



A National and International Review of Stormwater Management Programs

Innovative & Integrated Stormwater Management

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Funding Sources and
Financial Incentive Programs

DEP examined national and international stormwater programs to:

- enhance understanding of innovative and integrated stormwater solutions
- refine the approach to the city-wide stormwater program
- move forward with proven solutions that are both integrated and innovative



North America |  Participating Communities



- Department of Environmental Services, Arlington County, Virginia
- Department of Watershed Management, City of Atlanta, Georgia
- Aurora Water, City of Aurora, Colorado
- Department of Environmental Protection and Sustainability, Baltimore County, Maryland
- Department of Public Works, City of Baltimore, Maryland
- Boston Water and Sewer Commission, Massachusetts
- Department of Water Management, City of Chicago, Illinois
- Metropolitan Water Reclamation District of Greater Chicago, Illinois
- Stormwater Management Utility, City of Cincinnati, Ohio
- Metropolitan Sewer District of Greater Cincinnati, Ohio
- Department of Public Works and Environmental Services, Stormwater Management Division, Fairfax County, Virginia
- Department of Public Works and Environmental Services, Wastewater Management Division, Fairfax County, Virginia
- Department of Public Works, Sustainability Division, City of Fort Lauderdale, Florida
- Department of Public Works and Engineering, City of Houston, Texas
- Department of Public Works, City of Indianapolis, Illinois
- King County, Department of Natural Resources and Parks, Wastewater Treatment Division, Washington
- Public Works and Utilities Department, City of Lincoln, Nebraska
- Department of Public Works, Bureau of Sanitation, City of Los Angeles, California
- Department of Public Works, City of Milwaukee, Wisconsin
- Public Works Department, City of Minneapolis, Minnesota
- Metropolitan Government of Nashville and Davidson County, Tennessee
- Metro Water Services, City of Nashville and Davidson County, Tennessee
- Northeast Ohio Regional Sewer District, Ohio
- Planning Commission, City of New Orleans, Louisiana
- Sewerage and Water Board of New Orleans, Environmental Affairs Department, Louisiana
- Department of Water Environment Protection, Onondaga County, New York
- Philadelphia Water Department, Pennsylvania
- Bureau of Environmental Services, City of Portland, Oregon
- Department of Public Utilities, City of Richmond, Virginia
- San Francisco Public Utilities Commission, California
- Port of San Francisco, California
- Sanitation District No. 1 of Northern Kentucky
- Seattle Public Utilities, Washington
- Department of Energy and Environment, Washington D.C.
- City Development, City of Copenhagen, Denmark
- Halifax Water, Halifax Regional Municipality, Nova Scotia, Canada
- Melbourne Water, Melbourne, Victoria, Australia
- Toronto Water, City of Toronto, Ontario, Canada

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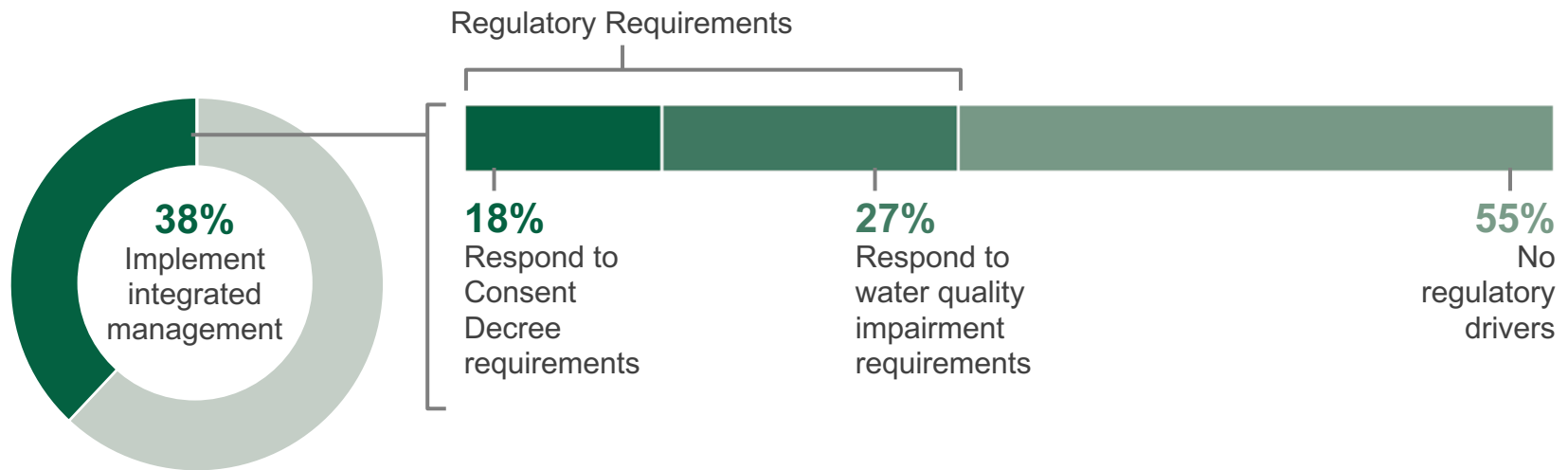
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Stormwater Monitoring

