



# Combined Sewer Overflow Long Term Control Plan

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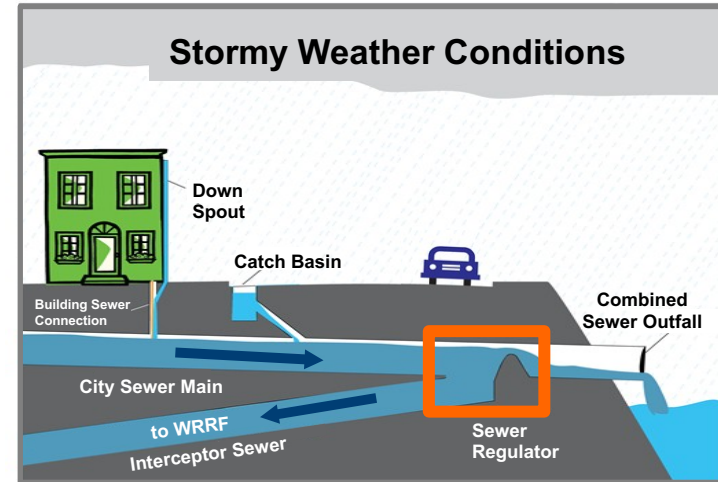
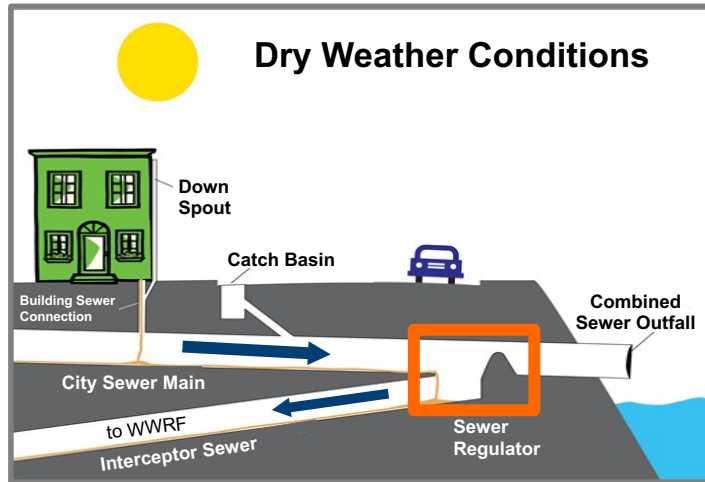
Citywide/Open Waters LTCP

Staten Island Retained Alternatives Public Meeting

November 6, 2019

# 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**

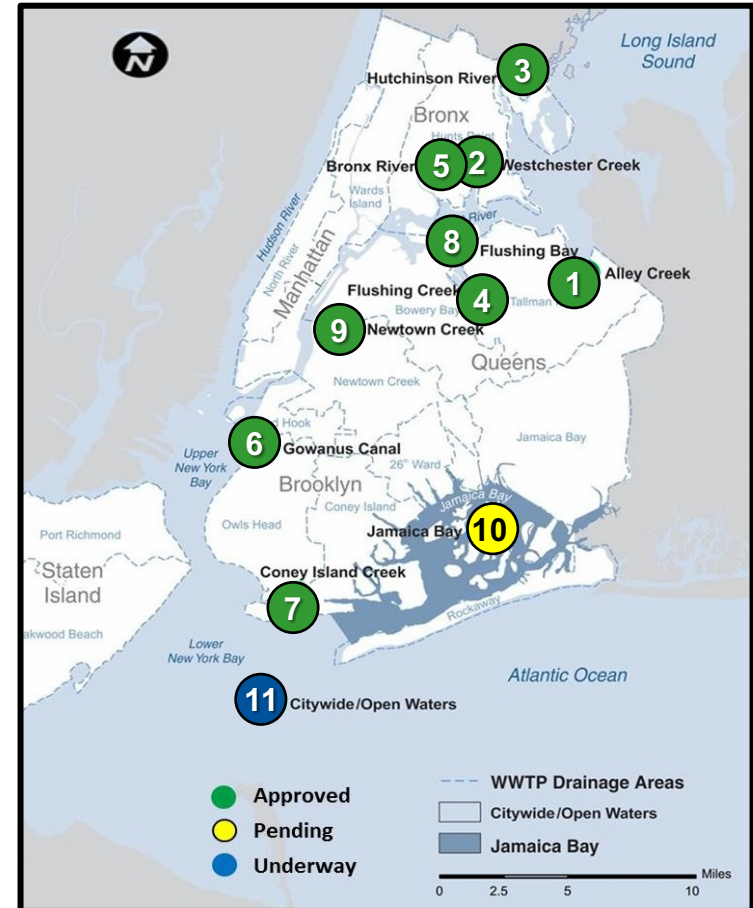
DEC requires DEP to develop LTCPs and mitigate CSOs

# LTCP Milestone Status

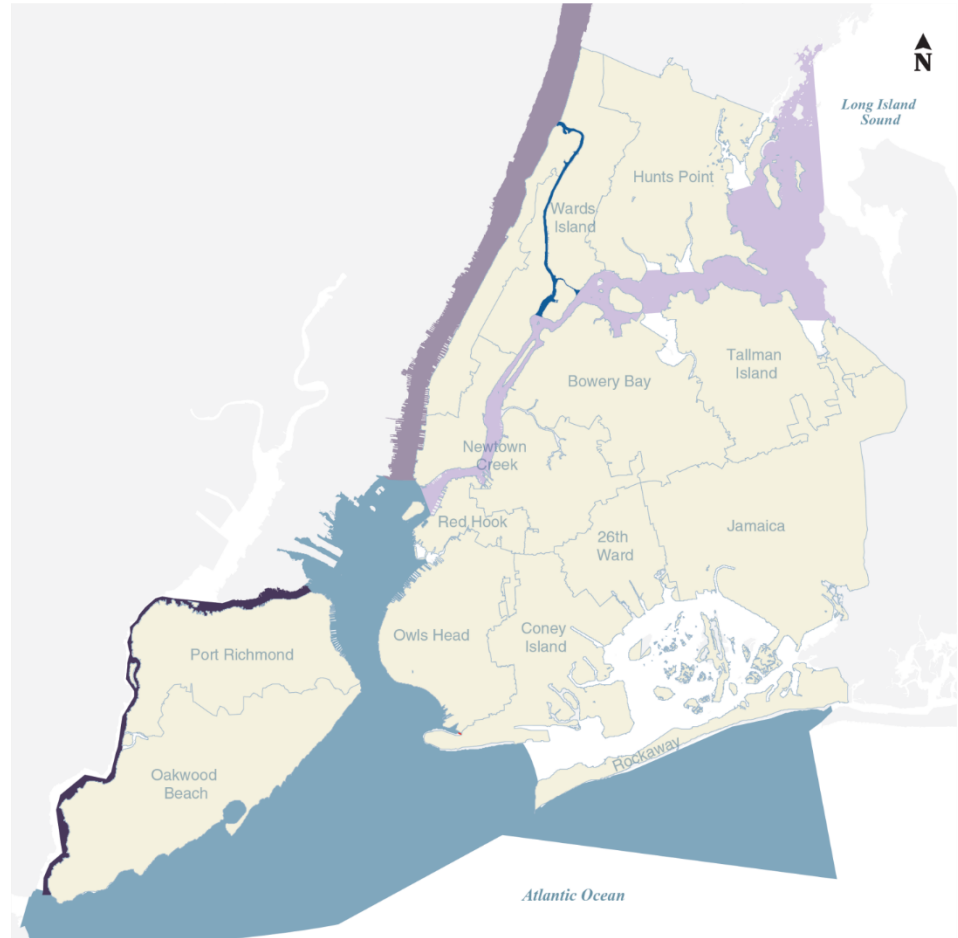
ID	LTCP	Approved?
1	Alley Creek	✓
2	Westchester Creek	✓
3	Hutchinson River	✓
4	Flushing Creek	✓
5	Bronx River	✓
6	Gowanus Canal	✓
7	Coney Island Creek	✓
8	Flushing Bay	✓
9	Newtown Creek	✓
10	Jamaica Bay and Tributaries <sup>(1)</sup>	Under DEC review
11	Citywide/Open Waters <sup>(2)</sup>	LTCP in development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








