MUNICIPAL SEPARATE STORM SEWER SYSTEM
Stormwater Management Program (SWMP) Updates

Stormwater Advisory Group
February 22, 2017
1) Introductions

2) Local Laws/Legal Authority

3) SWMP Public Involvement and Participation

4) **Stormwater Management Program (SWMP)**
   a) Mapping
   b) IDDE
   c) Monitoring

5) Open Discussion
Local Laws/Legal Authority

- **New York City MS4 Legislation**
  - Draft introduced by City Council on November 16, 2016 (Intro 1346-2016)
  - Hearing held by Environmental Protection Committee on December 13, 2016

- **Legal Authority Certification & Rulemaking Timeline**
  - Proposing new approach to DEC
  - Staggered rulemaking more closely coordinated with SWMP development
## SWMP Public Involvement and Participation

<table>
<thead>
<tr>
<th>Topics</th>
<th>Date/Time/Location</th>
</tr>
</thead>
</table>
| Annual SWMP Progress Report | June 22, 2016, 6:30pm–8:30pm  
NYS Department of Public Service |
| Pollution Prevention/Good Housekeeping for Municipal Operations and Facilities (Part 1) | September 27, 2016, 2:00pm-3:30pm  
Newtown Creek Visitor Center |
| Control of Floatable and Settleable Trash and Debris (Part 1) | September 27, 2016, 4:00pm-6:00pm  
Newtown Creek Visitor Center |
| • Construction Site Stormwater Runoff Control  
• Post-Construction Stormwater Management | December 13, 2016, 6:30pm–8:30pm  
Hostos Community College - C Building |
| • Mapping  
• Illicit Discharge Detection and Elimination (IDDE)  
• Monitoring and Assessment of Controls | February 22, 2017, 6:30-8:30pm  
St. Francis College |
| • Control of Floatable and Settleable Trash and Debris (Part 2)  
• Public Education & Outreach | Spring 2017** |
| Annual SWMP Progress Report | Spring 2017** |
| • Industrial and Commercial Stormwater Sources  
• Pollution Prevention/Good Housekeeping for Municipal Operations and Facilities (Part 2) | Summer 2017** |

**Check DEP’s EventBrite page for event information on SAG/TFW meetings: [https://www.eventbrite.com/o/nyc-water-8636246491](https://www.eventbrite.com/o/nyc-water-8636246491)
1. Introduction
2. Program Overview
3. Public Education and Outreach
4. Public Involvement/Participation
5. Mapping
6. Illicit Discharge Detection and Elimination (IDDE)
7. Construction Site Stormwater Run-off Control
8. Post-Construction Stormwater Management
9. Pollution Prevention/Good Housekeeping for Municipal Operations and Facilities
10. Industrial and Commercial Stormwater Sources
11. Control of Floatable and Settable Trash and Debris
12. Monitoring
13. Reliance on Third Parties
14. Recordkeeping
15. Annual Reporting and Certification
Mapping Permit Requirements

Permit Section IV.C – The Permittee must develop a geographic information system (GIS) based map of its MS4 drainage areas and its MS4 outfalls. At a minimum, the map and/or supportive documentation shall include the following information (within NYC MS4 areas):

- **IV.C.1.a.** NYC-owned or operated MS4 outfalls
- **IV.C.1.b.** Description of the zoning districts and related land uses and estimates of average runoff coefficients or impervious surface coverage
- **IV.C.1.c.** The location and activities of each currently operating or closed municipal landfill or other treatment/storage/disposal facility for municipal waste
- **IV.C.1.d.** The location and the permit number of any discharge to the MS4 that has an active State Pollutant Discharge Elimination System (SPDES) permit, as provided by the Department of Environmental Conservation (DEC)
- **IV.C.1.e.** The location of major structural controls for stormwater discharge on property owned or operated by NYC
- **IV.C.1.f.** The identification of publicly owned parks/recreational areas/other open lands
- **IV.C.1.g.** An explanation of the roles and responsibilities of different city agencies within the MS4 areas
- **IV.C.1.h.** Annotations that clearly define blocks and lots
What is a Municipal Separate Storm Sewer System (MS4)?

- A Municipal Separate Storm Sewer System (MS4) is any conveyance or system of conveyances (including but not limited to streets, ditches, catch basins, curbs, gutters, and storm drains) that is 1) owned by a municipality 2) collects or conveys stormwater, 3) not a combined sewer, and 4) not processed by a treatment plant.

