MS4
MUNICIPAL SEPARATE STORM SEWER SYSTEMS

Purpose – Regulatory Landscape
Municipal Responsibility
Benefits
Authority

July 17, 2013 – Martinsburg, WV
Why is there a municipal stormwater regulatory program?

- NURP study in late 1970’s
- Urban runoff loaded with pollutants
- Urban runoff Leading cause of water quality problems in US.
- Phase I (stormwater rule) enacted by Congress in 1987
- Phase II enacted by Congress in 1999
- WV’s first MS4 permit issued in March 2003
NPDES Regulations (permitting)

- Falls under the full authority of the Clean Water Act
- Fully Enforceable

- National Pollutant Discharge Elimination System = NPDES
Why?
Purpose of the MS4 program?

- To improve urban water quality and promote clean water
- Humans need clean water.
Clean water matters
Municipal Responsibilities (MS4 program):

Activities

- Scheduling,
- Documentation of your activities,
- Meeting deadlines, *(annual report)*
- Keeping abreast of technologies,
- Training and education opportunities,
- Implementation of the six minimum control measures,
- Educating new elected officials when administration changes,
- Getting people involved
Management of the MS4 program is a full time job.

Managers must understand the permit requirements, statutes, be an educator, sales person, field technician, sleuth, researcher, technical writer, politician, negotiator, leader, and….?
Seven program components

1. Public Education
2. Public Outreach
3. Illicit Discharge Detection and Elimination
4. Construction site runoff control
5. Stormwater management at New and Re-Development sites
6. Good Housekeeping
7. Impaired stream and TMDL requirements
MS4 program – six distinct program components

Public Education and Outreach – Educator, trainer, researcher, behavior analyst, social marketer, +
Public Involvement – Event planner, educator,

Illicit Discharge Detection and Elimination – Sleuth, investigator, enforcer, field technician, researcher for the Ordinance, salesperson,
Construction site runoff control – Researcher for the ordinance, diplomat, field inspector, enforcer, educator, +

Stormwater Management for new and re-development – Researcher, salesperson, technical writer, plan reviewer, record keeper, field inspector, enforcer, educator, +

Good Housekeeping at Municipal Operations – housekeeper, technical writer, educator, field inspector, mediator, negotiator, +
Let's not forget - TMDLs and Impaired water bodies:

monitoring
recordkeeping,
Analyzing impacts

All Minimum Control Measure require that you evaluate the effectiveness.
The Benefits of a dedicated funding stream

- Clean water. Clean water is something that all citizens need.

- Managing stormwater (polluted) runoff proactively will improve the quality of life for residents.
What if this was your backyard?
Quality of Life?
Benefits

- Formation of a stormwater utility demonstrates that the municipality is committed to managing stormwater.

- A stormwater utility provides the financial means for the municipality to address and undertake actions to manage stormwater that can reduce nuisance flooding.
In providing and implementing management measures to promote cleaner water – nuisance flooding will be reduced and quality of life will improve
Benefits

- A stormwater utility makes it possible to invest in infrastructure and conduct projects in a way that supports local jobs.

- A Utility creates a fair mechanism for paying for repairs and improvements to the storm sewer system – And, for implementing a mandated environmental program (MS4).
Benefits

- A stormwater utility provides a dedicated funding stream to support the administration and implementation of stormwater management requirements and activities.

- Provides the capacity to maintain compliance with Federal and State stormwater regulations.
Authority

- West Virginia State Code – Chapter 8-20-10

“"The governing body of a municipality availing itself of the provisions of this article shall have plenary power and authority to make, enact and enforce all necessary rules for the repair, maintenance, operation and management of the combined system of the municipality and for the use thereof.”

Combined system means a “combined waterworks, sewerage and stormwater system...”
Authority

- Chapter 8-20-10

“A municipality has the plenary power and authority to charge the users for the use and service of a combined system and to establish required deposits, rates, fees or charges for such purpose.”
The municipality and any county government, state government and federal government served by the services of the combined system shall be subject to the same rates, fees or charges established in this article...

