

**Testimony of James J. Roberts, P.E.**  
**Deputy Commissioner, Bureau of Water and Sewer Operations**  
**New York City Department of Environmental Protection**  
**before the**  
**New York City Council Committee on Environmental Protection**  
**concerning**  
**Oversight - On Citywide Localized Flooding – Intro. 240**  
**250 Broadway**  
**December 4, 2014, 11 am**

Good morning, Chairman Richards and Members. I am James Roberts, Deputy Commissioner of the Bureau of Water and Sewer Operation in the New York City Department of Environmental Protection (DEP). I am joined today by Associate Commissioner Eric Landau of the Bureau of Public Affairs, senior staff from the Department of Sanitation, and other DEP staff. Thank you for the opportunity to testify on Introduction 240 and localized flooding in the City.

As you know, DEP has overall responsibility for New York City’s water supply and sewer systems, which we operate and manage in accordance with a specific set of agreed-upon regulatory metrics. Our work includes hydrant maintenance and repair, and water and sewer repair work that includes leaks and blockages—all of which are critical to the life of the City. In this context we prioritize our activities in an effort to maintain acceptable levels of service while remaining ever conscious of the water rate paying consumer. Redirecting resources necessarily shifts them from other priorities. We are, regrettably, concerned that the legislation in its current form will have this negative impact and further, in so doing, we do not believe it will have a tangible benefit on what we believe is its real goal, namely reducing flooding. Before I address the specifics of the legislation, I believe it would be helpful to briefly describe our sewer system and how it functions, draw distinctions between events commonly and universally denoted as “flooding”, and describe how DEP maintains the system in order to ensure it functions as well as possible.

System Overview

DEP provides more than one billion gallons of drinking water each day to more than nine million residents, including eight million in New York City. The water is delivered from a watershed that extends more than 125 miles from the city, comprising 19 reservoirs and three controlled lakes. Approximately 6,800 miles of water mains, tunnels and aqueducts bring water to homes and businesses throughout the five boroughs, and 7,500 miles of sewer lines and 96 pump stations take wastewater to 14 in-city treatment plants, where we treat approximately 1.2 billion gallons daily. Largely through our efforts, New York City’s water bodies are the cleanest in nearly 100 years of our monitoring. DEP has nearly 6,000 employees, including almost 1,000 in the upstate watershed. In addition, DEP has a robust capital program, with a planned \$13 billion in investments over the next 10 years that will create approximately 3,000 construction-related jobs per year. This capital program is responsible for critical projects such as sewer construction and reconstruction; City Water Tunnel No. 3; the Staten Island Bluebelt program, an ecologically sound and cost-effective stormwater management system; the City’s Watershed Protection Program, which protects sensitive lands upstate near the City’s reservoirs in order to maintain their high water quality; and the installation of more than 820,000 Automated Meter Reading

devices, which will allow customers to track their daily water usage, more easily manage their accounts and be alerted to potential leaks on their properties.

The complex sewer collection system, of which catch basins are a part, employs primarily three types of infrastructure to manage stormwater: combined sewers, sanitary sewers, and separate storm sewers. Most recently, green infrastructure has been introduced as another approach to address stormwater control in certain areas of the city.

Approximately 60% of New York City's land area is served by a sewer system that is combined, meaning that it handles both sanitary waste from homes and businesses as well as stormwater from streets and roof tops, in a single pipe. This system includes more than 3,330 miles of sewers throughout the five boroughs. It is important to note that combined sewer design accounts for approximately 92% storm flow and typically 7%-8% sanitary flow.

The other 40 % of the City is served by separate sewers or direct drainage. In these areas, sanitary sewers, designed exclusively for sanitary flow (as a function of zoning), carry wastewater straight to the treatment plant, while storm sewers, designed exclusively for stormwater runoff (based on property usage, and how much water is generated by the acreage of the associated property) carry that runoff in separate pipes directly to a local waterway. The separate sewer system in New York City includes 2,220 miles of sanitary sewers and 1,820 miles of storm sewers. In addition, the City also has 138 miles of large, deep interceptor sewers, which are essentially sewer highways and which carry both sanitary and combined flow to our 14 wastewater treatment plants. These plants handle approximately double the average dry-weather flow on a typical wet-weather day. This can amount to as much as 27.5 billion gallons of flow that are captured and treated before being returned safely to the waterways.

