# Flushing Creek
# Combined Sewer Overflow
# Long Term Control Plan

Public Meeting #2

Al Oerter Recreational Center

October 23, 2014

# Welcome & Introductions

Shane Ojar
DEP

# Agenda

| | Topic |
|---|---|
| 1 | Welcome and Introductions |
| 2 | Long Term Control Plan (LTCP) Process |
| 3 | Waterbody/Watershed Characteristics |
| 4 | Water Quality – Current Improvement Projects |
| 5 | Draft Alternatives for LTCP |
| 6 | Next Steps |
| 7 | Discussion and Q&A Session |

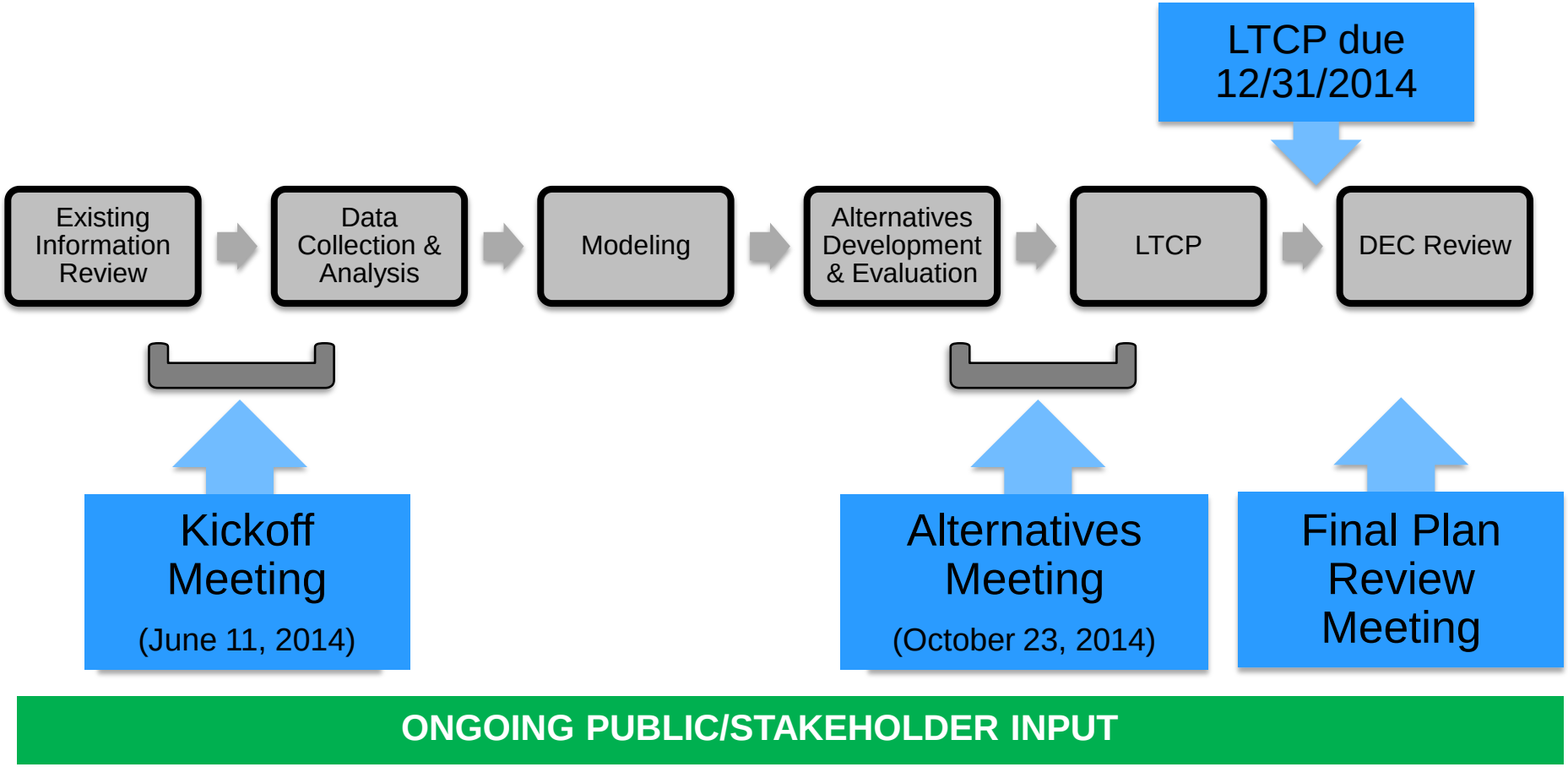
# Meeting Objectives

1. Provide background and understanding of the Long Term Control Plan process for Flushing Creek

2. Provide summary of existing water quality improvement projects

3. Gather public input on draft alternatives

# Public Involvement and LTCP Process

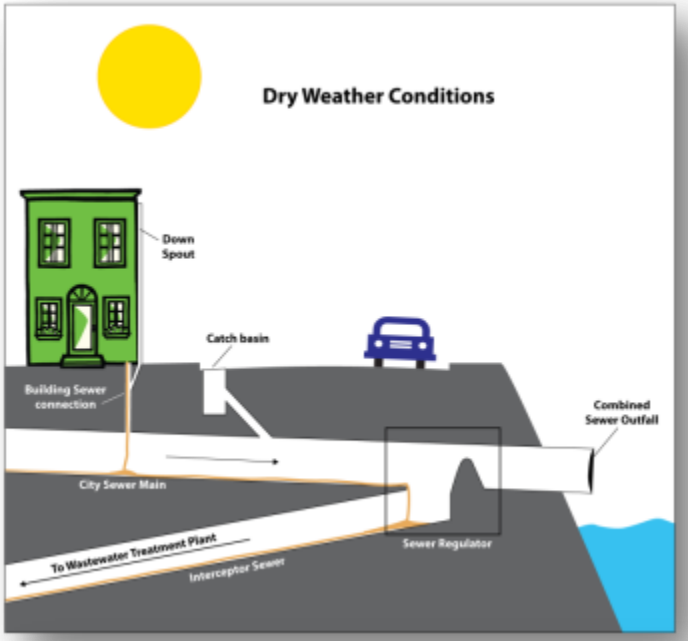


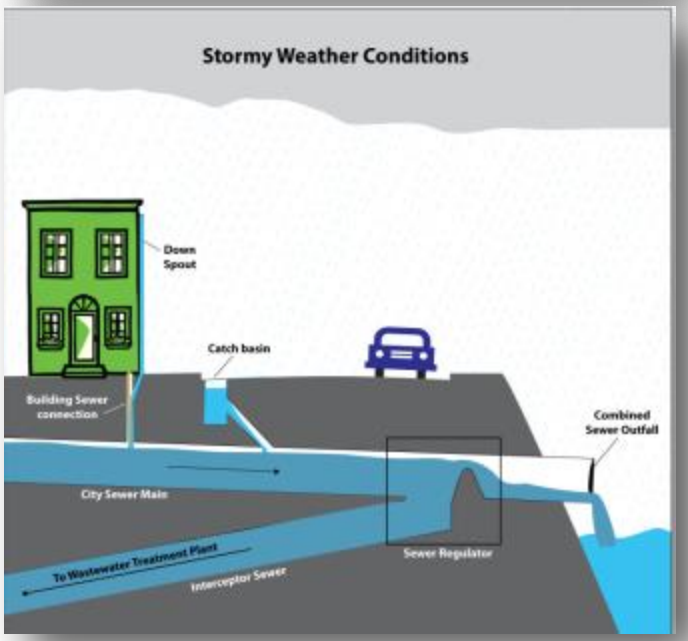
# Overview of Combined Sewer Overflow Long Term Control Plan Process

Shane Ojar
DEP

# What is a Combined Sewer Overflow?

- NYC's sewer system is approximately 60% **combined**, which means it is used to **convey both sanitary and storm flows**.
  - Heavy rain and snow storms can lead to higher than normal flows in combined sewers.
  - As it was designed to work, when the sewer system is at full capacity, a diluted mixture of rain water and sewage, also known as combined sewage, are released into local waterways. This is called a combined sewer overflow (CSO).
  - CSOs become a concern when they occur too frequently or in large amounts. When they do, they can affect water quality and recreational uses in local waterways.