Except – DOH is not subject to the fees.
Clean water matters

Questions?
Watershed Implementation Plan

Opportunities in Disguise

Sebastian Donner – Stormwater Specialist
WV Department of Environmental Protection
Division of Water and Waste Management
Non Point Source Program
Sebastian.Donner@wv.gov
Nitrogen, Phosphorous, Sediment Reductions for Chesapeake Bay

2002 – Chesapeake Bay Program Water Quality Initiative Memorandum of Understanding
2004 – Cooperative and Voluntary Tributary Strategies (WV 33% N, 35% P, 6% Sediment reductions by 2010)

NOT ACHIEVED -> Implementation of TMDLs
2010 – WIP I
2012 – WIP II
2017 – Progress evaluation and WIP III
2025 – Load reductions achieved
WIP- Combined Efforts

- Agriculture
- Forestry
- Wastewater
- Developed Lands
Focus

- US EPA
- Chesapeake Bay Program
- WV DEP
- Local government
- Watershed groups
- Special Interests
- Citizens
Basic Common Goals
Getting Started – What is Stormwater?

Rain or melting snow flowing over the ground entering into lakes and streams.
THE BASIS FOR THIS DESIGN REQUIREMENT IS TO PROVIDE A SIMPLE IMPLEMENTATION STANDARD FOR PROTECTING THE PHYSICAL, CHEMICAL, AND BIOLOGICAL CHARACTERISTICS OF RECEIVING WATERS.
Annual Pollutant Load Reduction

Annual Load = Annual Runoff Volume (X) EMC

Two Components:

1. Annual Runoff Volume
   - “Stormwater 101”; TR-55, Simple Method
2. Event Mean Concentration (EMC)
   - Pollution within Land Use

Therefore, reducing one or both of these factors will result in a reduced annual load.
Soil Survey of Morgan County, West Virginia

Urban Hydrology for Small Watersheds
TR-55

To show bookmarks which navigate through the document.
Click the show/hide navigation pane button, and then
click the bookmarks tab. It will navigate you to the contents,
chapters, rainfall maps, and printable forms.
Annual Runoff Volume

1. Meteorology
   - NOAA Based Data

2. Soils / Land Cover
   - NRCS / USDA Field Survey Based Data

Diagram:
- Funnel
- Overflow cylinder
- Measuring device

Image: Pizza slices and a pizza box.
Table 2-2a  Runoff curve numbers for urban areas

<table>
<thead>
<tr>
<th>Cover type and hydrologic condition</th>
<th>Average percent impervious area</th>
<th>Curve numbers for hydrologic soil group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td><strong>Fully developed urban areas (vegetation established)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open space (lawns, parks, golf courses, cemeteries, etc.)&lt;sup&gt;3&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor condition (grass cover &lt; 50%)</td>
<td>68</td>
<td>79</td>
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<tr>
<td>Fair condition (grass cover 50% to 75%)</td>
<td>49</td>
<td>69</td>
</tr>
<tr>
<td>Good condition (grass cover &gt; 75%)</td>
<td>39</td>
<td>61</td>
</tr>
<tr>
<td>Impervious areas:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paved parking lots, roofs, driveways, etc. (excluding right-of-way)</td>
<td>98</td>
<td>98</td>
</tr>
<tr>
<td>Streets and roads:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paved; curbs and storm sewers (excluding right-of-way)</td>
<td>98</td>
<td>98</td>
</tr>
<tr>
<td>Paved; open ditches (including right-of-way)</td>
<td>83</td>
<td>89</td>
</tr>
<tr>
<td>Gravel (including right-of-way)</td>
<td>76</td>
<td>85</td>
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<tr>
<td>Dirt (including right-of-way)</td>
<td>72</td>
<td>82</td>
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<tr>
<td>Western desert urban areas:</td>
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<tr>
<td>Natural desert landscaping (pervious areas only)</td>
<td>63</td>
<td>77</td>
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<tr>
<td>Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)</td>
<td>96</td>
<td>96</td>
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<tr>
<td>Urban districts:</td>
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<td></td>
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<tr>
<td>Commercial and business</td>
<td>85</td>
<td>89</td>
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<tr>
<td>Industrial</td>
<td>72</td>
<td>81</td>
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<tr>
<td>Residential districts by average lot size:</td>
<td></td>
<td></td>
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<tr>
<td>1/8 acre or less (town houses)</td>
<td>65</td>
<td>77</td>
</tr>
<tr>
<td>1/4 acre</td>
<td>38</td>
<td>61</td>
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<tr>
<td>1/3 acre</td>
<td>30</td>
<td>57</td>
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<tr>
<td>1/2 acre</td>
<td>25</td>
<td>54</td>
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<tr>
<td>1 acre</td>
<td>20</td>
<td>51</td>
</tr>
<tr>
<td>2 acres</td>
<td>12</td>
<td>46</td>
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<tr>
<td><strong>Developing urban areas</strong></td>
<td></td>
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<tr>
<td>Newly graded areas (pervious areas only, no vegetation)</td>
<td>77</td>
<td>86</td>
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</table>
EMC = Land Use/ Land Cover Pollution Load