Sewers are designed to handle most of the storms that pass through New York City. Much of the sewer system was designed to handle up to 1.5 inches of rain per hour. In the 1960s, DEP increased this design standard to the current standard of 1.75 inches of rain per hour, which is the standard we use when developing and revising drainage plans today. We have recently reviewed these current standards in the context of our understanding of climate impacts and have concluded that the design criteria do not warrant adjustments at this time. However, we are alert to these issues, continue to monitor them, and we will make necessary changes to our thinking as warranted. Green Infrastructure, about which I will go into further detail in a moment, is a prime example of how we are rethinking our approach to making our system more resilient, adaptive, and sustainable.

Catch basins are part of the City's vast stormwater collection system. Catch basins are part of the storm drain system. They are typically a large concrete chamber, covered by a heavy metal grate to prevent debris and "floatables" from falling in. They are designed with a deep sump, or storage area, to collect sediment and other debris that run off the street and pass through the gratings. A metal hood keeps lightweight objects like soda bottles and plastic bags from flowing into the sewer and helps mitigate unpleasant odors.

DEP works diligently to ensure that all catch basins owned by DEP are performing properly, especially during storm events. Please note that other City and State agencies and authorities are

responsible for some basins and drainage structures that are part of their infrastructure. Of the 148,000 catch basins that DEP is responsible for, our crews inspect each on a recurring three-year rotation, and clean them as needed. In addition, DEP responds to all 311 complaints regarding a clogged or broken catch basin, regardless of whether it is in the inspection cycle. Broken catch basins typically involve issues with the gratings or associated brick work and rarely impact the operation of the basin in its ability to manage water.

Some parts of the City still do not have a fully built-out sewer system with catch basins. Addressing this, as you know, is a major part of our capital construction program. Generally, these neighborhoods were developed before the storm sewer system could be extended to reach them. Larger areas of the City, such as Southeast Queens and the southern shore of Staten Island, lack a fully built-out storm sewer system. In areas where storm sewers are unavailable, seepage basins have at times been used to facilitate stormwater infiltration into the ground. Seepage basins are essentially large dry wells installed underground in the City right of way: they are a large perforated concrete box that is partially filled with stone and gravel and covered with filter cloth. Their effectiveness is greatly dependent on the soil conditions in the area immediately adjacent to the basin and the rate of seepage can vary significantly from hours to in some instances a day or more. In some areas, such as Hillside Avenue, seepage basins continue to function as designed so that the water percolates from the basin into the ground effectively, but in other areas, they drain more slowly or poorly, and as a result are not effective at quickly reducing ponding conditions on streets. In any case, these basins do not act as catch basins and do not take water immediately off the roadway as their physical appearance, being so similar to catch basins, may lead the public to believe. There is often little that can be done to service a seepage basin once installed and experience has taught us that their life cycle is typically less than five years of effectiveness. As such, their implementation is one of last resort and utilized on a very selective basis, if at all.

A relatively new approach to the management of stormwater is the Green Infrastructure (GI) program. DEP and its agency partners design, construct and maintain a variety of methods and technologies that collect and manage stormwater runoff from streets, sidewalks, parking lots and rooftops and direct it to engineered systems that typically use soils, stones, and vegetation to detain, retain and use water rather than convey it to the harbor. GI includes permeable paving and rain gardens at City schools, parks, and public housing, and most notably bioswales and stormwater greenstreets within the City streets and sidewalks. Bioswales look like enlarged tree pits, but are designed with specific plant species known to soak up a significant amount of water and are engineered below grade. Bioswales “intercept” storm water coming down the street, preventing it from going into the sewer system. In addition, they provide other hugely important environmental benefits, including improved air quality and the greening of the streets. DEP is installing 2,000 bioswales this year and a total of 6,000 over the next several years.

