Better, Cheaper, Greener

Advancing Next Generation - Higher Performing, Lower Cost Green Infrastructure (GI) Design, Technologies And Alternative Financing Strategies To Support Sustainable Urban Stormwater Retrofits

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Water Protection Division
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MARYLAND STORMWATER SYMPOSIUM

Overview

- Definition of GREEN INFRASTRUCTURE (GI)
- WHY Use a GI Approach –Background/Drivers
- Examples of GI Practices & Designs
- GI's Multiple Benefits
- EPA-Sponsored National Expert Roundtable
- Next Generation High Performance GI Technologies
- Alternative Financing Via Performance-Based Public Private Partnerships

What is Green Infrastructure?

Green infrastructure is an approach that communities can choose to:

Maintain healthy waters,

Provide multiple environmental benefits, and

Support sustainable communities

Unlike single purpose gray stormwater infrastructure, which uses pipes to dispose of rainwater, green infrastructure uses vegetation and soil to manage rainwater where it falls.

How is EPA Defining Green Infrastructure?

"Green infrastructure refers to **an array of technologies, approaches, and practices that protect and use natural systems or systems engineered to mimic natural processes, to manage rain water as a resource,** to solve combined sewer overflows (CSOs) and sanitary sewer overflows (SSOs), enhance environmental quality and achieve other economic and community benefits."

Green

Vs

Gray

Gray Infrastructure

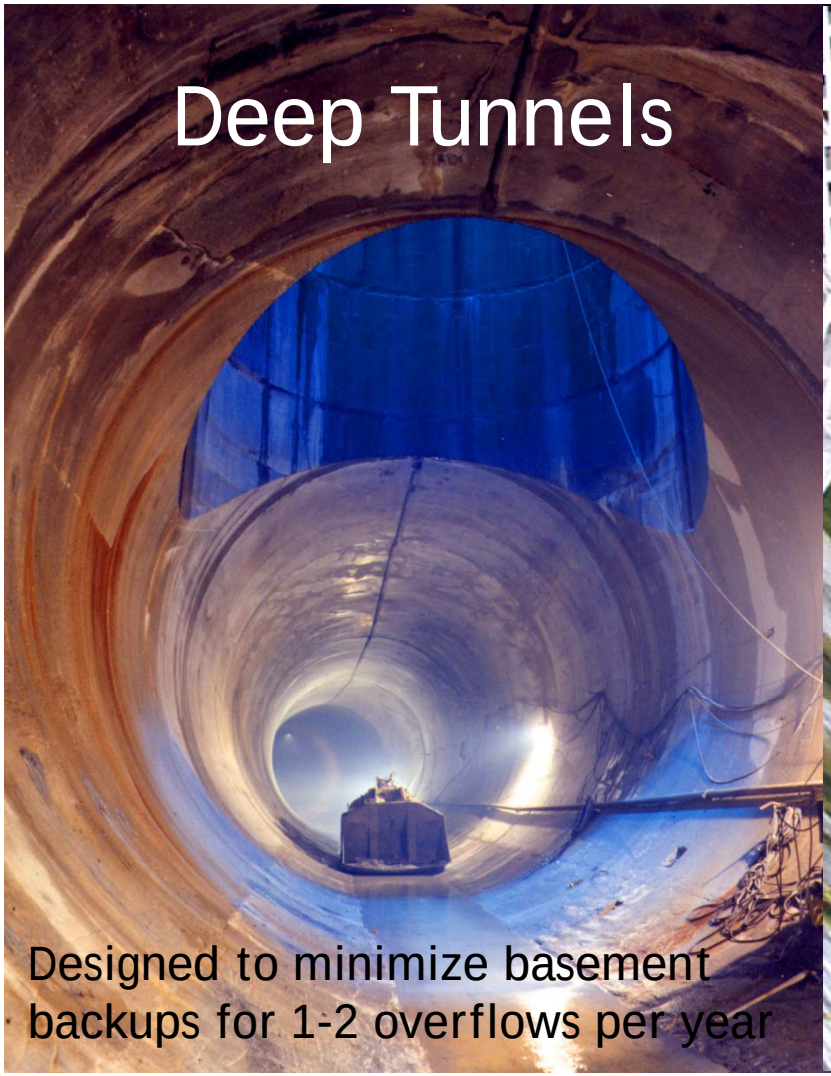


Photo credit: Kevin Shafer, MMSD

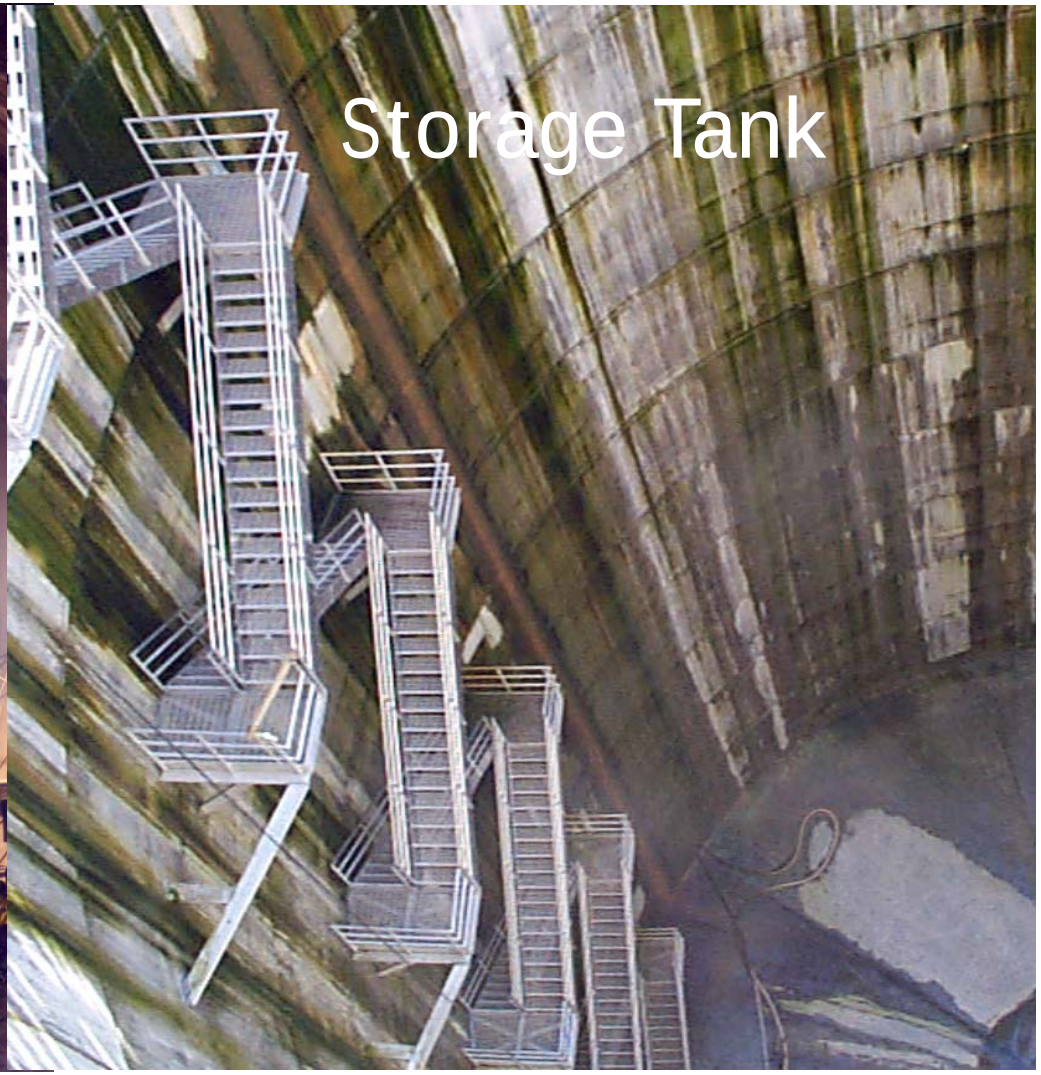


Photo credit: NRDC

Failing Gray Infrastructure

The Traditional Storm Water Approach

- Brick and mortar solutions
- Slow pace of permit renewals and retrofit due to “sticker shock”
- Highly engineered solutions – Detention Vs. Retention

- Storm Water as pollution –

Green Infrastructure is a Paradigm Shift:

Rain as a Resource, rather than a Waste

- Ground water recharge
- Enhance stream base flow
- Stormwater capture and use
- Augment water supplies

Why Green Infrastructure?

