



# Combined Sewer Overflow Long Term Control Plan

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Citywide/Open Waters LTCP

Retained Alternatives Public Meeting

October 15, 2019

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	<b>Topic</b>	<b>Speaker</b>
1	<b>Welcome &amp; Introduction</b>	Mikelle Adgate
2	<b>Overview of Baseline Projects &amp; Floatables Control Approach</b>	Pinar Balci
3	<b>Overview of Retained Alternatives</b>	Keith Mahoney
4	<b>Next Steps</b>	Mikelle Adgate

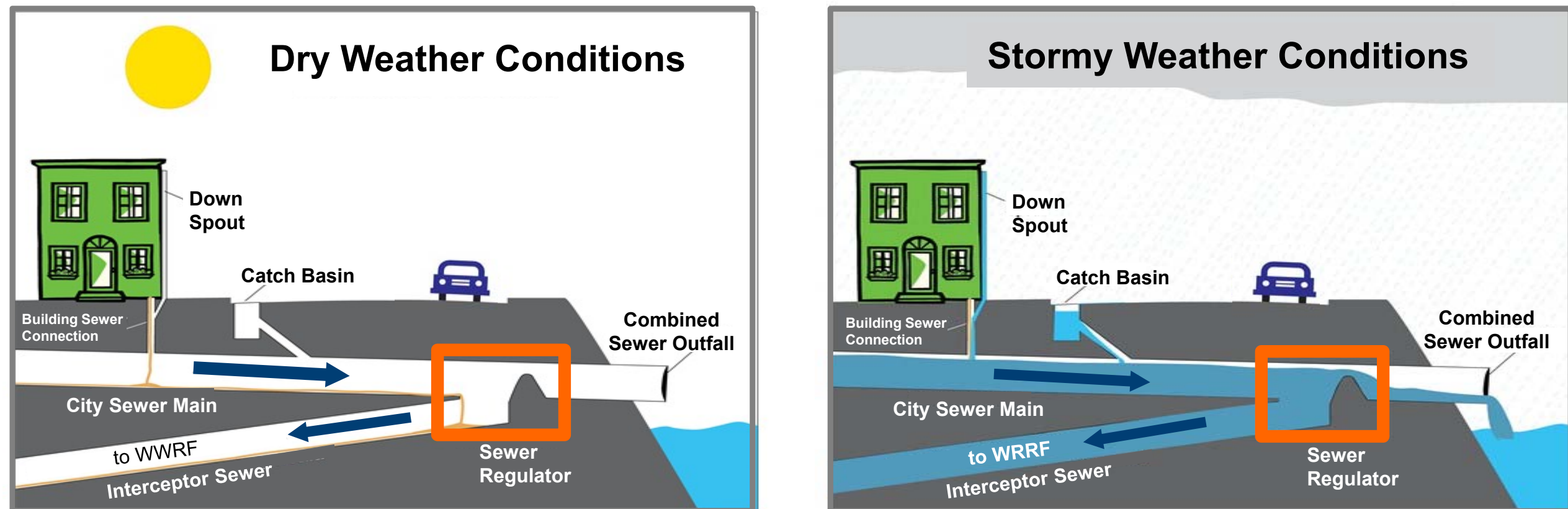
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# Welcome & Introduction

Mikelle Adgate  
Senior Advisor, BPAC  
DEP

# What is a Combined Sewer Overflow (CSO)?

- NYC's sewer system is approximately 60% combined, which means it is used to **convey both sanitary and storm flows**.



- 65% to 90% of **combined** sanitary & storm flow is captured at wastewater resource recovery facilities (WRRF).
- When the sewer system is at full capacity, a diluted mixture of rain water and sewage may be released into local waterways. This is called a combined sewer overflow (CSO).



## Long Term Control Plan (LTCP)

identifies appropriate CSO controls to achieve applicable water quality standards

consistent with the Federal CSO Policy and Clean Water Act

## CSO Consent Order

an agreement between NYC and DEC that settles past legal disputes without prolonged litigation

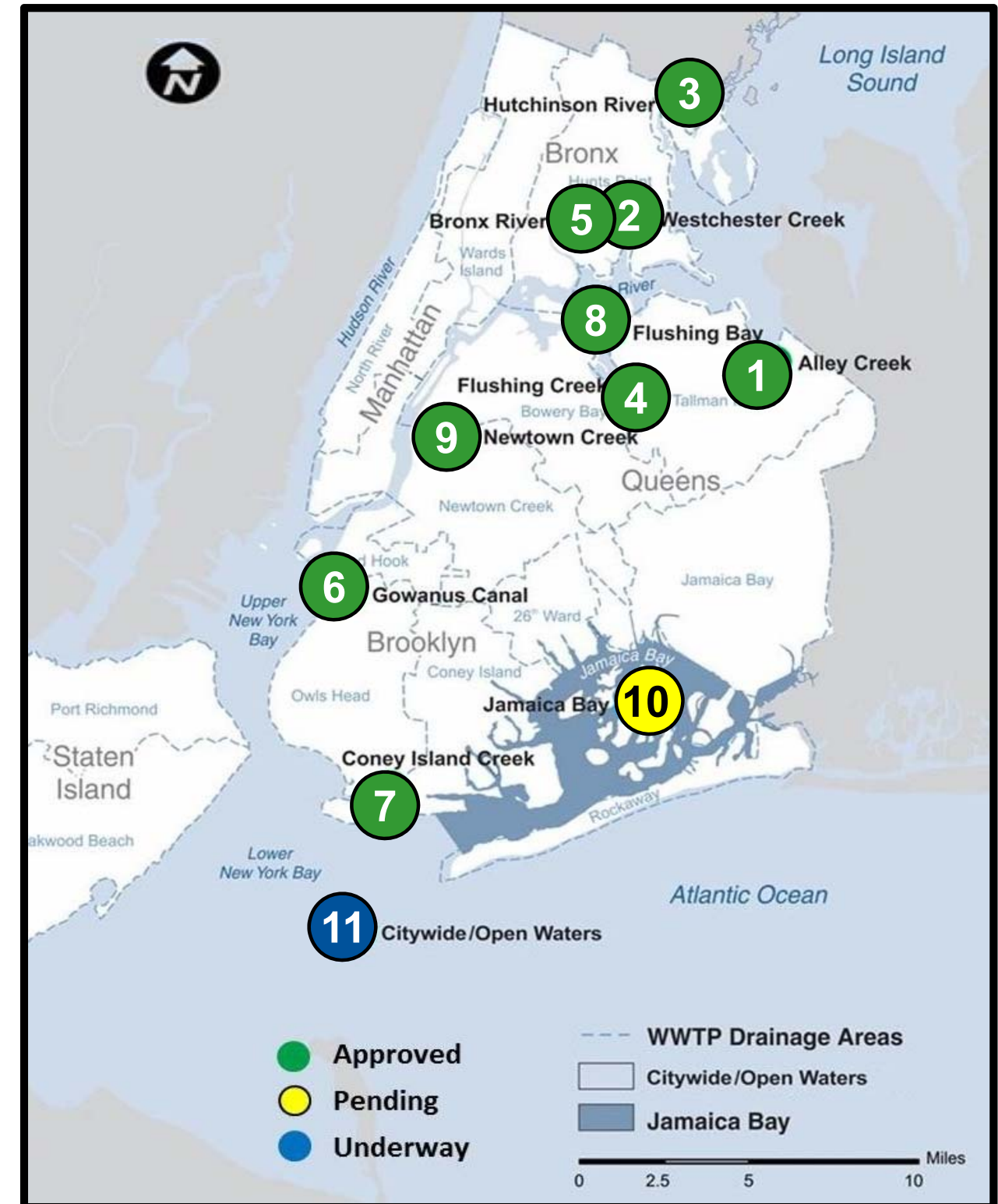
DEC requires DEP to develop LTCPs and mitigate CSOs

# LTCP Milestone Status

ID	LTCP	Approved?
1	Alley Creek	✓
2	Westchester Creek	✓
3	Hutchinson River	✓
4	Flushing Creek	✓
5	Bronx River	✓
6	Gowanus Canal	✓
7	Coney Island Creek	✓
8	Flushing Bay	✓
9	Newtown Creek	✓
10	Jamaica Bay and Tributaries <sup>(1)</sup>	Under DEC review
11	Citywide/Open Waters <sup>(2)</sup>	LTCP in development Due to DEC March 2020

(1) Jamaica Bay includes Thurston Basin, Bergen Basin, Hendrix Basin, Fresh Creek, Spring Creek, Paerdegat Basin and Jamaica Bay

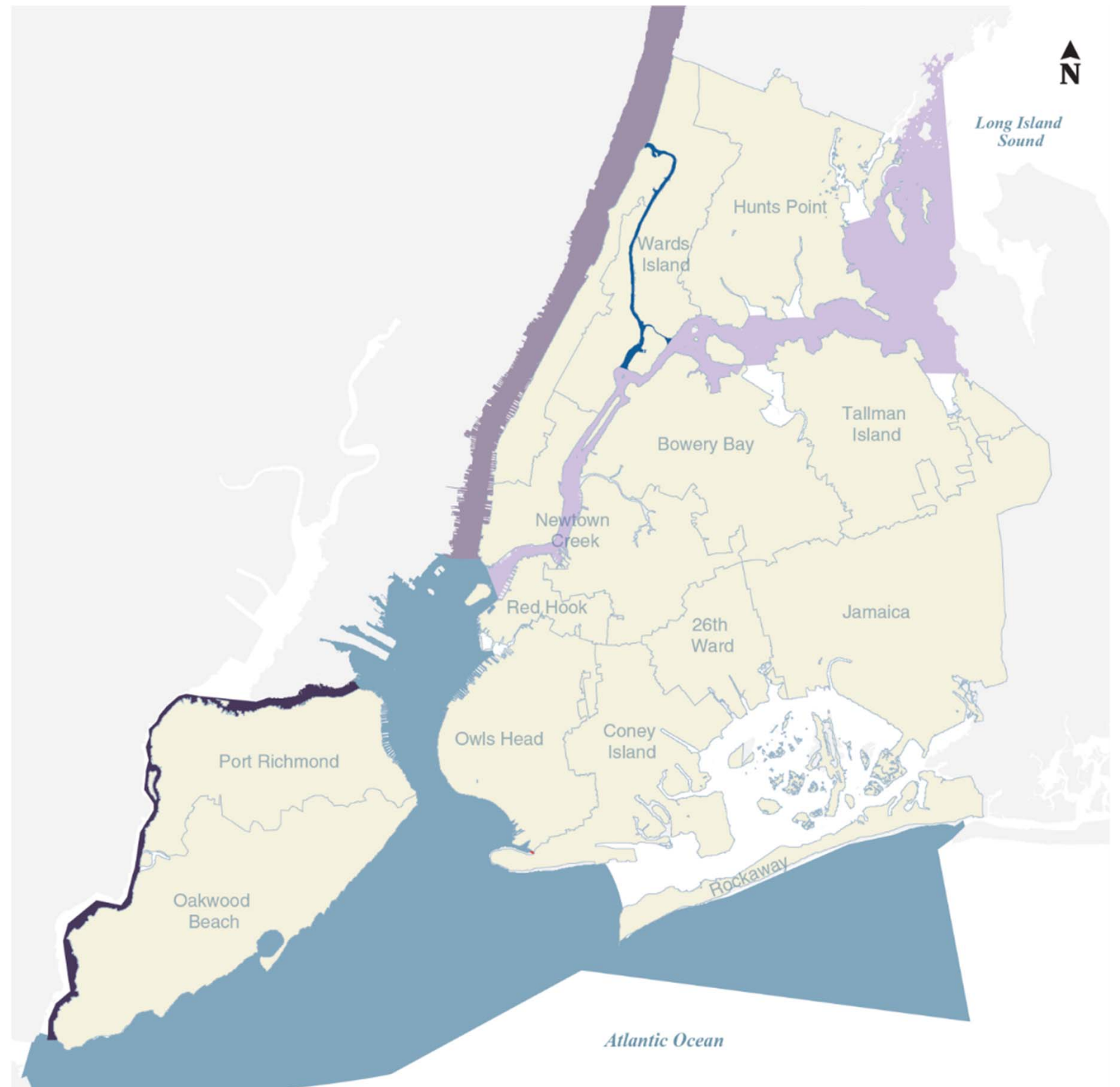
(2) Citywide/Open Waters LTCP includes East River, Lower Long Island Sound, Hudson River, Harlem River, Lower and Upper New York Bay, Arthur Kill and Kill Van Kull



- Waterbody-specific CSO evaluation of Open Waters:

- Harlem River
- Hudson River
- East River/Long Island Sound
- Upper and Lower New York Bay
- Arthur Kill and Kill Van Kull

- Citywide/Open Waters LTCP will be submitted to DEC in **March 2020**



# **Overview of Baseline Projects & Floatables Control Approach**

Pinar Balci, PhD  
DEP



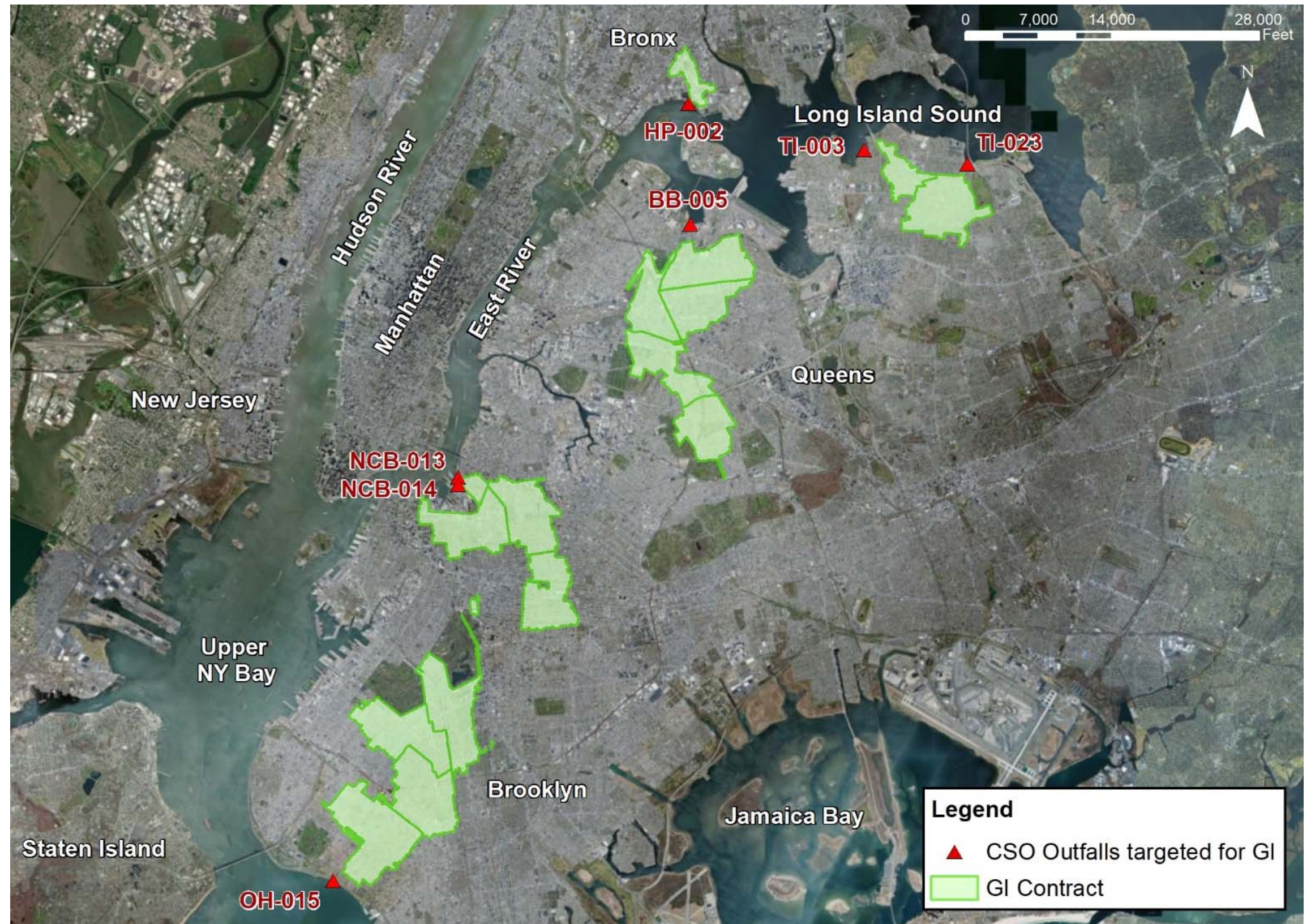
- **Grey Infrastructure Projects**
  - WWFP Projects (\$2.7B)
  - Tributary LTCPs (\$5.2B)
- **Green Infrastructure Projects (\$1.5B)**
  - Right-of-way Green Infrastructure
  - Public Property Retrofits
  - Private Property Incentives
  - Stormwater Rules
  - Demand Management
  - Tibbetts Brook Daylighting





# ROW Contract Areas in East River/Open Waters

- 435 Assets Constructed and In-Construction
- 180.6M Annual Gallons of Stormwater Managed
- 144 Equivalent Greened Acres





## Central Park Jackie Onassis Reservoir Recirculation Project

- 0.83 MGD of potable water savings
- CSO reduction of **about 4 MG/yr** to the East River



## Prospect Park Valve Replacement Project

- 0.80 MGD of potable water savings
- CSO reduction of **about 12 MG/yr** to New York Bay