# What are Long Term Control Plans (LTCPs)?

- Required by state pollution control permits in accordance with the Clean Water Act (CWA) and Federal CSO Control Policy; an agreement between the State and City of New York establishes the time frame for submittal of 11 LTCPs.

- Assesses feasibility of attaining current water quality standards and fishable/swimmable standards.

- Comprehensive evaluation of alternatives to reduce CSOs and improve water quality in NYC's waterbodies.

# What is the LTCP Process?

1. Builds off of improvements in Waterbody/Watershed Facility Plans (WWFP);

2. Assess current waterbody and watershed characteristics;

3. Identifies and analyze grey-green* infrastructure balance for different watersheds to meet applicable WQS; and

4. Select a preferred alternative based on a robust, targeted public process.

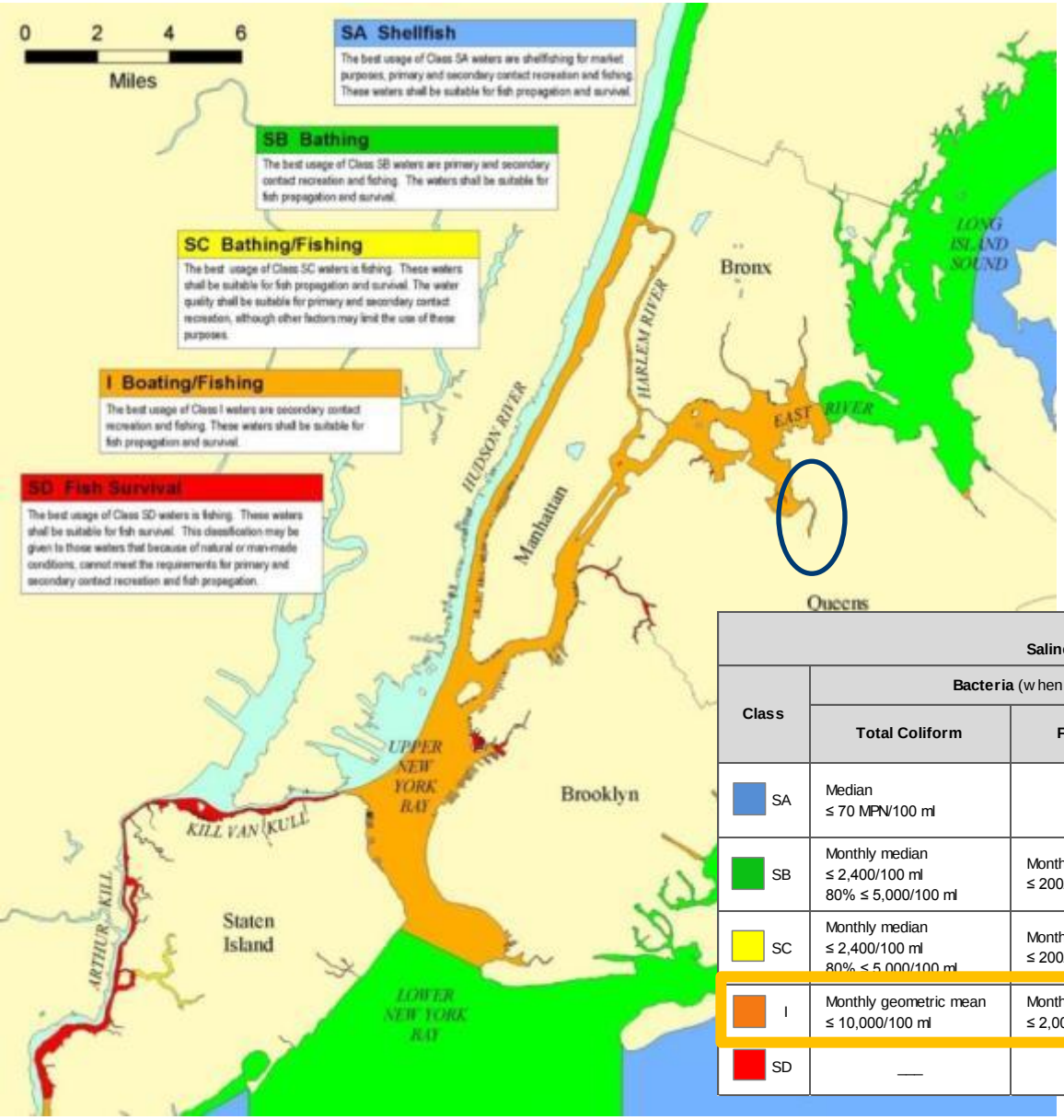
*Green: sustainable pollution reducing practices that also provide other ecosystem services.

*Grey: traditional practices such as pipes and sewers.

# Waterbody & Watershed Characteristics

Keith Beckmann, P.E.
DEP

# Current Water Quality Standards




- Best Use Designations
- Saline Surface Water Quality Standards
- **Flushing Creek– Class I**
  - DO ≥ 4.0 mg/L (acute, never less than)
  - Fecal Coliform ≤ 2,000 col /100 mL
  - Total Coliform ≤ 10,000 col /100 mL

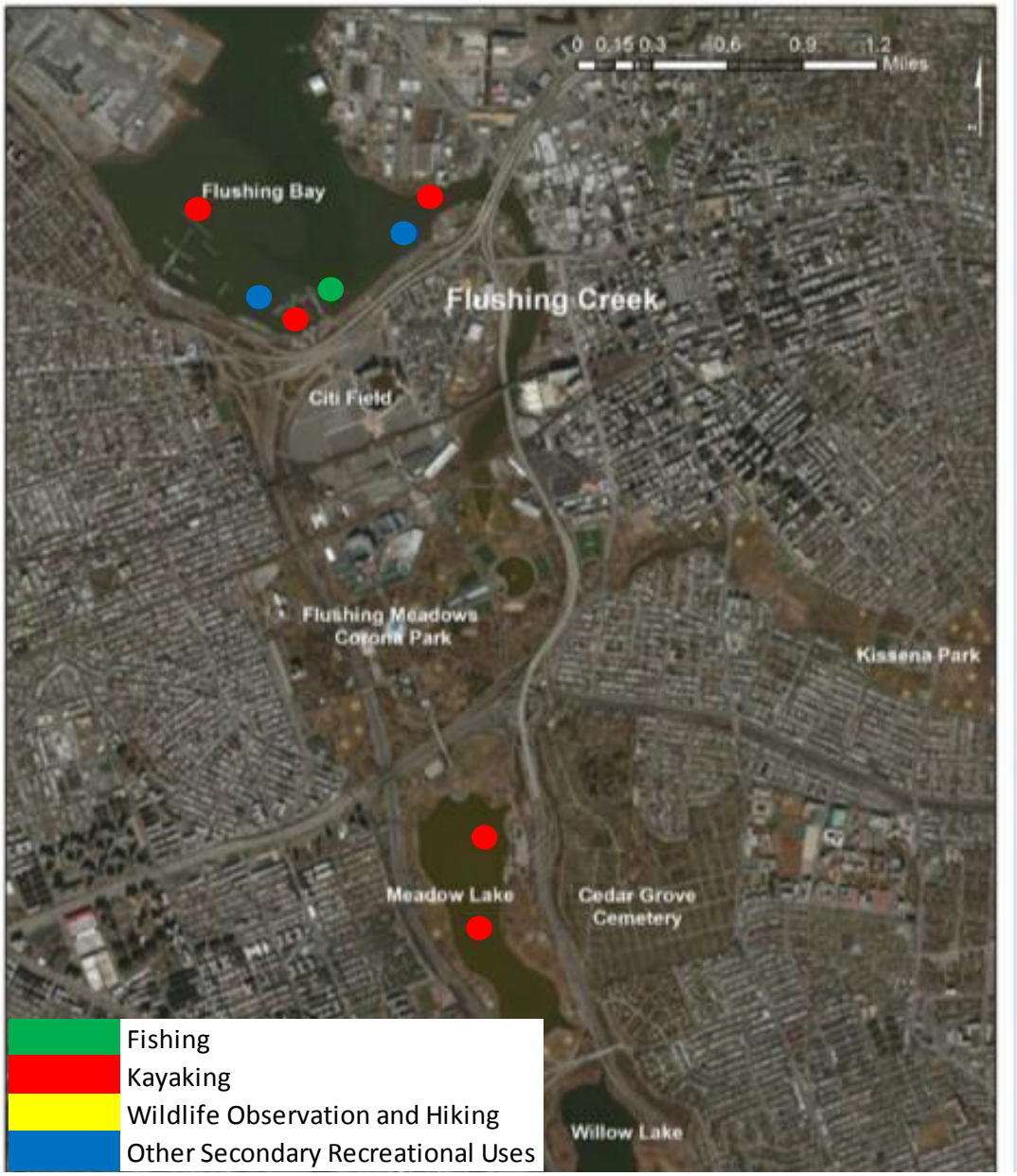
**New York State**
**Saline Surface Water Quality Standards**