Jefferson County, West Virginia

... not $E=MC^2$
<table>
<thead>
<tr>
<th></th>
<th>All Data</th>
<th>Residential</th>
<th>Commercial</th>
<th>Industrial</th>
<th>Freeways</th>
<th>Open Space</th>
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<tbody>
<tr>
<td># of Storms Sampled</td>
<td>3,765</td>
<td>1,042</td>
<td>527</td>
<td>566</td>
<td>185</td>
<td>49</td>
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<tr>
<td>Median Event Mean Concentrations (mg/L or ppm, except where noted)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>TDS</td>
<td>80</td>
<td>72</td>
<td>72</td>
<td>86</td>
<td>77.5</td>
<td>125</td>
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<tr>
<td>TSS</td>
<td>59</td>
<td>49</td>
<td>43</td>
<td>81</td>
<td>99</td>
<td>48.5</td>
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<tr>
<td>BOD₅</td>
<td>8.6</td>
<td>9.0</td>
<td>11.0</td>
<td>9.0</td>
<td>8.0</td>
<td>5.4</td>
</tr>
<tr>
<td>COD</td>
<td>53</td>
<td>54.5</td>
<td>58</td>
<td>58.6</td>
<td>100</td>
<td>42.1</td>
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<tr>
<td>Fecal Coliform¹</td>
<td>5,091</td>
<td>7,000</td>
<td>4,600</td>
<td>2,400</td>
<td>1,700</td>
<td>7,200</td>
</tr>
<tr>
<td>NO₂ + NO₃</td>
<td>0.60</td>
<td>0.60</td>
<td>0.6</td>
<td>0.69</td>
<td>0.28</td>
<td>0.59</td>
</tr>
<tr>
<td>TKN</td>
<td>1.4</td>
<td>1.5</td>
<td>1.5</td>
<td>1.4</td>
<td>2.0</td>
<td>0.74</td>
</tr>
<tr>
<td>Total N</td>
<td>2.0</td>
<td>2.1</td>
<td>2.1</td>
<td>2.09</td>
<td>2.28</td>
<td>1.33</td>
</tr>
<tr>
<td>Dissolved P</td>
<td>0.13</td>
<td>0.18</td>
<td>0.11</td>
<td>0.10</td>
<td>0.20</td>
<td>0.13</td>
</tr>
<tr>
<td>Total P</td>
<td>0.27</td>
<td>0.31</td>
<td>0.22</td>
<td>0.25</td>
<td>0.25</td>
<td>0.31</td>
</tr>
<tr>
<td>Dissolved Cu²</td>
<td>8.0</td>
<td>7.0</td>
<td>7.57</td>
<td>8.0</td>
<td>10.9</td>
<td>--</td>
</tr>
<tr>
<td>Total Cu²</td>
<td>16</td>
<td>12</td>
<td>17</td>
<td>20.8</td>
<td>34.7</td>
<td>10</td>
</tr>
<tr>
<td>Dissolved Zn²</td>
<td>52</td>
<td>31.5</td>
<td>59</td>
<td>112</td>
<td>51</td>
<td>--</td>
</tr>
<tr>
<td>Total Zn²</td>
<td>116</td>
<td>73</td>
<td>150</td>
<td>199</td>
<td>200</td>
<td>40</td>
</tr>
</tbody>
</table>

Source: Pitt et al., 2004.
¹ MPN/100 mL, which represents the most probable number (MPN) of bacteria that would be found in 100 mL of water
² Cu and Zn values are shown in μg/l
Annual Pollutant Load Reduction

Annual Load =

Annual Runoff Volume (X) EMC
Step 1 – Calculate Runoff Volume Coefficient

\( R_v = \text{Runoff Volume Coefficient} = 0.05 + 0.9I_a, \) where

\( I_a = \text{Impervious Fraction (from GIS analysis)} \)

Step 2 – Calculate Annual Runoff Volume

\( R = \text{Annual runoff (acre*ft)} = P \times P_j \times R_v \times A, \) where