# Staten Island is Primarily MS4

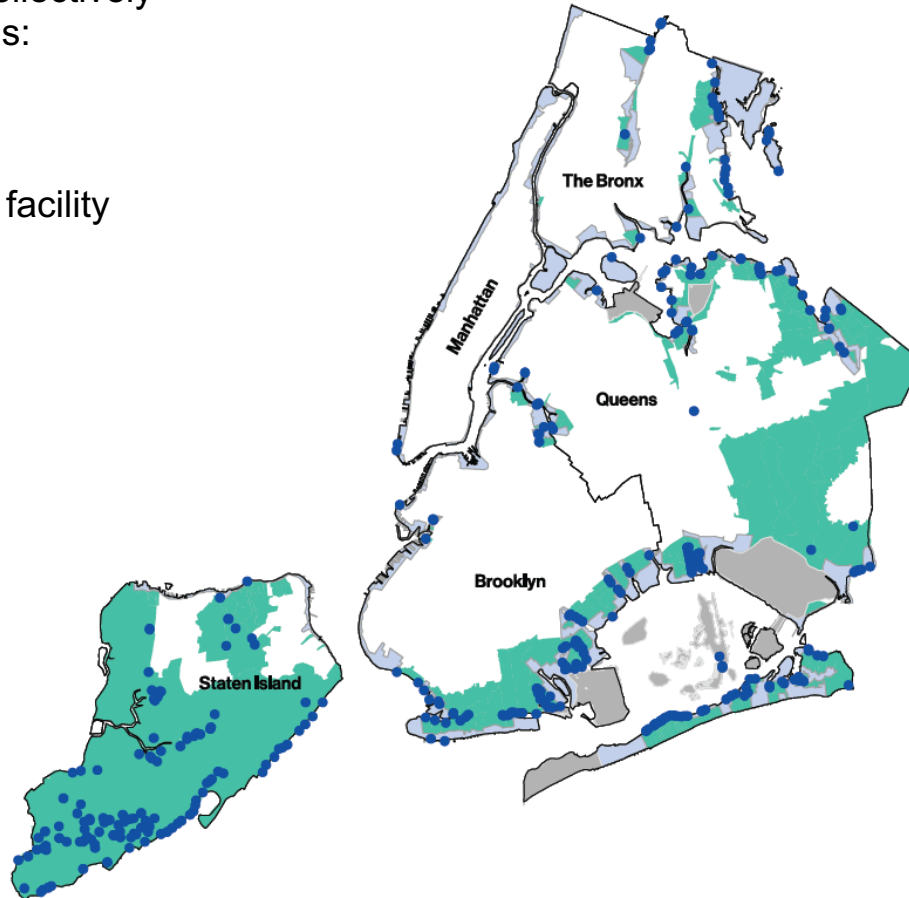
The MS4 Permit regulates drainage areas (collectively called the MS4 area) where stormwater drains:

- To a city-owned MS4
- By overland flow from a city-owned facility

Historical MS4 Map

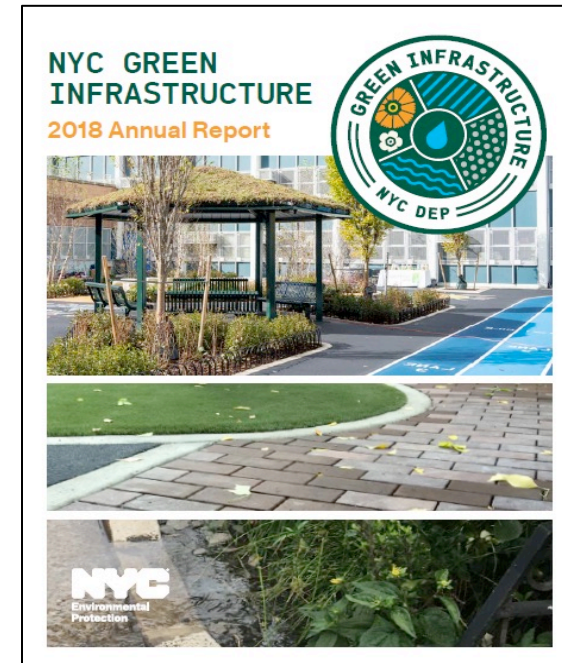
**Drainage Area Type**

-  Direct Drainage
-  Municipal Separate Storm Sewer System
-  Combined Sewer System (Not Covered By MS4 Permit)
-  Federal Land and Airports (Not Covered By MS4 Permit)
-  MS4 Outfalls



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

- 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





# Green Infrastructure in Staten Island

- Arrochar Playground
- DeMatti Playground
- Grandview Playground
- Levy Playground
- McDonald Playground



# Citywide/Open Waters Floatables

## Approaches

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

■ Street Sweeping



■ Catch Basin Hooding

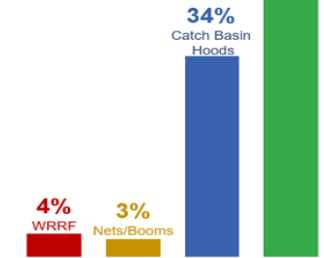


■ Netting/Booms



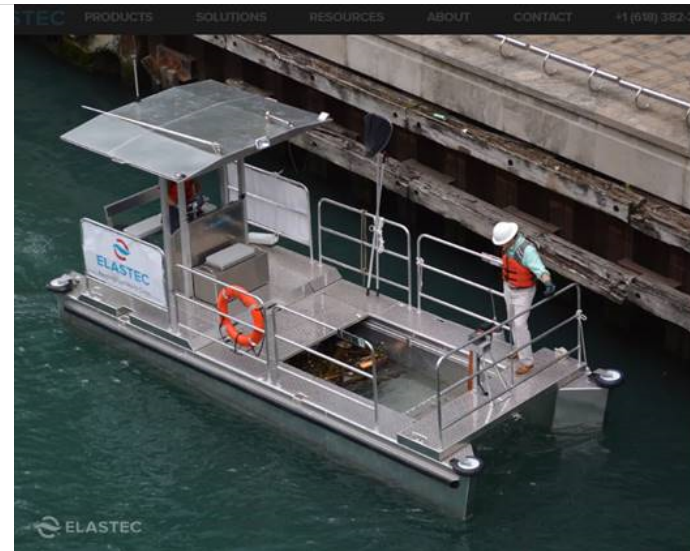
■ Wastewater Resource Recovery Facility (WRRF)