What is an MS4 outfall?

- An outfall is defined as any point where a separate storm sewer system discharges to either the waters of the United States or to another MS4. Outfalls include discharges from pipes, ditches, swales, and other points of concentrated flow.

What are considered MS4 Drainage Areas?

- Areas where stormwater drains to separate storm sewers owned or operated by NYC that discharge to waters of New York State through MS4 outfalls or that connect to combined sewer overflow pipes downstream of a regulator.
- Areas where stormwater drains to high level storm sewers and bluebelts that ultimately discharge to waters of New York State through MS4 outfalls.
- NYC municipal operations and facilities where stormwater drains by overland flow to waters of New York State.
Mapping Drainage Areas & Outfalls

### Drainage Area

- **Combined Area**
  - City Combined Sanitary and Storm Sewers
- **Sanitary Area**
  - City Sanitary Sewer
- **Discrete Storm Sewered Area**
  - City Separate Storm Sewer connected to CSO outfall *upstream* of regulator
- **Separate Storm Sewered Area**
- **High Level Storm Sewered Area**
  - City Separate Storm Sewer connected to MS4 Outfall
- **City Direct Drainage Area**
  - Overland Flow On City Property - No Storm Sewers
- **Private Separate Storm Sewered Area**
  - Private Separate Storm Sewer
- **Private Direct Drainage Area**
  - Overland Flow On Private Property - No Storm Sewers

### Outfall

- **Wastewater Treatment Plant**
- **Combined Sewer Outfall**
- **City Separate Storm Sewer System Outfall**
- **Direct to waterway-No Outfall**

**Covered by MS4 Permit**

- Discrete Storm Sewered Area
- Separate Storm Sewered Area
- High Level Storm Sewered Area
- City Direct Drainage Area

**Not Covered by MS4 Permit**

- Combined Area
- Sanitary Area
- Private Separate Storm Sewered Area
- Private Direct Drainage Area
The City must develop map of MS4 drainage areas and MS4 outfalls.

**3 years from EDP:**
Permittee shall submit a preliminary map depicting the information completed to date.

**5 years from EDP:**
Permittee shall submit a final map with all information outlined in Part IV.C.1.

**Once every 5 calendar years:**
Provide an updated version of the MS4 map including:

a. any additions or deletions to the MS4 drainage areas and all non-negligible changes to land use within the MS4 drainage areas for the previous five years;

b. newly constructed outfalls or newly discovered outfalls through the outfall reconnaissance inventory in Part IV.D.2.
This draft of the map gives a general understanding of MS4 areas but may contain inaccuracies.

NYC is in the process of confirming the areas that are part of the MS4.

This is an important process as it will determine where the SWMP is implemented.
The majority of the MS4 is comprised of separate storm sewers owned and operated by DEP.
DEP has delineated 199 of 365 DEP-owned outfall drainage areas (~50%) to date.

<table>
<thead>
<tr>
<th>Treatment Plant Drainage Area</th>
<th>Count of DEP Owned MS4 Outfalls</th>
<th>MS4 Outfall Drainage Areas Delineations COMPLETED</th>
<th>MS4 Outfall Drainage Areas Delineations PENDING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coney Island</td>
<td>60</td>
<td>54</td>
<td>6</td>
</tr>
<tr>
<td>Hunts Point</td>
<td>29</td>
<td>19</td>
<td>10</td>
</tr>
<tr>
<td>Bowery Bay</td>
<td>8</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>26 Ward</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Jamaica</td>
<td>31</td>
<td>29</td>
<td>2</td>
</tr>
<tr>
<td>Rockaway</td>
<td>51</td>
<td>40</td>
<td>11</td>
</tr>
<tr>
<td>Newtown Creek</td>
<td>11</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Tallman Island</td>
<td>34</td>
<td>28</td>
<td>6</td>
</tr>
<tr>
<td>Owls Head</td>
<td>9</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Red Hook</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Port Richmond</td>
<td>11</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Oakwood Beach</td>
<td>116</td>
<td>0</td>
<td>116</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>365</strong></td>
<td><strong>199</strong></td>
<td><strong>166</strong></td>
</tr>
</tbody>
</table>
Interagency Cooperation

While much of the MS4 is owned and operated by DEP, other agencies may also own or operate parts of the MS4.

DEP is working with other agencies to identify potential agency-owned outfalls and agency operations and facilities that drain by overland flow.