\( P = \text{Annual rainfall (ft)} \)

\( P_j = \text{Fraction of rainfall events producing runoff} = 0.9 \)

\( A = \text{Watershed area (acres)} \)

Step 3 – Calculate Annual Pollutant Load

\( L = \text{Annual pollutant load (lbs)} = R \times C \times U, \) where

\( C = \text{Pollutant concentration in stormwater, EMC (mg/l)} \)

\( U = \text{Unit conversion factor} = 0.226 \)
The basis for this design requirement is to provide a simple implementation standard for protecting the physical, chemical, and biological characteristics of receiving waters.

Annual Load = Annual Runoff Volume (X) EMC
Regulate Volume vs. Regulate EMC
1. Title, Authority and Purpose
   a) This article shall be known and may be cited as the Morgan County Stormwater Management Ordinance.

2. Authority and Purpose
   a) This ordinance is adopted by the authority of the West Virginia Code 8A-1-1 to 8A-11-2 seq.
   
   b) This ordinance is adopted for the following purposes:
      
      i) To protect and provide for the public health, safety, and general welfare of the citizens of Morgan County.
      
      ii) To mitigate the impact of increased stormwater runoff due to change in land use; and thereby

      iii) To safeguard lives and property from loss by flood and erosion

3. Applicability, Definitions, Exemptions, Waivers, and Variances
   a) Any activity which is subject to the Morgan County Subdivision Ordinance, as amended, or the Morgan County Commercial and Industrial Improvement Location Permit Ordinance, as amended, shall provide adequate Storm Water Management measures that control and manage stormwater runoff from such development/improvements, except as provided herein.
Analysis of precipitation data for West Virginia indicates that 90% of the annual rainfall events are 1” or less.

Therefore, the BMP *Performance Goal* is to manage on-site the runoff from a 1” rainfall event in order to reasonably mimic natural hydrologic processes.
Basic Soil Water and Runoff Terms

Infiltration
Percolation
Interflow
Baseflow
Surface Runoff

10%
90%
90%
Higher Regulatory Standards Benefits:

1. Recharge Groundwater and Drinking Wells
2. Reduce Flash Flood Risks
3. Minimize impervious surfaces
4. Preserve, protect, create and restore ecologically sensitive areas
5. Prevent or reduce thermal impacts to streams
6. Avoid or prevent hydro-modification of streams and other water bodies
7. Protect trees and other vegetation
8. Protect native soils
Figure 1. Annual Total Nitrogen Load Calculated from the Simple Method
Figure 2. Annual Total Phosphorus Load Calculated from the Simple Method

- Original
- Adjusted

Data categories:
- 2-5 Acre Residential
- 1 Acre Residential
- 1/2 Acre Residential
- 1/3 Acre Residential
- 1/4 Acre Residential
- 1/8 Acre Residential
- Townhouses/Garden Apartments
- Light Industrial
- Heavy Industrial/Commercial
- Pavement

Annual Phosphorus Load (lbs/acre-yr)
Economic Impact of Stormwater Financing

Presented by Dan Nees
Environmental Finance Center, University of Maryland

July 17, 2013
Discussion Points

• Project brief project overview
• Overview of stormwater financing environment within the Chesapeake Bay region
• Define and explain economic impact analysis (EIA)
• Summarize EFC stormwater EIA project
• Discuss role of EIA in moving stormwater financing programs forward
Overview of Stormwater Financing

- There has been a fundamental shift in approach to stormwater financing:

  Push for impracticability  \hspace{0.5cm} Desire for efficient solutions
Overview of Stormwater Financing

• There has been a fundamental shift in approach to stormwater financing:
  
  Push for impracticability
  Desire for efficient solutions
Implementation Shift

Agriculture ➔ Individual
Stormwater ➔ Community
Wastewater ➔ Institution
Stormwater Mitigation

Costs
Investments
Benefit
Effectiveness
Impact

=Environmental, economic, fiscal, social
Achieving desired goals efficiently
Stormwater Management in Context

- **Cost benefit analysis**: compares benefits and costs
  - Determine soundness of investment
  - Compare projects
- **Cost effectiveness**: how well a policy achieves a desired goal
- **Economic impact analysis (EIA)**: examines effects on the economy of a given area