# Tibbetts Brook – Proposed Alternatives



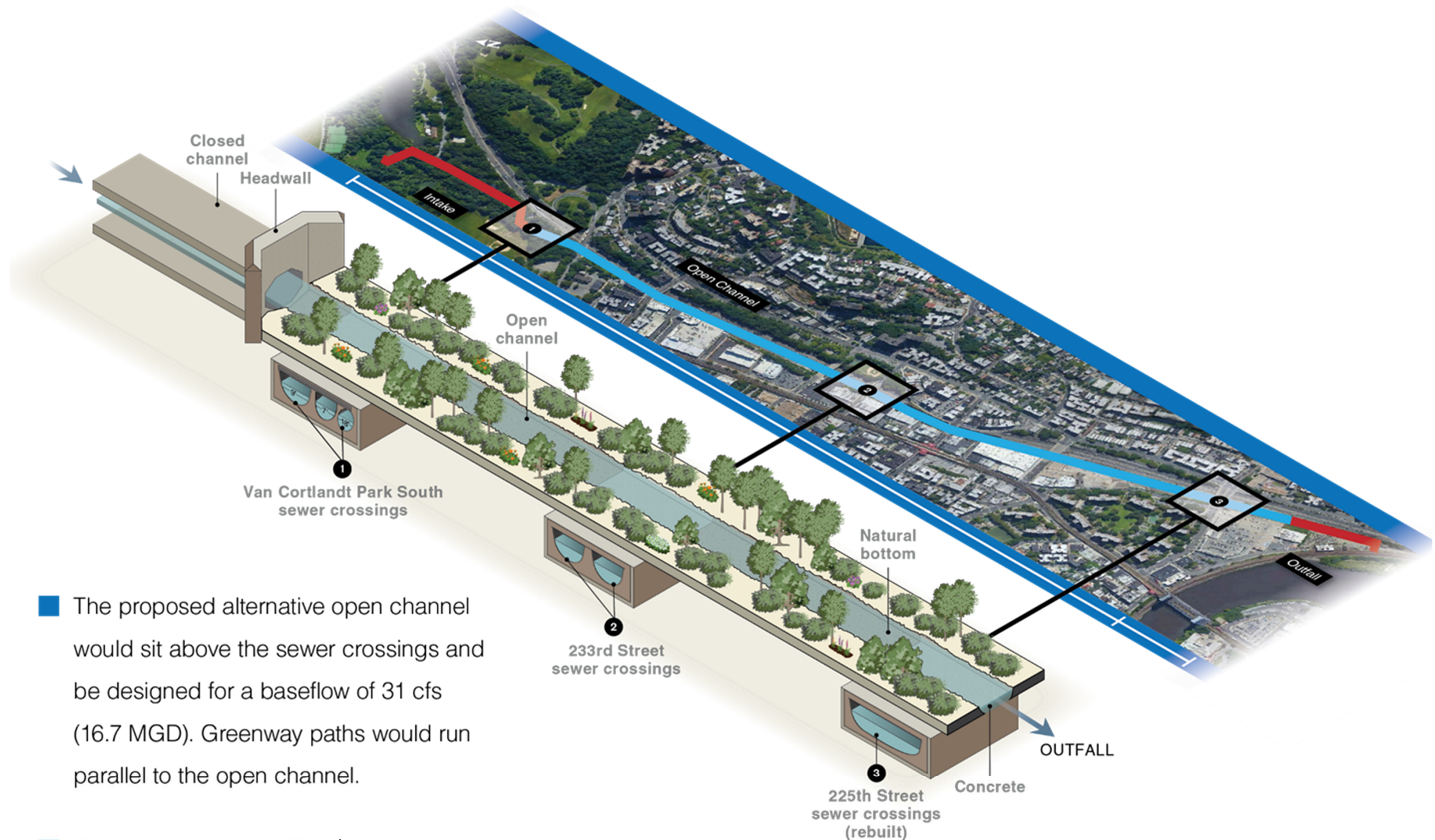
— Closed Channel — Open Channel

## Summary of Alternatives

CSO Reduction		CSO Reduction (MG/year)	Cost Estimate (\$M)	CSO Reduced \$/gal	Need Siphons	Maintenance Requirements	Safety Requirements	Constructability Concerns	Open Channel Flow (cfs)	Channel Dimensions	
Option	Description									Open Channel Cross Section	
1	Base Flow Daylighting   w/ Van Cortlandt Lake Improvements	156   202	55   60	0.35   0.30	No	Low	Low	Medium	Up to 14	3'	
2	Base Flow Daylighting w/ Van Cortlandt Lake Improvements and Additional Storm Flow	228	63	0.28	No	Low	Low/Moderate	Medium	Up to 31	3.5'	
3	Base Flow Daylighting with Parallel Pipe for Full Flow	282	90	0.32	Yes	High	Low	Severe	Up to 14 (203 in parallel pipes)	5'	
4	Full Flow Daylighting	282	N/A	N/A	Yes	High	High	Very Severe	Up to 217	5'	



# Tibbetts Brook Option 2 – Open Channel



■ The proposed alternative open channel would sit above the sewer crossings and be designed for a baseflow of 31 cfs (16.7 MGD). Greenway paths would run parallel to the open channel.

■ Cost estimate: \$63 million\*

\*2019 \$, does not include site acquisition costs



- Modify the downstream overflow weir to include a low flow orifice, which would create a foot of dynamic storage at the top of the lake (volume of 13 acre-feet)
- Construct new weir structure between Upper Basin and Van Cortlandt Lake to maintain existing water surface elevation of Upper Basin and protect high-value wetland



Overflow weir structure

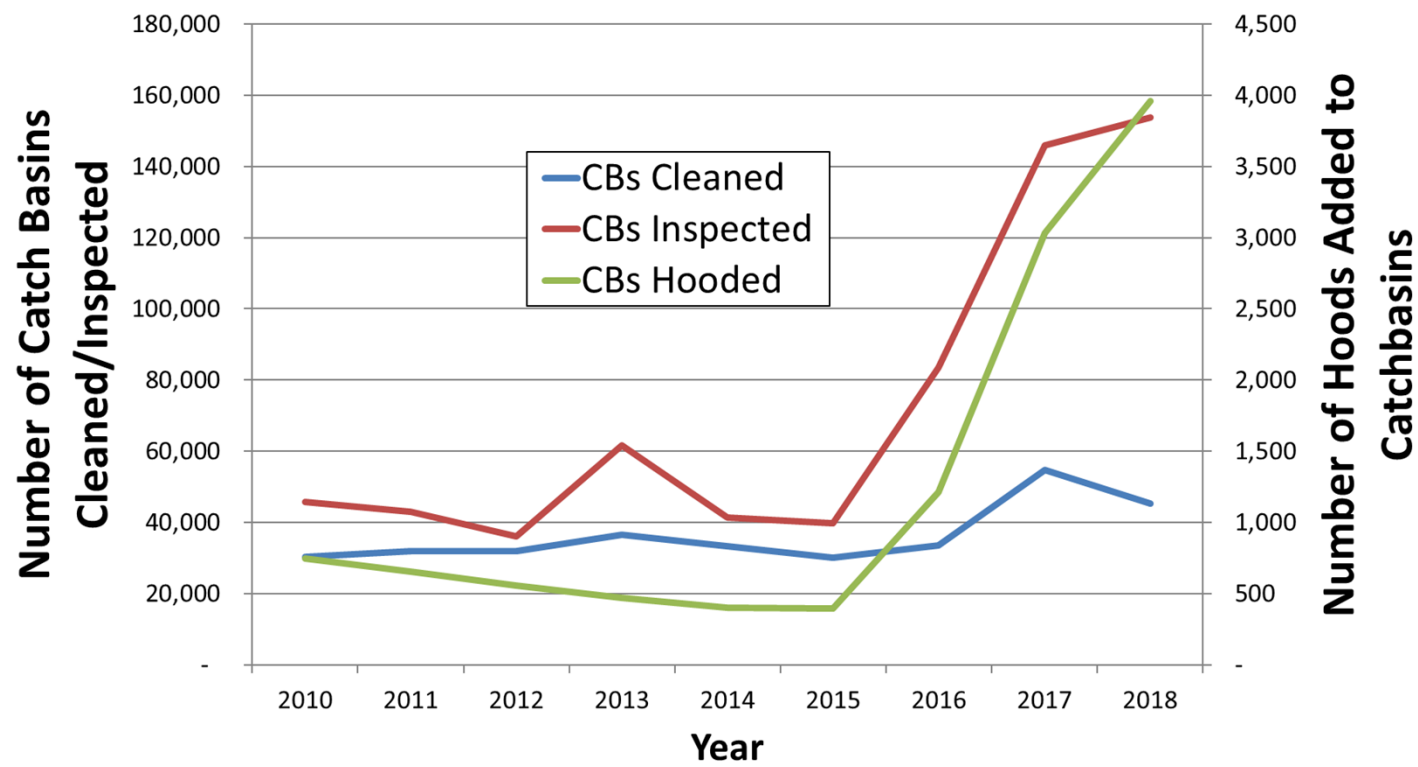
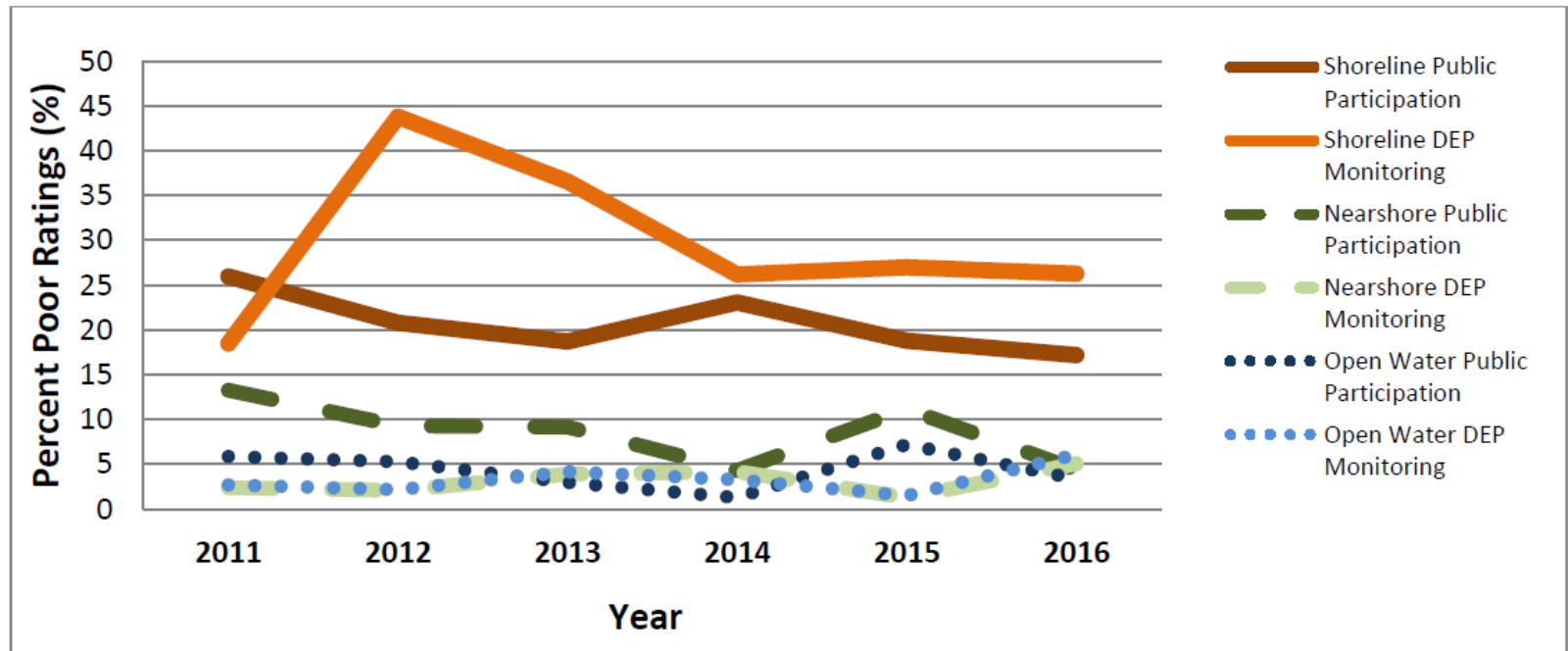
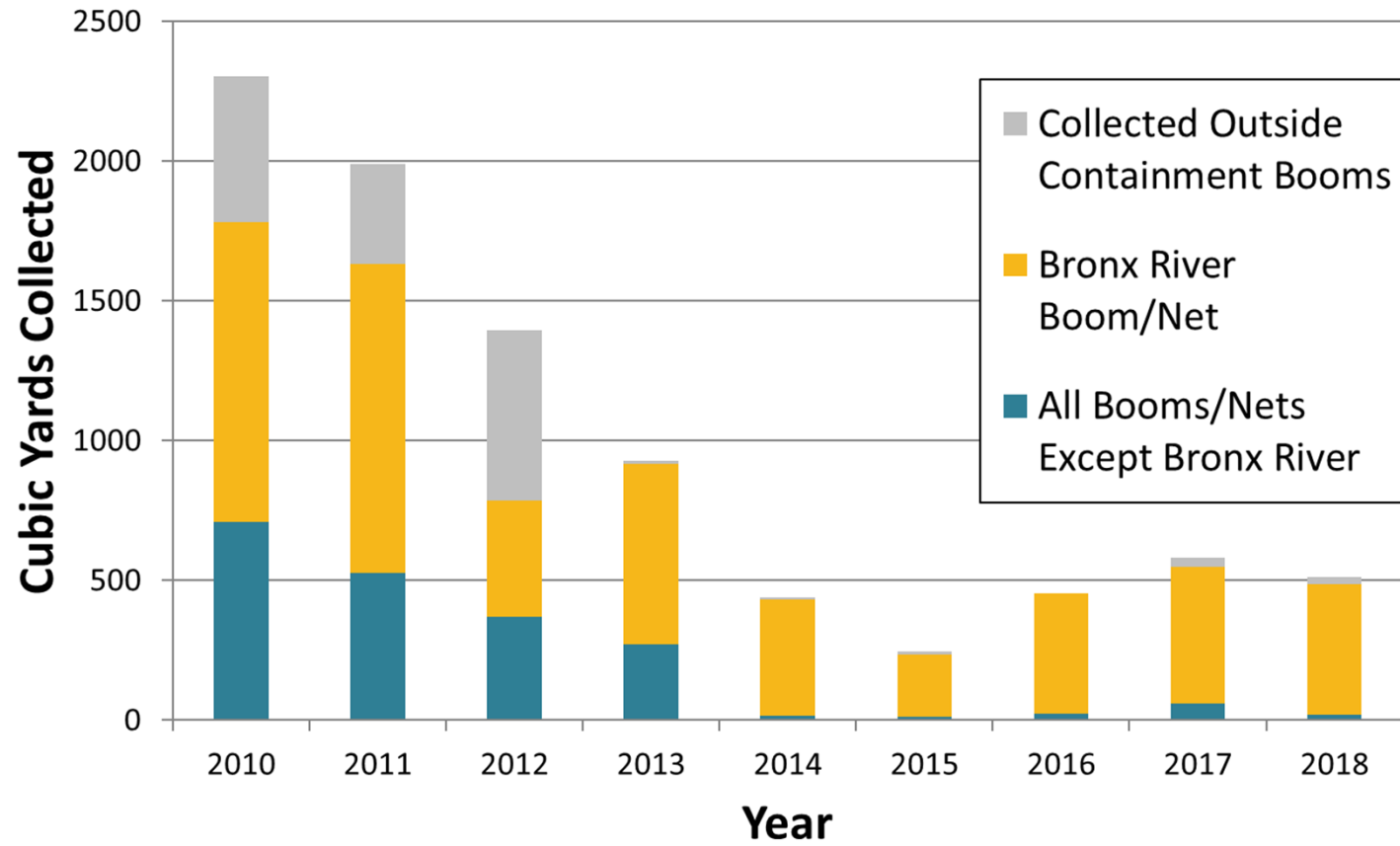
Entrance to collection system





# Annual Citywide Floatables Reporting

### DEP Boom and Skim Program: Total Floatables Collected 2010 - 2018





# Citywide/Open Waters Floatables

## Approaches

- Continue and enhance current floatables controls
- Coordinate with MS4 to develop citywide floatables plan and associated field program to further quantify floatables in 303(d) impaired areas
- Evaluate additional programmatic/integrated floatables control
- Evaluate purchasing an inter-pier skimmer vessel
- Eliminate existing floatables booms where feasible

Street Sweeping



Catch Basin Hooding

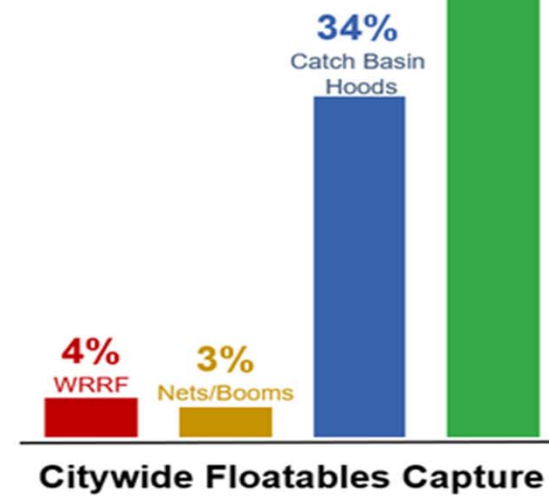


Netting/Booms

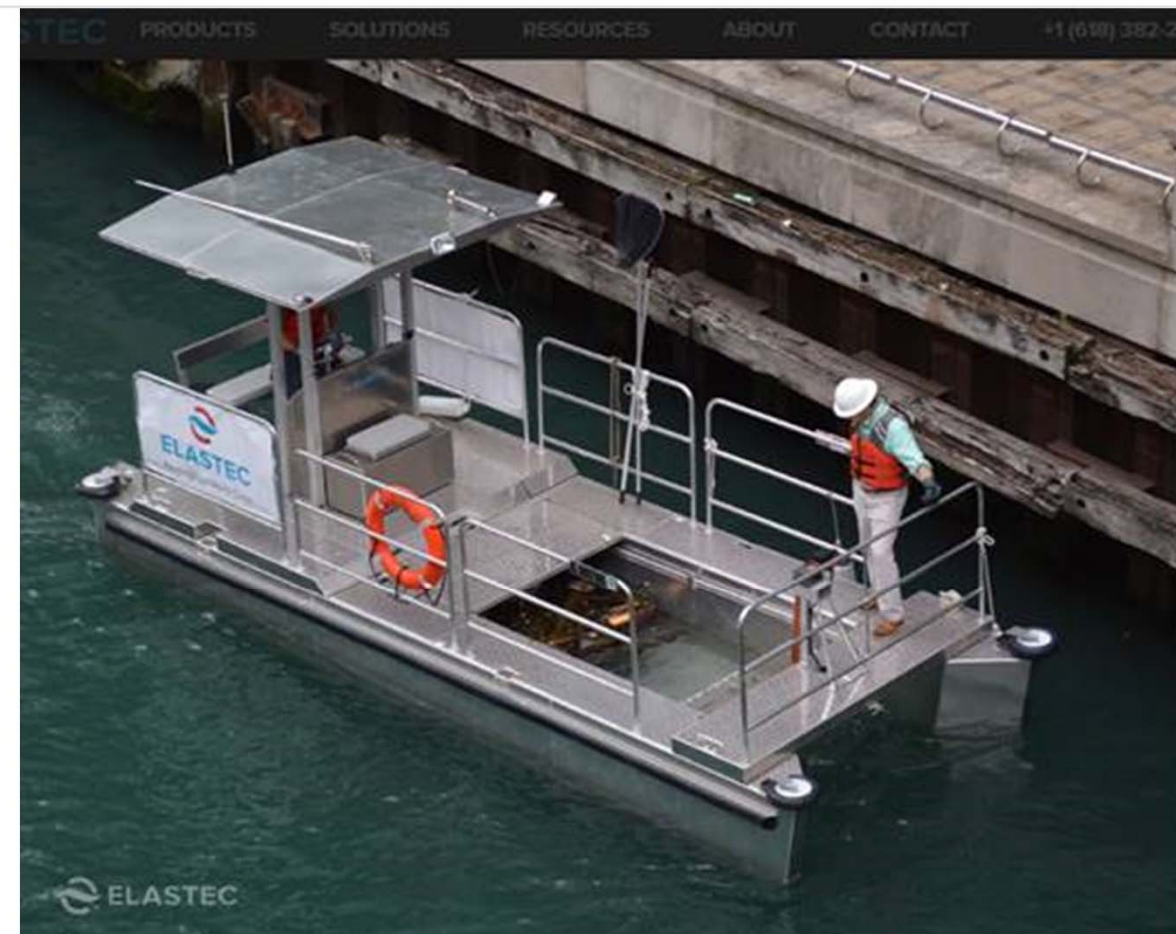


Wastewater Resource Recovery Facility (WRRF)

96% of citywide street litter (floatables) is captured<sup>(1)</sup>



(1) Source: NYC Stormwater Management Program, NYCDEP, August 2018





# Programmatic Controls



Clean Streets = Clean Beaches



B.Y.O. Campaign

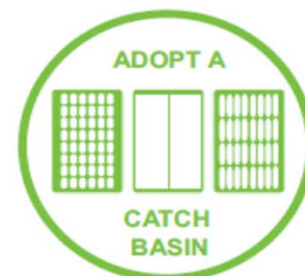
Don't Trash Our Waters



Talk Trash New York



## Public Education and Outreach



Adopt a  
Catch Basin



Clean Streets  
Clean Beaches



Adopt a  
Basket



Forgot Your  
Bag?

