Green Infrastructure at the Neighborhood Level
And the Importance of Community Planning

May 22nd, 2013

Loralyn Fabian, Program Manager
East Liberty Development, Inc.
412.361.8061 ext. 28
loralyn.fabian@eastliberty.org
Agenda

1) Introduction
   • Who is East Liberty Development, Inc.?
   • What is our revitalization model?
   • How have we planned for sustainability?

2) Sample Green Infrastructure Projects to Date

3) 10 Take-A-Ways
East Liberty Development, Inc.

- 501(c)(3) community-based organization in Pittsburgh’s East Liberty neighborhood

- We work alongside many partners and stakeholders to foster the revitalization of East Liberty

- Through Planning, Advocacy, Facilitation, and Investment
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East Liberty Development, Inc.
Our Revitalization Model - “P.A.F.I.”

- **Planning** builds consensus between stakeholders & provides guidelines
- Plan used as tool to **Advocate** for change and funding
- ELDI helps to **Facilitate** other partners to implement the plan
- ELDI also **Facilitates** implementation projects in-house
- ELDI’s **Investment** in projects results in both direct and indirect returns
East Liberty Development, Inc.
Planning

East Liberty Community Plan (1999 and 2010)
• Guidelines for holistically improving East Liberty’s quality of life

East Liberty Green Vision (2010)
• Specific guidelines for creating innovative, sustainable change in the neighborhood

To read these plans: www.eastliberty.org
1. **Sustainable Infrastructure and Landscape**
   - Build green infrastructure for the 21st century
   - Create exceptional parks, recreation and open space
   - Reinforce urban farming and urban forestry practices

2. **Compact Green Development**
   - Optimize neighborhood density and diversity
   - Build mixed-use projects at a pedestrian scale
   - Expand transit alternatives and bicycle network options

3. **Community Action and Education**
   - Improve energy efficiency and target waste reduction
   - Incorporate art into the neighborhood landscape
   - Advance local environmental awareness and education
East Liberty Development, Inc.
East Liberty Green Vision – 9 Fundamental Elements

1. **Sustainable Infrastructure and Landscape**
   - Build green infrastructure for the 21st century
   - Create exceptional parks, recreation and open space
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East Liberty Development, Inc.
Build Green Infrastructure for the 21st Century

Instead of “big-pipe” solutions, East Liberty can be a green neighborhood model to minimize stormwater runoff at its source.

Our 9 Initiatives to Build G.I.
1. Reduce impervious surface area
2. Porous pavements
3. Bio-retention areas
4. Trees
5. Infiltration beds
6. Cisterns and rain barrels
7. Rain gardens
8. Green roofs
9. Enlarged tree planting strips
Instead of “big-pipe” solutions, East Liberty can be a green neighborhood model to minimize stormwater runoff at its source.

**Our Goals:**

<table>
<thead>
<tr>
<th></th>
<th>Existing Condition Baseline</th>
<th>2008 to 2011</th>
<th>2011 to 2014</th>
<th>2014 to 2017</th>
<th>2017 to 2020</th>
<th>Strategic Initiatives</th>
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<tbody>
<tr>
<td>Reduce Amount of Impervious Pavement Area (SF) to Pervious</td>
<td>213.0 Acres (57.6% of Area)</td>
<td>206.6 Acres (54.6% of Area)</td>
<td>200.6 Acres (51.6% of Area)</td>
<td>194.4 Acres (48.6% of Area)</td>
<td>188.6 Acres (45.6% of Area)</td>
<td>Permeable pavements; infiltration beds; downspout disconnects; green roofs</td>
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<tr>
<td>Reduce Amount of CSO Events in the three Sub-Watershed Areas</td>
<td>15,500,000 gallons (Annual Total)</td>
<td>10% Reduction</td>
<td>20% Reduction</td>
<td>33% Reduction</td>
<td>50% Reduction</td>
<td>Target “zero” storm-water runoff for parking lot/street retrofits, new construction and downspout disconnects</td>
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<tr>
<td>Net Trees Planted (for Each 3-Year Period)</td>
<td>0</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>City supported tree installation; TreeVitalize and volunteers; private on-site owner planting</td>
</tr>
<tr>
<td>Increase Overall Tree Canopy in East Liberty</td>
<td>9.0%</td>
<td>10.0%</td>
<td>12.0%</td>
<td>16.0%</td>
<td>24.0%</td>
<td>Street tree maintenance; new street trees; residential, parks and institutional site plantings</td>
</tr>
<tr>
<td>Increase Urban Agriculture</td>
<td>28,000 SF</td>
<td>27,000 SF</td>
<td>38,000 SF</td>
<td>50,000 SF</td>
<td>216,000 SF</td>
<td>Community gardens or bio-fuel agriculture on vacant lots</td>
</tr>
</tbody>
</table>
Estimated Annual Stormwater Benefits of East Liberty Green Infrastructure Projects Completed to Date
December 2011
Prepared by CH2M HILL