| Class | Bacteria (when disinfection is practiced) | | | Dissolved Oxygen |
|---|---|---|---|---|
| | Total Coliform | Fecal Coliform | Enterococci | |
| SA | Median ≤ 70 MPN/100 ml | — | Geometric mean ≤ 35/100 ml | $DO_i = \frac{13.0}{2.80 + 1.84e^{-0.1i_t}}$ ≥ 3.0 mg/l (acute, never less than) |
| SB | Monthly median ≤ 2,400/100 ml 80% ≤ 5,000/100 ml | Monthly geometric mean ≤ 200/100 ml | Geometric mean ≤ 35/100 ml | $DO_i = \frac{13.0}{2.80 + 1.84e^{-0.1i_t}}$ ≥ 3.0 mg/l (acute, never less than) |
| SC | Monthly median ≤ 2,400/100 ml 80% ≤ 5,000/100 ml | Monthly geometric mean ≤ 200/100 ml | Geometric mean ≤ 35/100 ml | $DO_i = \frac{13.0}{2.80 + 1.84e^{-0.1i_t}}$ ≥ 3.0 mg/l (acute, never less than) |
| I | Monthly geometric mean ≤ 10,000/100 ml | Monthly geometric mean ≤ 2,000/100 ml | — | ≥ 4.0 mg/l (acute, never less than) |
| SD | — | — | — | ≥ 3.0 mg/l (acute, never less than) |

$DO_i$ = DO concentration in mg/l between 3.0 – 4.8 mg/l

# Designated & Recreational Uses

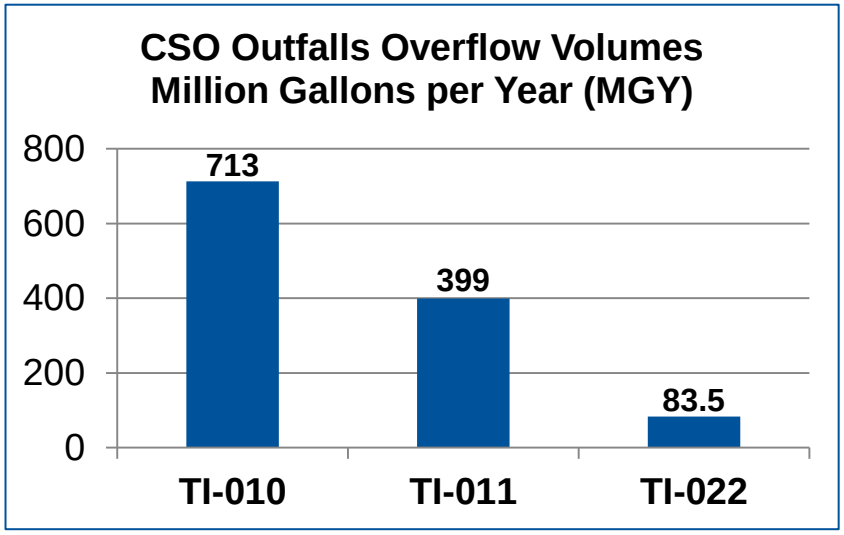
- New York State DEC classifies the best use of the creek as being suitable for secondary contact recreation and fishing.
- Current Water Uses:
  - No designated access for swimming
- All recreational uses identified by the public during Flushing Creek LTCP public meeting on June 11, 2014 are in Flushing Bay and Meadow Lake.



# Drainage Area Characteristics

| Drainage Area | Area (Acres) |
|---|---|
| Combined Sewered | 6,323 |
| Separate/Direct Drainage | 4,693 |
| **Total watershed area** | **11,016** |

- Within Tallman Island WWTP drainage area
- DEP wet weather outfalls include:
  - 3 CSO Outfalls
  - 5 Permitted Stormwater Outfalls




# Water Quality Sampling Data

- **LTCP Receiving Water Sampling**
  - November 2013 - May 2014
  - 18 dry weather and 60 wet weather samples per station
  - Fecal coliform and enterococci

**Geomean (Average) of LTCP Sampling Data**

| River Station | Enterococci (col/100ml) | | | Fecal Coliform (col/100ml) | | |
|---|---|---|---|---|---|---|
| | **Dry** | **Wet** | **All** | **Dry** | **Wet** | **All** |
| **OW1** | 32 | 51 | 44 | 130 | 131 | 131 |
| **OW2** | 20 | 99 | 61 | 100 | 433 | 278 |
| **OW3** | 61 | 863 | 468 | 327 | 3310 | 1940 |
| **OW4** | 23 | 494 | 232 | 119 | 2176 | 1063 |
| **OW5** | 20 | 497 | 223 | 112 | 1894 | 933 |
| **OW6** | 14 | 221 | 111 | 77 | 910 | 490 |

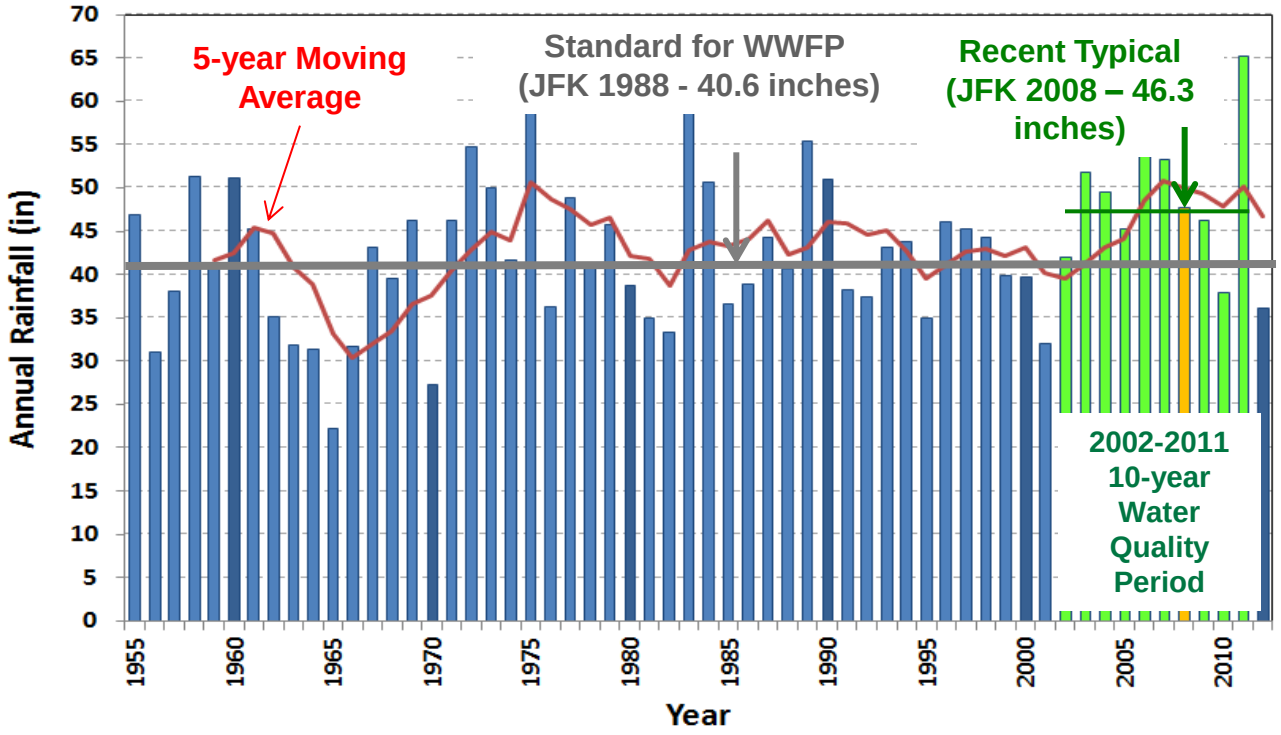

Additional DEP Water Sampling Programs**:**

- **Harbor Survey Monitoring**
  *http://www.nyc.gov/html/dep/html/harborwater/harbor_water_sampling_results.shtml*