DEP will support the mapping efforts by these agencies by preparing a guidance manual. However, other agencies are responsible for mapping their own properties for inclusion in the citywide MS4 map.
Other City Outfall and Drainage Area

Illustrative Example of Agency-Owned Outfall and Drainage Area

LEGEND
- Outfall
- Catch Basin
- Agency Owned Storm Sewer
- Curb Lines
- Building
- Catchment Area
- Park
- Water
Illustrative Example of Agency-Owned Sewers

Agency Storm Sewer Connects to DEP Storm Sewer

- Catch Basin
- Storm Sewer
- Agency Owned Storm Sewer
- Curb Lines
- Agency Owned Facility
- Catchment Area
- Park
- Water
Municipal Operations/Facilities Draining by Overland Flow

Illustrative Example of Agency-Owned Facilities in Overland Flow Area

LEGEND
- Water Flow
- Curb Lines
- Building
- Catchment Area
- Park
- Water
Municipal vs. Private Operations/Facilities in Direct Drainage Areas

City Agency Overland Flow vs. Non City Facilities in Direct Drainage Areas

Legend:
- Outfall
- Catch Basin
- Water Flow Over Land
- Storm Sewer
- Curb Lines
- Building
- Overland Flow Catchment Areas with City Owned Facilities
- Direct Drainage Catchment Areas with Non-City Owned Facilities
- Park
- Water
Proposed Guidance for Other Agencies

Lot Boundaries (Most Simple)
• Data needs: outfall location, property ownership/boundaries. Appropriate for small lots.

Manual Digitization (Medium Complexity)
• Data needs: topographic map or a contour layer, outlet or downstream point, sewers and catch basins, knowledge of geomorphology/topography, exiting MS4/direct drainage boundaries. Appropriate for medium to larger lots.

GIS – Spatial Analyst (High complexity)
• Data needs: Digital Elevation Model (DEM), license for ArcGIS Spatial Analyst Extension, outlet or downstream point. Appropriate for medium to larger lots where good data exist.

GIS – ArcHydro (High complexity)
• Data needs: DEM, license for ArcGIS Spatial Analyst Extension, outlet or downstream point. Appropriate for medium to larger lots where good data exist.
Additional Mapping Requirements and Data Sources

**Permit Section IV.C** – The Permittee must develop a GIS-based map of its MS4 drainage areas and its MS4 outfalls. At a minimum, the map and/or supportive documentation shall include the following information (within NYC MS4 areas):

**IV.C.1.b** Description of the **zoning districts** and related **land uses** and estimates of average runoff coefficients or impervious surface coverage

- Land Uses from DCP MapPLUTO: https://www1.nyc.gov/site/planning/data-maps/open-data/dwn-pluto-mappluto.page#mappluto and Department of Information Technology & Telecommunications (DOITT) Planimetrics Roadbed features: https://data.cityofnewyork.us/Transportation/NYC-Planimetrics/wt4d-p43d

**IV.C.1.c** The location and activities of each currently **operating or closed municipal landfill or other treatment/storage/disposal facilities for municipal waste**

- Data provided by agencies

**IV.C.1.d** The location and the permit number of any discharge to the MS4 that has an **active State Pollution Discharge Elimination System (SPDES permit)** (as provided by DEC)

- Active Individual and MSGP SPDES Permits are available through DEC: https://www.dropbox.com/sh/hz3spt98h4d88ue/AADmNLcYxcpZQFeWUNAxGMi9a
IV.C.1.e The location of **major structural controls** for storm water discharge on property owned or operated by NYC

- Data to come from Pollution Prevention and Good Housekeeping assessments of municipal facilities and operations

IV.C.1.f The identification of **publicly owned parks/recreational areas/other open lands**

- DOITT Planimetrics Parks and Open Space features: https://data.cityofnewyork.us/Transportation/NYC-Planimetrics/wt4d-p43d

IV.C.1.g An explanation of **the roles and responsibilities of different city agencies** within the MS4 areas

- Existing agency operations, City Charter, and Pollution Prevention and Good Housekeeping Program

IV.C.1.h Annotations that clearly define **blocks and lots**

- DCP MapPLUTO: https://www1.nyc.gov/site/planning/data-maps/open-data/dwn-pluto-mappluto.page#mappluto
Illicit Discharge Detection and Elimination (IDDE)

