water Resources and Environment
September 30, 2010

Chairwoman Johnson, Ranking Member Boozman, and members of the Committee. Thank you for asking me to testify on the importance of green infrastructure and my proposal, the *Green Communities Act*. As a former member of this panel, it is an honor to return and testify before it. I want to commend the Chairwoman and the members of this committee for their leadership in working to improve the environment and water quality in our country.

Meeting our nation's water infrastructure needs with green infrastructure

The water infrastructure needs of the United States are immense, and implementing green infrastructure solutions can enable municipal governments to better meet water quality standards while addressing other crucial priorities in their communities. Benjamin Grumbles, the Environmental Protection Agency's Assistant Administrator for the Office of Water during the Bush Administration, wrote in a 2007 memo, "Green infrastructure can be both a cost effective and an environmentally preferable approach to reduce stormwater and other excess flows entering into combined or separated sewer systems in combination with, or in lieu of, centralized hard infrastructure solutions."

It is the capacity of green infrastructure to meet multiple goals, which makes its implementation such a worthwhile and cost-effective investment. In addition to improving water quality to ensure compliance with standards that protect our health and welfare, green infrastructure has been demonstrated to attract businesses, increase property values, and improve people's perceptions about their communities. University of Pennsylvania research showed that the greening of vacant lots created a 37 percent increase in adjacent property values while properties located next to a non-greened vacant lot saw their property values decrease by 20 percent. In addition, University of Washington research demonstrates that putting trees in the streetscapes of a business district improved visitors' perception of the location and typically resulted in longer shopping visits. Green infrastructure can create not only results in cleaner, safer water

quality, but also can revitalize depressed economic areas and contribute to economic growth. It is a sensible and wise investment.

Philadelphia's commitment to green infrastructure

In recent years, my home city of Philadelphia has been recognized as a national leader in implementing green infrastructure. Mayor Michael Nutter's Greenworks Plan - a vision and plan to become the greenest big city in America by 2015, has but Philadelphia on the cutting edge. Specific goals include:

- Increasing tree coverage by 30 percent by 2025 by planting 300,000 trees;
- Providing parks and recreation resources within 10 minutes of 75 percent of residents by expanding open space; and
- Making a $1.6 billion commitment to managing the city's stormwater by using green infrastructure.

Philadelphia has used both public and private institutions to accomplish these goals. First, Mayor Nutter created the Office of Sustainability to promote sustainability efforts across all departments and agencies within the city government. Their efforts include increasing the number of green roofs, expanding pervious pavement to an additional 25.7 acres, and distributing more than 1,600 rain barrels. These efforts and other improvements to building efficiency, recycling, and alternative transportation have already led the city to be recognized nationally by the U.S. Chamber of Commerce for its commitment and achievements. Second, Philadelphia has strong community and philanthropic institutions, like the Pennsylvania Horticultural Society and the William Penn Foundation, that muster much needed human and capital resources in the private sector. Third, Philadelphia is fortunate to have a municipal water department that is determined to find and implement innovative solutions to address serious stormwater problems through green infrastructure.

The Green Communities Act

While Philadelphia takes pride in its national leadership in green infrastructure innovation, we don't want to keep it to ourselves. We want to share our knowledge and experience with other cities – large and small. That's why I introduced the *Green Communities Act* (H.R. 2222), which aims to take the excellent work that we are doing in Philadelphia and disseminate it to communities across the country that are less experienced with the use and value of green infrastructure. Specifically, my proposal would authorize the Secretary of Commerce, through the Economic Development Administration, to partner with five non-profit organizations with experience in implementing green infrastructure initiatives in order to work with 80 municipal governments to build capacity in the implementation of green infrastructure. The Secretary of Commerce would select the communities with input from the non-profits and with sensitivity toward areas with need for economic revitalization. The bill would authorize $180 million over a five-year period to accomplish this work.