- **Sentinel Monitoring**

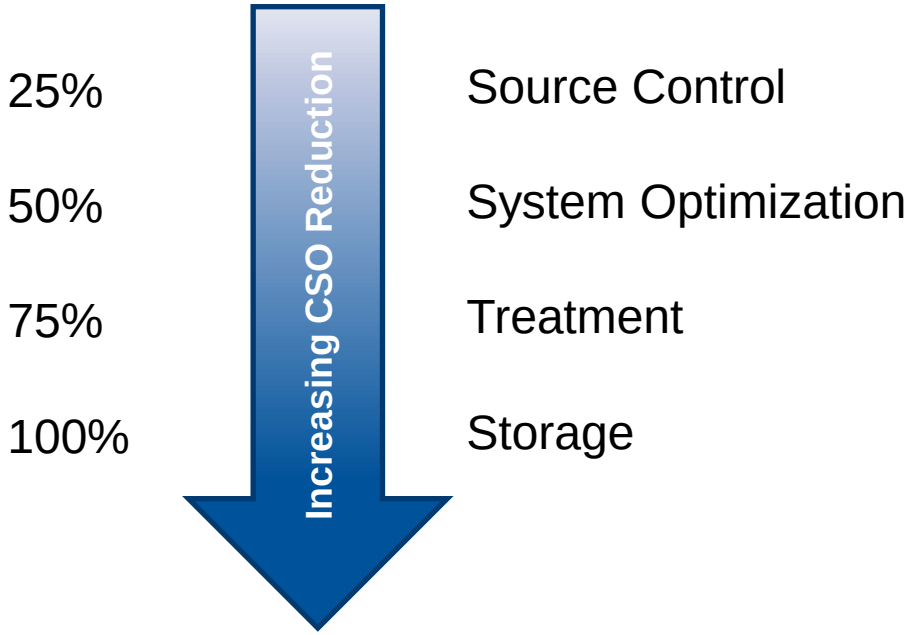
# Model Updates & Baseline Assumptions

- Model runs are based on ten years of data (2002 – 2011) for pathogens; one year of data used for DO ( “typical year rainfall - 2008”)
- 2040 population projections
- Model is calibrated with Harbor Survey data plus LTCP synoptic sampling data



# Modeling Runs – Scenario Analysis

- Gap Analysis for Water Quality Standard Attainment
  - Calculate Bacteria and DO for Baseline conditions
    - Include WWFP grey infrastructure
    - Green Infrastructure (GI) as per NYC GI Plan
- Bacteria Source Component Analysis
  - CSO, stormwater, direct drainage, upstream rivers
- Matching CSO Scenarios to CSO Engineering Control Alternatives



# Current Improvement Projects

Flushing Creek CSO Retention Facility
Increased Flow Conveyance to Tallman Island WWTP
Area-wide GI Projects
Planned On-site GI Projects
Potential Area-wide GI Contracts

# Current Improvement Projects

**Upgrades to Increase Flow Conveyance to Tallman Island WWTP**
**Cost = $41 million**

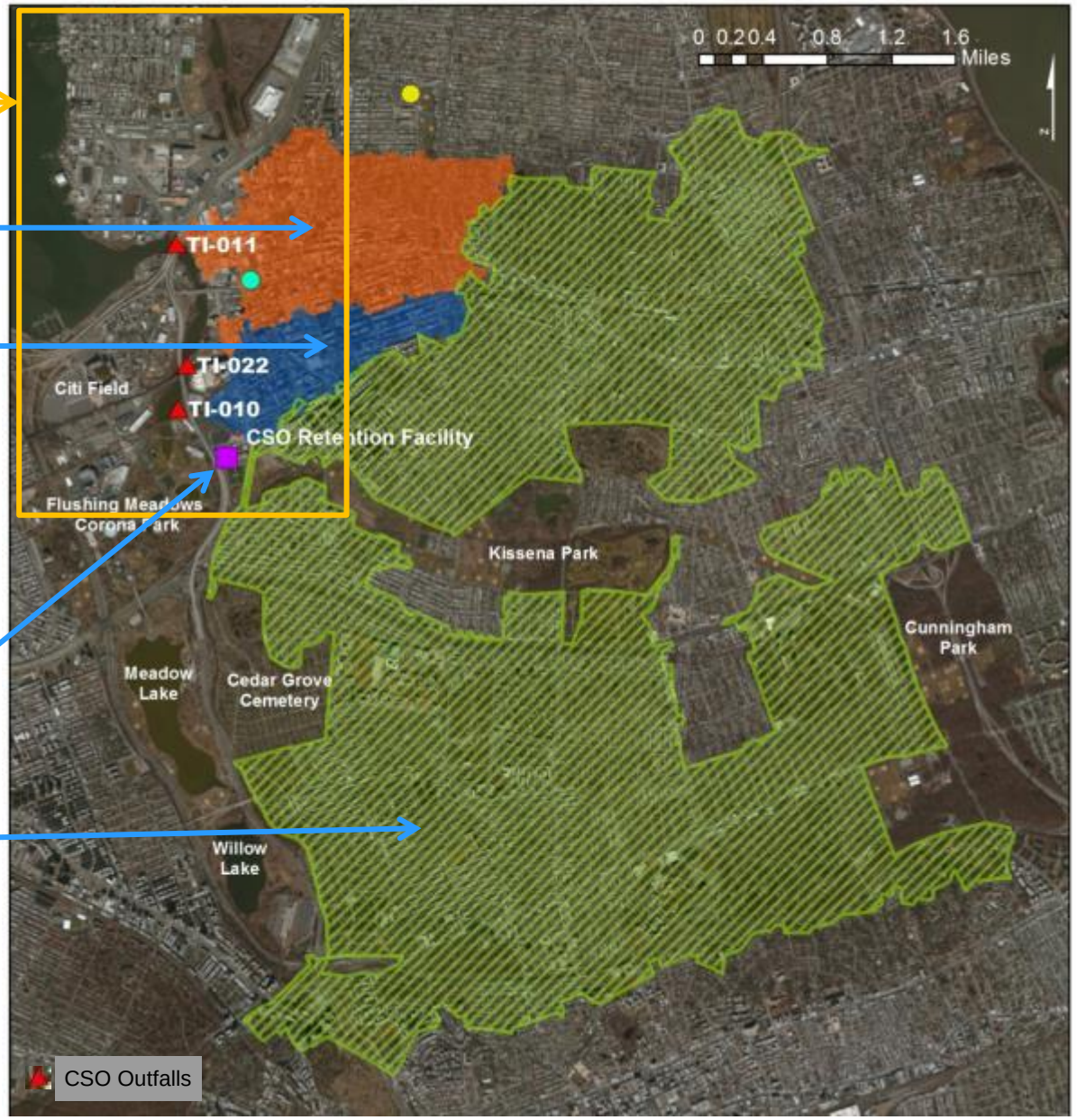
**Planned On-site GI Projects:**
- 185Q, Edward Bleeker Jr. High
- Flushing Town Hall & JSH