Urban Stormwater is a Leading Source of Water Quality Impairment

Urban stormwater identified as source of impairment (2004 WQ Report)

- 22,559 miles of impaired rivers and streams
- 701,024 acres of impaired lakes
- 867 square miles of impaired estuaries

Stormwater pollutants

Sediments, nutrients, metals, temperature, trash, bacteria

Cause beach closures and swimming illnesses

Impact fisheries and shellfish harvesting

Increase the costs of treating drinking water supplies

Hydrologic impacts

- Increased stormwater volume can cause
  - flooding, scouring and sewer overflows
- Reduce groundwater recharge

Impacts to Human Health and the Environment

- Combined Sewer overflows
- Beach closures and swimming related illnesses
- Impact to fisheries and shellfish harvesting
- Increased water treatment costs
- Hydrologic impacts
  - Scouring
  - Reduced groundwater recharge

Why Use A GI Approach?

The USGS estimates that the country loses six billion gallons of clean drinking water each day, or 14% of all that is used, through leaky pipes in need of repair.

The American Society of Civil Engineers 2009 *Report Card for America's Infrastructure* rated both the nation's drinking water and wastewater infrastructure a D-, the lowest grades given to any public infrastructure.

Why Use A GI Approach?

Our nation's water infrastructure is in desperate need of improvement

Communities across the country identified the need for $300 billion in wastewater and $335 billion in drinking water infrastructure improvements for capital expenditures alone over the next 20 years. *(SOURCE: EPA 2008 Clean Water Survey - estimates do not include O&M)*

Why Use A GI Approach?

US communities are facing a total of $106 billion in needed stormwater management and combined sewer correction upgrades or improvements.

(SOURCE: EPA 2008 Clean Water Survey - estimates do not include O&M)

Why Use A GI Approach?

There are further complications resulting from climate change.

Warmer waters foster pathogen growth - increased demands for drinking water disinfection.

Increased wet weather and big storms will demand more treatment and threaten our water supplies.

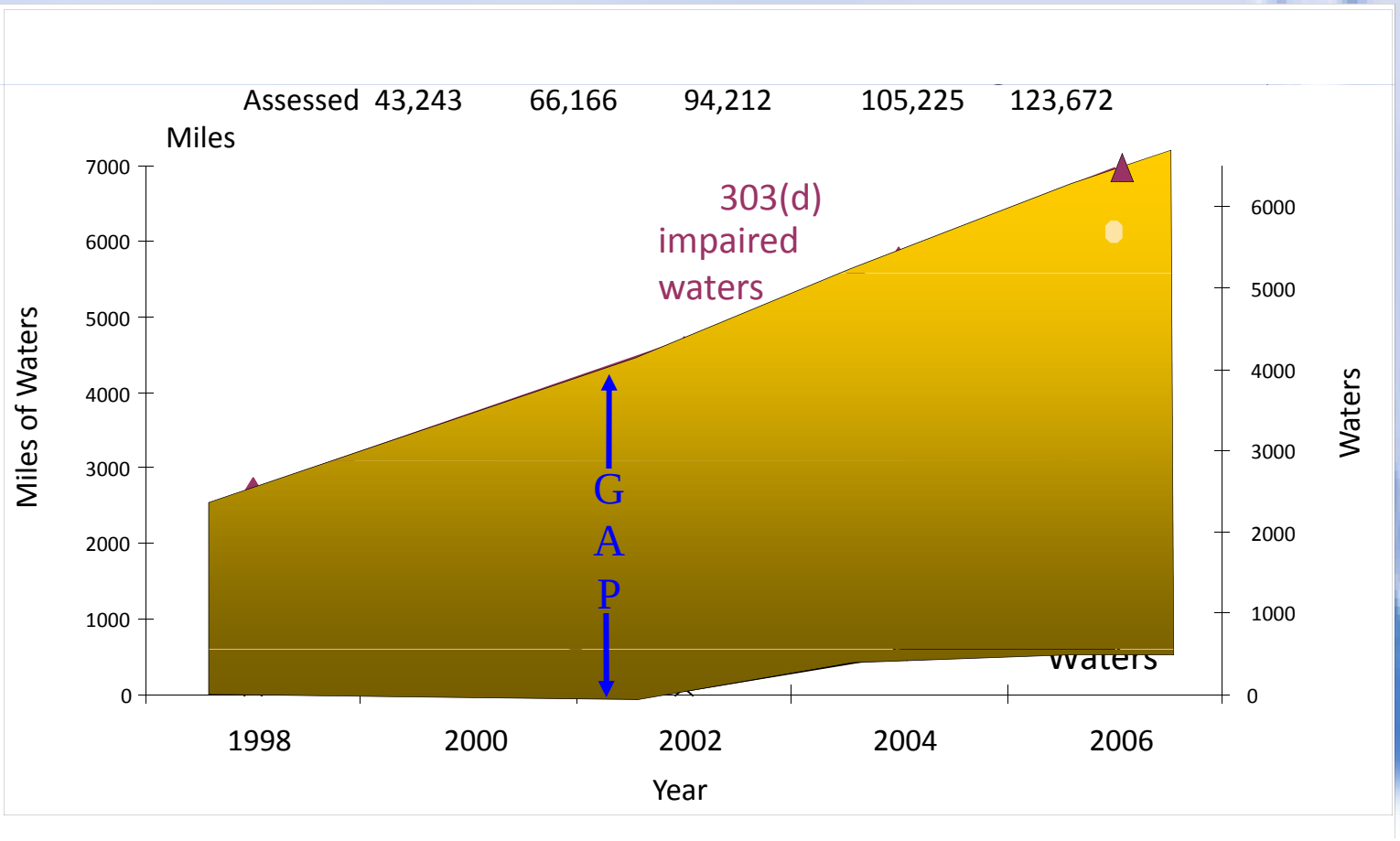
Significant water shortages in the coming five years.

Annual flood damages in the U.S. - increased from $1 billion in the 1940's to $5 billion in the 1990's.

WHY GO GREEN!?

❖The GAP WIDENS - between impaired waters and restored waters!

Region III Rivers and Streams Trend Analysis



Negative Progress in Urban Sector Threatens Investments in Other Sectors

Chesapeake Bay TMDL Pollutant Reduction Targets (% from 2009 baseline) by Jurisdiction for the Urban Sector

	Nitrogen	Phosphorus	Sediment
Delaware	13.1%	12.3%	5.1%
District of Columbia	12.8%	21.9%	16%
Virginia	13%	21.5%	29.6%
West Virginia	NNI	NNI	NNI
Maryland	**24.2%**	**28.2%**	**29.3%**
Pennsylvania	41.1%	44.8%	50.4%

The LIMITS on Cities and Towns to Meet the Challenge

- Traditional Urban Retrofit methods are difficult and costly
  - Reported as high as $300k per acre by Montgomery Co MD
- Pace of Controls: Costs can be greatly reduced if work is accomplished on pace with redevelopment or maintenance schedules
  - Will this pace get the job done on time? (2025?)
- Affordability thresholds come into play as well with severe economic stress - -2% of MHI used as a guide
- Limits on Municipal Financing Options for Controls
  - Municipal bonding authority has caps
  - Storm Water Utility fees not always available
  - Fees not at a level to get the job done





Solutions for the Future are GI-Driven

- **Watershed-Driven Green Techniques**
- **Volume –Driven Performance Targets**
- **EZ Tools for States and Muni's**
- **Next Generation GI & New Financing Approaches**

Promising New Developments

Bay States Get Stronger Regulatory Tools

Stop the Bleeding through tools for New Development and Redevelopment – PA Act 167 & Senate Bill 1261, MD ESD, DC

Storm Water Regs and MS4, DE Regs…

Impervious Fee Requirements for Phase I Communities in Maryland (May 2012)

Innovative and Green MS4 Permit Renewals – DC, Montgomery Co MD, WV Phase II

* performance standards, GI milestones, retrofit

Summary State Stormwater Regulations

	MD	PA	VA	DE	DC	WV
New Development	**1"- 2.6" OSR depending on soils and imperviousness; 5,000 sq ft (state-wide reg)**	New development woods in good condition for 2 year-24 hour storm, which varies, but approx 1.5" OSR; 1 acre generally, but 5,000 sq ft for discharges to high quality waters (state-wide reg)	OSR not required. New rules (in full effect in 2014) include std extended detention & phosphorus limits; OSR is optional for meeting phosphorus limits. (state-wide reg)	Predevelopment hydrology (OSR) in draft (state-wide reg)	1.2" OSR; 5,000 square feet (District-wide reg, driven by the permit)	1" OSR (in MS4s, per permit)
Redevelopment	**Same as above (state-wide reg)**	Similar approach, but less stringent (state-wide reg)	Similar approach, but less stringent (state-wide reg)	Similar (state-wide reg)	Same as above (District-wide reg)	1" OSR, reductions for certain development (permit)
Retrofit	**20% drainage area within Phase I MS4s; performance target is forest pollutant loads. (permit)**	PAG-13 does have a TMDL planning requirement that could drive retrofits; no target/performance has been stipulated (permit)	Not yet, though there's a WIP commitment to include specific requirements in reissued MS4 permits this year and next year with specific performance objectives (permit)	No	Over 5 yrs: 350,000 ft^2 green roofs; net increase of 4,150 trees annually; addn'l 18 million sq ft drainage retrofit to meet the 1.2" std (permit)	No