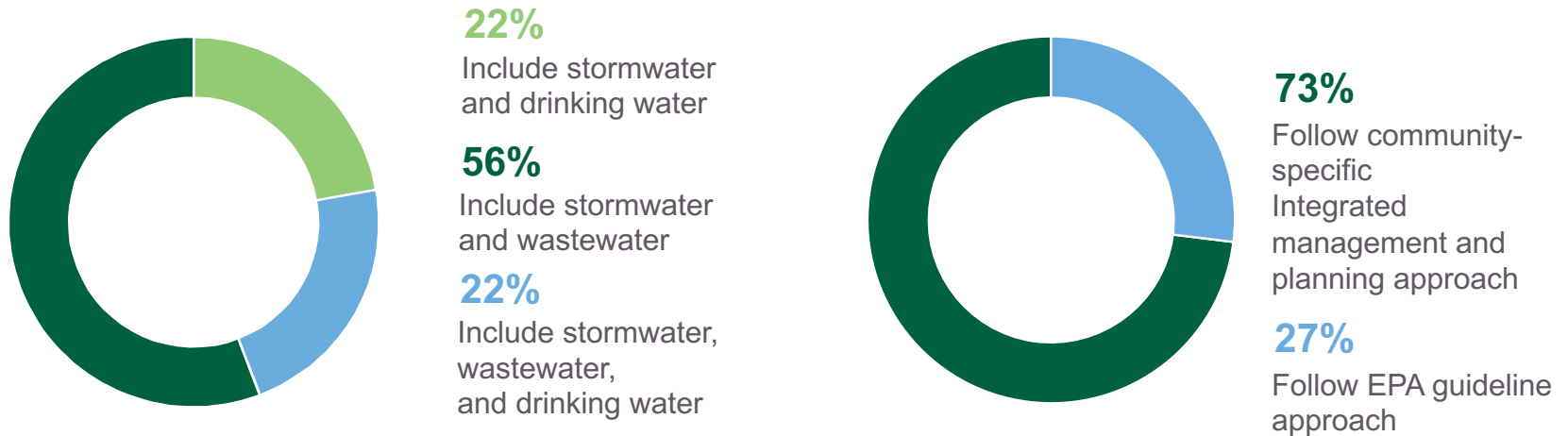
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Funding Sources and
Financial Incentive Programs