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



Citywide Floatables Capture

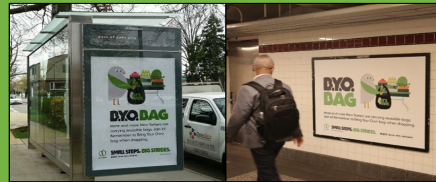
(1) Source: NYC Stormwater Management Program, NYCDEP, August 2018



# Programmatic Controls



Clean Streets = Clean Beaches



B.Y.O. Campaign

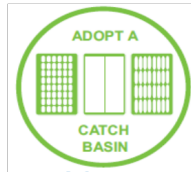
## Don't Trash Our Waters



## 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

# Overview of Retained Alternatives

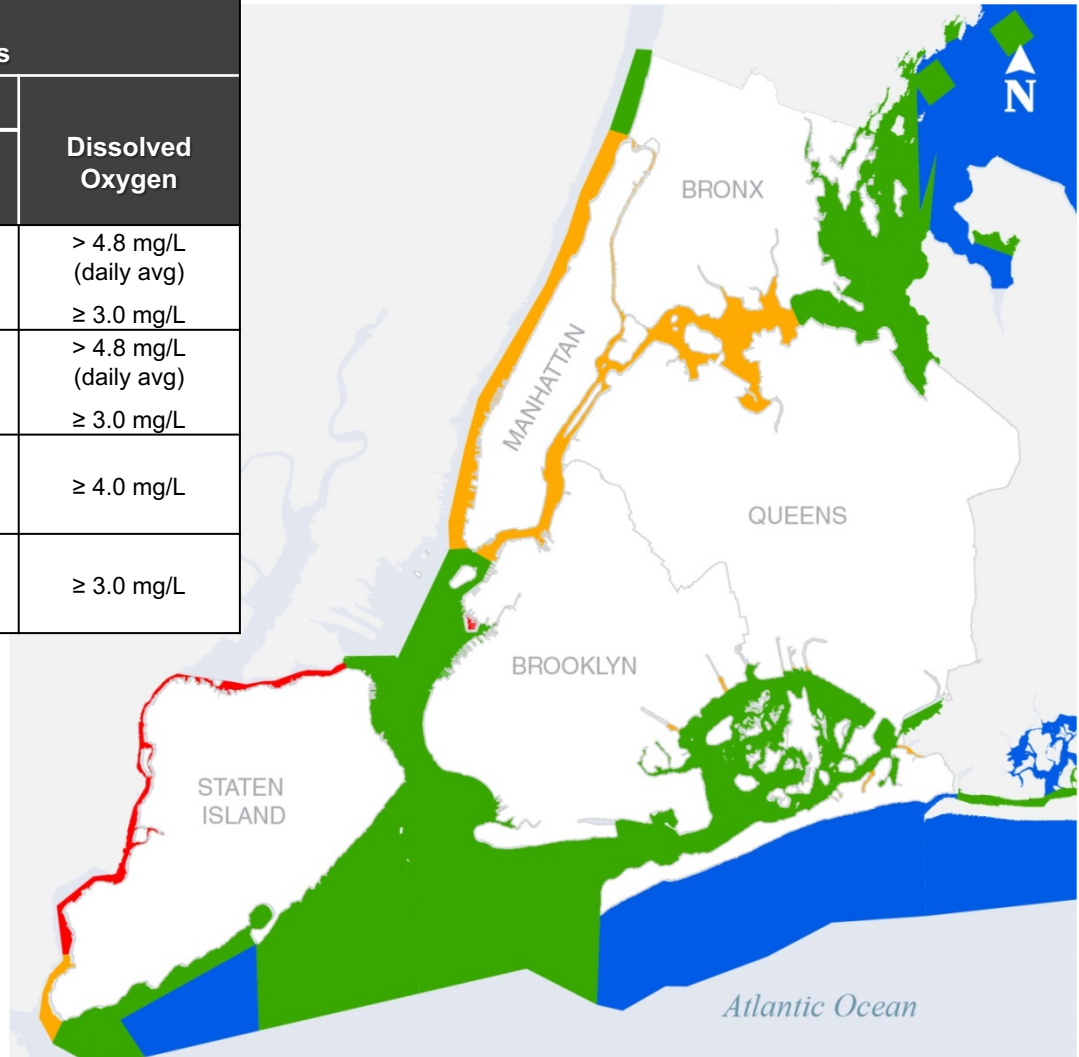
# Water Quality Standards

## 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 $\leq$ 35/100mL STV 90% $\leq$ 130 cfu/100mL	> 4.8 mg/L (daily avg) $\geq$ 3.0 mg/L
 SB	Monthly GM $\leq$ 200/100mL	GM $\leq$ 35/100mL STV 90% $\leq$ 130 cfu/100mL	> 4.8 mg/L (daily avg) $\geq$ 3.0 mg/L
 I	Monthly GM $\leq$ 200/100mL	-	$\geq$ 4.0 mg/L
 SD	Monthly GM $\leq$ 200/100mL	-	$\geq$ 3.0 mg/L

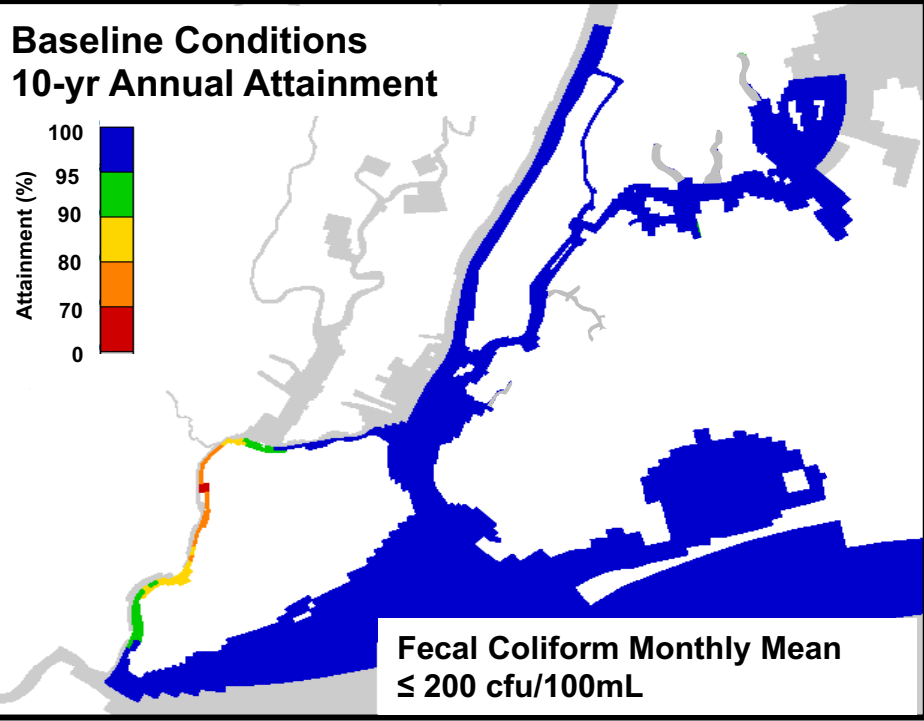
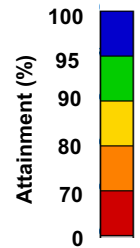
### Notes:

- (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



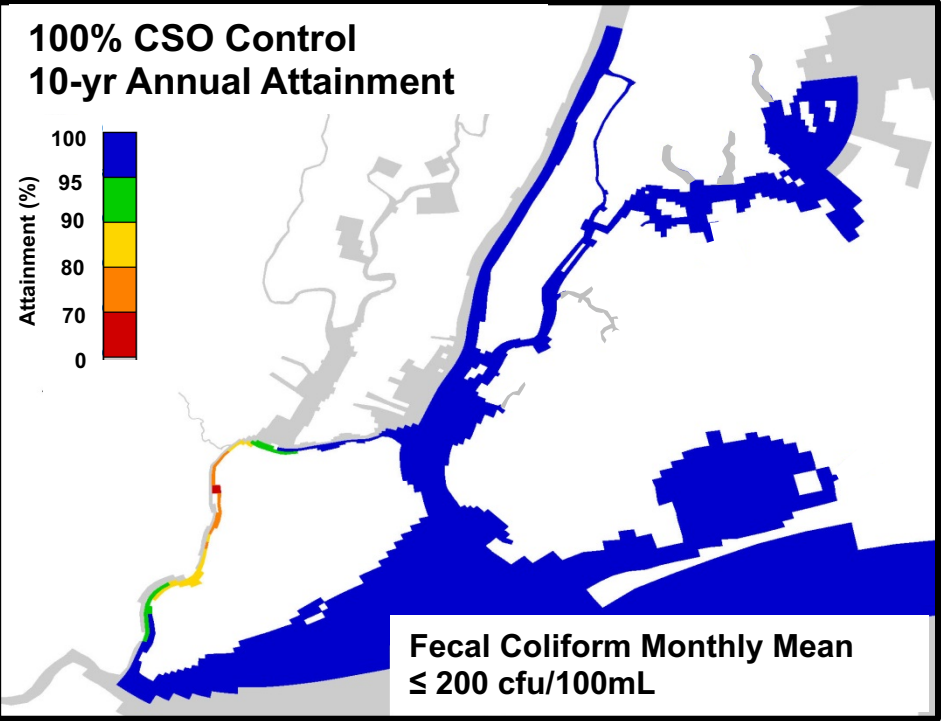
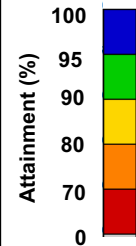
# Fecal Coliform Gap Analysis

## Baseline Conditions 10-yr Annual Attainment



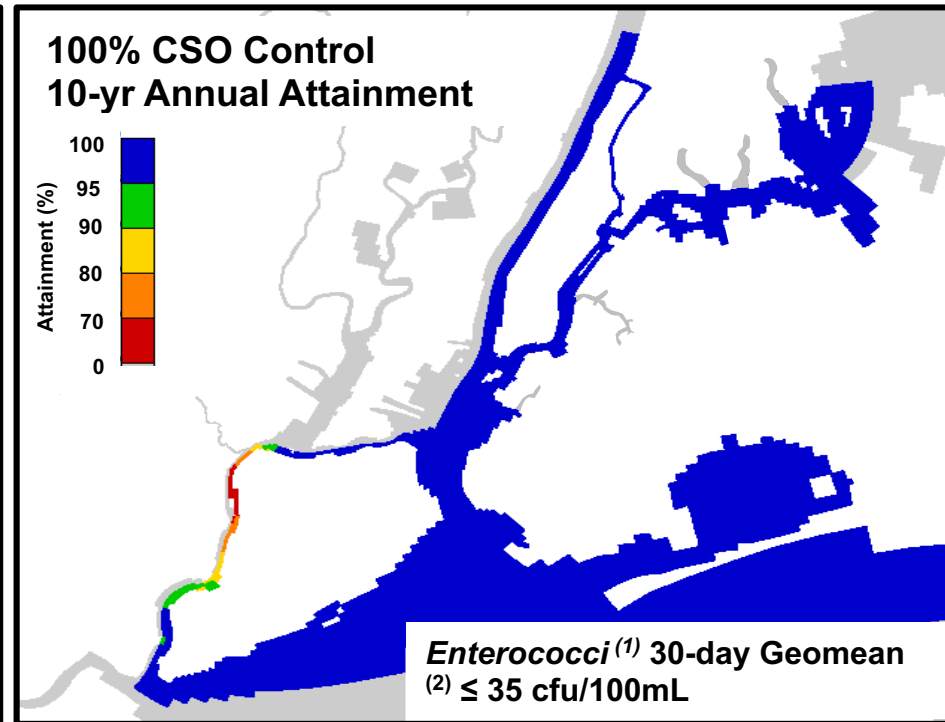
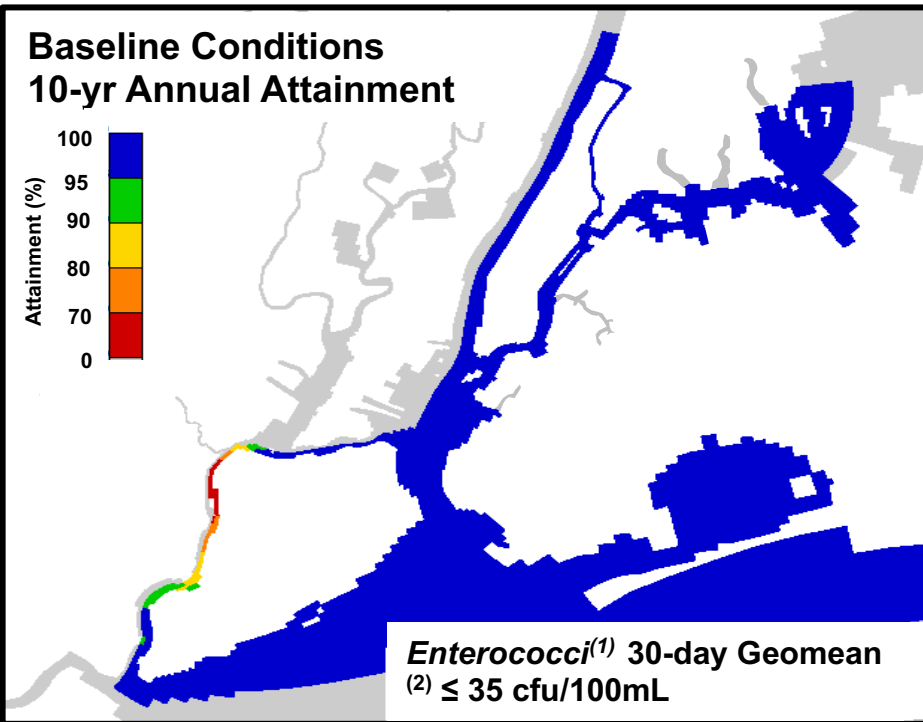
Fecal Coliform Monthly Mean  
 $\leq 200$  cfu/100mL

