Combined Sewer Overflow
Long Term Control Plans

Citywide Public Meeting
La Guardia Community College
January 12, 2016
<table>
<thead>
<tr>
<th>Topic</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 New York City Wastewater Infrastructure</td>
<td>Emily Lloyd</td>
</tr>
<tr>
<td>2 Long Term Control Plan (LTCP)</td>
<td>Jim Mueller</td>
</tr>
<tr>
<td>3 LTCP Submittal Status</td>
<td>Jim Mueller</td>
</tr>
<tr>
<td>4 Green Infrastructure Status Update</td>
<td>Angela Licata</td>
</tr>
<tr>
<td>5 Breakout Sessions &amp; Summary</td>
<td></td>
</tr>
<tr>
<td>• Affordability</td>
<td>All</td>
</tr>
<tr>
<td>• Water Quality, Uses, Classification</td>
<td></td>
</tr>
<tr>
<td>• CSO Control</td>
<td></td>
</tr>
<tr>
<td>• Green Infrastructure</td>
<td></td>
</tr>
<tr>
<td>6 Ongoing LTCP Public Participation Program</td>
<td>All</td>
</tr>
<tr>
<td>7 Next Steps</td>
<td>All</td>
</tr>
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</table>
New York City
Wastewater Infrastructure

Emily Lloyd
Commissioner
DEP
NYC’s sewer system is approximately 60% combined, which means it is used to convey both sanitary and storm flows.

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).

65% to 90% of combined sanitary & storm flow is captured at treatment plants.
Major Historical Timeline for Wastewater Infrastructure

- **1967**: Newtown Creek WWTP Commissioned
- **1972**: Spring Creek CSO Facility Commissioned

**Clean Water Act 1972**

**CSO Consent Order 1992**

**CSO Consent Order 2005**

**Modified CSO Consent Order 2012**

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**$40 Billion**

OMB Records & 10-yr Capital Plan

**1973 – 2011**: Upgraded 12 WWTPs to **Secondary Treatment** and built 2 new Wastewater Treatment Plants

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**$1.1 Billion**

OMB Records & 10-yr Capital Plan

**1999 – 2020**: Upgrade **Biological Nitrogen Removal** at 70% of WWTPs

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**$4.2 Billion**

OMB Records & 10-yr Capital Plan

Grey (1995 – 2022, $2.7 B)
Green (2012 – 2030, $1.5 B)

1995 – 2030: Construct **Grey / Green Infrastructure** to Mitigate CSOs

OMB = Office of Management and Budget
Note: Dashed lines reflect estimated future cost and CSO volume reduction associated with implementation of the Long Term Control Plans, which are currently under development. Future CSO control will be a combination of storage and disinfection projects, with the exact volume to be developed during the LTCP process.

2) 2030 LTCP Baseline Scenario for Grey & Green Infrastructure Estimate
Fecal Bacteria (Summer Geometric Means)

1985

2014

Fecal Coliform Bacteria:  
- < 100 cfu/100 mL
- 100 – 200
- 201 – 2,000
- >2,000

Data from Harbor Survey Program.
Dissolved Oxygen (Summer Average for Bottom Waters)

1985

2014

Dissolved Oxygen:  
- ≥ 5 mg/L
- 4.0 – 4.9
- 3.0 – 3.9
- < 3.0

Data from Harbor Survey Program
Capital Expenditures

$ in Billions

Fiscal Year


$0.97 $1.17 $1.63 $1.68 $1.80 $1.95 $2.31 $2.70 $2.63 $2.82 $2.41 $1.84 $1.58 $1.37 $1.56 $1.54 $1.63 $1.65 $1.79

3.0% 6.5% 5.5% 5.5% 3.0% 9.4% 11.5% 14.5% 12.9% 12.9% 7.5% 7.0% 6.6% 3.35% 2.97% 2.6% 2.6% 2.7% 2.7%

0% 2% 4% 6% 8% 10% 12% 14% 16%

Capital Expenditures
Water & Sewer Rate Increase
NYC Income Levels and Poverty Rates

