NYC Environmental Protection

LTCP Submittal Dates

CSO Watershed	LTCP Due Date
Alley Creek	Submitted to DEC June 2014
Westchester Creek	Submitted to DEC June 2014
Hutchinson River	Submitted to DEC September 2014
Flushing Creek	Submitted to DEC December 2014
Bronx River	Submitted to DEC June 2015
Gowanus Canal	Submitted to DEC June 2015
Flushing Bay	June 2016
Coney Island Creek	June 2016
Jamaica Tributaries & Bay	June 2017
Newtown Creek	June 2017
Harlem River	Due Date Pending
Citywide*	Due Date Pending

*The Citywide LTCP shall include the East River and Open Waters

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CSO Improvement Projects

1995–2013:

- 4 CSO Storage Tanks (118 MG)
- Pumping Station Expansion (Additional 60 MGD)
- Floatables Control (Bronx & Gowanus)
- NYC Green Infrastructure Program Initiated

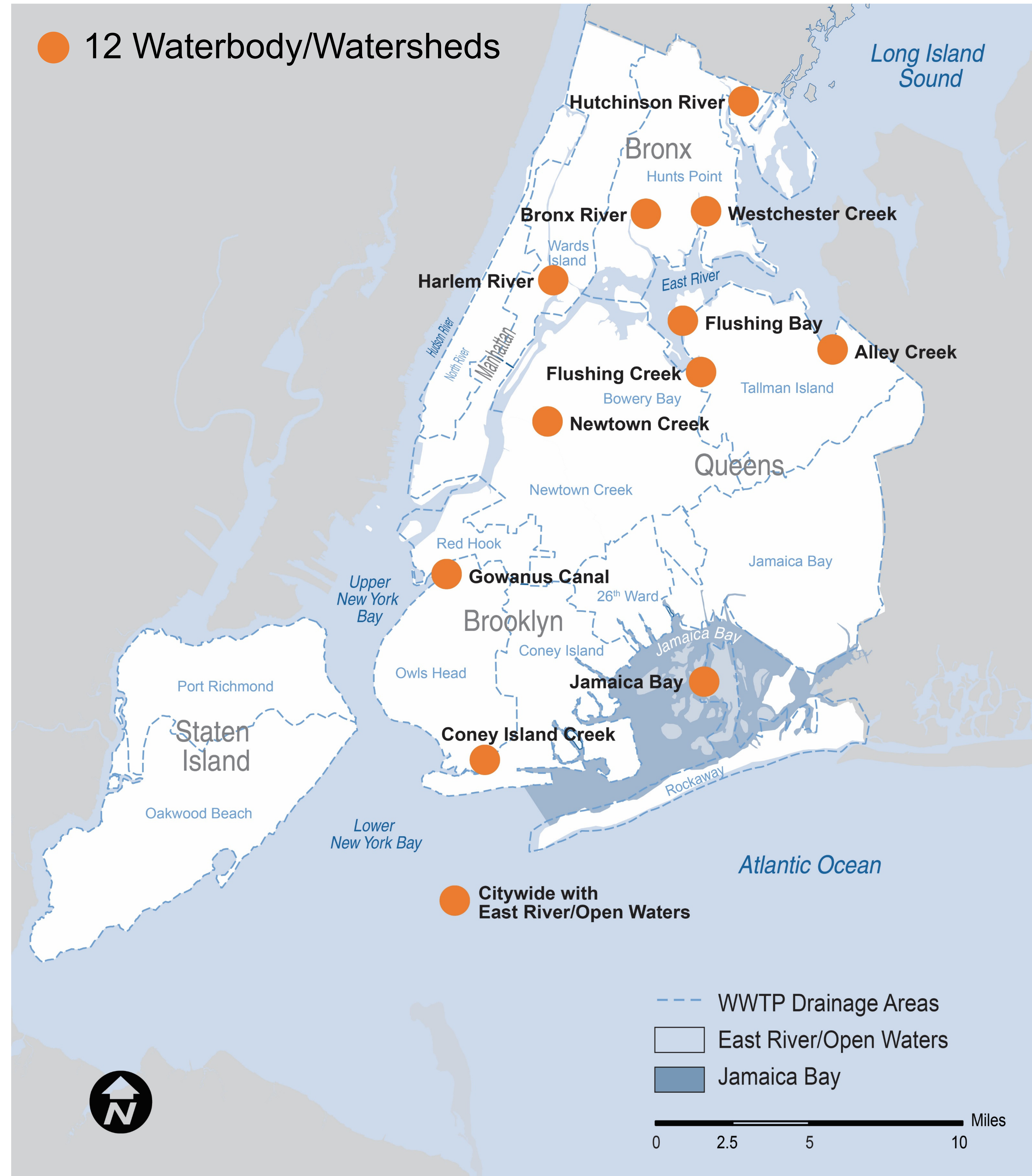
2014–2030:

- Wet Weather Maximization (Tallman Island)
- Dredging (Paerdegat & Hendrix Creek)
- Flushing Tunnel and PS Upgrades (Gowanus)
- Aeration (Newtown Creek)
- Regulator Modifications (Westchester Creek, Newtown Creek, Jamaica Tributaries)
- Sewer Work (Pugsley Creek, Fresh Creek HLSS, Belt Pkwy Crossing, and Flushing Bay Low Lying Sewers)
- Plant Wet Weather Stabilization
- Dredging (Flushing Bay)
- GI Program to manage 1” of rain on 4% of impervious surfaces in CS area by 2020, and 10% by 2030

Total Costs:

- Grey Infrastructure: $2.7 Billion
- Green Infrastructure: $1.5 Billion

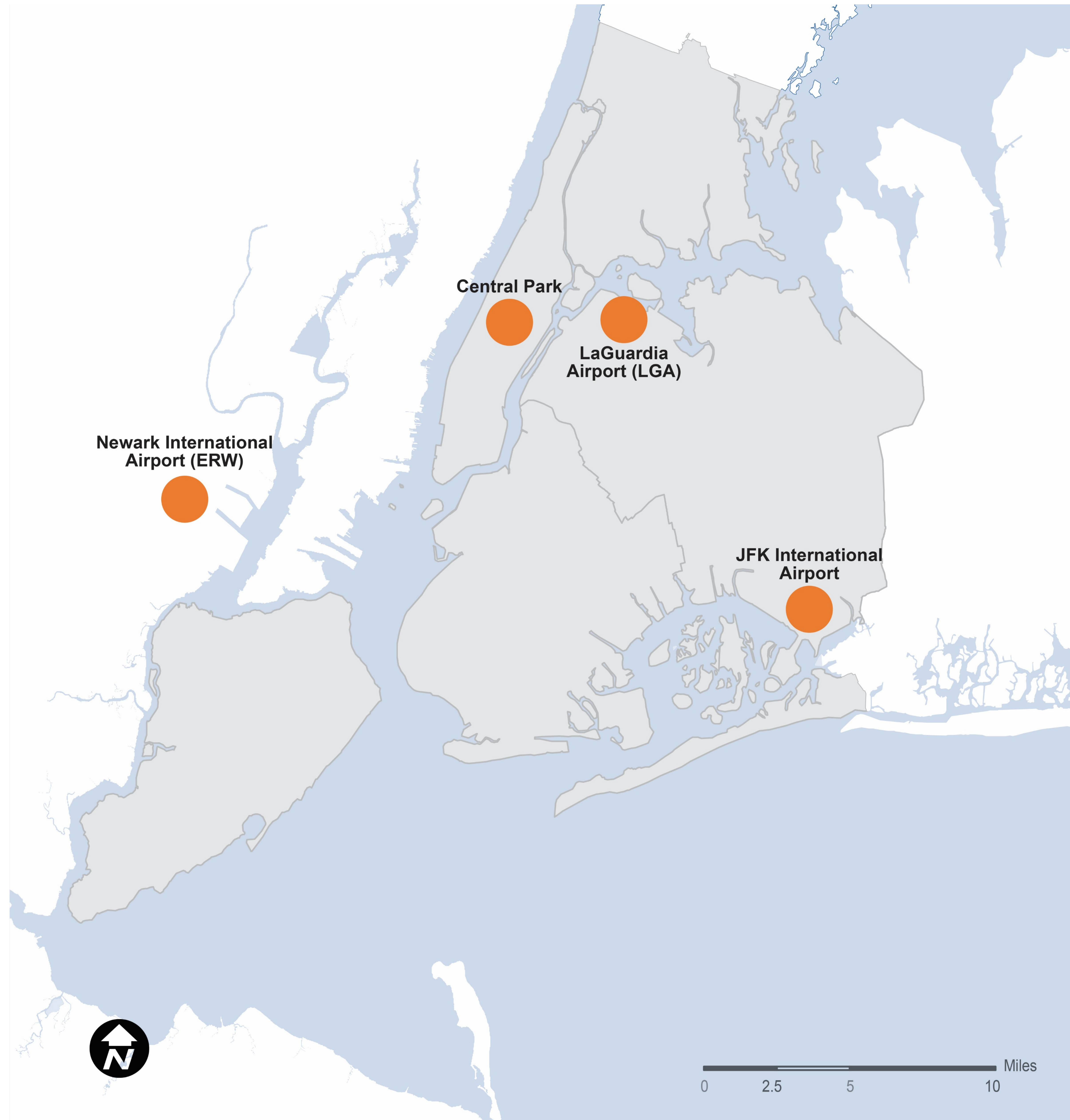
} **$4.2 Billion**



Rainfall Selection for Model Updates

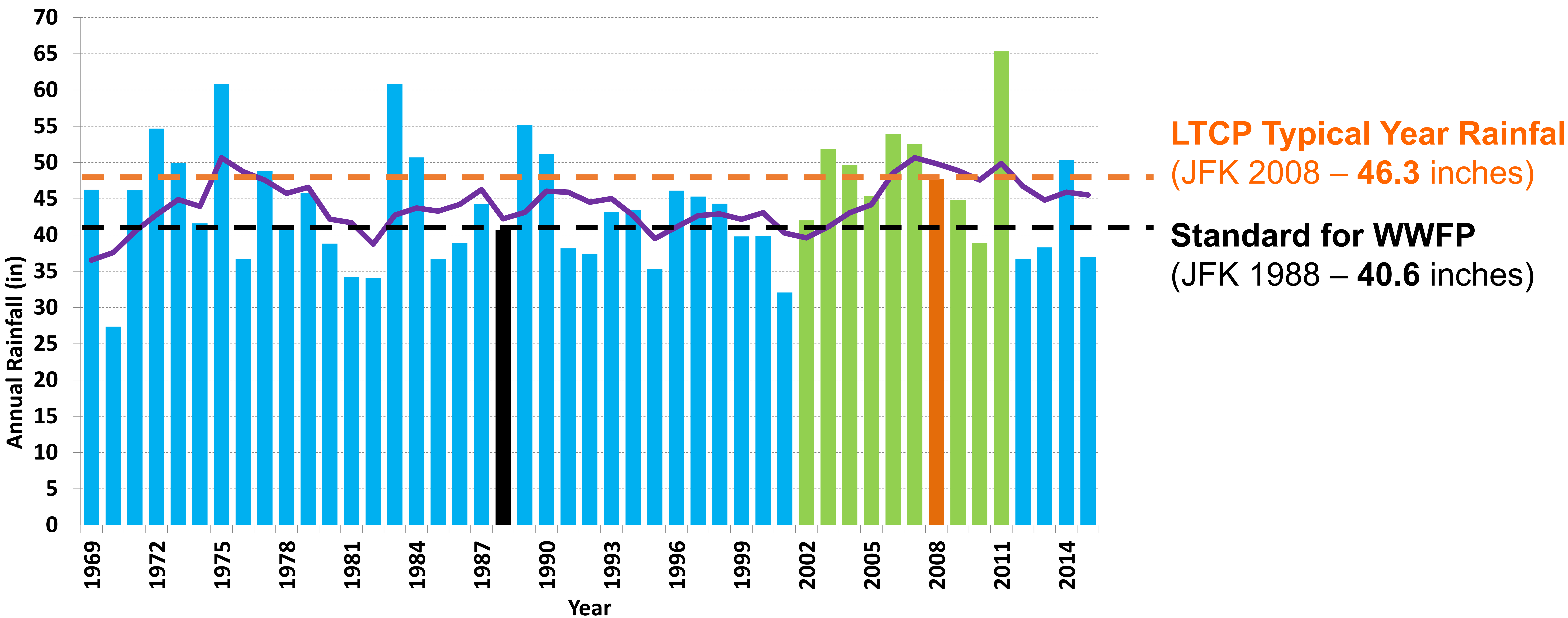
Evaluated a comprehensive range of rainfall data:

- Historical data range: **42 years** from 1969 to 2010
- Four representative rainfall gauges: Central Park, LGA, JFK, and ERW
- Selected **2008 JFK rainfall** as the most representative of average annual rainfall across all four gauges



Model Calibration & Updates

- Calibrated with Harbor Survey and LTCP sampling data
- Future wastewater flows based on **2040 population** projections
- Recalibrated 2012 InfoWorks based on **revised impervious areas**
- Alternative Model runs based on 1-yr data (**JFK 2008 "Typical Year Rainfall"**)
- Selected Plan Model runs based on 10-yr data (2001 to 2011) to address elevated rainfall amount due to **climate change**