## 100% CSO Control 10-yr Annual Attainment



Fecal Coliform Monthly Mean  
 $\leq 200$  cfu/100mL

# Enterococci GM Gap Analysis

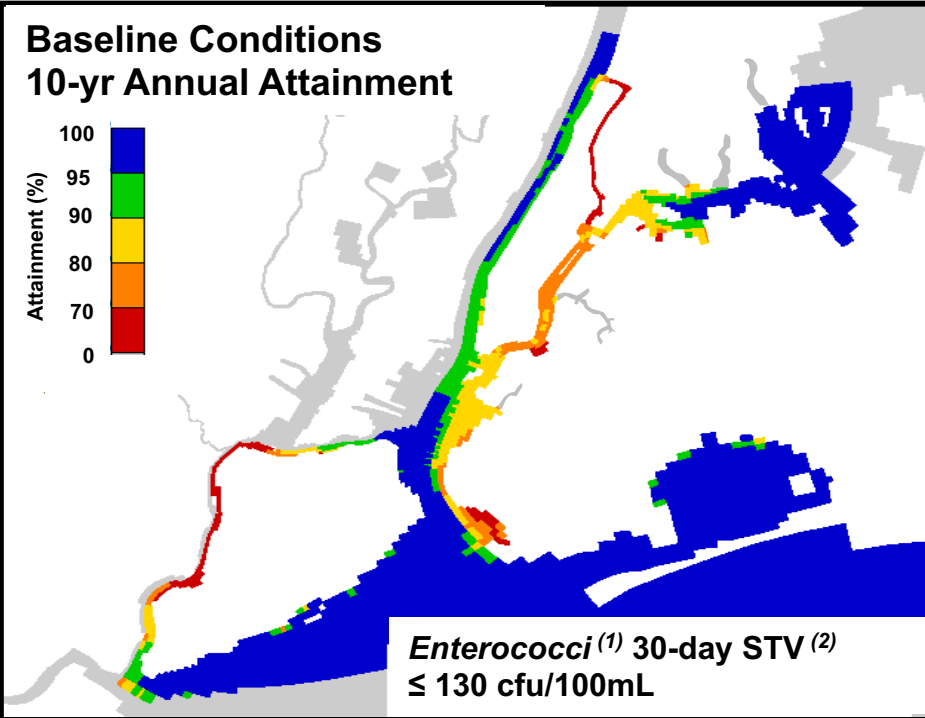
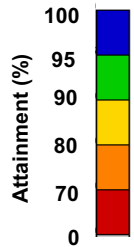


## Notes:

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

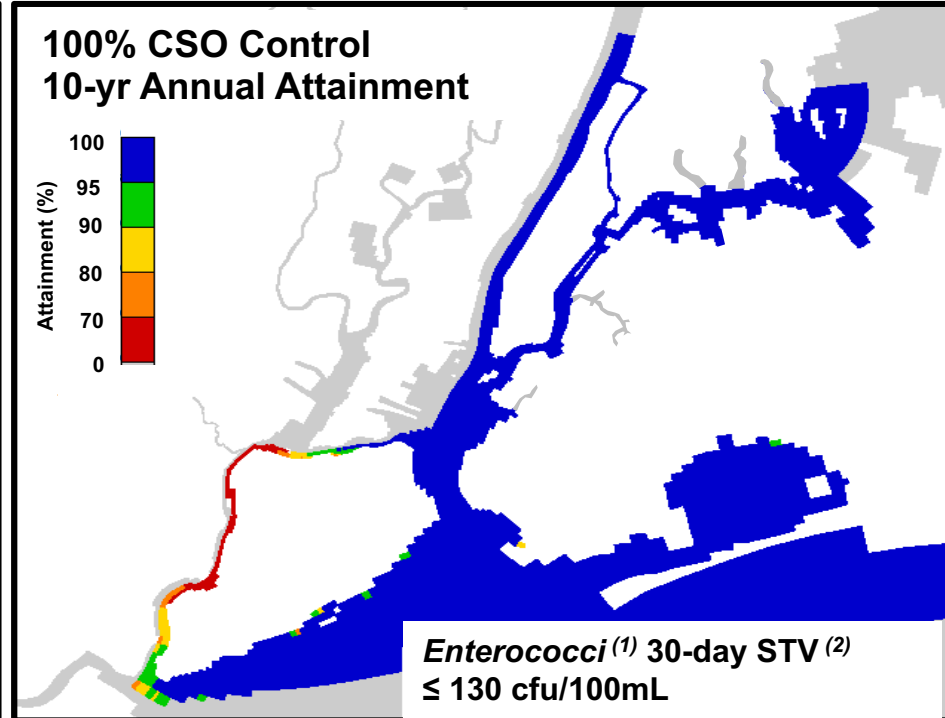
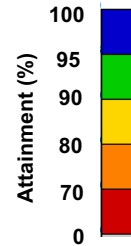
# Enterococci STV Gap Analysis

## Baseline Conditions 10-yr Annual Attainment



*Enterococci*<sup>(1)</sup> 30-day STV<sup>(2)</sup>  
≤ 130 cfu/100mL

## 100% CSO Control 10-yr Annual Attainment



*Enterococci*<sup>(1)</sup> 30-day STV<sup>(2)</sup>  
≤ 130 cfu/100mL

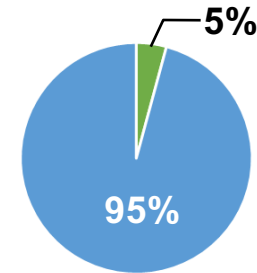
- Notes:
- 1) *Enterococci* criteria apply only to Class SB Coastal Primary Contact Recreational waters
  - 2) 30-day running 90<sup>th</sup> percentile statistical threshold value



# Key Take-Aways for Alternatives Analysis



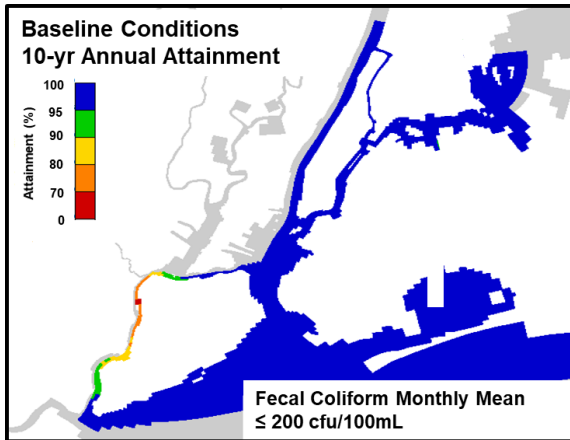
Over \$9B in investments have been made or committed as part of the CSO Program to date