### Stewardship Programs

- 311
- Adopt-a-Bluebelt
- Shoreline and Bluebelt Cleanups
- Adopt-a-Basket
- Community Clean-ups
- Park Stewardship
- Adopt-a-Highway/Greenway

### Educational Programs

- Water Resources Annual Art and Poetry Contest
- Catch Basin Marking
- Environmental Education
- Visitor Center at Newtown Creek
- SAFE Disposal Events
- Special Waste Drop-Off Sites
- School Sustainability Coordinator Trainings
- The Natural Classroom
- Weekend, Pop-up, and Custom Adventures

### Other Programs

- Public Litter Baskets
- Mechanical Broom Street Sweeping
- Catch Basin Inspection, Cleaning, Grates and Hoods
- Floatables Controls in Combined Sewer System
- End-of-pipe Booms and Nets







# Questions

# Overview of Retained Alternatives

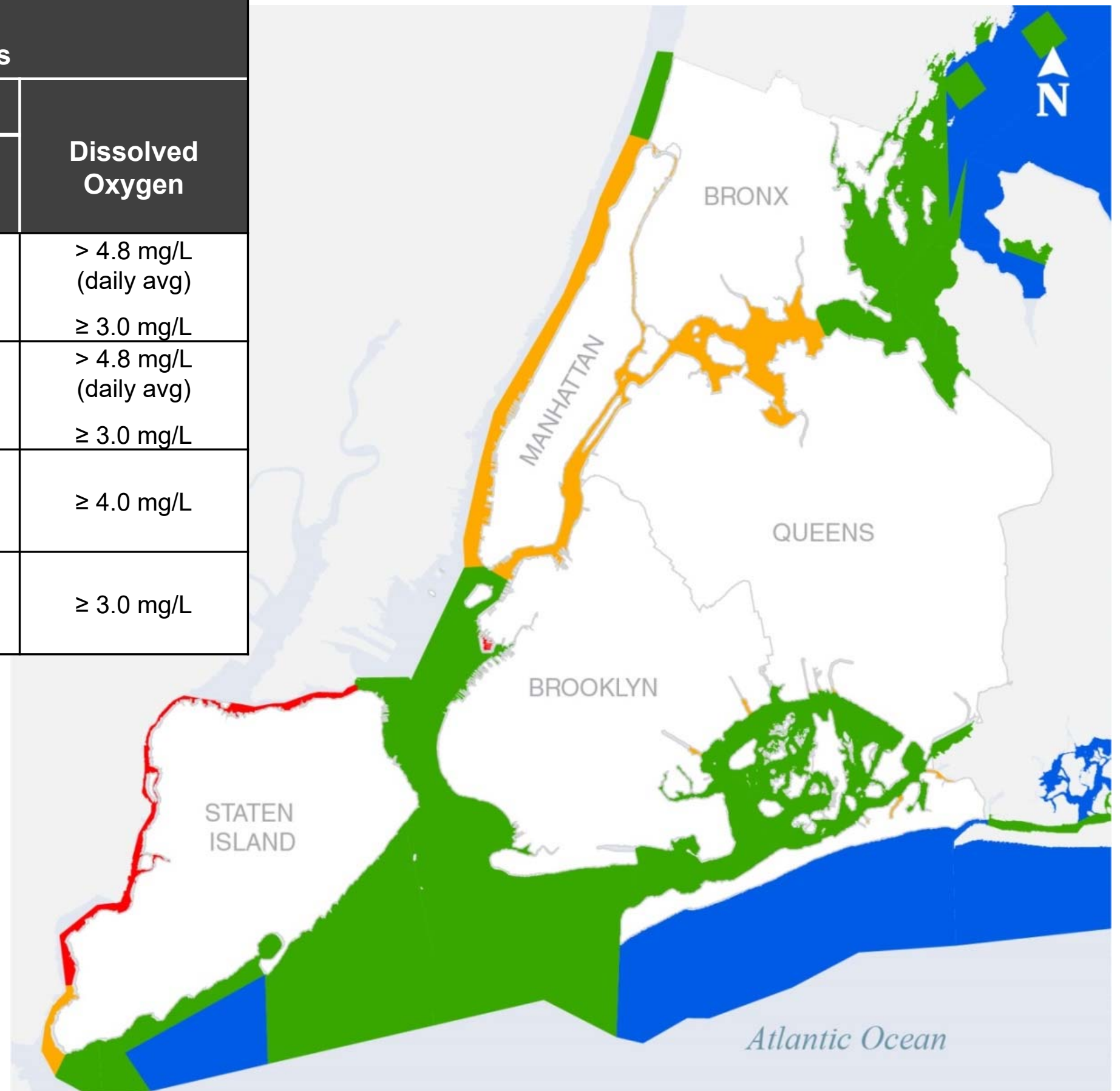
Keith Mahoney, PE  
DEP

# Water Quality Standards

New York State Saline Surface Water Quality Standards			
Class	Bacteria <sup>(1)</sup>		Dissolved Oxygen
	Fecal Coliform <sup>(2)</sup>	<i>Enterococci</i> <sup>(3)(4)</sup>	
 SA	-	GM ≤ 35/100mL STV 90% ≤ 130 cfu/100mL	> 4.8 mg/L (daily avg) ≥ 3.0 mg/L
 SB	Monthly GM ≤ 200/100mL	GM ≤ 35/100mL STV 90% ≤ 130 cfu/100mL	> 4.8 mg/L (daily avg) ≥ 3.0 mg/L
 I	Monthly GM ≤ 200/100mL	-	≥ 4.0 mg/L
 SD	Monthly GM ≤ 200/100mL	-	≥ 3.0 mg/L

**Notes:**

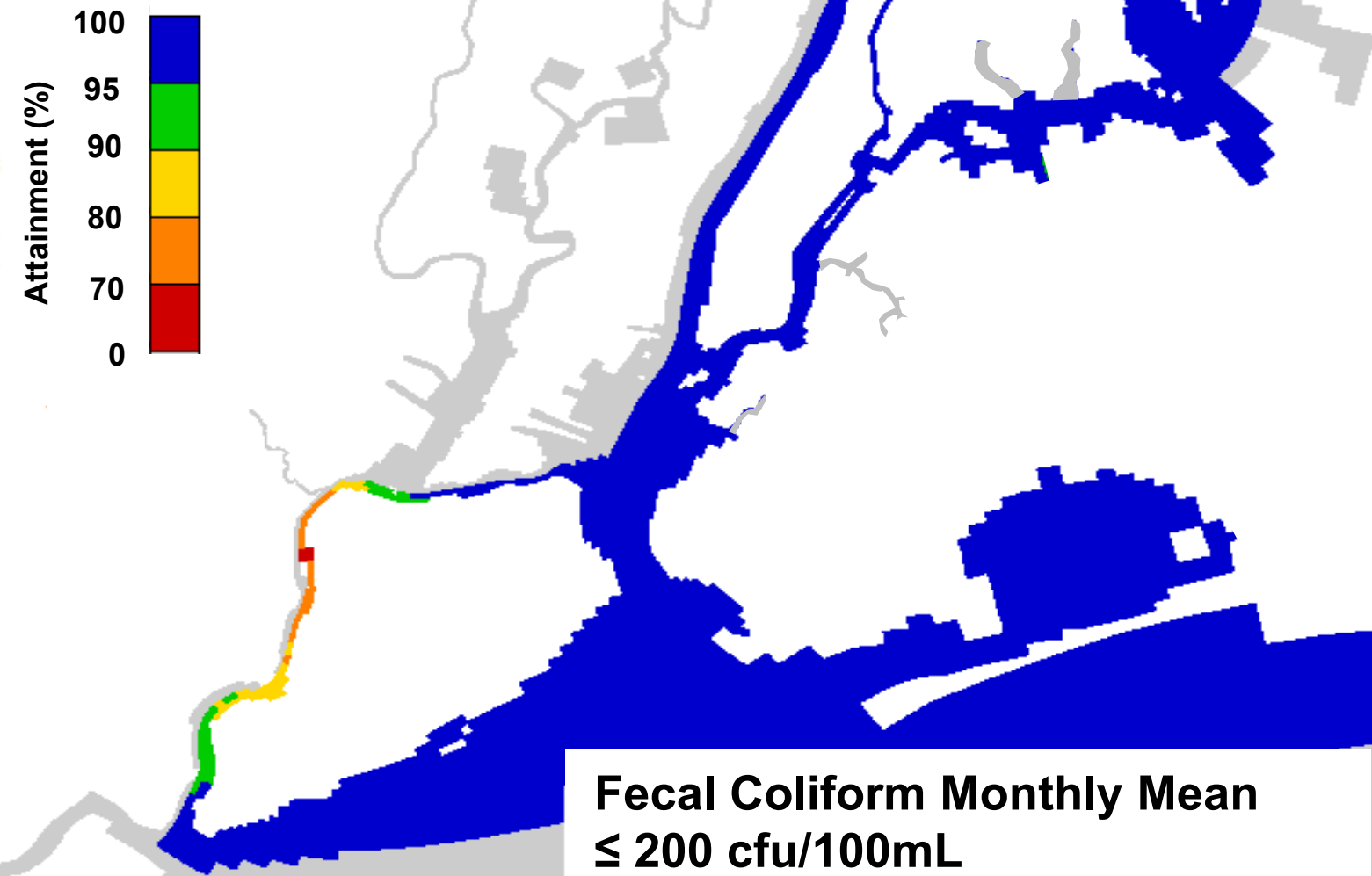
- (1) Total coliform criteria not shown
- (2) Assessed on an annual basis and recreational season
- (3) Assessed during primary contact recreational season or as necessary to protect human health
- (4) Applicable to coastal primary contact recreational waters only