The proposal has received bipartisan and bicameral support in Congress. It currently has 24 co-sponsors from many parts of the country and there is companion legislation in the Senate. In addition, many business, environmental, and water agency organizations have expressed support, including: the Alliance for Community Trees, the American Nursery & Landscape Association, the Pennsylvania Horticultural Society, and the National Association of Clean Water Agencies. Just to highlight the support that this proposal has from businesses, the American Nursery & Landscape Association said of my bill, "Investments in landscape systems, such as those found in H.R. 2222, will yield visible and high returns in the form of employment, economic and social benefits, and will increase in monetary value over time."

Conclusion

In summary, green infrastructure can play a vital role across the country in meeting our water infrastructure needs. The City of Philadelphia has made a commitment to do this and I believe its approach can serve as a model for the rest of the country. *The Green Communities Act* can better enable the dissemination of information and training necessary to offer beneficial green alternatives to gray infrastructure to address our nation's water infrastructure deficiencies. This will yield multiple benefits –

improved water quality, a cleaner environment, and enhanced economic development. Infrastructure investments can accomplish multiple goals and yield multiple public benefits. In tough financial times, the ability to meet multiple community needs with smart and targeted investments makes common sense. Thank you for your time this morning. I am happy to answer any questions you may have.

AMERICAN SOCIETY OF LANDSCAPE ARCHITECTS

Testimony before the
United States House of Representatives
Committee on Transportation and Infrastructure
Subcommittee on Water Resources and the Environment
The Honorable Eddie Bernice Johnson, Chairwoman

Impact of Green Infrastructure and Low Impact Development
On the Nation's Water Quality and, Economy, and Communities

September 30, 2010

By

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Good morning Chairwoman Johnson, Ranking Member Boozman and members of the Subcommittee on Water Resources and Environment. My name is David Yocca; I am a licensed landscape architect and certified planner, and one of three principal partners in Conservation Design Forum (CDF) located in Elmhurst, Illinois - a nationally-recognized planning, design, and engineering small business that assists communities, neighborhoods and individual residents in addressing a host of issues using integrated green infrastructure strategies. I am also part owner of an allied firm, Conservation Land Stewardship, which provides implementation and contracting services for ecological restoration and green infrastructure applications in the Midwest. Thank you for inviting me today to discuss some of my professional experiences with green infrastructure and its impact on water quality and economic opportunities. For over 20 years, I have worked on and promoted the use of green infrastructure techniques that promote economic, social and ecological sustainability.

Today, I am representing the American Society of Landscape Architects, of which I am a long-time member and was recently inducted into its Council of Fellows – the Society's highest honor. Also known as ASLA, the Society represents more than 16,000 members nationally, with local chapters in every state across the country. To become a landscape architect generally requires a four-year degree in landscape architecture, along with a rigorous testing and licensing process in each state. During our formal education and training, landscape architects are specifically trained in hydrology, grading, drainage and environmental sciences, which make us uniquely qualified to lead the process to identify and incorporate green infrastructure techniques that address stormwater management and other water quality issues in an integrated and sustainable manner into our neighborhoods and cities.

Greening of Chicago

It is widely known that the City of Chicago is currently one of the shining examples of how "greening" a city has yielded tremendous ecological and economic results. In the last decade, we have seen green infrastructure in Chicago expand dramatically, including approximately 7 million square feet of green roof space, several million square feet of porous pavement, 500,000 trees planted, and 280 miles of new median planters on parkways and neighborhood streets.[1] According to the City of Chicago's Department of Environment, this has resulted in a city with cooler ambient temperatures in summer months, reduced stormwater flows into an aging grey infrastructure system, the creation of new businesses to support this emerging green industry, increased tourism, and an overall more "livable city." My firms have worked closely with the City Department of the Environment, the Chicago Park District, and others as part of this greening effort over the past ten years.

Chicago City Hall Green Roof

More than a decade ago, I, along with my colleagues at Conservation Design Forum, led the design process to convert the Chicago City Hall rooftop into a green roof pilot project. CDF's scope for this unique project included design of the green roof system as well as grading and drainage design and plant selection. The project was a component of the Chicago Department of Environment's Urban Heat Island Initiative and was sponsored by the United States Environmental Protection Agency to study certain effects of green roof technologies.