38% of respondent communities use an integrated management approach



56% of integrated management communities include stormwater and wastewater

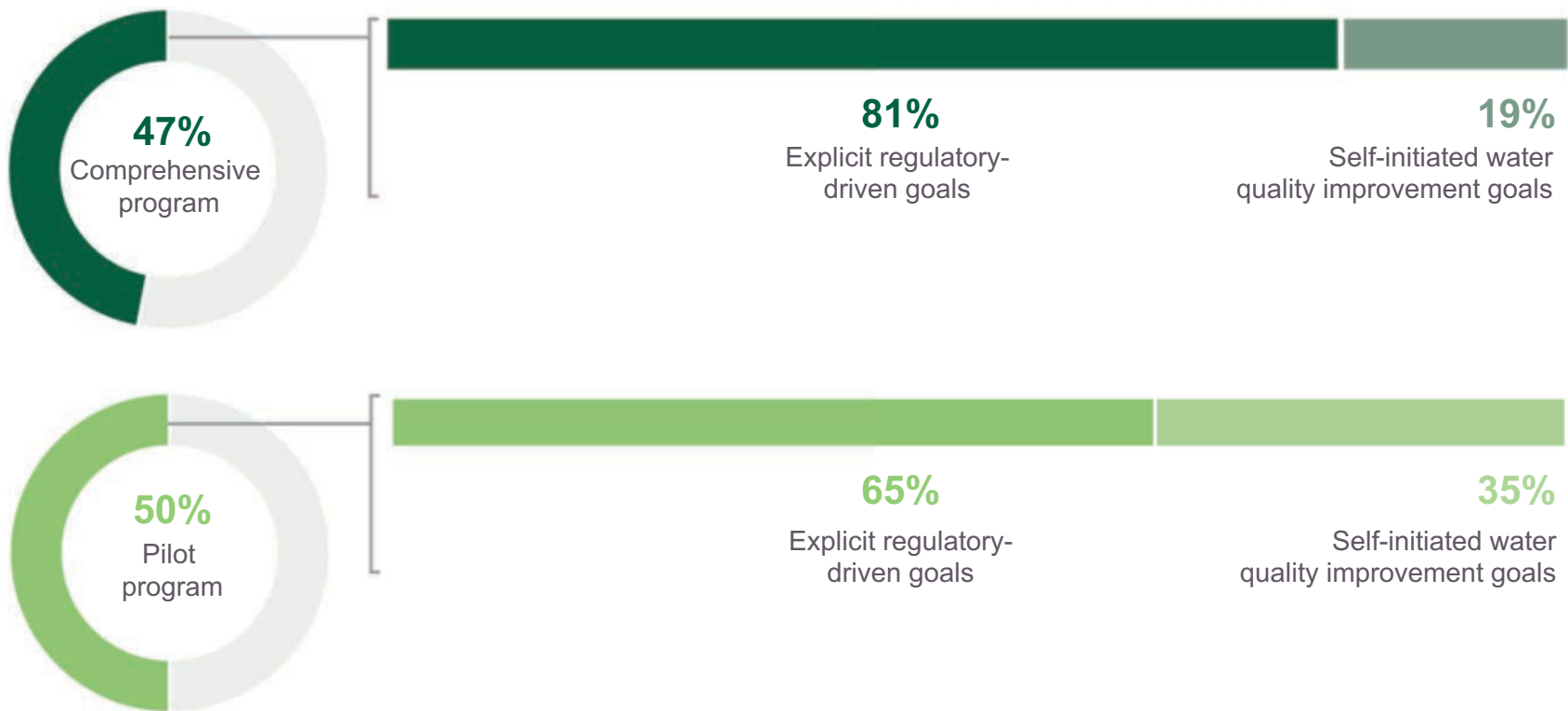


Integrated Plan:

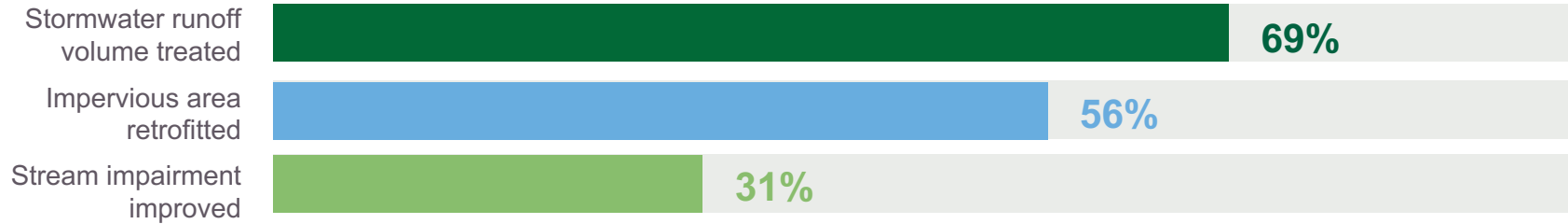
- Drivers: Regulatory driven
- Use customized plan
- Defines structural stormwater control projects that provide significant benefits beyond approved CSO projects alone
- Some of the Integrated Plan stormwater projects include:
 - Capitol Hill Water Quality Project: Four blocks of biofiltration swales
 - Venema Natural Drainage System: Five blocks of roadway to include natural drainage systems
 - South Park Water Quality Project: Regional stormwater quality facility
 - Street Sweeping: 560 lane miles per year
- **Catch Basin Inspection:** Inspected annually and fixed within six months if they do not pass inspection. Seattle has 22,000 catch basins in the MS4 areas.



97% of respondent communities implementing some green infrastructure
47% have comprehensive green infrastructure programs



Success Measure Distribution



Portland, OR



Green Street Policy: Encourages implementation of GI, such as green streets, in the right-of-way.

The Building Code prioritizes the use of GI for stormwater management on private property and in the right-of-way.