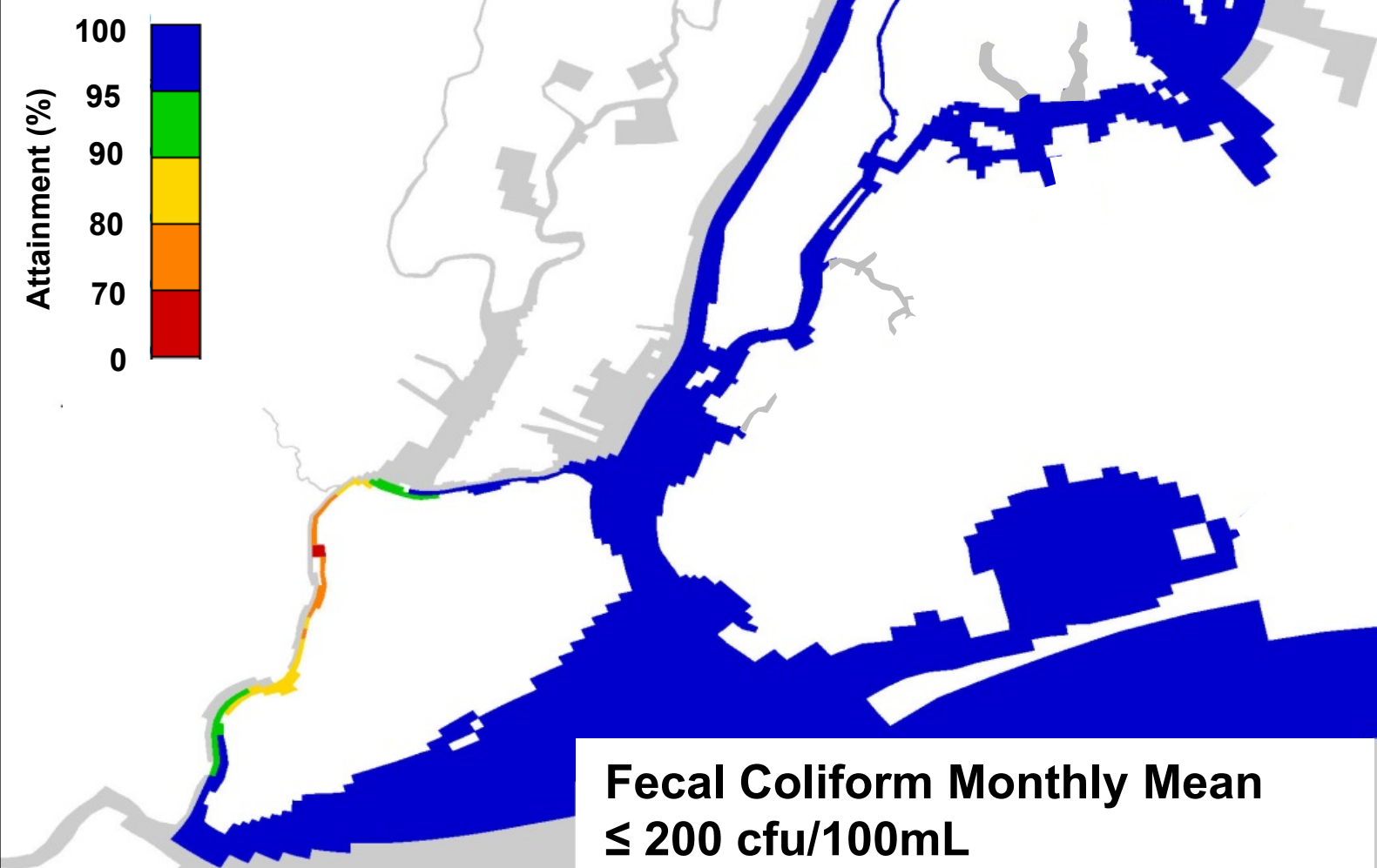


# Fecal Coliform Gap Analysis

## Baseline Conditions 10-yr Annual Attainment

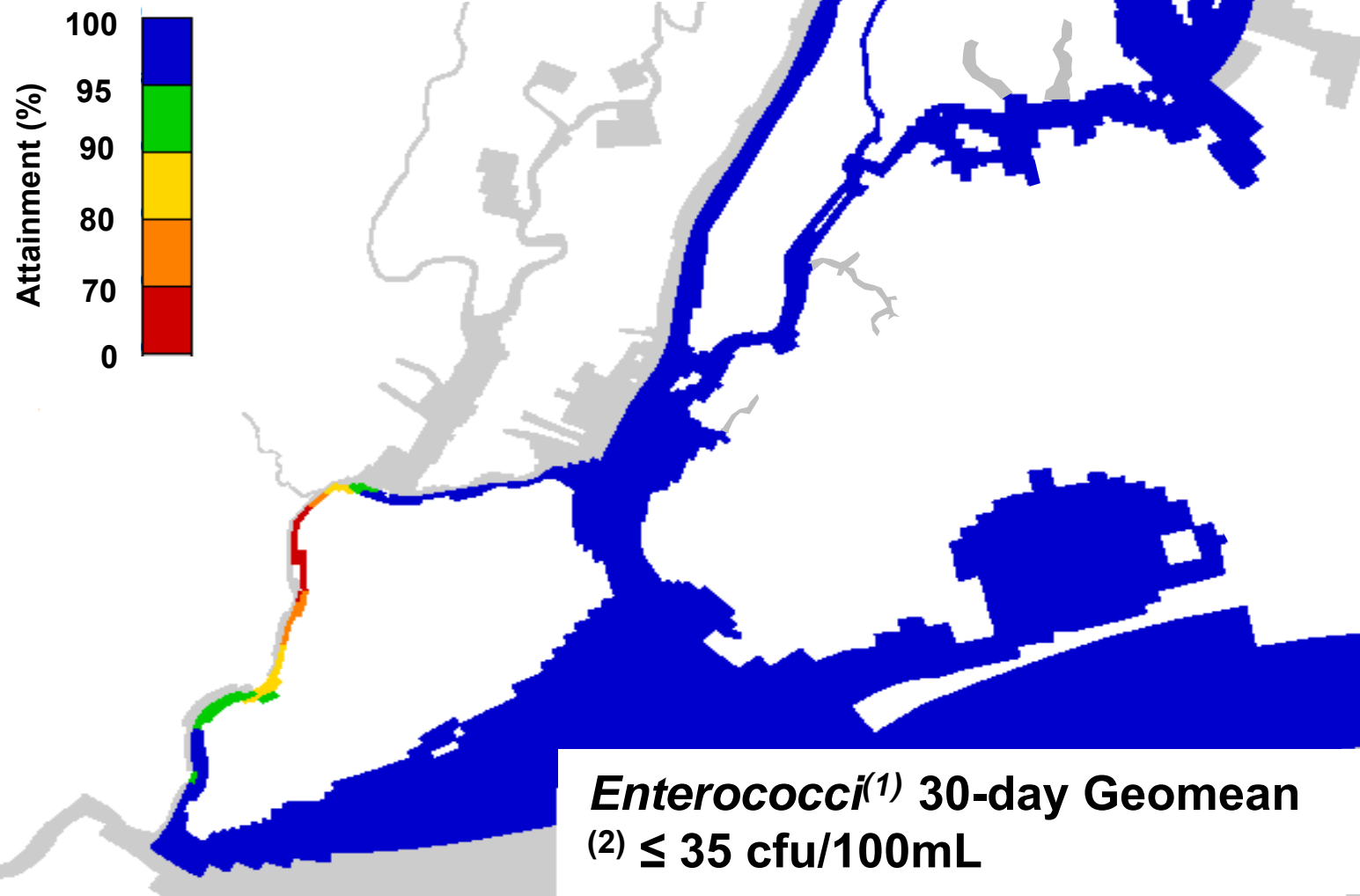


## 100% CSO Control 10-yr Annual Attainment

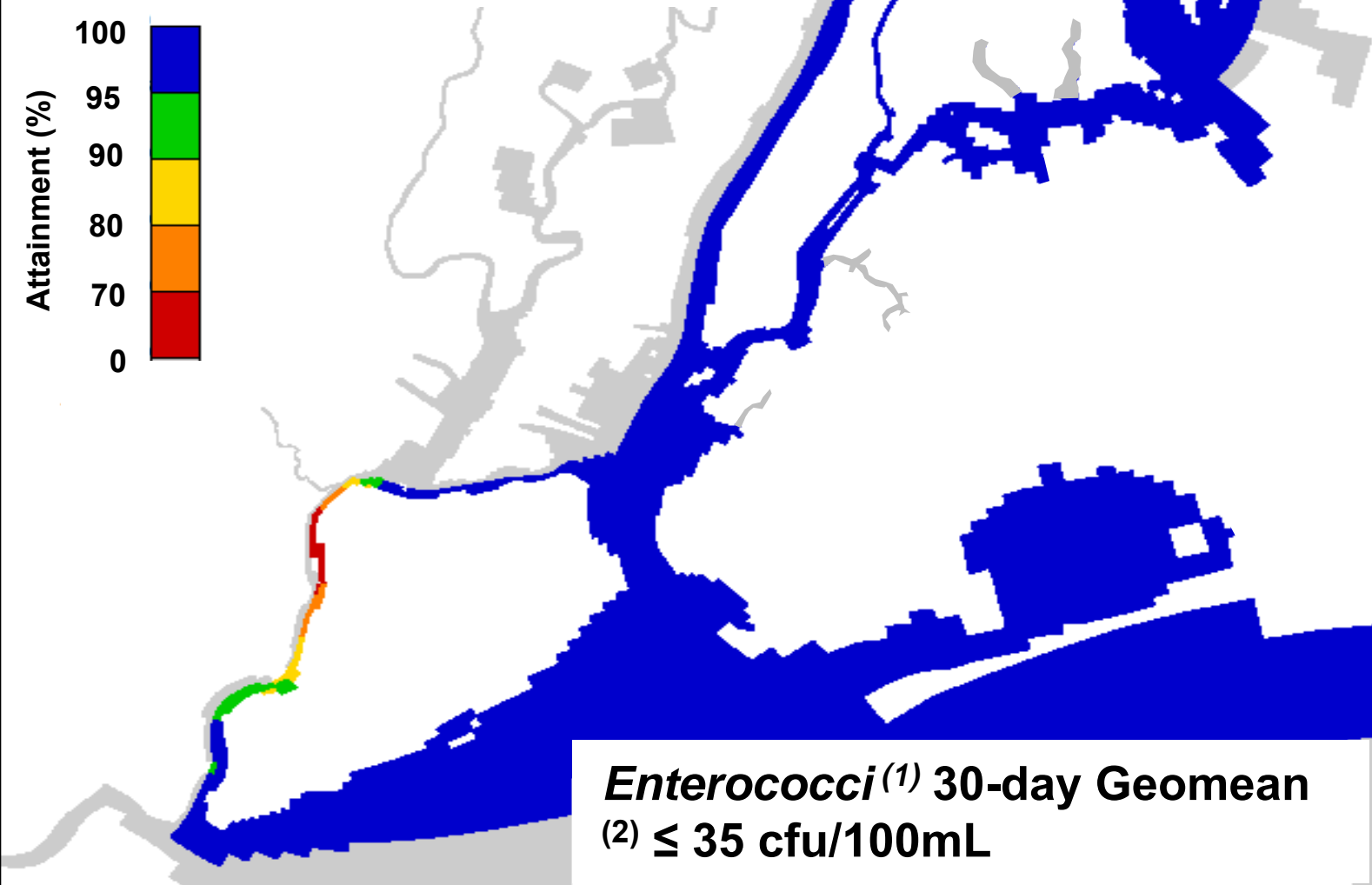


# Enterococci GM Gap Analysis

## Baseline Conditions 10-yr Annual Attainment



## 100% CSO Control 10-yr Annual Attainment

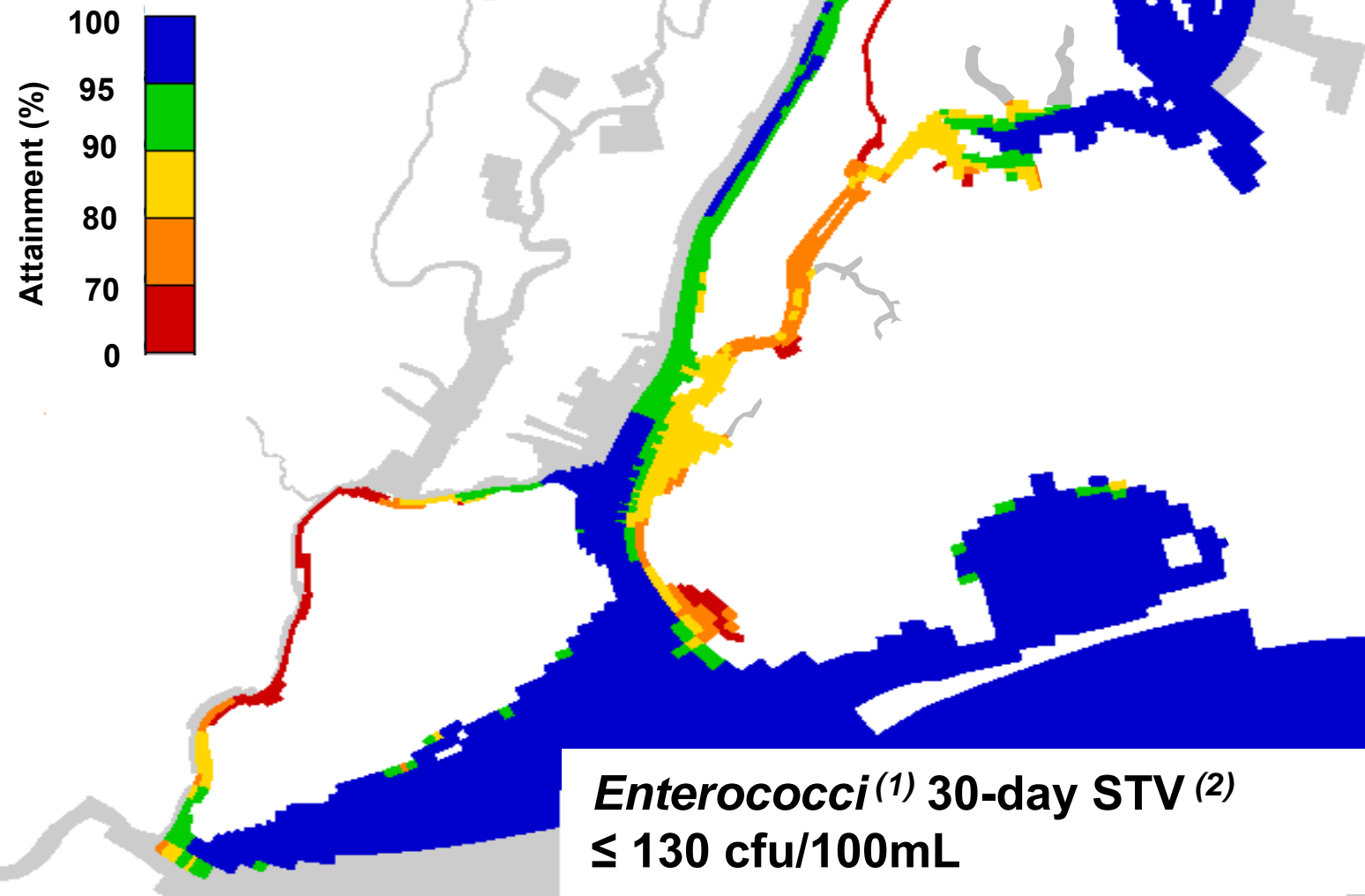


### Notes:

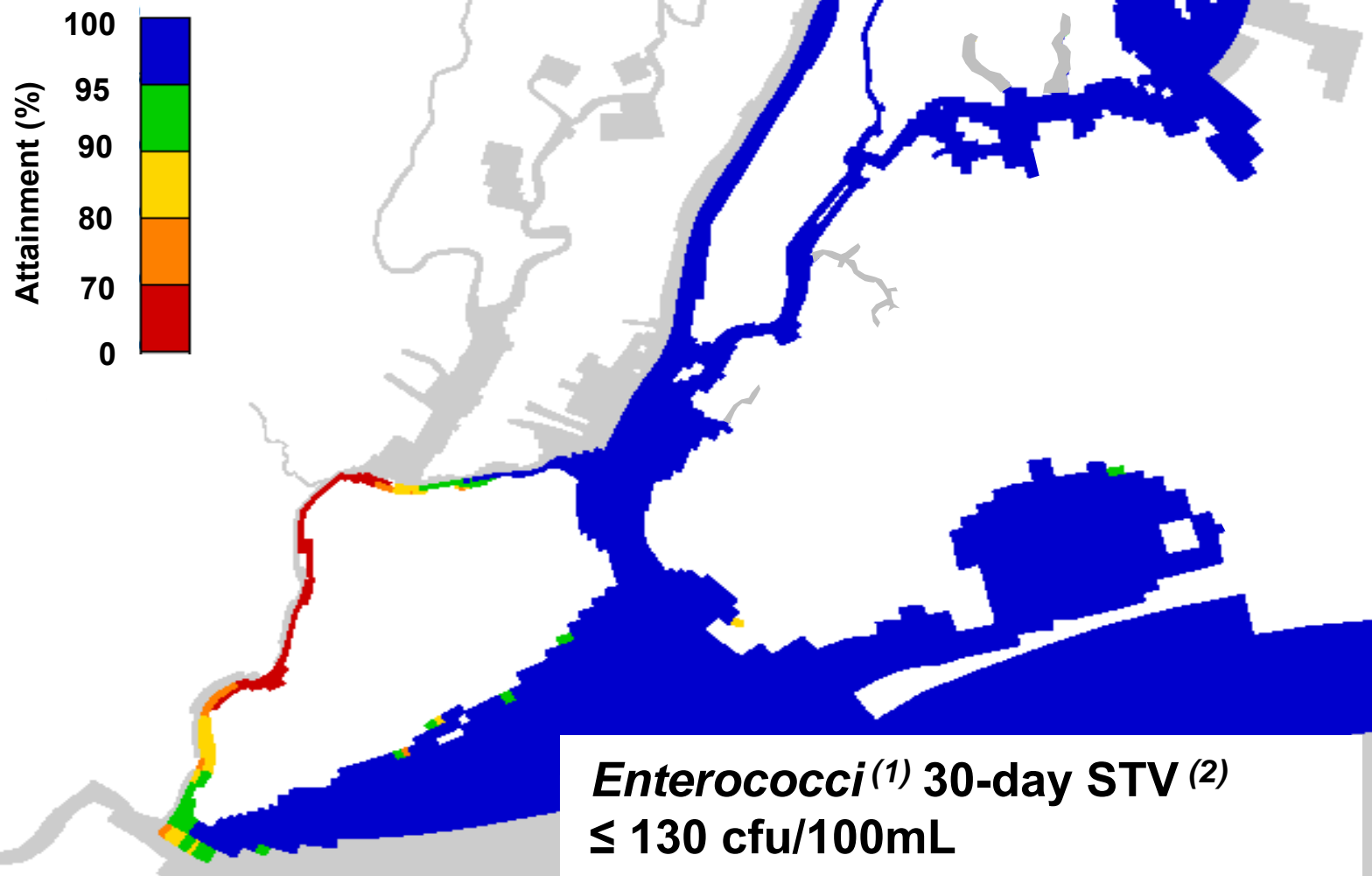
- 1) *Enterococci* criteria apply only to Class SB Coastal Primary Contact Recreational waters
- 2) 30-day running geometric mean

# Enterococci STV Gap Analysis

## Baseline Conditions 10-yr Annual Attainment



## 100% CSO Control 10-yr Annual Attainment

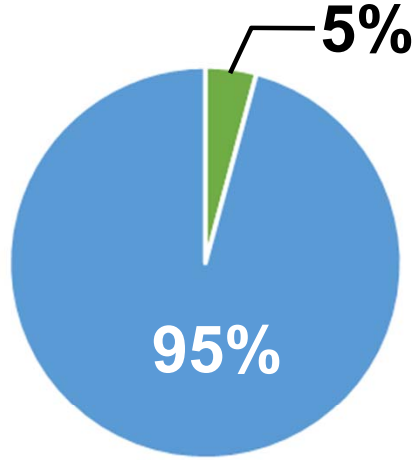


- Notes:
- 1) *Enterococci* criteria apply only to Class SB Coastal Primary Contact Recreational waters
  - 2) 30-day running 90<sup>th</sup> percentile statistical threshold value

# Key Take-Aways for Alternatives Analysis



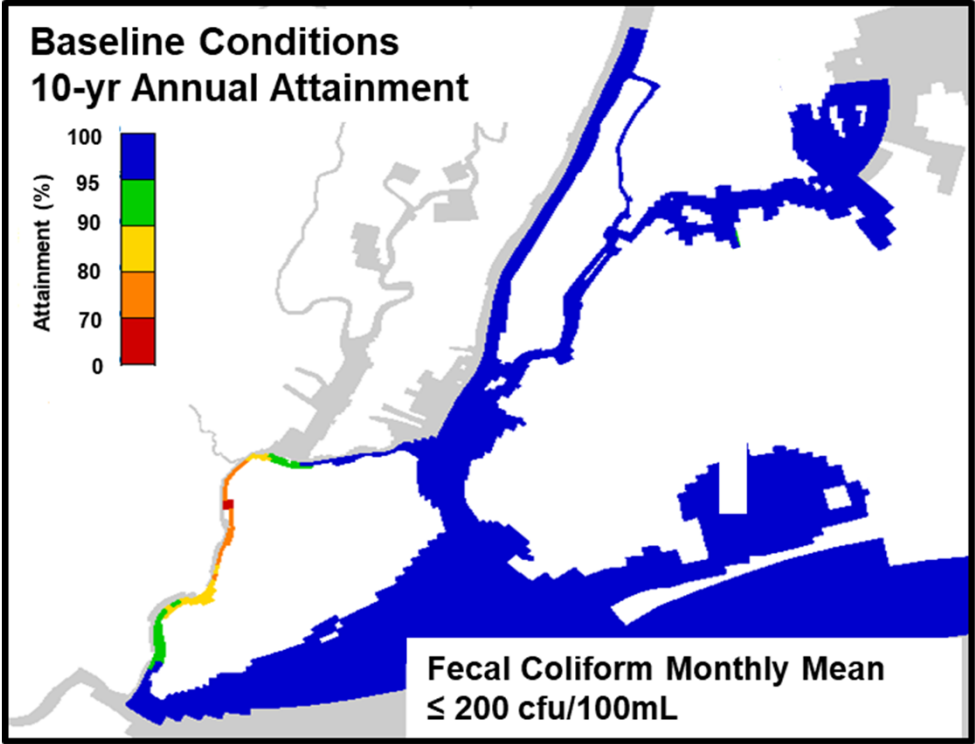
Over \$9B in investments have been made or committed as part of the CSO Program to date



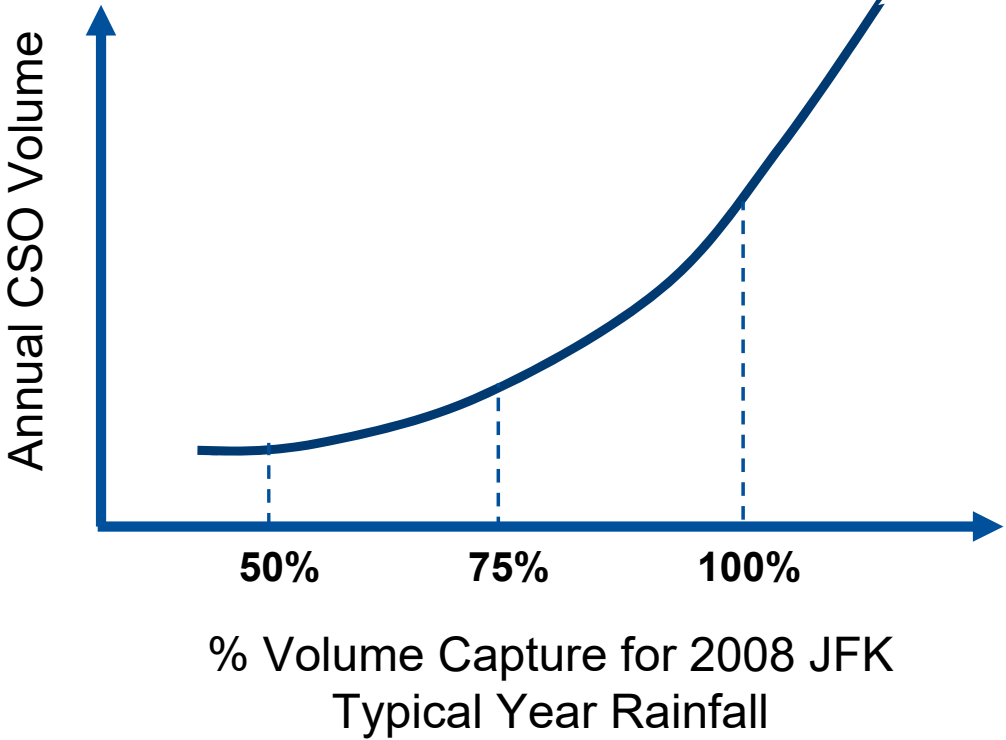
- Annual CSO Volume (11 BGY)\*
- Annual Volume Treated at WRRFs (251 BGY)\*