Back in 1999, when we began construction of the City Hall green roof, there were no local contractors that had experience with green roofs, and only three green roof systems available to specify. Today, I

[1] United States Environmental Protection Agency, Smart Growth and Urban Heat Islands, accessed online September 25, 2010, (http://ideas.usda.gov/ago/ideas.nsf/0/2380D67EE371E126862577AB005404AF?OpenDocument).

work with over 2 dozen local, mostly small business, contractors and suppliers of green roof systems, components, materials, and plants. These companies make the green roof components, deliver the materials and install these complex green infrastructure systems, and then maintain the systems to ensure optimal performance. What we are seeing in Chicago is the creation of an industry that did not exist 10 years ago. We're not only creating sustainable buildings, alleys, streets, and neighborhoods; we are creating good paying sustainable local jobs that capitalize on the talents and expertise of local workers.

Several nationally-based green roof system suppliers are based in Chicago, and have been established in the decade since the Chicago City Hall green roof project. American Hydrotech is a Chicago-based roofing company that is also a leader in green roof systems. They have helped to promote and develop the green roof industry, and their products are now installed throughout the country. Tecta America, headquartered in Skokie, Illinois, also specializes in green roofs and is currently the largest union roofing contractor in the United States. The company started in 2000 – at the inception of the City's greening initiatives - with about 1,000 employees and now employs about 3,500 roofing professionals. [2] Midwest Trading, based in Virgil, outside of Chicago, now provides green roof media for numerous green roof projects regionally, as well as structure soil for green streetscapes.

Greencorps Chicago

Because of Chicago's success in developing a healthy green industry sector, there is a growing demand for green jobs. To help meet this demand, the City has created *Greencorps Chicago*, a job training program that provides diverse environmental trades training for some of the city's most economically-disadvantaged citizens. Participants are trained in environmental remediation, landscaping, maintenance and a host of other green jobs that are sorely needed throughout the city. Greencorps trainees have performed maintenance of green infrastructure and landscapes on many projects planned or designed by my company, including Chicago Park District projects, schools, restored native landscape systems, and green roofs, including the Chicago City Hall green roof.

Chicago River Master Plan

As part of its *Water Agenda*, the City of Chicago announced that "traditional engineering fixes are not enough to manage stormwater and protect water quality. A combination of upgrading our built infrastructure **and** creating a green infrastructure will demonstrate forward-thinking ways to reduce the burden on our sewer system and keep stormwater in the environment. "[3] So the city embarked on a major campaign to employ green infrastructure wherever feasible to help limit stormwater flowing into its combined sewer system. Restoring parks, wetlands, and woodlands is a major part of the strategy.

The Chicago Park District hired my firm to prepare the *Chicago River Master Plan: Connecting People to the River*," which helped to identify restoration projects for over 40,000 linear feet of the Chicago Shoreline. Along with being "sponges" for stormwater, these parks and open spaces also help to connect the people with Chicago's natural environment and provide unique recreational opportunities along the river. This project, together with numerous other green infrastructure strategies the City is employing, is helping Chicago to attain its goal of reducing stormwater runoff by up to fifty percent.

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[2] Stern, Cassandra and Schneider, Keith, "Greening Chicago One Roof at A Time," Apollo News Service, January 28, 2008. (http://apolloalliance.org/rebuild-america/signature-stories-energy-efficiency/greening-chicago-one-roof-at-a-time/).

[3] City of Chicago Office of Water, Chicago's Water Agenda 2003, p. 18, accessed online September 23, 2010 (http://www.cityofchicago.org/content/dam/city/depts/water/general/CmsrOffice/wtrAgenda/wateragenda_1.pdf).

Woodlawn Center South

Green infrastructure also plays a critical role in redevelopment efforts. Currently, my firm is engaged in the Woodlawn Center South project, an affordable housing preservation project in Chicago. Phase one of the project will construct two multi-family units that will anchor future development of the neighborhood. My firm joined the design team to provide integrated landscape and stormwater design services. Studies have shown that incorporating sufficient green space and green infrastructure can significantly increase real estate values of surrounding areas.[4]

Adding green space to the city has proven to be a smart approach to signify investment and pride in neighborhoods in Chicago. Developers hunting for the next up-and-coming neighborhood keep a close eye on investment in the City in the form of planters along boulevards, upgraded parks, and street beautification. [5] We've seen these small public investments leverage millions in private money, and a greener more sustainable Chicago to boot.