The IDDE Program goal is for the City to develop, implement and enforce a program to detect and eliminate illicit discharges through:

- Ordinance, orders or similar means to prevent illicit discharges and illicit connections to the MS4

- Outfall survey to detect and eliminate illicit discharges and illicit connections in MS4

- Educate public about the hazards associated with illegal discharges and improper disposal of waste to the MS4

- Selection and assessment of appropriate IDDE BMPs and measurable goals to ensure the reduction of pollutants in stormwater discharges to the MEP

- Implementation of a training program for all staff whose job duties include implementing the IDDE program and/or performing IDDE operations
Existing IDDE Program
DEP already implements a robust citywide IDDE program. Under the MS4 Permit, the City is identifying additional strategies to enhance current efforts and ensure equivalence with state mandates

- Shoreline Survey
- Sentinel Monitoring
- Response to 311 Complaints and Emergency Spill Response
- Education and outreach
- Training

Changes Proposed

- Revisions to New York City Administrative Code
  - Adding new subsection 24-520.1 to explicitly prohibit non-stormwater discharges to storm sewers, other than “allowable runoff.”
  - Providing DEP the authority to establish by rule what is “allowable runoff” consistent with the City’s MS4 permit and the proper maintenance of storm sewers

Affected Properties
Anyone discharging prohibited non-stormwater into the MS4 system
Completed Tasks:

- DEP completed internal review of draft IDDE chapter
- DEP outlined an IDDE Guidance Manual for other agencies, which includes:
  - delineation of responsibilities of agencies and DEP under the MS4 permit
  - guidance for source tracking, elimination, reporting of illicit discharges, sample collection and dye testing protocol
- Responsibilities of other City agencies, memorialized through MOUs:
  - Work with DEP to eliminate any identified illicit discharges to separate storm sewers operated by DEP
  - Detect and eliminate any illicit discharges to separate storm sewers operated by the agency, including reporting required under State law, and coordinating with DEP as necessary to seek appropriate sewer connections
- Presented draft IDDE Guidance Manual Outline to other City agencies

Current Tasks (DEP):

- Identify gaps in current permit program and address them
- Review draft IDDE Chapter
- Draft NYC IDDE Agency Guidance Manual (MS4 SWMP consultant)
Permit monitoring objectives:

- Assessment of compliance
- Measurement of effectiveness of the SWMP
- Characterization of discharges at representative outfalls
- Identification of sources of specific pollutants
- Detect and eliminate illicit discharges to the MS4
- Evaluation of long-term trends
Existing Monitoring Programs

Sentinel Monitoring

- Beach Sampling

Harbor Survey Monitoring

- LTCP Stormwater Monitoring
Monitoring

- **Summary of DEP completed tasks**
  - Desktop analyses of existing City programs and other monitoring guidance documents
  - Senior management interviews with 18 other MS4 utilities nationally and internationally
  - Mapped all DEP-owned and operated MS4 outfalls
  - Delineated over 50% of sewersheds discharging to DEP-owned and operated MS4 outfalls
  - Mapped and computed the acreages of land use types of every delineated sewershed using PLUTO map
  - Developed water quality and flow sampling approach for landside and receiving waterbodies
  - Identified POCs to be sampled under land use-based, targeted and receiving waterbodies monitoring approaches
  - Presented monitoring approach to other City agencies and DEC
Monitoring

- **Summary of DEP completed tasks**
  - Desktop analyses of existing City programs and other monitoring guidance documents
  - Senior management interviews with 18 other MS4 utilities nationally and internationally
  - Mapped all DEP-owned and operated MS4 outfalls
  - Delineated over 50% of sewersheds discharging to DEP-owned and operated MS4 outfalls
  - Mapped and computed the acreages of land use types of every delineated sewershed using PLUTO map
  - Developed water quality and flow sampling approach for landside and receiving waterbodies
  - Identified POCs to be sampled under land use-based, targeted and receiving waterbodies monitoring approaches
  - Presented monitoring approach to other City agencies
Monitoring