<table>
<thead>
<tr>
<th>Green Infrastructure Measure</th>
<th>Number</th>
<th>Impervious Area Managed (SF)</th>
<th>Unit Stormwater Benefit (gal/each or gal/SF)*</th>
<th>Estimated Annual Stormwater Benefit (gal/yr)</th>
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<tbody>
<tr>
<td>Tree Planting</td>
<td>721</td>
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<td>600</td>
<td>432,600</td>
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<tr>
<td>Impervious Area Removed</td>
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<td>33,700</td>
<td>16</td>
<td>539,200</td>
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<tr>
<td>Rain Gardens</td>
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<td>6,200</td>
<td>19</td>
<td>117,800</td>
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<tr>
<td>Rain Barrels/Cisterns**</td>
<td>65</td>
<td>14,232</td>
<td>19</td>
<td>270,411</td>
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<tr>
<td>Roof Garden</td>
<td>---</td>
<td>50</td>
<td>19</td>
<td>950</td>
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<tr>
<td>TOTAL</td>
<td>---</td>
<td>54,182</td>
<td>---</td>
<td>1,360,000</td>
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</tbody>
</table>

In 2011, over 1.3 Million gallons of stormwater mitigated annually by ELDI facilitated green infrastructure projects....
East Liberty Development, Inc.
Green Roof Bus Shelter

- Fall of 2011
- Penn Ave. at Whitfield St.
- Biodiversity and stormwater mitigation demonstration
- Community design workshops
- Aiming to be self-sustaining
- ELDI responsible for maintenance
East Liberty Development, Inc.

Green Roof Bus Shelter
East Liberty Development, Inc.
Rain Gardens, Rain Barrels, and Cisterns

- 2010 through 2012
- In our NW residential enclaves
- Visible to public to raise awareness
- Maintained by the property owners
East Liberty Development, Inc.
Rain Gardens, Rain Barrels, and Cisterns

The Heinz Endowments
Howard Heinz Endowment • Vira I. Heinz Endowment

Audubon Society of Western Pennsylvania

SEEDS
Ecology + Education + Design

Negley Place Neighborhood Alliance

Three Rivers Rain Garden Alliance

Nine Mile Run Watershed Association

East Liberty Development, Inc.

Pittsburgh Parks Conservancy
gtech
East Liberty Development, Inc.
Rain Gardens, Rain Barrels, and Cisterns

- Rain gardens installed by volunteers
East Liberty Development, Inc.
Rain Gardens, Rain Barrels, and Cisterns

- A finished rain garden the following season
East Liberty Development, Inc.
Rain Gardens, Rain Barrels, and Cisterns

- Rain barrels installed by Nine Mile Run Watershed Association
East Liberty Development, Inc.
“Town Square” Stormwater Mitigation Public Plaza