OSR: on-site retention

GI Solutions Address Multiple Benefits

- Impacts to human health and the environment
- Regulation
- Flooding
- Cost / Benefit: Cities are interested in the multiple benefits of green
  - Multiple Benefits / Triple Bottom Line
  - “Livability”
  - Becoming green leaders
  - Cities want to be seen as green

GI Solutions Have a Growing Business Case – 10's of $$$$ Billions

CSO LTCPs with Green Elements

- Portland, Or
- Seattle, WA
- Cincinnati OH
- Kansas City MO
- Lansing MI
- Louisville KY
- Milwaukee, WS
- New York City
- Philadelphia PA
- Washington, DC

CITY OF PHILADELPHIA

CSO - Long Term Control Plan

Green City, Clean Waters

~**10,000** greened acres

~**8 billion** gallon reduction (in overflow volume)

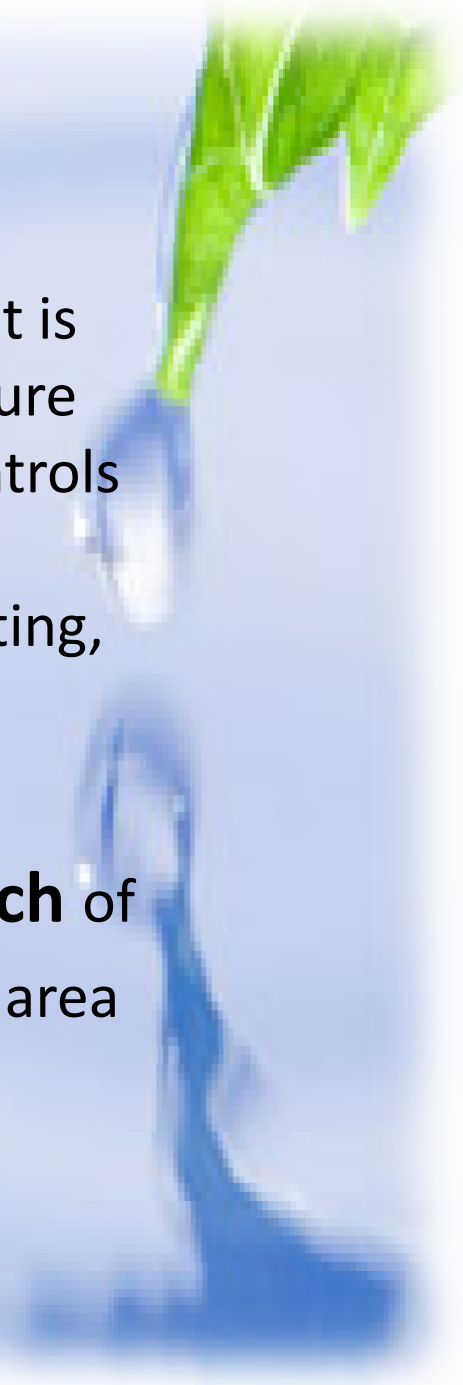
~**25** years

~**$800 million - $ 1.2 Billion**

Philadelphia's Greened Acre

A Greened Acre is an acre of impervious cover that is retrofitted to utilize Green Stormwater Infrastructure (GSI) which manages stormwater using source controls such as infiltration,evaporation, transpiration, decentralized storage, alternative stormwater routing, reuse and others.

One **Greened Acre** is equivalent to **one inch** of managed stormwater from **one acre** of drainage area or **27,158 gallons of managed stormwater**.



GI Drivers --- The Business Case

CITY OF PHILADELPHIA

~10,000 greened acres,
~8 billion gallon reduction in overflow volume

Jobs -**250 people employed** annually
Recreation -**10% more recreation** and stream related visits
Property Values -$390M increase to homes near parks and green areas
Heat Related **Fatalities -140 fewer**
Premature Deaths -1-2 avoided / yr
Asthma Attacks -20 avoided / yr
Missed Days of School / Work -250 fewer / yr
Carbon Dioxide Emissions -**1.5 Billion lbs** avoided/absorbed
Water Quality and Habitat Improvements **-$8.5M**

Cost Savings

Table 2. Summary of Cost Comparisons Between Conventional and LID Approaches

Project	Conventional Development Cost	LID Cost	Cost Difference	Percent Difference
2nd Avenue SEA Street	$868,803	$651,548	$217,255	25%
Auburn Hills	$2,360,385	$1,598,989	$761,396	32%
Bellingham City Hall	$27,600	$5,600	$22,000	80%
Bellingham Bloedel Dono	$52,800	$12,800	$40,000	76%
Gap Creek	$4,620,600	$3,942,100	$678,500	15%
Garden Valley	$324,400	$260,700	$63,700	20%
Kensington Estates	$765,700	$1,502,900	–$737,200	-96%
Laurel Springs	$1,654,021	$1,149,552	$504,469	30%
Mill Creek	$12,510	$9,099	$3,411	27%
Prairie Glen	$1,004,848	$599,536	$405,312	40%
Somerset	$2,456,843	$1,671,461	$785,382	32%
Tellabs Corporate Campus	$3,162,160	$2,700,650	$461,510	15%

15-96% Cost Savings

[a] The Central Park Commercial Redesigns, Crown Street, Poplar Street Apartments, Prairie Crossing, Portland Downspout Disconnection, and Toronto Green Roofs study results do not lend themselves to display in the format of this table.

[b] Negative values denote increased cost for the LID design over conventional development costs.

[c] Mill Creek costs are reported on a per-lot basis.

Reducing Stormwater Costs through LID Strategies and Practices, EPA 2007

GI=Smarter Stormwater Management

Traditional approach

- Convey stormwater quickly from site to MS4 system, detention pond or directly to waterbody.
- Manage peak flows for flood control, drainage and large scale downstream erosion.

New approach

Integrate green infrastructure in the design of the project

- View stormwater as a resource.
- Slow down the flow, allow to infiltrate.
- Reduces pollutant loads to waterbodies.
- multiple community benefits

Green Infrastructure Approaches

Infiltration - Evapotranspiration - Capture & Use

- Protecting areas with natural ecological functions
- Impervious cover removal
- Bio retention
- Permeable pavements
- Green roofs
- Cisterns & rain barrels
- Green Streets
- Trees & expanded tree boxes
- Reforestation & restoration
- Infill & Redevelopment
- Alternative parking & street designs

Importance of Design

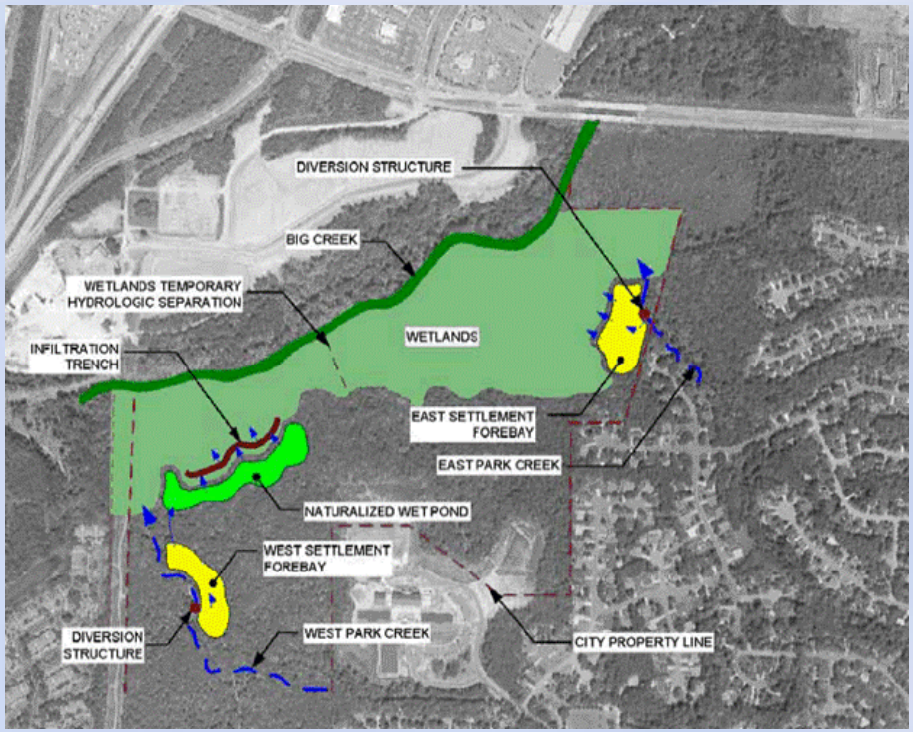
Design is crucial with respect to whether or not performance standards can be met.