<table>
<thead>
<tr>
<th>地理分布</th>
<th>中位家庭收入（MHI）</th>
<th>低于联邦贫困线的居民比例</th>
</tr>
</thead>
<tbody>
<tr>
<td>全美</td>
<td>$53,675</td>
<td>15.5%</td>
</tr>
<tr>
<td>NYC</td>
<td>$52,996</td>
<td>20.9%</td>
</tr>
<tr>
<td>布朗克斯</td>
<td>$33,712</td>
<td>31.6%</td>
</tr>
<tr>
<td>布鲁克林</td>
<td>$47,966</td>
<td>23.4%</td>
</tr>
<tr>
<td>曼哈顿</td>
<td>$76,089</td>
<td>17.6%</td>
</tr>
<tr>
<td>皇后区</td>
<td>$57,241</td>
<td>15.2%</td>
</tr>
<tr>
<td>史坦顿岛</td>
<td>$71,121</td>
<td>14.5%</td>
</tr>
</tbody>
</table>

源：美国人口调查局2014年ACS 1年估计。

- 纽约市的中位家庭收入与全国平均水平相当，但生活成本和住房负担对纽约市居民来说通常要高得多。
- 约21%的纽约市人口（>1.7百万）生活在联邦贫困线以下。
- 约19%的老年人口生活在贫困中。

- 约19%的老年人口生活在贫困中。
DEP has partnered with the Human Resources Administration and the Department of Finance to provide assistance to low income, senior, and disabled households that either participate in the federal Home Energy Assistance Program or receive tax exemptions because of their income or status.

In January 2016, approx. 52,000 homeowners received a credit of $115.89.
## Avg. Wastewater Bill Compared to HH Income

<table>
<thead>
<tr>
<th>Year</th>
<th>Average Wastewater Bill/MHI</th>
<th>% of Household (HH) estimated to be paying more than 2% of HH income on Wastewater Services*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>1%</td>
<td>27%</td>
</tr>
<tr>
<td>2025</td>
<td>1.5%</td>
<td>40%</td>
</tr>
</tbody>
</table>

Questions?
Long Term Control Plan

Jim Mueller, P.E.
Assistant Commissioner
DEP
Long Term Control Plan (LTCP)
identifies and selects appropriate CSO controls to achieve applicable DEC 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
Typical timeline for this process ranges from 12 to 24 months, depending on the water quality and complexity of the waterbody/watershed.
How does rainfall affect CSOs?

Throughout the City, rainfall characteristics that may trigger a CSO event vary by drainage area due to different physical characteristics such as:

- Acreage
- Impervious Areas
- Dry Weather Flow
- Design Capacity of Regulators and Interceptors
- Treatment Plant Capacity
- Tides

Photo Credit: Baptisete Pons
https://www.flickr.com/photos/bpt/2882285636/
Evaluated a comprehensive range of rainfall data:

- **Historical data range:** 42 years from 1969 to 2010
- Only four representative rainfall gauges with *continuous data* within this time frame: Central Park, LGA, JFK, and EWR
- Selected **2008 JFK rainfall** as the most representative of average annual rainfall across all four gauges over the 42-year period
Model Calibration & Updates

- Receiving Water Quality Model calibrated with Harbor Survey and LTCP sampling data
- Landside InfoWorks Model calibrated with LTCP flow and sampling data
- Future wastewater flows based on **2040 population** projections
- Recalibrated 2012 InfoWorks based on **revised impervious areas**
- Screening of alternatives 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**

![Bar chart showing annual rainfall from 1969 to 2014 with 5-year moving average. The chart highlights the LTCP Typical Year Rainfall (JFK 2008 – 46.3 inches) and the Standard for WWFP (JFK 1988 – 40.6 inches).]
1. Bacteria Source Component Analysis
   - CSO, stormwater and direct drainage

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

3. Matching CSO Scenarios to CSO Engineering Control Alternatives

   - 100% Storage
   - 75% Treatment
   - 50% System Optimization
   - 25% Source Control
## CSO Mitigation Toolbox