Over the last ten years DEP has also built Bluebelts for approximately one-third of Staten Island’s land area. In the South Richmond and mid-Island areas, the City has jurisdiction over approximately 400 acres of wetland property for Bluebelts that provide drainage for 19 watersheds, covering about 14,000 acres. The Bluebelts also provide important open spaces and serve as a habitat for diverse wildlife. This past April, DEP announced a \$48 million project in the Woodrow Area that will add catch basins and storm sewers to reduce street flooding, build

new wetlands and allow nearly 600 homes to connect to the City sewer system. As you know, DEP has, over the past several years, started to implement forms of the Bluebelt strategy in other areas of the city, including Springfield Lake in Queens.

### Flooding and Response

Now let's look at flooding and why it occurs: Flooding is a broad term and many use it to describe events ranging from water pooling or ponding on streets to complete inundation resulting from severe events like Hurricane Irene or Superstorm Sandy. Flooding can be caused by simple events or in some instances, by a complex interplay of many factors that vary by event type, geography and local topography.

Generally flooding falls into at least two large categories. Tidal flooding, where coastal waters surge onto land, extreme high tide events, etc., is one major type. It is important to note that tidal flooding does not typically involve DEP or its infrastructure, although in instances elements of our infrastructure that do not perform as designed can abet this type of flooding by allowing a storm surge to back up through storm outfalls into the storm system and potentially onto streets.

The second major type of flooding occurs when the level of rainfall intensity exceeds the design capacity of the sewers to take the generated storm water off the street readily. In these instances, when the system is surcharged—above its capacity—flooding of roadways, and in some cases basements, can occur. In almost all instances, these events are typically short lived for the operation of the system, although, particularly with regard to water that overflows into driveways or basements, the impacts can be severe.

Some communities throughout the City have been historically prone to flooding. For example, areas of Southeast Queens and the South and East shores of Staten Island lack a fully built-out storm sewer system. Geography, including the City's 520 miles of coastline, large very flat expanses of land, local topography (with localized low-lying areas being hardest hit), dense urban development patterns, the older design capacity of our sewer system and, increasingly, extreme weather are some of the major causes. In addition to large intense storms, we have witnessed some unique types of storms, such as microbursts, during which intense rain falls over small areas resulting in overtaking of the system and consequent very local flooding.

New York City, like many municipalities, is working to confront the challenge of more frequent extreme weather events and flooding. Average annual rainfall in the City at Central Park has increased almost 20% in the last century, with a high concentration of heavy rainfall events in the last 30 years. Furthermore, climate projections indicate the potential for even more rainfall, particularly in the form of increasingly frequent intense storms. Advancing the build-out of our storm sewer system, supported by the other efforts, is the best overall solution to cope with these environmental changes. As the Chair is aware, Mayor de Blasio has charged us with addressing flooding in Southeast Queens, and we are very focused on identifying and executing both long- and short-term solutions.

A very common cause of flooding is catch basin grates that become matted over when rainwater—especially during these very intense storms—scours streets and sidewalks, pushing debris like leaves, gum wrappers and restaurant menus onto the catch basin. Such debris can

block the grate so completely that water cannot enter the storm sewers, much like hair on the drain in your shower can clog your drain at home. Instead, it pools around the basin, causing flooding even before the sewer is full. Catch basins can also be a source of flooding if the basin storage area gets full almost to the top to the point where the connection to the sewer is blocked. In those cases DEP must clean out the basin trash storage area. It is important to note that the level of debris on streets in a given area may not be readily apparent until it is carried to the catch basin grate by runoff. We believe improved attention to the rule that property owners are responsible for sweeping the sidewalk and the street 18 inches from the curb may help prevent the matting on basins.

As I stated earlier, we inspect all 148,000 catch basins on a three year rotation (approximately 49,000 per year), and clean as needed, which is the first step in ensuring the proper functionality of the catch basins. The result of negotiations between DEP and our State and federal regulators (DEC and EPA), the rotation has been in place since 2002 and represents a responsible approach to both our operational and financial responsibilities. In FY2014, less than half of those catch basins inspected required cleaning. As part of the rotation, we also inspect the hoods in the catch basins, which cover the entry into the sewer. These hoods are designed to minimize trash and litter entry to the sewers and waterways, and we replace defective or missing hoods within 90 days.