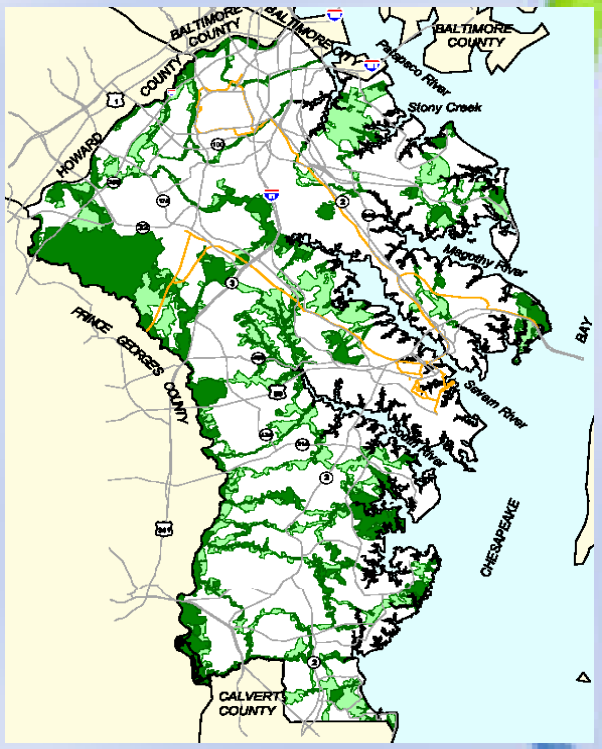
Not all ‘green’ is created equal: some practices look green, but do not necessarily function green.

Maximizing retention is important, so think about design details for each application.

Simple designs often mean simple construction and maintenance.

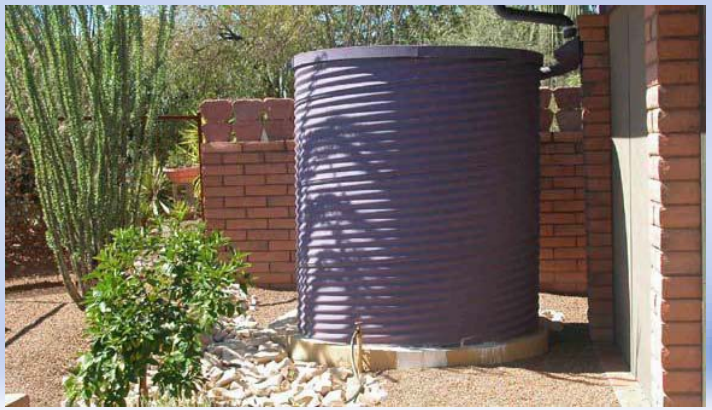
GI – Watershed Scale Practices





GI – Site Level practices

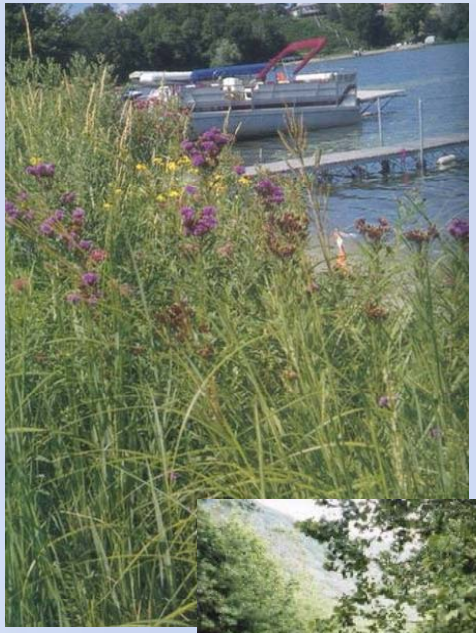
- Bioretention
- Permeable pavements
- Green roofs
- Cisterns & rain barrels
- Trees & expanded tree boxes
- Alternative parking & street designs…



Rain Gardens

Vegetated Swales

Vegetated Buffers & Landscaping

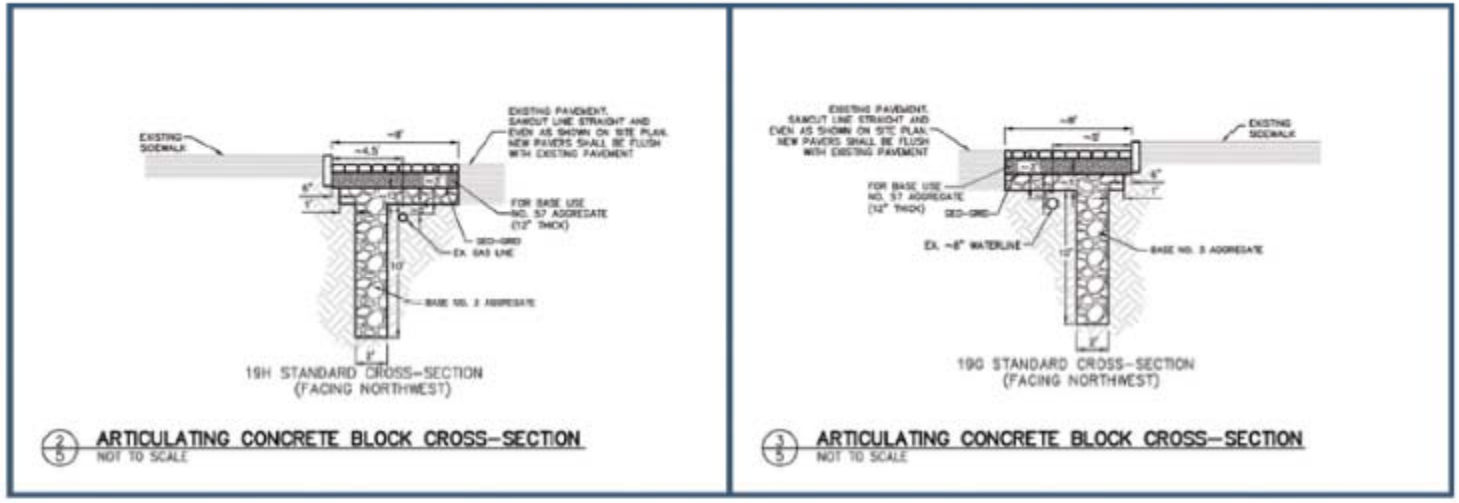


Bio infiltration

Southport Broadwater, Australia

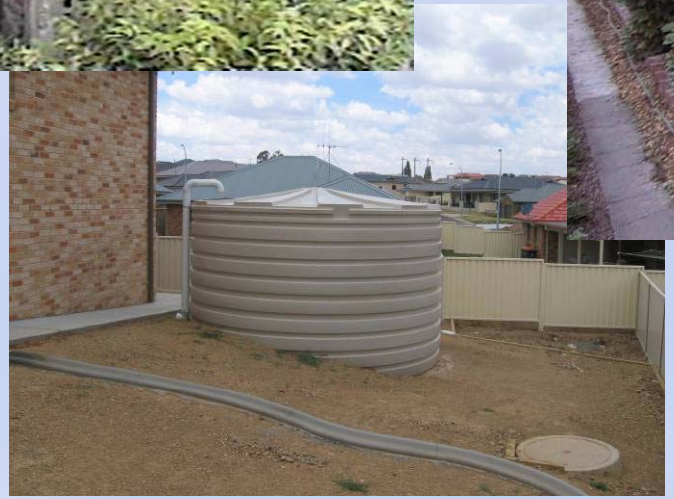
Image from AECOM Presentation

Permeable and Porous Pavements



Sub-pavement infiltration trenches can be designed to avoid exiting utilities. Research by M. Borst & R. Brown shows that infiltration through the sides of the trench make this an effective shape.