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CSO Mitigation Toolbox

INCREASING COMPLEXITY →

INCREASING COST ↓

Source Control	Additional Green Infrastructure		High Level Sewer Separation (HLSS)	
System Optimization	Fixed Weir	Parallel Interceptor / Sewer	Bending Weirs Control Gates	Pump Station Expansion
CSO Relocation	Gravity Flow Tipping to Other Watersheds	Pumping Station Modification	Flow Tipping with Conduit / Tunnel and Pumping	
Water Quality / Ecological Enhancement	Floatables Control	Dredging	Dissolved Oxygen Improvement	Flushing Tunnel
Treatment ***Satellite:***	Outfall Disinfection	Retention Treatment Basin (RTB)		High Rate Clarification (HRC)
Centralized:	WWTP Expansion			
Storage	In-System	Shaft	Tank	Tunnel

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Potential LTCP Alternatives

System Optimization


Pump Station Expansion


Bending Weirs

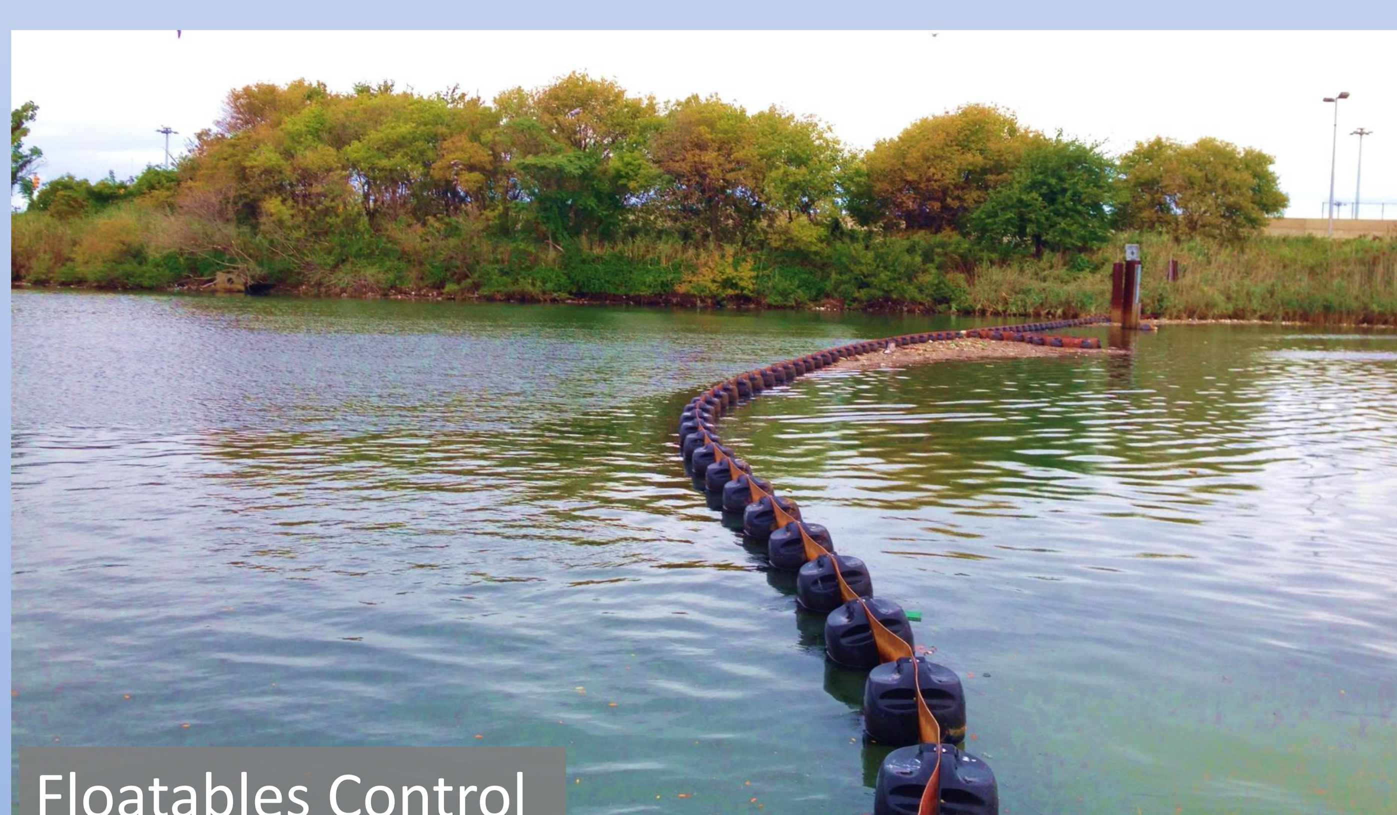
CSO Relocation


Pump Station Modification


Flow Tipping with Conduit and Pumping

Water Quality Enhancement


Flushing Tunnel


Floatables Control

Treatment


WWTP Expansion


Retention Treatment Basin (RTB)