Annual CSO volume is small percentage of total volume treated at WRRFs

\*Based on 2008 JFK Typical Year rainfall



Baseline Water Quality shows high levels of attainment with applicable WQS

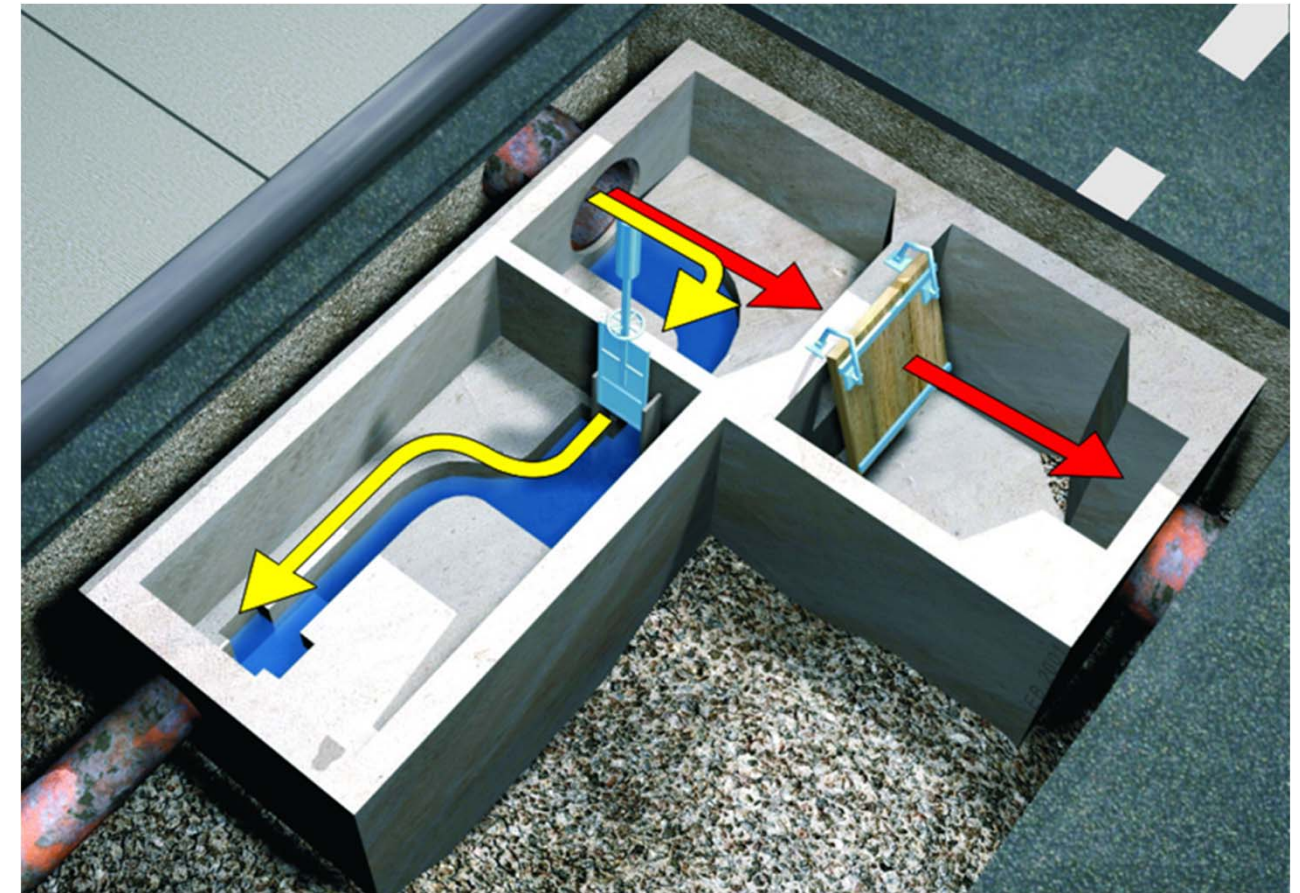


CSO volume to be captured increases significantly with increasing level of control



## Approach:

- Toolbox defines technologies to be assessed
- Range of levels of CSO control evaluated, per EPA CSO Policy
- Multiple iterations of screening steps to identify alternatives to be retained for cost/benefit evaluations presented in LTCP. Screening considers:
  - Hydraulic/operational feasibility
  - CSO reduction
  - Cost
  - Siting availability
  - Impact on attainment of Water Quality Standards
- Screening process resulted in focus on system optimization alternatives and tunnel storage



# Citywide/Open Waters LTCP Alternatives Toolbox

Source Control	Green Infrastructure		Storm Sewers		
<b>System Optimization</b>	<b>Fixed Weir</b>	<b>Parallel Interceptor / Sewer</b>	Bending Weirs Control Gates	Pump Station Optimization	Pump Station Expansion
<b>CSO Relocation</b>	<b>Gravity Flow Tipping to Other Watersheds</b>	Pumping Station Modification	Flow Tipping with Conduit/Tunnel and Pumping		
<b>Water Quality / Ecological Enhancement</b>	<b>Floatables Control</b>	Environmental Dredging	<b>Wetland Restoration &amp; Daylighting</b>		
<b>Treatment</b> <i>Satellite:</i>	Outfall Disinfection	Retention Treatment Basin (RTB)		<b>High Rate Clarification (HRC)</b>	
<i>Centralized:</i>	WRRF Expansion				
<b>Storage</b>	In-System	Shaft	<b>Tank</b>	<b>Tunnel</b>	

Ongoing Projects

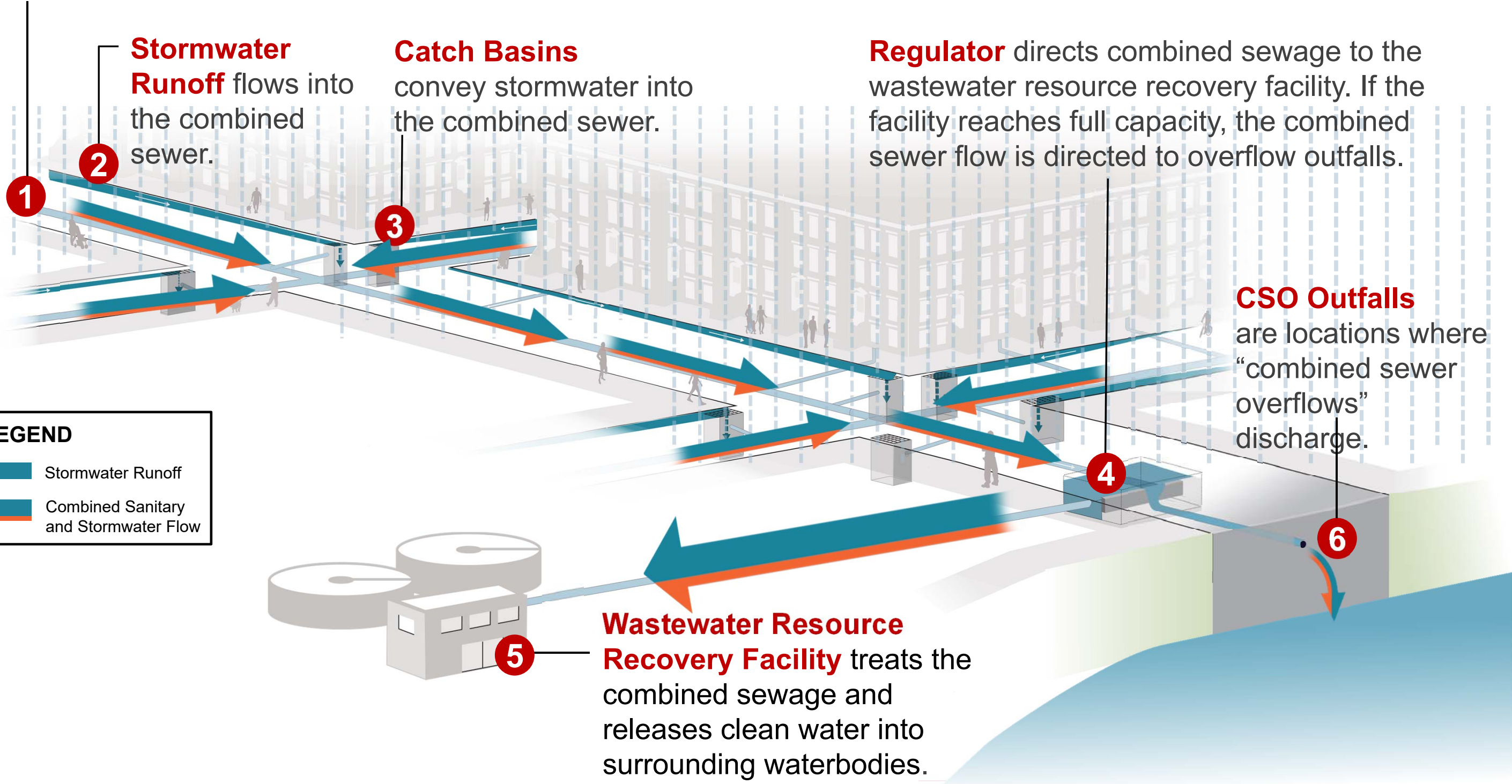
Evaluated but Screened Out

Retained Alternatives



# CSO Regulator Operation

**Combined Sewer** conveys stormwater runoff and sanitary waste to the Wastewater Resource Recovery Facility.



**LEGEND**

- Stormwater Runoff
- Combined Sanitary and Stormwater Flow

# System Optimization Analysis Summary

- Each CSO outfall was assessed for distance to closest public access point
- Optimization process prioritized outfalls that were near public access points
- Performance of optimization alternatives was driven by system hydraulics, and limited by constraints on increasing water levels in the sewers
- Analysis demonstrated that the existing system is currently being operated essentially at its capacity
- Limited opportunities to further optimize flow to the WRRFs and reduce CSOs in the existing system without increasing risk of flooding/sewer backups

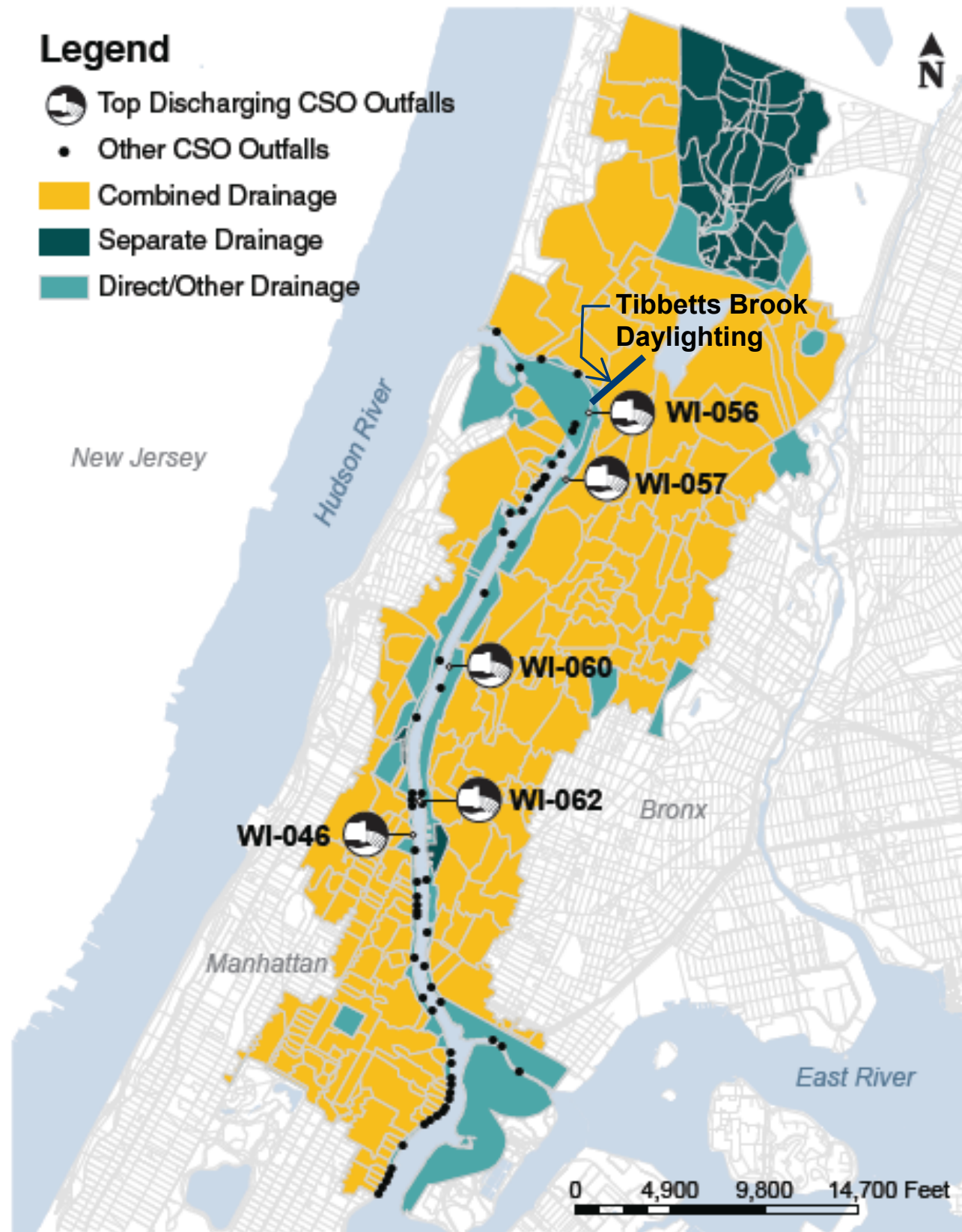




# Harlem River

## Legend

- Top Discharging CSO Outfalls
- Other CSO Outfalls
- Combined Drainage
- Separate Drainage
- Direct/Other Drainage



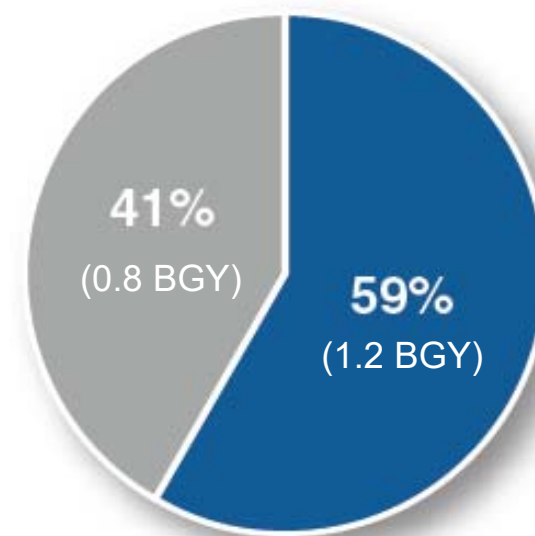
**Meets all Class I WQ standards**

✓ Fecal Coliform and Dissolved Oxygen

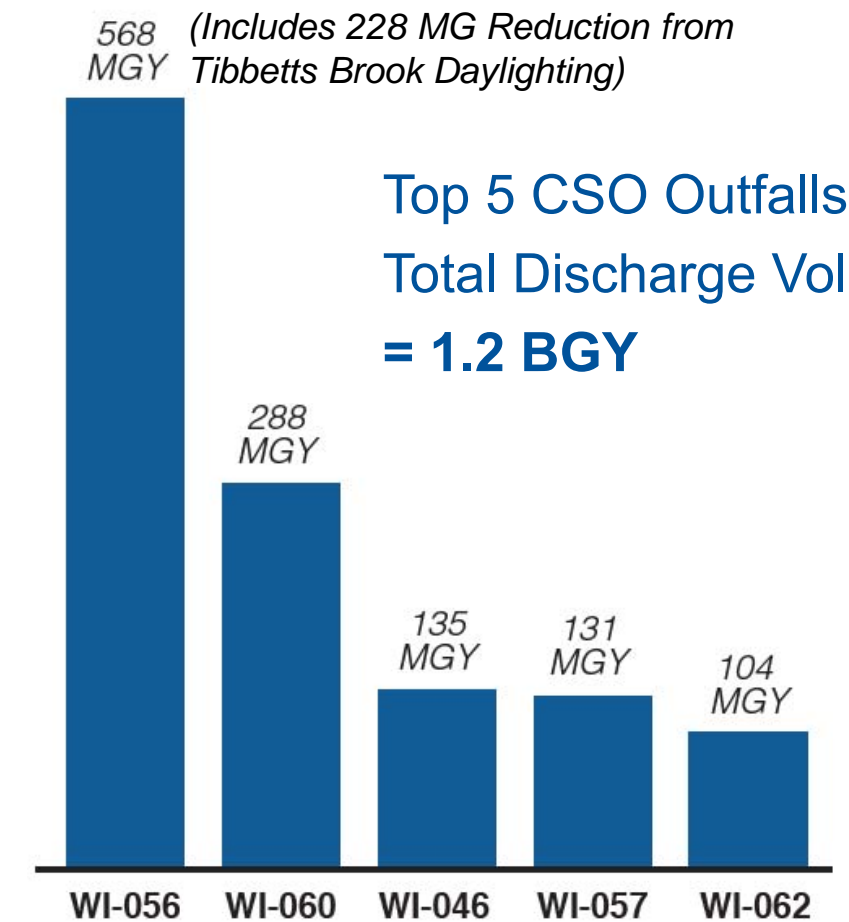
Total Number of CSO Outfalls = 65

Total CSO Discharge Volume = **2.0 BGY**

Top 5 CSO outfalls account for **59%** of CSO discharge volume



■ % of top 5  
■ % of other



Top 5 CSO Outfalls Total Discharge Volume = **1.2 BGY**



# Harlem River – Optimization Alternatives

- Regulator optimization is feasible only for a subset of smaller CSO outfalls
- As a result, only provides a limited CSO volume reduction benefit
- Tibbetts Brook Daylighting provides 228 MGY CSO reduction (included in Baseline Conditions)

Alternative	Description	CSO Volume Reduction <sup>(1)(2)</sup>	Estimated Probable Bid Cost
<b>HAR-1</b>	<ul style="list-style-type: none"> <li>• Optimization of regulators associated with outfalls NR-007, 008, 009, 010, 017</li> <li>• Relocate and upsize portion of Main Interceptor</li> </ul>	<b>16 MGY</b>	<b>\$35 Million</b>
<b>HAR-2</b>	<ul style="list-style-type: none"> <li>• Optimization of regulators associated with Outfalls NR-008 and NR-010</li> <li>• Relocate and upsize portion of Main Interceptor</li> </ul>	<b>15 MGY</b>	<b>\$31 Million</b>



Outfalls Addressed by Optimization Alternatives

- (1) Based on 2008 JFK Typical Year Rainfall  
 (2) Modeling of CSO Volume Reduction includes relocation of regulators for CSOs NR-010, 011 & 012 from the MTA railyard by others