### INCREASING COMPLEXITY

<table>
<thead>
<tr>
<th>Source Control</th>
<th>Additional Green Infrastructure</th>
<th>High Level Sewer Separation (HLSS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Optimization</td>
<td>Fixed Weir</td>
<td>Parallel Interceptor / Sewer</td>
</tr>
<tr>
<td>CSO Relocation</td>
<td>Gravity Flow Tipping to Other Watersheds</td>
<td>Pumping Station Modification</td>
</tr>
<tr>
<td>Water Quality / Ecological Enhancement</td>
<td>Floatables Control</td>
<td>Dredging</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Treatment Satellite:</th>
<th>Outfall Disinfection</th>
<th>Retention Treatment Basin (RTB)</th>
<th>High Rate Clarification (HRC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centralized:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage</td>
<td>In-System</td>
<td>Shaft</td>
<td>Tank</td>
</tr>
</tbody>
</table>
Questions?
LTCP Submittal Status

Jim Mueller, P.E.
Assistant Commissioner
DEP
Recommended Plan: Disinfect at the Existing 5 MG CSO Retention Facility during Recreational Season (May 1st – Oct 31st) and Initiate a post-construction compliance monitoring program

- **Primary Contact Compliance**
  - Annual = 90%  
  - Seasonal = 98%  
  (Fecal Monthly GM ≤ 200 #/100 mL)

- **Benefits:**
  - Reduce bacteria load to creek
  - Avoid structural modifications to existing tank

- **Challenges:**
  - Control of residual chlorine

- **Total Capital Cost / Annual O&M:**
  - $7.6 Million / $250,000

**Submitted to DEC June 2014**
Submitted to DEC September 2014

Recommended Plan:
- Divert flow to Outfall HP-024 Extension,
- Provide Floatables Control,
- Disinfect 50 MGD in Recreational Season*
- Initiate a post-construction compliance monitoring program

Primary Contact Compliance
- Annual = 84% (Fecal Monthly)
- Seasonal = 95% (GM ≤ 200 #/100 mL)

Benefits:
- Reduces bacteria load to river from seasonal disinfection
- Provides floatables control
- Avoid construction of costly retention tank

Challenges:
- Solids deposition in outfall
- Permitting of new outfall

Est. Construction Cost / Annual O&M:
$90 Million / $1.25 Million

*Recreational Season is from May 1st through October 31st
**Flushing Creek LTCP**

- **Submitted to DEC December 2014**

**Recommended Plan:**
Recreational Season Disinfection (May 1st – Oct. 31st)
- Outfall TI-010 – Disinfect at Influent Screens and DC5*
- Outfall TI-011 – Disinfect at Regulator 9*

Initiate post-construction compliance monitoring

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Outfall TI-010</th>
<th>Outfall TI-011</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Provides disinfection of tank bypass flows</td>
<td>• Provides disinfection of CSO discharge</td>
</tr>
<tr>
<td></td>
<td>• Disinfection equipment can be installed at existing site</td>
<td>• Maximizes use of existing infrastructure</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Outfall TI-010</th>
<th>Outfall TI-011</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Potential residual chlorine issues</td>
<td>• Potential residual chlorine issues</td>
</tr>
</tbody>
</table>

| Construction                                 | $2 Million                                          | $5 Million                                          |
| O&M Cost                                     | $350,000 per Year                                  | $300,000 per Year                                  |

**Primary Contact Compliance**
- Annual = 67%  
- Seasonal = 78%  
  (Fecal Monthly GM ≤ 200 #/100 mL)

*Note:* Provisions for floatables control to be evaluated and included in the design for both TI-010 and TI-011.
Westchester Creek LTCP

- Submitted to DEC June 2014

Recommended Plan:
Continue to Implement the WWFP Recommendations

- **Primary Contact Compliance**
  - Annual = 93%
  - Seasonal = 95%
  (Fecal Monthly GM ≤ 200#/100 mL)

- Initiate a post-construction compliance monitoring program

- **Weir Modifications to Regulators CSO-29A and CSO-29**
  (Directs more flow to WWTP)
  **Cost = $15 Million**

- **Parallel Relief Sewer to Divert CSO Away from Pugsley Creek**
  **Cost = $66 Million**

- **Floatables Control at HP-011**
  (Incorporated under Bronx River LTCP)
  **Cost = $9 Million**
Submitted to DEC June 2015

Recommended Plan
Hydraulic Relief (HP-007 & HP-009)
Floatables Control (HP-011) and
Initiate post-construction compliance monitoring

Primary Contact Compliance
- Annual = 83% (Fecal Monthly GM ≤ 200 #/100 mL)
- Seasonal = 87%

