Prioritizing and Selecting Green Infrastructure in Combined Sewer System Service Areas

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Topics

- Green Infrastructure in CSO Control Programs
- Examples of early activities
- Approaches to broader planning
Major CSO Municipalities Including Green Infrastructure

Green Infrastructure – Municipal Definition

- Disconnecting downspouts
- Converting impervious cover to pervious cover
- Implementing LID
- Retention/detention/wetlands
- Redirecting stormwater (including selective separation)
History of Green Infrastructure in CSO Plans

- 1994 CSO Policy
- 2007 EPA memo on GI
- 2009 Approved LTCPs with GI
- Early Implementation of GI for CSO
- LTCPs/implementation with minimal GI
- Planning effort includes GI

Milestones

- 2005 Portland: GI to offset future growth
- 2007 EPA GI memorandum
- 2009 Louisville: GI as an option – Louisville MSD to prove effectiveness
- 2010 Kansas City: schedule allows for testing of GI in early part of plan
- 2011 Philadelphia: level of control is annual pollutant reduction target; primarily GI based plan
- 2012 NYC: GI focused plan is approved by New York
- 2012 Seattle: Draft consent decree identifies performance expectations
How Green Infrastructure is included in CSO Programs

- Primary/ Focal Approach in LTCP
- Secondary/ Supportive Approach in LTCP
- Exploratory – amount in final program based on pilot effectiveness/cost
- Enhancement to ongoing CSO implementation (not in LTCP)

Philadelphia, PA LTCP

- Primary technology for CSO control: green infrastructure
- Convert 9,564 acres (23%) of combined area to “greened acres” by year 25 (2026)
- Greened acre = Control 1” – 1.5” over acre
- Overall performance:
  - 85% control of pollutants
- Investment: $1.2 B (2009$) – ($800/person)
Philadelphia Primary Strategies

- Private property redevelopment
- Codes/ ordinances
- Financial incentives
- Improvements in conjunction with street projects
- Green corridors

Private Properties (development/ retrofit)

Top 500 parcels in the combined sewer area make up 12.3% of total impervious area

Gross Area = 600,000
Impervious Area = 500,000

Existing Charge = $400
New Charge = $2,500
Rights of Way

- Green Streets Manual
- Mayor’s Office of Transportation and Utilities, Streets Department and PWD
- Standardizes green stormwater infrastructure when
  - Water and sewer lines are replaced
  - Streets are re-surfaced

Larger projects – build momentum

- Connections to neighborhood amenities
- Columbia Avenue corridor to Penn Treaty Park
- Waterfront connection
- Integration of local art
- Promotes awareness

Photo credit: NKCDC
NEORSD LTCP
- Green infrastructure included as secondary technology
- Control 44 MG of overflow in addition to primary controls (tunnels)
- Screening of opportunities
- Facilities Plan Development

**NEORSD Screening Criteria**

**Performance Criteria:**
- Cost-benefit (Project costs/CSO gallons removed)
- CSO reduction magnitude (volume)

**Feasibility Criteria:**
- Land requirements
- Partnership opportunities
- Public acceptance
- Flexibility
- O&M administration
- Performance reliability
- Overall feasibility of GI within the priority area
Kansas City LTCP

- Green infrastructure included as piloted technology
- First pilot area included intensive placement of green infrastructure in 100 acre area
- Additional green infrastructure if performance / cost is effective
Planning Green Infrastructure Implementation

Prioritization Questions

- To what extent and in which locations can CSO discharges be significantly reduced by GI?
- What are the placement opportunities for GI in the system?
- What are the costs associated with placement of GI in various locations?
How much reduction in CSO? Which locations? – Modeling Tools

- Objective: Assess potential magnitude of benefit
  - Green practices as change in impervious area or similar
  - Limited representation of sewer system

- Objective: Prioritize outfalls
  - Green practice quantified based on placement potential
  - Collection system hydraulics included

- Objective: Quantify benefits
  - Actual placement opportunities considered
  - Integrated green/collection system model
  - Routing effects and sequential storms considered

Identifying Placement Opportunities

- What are the physical limitations on placement?
- Are there near term projects that can incorporate green infrastructure?
- Are there locations where early projects can be accomplished due to land owner/stakeholder interest?
Placement Opportunity Tools: GIS analysis

- Consider and evaluate:
  - Land characterization
    - Land Use
    - Imperviousness (by type)
    - Slopes, soils, groundwater
    - Ownership (Public lands, Land banks)
  - Projects
    - Capital Improvements
    - Redevelopment
  - Interest
    - Local community groups
    - Political leadership

Financial Evaluations

Measuring Costs
- Capital Costs
- Land acquisition
- Operation and Maintenance

Measuring Benefits
- CSO Reduction
- Triple Bottom Line
  - Social
  - Economic
  - Environmental
Financial Evaluations

- Considering who pays?
  - Private
  - Public (sewer utility, owner of other infrastructure, shared)
  - Public-private partnerships
  - Capital and O&M

Conclusion

- Individual municipal approach tailored to the significance of GI in CSO Plan and local situations
- Initial priorities based on moments of opportunities/potential to coordinate with other projects
- Technical tools assist in long term planning
Questions?

Thank you!
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