Rainwater Harvesting & Re-Use

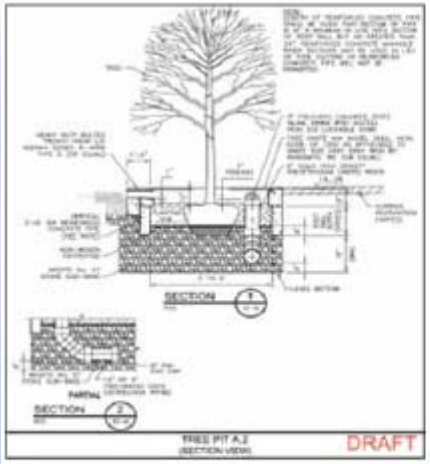


Green Roofs

Gempale Foshen, Foshen China

Image from AECOM Presentation

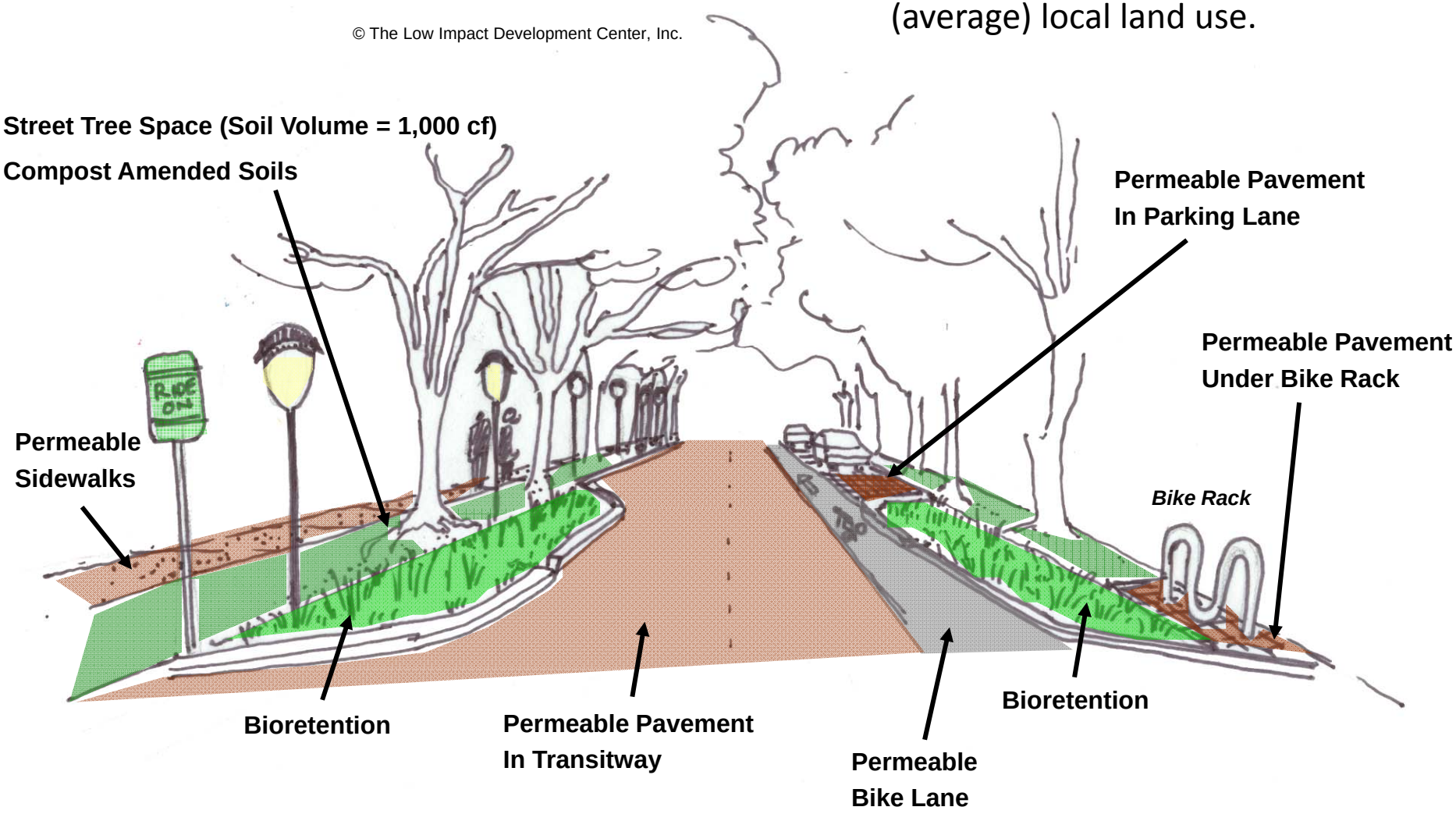
Green Streets




CITY OF PORTLAND
PUBLIC WORKS


Focus on Green Streets – Strategic & Essential!

Streets make up 25-30% (average) local land use.



CHESAPEAKE BAY

GREEN STREETS GREEN JOBS INITIATIVE

ANACOSTIA PILOT

Major Elements of a "Green Street"

- Minimizes impact on the surroundings through a natural systems approach.
- Integrated system of stormwater management to increase infiltration or filtration of runoff, reduce flows, reduce urban heat island effects, and enhance watershed health;
- Makes the best use of the street tree canopy for stormwater interception and air quality improvement;

green streets, green jobs initiative

CHESAPEAKE BAY

GREEN STREETS GREEN JOBS INITIATIVE

ANACOSTIA PILOT

Major Elements of a "Green Street"

- Uses clean, renewable energy (e.g. wind, solar) for street lighting
- Uses recycled materials – in "green construction"
- Encourages pedestrian and/or bicycle access; and
- Provides an aesthetic advantage to a community and improves economic viability

green streets, green jobs initiative

CHESAPEAKE BAY
ANACOSTIA
GREEN STREETS, GREEN JOBS, GREEN TOWNS

ACADEMY

Jobs
Livability
Environment!

Greening Towns by Greening Infrastructure & the Economy

green streets,
green jobs initiative

CHESAPEAKE BAY

GREEN STREETS GREEN JOBS INITIATIVE

ANACOSTIA PILOT

"The Green Streets-Green Jobs initiative demonstrates another commitment in the Executive Order strategy to address stormwater pollution. We are partnering with towns and communities in urbanized areas not only promoting environmental protection, but also creating green infrastructure, renewable energy use and green jobs." ***EPA Administrator Lisa P. Jackson***

- Developed under the President's May 2009 Chesapeake Bay Executive Order Strategy
- To provide technical and financial assistance to communities in urbanized watersheds
- To reduce stormwater runoff, improve energy conservation, promote livable communities, and create Green jobs
- Through the creation of green streets.

Chesapeake Bay Trust, State of Maryland, and US EPA 2013 Chesapeake Bay Green Streets-Green Jobs-Green Towns (G3) Grant Program Application Package

www.chesapeakebaytrust.org / 410-974-2941

Deadline:
March 22, 2013

EPA Convened an Experts Roundtable – Seeking Ways to Better Assist Local Jurisdictions

Tapping National Experts in a GI Network to Define New Affordable Solutions

LID/GI Workshop – April 23-24, 2012

Summary of Key Recommendations

Advancing Next Generation – Cost-Effective, Higher Performance LID/GI

- **Provide Incentives and programmatic drivers for innovative LID/GI technologies.**
- **Use more robust, performance-based design standards for Better, Cheaper, Greener technologies.**
- **Promote Public- Private Partnerships to optimize all available technical and financial resources to reduce cost burdens to local government**
- **Streamline the BMP technology Verification Processes to accelerate innovative solutions.**
- **Consider Long-Term Asset Management when selecting technologies and determining long-term costs.**
- **Revisit Federal and State Grants (including Sec. 319) to support alternative affordable business models for successful local government urban retrofits.**
- **Use Energy Sector as a role model for advancing a cost-effective, performance driven GI/LID model to implement the Bay TMDL.**

Two Basic Strategies
Reducing Urban Retrofit Costs

Improve Technologies.

"Next Generation LID / GI Technologies"

There is a need and there are opportunities.

Alternative Financing

"PPP Business Model"

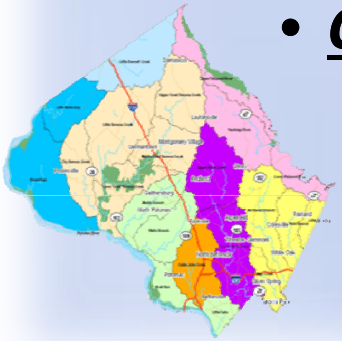
Better leverage public and private funding and use of market forces to drive down costs, increase value, create jobs and promote innovation.