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Outfall HP-007</th>
<th>Outfall HP-009</th>
<th>Outfall HP-011</th>
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</thead>
<tbody>
<tr>
<td>Benefits</td>
<td>• CSO volume reduction</td>
<td>• CSO volume reduction</td>
<td>• CSO volume reduction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Provides floatables control</td>
</tr>
</tbody>
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<th>Challenges</th>
<th>Outfall HP-007</th>
<th>Outfall HP-009</th>
<th>Outfall HP-011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Challenges</td>
<td>• Need to maintain hydraulic neutrality</td>
<td>• Proximity to parkland/shoreline</td>
<td>• Need to maintain hydraulic neutrality</td>
</tr>
</tbody>
</table>

Construction          $111 Million
O&M Cost              $53,000 per Year
Gowanus Canal LTCP

Submitted to DEC June 2015

Primary Contact Compliance
- Annual = 98%  (Fecal Monthly GM ≤ 200 #/100 mL)
- Seasonal = 100%

Current Status:

Flushing Tunnel Activation and Gowanus Pump Station Upgrade with floatables control enables Gowanus to meet current & future dissolved oxygen and recreational season fecal water quality standards

Superfund Mandate requires an estimated reduction of 58% to 74% of CSO solids at:
- Owl’s Head Outfall OH-007
  - 4 MG Storage Tank
- Red Hook Outfall RH-034
  - 8MG Storage Tank

Initiate a post-construction compliance monitoring program

Current Gowanus Canal Improvements:

Flushing Tunnel Upgrades
- Operational since May 2014
- New automated screens
- Increased capacity to 250 MGD (3 new pumps)

Gowanus Pump Station Upgrades
- Operational since June 2014
- Increased capacity from 20 to 30 MGD
- Added screening facility and floatables control

Total Capital Cost for Flushing Tunnel and Pump Station Upgrades = $190 Million
Upcoming LTCP Submittals

Flushing Bay
June 2016

Coney Island Creek
June 2016

Jamaica Tribs & Bay
June 2017

Newtown Creek
June 2017

Harlem River
Date Pending

Citywide
Date Pending
Questions?
Green Infrastructure
Status Update

Angela Licata
Deputy Commissioner
DEP
### Green Infrastructure Status Update

<table>
<thead>
<tr>
<th>Submitted LTCP</th>
<th>Green Infrastructure (GI) Status Update</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alley Creek</td>
<td>• No public GI proposed as part of the LTCP</td>
</tr>
<tr>
<td>Hutchinson River</td>
<td>• Construction of ROW GI complete in 2016, Edenwald Houses in construction, and porous pavement pilot (LL80) in design. Estimated construction value = $14 million</td>
</tr>
<tr>
<td>Flushing Creek</td>
<td>• TI-11/22 start ROW GI construction spring 2016, TI-10 design start spring 2016.</td>
</tr>
<tr>
<td>Westchester Creek</td>
<td>• ROW GI construction start fall 2016, porous pavement pilot currently in design. Public retrofits under investigation.</td>
</tr>
<tr>
<td>Bronx River</td>
<td>• Design start January 2016, construction start fall 2016.</td>
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<td>Margot Walker and Mikelle Adgate</td>
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# 30 Minute Breakout Session Summary

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GOAL
Raise awareness, foster understanding, and encourage input on LTCP development

Activities:
- Annual citywide public meetings rotating across boroughs
- Local public meetings in each watershed and existing forums
- Meeting with key stakeholders and organizations
- Briefings with elected officials and their staff

Communication Tools:
- Program Website
- Social Media
- Advisories & Notifications
Next Steps

- Please visit [www.nyc.gov/dep](http://www.nyc.gov/dep) to access:
  - LTCP Public Participation Plan
  - Presentation, handouts and poster boards from kick-off meeting
  - Links to Waterbody/Watershed Facility Plans
  - CSO Order including LTCP Goal Statement
  - NYC’s Green Infrastructure Plan
  - Green Infrastructure Pilots 2011 Monitoring Results
  - Real-time waterbody advisories
  - Upcoming meeting announcements
  - CSO Quarterly Reports
  - Other LTCP updates

- Comments can be submitted at any information station or sent to:
  - New York City DEP at: ltcp@dep.nyc.gov