*All three are necessary; none are sufficient*
Cost/Benefit

Lynchburg, VA

- Transportation
- Economic development
- Natural resources
- Education
- Human health
- Financial efficiency
Cost/Benefit

Greenville, SC

- Downtown revitalization
- Community redevelopment
- Economic development
- Parks and recreation
- Natural resource restoration and protection
Cost/Benefit

Lancaster, PA

- Downtown revitalization
- Community redevelopment
- Economic development
- Parks and recreation
- Natural resource restoration and protection
Cost Effectiveness

Accomplishing a stated goal as efficiently and effectively as possible:

• Reduced impervious surface
Cost Effectiveness

Accomplishing a stated goal as efficiently and effectively as possible:

• Reduced runoff volume
Cost Effectiveness

Accomplishing a stated goal as efficiently and effectively as possible:

- Reduced nutrient emissions

Photograph by Peter Essick, National Geographic
Economic Impact

Frames the issue within a community context:

- Economic development
- Job training
- Infrastructure financing
EFC Stormwater Financing Project

- Technical assistance project being implemented in three urban communities: Baltimore, MD; Anne Arundel County, MD; and, Lynchburg, VA.
- Supported through a grant by the National Fish and Wildlife Foundation.
- Project partner: Business Economic and Community Outreach Network (BEACON), at Salisbury University.
Project Phases

- **Phase 1**: economic impact assessment
- **Phase 2**: assessment of existing financing programs and processes
- **Phase 3**: recommendations for creating efficiencies and maximizing community benefit

*This presentation focuses on the results of Phase 1*
## Stormwater Financing in Context

<table>
<thead>
<tr>
<th></th>
<th>Lynchburg, VA</th>
<th>Baltimore, MD</th>
<th>Anne Arundel County, MD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Population</strong></td>
<td>77,000</td>
<td>621,000</td>
<td>550,500</td>
</tr>
<tr>
<td><strong>Median Household Income</strong></td>
<td>$38,000 (state average: $63,000)</td>
<td>$40,100 (state average: $72,000)</td>
<td>$85,700 (state average: $72,000)</td>
</tr>
<tr>
<td><strong>Citizens below poverty line</strong></td>
<td>23.2% (state average: 10.7%)</td>
<td>22.4% (state average: 9%)</td>
<td>5.5% (state average: 9%)</td>
</tr>
<tr>
<td><strong>Median home value</strong></td>
<td>$146,100 (state average:$254,600)</td>
<td>$163,700 (state average: $319,800)</td>
<td>$361,700 (state average: $319,800)</td>
</tr>
</tbody>
</table>

Source: US Census Bureau 2012
Project Process and Parameters

Focus on Chesapeake Bay restoration obligations:

- Watershed Implementation Plans (WIPs)
- These plans are required to achieve Bay-wide Clean Water Act requirements (TMDL)
Project Process and Parameters

- Assessments were conducted at the county and/or municipal level
- EIA tools: IMPLAN, iDecide
- Assessment results:
  - Impact per $100 million in construction investment
  - Impact per $10 million in operations and maintenance
Estimated Economic Impact of Construction Activities: Value Added

Based on $100 million investment

<table>
<thead>
<tr>
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<th>Lynchburg</th>
<th>Baltimore</th>
<th>Anne Arundel County</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct</td>
<td>$186,138,948</td>
<td>$119,596,600</td>
<td>$134,906,126</td>
</tr>
<tr>
<td>Indirect</td>
<td>$ 71,862,242</td>
<td>$ 16,896,723</td>
<td>$ 38,795,636</td>
</tr>
<tr>
<td>Induced</td>
<td>$ 57,928,686</td>
<td>$ 8,536,405</td>
<td>$ 46,499,275</td>
</tr>
<tr>
<td>Total</td>
<td>$315,929,876</td>
<td>$145,029,732</td>
<td>$220,201,036</td>
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</table>
Estimated Economic Impact of Construction Activities: Jobs Supported

Based on $100 million investment

<table>
<thead>
<tr>
<th>Location</th>
<th>Jobs Supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lynchburg, VA</td>
<td>1,411</td>
</tr>
<tr>
<td>Anne Arundel County MD</td>
<td>776</td>
</tr>
<tr>
<td>Baltimore, MD</td>
<td>344</td>
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</tbody>
</table>
Estimated Economic Impact of Operations and Maintenance Activities: Value Added