Montgomery County

Challenge: Retrofit 4300 Acres to MEP

Initiative:

- Approximately 3800 acres of traditional structural stormwater retrofits
  - approximately 250 projects, mostly stormwater ponds
  - Cost: $20,000 to $40,000 per impervious acre
- Approximately 500 acres of environmental site design (ESD) (limited LID approach)
  - approximately 500 projects including bioretention, Rainscapes, etc.
  - ***Cost: $150,000 to $300,000 per impervious acre***



Costs and Water Quality Benefits

							Permit/TMDL Targets	
Watershed	Fiscal Year	2015	2017	2020	2025	2030	2017	2020
Countywide	Impervious Treated (acres)	4,302	6,014	7,722	10,518	11,154	6,008	7,723
	ESD (% Impervious)	18%	34%	47%	60%	63%		
	Cost (Million $)	305	622	987	1,687	1,884		
	ESD (% Cost)	53%	66%	70%	80%	80%		
	Nitrogen	18%	25%	36%	46%	51%	9%	20%
	Phosphorus	17%	23%	34%	44%	46%	12%	34%
	Sediment	23%	34%	54%	60%	62%	20%	37%
	Bacteria	11%	15%	20%	28%	30%		
	Trash	18%	26%	33%	41%	42%		

Next Generation LID / GI

Lower Cost @ ~ $40 k Acre for 1”+
More Efficient
More Reliable
Greater value

Focus on:

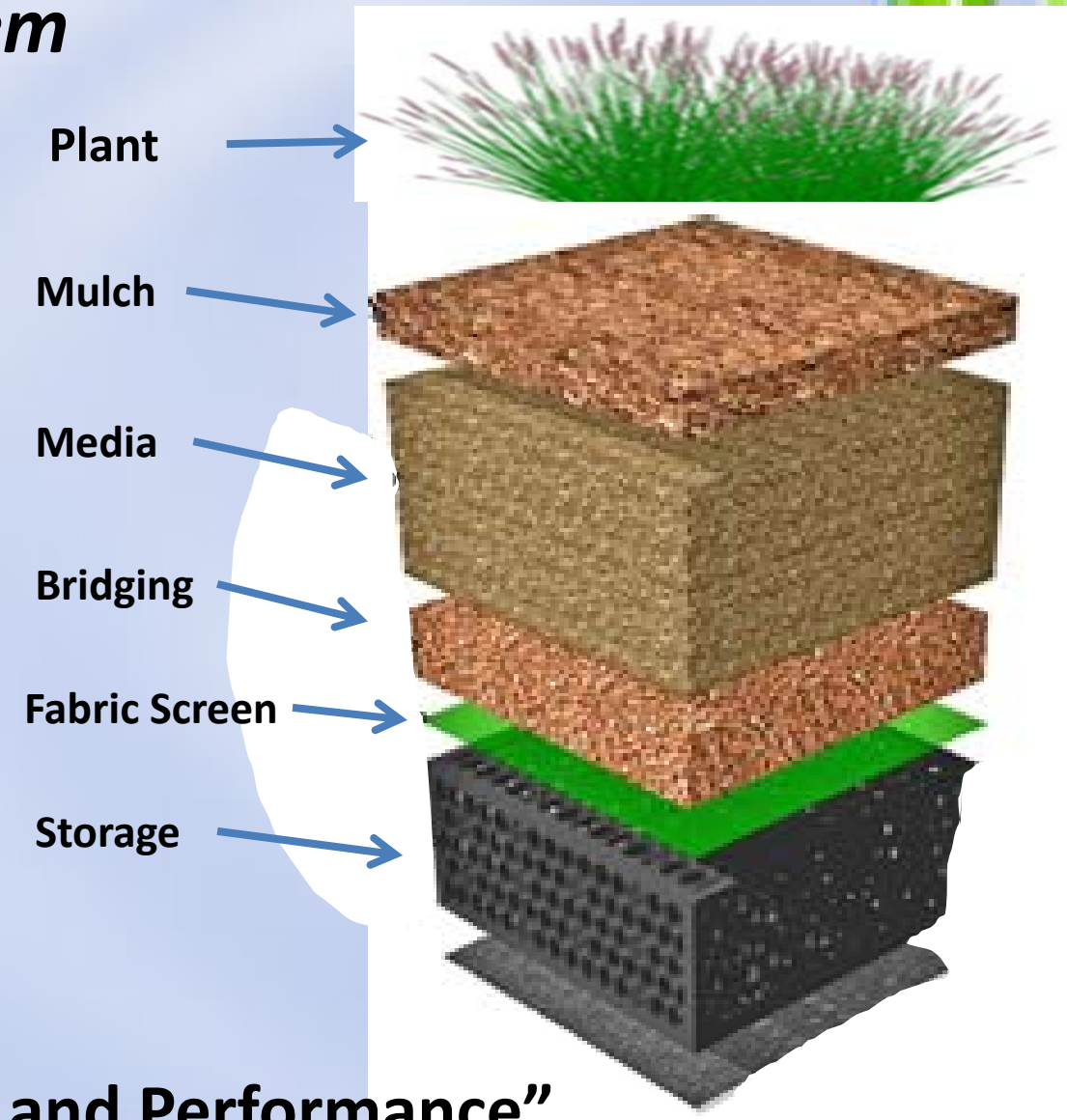
Next Generation High Performance Green Infrastructure

- Maintenance friendly designs
- Smaller footprint
- High flow media and storage
- Using modular designs that can still respond to variations in site conditions

Example of the Next Generation Urban Bioretention System

Characteristics

- Generic
- Modular
- Small foot print
- High performance media
- Robust design (AASHTO)
- Certifications (pre / post)
- QA / QC
- Tight specifications
- Optimized storage
- Easy maintenance
- Easy inspection
- Easy management
- Performance standards



"Market Driven Cost and Performance"

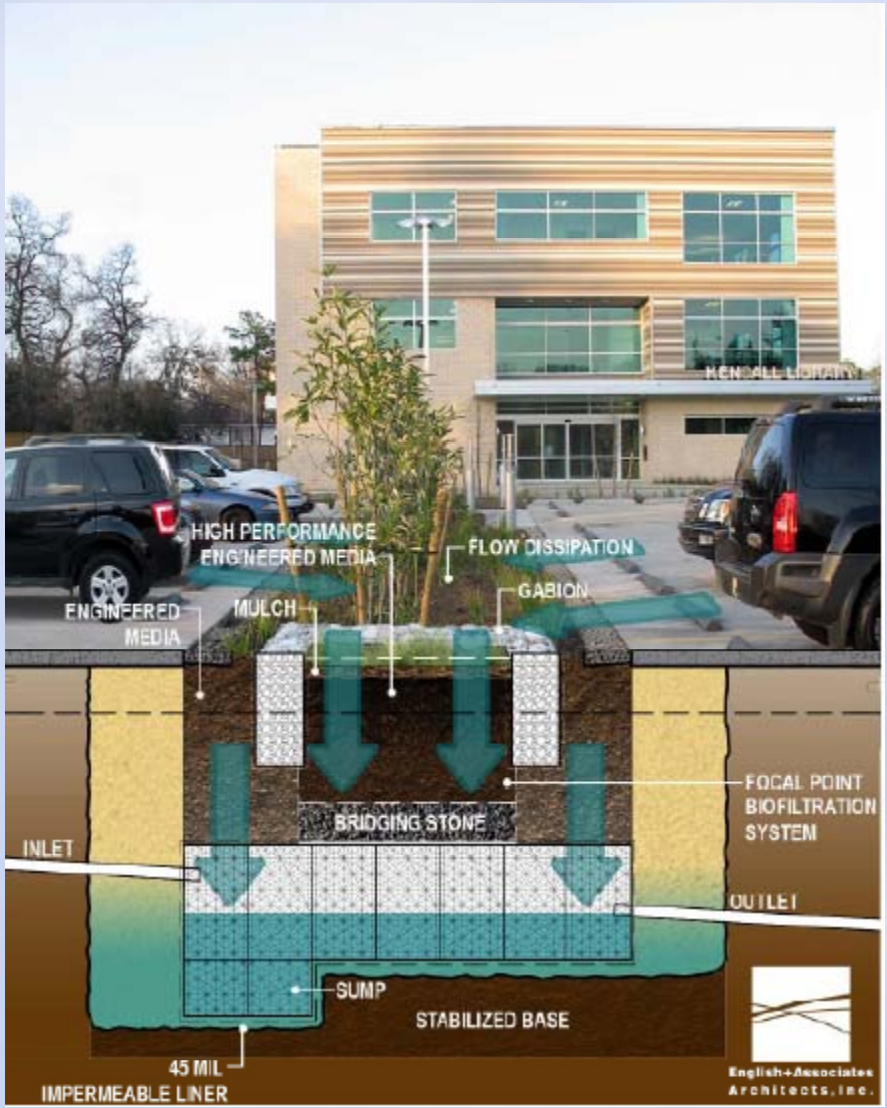

HIGH PERFORMANCE
ENGINEERED MEDIA
FLOW DISSIPATION
GABION
ENGINEERED
MEDIA
MULCH
FOCAL POINT
BIOFILTRATION
SYSTEM
BRIDGING STONE
INLET
OUTLET
SUMP
STABILIZED BASE
45 MIL
IMPERMEABLE LINER
English+Associates
Architects, Inc.