# Harlem River – Tunnel Alternatives

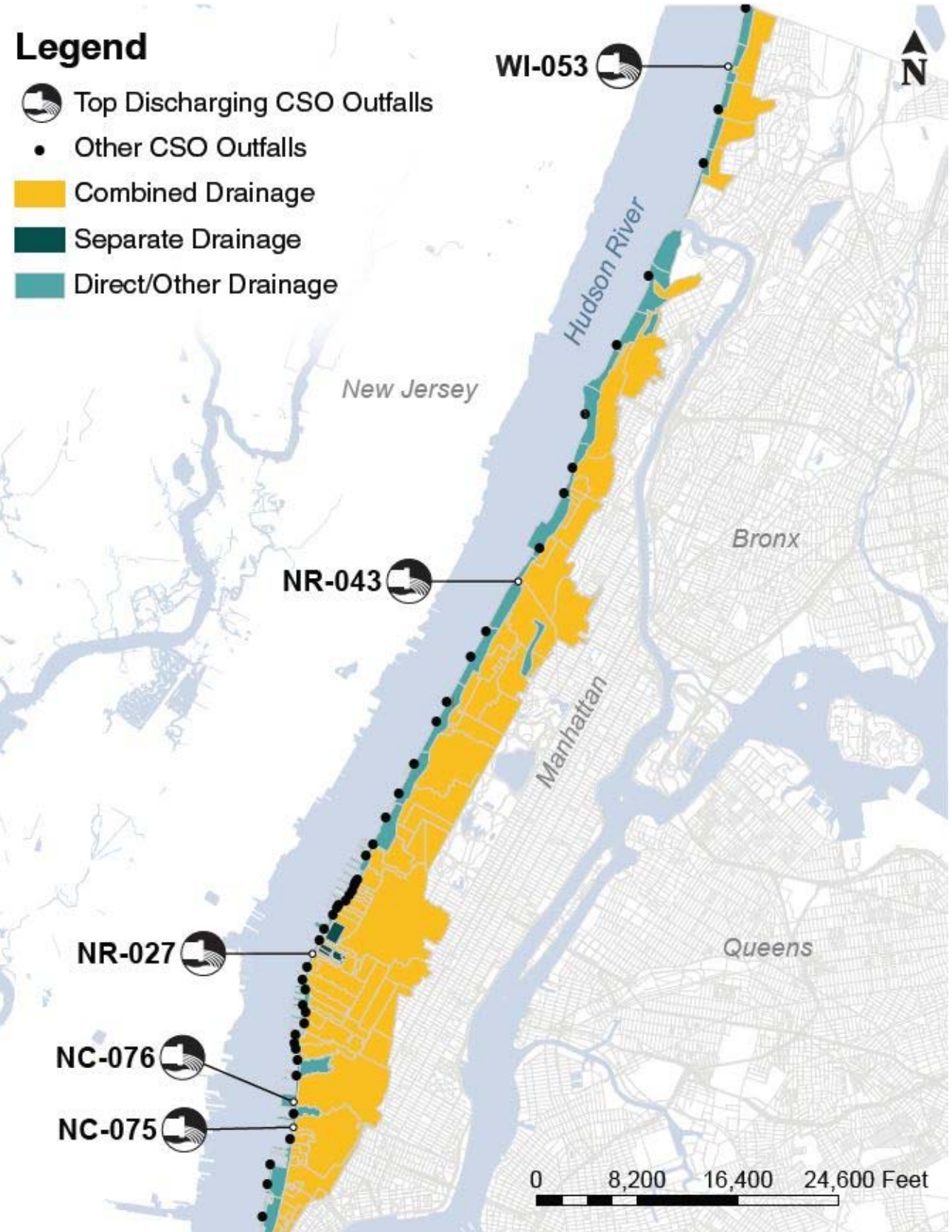
- Tunnels can provide significant CSO volume reduction benefits
- However, these alternatives carry a significant capital cost and site availability is uncertain

Alternative	Description	CSO Volume Reduction <sup>(1)</sup>	Estimated Probable Bid Cost
<b>HAR-3</b>	<ul style="list-style-type: none"> <li>• <b>50% CSO Control Tunnel</b></li> <li>• 5.4 miles of 28 ft dia. tunnel</li> <li>• Address 3 of the top 5 outfalls</li> </ul>	<b>1.0 BGY</b>	<b>\$1.9 Billion</b>
<b>HAR-4</b>	<ul style="list-style-type: none"> <li>• <b>75% CSO Control Tunnel</b></li> <li>• 6.0 miles of 33 ft dia. tunnel</li> <li>• Address all top 5 outfalls <i>plus 5 other outfalls</i></li> </ul>	<b>1.5 BGY</b>	<b>\$3.5 Billion</b>
<b>HAR-5</b>	<ul style="list-style-type: none"> <li>• <b>100% CSO Control Tunnel</b></li> <li>• 12.0 miles of 28 ft dia. tunnel</li> <li>• Address all top 5 outfalls <i>plus 58 other outfalls</i></li> </ul>	<b>2.1 BGY</b>	<b>\$7.7 Billion</b>

(1) Based on 2008 JFK Typical Year Rainfall



# Hudson River



**Meets all Class I WQ standards** (s. of Harlem River)

- ✓ Fecal Coliform and Dissolved Oxygen

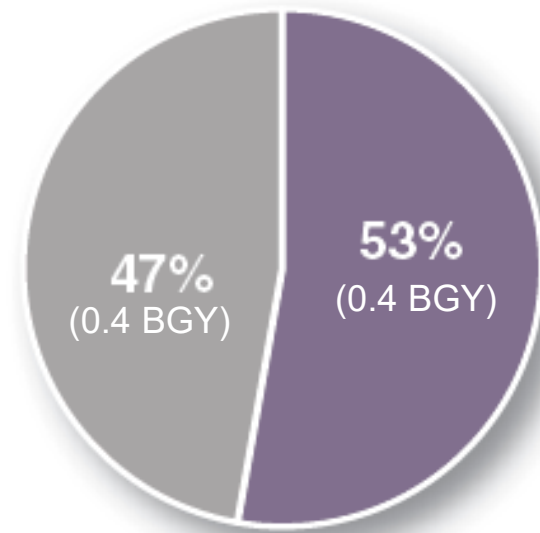
**Meets most Class SB WQ standards** (n. of Harlem R.)

- ✓ Fecal Coliform
- ✓ Dissolved Oxygen acute criterion
- ✗ Dissolved Oxygen chronic criterion (88% attainment)

Total Number of CSO Outfalls = 52

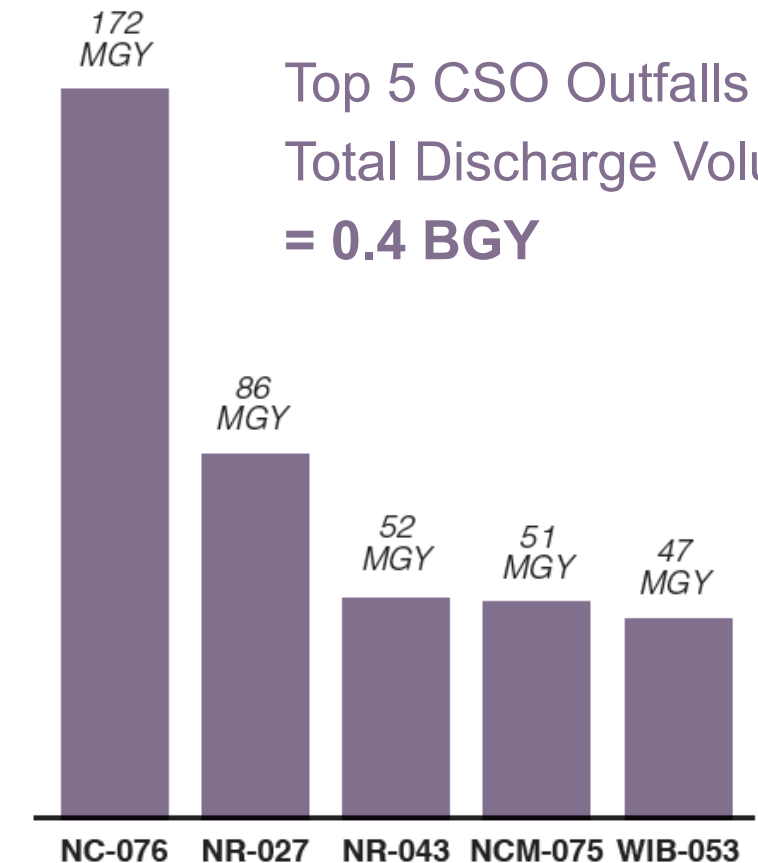
Total CSO Discharge Volume = **0.8 BGY**

Top 5 CSO outfalls account for **53%** of CSO discharge volume



■ % of top 5  
■ % of other

Top 5 CSO Outfalls  
Total Discharge Volume  
= **0.4 BGY**





# Hudson River – Optimization Alternatives

- Regulator optimization is feasible only for a subset of smaller CSO outfalls
- As a result, only provides a limited CSO volume reduction benefit

Alternative	Description	CSO Volume Reduction <sup>(1)</sup>	Estimated Probable Bid Cost
<b>HUD-1</b>	<ul style="list-style-type: none"> <li>• Optimization of regulators associated with HUD-2 outfalls plus NR-022, 023, 026, 027, 031, 032, 035, 038, 040, 046</li> </ul>	<b>13 MGY</b>	<b>\$19 Million</b>
<b>HUD-2</b>	<ul style="list-style-type: none"> <li>• Optimization of regulators associated with Outfalls NR-038, 040, 046</li> </ul>	<b>10 MGY</b>	<b>\$3 Million</b>



Outfalls Addressed by Optimization Alternatives

(1) Based on 2008 JFK Typical Year Rainfall

# Hudson River – Tunnel Alternatives

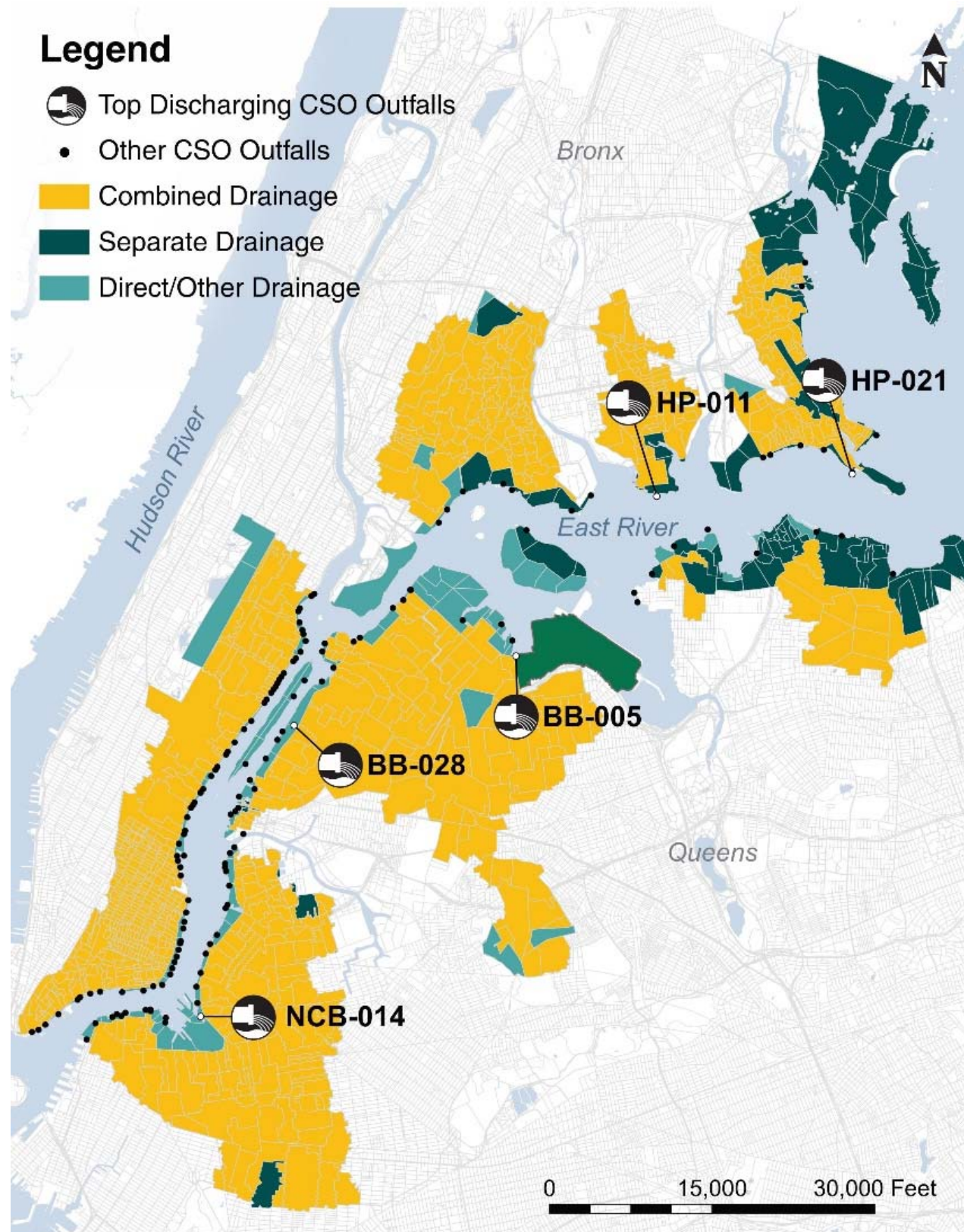
- Tunnels can provide significant CSO volume reduction benefits
- However, these alternatives carry a significant capital cost and site availability is uncertain

Alternative	Description	CSO Volume Reduction <sup>(1)</sup>	Estimated Probable Bid Cost
<b>HUD-3</b>	<ul style="list-style-type: none"> <li>• <b>50% CSO Control Tunnel</b></li> <li>• 7.0 miles of 19 ft dia. tunnel in NCM &amp; NR</li> <li>• Address 4 of the top 5 outfalls <i>plus 1 other outfall</i></li> </ul>	<b>0.4 BGY</b>	<b>\$1.5 Billion</b>
<b>HUD-4</b>	<ul style="list-style-type: none"> <li>• <b>75% CSO Control Tunnel</b></li> <li>• 10.9 miles of 18 ft dia. tunnel in NCM &amp; NR</li> <li>• Address all top 5 outfalls <i>plus 12 other outfalls</i></li> </ul>	<b>0.6 BGY</b>	<b>\$2.9 Billion</b>
<b>HUD-5</b>	<ul style="list-style-type: none"> <li>• <b>100% CSO Control Tunnel</b></li> <li>• 14.8 miles of 18 ft dia. tunnel in NCM &amp; NR</li> <li>• Address all top 5 outfalls <i>plus 44 other outfalls</i></li> </ul>	<b>0.8 BGY</b>	<b>\$4.7 Billion</b>

(1) Based on 2008 JFK Typical Year Rainfall



# East River/Long Island Sound



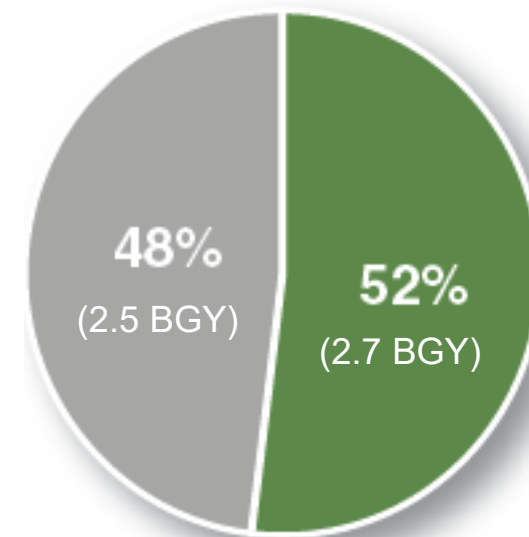
**Meets all Class SB (e. of Whitestone Bridge) and Class I (w. of Whitestone Bridge) WQ standards**  
 ✓ Fecal Coliform, *Enterococci*\* and Dissolved Oxygen

*\*for Class SB coastal primary contact recreational waters east of Whitestone Bridge*

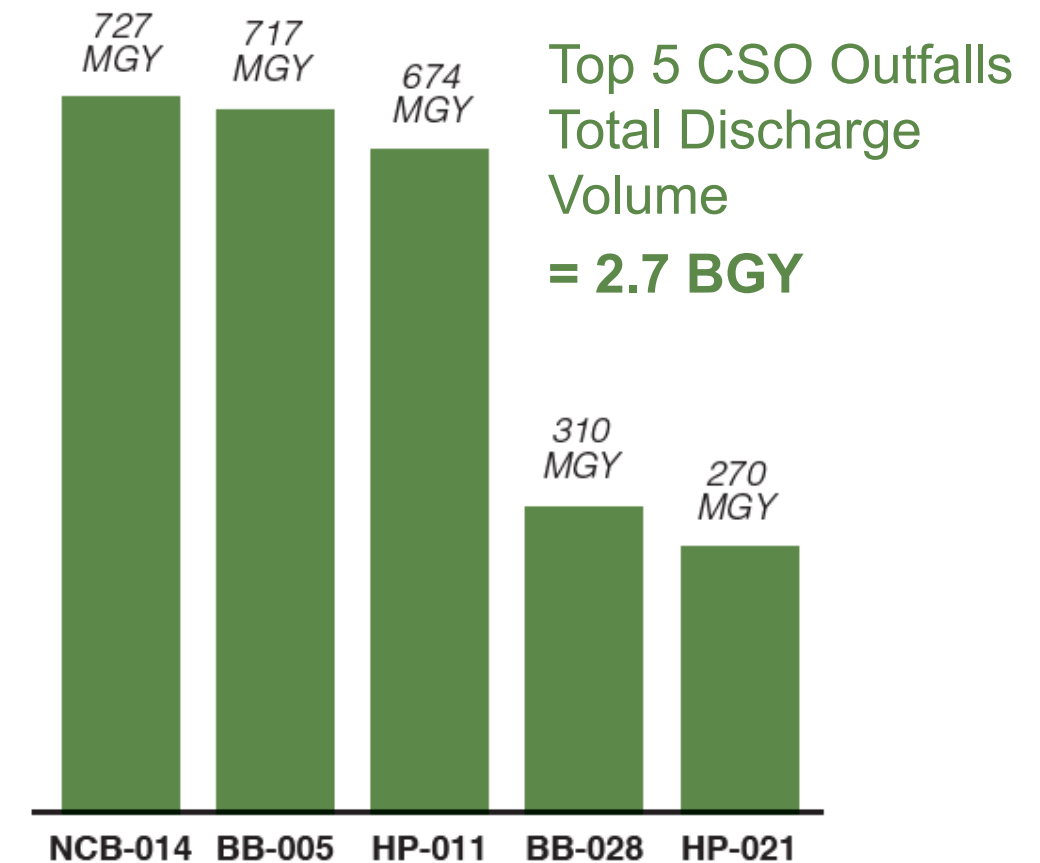
Total Number of CSO Outfalls = 139

Total CSO Discharge Volume = **5.2 BGY**

Top 5 CSO outfalls account for **52%** of CSO discharge volume



■ % of top 5  
 ■ % of other





# East River/LIS – Optimization Alternatives

- Regulator optimization is feasible only for a subset of smaller CSO outfalls
- As a result, only provides a limited CSO volume reduction benefit