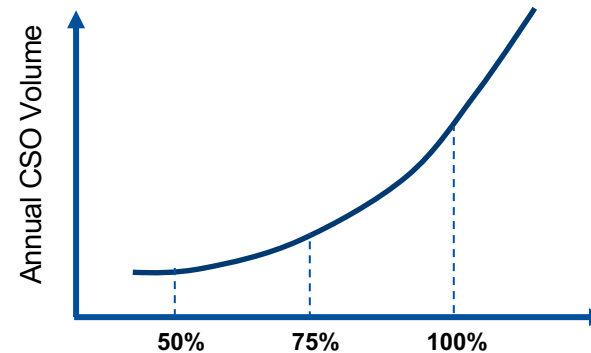
- Annual CSO Volume (11 BGY)\*
- Annual Volume Treated at WRRFs (251 BGY)\*

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



% Volume Capture for 2008 JFK Typical Year Rainfall

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

# 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>	

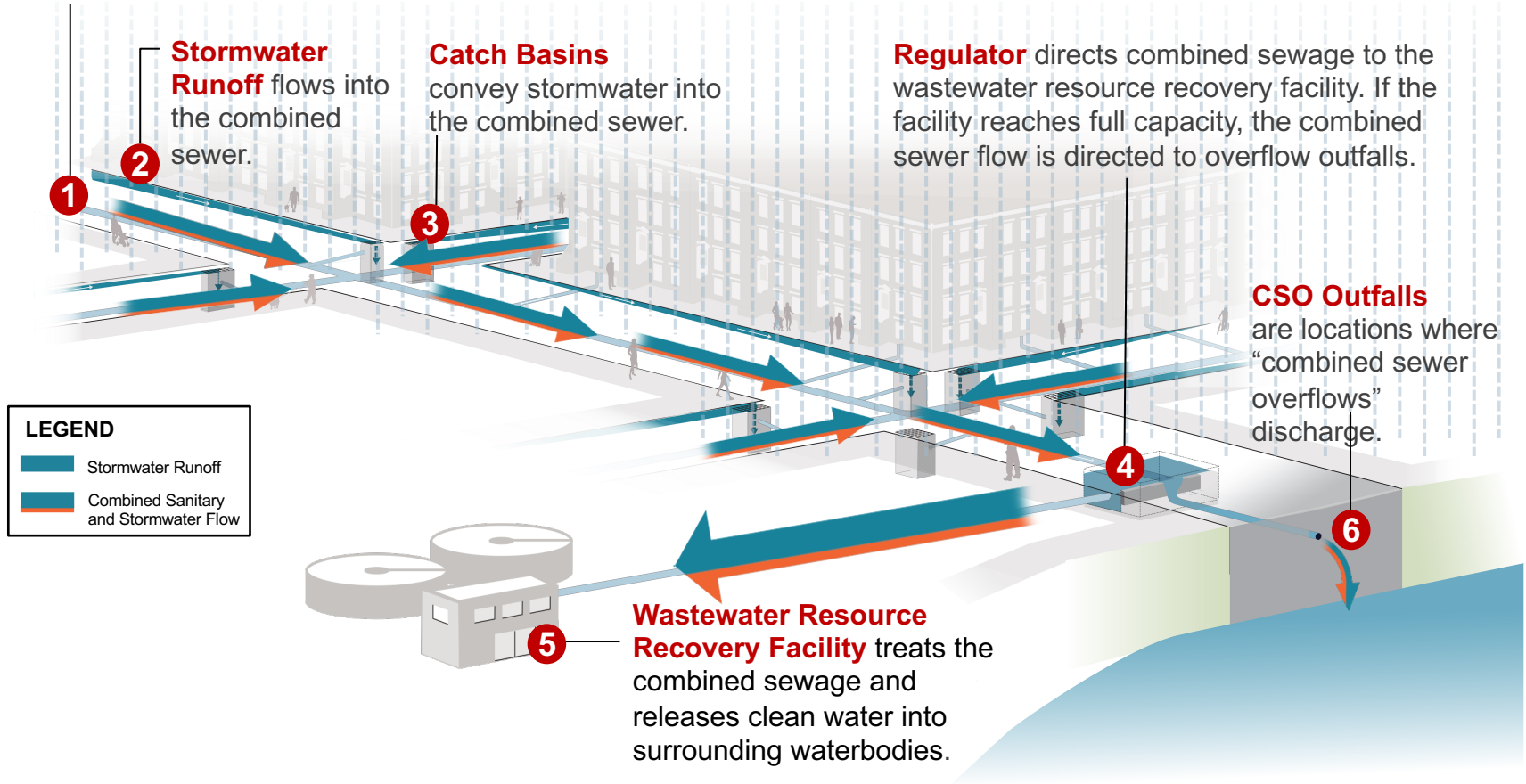
Ongoing Projects

Evaluated but Screened Out

Retained Alternatives

# CSO Regulator Operation

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








# System Optimization Analysis Summary

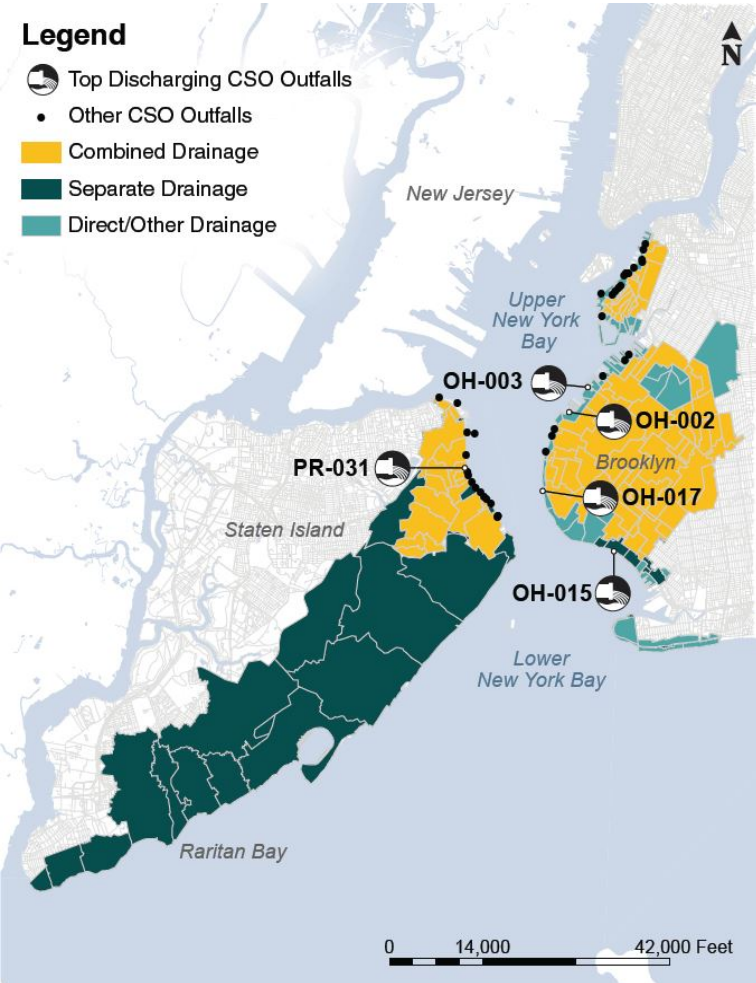
- Each CSO outfall was assessed for distance to closest public access point
- Optimization process prioritized outfalls that were near public access points
- Performance of optimization alternatives was driven by system hydraulics, and limited by constraints on increasing water levels in the sewers
- 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



