<table>
<thead>
<tr>
<th></th>
<th>Topic</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Welcome &amp; Introductions</td>
<td>Mikelle Adgate</td>
</tr>
<tr>
<td>2</td>
<td>Waterbody &amp; Watershed Characteristics and Water Quality Sampling</td>
<td>Keith Mahoney</td>
</tr>
<tr>
<td>3</td>
<td>Water Quality Improvement Projects</td>
<td>Keith Mahoney</td>
</tr>
<tr>
<td></td>
<td>• Grey Infrastructure</td>
<td>Pinar Balci</td>
</tr>
<tr>
<td></td>
<td>• Green Infrastructure</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>LTCP Modeling &amp; Alternative Development Process</td>
<td>Keith Mahoney</td>
</tr>
<tr>
<td>5</td>
<td>Next Steps</td>
<td>Mikelle Adgate</td>
</tr>
<tr>
<td>6</td>
<td>Discussion and Q&amp;A Session</td>
<td>All</td>
</tr>
</tbody>
</table>
Welcome & Introductions

Mikelle Adgate
Director of Stormwater Outreach
DEP
Green shading represents shoreline of Jamaica Bay in late 1800’s – system has since been drastically altered.

Urban development throughout the decades has led to a highly impervious watershed in Jamaica Bay. Approximately 1,200-acres remain of the original 16,000-acres of tidal wetland.
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 treatment plants.

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).
How does rainfall affect CSOs?

- Rainfall characteristics that trigger a CSO event at Jamaica Bay and Tributaries:
  - 0.5 to 1-inch of constant rainfall over a period of 2 to 10 hours

- Not every rainfall causes a CSO event:
  - Of the average 100 rainfall events per year about 40% may trigger a CSO at Jamaica Bay and Tributaries

Photo Credit: Baptisete Pons
https://www.flickr.com/photos/bpt/2882285636/
<table>
<thead>
<tr>
<th><strong>Long Term Control Plan (LTCP)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>identifies appropriate CSO controls to achieve applicable water quality standards</td>
</tr>
<tr>
<td>consistent with the Federal CSO Policy and Clean Water Act</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>CSO Consent Order</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>an agreement between NYC and DEC that settles past legal disputes without prolonged litigation</td>
</tr>
<tr>
<td>DEC requires DEP to develop LTCPs and mitigate CSOs</td>
</tr>
</tbody>
</table>
LTCP Process and Public Involvement

- Existing Information Review
- Data Collection & Analysis
- Modeling
- Alternatives Development & Evaluation
- LTCP
- DEC Review

- Kickoff Meeting TODAY
- Alternatives Meeting TBD
- Final Plan Review Meeting TBD

ONGOING PUBLIC/STAKEHOLDER INPUT

LTCP Due
6/30/17
Questions?
Waterbody & Watershed Characteristics and Water Quality Sampling

Keith Mahoney, P.E.
Director
DEP
Jamaica Bay Drainage Area

- **6 Urban CSO Tributaries**
  - Paerdegat Basin
  - Fresh Creek
  - Hendrix Creek
  - Spring Creek
  - Bergen Basin
  - Thurston Basin

- **Sewer System**
  - 20 CSO Outfalls (▲)
  - 149 MS4 Outfalls (○)

- **4 Wastewater Treatment Plants (●)**
  - Jamaica, 26th Ward, Rockaway, Coney Island

- **2 CSO Facilities (●)**
  - Spring Creek, Paerdegat

- **Significant stormwater discharge in area**

<table>
<thead>
<tr>
<th>Drainage Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Acres</td>
</tr>
<tr>
<td>Served by Combined Sewers</td>
</tr>
</tbody>
</table>
**CLASS SB**

**Bathing**

The best usages of Class SB waters are **primary and secondary contact** recreation and fishing. These waters shall be suitable for fish, shellfish, and wildlife propagation and survival.

**CLASS I**

**Boating/Fishing**

The best usages of Class I waters are **secondary contact** recreation and fishing. These waters shall be suitable for fish, shellfish, and wildlife propagation and survival.