- Installation summer 2013
- Heart of the neighborhood on Penn Ave. at East Liberty Presbyterian Church
- 100% church runoff mitigated
East Liberty Development, Inc.
“Town Square” Stormwater Mitigation Public Plaza
East Liberty Development, Inc.
“Town Square” Stormwater Mitigation Public Plaza
East Liberty Development, Inc.
“Town Square” Stormwater Mitigation Public Plaza
East Liberty Development, Inc.
10 Take-A-Ways

1. **Importance of planning first** – To build consensus and raise resources

2. **Importance of unique partners** willing to take funding risk on pilot

3. **It takes many partners**, working towards the same goal, to implement just one project – And a good project manager to facilitate

4. **Change can occur from decentralized projects** implemented on a hyper-local level – As long as they fit into the community’s plan

5. **Hire project management staff with landscape design or engineering backgrounds** at your organization to stretch resources – Design/build in house
East Liberty Development, Inc.
10 Take-A-Ways

6. However, do not need to be an expert in green infrastructure – Can hire consultants/round up partners who are experts.

7. Each project is an opportunity to educate and raise awareness – Volunteers, visibility, signage, etc.

8. Worth noting: every consultant has gone above and beyond their original scope to make these projects the best they can be – In-kind consultant work.

9. When project is not in the public rights-of-way, there are generally less City Planning/Department of Public Works review and permitting processes.

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May 22\textsuperscript{nd}, 2013

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Stormwater Utility

The Next Wave of Infrastructure Management

May 22, 2013
What Will be Discussed?

- Overview
- Key Issues Needing Improvement
- What is a Stormwater Utility
- What funds Stormwater
- Steps and Cost in creating a Utility
- Case Study of Utility Implementation – Mt. Lebanon
- First Year Results
Overview

Aging infrastructure is prevalent all around us. The forgotten stepchild is the storm sewer system.
Overview

Various events, both nationally and locally, have brought to light stormwater and the need for upgrades to its infrastructure and new ways to approach its management.

Residents decry flooding in city’s East End
September 7, 2011 12:00 am
By Joe Smydo / Pittsburgh Post-Gazette
They came from East Liberty, Homewood, Oakland, Shadyside and Squirrel Hill with variations of the same story -- chronic flooding that’s rotted their walls, ruined their carpets, set their cars afloat and cost thousands of dollars in repairs.
Key Issues Needing Improvement

- Flooding – real, growing, unresolved
  - Be proactive to maintain and improve systems
  - Add infrastructure where it does not exist
  - Alleviate pressure on sanitary system
  - Reduce flooding complaint backlog
Key Issues Needing Improvement

- Infrastructure – aging, blocked, failing

- Quality of life – service values and property values
Key Issues Needing Improvement

• Sustainability
  • Green approaches to stormwater management
  • Costly environmental compliance (NPDES, MS-4s)
What is a Stormwater Utility?

Mix of Methods

• A funding method
• A program concept
• An organizational entity
General Legal Categories of Municipal Revenue

• Taxes
  • Primary revenue generator
  • No mandatory association with specific activities

• Assessments
  • Direct and special benefit
  • Often one time capital construction

• Service Charge
  • Tied to objective or program
  • Fee level based on provision of goods and services
Building Blocks for Funding

- Resource
- Impact Fee
- Shared Costs
- User Fee
- Bonding
- Inspection Fees
- Volunteers
- General Fund
- Grants
- Fines
- Tax Assessment
- Special Sales Tax

Gateway
On Call. On Time. On Target.
Stable Utility vs. Tax or “Money” Funding

User fee based

“Money” or Tax-based

Maximum possible program

Time
Advantages of a Stormwater Utility to Support Programs

Stable
Adequate
Flexible
Equitable
Flexible

• Primary source for the whole program
• Other fees to enhance equity
• Credits to encourage good performance
• Can take into account environmental costs
Legal Challenges are Expected