Iowa Green Streets Initiatives

Green infrastructure and low impact development approaches are equally effective in small towns. And during these economically trying times, small towns are particularly looking for innovative ways to spur economic growth and development. The Iowa Department of Economic Development (IDED) through its Green Communities Pilot Program offered grants and technical assistance to 2 pilot cities in Iowa - West Union and Woodbine.

Downtown West Union, Iowa

IDED and West Union called upon Conservation Design Forum to plan and implement the Iowa Green Streets Pilot Project, a community-wide sustainability initiative to serve as a catalyst for further investment in historic Downtown West Union. CDF designed and will help implement the complete renovation of 6 downtown blocks, replacing aging water, storm and sanitary sewer infrastructure. The project's integrated approach, which will serve as a model for other communities, showcases state-of-the-art sustainable design strategies including permeable pavers, rain gardens, energy efficient lighting, and a district-wide geothermal heating and cooling system. The project began with an initial community planning workshop in June 2008, where a series of sustainable strategies were proposed and evaluated within the context of West Union's long-term community vision.

We project that small businesses in West Union will benefit from lower electric bills, increased foot traffic from the sidewalk improvements, and West Union will continue to see interest from additional small businesses seeking to relocate to its downtown. National research backs up what the small businesses in West Union are telling us. Green streets are an important contributor to a positive downtown retail experience in large and small towns alike. In a survey, consumers claimed they were willing to pay 9 percent more in small cities and 12 percent more in large cities for equivalent goods and services in business districts having trees. Visitors also claim they will pay more to park on streets with trees[6].

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[4] Dixon, K. K., & K. L. Wolf, 2007, Benefits and Risks of Urban Roadside Landscapes: Finding a Livable, Balanced Response, Proceedings of the 3rd Urban Streets Symposium (June 24-27, 2007), Washington, DC, Transportation Research Board of the National Academies of Science.

[5] Loder, Angela, "Chicago's Green Renaissance," Greening the City.com, accessed September 25, 2010 (http://greeningthecity.wordpress.com/chicagos-green-renaissance/)

[6] Wolf, Kathy, *Trees Mean Business: City Trees and The Retail Streetscape*, Main Street News http://www.naturewithin.info/CityBiz/MainStreetNews_Aug09_Trees.pdf accessed online September 23, 2010

But the benefits of the green streets extend beyond curbside appeal. We anticipate significant heating and cooling cost savings, a drastic reduction in stormwater runoff, and increased real estate values in the surrounding areas. Further, the improvements to the local hydrology and water quality will also have a positive impact on Otter Creek, a destination trout stream for Midwest anglers, who spend their tourism dollars in West Union and the surrounding area. Currently, the stream must be re-stocked and is fished out in a few short weeks. By providing stable, healthy aquatic habitat, the stream will be able to support the reproduction of trout and other aquatic species once again.

Historic Charles City, Iowa

The downtown historic residential and business district of Charles City, Iowa like many large and small cities is facing crumbling infrastructure, including an aging stormwater system. Charles City retained CDF to develop a comprehensive plan to address their decaying streets and stormwater issues and evaluate the expected performance of the existing and proposed system.

In consultation with residents and the local government, we designed a permeable streets plan for a 16 block area of the city that features permeable paving, parkway bioretention, bioretention intersection narrowings, and infiltration beds. We modeled the hydrologic design to capture stormwater runoff from the streets, yards and alleys and provided for the complete infiltration of a 2-year storm event, and 90 percent retention of a 10-year storm event. We're about 90 percent complete on this project and we are already seeing virtually zero runoff, even in heavy rains. After implementing our integrated green strategies, a neighborhood susceptible to periodic localized flooding has seen no flooding.