**Area-wide GI Projects**
- TI-011
- TI-022

**Design Cost = $3.5 million**

**Flushing Creek CSO Retention Facility**
**Cost = $349 million**

**Potential Area-wide GI Contracts**



# Status of Current Improvement Projects

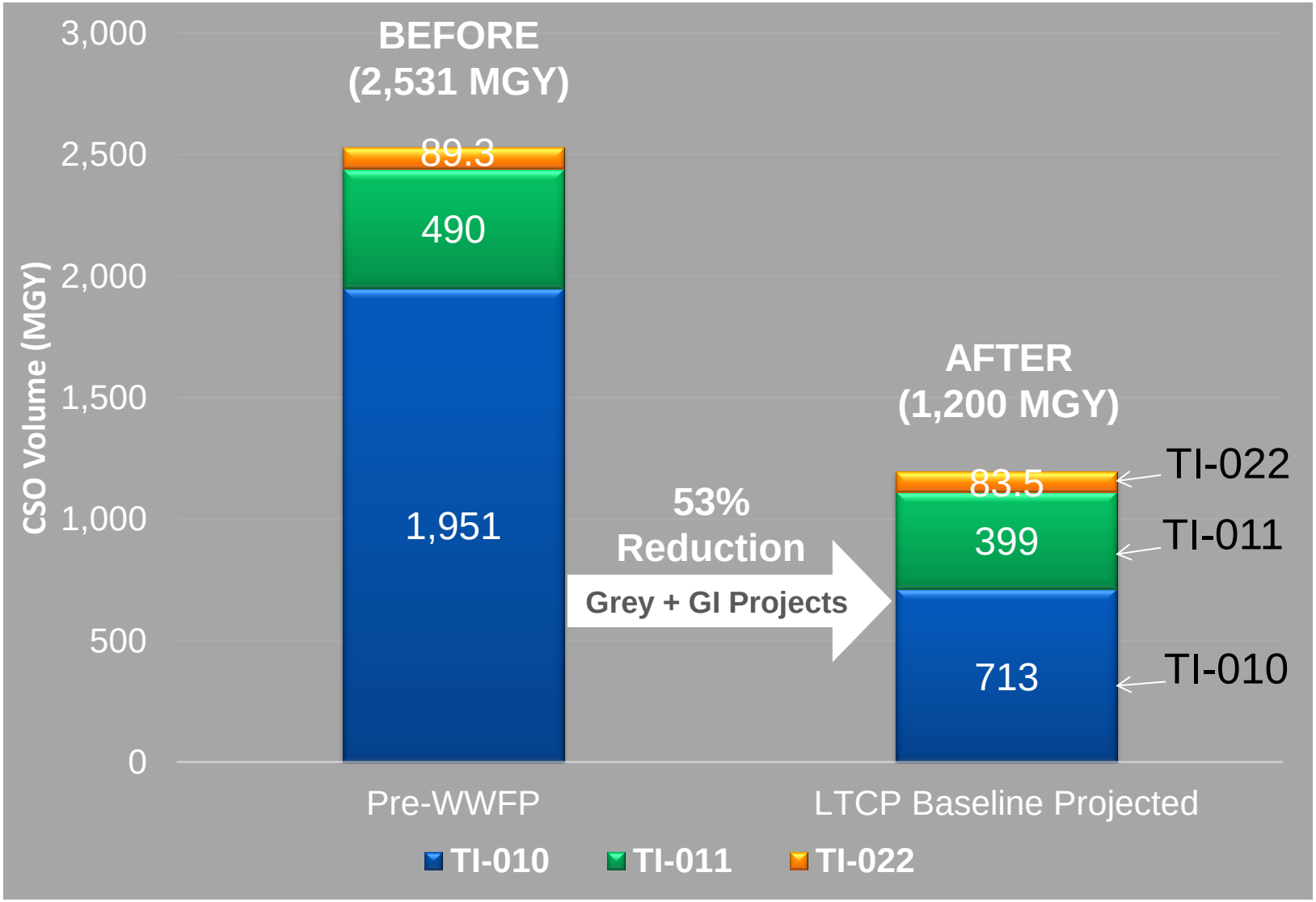
## ➢ Grey Infrastructure Projects

- Flushing Creek CSO Retention Facility – Cost $349 million
  - ✓ Tank operational since May 2007
  - ✓ 43 MG Storage (28 MG tank storage plus 15 MG sewers storage); 40 MGD pump station
- Upgrades to Increase Flow Conveyance to Tallman Island WWTP – Cost $41 million
  - ✓ New Whitestone Interceptor to come online Winter 2014

## ➢ Green Infrastructure Projects

- Area-wide GI Contracts – Cost $3.5 million
  - ✓ TI11 and TI22 with NYC Department of Design and Construction
  - ✓ Design underway
- JHS 185Q, Edward Bleecker Jr. High
  - ✓ Rain garden and synthetic turf field for “Schoolyards to Playgrounds” project with Trust for Public Land/School Construction Authority/Dept. of Education
- Flushing Town Hall
  - ✓ Rain garden and swales with the Department of Cultural Affairs