<table>
<thead>
<tr>
<th>Waterbody</th>
<th>Class</th>
<th>Dissolved Oxygen (mg/L)</th>
<th>Fecal Coliform* (col/100 mL)</th>
<th>Total Coliform* (col/100 mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jamaica Bay</td>
<td>SB</td>
<td>≥ 4.8 (daily average)</td>
<td>Monthly Geometric Mean ≤ 200</td>
<td>Monthly Median ≤ 2,400</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥ 3.0 (acute, never less than)</td>
<td></td>
<td>and 80% ≤ 5,000</td>
</tr>
<tr>
<td>Tributaries</td>
<td>I</td>
<td>≥ 4.0 (acute, never less than)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: Based on new rulemaking promulgated by DEC on November 14th, 2015. EPA has also recommended future RWQC for enterococcus of 30 day rolling GM ≤ 30 col/100 mL.
## Sampling & Monitoring Programs

### Receiving Water Sampling

<table>
<thead>
<tr>
<th>Program</th>
<th>Sampling Period</th>
<th>Sampling Frequency</th>
<th>Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTCP</td>
<td>10/1/2015 – 11/22/2015</td>
<td>Two 4-day events</td>
<td>Fecal, Entero, *YSI</td>
</tr>
<tr>
<td>SM</td>
<td>1/1/2015 – 3/30/2016</td>
<td>Quarterly</td>
<td>Fecal</td>
</tr>
</tbody>
</table>

*YSI Parameters include: Dissolved Oxygen, Temperature, Conductivity, and Salinity.

### CSO Sampling
- 8/1/2015 – 12/31/2015
- 6 CSO locations
- 9 wet weather events
- Fecal, Entero, YSI

### Flow Monitoring
- 9/1/2015 – 12/31/2015
- 5 locations
- Continuously monitored
- Depth & Velocity measurements
Landside Flow Monitoring Locations
1. Northern Shore:
   - 7 locations
   - 6 HSM, 1 SM

2. Inner Bay:
   - 5 locations
   - 4 HSM, 1 SM

3. Rockaway Shore:
   - 9 locations
   - 3 HSM, 6 SM
Tributary Sampling Locations

**Paerdegat:**
- 4 locations
- 3 HSM, 1 SM

**Hendrix:**
- 3 locations
- 2 HSM, 1 SM

**Spring:**
- 3 locations
- 3 HSM

**Thurston:**
- 5 locations
- 1 SM
- 4 LTCP

**Bergen:**
- 8 locations
- 3 HSM, 1 SM
- 4 LTCP

**Fresh:**
- 8 locations
- 3 HSM, 1 SM
- 4 LTCP
Fecal Coliform – Sampling Results – Dry Weather

Sampling Period
1/1/15 – 3/30/16

Geometric Mean
Fecal Coliform – Sampling Results – Wet Weather

Sampling Period: 1/1/15 – 3/30/16

Scale (col/100 mL) Geometric Mean:
- 0-200
- 201-500
- 501-1,000
- >1,000

Locations:
- Bergen Basin
- Fresh Creek
- Hendrix Creek
- Paerdegat Basin
- Thurston Basin
- Spring Creek
- Jamaica Bay

Environmental Protection

NYC
Entero – Sampling Results – Dry Weather

Sampling Period
1/1/15 – 3/30/16
DO – Sampling Results – Dry Weather

Sampling Period
1/1/15 – 3/30/16

Scale (% Attainment for Average DO: Class I ≥ 4 mg/L and Class SB ≥ 3 mg/L)

95-100 | 81-94 | 71-80 | 51-70 | 0-50
### Indication of Water Quality Sampling Results

<table>
<thead>
<tr>
<th>Good WQS Compliance</th>
<th>Potential WQS Compliance Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jamaica Bay</td>
<td>Bergen Basin</td>
</tr>
<tr>
<td>Paerdegat Basin</td>
<td>Thurston Basin</td>
</tr>
<tr>
<td>Spring Creek</td>
<td>Fresh Creek</td>
</tr>
<tr>
<td></td>
<td>Hendrix Creek</td>
</tr>
</tbody>
</table>

Additional Water Quality Improvement will be evaluated for Bergen Basin, Thurston Basin, Fresh Creek, and Hendrix Creek.
Water Quality Improvement Projects
Grey and Green Infrastructure