Also, by improving the water quality through natural filtration we are helping to provide clean base flow to the Cedar River, where the city is also implementing a whitewater kayaking course through the removal of two dilapidated low-head dams in a location just south of Main Street. The City expects this added recreational feature will help draw additional visitors to shop and dine in the downtown district, and to enhance the image and desirability of Charles City as a livable community.

Iowa Green Streets Training Program

Because of the enthusiastic response to the West Union and Charles City projects, the Iowa Department of Economic Development has also retained CDF to consult with additional cities. Earlier this year, I delivered a webinar available state-wide, and subsequently visited 25 small town *Main Street* organizations to share preliminary training and technical advice on how to make their main streets green streets.

Detroit East Riverfront District Sustainable Redevelopment Guidelines

Finally, my firm, Conservation Design Forum, and landscape architects more broadly, help "cities in transition," plan for future sustainable development.

To improve water quality in the Detroit River, which was subject to wastewater contamination as the result of combined sewer overflows, the City of Detroit asked us to develop green urban design and redevelopment guidelines to be incorporated into the city's redevelopment plans. The Detroit East Riverfront plan is comprehensive; it recommends sustainable practices in urban design, pedestrian orientation, streets and surfaces, water management, landscapes, exterior lighting, materials, energy efficiency, and interior environments. If implemented as envisioned, this would create one of the first, and most visible, green urban districts in the nation.

Detroiters Working For Environmental Justice

CDF is also working with local organizations, including the Detroiters Working for Environmental Justice (DWEJ) to provide opportunities to retrain unemployed citizens in the construction, operations, and maintenance of green infrastructure. DWEJ is committed to using green jobs for long-term employment and quality-of-life solutions. Launched in 2007, the program has successfully placed over 90% of its graduates in green-related occupations. This training program serves the unemployed, underemployed, ex-offenders and college graduates. The green jobs placement ranges from geo-thermal driller assistants to construction laborers. DWEJ has partnered with a number of leading companies, including MASCO, and is supported by a broad base of foundations and agencies, including the Ford Foundation, the Kresge Foundation.

An essential aspect of green job training is the availability of actual, "in-the-ground" examples of the type of green systems that the training is about. The Detroit Sustainability Center will transform a vacant building and site in the Detroit area with leading-edge green practices, and provide classroom and demonstration space for people to see and work on a wide range of green practices, including green roofs, porous pavement, and bioretention systems. It will showcase the application of green systems that have been proven to be best adapted to Southeast Michigan's environmental conditions and business climate.

Many landscape architects and other design professionals see the retrofit of Detroit's infrastructure in a green, sustainable fashion as a critical link to local job creation, providing for daily needs, and its overall evolution to become a healthy, economically and technologically competitive city of the future.

Conclusions

There is great need throughout the country to update, repair, and replace our crumbling infrastructure. There is a great need to improve water quality, habitat, fisheries, and recreation space. And most important, there is a great need to re-employ Americans in valuable, meaningful work.

So why green infrastructure? Why Low Impact Design? Simply put, these are better performing, longer lasting and cost efficient resources that provide multiple benefits. Integrated green infrastructure combines leading-edge, living technology with local art, craft, and skill to help restore our neighborhoods and cities to be healthier, more beautiful, and ultimately more economically and ecologically sustainable over time.

Landscape architects and other design professionals have successfully incorporated green infrastructure solutions in our communities for many decades. As a profession, we stand ready to assist communities of all sizes in reaping the many benefits of green infrastructure.

I encourage the members of this Subcommittee and their staff to visit the green roof at ASLA's headquarters located at 636 Eye Street, NW. There you can see first-hand a local example of a successful green infrastructure project that is helping the District of Columbia address its combined sewer overflow problem, as well as cleaning the air and providing energy cost savings for our organization.

I thank you for the opportunity to testify in front of this Subcommittee and I especially want to thank Chairwoman Johnson for convening a hearing on this issue. I also want to thank Congressman Russ Carnahan, an honorary member of ASLA, for his work on this issue and to Congresswoman Donna Edwards from Maryland for taking a leadership role in highlighting varied ways that green infrastructure can help our communities. Thank you.

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