New York, NY



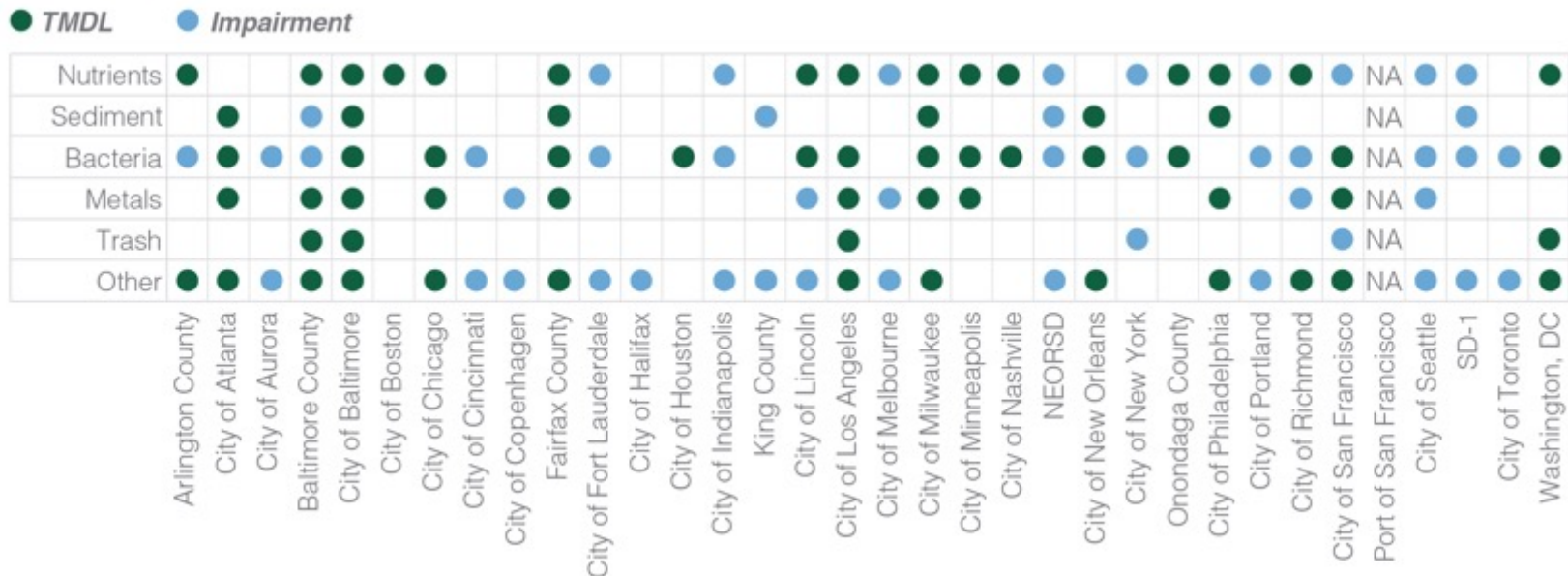
Area-wide Approach: Implements GI in Combined Sewer Overflow priority watersheds to meet Consent Decree milestones. NYC has standardized right-of-way GI for streamlined siting and design. NYC is also implementing customized green infrastructure on many public properties.

Philadelphia, PA



Neighborhood Area Opportunity Analysis: Assesses GI opportunities by an area wide approach with targeted design and implementation throughout combined sewer neighborhoods. PWD uses a decentralized and creative approach to planning and design of right-of-way and parcel GI.

59% of respondent communities have active TMDLs



73% of respondent communities implement local monitoring to better the watershed plan effectiveness



Goal: Remove all streams from the 303(d) list by 2050.

Tools:

- Green infrastructure
- Robust Urban Forestry Program
- Preserved Open Spaces

Measure Success:

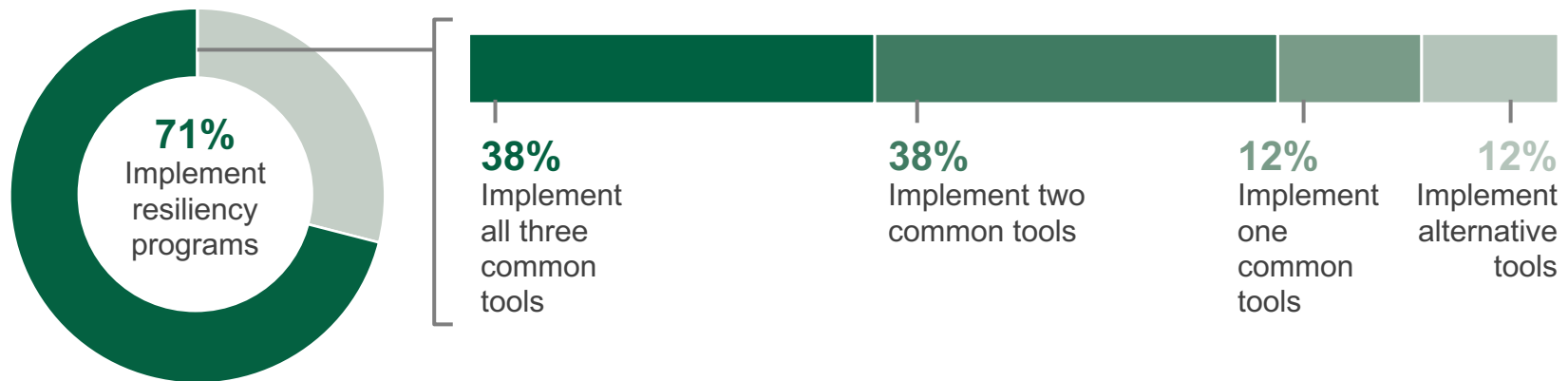
- Monitor local streams to better assess the health of its 303(d) listed streams