Keith Mahoney, P.E.
Director
DEP

Pinar Balci
Assistant Commissioner
DEP
Water Quality Programs & Studies in Jamaica Bay

- **Nitrogen Reduction Upgrades at 4 Treatment Plants**
  - Jamaica and 26th Ward Treatment Plants are currently operating in Step Feed BNR mode
  - Coney Island and Rockaway Treatment Plants are planned to be upgraded to Step Feed BNR in near future

- **Watershed Restoration Pilot Studies**
  - Bivalve & Eelgrass Restoration, Algae and Sea Lettuce Harvesting, Salt Marshes and Beach Habitats, and Marsh Island Wave Attenuator Study

- **3 Year Nitrogen Post-Construction Water Quality and Ecological Study**

- **Marshland Restoration Projects**

- **Army Corp of Engineers Resiliency Planning**

- **Jamaica Bay Science & Resiliency Institute**
## Combined Sewer Overflow Mitigation Projects

<table>
<thead>
<tr>
<th>Recommended Project</th>
<th>Net Present Worth ($ Millions, 2011)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paerdegat Basin CSO Facility (50 MG Storage)</td>
<td>$397</td>
<td>Complete</td>
</tr>
<tr>
<td>Automation of Regulator JA-2</td>
<td>$2.3</td>
<td>Complete</td>
</tr>
<tr>
<td>Upgrade the Spring Creek AWWTP</td>
<td>$87</td>
<td>Complete</td>
</tr>
<tr>
<td>Sewer Cleaning in the 26(^{th}) Ward WWTP Drainage Area</td>
<td>$4</td>
<td>Complete</td>
</tr>
<tr>
<td>Hendrix Creek Dredging</td>
<td>$13</td>
<td>Complete</td>
</tr>
<tr>
<td>Regulator Improvements at J3, J6 and J14</td>
<td>$7</td>
<td>Complete</td>
</tr>
<tr>
<td>New 48” Parallel Sewer Jamaica WWTP</td>
<td>$20</td>
<td>In Construction thru 2016</td>
</tr>
<tr>
<td>26(^{th}) Ward WWTP Wet Weather Stabilization</td>
<td>$128</td>
<td>In Construction thru 2020</td>
</tr>
<tr>
<td>26(^{th}) Ward High Level Sewer Separation</td>
<td>$164</td>
<td>Ongoing thru 2022</td>
</tr>
</tbody>
</table>

**Total = $822 M**
Spring Creek Auxiliary WWTP

- Constructed early 1970s
- Upgraded in 2007 ($87 M)
- CSO Storage Capacity: 19 MG
- Drainage Area: 3,256 Acres
- Connected to 26th Ward WWTP

**Disinfection Pilot Study**
- Aug 2016 to Jan 2018
- Assess feasibility of disinfecting CSOs and impact on chlorine byproducts
Paerdegat Basin CSO Facility

- In-Service since 2011
- Construction Cost = $397 Million
- CSO Storage Capacity: 50 MG
- CSO retained in underground tanks until weather subsides then pumped to Coney Island WWTP
- Significantly improved water quality in Paerdegat Basin
Floatables Control

- Floatable Controls currently implemented at:
  - Bergen Basin
  - Thurston Basin
  - Hendrix Creek
Green Infrastructure (GI) collects stormwater runoff from impervious surfaces, such as streets and roofs, reducing flow to sewers.

$1.5 \text{ billion}$ committed for GI Citywide to manage 1” of stormwater runoff from 10% of impervious combined sewer areas by 2030.

DEP will meet this goal through:
- Area-Wide Contracts
- Public Property Retrofits
- Grant Program for Private Property Owners
- Stringent Detention Rule for New Development
By the end of 2017 green infrastructure will manage approx. 340 acres of impervious area in the Jamaica Bay watershed.