Storage


Tunnel


Tank

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Flushing Creek
LTCP Preferred Alternative

Disinfection for Outfalls TI-010 and TI-011

TI-010

Recreational Season Disinfection at Influent Screens & Regulator Chamber DC5 (May 1st to October 31st)

TI-011

Recreational Season Disinfection Downstream of Regulator 9
(May 1st to October 31st)

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History of Chlorination

Chlorination of sewage remains the most common practice of wastewater disinfection today

1890's	• Became common practice in English municipal water treatment
1908	• Application proven effective in Chicago and Jersey City water districts
1910	• City of Philadelphia first to chlorinate wastewater in U.S.
1911	• First application in NYC for disinfection of Croton water supply
1918	• Over 1,000 U.S. cities use chlorination for drinking water supplies
1936	• First application in NYC for seasonal disinfection of wastewater effluent
Today	• Most widely-used disinfectant for water & wastewater treatment in the U.S.

CSO Disinfection

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Disinfection with sodium hypochlorite (liquid chlorine) is practiced nationwide for CSO treatment

Key Benefits

- Liquid chlorine is best suited for the intermittent and variable character of CSO discharges.
- Other disinfection methods are not as effective, reliable or economical.
- Extensive experience nationwide for CSO treatment.
- NYCDEP has extensive experience in storing, handling, and applying liquid chlorine at water and wastewater facilities.

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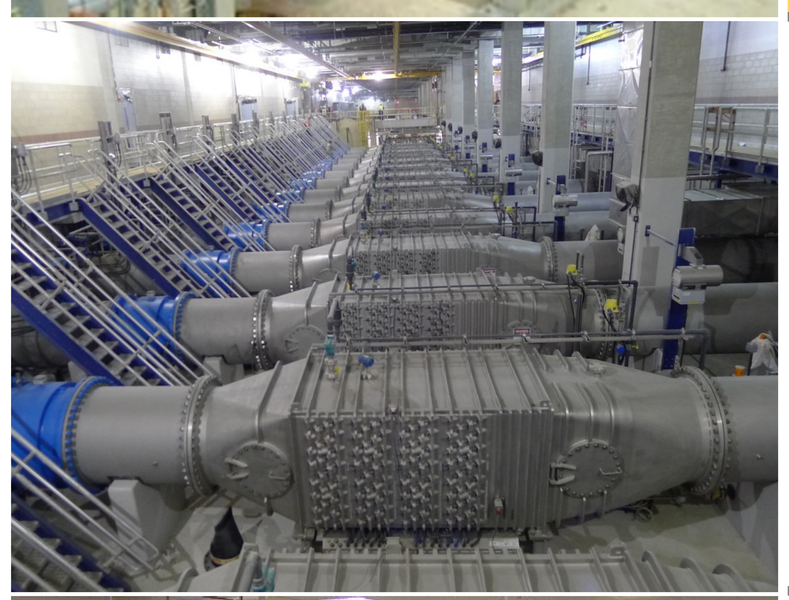
Common Methods of Disinfection

		%Utilization across USA* (WWTPs > 1 mgd)	Benefits	Challenges
	**Chlorine**	75.3 %	• Effective against a wide range of pathogens • Relatively inexpensive	• Residual chlorine can be toxic to some aquatic life
	**UV**	20.6 %	• Effective against a wide range of pathogens	• Relatively expensive • Energy intensive • Requires larger footprint than chlorination • Not as effective as chlorine for CSO disinfection
	**Ozone**	0.2 %	• Highly effective against a wide range of pathogens	• Relatively expensive • Energy intensive • Requires larger footprint than chlorination • Not used for CSO disinfection
	None	3.9 %	-	-

Pathogens – Disease causing organisms

*Source: Disinfection of Wastewater Effluent – Comparison of Alternative Technologies, WERF, 2008.

Residual Chlorine Management

The amount of chlorine being discharged into the waterways must be regulated.
Two common management strategies are:

1) Instrumentation: to closely monitor & control chlorine dosage
2) Dechlorination: add additional chemical (sodium bisulfite) to quench residual chlorine

SPRING CREEK PILOT

To be completed in time to **inform final design and control requirements** for proposed disinfection facilities

- Test and measure chlorine residuals and potential toxicity to receiving waters
- Determine proper disinfection control protocols and potential dosage ranges
- Determine if dechlorination may be required based upon potential toxicity issues