Main drivers are:

- Drought
- Sea Level Rise
- Heavy Precipitation Events

71% of respondent communities are implementing climate change resiliency programs



Common tools:

- Design standard revisions
- Scenario planning
- Vulnerability/ risk assessments on critical infrastructure



Climate Change Adaptation Plan:

Prepared innovative plan to adapt to climate change that considers:

- Increasing precipitation (mainly as rain)
- More intense weather (cloudbursts, storms etc.)
- Summers with dry spells interspersed by heavy thunderstorms
- More annual rain (expected about a 30% increase)
- Rising sea levels
- Rising ground water levels



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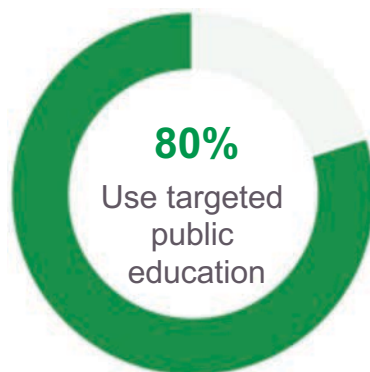
Funding Sources and
Financial Incentive Programs

100% of respondent communities have customized public education programs to address local conditions such as pollutants, receiving water, and audience

Common Tools:

- Branding
- Regional Consortia
- Watershed Signage
- Pollutant-focused Campaigns
- Media

58% of respondent communities participate in regional consortiums to coordinate regional public education



83%

Use only pollutant-focused campaigns

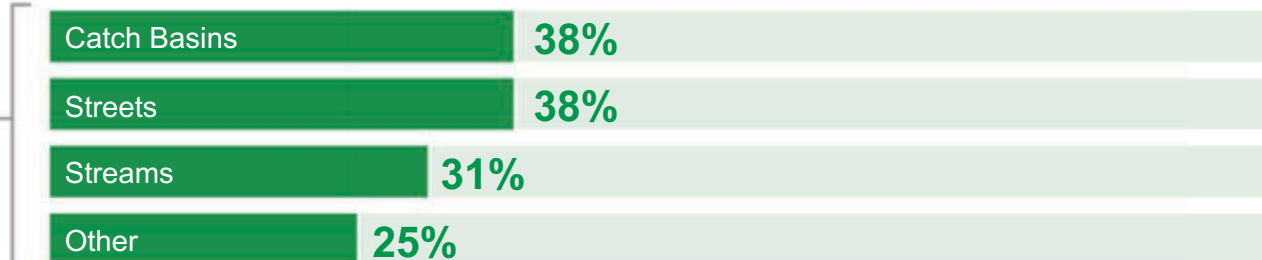
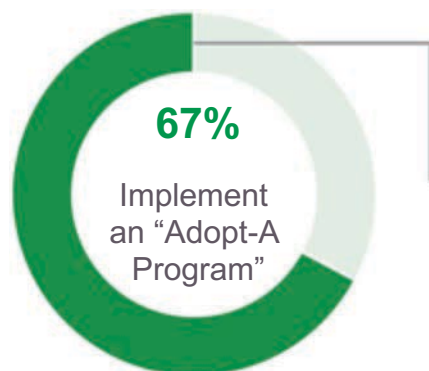
17%

Both pollutant-focused and watershed-focused campaigns

87% of respondent communities partner with schools and/or with parks to provide opportunities for public involvement in stormwater pollution prevention.

Other Common Tools:

- Appointed Stakeholder Group Roles
- Rain Barrel Giveaway Programs
- Catch Basin Marking
- “Adopt-A” Programs



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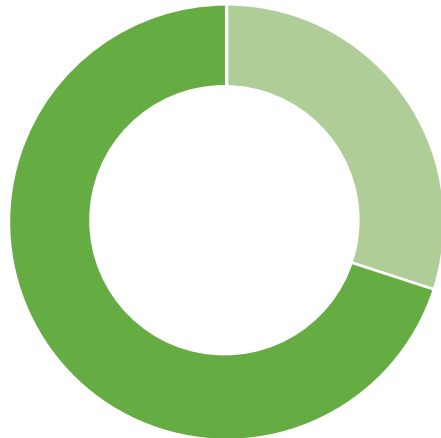
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Funding Sources and
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64% of respondent communities implement a consistent community-wide program

36% of respondent communities implement a watershed-focused IDDE program



69% of respondent communities use monitoring to target future IDDE program efforts to increase effectiveness

41% of respondent communities perform dry weather screening annually or more-frequent basis