26W-003
- 884 Assets Constructed
- ~200 Assets in Design

26W-004
- Planning/Design

26W-005
- Planning/Design
- 14 Assets Constructed

JAM-003
- Planning/Design

JAM-006
- Planning/Design
Public Property Retrofits in Jamaica Bay

<table>
<thead>
<tr>
<th>Status</th>
<th>Parks and Recreation</th>
<th>Department of Education</th>
<th>NYC Housing Authority</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential</td>
<td>8</td>
<td>15</td>
<td>15</td>
<td>38</td>
</tr>
<tr>
<td>Preliminary</td>
<td>11</td>
<td>7</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>Contract Plans</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Constructed</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>22</strong></td>
<td><strong>24</strong></td>
<td><strong>18</strong></td>
<td><strong>64</strong></td>
</tr>
</tbody>
</table>
- **Green Infrastructure Grant Program:**
  DEP provides funding for the design and construction costs of green infrastructure on private property in combined sewer areas of the City.

- **Green Roof Tax Abatement:**
  The City provides a one-year property tax abatement for private properties that install green roofs. The abatement value is $5.23 per square foot (up to the lesser of $200,000 or the building’s tax liability) and is available through March 15, 2018.

- **New Private Incentive Program:**
  DEP is currently developing a new private property green infrastructure retrofit initiative to augment its current efforts on stormwater management on private property. There will be an RFI released on 9/19 in which the Agency is seeking ideas on innovative program management structures for this new initiative.

- **2012 Stormwater Rule:**
  In 2012, DEP amended the allowable flow rate of stormwater to the City’s combined sewer system for new and existing development. Site Connection Proposals may include green infrastructure technologies to meet the new allowable rate.
Questions?
LTCP Modeling and Alternatives Development Process

Keith Mahoney, P.E.
Director
DEP
Model Inputs and Assumptions

- **Landside Model** calibrated based on flow monitoring data, gauge adjusted radar rainfall data, and satellite flyover impervious data

- **Water Quality Model** calibrated with Harbor Survey and LTCP sampling data

- Calibrated modeling inputs and assumptions include:
  - Committed CSO and BNR projects
  - 2040 sanitary flows and loads
  - JFK 2008 “Typical Year Rainfall” for Alternative Analysis
  - JFK 10-yr data (2001 to 2011) for baseline and selected alternatives

---

**LTCP Typical Year Rainfall**
(JFK 2008 – 46.3 inches)

**Standard for WWFP**
(JFK 1988 – 40.7 inches)
CSO Control Evaluation Process

1. Bacteria Source Component Analysis
   - CSO, stormwater and direct drainage

2. Gap Analysis for Water Quality Standard (WQS) Attainment
   - Calculate bacteria and dissolved oxygen for:
     - Baseline Conditions
     - 100% CSO Control Conditions

3. Assess Levels of CSO Control Necessary to Achieve WQS

4. Identify Technologies to Cost-Effectively Achieve the Required Level of CSO Control

Increasing CSO Reduction Potential

Sample Technologies:
- Storage
- Treatment
- System Optimization
- Source Control
<table>
<thead>
<tr>
<th>Source Control</th>
<th>Additional Green Infrastructure</th>
<th>High Level Sewer Separation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System Optimization</strong></td>
<td>Fixed Weir</td>
<td>Bending Weirs / Control Gates</td>
</tr>
<tr>
<td><strong>CSO Relocation</strong></td>
<td>Segregate CSO and Storm Outfalls</td>
<td>Flow Tipping to Other Watersheds</td>
</tr>
<tr>
<td><strong>Water Quality / Ecological Enhancement</strong></td>
<td>Floatables Control</td>
<td>Environmental Dredging</td>
</tr>
<tr>
<td><strong>Treatment</strong></td>
<td>Outfall Disinfection</td>
<td>Retention Treatment Basin (RTB)</td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td>In-System</td>
<td>Shaft</td>
</tr>
</tbody>
</table>

- Completed or underway per Waterbody / Watershed Facility Plan (WWFP)
Questions?
Next Steps

Mikelle Adgate
Director of Stormwater Outreach
DEP
Next Steps

- Jamaica Bay LTCP Public Meeting #2, Spring 2017
  - LTCP Submittal to NYSDEC in June 2017

- Public Comments will be accepted through Oct. 31st, 2016
  - There will be subsequent comment periods following the alternative and final plan review meetings.

- Comments can be submitted to:
  - New York City DEP at: ltcp@dep.nyc.gov
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
- NYC Waterbody Advisory Program
- Upcoming meeting announcements
- Other LTCP updates