As you know, the Office of Emergency Management (OEM) coordinates a storm preparedness program known as the Flash Flood Emergency Action Plan (plan), which targets areas that are prone to flooding and which involves the Departments of Sanitation (DSNY) and Transportation (DOT), the New York Police Department, and DEP. OEM activates the plan in advance of a forecasted rain event when the intensity of rainfall is equal to or exceeds one inch per hour for at least an hour. DEP, DSNY and DOT pre-inspect historically problematic areas for these conditions in advance of major predicted rain events. The areas selected are a collaborative view of areas known to be potentially problematic through 311 and institutional knowledge. Based on that knowledge, we provide a list of just under 100 catch basins in problem areas to DSNY, whose field supervisors inspect the grating areas within 24 to 48 hours prior to the onset of any rainfall anticipated to reach the threshold intensity. If the debris is observed on top of the catch basin grate, DSNY or other responsible agency will remove the debris. If debris is observed as being potentially problematic to the function of the basin, DSNY notifies us and crews are dispatched to evaluate and clean the basin as appropriate.

A partnership with DSNY is a necessary piece to ensuring the catch basins are functioning as designed. In addition to the Flash Flood Emergency Action Plan, DSNY is responsible for clearing litter and debris from the accessible curbsides and parking lanes of streets during alternate-side parking restrictions under its street cleaning program. While the mechanical broom is in operation, the operator will sweep over the tops of catch basins to pull away and collect any debris that has accumulated. We ask that all New Yorkers help prevent localized flooding by not littering, as well as by sweeping debris adjacent to their properties, including leaves and trash, and placing it into their refuse receptacles.

Understandably, street conditions also have an important impact on stormwater flow and drainage. When constructed to legal grades and properly sloped, streets channel stormwater from

the crown (center) of the roadway to the curb line; from there it can flow into catch basins and our storm sewers. Similarly, homes built to legal grades are far less likely to be impacted by street flooding. In areas where street conditions result in compromised grading, or there is a missing or low curb reveal, stormwater can collect in low spots causing a localized ponding condition. If these low spots are close to low-lying properties with unprotected basements, driveways or other spaces that are below street level, there is added risk for stormwater to enter homes. These private property configurations can more easily direct stormwater flows into them and thereby increase the risk of flooding.

As I stated earlier, DEP responds to all 311 complaints of street flooding or clogged or broken catch basins. A crew responds to investigate in order to ascertain whether the condition has been caused by a problem with the stormwater infrastructure or some other issue that does not allow the runoff to reach the catch basin at the corner by gravity. When the source of the flooding is the catch basin or sewers, DEP will resolve the condition either by cleaning the basin, its connection to the sewer or the sewer itself. In instances where the street topography is the main driver of the flooding or ponding observed, DEP and DOT will visit the site together to assess possible remedies to the ponding.

Sewer backups, which can cause flooded basements, result from a blockage in the sewer, most commonly coming from improper disposal of cooking grease. In FY2014, fat, oil, and grease buildups caused approximately 72% of confirmed sewer backups in New York City.

To reduce the effects of fat, oil and grease, DEP has launched a number of operational and outreach initiatives. Over the past year, DEP has improved coordination among units that handle grease public outreach, grease trap inspection, and sewer maintenance. Because grease entry into sewers is preventable and relies on choices made by individuals, we have focused on public education as a way to reduce it. We have targeted public education programs in schools and at professional organizations; we have also given out educational materials on a door-to-door basis in neighborhoods we know have prevalent grease problems.

Where field crews observe persistent or systematic grease buildup in a commercial area, especially where restaurants are concentrated, they refer the location to DEP's enforcement unit for targeted grease interceptor inspections. In addition, our Economic Development Unit holds workshops to help restaurants and businesses comply with grease interceptor regulations. Also, inspectors from the Department of Health and Mental Hygiene check for proper grease trap sizing during regular restaurant inspection.