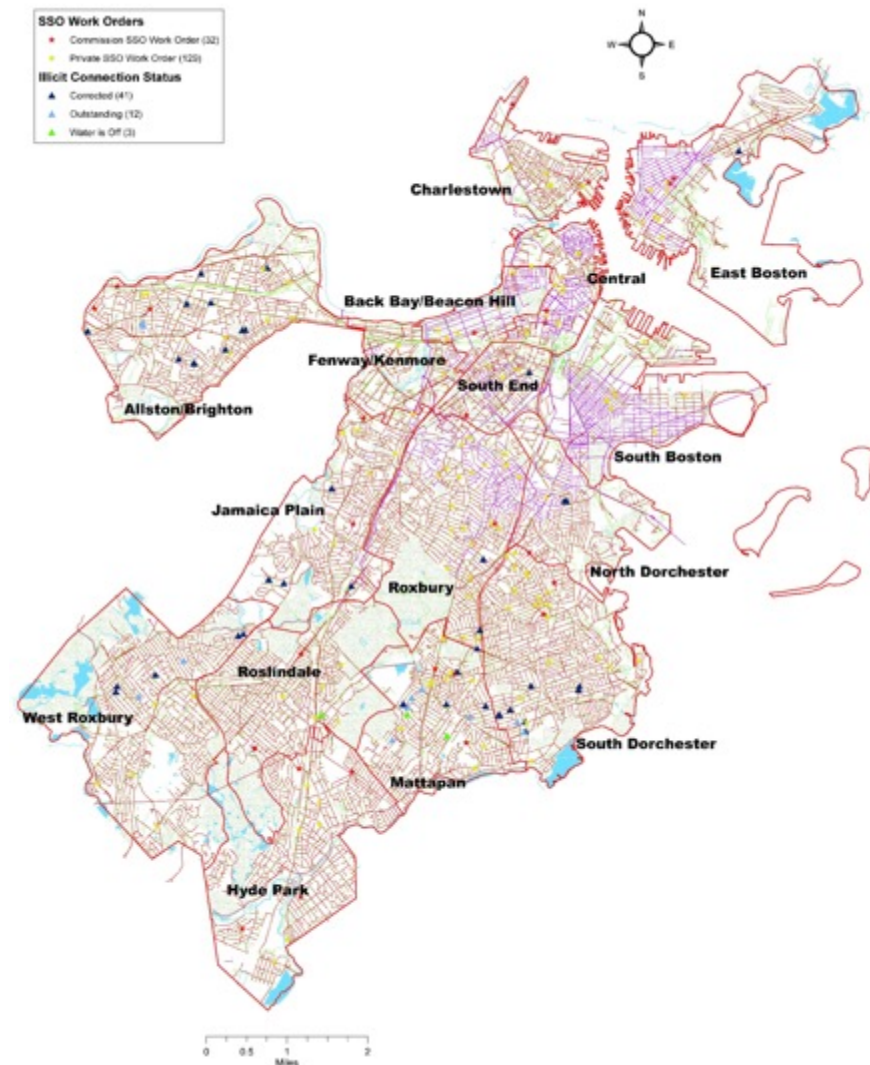


Urban Runoff Water Quality Project:

Water quality sampling from manholes, outfalls, and gutters. Explores use and effectiveness of alternate parameters to determine sources of bacteria.

Samples are analyzed for:

- Bacterial indicators
- Human DNA markers
- Pharmaceuticals
- Personal Care Products
- Nutrients
- Other Common Parameters



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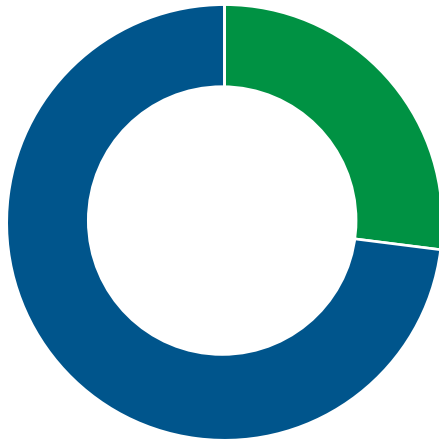
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Funding Sources and
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73% of respondent communities are more protective than federal requirements of 1-acre of disturbed area



73%

Have a threshold of $< \frac{1}{4}$ acre

0%

Have a threshold of $\frac{1}{4}$ acre to $< \frac{1}{2}$ acre

0%

Have a threshold of $\frac{1}{2}$ acre \leq 1 acres

27%

Have a threshold of ≥ 1 acres



28% of respondent communities implement enhanced erosion and sediment control such as watershed specific requirements or receiving stream assessments

55% of respondent communities have a disturbed area threshold lower than ¼ acre
53% of respondent communities have an impervious area threshold lower than 2,500 sf