Table 2: Estimated Construction Costs for Rooftop Retrofit Techniques (2006 $ per cubic foot treated)			
Rooftop Retrofit Technique	Median Cost	Range	Design & Engineering (%)
Simple Disconnection [1]	$ 2.00	$1.00 to $3.00	5
Rain Barrel [2]	$ 25.00	$ 12.50 to $ 40.00	5
French Drain/Drywell [3]	$ 12.00	$ 10.50 to $13.50	5
Rain Garden [4]	$ 4.00	$ 3.00 to $ 5.00	5
Installed Rain Garden [5]	$ 10.00	$ 5.00 to $ 10.00	32
Bioretention Cell [6]	$ 30.00	$ 25.00 to $40.00	32

Conventional Bioretention surface area = 5%

Next Gen Bioretention = .4%

Factor of 100 improvement

Benefits - less excavation, disturbance, maintenance area and space used.

Conventional Bioretention void space storage = 30%

Next Gen Bioretention Storage = 95%

Factor of 3 improvement

Benefits – less excavation, disturbance, easier to maintain and replace.

Technology Recommendations

All LID / GI technologies can be improved and optimized for efficiency and economy though more flexible standards. Some of the featured practices included:

- Infiltration techniques
- Increasing Interception
- Disconnection
- Detention strategies
- Optimize Sheet flow
- Harvesting and use
- Green roofs
- Vegetated swales
- Bioretention techniques
- Filtration systems
- Treatment trains use
- Manufactured Products
- Porous pavements
- Amended soils in green space

FINANCING - Recommendations

Basic Finding - No shortage of money

- NYC, Philadelphia, Chicago, DC, and hundreds of other municipalities pursuing GI as an alternate to constrained gray infrastructure
- Investment banks, financiers see innovation in stormwater as an emerging market
- Stormwater credit and contract trading markets being established (GLPF, Ches Bay, DC)

Geosyntec consultants

National Experts Roundtable – Financial Findings and Directions

Most promising financing option – Privately financed Public / Private Partnerships.

Examples of government utilizing public private partnerships to more cost effectively finance, build and manage public infrastructure -

- **Toll roads -** ttps://www.thetollroads.com/assets/objects/207/6_15_06_LeCG_Toll_Road_Study.pdf
- **Military Housing** - http://www.afcee.af.mil/resources/housingprivatization/index.asp
- **Solid waste** - http://www.environmentalistseveryday.org/solid-waste-management/privatization-saving-money-maximizing-efficiency/index.php
- **Wastewater** - http://ncppp.org/resources/papers/wastewater_omi.pdf
- **Recycling** - http://www.republicservices.com/Corporate/GovernmentMunicipalities/republic-services-privatization.aspx

MES is a model PPP!

Lt. Governor Brown, Joint Committee on Oversight of Public-Private Partnerships Submit Recommendations to Governor and General Assembly

ANNAPOLIS, Md. (January 10, 2012) – Today, the Joint Legislative and Executive Commission on Oversight of Public-Private Partnerships, chaired by Lt. Governor Anthony G. Brown, submitted to Governor Martin O'Malley and the General Assembly a series of recommendations for streamlining and enhancing the framework for establishing public-private infrastructure projects in Maryland.

Initial estimates by Maryland departments overseeing capital projects have found that additional utilization of public-private partnerships could contribute between six percent and ten percent, or $205 million and $315 million respectively, of Maryland's $3.1 billion annual capital budget while creating as many as 4,000 jobs. This includes an estimated $160 million to $240 million annually that could be invested in Maryland transportation projects through public-private partnerships.

Definition PPP

Innovative involvement of the private sector through a "*contractual agreement*" between a public agency and a private sector entity that allows for the private sector participation in the financing, planning, design, construction, operation, maintenance, rehabilitation and replacement of urban retrofit facilities.

Can reduce costs to government from 20-50+ %

Areas for Cost Savings

- Procurement
- Permitting
- Design
- Construction
- Maintenance

Benefits

"Mutual Rewards"

Local Government

- No capital outlay.
- No increase in staff.
- Reduced risks.
- Reduced Cost up to 50%.
- No bond or debt service.
- Phase in fees.
- Control performance.
- Demand added values.
- Quicker completion.

Private Entity

- Low risk source of income.
- Hire local vendors.
- Performance rewards.
- Reduced Admin costs.
- Taxes, finance cost, banking trading
- ROI long-term.
- Technology innovations.
- Experience is more competitive.
- Private sector efficiencies.

Public Private Partnership

Design

Build

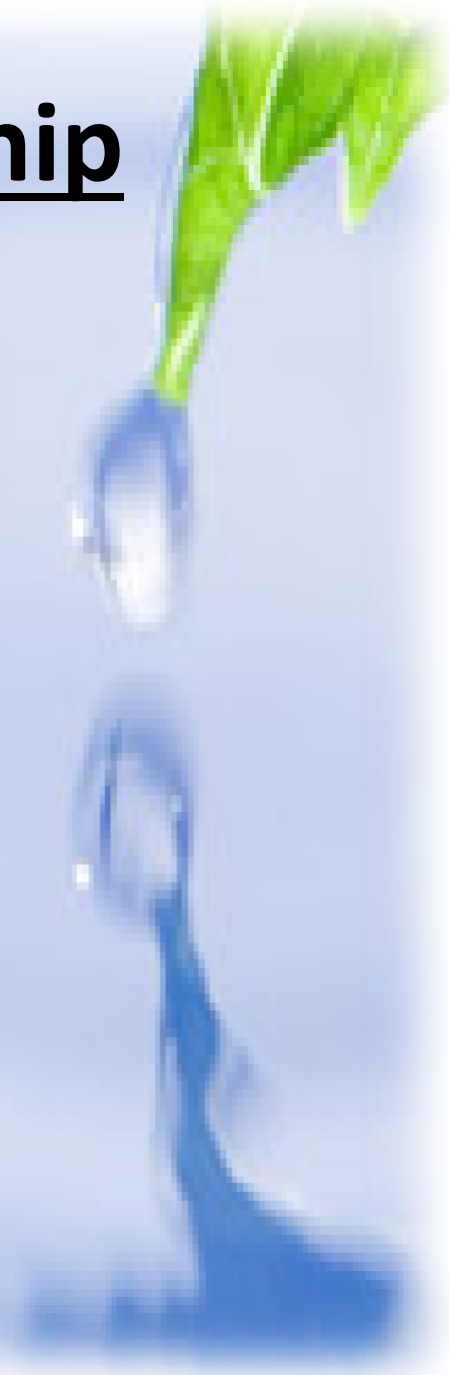
Finance

Operate

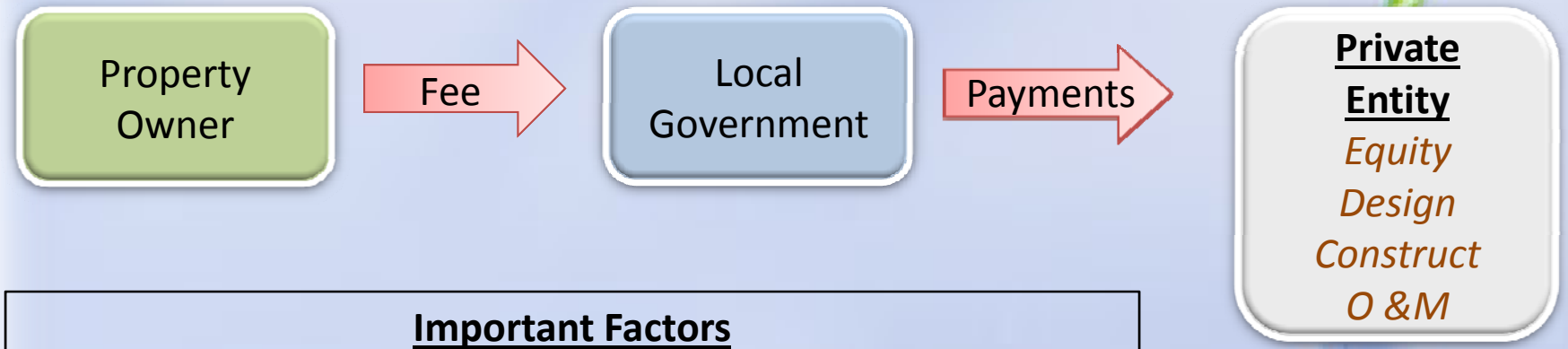
Maintain

DBFOM

"Performance Contract"



Performance Based
DBFOM
Urban Retrofit Program Model



Important Factors

- Dedicated Stormwater funding (fee or taxes).
- Competitive bidding for “best value”.
- L.G. controls revenue and manages DBFOM “contract”.
- L.G. pays Private Entity as retrofits go online.
- L.G no capital outlay.
- Incentives to use best technologies and practices.
- Reduce risks for L.G.
- Opportunity to optimize economic, environmental & social benefits.