# Modeling Pre-WWFP & LTCP Baseline*




*LTCP projections using 2008 Typical Rainfall Year, including 8% GI

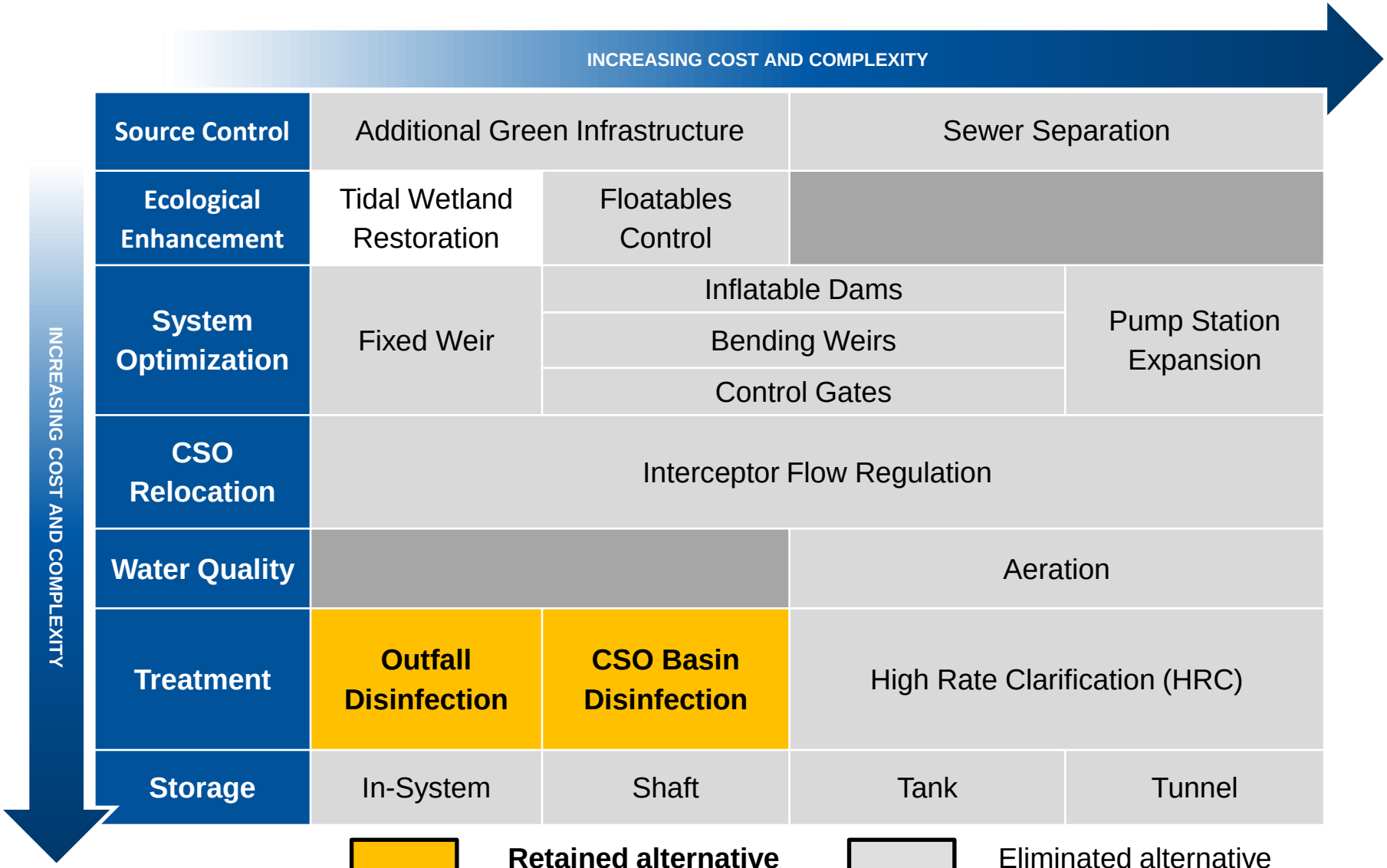
# Overview of LTCP Targets

| Target | Criteria | Dissolved Oxygen (DO) Criteria | Fecal Coliform Criteria | Enterococci Criteria |
|---|---|---|---|---|
| **Existing Water Quality Criteria** | Class I | • ≥ 4.0 mg/L | • Monthly Geometric Mean ≤ 2,000 col/100 ml | • Not Applicable |
| **Potential Future Standard:**<br><br>**Primary Contact** | Class SC with RWQC (EPA Recommended Recreational Water Quality Criteria) | • 4.8 mg/L Average<br>• ≥ 3.0 mg/L | • Monthly Geometric Mean ≤ 200 col/100 ml | • Rolling 30-Day Geometric Mean 30 col/100 ml<br>• STV (90$^{th}$ percentile value) 110 col/100 ml<br>• Recreational Season<br>• Potential 2015 Modification (RWQC) |

# Alternatives Evaluation

Keith Beckmann, P.E.
DEP

# Flushing Creek CSO Mitigation Toolbox




**Note:** A joint Wetlands Restoration & Dredging project with the US Army Corp of Engineers (ACOE) is being coordinated outside of the LTCP framework.

# Reasons Alternatives Eliminated

**Insufficient Opportunity Available**

- Additional GI
- Sewer Separation
- Floatables Control

**Limited Hydraulic Capacity**

- Fixed Weirs

Reliability Concerns

- Inflatable Dams

**Minimal CSO Impact Mitigation**

- Interceptor Flow Regulation
- Aeration

**Effectiveness Comparison**

- Storage Shafts, Tanks, Tunnels

# Option 1 – CSO Basin Disinfection (TI-010)

## Concept:

- Disinfect CSO at Existing Tank's Screens
- Operate in recreational season (May – October)
- Install disinfection equipment at existing chemical storage location
- Treat flows discharged through outfall TI-010

## Benefits:

- 31% bacteria load reduction from baseline
- Maximizes use of existing infrastructure

## Water Quality Implications:

- Reduces bacteria loads from CSOs during recreational season

## Challenges:

- Coordination with on-site Parks Dept. operations
- Operation and maintenance of disinfection facilities
- Potential residual chlorine issues

**Capital and O&M Costs:** $4.7 million

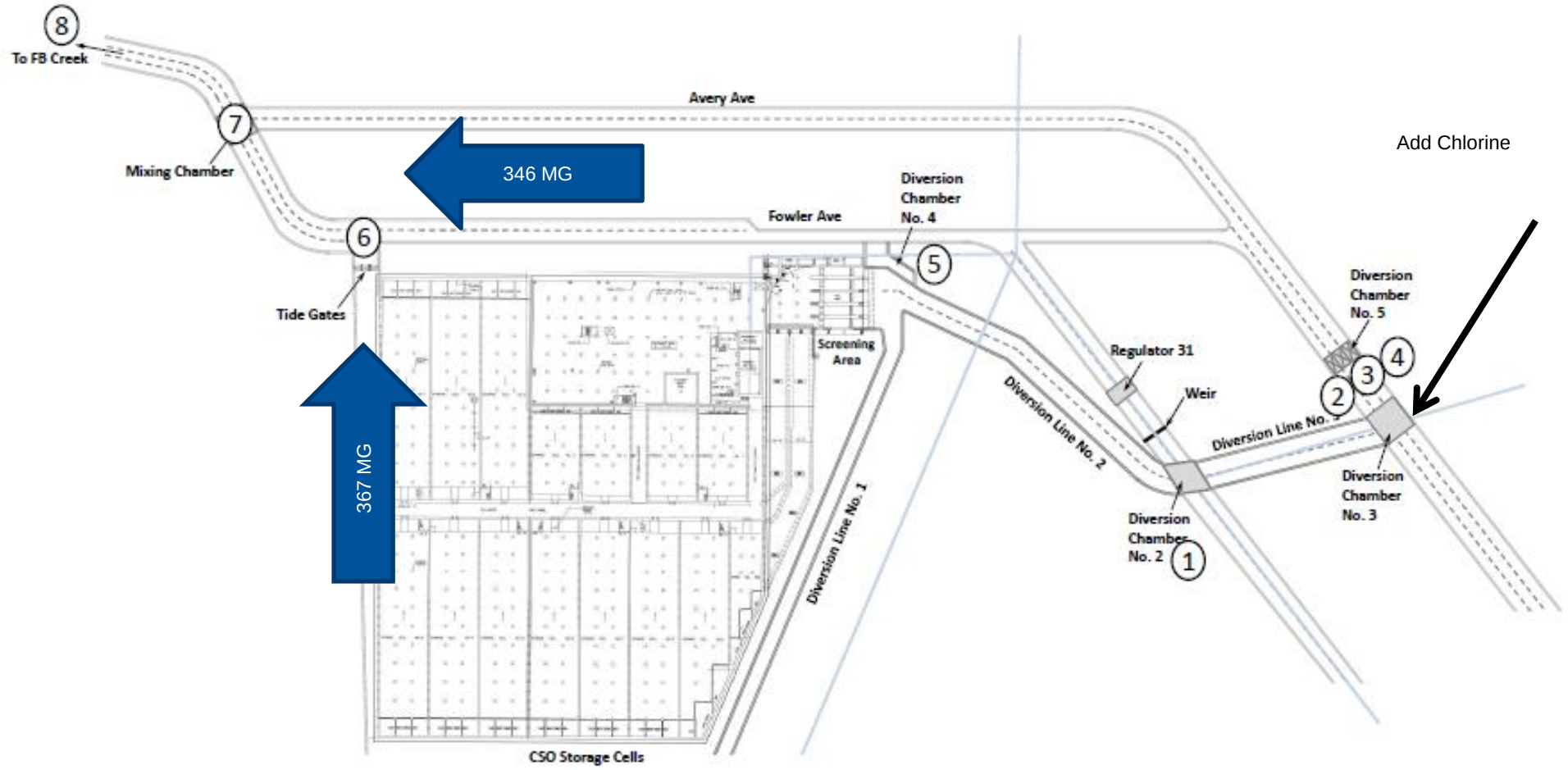
CSO Retention Tank is located underneath soccer Fields 9 & 8

Entrance Gate to the Screening Building

# Option 2 - Outfall Disinfection at Chamber 3 (TI-010)

## Concept

- Move dosing point from screens to upstream of Diversion Chamber 3
- Operate in recreational season (May – October)
- Increases amount of flow disinfected prior to discharge



# Option 2 - Outfall Disinfection at Chamber 3 (TI-010)

## Benefits:

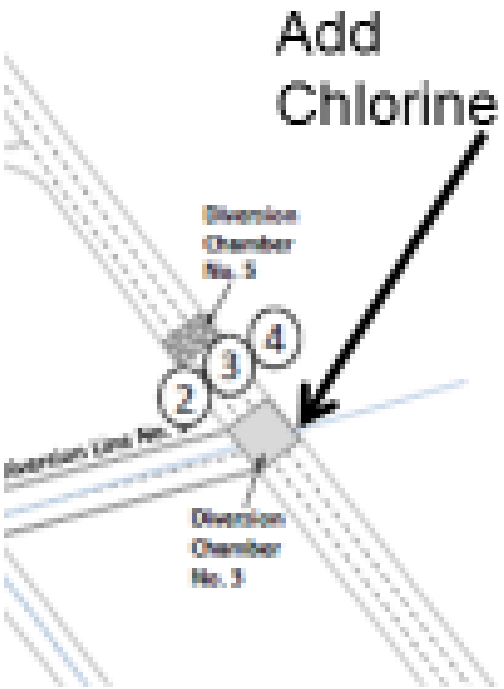
- Tank discharge and bypass flow disinfected
- Approximately 40% Recreational Season Bacteria load reduction in Flushing Creek from baseline
- Disinfection equipment can be installed at existing site