Further, DEP began a year-long collaboration in 2013 with the New York City Housing Authority at the Baruch Houses in Lower Manhattan, for example. The program is piloting intensive educational outreach about the proper disposal of used cooking oil and the impact of grease on City sewers. Residents of one building in the complex act as the control group and receive DEP's standard educational materials, while residents of another building will participate in additional meetings, workshops, and events focused on grease. The sewer service lines from both buildings were inspected and cleaned prior to the program, and crews will re-inspect the lines at the pilot's conclusion to measure the relative improvement as a result of the intensive curriculum.

Our operational programs for grease are also robust. DEP has implemented a proactive, data-driven maintenance program to remove the grease buildup in the sewers from areas with persistent grease issues. As part of this program, DEP analyzes complaint data in combination with the results of field inspection to identify strategic locations to be degreased on a scheduled cycle. We inspect these locations on a monthly, quarterly or annual basis depending on the severity of the grease issue identified and degrease the sewer using chemical degreaser on this cycle once depositions re-form.

Finally, sanitary and baby wipes also present a significant problem for our sewers and a potential for flooding. Flushed wipes not only damage wastewater treatment plants and put homes and businesses at risk for sewer backups, they cost a significant amount of money—more than \$3.5 million per year in removing them from the system. We are currently working with our partners in government to develop a plan to educate and inform the public about the significant costs and dangers that wipes present.

Realizing that flooding is something that can be both very frustrating and hard to understand, DEP issued the “Homeowner’s Guide to Flood Preparedness” in 2013. This educational brochure offers a range of precautions homeowners can take to protect their homes against rain events. In addition to providing information about how one’s property configuration can put a home at risk for flooding or sewer backups from heavy rain, we offer the following about catch basins specifically: “When debris covers and mats the street level gratings, stormwater cannot enter the catch basin and can pool around the area causing street flooding, even before the sewer is full. You and your neighbors can help reduce this type of flooding by disposing of litter properly and by carefully removing leaves or trash from catch basins before or during a rain event.” I have brought copies of the brochure and am glad to make multiple copies available for your offices to distribute to constituents.

As you know, all of this does not cover the breadth and scope of all that DEP does to maintain the infrastructure we have in the City. We maintain the 6,800 miles of water mains, 7,500 miles of sewers, 110,000 fire hydrants and many more assets that I have listed for your reference in an appendix attached to this testimony. We ensure adequate water pressure for water distribution and firefighting and respond to leaks and emergencies, such as water main breaks and/or sewer collapses. Day to day, we balance the challenges of the water supply and sewer systems and use our professional judgment and analytical programs to best target our resources where they are most needed. Over the last many years, by focusing on our role as stewards of the system, we have made huge improvements in the way the system performs. This is demonstrated by the sustained improvement of almost all of our operational metrics across the board.

The FY15-18 Capital Plan projects \$1.7 billion of spending on sewers including:

- \$425 million for replacement of sewers (storm, sanitary, or combined);
- \$885 million for new sewers (of all types) of which:
  - Storm sewers (either new or reconstructed) account for \$658 million of projected spending, of which \$164 million is for high-level storm sewers, including Third Avenue in Brooklyn; and

- \$278 million of the total is for both the conventional sewers and the lands necessary to create Bluebelt systems, which continue to extend beyond Staten Island to multiple locations in Queens including Springfield Lake, and to Van Cortlandt Park in the Bronx.

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Now looking at the specifics of the proposed legislation, it first requires semiannual reporting on various catch basin indices. DEP currently reports on catch basins semiannually in the Mayor's Management Report (MMR). Specifically, the MMR puts forth many of the metrics discussed today and with more detail, such as number of complaints received, response time and resolution time. We also report yearly to the New York State Department of Environmental Conservation (DEC) on our catch basin programmatic cycle; this report includes the schedule for the cycle as well as the number of basins inspected, cleaned and hoods repaired.