# Lower and Upper New York Bay

## Legend

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



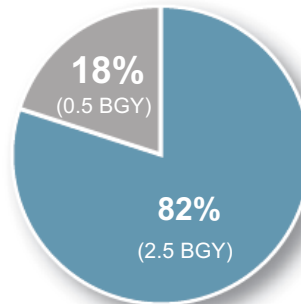
## Meets most Class SB WQ standards



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

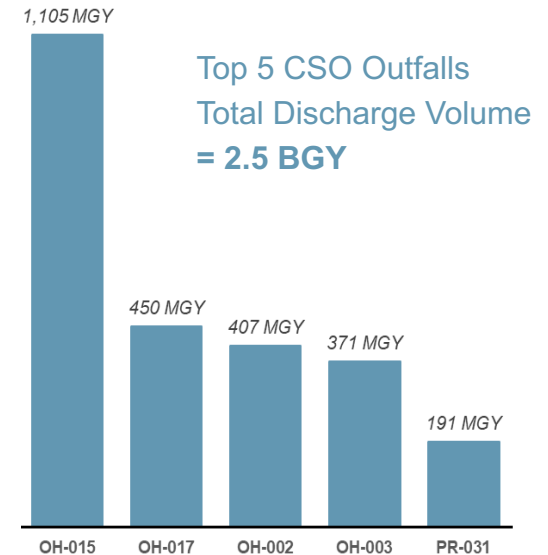
Total Number of CSO Outfalls = 39

Total CSO Discharge Volume = **3.0 BGY**

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



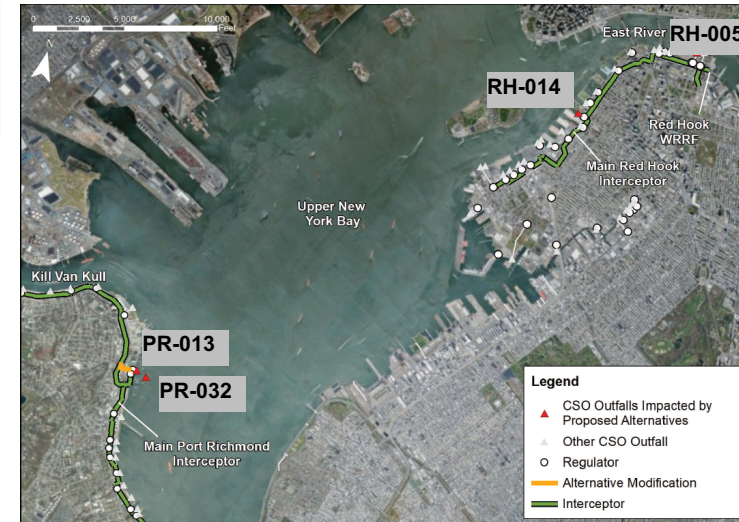
-  % of top 5
-  % of other



# 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

# New York Bay – Tunnel Alternatives






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

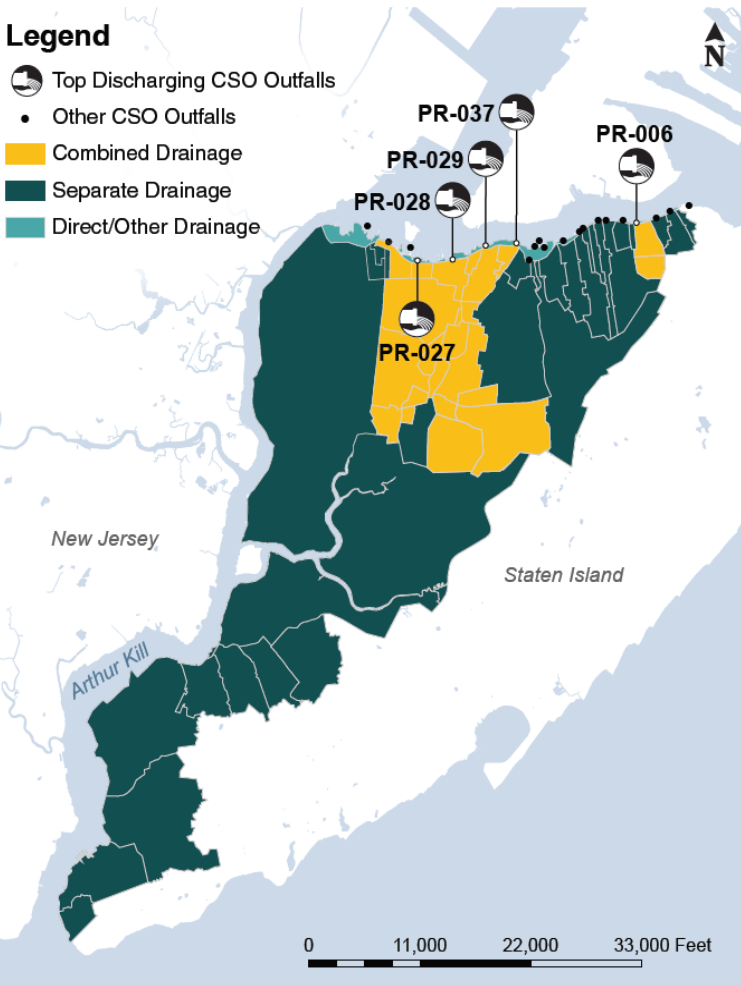
Alternative	Description	CSO Volume Reduction	Estimated Probable Bid Cost
<b>NYB-3</b>	<ul style="list-style-type: none"> <li>• <b>50% CSO Control Tunnel</b></li> <li>• 9.3 miles of 23 ft dia. tunnel</li> <li>• Address 2 of the top 5 outfalls</li> </ul>	<b>1.6 BGY</b>	<b>\$3.0 Billion</b>
<b>NYB-4</b>	<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



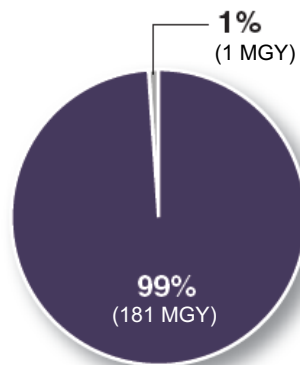
## Meets most Class SD and I WQ standards