## Challenges:

- Design to achieve desired contact time
- Dosing point construction site across College Point Boulevard
- May require control structure at end of outfall
- Potential residual chlorine issues

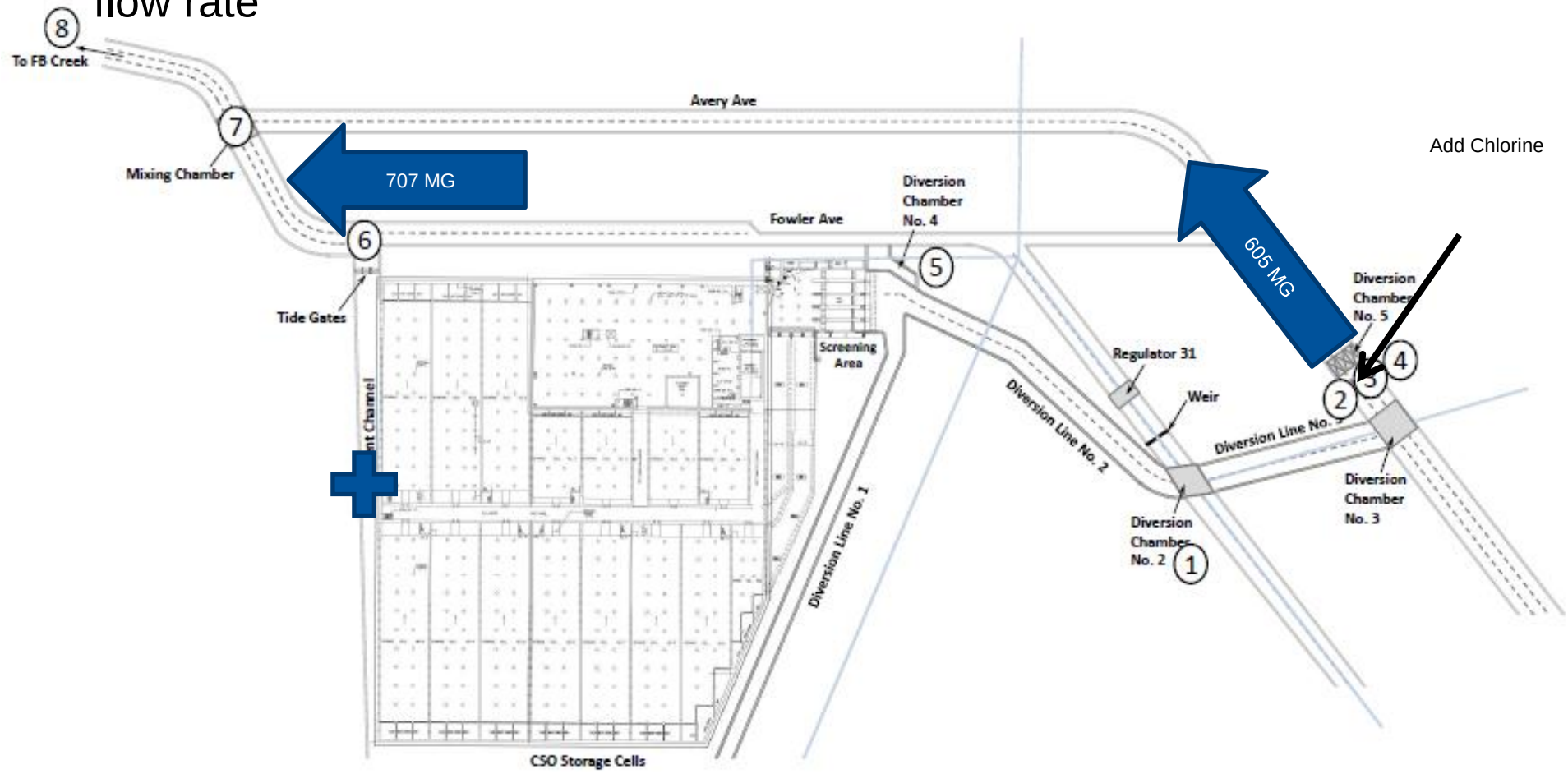
## Capital and O&M Cost:

- $5.8 Million



# Option 3 - Outfall Disinfection at Chamber 5 (TI-010)

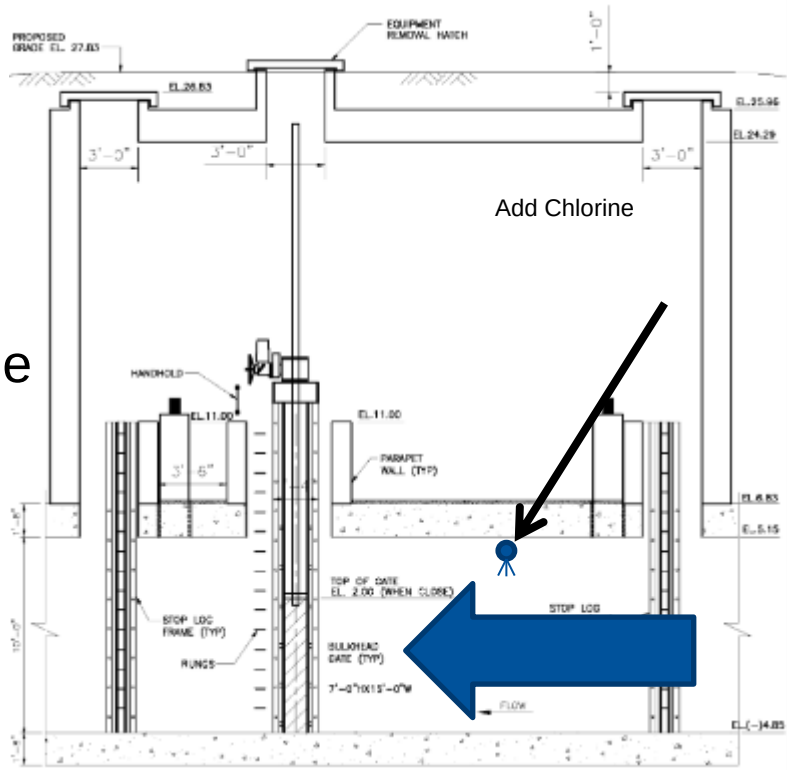
- Move dosing upstream of  Diversion Chamber 5
- Operate tank as offline storage under lower flows by raising the effluent weir slightly
- Disinfect majority of flows that bypass tank up to design flow rate



# Option 3 - Outfall Disinfection at Chamber 5 (TI-010)

**Benefits:**

- Disinfection of tank bypass flows
- 53% Recreational Season bacterial load reduction in Flushing Creek from baseline
- Does not chlorinate pump back volume, reducing chlorine use
- Disinfection Equipment Can Be Installed at Existing Site




**Challenges:**

- Design disinfection system for 15 minutes of contact time
- May require control structure at end of outfall
- Possible floatables & residual chlorine issues

**Capital and O&M Cost (NPV):**

- $6 Million Capital

# Disinfection in TI-011 Outfall

**Concept:**

- CSO disinfection within existing TI-011 outfall
- Operate in recreational season (May – Oct.)
- New disinfection building on existing DEP site

**Benefits:**

- 30% bacteria load reduction from baseline
- Maximizes use of existing infrastructure
- Utilizes gravity, no effluent pumping
- No construction of retention tank

**Water Quality Implications:**

- Reduces bacteria load from CSO during recreational season

**Challenges:**

- Operation and maintenance of disinfection facilities
- Potential residual chlorine issues