We do not disaggregate the data by Community Board except for the schedule of our programmatic cycle included in our yearly report to the DEC, as would be required in the legislation. Community Boards vary greatly in size and number of catch basins, making it difficult to compare more detailed metrics within them on a one-to-one basis. Intro. 240 also requires that all 148,000 catch basins be inspected annually, and any catch basin requiring repair in response to a complaint be completed in three days.

In FY2014 we received 8,576 clogged catch basins and street flooding complaints. The average time it took to resolve these complaints was 3.9 days, well under the target completion date set in the Mayor's Management Report (MMR) of 9 days. During this period, DEP surveyed 31% (45,819) of catch basins citywide; of which less than half required cleaning – a total of 21,405 (representing 14% of the total system). During FY2014, an additional 8,325 basins, representing less than 6% of our system, were cleaned in response to 311 complaints. In addition, in the past five years, we have seen catch basin complaints decline 24% from the levels in FY2010 compared to those in FY2014. Our catch basin repair backlog has also declined significantly during that time, specifically 45% from FY2010.

Over the last six years, total sewer backup complaints have decreased from 16,920 in FY 2009 to 14,903 in FY 2014, a decrease of 31%. Confirmed sewer backups decreased from 6,831 in FY2009 to 4,200 in 2014, a decrease of 53%. Over the last six years, the number of street segments with recurring backups decreased 54%. The number of street segments with recurring dry weather backups also decreased 57% since FY2009. In FY2014, 380 street segments had recurring backups in dry weather conditions, just 0.4% of approximately 157,700 citywide segments.

As mentioned earlier, 72% of the confirmed citywide sewer backups in FY 2014 were caused by commercial and residential grease buildup in the sewer. The remaining 28% of backups were caused by other conditions, mostly debris and other blockages within the sewers, but also due to situations where they were temporarily overtaxed due to rain, a pipe that was broken, or other causes.

We firmly believe that our three-year inspection cycle is effective, appropriate, and responsible. Most importantly, as written, we do not believe that Intro. 240 will have any tangible effect on reducing flooding, which we believe is the major issue of concern in this context. If Intro. 240 were enacted, DEP would need to significantly increase our resource allocation to this operation. One option would be to reallocate resources from other areas of our operations, such as hydrant repairs, leaks, water-main breaks, response to sewer collapses, or other repairs, thereby increasing the time it takes to respond to and resolve those issues. Of course, another alternative would be to increase the agency's overall funding. As you well know, all DEP's water activities are entirely funded by the water and sewer rates, paid by NYC home and business owners. This significant change in our operations would require a significant increase on the water and sewer rate, which we do not believe is necessary, appropriate, or responsible.

DEP has had considerable success implementing new and innovative programs to run our sewer system better and more effectively than ever before. We recognize that there is improvement needed and we constantly strive for it. We have and are implementing additional measures, such as accelerating storm sewer installations in locations like 119<sup>th</sup> Avenue in Queens, extending storm sewers to areas like Springfield Boulevard in Queens, building out Bluebelt projects in both Staten Island and other areas of the city, and using Green Infrastructure in areas where it can help manage stormwater. These and other measures have been successful and are the real answers to the concern at hand. Maintaining our operational flexibility is paramount, especially when we are juggling a myriad of issues including operational maintenance and emergencies, all while balancing those needs with a fair and reasonable water and sewer rate charge. We will also continue to work with our partners in government and other utilities across the country to ensure that regulatory decisions are made that help us run our system more efficiently. Finally, we would be glad to work with this Committee to craft legislation that would provide the Council with meaningful transparency in reporting on our operations and expenditures.

Again, I thank you for the opportunity to testify today and would be happy to address any of your questions.

## **Appendix: BWSO Water and Sewer System Assets**

### **Water System**

- 3 City Water Tunnels and The New Croton Aqueduct
- 76 water distribution shafts
- 518 Regulators
- 220, 000 valves
- 110, 000 hydrants
- 6,800 miles of water mains
- 2 active reservoirs; 100 million gallon Silver Lake Tanks
- 4 booster chlorination facilities
- 68 groundwater wells in SE Queens

### **Sewer System**

- 7,500 miles of sewers
- 148,000 catch basins
- 400 acres of Bluebelts on Staten island
- 277,000 manholes