• Fair and reasonable
• Not illegally discriminatory or confiscatory
• Costs substantially related to provision of facilities and services
• Individual rate based on loosely on demand or “use” of service
• Legal by charter or legislation
• Proper procedures followed and appropriate governance
A Question of “Due Diligence”

Establishing a successful stormwater utility requires that you pay attention to five key areas of due diligence:

1. Governance and inter-municipal consensus
2. Program concept and the compelling case
3. Public and political education and support
4. Financial policies and documents
5. Database development and accuracy and customer service
Implementation of Stormwater Fee

- Visibility & Long-Term Branding
- Start-Up Program Activities & Policy Making
- Customer Service
Case Study

Municipality of Mt. Lebanon
Basic Mt. Lebanon Information

- 6.05 square miles or 3,891 acres
- 33,000 people
- 5,460 / square Miles
- 12,000 parcels
- 10,800 Single Family Residential Parcels
### 2011 Stormwater Program (Pre-Utility)

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<td>Engr. And Planning</td>
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<tr>
<td>Operations</td>
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<td>Reg. &amp; Enforcement</td>
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<td>Capital Const.</td>
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<td>SW Quality</td>
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<td><strong>TOTALS</strong></td>
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# Post Program Plan

### Stormwater Cost of Service

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<th>Major Cost Category</th>
<th>Cost Subcategory</th>
<th>Existing</th>
<th>First 4 months</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
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<td><strong>Engineering and Master Planning</strong></td>
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<td>System/Project Design Engineering</td>
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<td>GIS, Databases, and Mapping</td>
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<td>Storm Sewer and Culvert Maintenance</td>
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<td>Remedial Repair and Replacement</td>
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<td>Curb and Gutter Maintenance</td>
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<td>Video testing of storm sewers</td>
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<td><strong>Stormwater Quality</strong></td>
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*Costs are in USD.*

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MT. LEBANON, PA

Cost of Service Analysis: Fully-Burdened Personnel Costs, Summary by Cost Subcategory by Year
Equitable: How a Fee is Calculated

Equals 1.0 ERU
Mt. Lebanon is about 2,400 SF, 150 properties measured, median impervious surface used
How a Fee is Calculated

= 40 ERUs less credit

= 1 ERU
Fee is $8.00 / ERU / MONTH
These small businesses pay $16 / month
For a $8.00 / ERU / mo charge
36,000 sf impervious area

13 ERUs
$104.00 / mo

Lease Information

$320,000 / yr
Credits

- If you spend private resources that materially reduce your site’s impact on the public drainage system, flooding or water pollution, you may receive a credit.

- If you spend private resources that materially reduce the City’s cost of the stormwater program, you may receive a credit.
Credits

- One-time Rain Barrel Credit
- Peak Flow Attenuation Credit
  - Designed for 25-year storm
  - Up to 50% reduction in fee per year
First Year Results

- Fee implemented September 2011
- Projects ready to start
- By September 2012 approximately $800 K committed to projects including:
  - Roads-curbs and new storm sewers
  - MS-4 Permit-testing and work on TMDL
  - Storm sewers to address flooding and icing
  - CCTV- to assess the system
First Year Results
2013 Plan

• More curbs with storm sewers
• Addressing capital projects for flooding
• Piggy back on PennDOT project in Washington Road to address long term
• Review of rain gardens for islands and grant application.
• Developed a project priority list
Summary

- Stormwater utilities are on the rise and Municipalities will continue implementing them as a funding stream for dealing with infrastructure maintenance and regulatory compliance
- The case study proves that good planning and a sound programming is necessary for the utility to succeed without incident or repeal.
Questions
PURPOSE

- Green Infrastructure (GI) Applications that can control/treat wet weather and stormwater flows
- Effectiveness of GI, Need Grey Backbone
- Design, Soils, Topography and Seasonal Concerns of GI
- GI applications Can Address Public and Private Sources
- GI Supports Integrated Planning and Solutions
- GI Applications are Site-specific, Not Prescriptive
- GI Maintenance Lessons Learned
- GI Innovative Outreach Strategies
INTEGRATED SOLUTIONS- IS IT WORTH TAKING A SECOND LOOK?