- ✓ Dissolved Oxygen
- ✗ Fecal Coliform

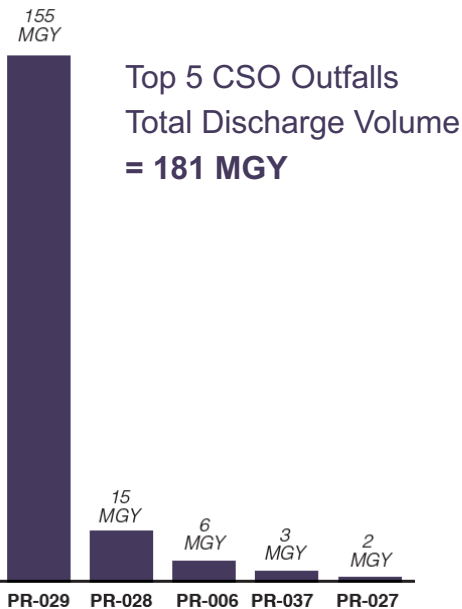
Total Number of CSO Outfalls = 19

Total CSO Discharge Volume = **182 MGY**

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



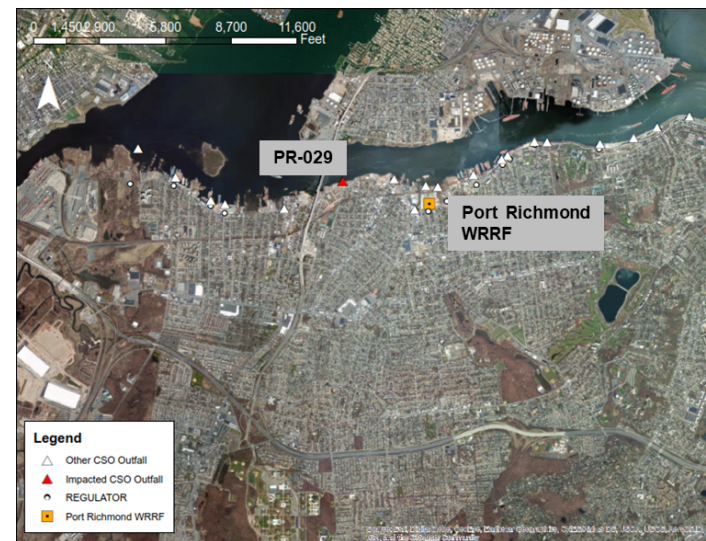
-  % of top 5
-  % of other





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

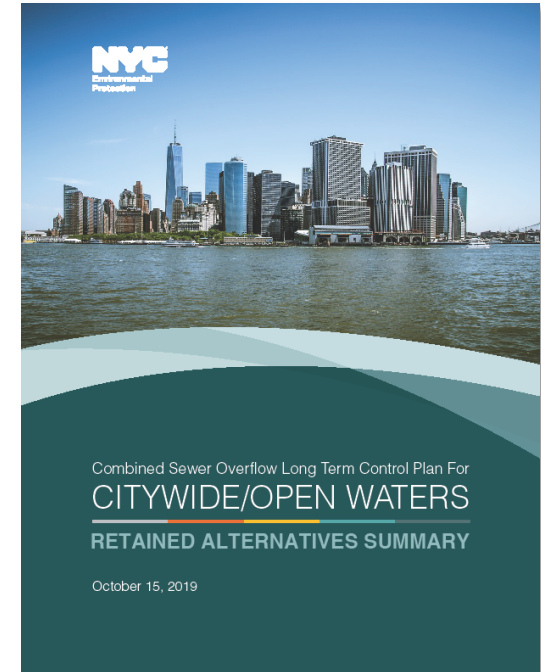
Alternative	Description	CSO Volume Reduction <sup>(1)</sup>	Estimated Probable Bid Cost
<b>AK / KVK-1</b>	<ul style="list-style-type: none"> <li>• <b>50% CSO Control</b></li> <li>• 5.4 MG storage tank for Outfall PR-029</li> </ul>	<b>91 MGY</b>	<b>\$324 Million</b>
<b>AK / KVK-2</b>	<ul style="list-style-type: 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

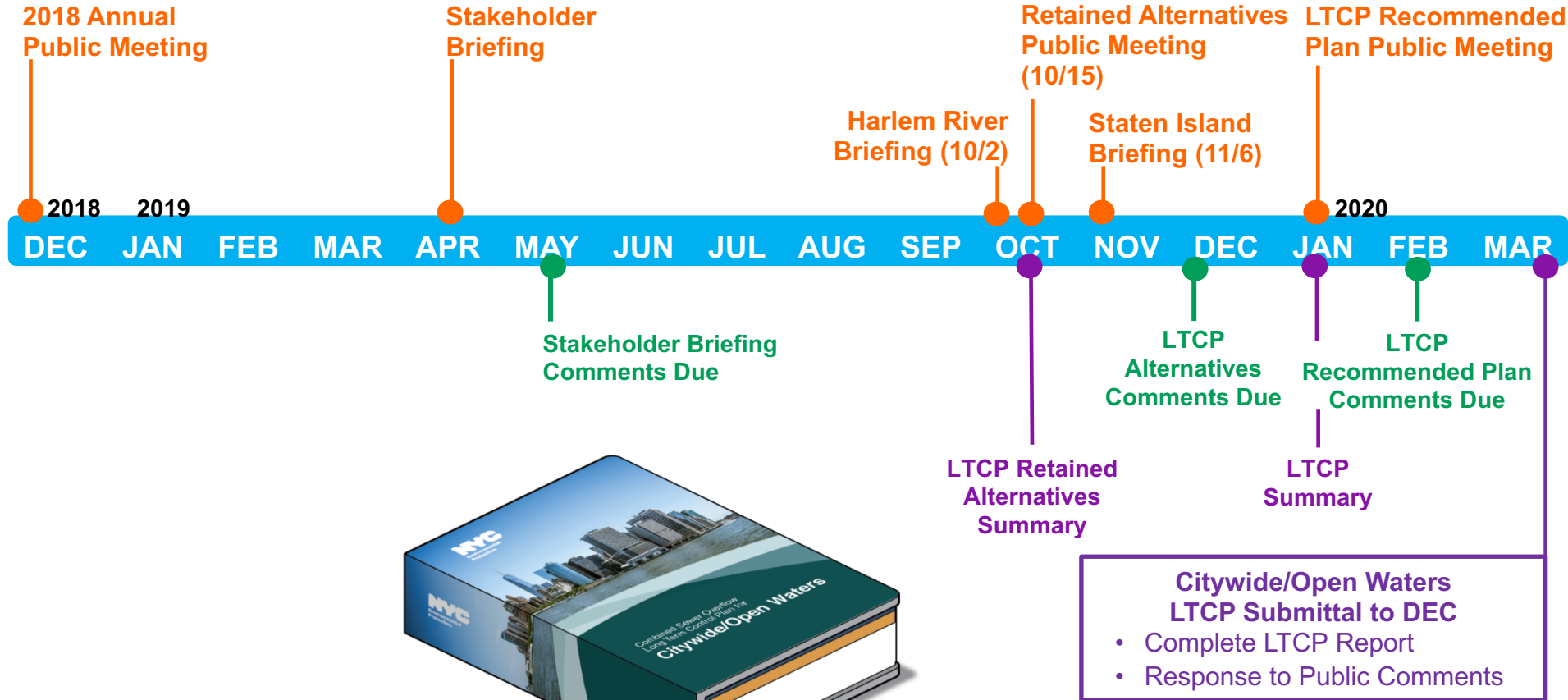
(1) Based on 2008 JFK Typical Year Rainfall

- 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 2<sup>nd</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)