Based on $10 million annual investment

<table>
<thead>
<tr>
<th></th>
<th>Lynchburg</th>
<th>Baltimore</th>
<th>Anne Arundel County</th>
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<tbody>
<tr>
<td>Direct</td>
<td>$15,115,420</td>
<td>$18,816,139</td>
<td>$20,745,186</td>
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<tr>
<td>Indirect</td>
<td>$3,547,828</td>
<td>$4,775,319</td>
<td>$4,085,823</td>
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<tr>
<td>Induced</td>
<td>$3,876,330</td>
<td>$5,318,083</td>
<td>$8,813,986</td>
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<tr>
<td>Total</td>
<td>$22,539,589</td>
<td>$28,909,541</td>
<td>$33,644,996</td>
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Estimated Economic Impact of Operations and Maintenance Activities: Jobs Supported

Based on $10 million annual investment

<table>
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<tr>
<th>Location</th>
<th>Jobs Supported</th>
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<tbody>
<tr>
<td>Lynchburg</td>
<td>90</td>
</tr>
<tr>
<td>Anne Arundel County</td>
<td>118</td>
</tr>
<tr>
<td>Baltimore</td>
<td>95</td>
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## Impacts on Industry Sectors

<table>
<thead>
<tr>
<th>IMPLAN Sector Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>369</td>
<td>Architectural, engineering, and related services</td>
</tr>
<tr>
<td>380</td>
<td>All other miscellaneous professional, scientific, and technical services</td>
</tr>
<tr>
<td>319</td>
<td>Wholesale trade businesses</td>
</tr>
<tr>
<td>36</td>
<td>Construction of other new nonresidential structures</td>
</tr>
<tr>
<td>375</td>
<td>Environmental and other technical consulting services</td>
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<tr>
<td>426</td>
<td>Private household operations</td>
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# Impacts on Industry Sectors

<table>
<thead>
<tr>
<th>Product Development</th>
<th>Manufacturing/Distribution</th>
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<tr>
<td>• Civil Engineering</td>
<td>• Landscape Media</td>
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<tr>
<td>• Landscape Architecture</td>
<td>• Construction Equipment</td>
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<tr>
<td>• Hydrologic/Hydraulic</td>
<td>• Plumbing Equipment &amp; Supplies</td>
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<tr>
<td>Engineering</td>
<td>• Building Supplies</td>
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<tr>
<td>• Environmental Engineering</td>
<td>• Farm &amp; Garden Machinery &amp; Equipment</td>
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<td></td>
<td>• Nurseries and Horticultural Services</td>
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<td>• Arborist Services</td>
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<td>• Cistern Manufacturers</td>
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<td>• Meters Sensors and Components Manufacturers</td>
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<td></td>
<td>• Landscape Architecture</td>
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<td>• Architecture Firms</td>
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<td>• Planning and Expediting Services</td>
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<td>• Civil Engineering Services</td>
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<td>• Hydrology</td>
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<td>• Permitting and Administrative Services</td>
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<td>• Soil Scientist Services</td>
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</tbody>
</table>

Source: *Gray to Green: Jumpstarting Private Investment in Green Stormwater Infrastructure* (Philadelphia SBN’s Green Economy Task Force)
Impacts on Industry Sectors

**Construction**
- General Construction Services
- Paving, Surfacing and Tamping Services
- Roof Contracting Services
- Landscaping Services
- Poured Concrete Foundation & Structure Contracting Services
- Site Management and Evaluation Plumbing Services
- Electrical Services
- Hauling Services
- Truck and Tractor Operations
- Weatherization Companies
- Demolition/Deconstruction
- Hazardous Waste Treatment and Disposal Services

**Monitoring/Maintenance**
- Service Technician Firms
- Landscaping
- Compliance Testing and Monitoring
- Septic Tank Servicers and Sewer Pipe Cleaning
- Plumbing/Sprinklers/Irrigation
- Jetvac Cleaning Services
- Erosion and Sediment Inspection

Source: *Gray to Green: Jumpstarting Private Investment in Green Stormwater Infrastructure* (Philadelphia SBN’s Green Economy Task Force)
Impacts on Industry Sectors
Impacts on Industry Sectors
Conclusion

• New shift to community-focused implementation
• Context in the community matters:
  ➢ Impact
  ➢ Benefit
  ➢ Effectiveness
• Full project report is available in EFC website: www.efc.umd.edu
QUESTIONS?

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