- New way to look at old problems
- Provides a community flexibility
- Provides a sequenced approach to CIPs
- Evolutionary approach to what we are already implementing
- It's not a LTCP all over again
- Aesthetically pleasing environmental / community benefits
- Ancillary benefits (i.e. WQ, social)
Green Solutions

Combined Sewer Overflow Controls + Neighborhood Renewal
Pilot Project Location

- Older, Urban Neighborhood
- 100 acres
- Residential + Commercial
- 36 CSO Events/yr

Red: Sewers
Yellow: Watershed
Green Infrastructure Types

- 91 Rain Gardens/Landscaping
- 36 Curb Extension Planters/Bumpouts
- 400 ft. of Bioswales
- Over 5,200 ft. of Porous Concrete Sidewalks
- Over 1,000 ft. of Pervious pavement

Photo: Shockey Consulting
Rain Garden, New Curbs and Porous Sidewalk
Bioretention Gardens:
Rain gardens with engineered soil + underdrains

Photos: URS
Curb Extensions with Below-Grade Storage

- Stormwater Collection Focal Points
- Traffic Calming

Photos: URS
Porous Concrete Sidewalks

> 5,000 feet
Commercial Street: Little Greenspace; Lots of Utilities

Pervious Sidewalks

Below Grade Storage

Photos URS
Constructability & Flexible Design

- Unanticipated utility conflicts are common with below grade projects
- Quickly adjusted in the field if standard, or off-the-shelf materials are used
Challenges

- 20% of the neighborhood lives below the poverty line
- Stormwater is not a high priority to people who can’t put food on the table
Challenges: Trash and Vandalism
(Lost plants and iron parts)
Integrate Stormwater Controls with Neighborhood Improvements

- Stormwater Controls
- Curbs, Sidewalks
- Traffic Calming
- Street Overlay
- Neighborhood Landscaping

Photo URS
Neighborhood Improvements

Photo URS
Neighborhood Improvements
Neighborhood Improvements
Improving Our City Waterways Together

Green Infrastructure:
Partnering for the
Butchertown and Portland
Neighborhoods

- MSD is responsible for clean water in the community
- $850 million EPA consent decree obligation
- Green infrastructure is a component of this consent decree
- Green programs are only successful if the entire community is involved
Green Stormwater Technology/MS4 Efforts

Practice Types

- Downspout disconnection
- Permeable pavement strips
- Tree boxes
- Infiltration trenches
- Bioswales
- Rain gardens
- Urban reforestation
- Underground infiltration/storage
First CRADA Community

- 3 Year Effort-potential for up to 10 years
- EPA’s involvement in GI validation process
- Establish gallons removed compared to gray
- Evaluate and establish long term trends
- Standardize Design Criteria/O&M
- Standardize Modeling Parameters
- Other Ancillary Benefits
- Partner with University of Louisville
Basin Evaluation: CSO 130

CSO 130 GMP Locations
Integrated Overflow Abatement Plan
Vol. 2 - Final CSO Long Term Control Plan
CSO 130
Green Infrastructure Solution

Legend
- Green: Active CSO
- Black: Existing Manhole
- Blue: Existing Catch Basin
- Black: Streams
- Blue: Combined Sewer Pipe
- Blue: Floodway
- Yellow: CSO 130 Drainage Boundary
- Yellow: CSO 130 Practices
- Red: Proposed Green Infrastructure Solutions
  - Pervious Pavers
  - Tree Boxes

General Representation of overflow abatement solutions are currently out for bid and may be altered during the construction process.