**Capital and O&M Cost:** $9.2 million

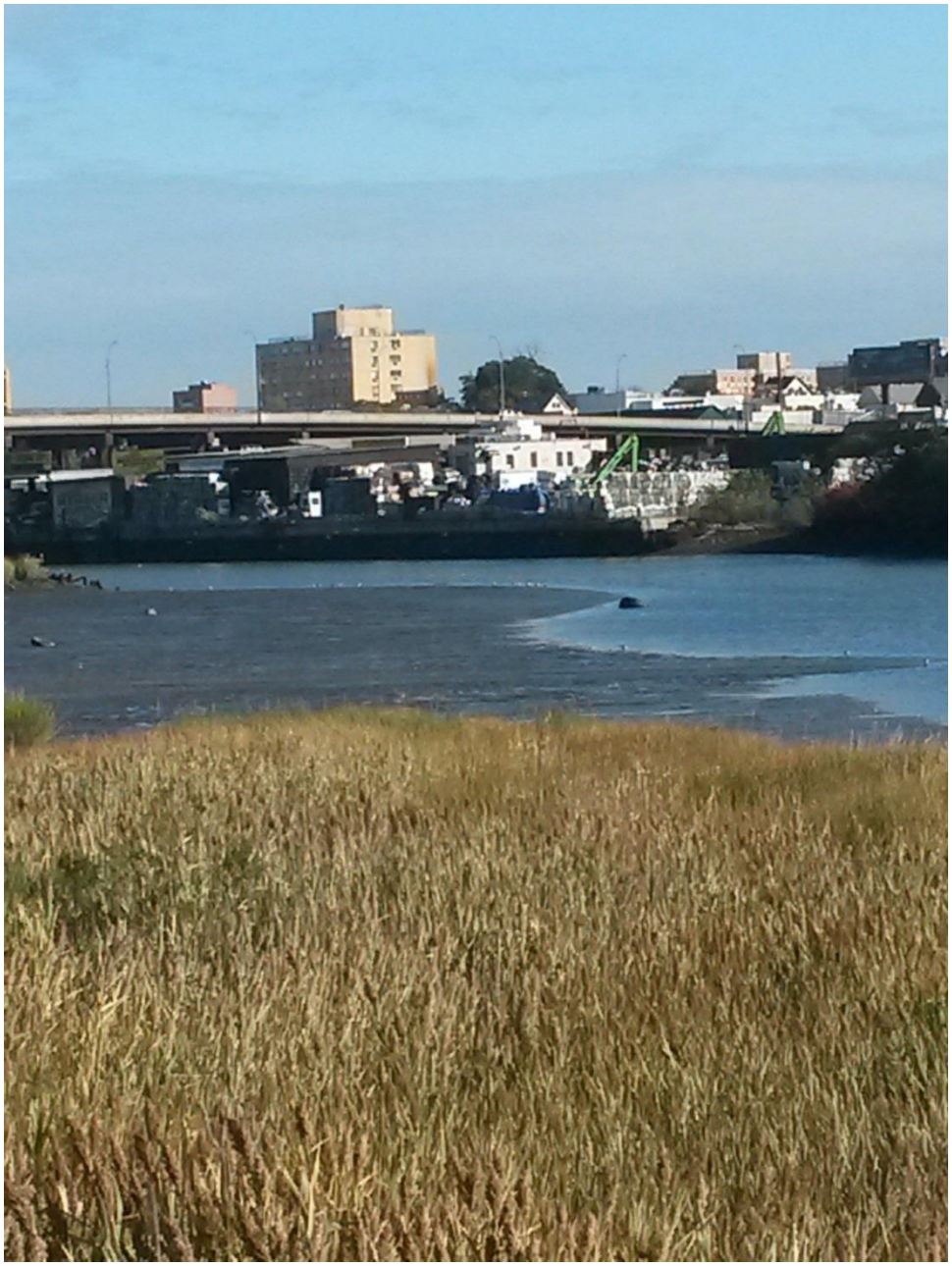
Potential DEP Site for New Chlorination Facility

# Wetland Restoration Opportunities

# Restoration – Benefits and Challenges

- Restore the natural state and functioning of the system to support **biodiversity** and **aesthetic improvements**.
- Expand **habitat** for diverse species (e.g. fish, aquatic insects, other wildlife).
- Enhance **water quality** and increased **dissolved oxygen** levels.
- Restoration activities may range from a **removal of fill** that inhibits natural hydrologic function, to **wetland planting** and upstream **constructed wetland**
- **Access**, **property ownership** issues and establishment of proper **elevation**.
- Projects should conduct **monitoring** of conditions after construction, to evaluate effectiveness. This may take considerable time therefore monitoring efforts should be conducted for **several years** after a project has completed.

# Wetland Restoration



- Protecting and improving water quality
  - Wetlands are part of the solution in keeping with the spirit of the Clean Water Act (CWA)
  - Provide critical functions:
    - Water storage
    - Water filtration
    - Reduction of Biological Oxygen Demand (BOD) for increased Dissolved Oxygen
- Providing habitat
  - Biological productivity
    - Wetlands are one the most biologically productive natural ecosystems known, comparable to tropical rain forests in their productivity species diversity
    - 85% of waterfowl and migratory birds use wetlands
- Aesthetic value
  - Open space
  - Education
  - Research

# Potential Wetland Restoration Opportunities


- Approximately 2 to 4 acres of additional wetland restoration are possible outside of USACE/DEP restoration/dredging coordination effort
- Approximate cost of restoration is $850K per acre

# Other Projects Considered in Addition to LTCP

## Dredging and Environmental Restoration with US Army Corp of Engineers (USACE)

**Concept:**

- DEP is working with USACE on dredging and wetland restoration

**Benefits:**

- May improve waterbody aesthetics

**Water Quality Implications:**

- Reduce odor and aesthetic issues

**Challenges:**

- Not a CSO reduction strategy
- Does not remove bacteria
- Coordination with ACOE
- Permitting

**Capital Cost: $**35 Million

# Shortlisted Alternatives Costs

| LTCP Alternative | Recreational Season Bacteria Reduction | DO Improvement | High Level Cost (Millions) |
|---|---|---|---|
| Option 1 Tank Disinfection | 31% | No | $5 |
| Option 2 Outfall Disinfection at Diversion Chamber 3 | 40% | No | $6 |
| Option 3 Outfall Disinfection at Diversion Chamber 5 | 53% | No | $6 |
| TI-011 Outfall Disinfection | 30% | No | $9 |

| Outside LTCP w/ACOE | Recreational Season Bacteria Reduction | DO Improvement | High Level Cost (Millions) |
|---|---|---|---|
| Wetland Restoration/Dredging | NA | Yes | $35 |

# Flushing Creek Summary of Considerations

- Flushing Creek's water quality is affected by CSOs.
- Both pathogens and dissolved oxygen must be considered.
- CSO reduction alternatives vary in size, effectiveness and cost.
- CSO reduction alternatives may be bundled together for further effectiveness
- Ratepayers may be directly impacted by the cost of planned CSO reduction alternatives.
- Submitted LTCP will propose a preferred alternative.

# Next Steps

Shane Ojar
DEP

# Next Steps

- To have public comments on alternatives incorporated into the LTCP, please send comments by November 17, 2014

- Comments can be submitted to:
  - New York City DEP at: ltcp@dep.nyc.gov

- Flushing Creek LTCP Public Meeting #3
  - Objective & Topics: Present and review proposed Draft LTCP

# Additional Information & Resources

- Visit the informational tables tonight for handouts and poster boards with detailed information

- Go to www.nyc.gov/dep/ltcp to access:
  - LTCP Public Participation Plan
  - Presentation, handouts and poster boards from this meeting
  - Links to Waterbody/Watershed Facility Plans
  - CSO Order including LTCP Goal Statement
  - NYC's Green Infrastructure Plan
  - Green Infrastructure Pilots 2011 and 2012 Monitoring Results
  - Real-time waterbody advisories
  - Upcoming meeting announcements
  - Other LTCP updates

# Discussion and Q&A Session