Keys to Success
from NCPPP

- Public Sector Champion
- Statutory Environment
- Public Sector Contract Administration
- Detailed Comprehensive Contract
- Dedicated Revenue Stream
- Stakeholder Support
- Pick Partner Carefully (trust)
  - Best value most trusted not lowest price!

The Contract is a Key to Success

"A PPP is a contractual relationship between the public and private sectors for the execution of a project or service. This contract should include a detailed description of the responsibilities, risks, benefits and remedies of both the public and private partners. Such an agreement will increase the probability of success of the partnership." - NCPPP

Financing Recommendations

The ways to generate reliable revenues to ensure success include:

- Property Tax
- Utility Fee
- Fee-in-lieu
- Special Assessments
- Fee for services

Financing Recommendations

Other funding resources can play an important role in urban retrofit.

- Grants
- Banking and trading
- State Revolving Loans
- User fees
- Service Fee Credits
- Multi-jurisdictional funding
- Cost-sharing with other public programs
- Broader private sector participation

EPA Near-Term Follow-Up Actions

Establishing Partnerships with States & Bay Watershed Communities to Show the Path

- Prince George's County, Montgomery County MD, DC, Lancaster, PA, (Philadelphia may also serve as model), others(?)
- Tapping NGO Partnerships and private sector expertise to assist
- Linking Green Streets/Green Towns work task to this - incentive funding, training, tech-transfer

Public Private Partnership Initiative - Sustainable Urban Retrofit P3 Pilots

- **First Pilot Partner– Maryland & Prince George's County**

Targeting a 40+% reduction in the current estimated cost of $ 1 Billion for stormwater retrofits to address the Bay TMDL

Public Private Partnership Initiative –

Sustainable Urban Retrofit P3 Demonstrations

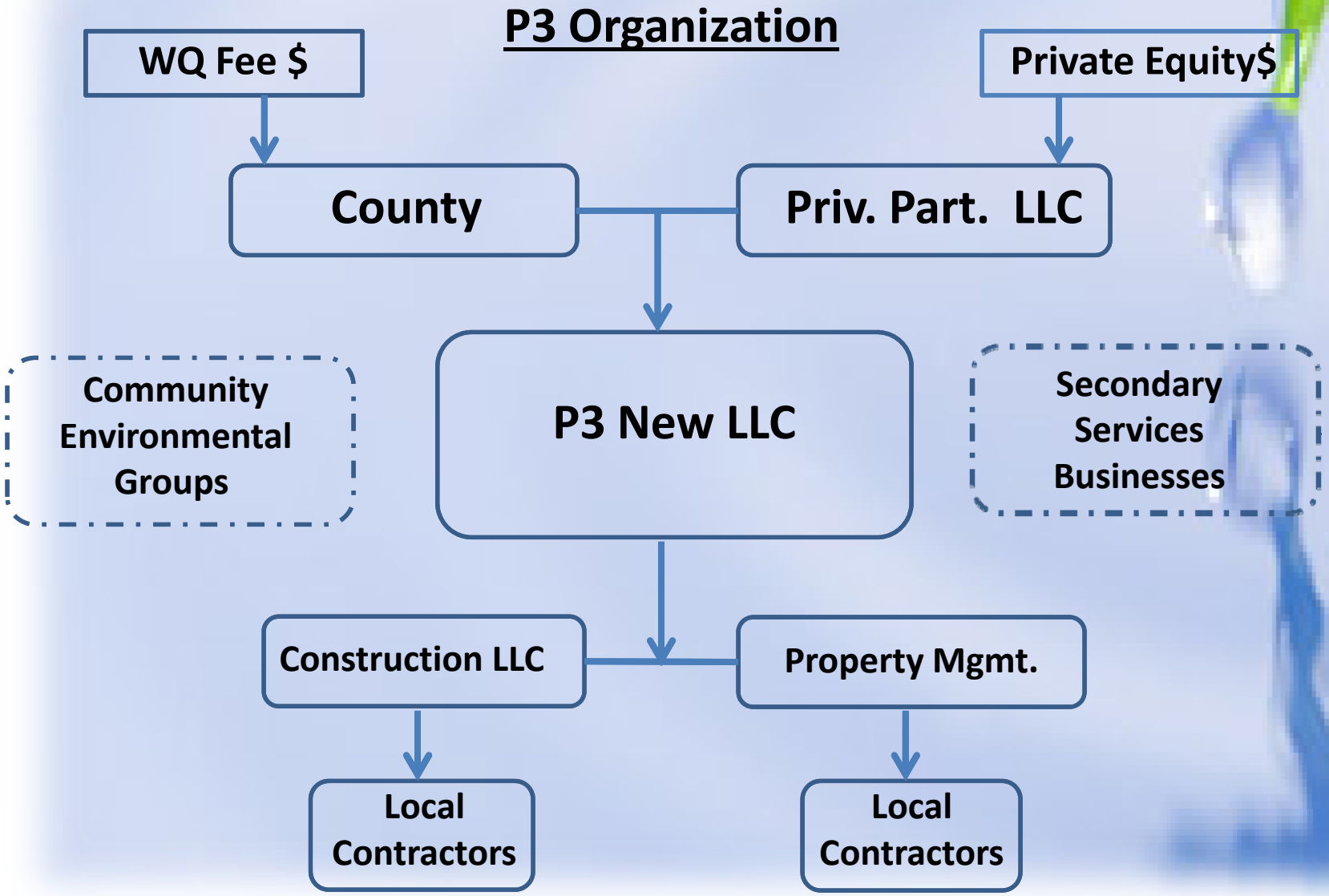
- **Evaluate the Following**
  - Best market drivers
  - Transfer of risk
  - Leverage (funding / predictability / term)
  - Innovation (permitting / design / construction / technology/ etc.)
  - Business and Job Creation
  - Financing - longer terms
  - Less staff - Capacity

Public Private Partnership Initiative - Sustainable Urban Retrofit P3 Pilots

- Issues
  - Technology - innovation and verification
  - Legal – LLC Structure
  - Transparency & Oversight
  - Cost Savings - Reinvested
  - Flexibility - Change as required
  - Sustainability / Social / Community
  - Ancillary Programs and Spin-offs

Public Private Partnership Initiative

EPA Region 3 –
Developed "Boilerplate"
P3 Framework - Option



PPP Resources

Experience is Transferable

- National Council of Public Private Partnerships
  - http://www.ncppp.org/
- Federal Highway Administration
  - http://www.fhwa.dot.gov/ipd/p3/index.htm
- Department of Defense Privatized Military Housing
  - http://www.afcee.af.mil/resources/housingprivatization/index.asp
- Solid Waste
  - http://www.environmentalistseveryday.org/solid-waste-management/privatization-saving-money-maximizing-efficiency/index.php
- Wastewater
  - http://www.gao.gov/products/GAO-10-728
- Recycling
  - http://www.republicservices.com/Corporate/GovernmentMunicipalities/republic-services-privatization.aspx
- World bank
  - http://ppp.worldbank.org/public-private-partnership/

Final Thoughts

GI is about **INNOVATION & COLLABORATION – so is the Chesapeake Bay!**

It's time to do things **Differently** in order to meet today's demands and tomorrow's challenges. Green stormwater management is an **EMERGING MARKET!**

The U.S. (& Mid-Atlantic!) is filled with **innovators** and **problem solvers**.

Creativity, Collaboration, and Commitment are pivotal to saving our natural resources and **ensuring a sustainable future for our Communities**!!

Better,
Cheaper,
GREENER

Thank You!

MARYLAND STORMWATER SYMPOSIUM

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