Disturbed Area Thresholds



55%

Have a threshold < ¼ acre

27%

Have a threshold of 1 acre

8%

Have a threshold from ¼ acre to < ½ acre

5%

Have a threshold > 1 acre

5%

Have a threshold from ½ acre < 1 acre

Impervious Area Thresholds



53%

Have a threshold < 2,500 sf

21%

Have a threshold from 5,000 sf to < 10,000 sf

13%

Have a threshold from 2,500 sf to < 5,000 sf

13%

Have a threshold ≥ 10,000 sf

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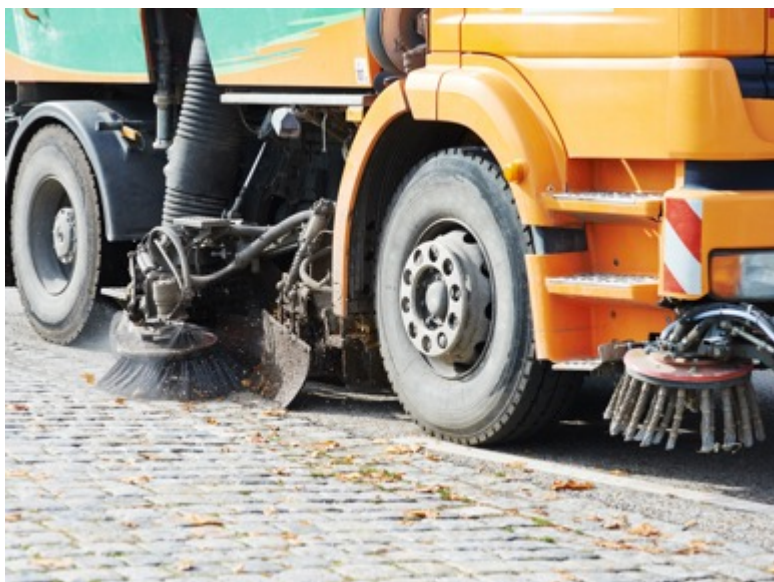
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62% of lead agencies prioritize facilities with high potential for release of pollutants of concerns

86% of communities have changed their operational methods to reduce pollution



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Funding Sources and
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76% of the programs implement a floatable program. **57%** of programs responding to regulatory requirements also have a floatables TMDL



70% of respondent communities implement structural controls for floatable reduction

Floatable Controls (most common to least common)

Public Education

Netting or Litter Traps

Focused street sweeping

Volunteers

Catch Basin Inserts or Hoods

Bag Tax and Styrofoam Laws

47% of respondent communities prioritize hot spot areas for floatable reduction

Los Angeles Case Study

Floatable Structural Control:

Flow Activated Catch Basins are used to maximize the amount of trash kept on the street and minimizes flooding. Los Angeles sets the trigger at which the screen will swing open.



New York City Case Study

Floatable Media Campaign:

In partnership with the Wildlife Conservation Society and centered around the New York Aquarium in Coney Island, this media campaign highlights the impact of litter on local waterways and wildlife, and aims to reduce littering behavior.



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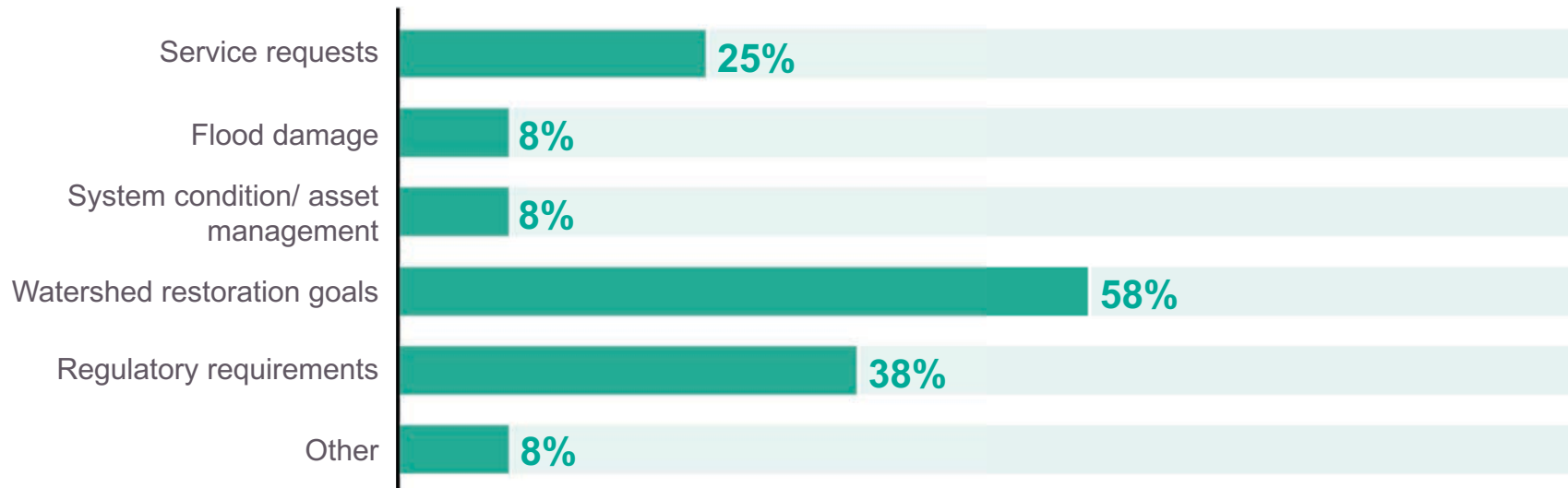
Funding Sources and
Financial Incentive Programs