1 Inch = 166 feet
Some boundaries are uniquely symbolized within the map.

Map Revision
May 2012
Aerial Date 2007

[Map Information]
## CSO 130 Results

<table>
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<tr>
<th></th>
<th>Overflow Volume Comparison</th>
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<td><strong>Overflow Volume</strong></td>
<td>CSO 130: 1.30 MG</td>
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<tr>
<td></td>
<td>Gray Storage Basin: 0.67 MG</td>
</tr>
<tr>
<td></td>
<td>Green Alternative: 0.28 MG</td>
</tr>
<tr>
<td><strong>Number of Overflows / Year</strong></td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>8</td>
</tr>
<tr>
<td><strong>20-Year Total Present Worth</strong></td>
<td>$1.72</td>
</tr>
<tr>
<td></td>
<td>$938,000</td>
</tr>
</tbody>
</table>
Pervious Pavers Installation
Monitoring in Louisville
Pervious Pavers Parking Lane
Tree Box Application
Tree Box Monitoring
Latest Pervious Paver Design
Basin Evaluation - CSO 190

CSO 190 GMP Locations

Legend
CSO190
Portland Neighborhood
Green Infrastructure
Project Areas
## CSO 190 Results

<table>
<thead>
<tr>
<th></th>
<th>Overflow Volume Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSO 190 Existing Conditions</td>
<td>Gray Storage Basin</td>
</tr>
<tr>
<td>Overflow Volume</td>
<td>35.92 MG</td>
</tr>
<tr>
<td>Number of Overflows / Year</td>
<td>54</td>
</tr>
<tr>
<td>Capital Cost</td>
<td>$5.32 M</td>
</tr>
<tr>
<td>20-Year Total Present Worth</td>
<td>$6.32 M</td>
</tr>
</tbody>
</table>
## Maintenance Considerations

<table>
<thead>
<tr>
<th>Practice Type</th>
<th>MSD (Internal Cost)</th>
<th>Contracted (External Cost)</th>
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</thead>
<tbody>
<tr>
<td>Tree Maintenance</td>
<td>$2,110</td>
<td>$1,660</td>
</tr>
<tr>
<td>Mowing</td>
<td>$16,360</td>
<td>$15,000</td>
</tr>
<tr>
<td>Tree Mortality</td>
<td>$1,530</td>
<td>$3,000</td>
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<tr>
<td>Rain Garden</td>
<td>$4,440</td>
<td>$21,000</td>
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<tr>
<td>Infiltration Trench</td>
<td>$1,540</td>
<td>$200</td>
</tr>
<tr>
<td>UIG</td>
<td>$17,160</td>
<td>$37,760</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$43,140</strong></td>
<td><strong>$78,620</strong></td>
</tr>
</tbody>
</table>
Community Buy-in

- Incentives
- Property Owner Participation
  - Downspout Disconnect
- Phased Construction Approach
- Long-term Community Project
  - Tree Planting Expansion
    - CSO 130
  - Park and Open Space
  - Vacant Land Usage

Green Infrastructure is not Sustainable without Public Outreach
LOUISVILLE LESSONS LEARNED

PARDON OUR DUST
Green Infrastructure Project in Louisville

MSD
URS

Money saved by using green infrastructure:
$400,000

6.5 Million Gallons

Right Sizing Strategy - Tools

Downspout Disconnection
Infiltration Trenches & Dry Wells
Bioinfiltration Swales
Rain Gardens
Pavement Pavers

URS
Integrated Planning Key Points!

- Your community does not have to do a Plan….only if it makes sense
- The Plan does not have to have every regulatory requirement that applies….scope up to the community
- Plans can be single source or watershed basis…or anywhere in between
- If doing a Plan, think broadly and consider including SW, Drinking water
- Plan can be simple to complex
More Key Points!

- Affordability is key!
- Consider how to build the Plan that provides adequate legal protection
- Involve the community including on affordability analysis
- Think about environmental justice broadly
- Exchange information with other communities considering Integrated Planning
- Work with your Regional EPA offices to consider Integrated Planning.
Wrap Up

Questions?

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614-600-5885