Alternative	Description	CSO Volume Reduction <sup>(1)</sup>	Estimated Probable Bid Cost
ER-1	<ul style="list-style-type: none"> <li>• Optimization of regulator associated with Outfall HP-025</li> </ul>	<b>30 MGY</b>	<b>\$16 Million</b>
ER-2	<ul style="list-style-type: none"> <li>• Optimization of regulators associated with Outfalls HP-016, 018, 019, 025</li> </ul>	<b>30 MGY</b>	<b>\$24 Million</b>
ER-3	<ul style="list-style-type: none"> <li>• Optimization of regulators associated with Outfalls TI-003, 022</li> </ul>	<b>102 MGY<sup>(2)</sup></b>	<b>\$4 Million</b>
ER-4	<ul style="list-style-type: none"> <li>• Optimization of regulators associated with Outfalls TI-003, 022, 023</li> </ul>	<b>131 MGY<sup>(2)</sup></b>	<b>\$7 Million</b>



Outfalls Addressed by Optimization Alternatives

(1) Based on 2008 JFK Typical Year Rainfall

(2) CSO volume reductions for alternatives ER-3 & ER-4 account for additional CSO that will be disinfected at outfalls TI-010 & TI-011 upon implementation of either alternative








- Tunnels can provide significant CSO volume reduction benefits
- However, these alternatives carry a significant capital cost and site availability is uncertain

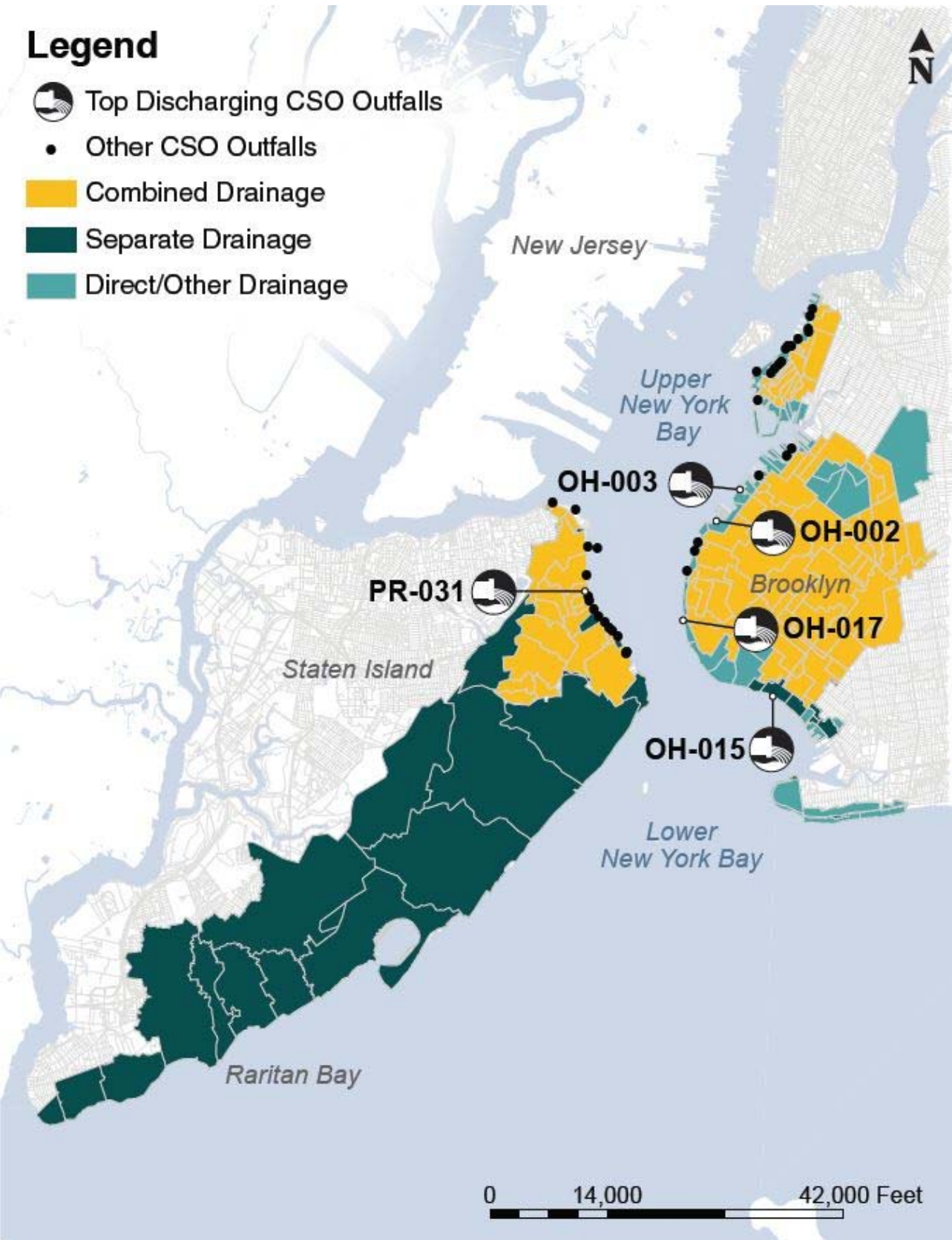
Alternative	Description	CSO Volume Reduction <sup>(1)</sup>	Estimated Probable Bid Cost
<b>ER-5</b>	<ul style="list-style-type: none"> <li>• <b>50% CSO Control Tunnel</b></li> <li>• 15.3 miles of 28 ft dia. tunnel in NCB, BB &amp; HP</li> <li>• Address all top 5 outfalls</li> </ul>	<b>2.7 BGY</b>	<b>\$4.7 Billion</b>
<b>ER-6</b>	<ul style="list-style-type: none"> <li>• <b>75% CSO Control Tunnel</b></li> <li>• 8.1 miles of 37 ft dia. tunnel in BB &amp; NCB</li> <li>• 2.7 miles of 17 ft dia. tunnel in TI</li> <li>• 10.7 miles of 22 ft dia. tunnel in HP, WIM, NCM</li> <li>• Address all top 5 outfalls <i>plus 11 other outfalls</i></li> </ul>	<b>3.9 BGY</b>	<b>\$8.0 Billion</b>
<b>ER-7</b>	<ul style="list-style-type: none"> <li>• <b>100% CSO Control Tunnel</b></li> <li>• 9.5 miles of 37 ft dia. tunnel in BB, NCB &amp; RH</li> <li>• 3.9 miles of 14 ft dia. tunnel in TI</li> <li>• 15.8 of 26 ft dia. tunnel in HP, WIM &amp; NCM</li> <li>• Address all top 5 outfalls <i>plus 130 other outfalls</i></li> </ul>	<b>5.2 BGY</b>	<b>\$18.4 Billion</b>

(1) Based on 2008 JFK Typical Year Rainfall

# Lower and Upper New York Bay

## Legend

-  Top Discharging CSO Outfalls
-  Other CSO Outfalls
-  Combined Drainage
-  Separate Drainage
-  Direct/Other Drainage



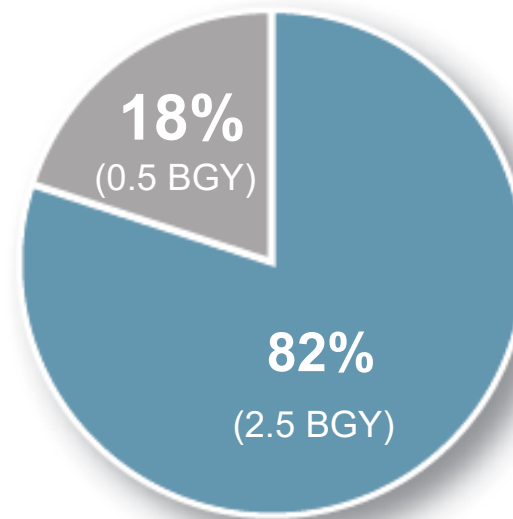
## Meets most Class SB WQ standards

- ✓ Fecal Coliform, Dissolved Oxygen, and *Enterococci* (GM)
- ✗ *Enterococci* (STV)

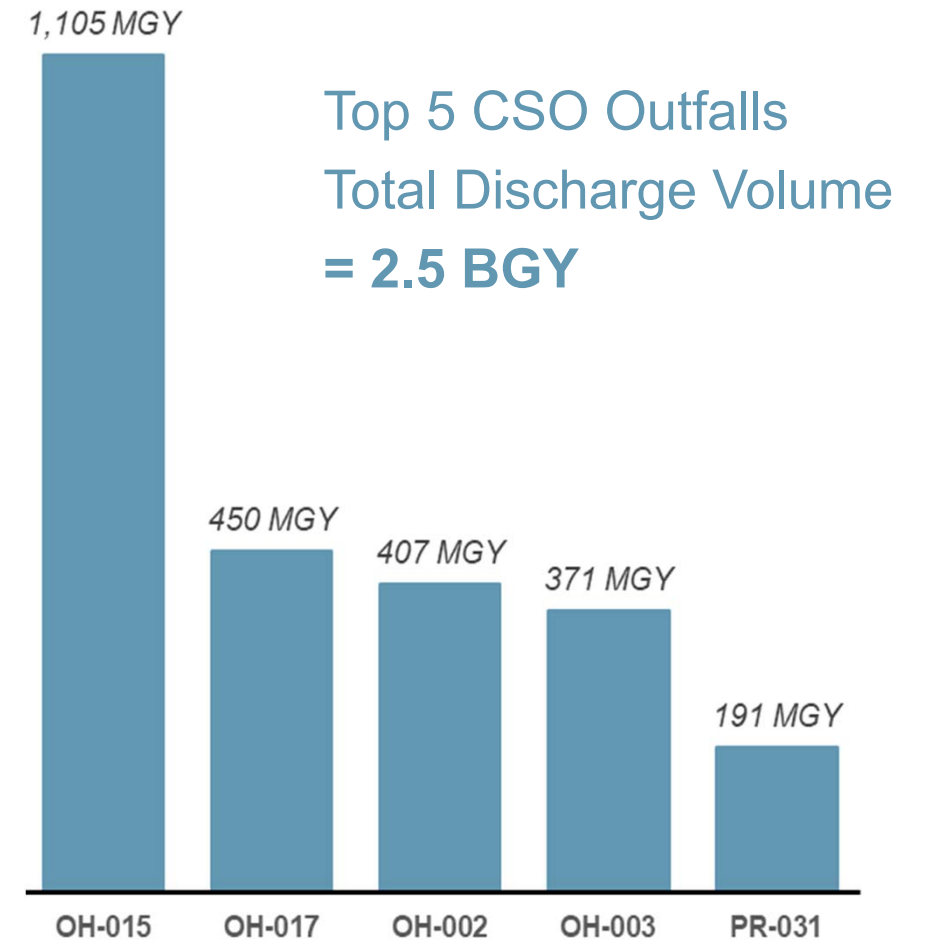
Total Number of CSO Outfalls = 39

Total CSO Discharge Volume = **3.0 BGY**

Top 5 CSO outfalls account for **80%** of CSO discharge volume



■ % of top 5  
■ % of other

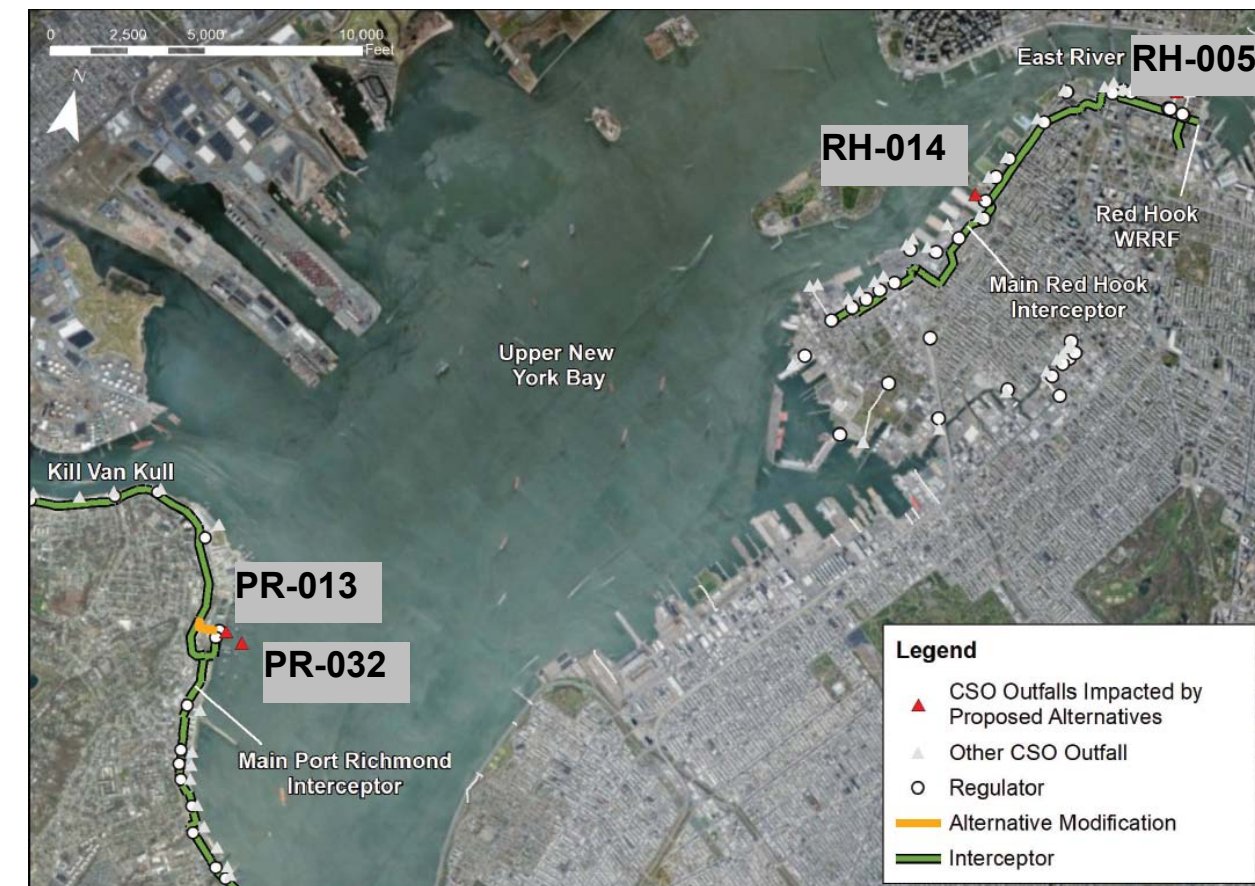




# New York Bay – Optimization Alternatives

- Regulator optimization is feasible only for a subset of smaller CSO outfalls
- As a result, only provides a limited CSO volume reduction benefit

Alternative	Description	CSO Volume Reduction <sup>(1)</sup>	Estimated Probable Bid Cost
<b>NYB-1</b>	<ul style="list-style-type: none"> <li>• Optimization of regulators associated with Outfalls RH-005, 014</li> </ul>	<b>15 MGY</b>	<b>\$6 Million</b>
<b>NYB-2</b>	<ul style="list-style-type: none"> <li>• Gravity flow connection from Victory Boulevard combined sewer directly to interceptor, bypassing Hannah Street Pumping Station</li> <li>• Diverts dry and wet weather flow upstream of Outfall PR-013</li> </ul>	<b>43 MGY</b>	<b>\$22 Million</b>



Outfalls Addressed by Optimization Alternatives

(1) Based on 2008 JFK Typical Year Rainfall

- Tunnels can provide significant CSO volume reduction benefits
- However, these alternatives carry a significant capital cost and site availability is uncertain






Alternative	Description	CSO Volume Reduction	Estimated Probable Bid Cost
<b>NYB-3</b>	<ul style="list-style-type: none"> <li>• <b>50% CSO Control Tunnel</b></li> <li>• 9.3 miles of 23 ft dia. tunnel</li> <li>• Address 2 of the top 5 outfalls</li> </ul>	<b>1.6 BGY</b>	<b>\$3.0 Billion</b>
<b>NYB-4</b>	<ul style="list-style-type: none"> <li>• <b>75% CSO Control Tunnel</b></li> <li>• 10.8 miles of 28 ft dia. tunnel</li> <li>• Address 4 of the top 5 outfalls</li> </ul>	<b>2.3 BGY</b>	<b>\$4.3 Billion</b>
<b>NYB-5</b>	<ul style="list-style-type: none"> <li>• <b>100% CSO Control Tunnel</b></li> <li>• 18.6 miles of 23 ft dia. tunnel in OH &amp; RH</li> <li>• 3.1 miles of 25 ft dia. tunnel in PR</li> <li>• Address all top 5 outfalls <i>plus 32 other outfalls</i></li> </ul>	<b>3.1 BGY</b>	<b>\$8.6 Billion</b>