100% of communities implement a structural stormwater management program;
94% of these use a combination of green and gray infrastructure



50% of communities implement a structural control programs on the entire system (public and private property)

Structural Control Program Drivers



Staten Island Bluebelt: drainage infrastructure to mitigate flooding issues for approximately 1/3rd of Staten Island's land area

Stormwater BMPs

- Constructed wetlands
- Outlet stilling basins
- Stream restorations

Provide:

- Water quality treatment
 - Nutrient Removal
 - Bacteria Removal
 - Organics Removal
- Extended detention

Scale:

- 62 BMPs of 124 constructed to date
- Capital program extends to 2043



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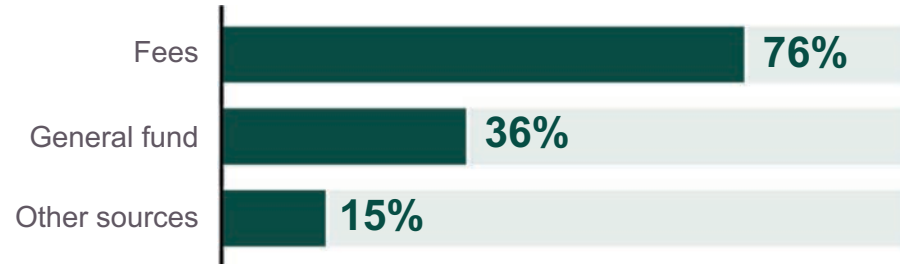
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**Funding Sources and
Financial Incentive Programs**

76% of communities use a stormwater fee to fund stormwater management programs



66%

Impervious-based stormwater utility

28%

Flat rate utility

6%

Development intensity-based stormwater utility

The **average monthly** residential stormwater fee is **\$8.79** for the communities that utilize a stormwater fee.



Types of Financial Incentive Programs

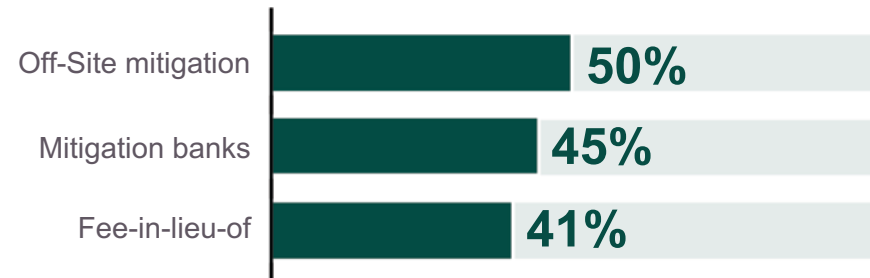
- Stormwater Fee Credits
- Off-site Mitigation Programs
- Fee-In-Lieu-Of Programs
- Green Infrastructure Grant Programs

62% of communities with stormwater fees offer a stormwater fee credit program

Average maximum fee credit is **70%** of the stormwater fee



65% of communities offer a green infrastructure grant program



Comprehensive planning of permit compliance, consent decree compliance, TMDL compliance, etc. allows for efficiencies to be identified and overall goals coordinated while also meeting minimum regulatory requirements.

Post-construction requirements that target specific waterbody impairments, not just state minimums, better leverage community investment.

Co-assessing all three water infrastructures results in cost-savings and co-benefits.

Comprehensive **monitoring programs** that assess all monitoring needs and measure actual receiving waterbody improvements provide the basis for more cost-effective programs.

How to find the report

Please find information on the report NYC DEP's website:

<https://medium.com/nycwater/innovative-and-integrated-stormwater-management-26158da223d8>

The report can also be found for download or print copy at

<http://www.waterrf.org/resources/Pages/NYC-Stormwater-Report.aspx>

Google: Innovative and Integrated Stormwater Management

or

NYC Stormwater Report