- Desktop analyses of existing City programs and other monitoring guidance documents
  - Review of existing studies/databases
    - LTCP
      - MS4 outfalls/manholes water quality and flow data from 1991-2016
    - Sentinel monitoring
    - Shoreline survey
    - NYCDEP Supplemental Discharge Characterization Study
    - Receiving waterbodies HEP-CARP study
  - Review of EPA Guidance Manuals
    - Guidance Manual for the Preparation of Part 1 of the NPDES Permit Applications for Discharges from MS4s
    - NPDES Stormwater Sampling Guidance Document
  - Review Center for Watershed Protection monitoring guidance manual
    - Monitoring to Demonstrate Environmental Results: Guidance to Develop Local Stormwater Monitoring Studies Using Six Example Study Designs
Senior management interviews with other MS4 utilities nationally and internationally

- Utilities have been doing monitoring for a number of years and have experience with what works and what does not work.
- Information collected includes frequency of sampling, sampled parameters, lessons learned, etc.
- Many utilities found monitoring challenging with monitoring data making little or no sense irrespective of size sample.
- Other utilities found no significant difference between published NURP and NSQD data, and their sampling results.
- Some utilities recommended that we use a staged approach with fairly simple initial effort to obtain basic information.
- Mapped all DEP-owned and operated MS4 outfalls
  - Number of owned and operated outfalls – 365
  - Outfall size and shape

- Delineated over 50% of sewersheds discharging to DEP-owned and operated MS4 outfalls
Estimated the acreages of land use types of every delineated sewershed using PLUTO map

- Accurate estimates of land use of paramount importance to inform selection of representative catchments for a stormwater outfall monitoring

- Estimates are also needed to help target measures that reduce loadings from the greatest contributing land uses

- No sewershed is made up of a single land use type

- All sewersheds mapped to date are made up of a combination of different land uses in varying proportions
**Sampling approach**

- Select 19 outfalls/manholes for landside monitoring
- Select 13 locations for receiving water monitoring

- Two-tiered approach for landside sampling

  - **Tier 1**: Land-use based monitoring (6 locations)
    - Short term monitoring to **identify sources of specific pollutants** as required by permit
    - Six sites selected to represent City’s main land uses:
      - LD Residential, HD Residential, Open Space, Industrial, Mix residential/commercial, and Highway
    - Sample 3 times per outfall over the first permit term
    - Water Quality sampling only
    - Selected POCs (provisional)
      - **Bacteriology**: Entero and fecal coliform
      - **Metals**: CD, Cr, Cu, Pb, Ni, As, Hg, Zn
      - **Nutrients**: TOP, DOP, TN, Org N, TKN, NH4
      - **Residue**: TSS, TDS
      - **Others**: Oil & Grease, Pesticide

  - Discontinue sampling after first permit term
Monitoring

- **Tier 2: Targeted monitoring (13 provisional locations)**
  - Long term monitoring to measure improvements to the water quality condition
  - Focuses on long-term monitoring of MS4 outfalls that are most likely to contribute the largest pollutant load to priority MS4 waterbodies
  - Select largest outfalls (>36 in):
    - Drain the largest upstream area, convey the greatest stormwater volume and have greater impact on receiving water quality
  - Fixed (permanent) sampling locations:
    - Sample 3 times per outfall over first permit term
  - Water quality sampling
    - Selected POCs (provisional)
      - **Bacteriology:** Entero and fecal coliform
      - **Nutrients:** TP and TN
  - Flow sampling
    - Automated flow monitoring
    - Time weighted composite sampling
  - Use measured POC concentration and flow to estimate pollutant load
Receiving Waters Monitoring (13 provisional locations)

- Paired monitoring with targeted monitoring

- **Main Objective:** Comparison of outfall/manhole monitoring results with receiving water monitoring results may provide information to evaluate the role that stormwater plays as a potential source to receiving water impairment

- Use Harbor or Sentinel stations within mixing zone of targeted outfall

- Monitor for same water quality parameters as those of associated outfalls

  ➢ Selected POCs (provisional)

  - **Bacteriology:** Entero and fecal coliform
  - **Nutrients:** TP and TN

- No flow monitoring

- Sample 3 times per location over every permit term
Current Tasks

- Draft the monitoring and assessment plan for inclusion in the MS4 SWMP Plan

Next Steps

- Conduct field reconnaissance to ensure selected outfalls/manholes are not impacted by tide, have no dry weather flows, safe and accessible by sampling field crews
- Add additional outfalls identified by other agencies to the land use-based monitoring list after reassessment by DEP
- Include outfall sampling data from other city agencies as data is collected and made available to DEP
For more information, visit our website: nyc.gov/dep/ms4
If you have questions or feedback, please contact the MS4 Team at:
ms4@dep.nyc.gov