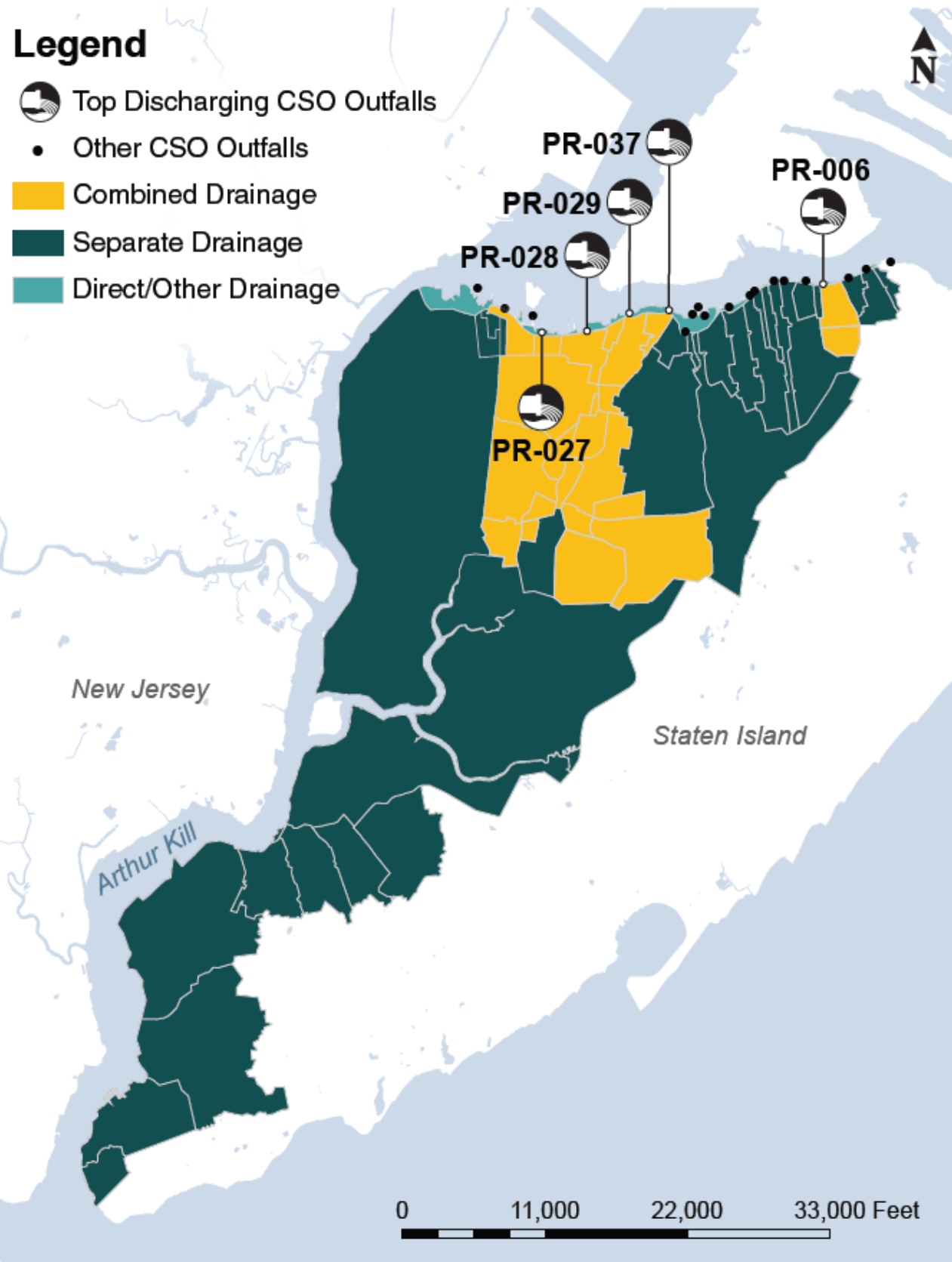
(1) Based on 2008 JFK Typical Year Rainfall



# Arthur Kill and Kill van Kull

## Legend

-  Top Discharging CSO Outfalls
-  Other CSO Outfalls
-  Combined Drainage
-  Separate Drainage
-  Direct/Other Drainage



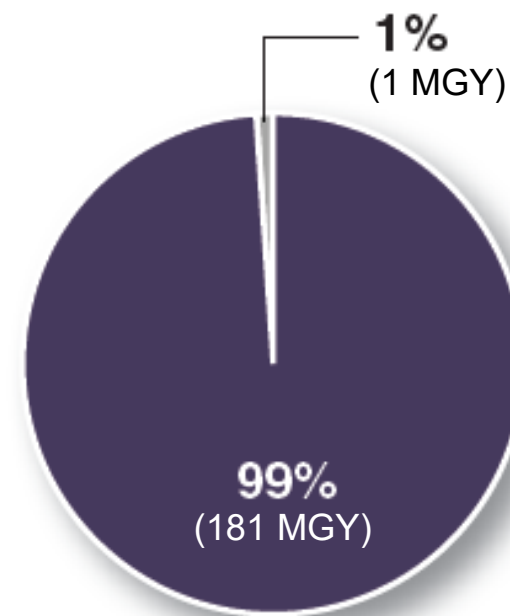
## Meets most Class SD and I WQ standards



- ✓ Dissolved Oxygen
- ✗ Fecal Coliform

Total Number of CSO Outfalls = 19

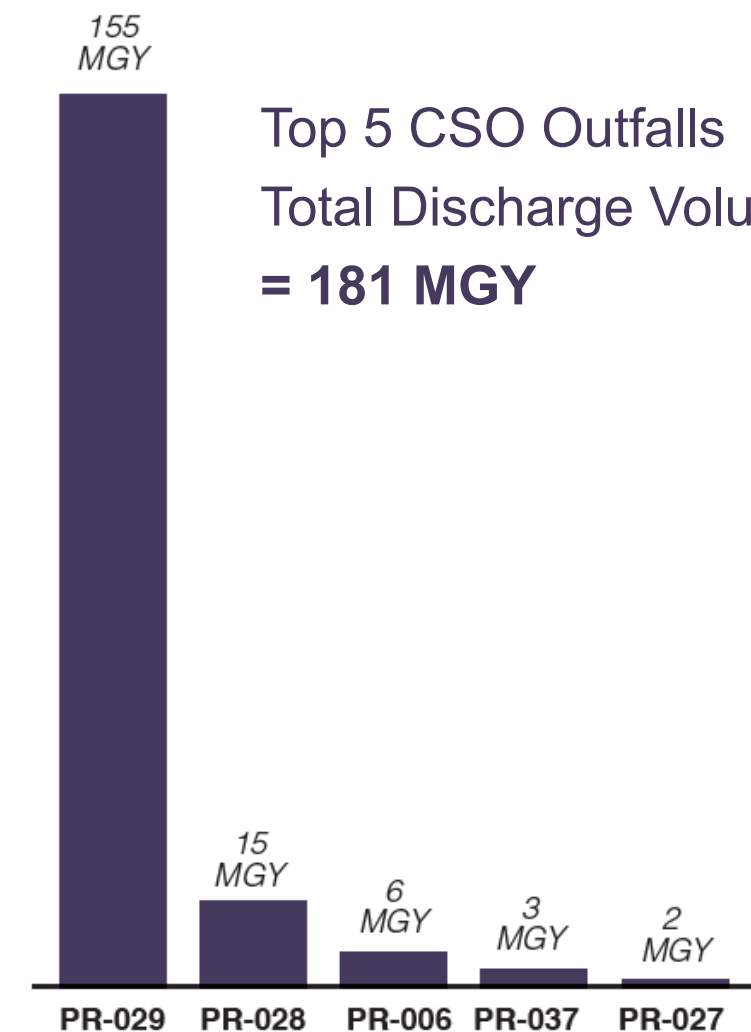
Total CSO Discharge Volume = **182 MGY**

Top 5 CSO outfalls account for **99%** of CSO discharge volume



-  % of top 5
-  % of other

Top 5 CSO Outfalls  
Total Discharge Volume  
= **181 MGY**



- Tanks/Tunnels can provide significant CSO volume reduction benefits
- However, these alternatives carry a significant capital cost and site availability is uncertain

Alternative	Description	CSO Volume Reduction <sup>(1)</sup>	Estimated Probable Bid Cost
<b>AK / KVK-1</b>	<ul style="list-style-type: none"> <li>• <b>50% CSO Control</b></li> <li>• 5.4 MG storage tank for Outfall PR-029</li> </ul>	<b>91 MGY</b>	<b>\$324 Million</b>
<b>AK / KVK-2</b>	<ul style="list-style-type: none"> <li>• <b>75% CSO Control</b></li> <li>• 11.2 MG storage tank for Outfall PR-029</li> </ul>	<b>137 MGY</b>	<b>\$650 Million</b>
<b>AK / KVK-3</b>	<ul style="list-style-type: none"> <li>• <b>100% CSO Control</b></li> <li>• 4.1 miles of 16 ft dia tunnel capturing Outfalls PR-006, 026, 027, 028, 029, 037</li> </ul>	<b>182 MGY</b>	<b>\$1,000 Million</b>



Location of Outfall PR-029

(1) Based on 2008 JFK Typical Year Rainfall





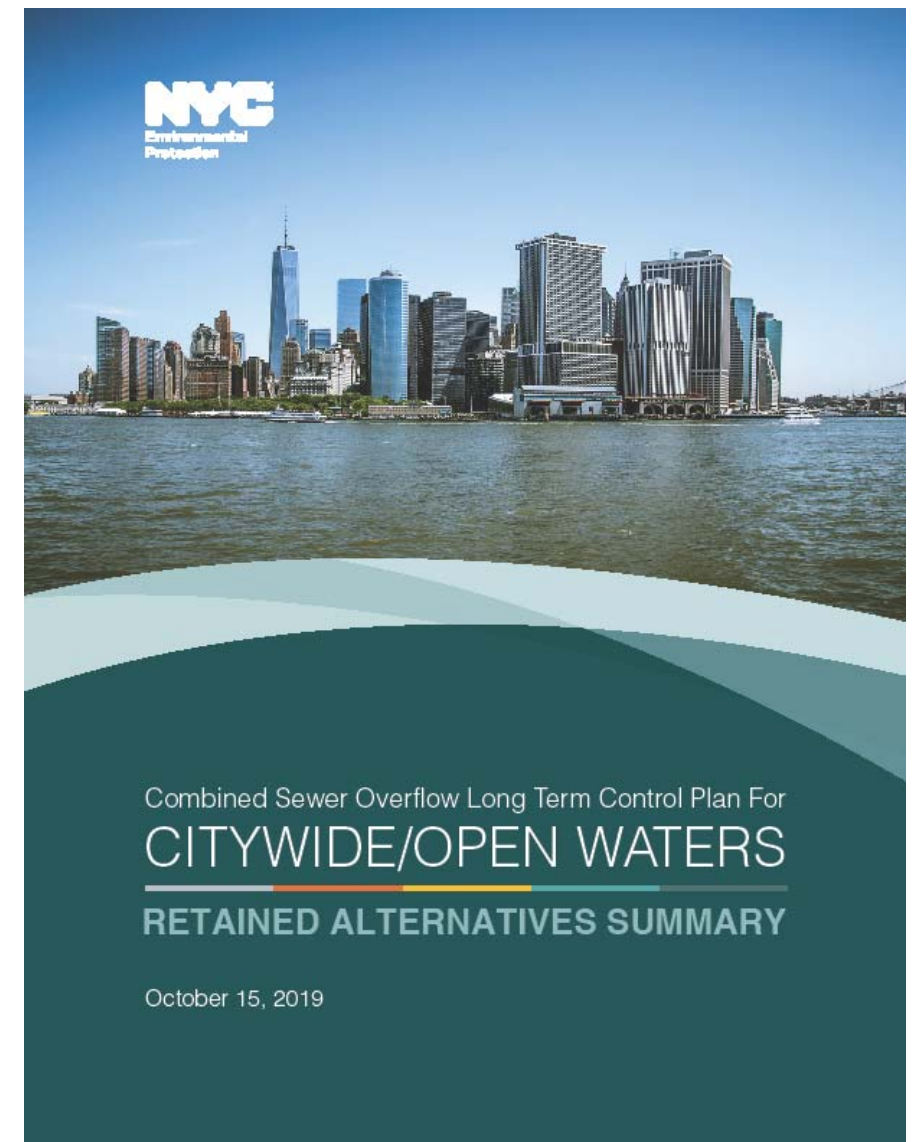
# Questions

# Next Steps

Mikelle Adgate  
Senior Advisor, BPAC  
DEP

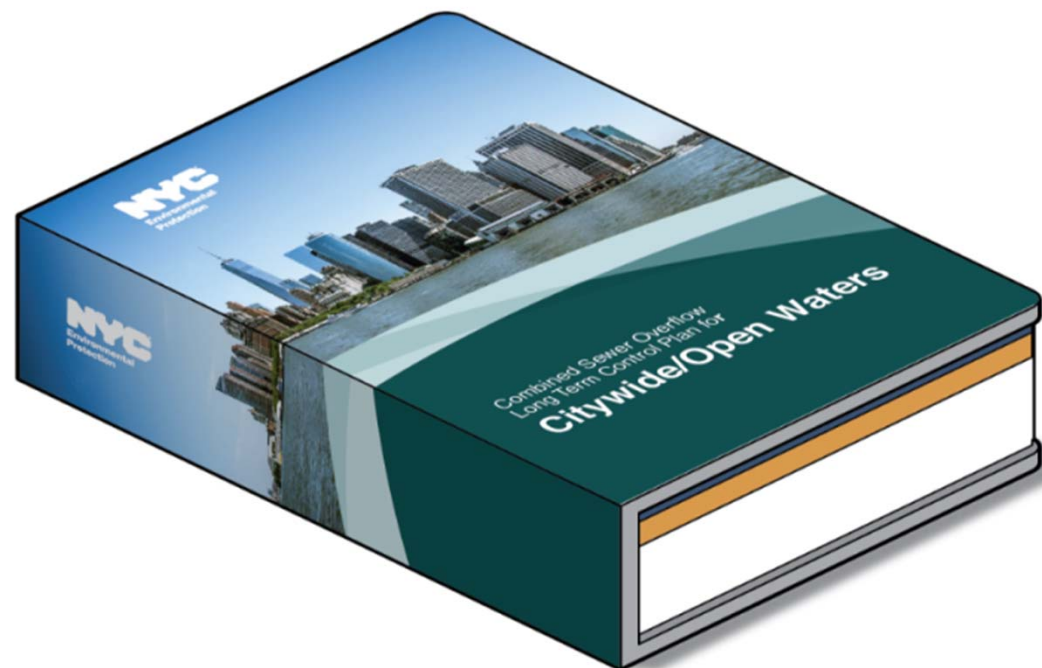
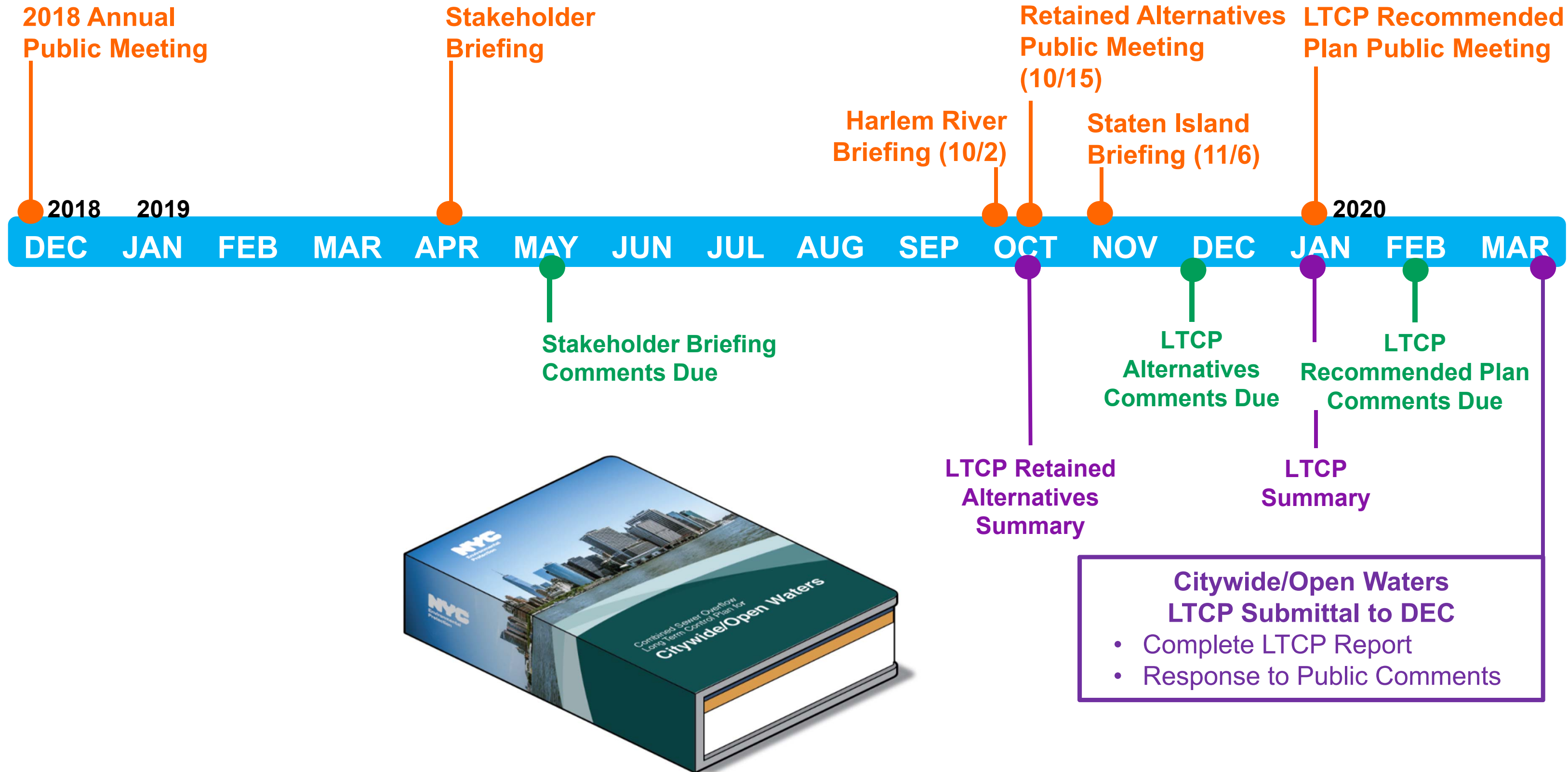


- Outline was presented at the LTCP Update meeting in April
- LTCP Retained Alternatives Summary now available online at [nyc.gov/dep/ltcp](http://nyc.gov/dep/ltcp)
- Table of Contents:
  1. Introduction
  2. CSO BMPs
  3. Grey Infrastructure Strategies
  4. Green Infrastructure Strategies
  5. Summary of Tributary LTCPs
  - 6. Baseline Conditions for LTCP Models**
  - 7. WQS Attainment and Alternatives Screening**
  - 8. Waterbody Snapshots and Retained Alternatives**
  9. Public Outreach



Public Comments on the Retained Alternatives are due to [ltcp@dep.nyc.gov](mailto:ltcp@dep.nyc.gov) by December 1<sup>st</sup>, 2019

# Citywide/Open Waters LTCP Public Outreach





- Visit the DEP Website for more information: [www.nyc.gov/dep/ltcp](http://www.nyc.gov/dep/ltcp)
- Monthly Updates on the Citywide LTCP
- Citywide LTCP Content: sampling information, baseline information etc.
- CSO Order including LTCP Goal Statement
- Links to Waterbody/Watershed Facility Plans
- Presentations, Meeting Materials and Meeting Summaries
- LTCP Brochure and Waterbody Fact Sheets
- All Submitted LTCP Reports and Other LTCP Updates
- NYC's Green Infrastructure Reports and Grant Program
- Green Infrastructure Interactive Map of Projects
- NYC Waterbody Advisory Program
- Upcoming Meeting Announcements

# Thank You!



[www.nyc.gov/dep/ltcp](http://www.nyc.gov/dep/ltcp)  
[ltcp@dep.nyc.gov](mailto:ltcp@dep.nyc.gov)