3 Analysis of July and September 2012 Flood Events

3.1 Rainfall Conditions

On July 10, 18, 19, and September 2, 2012, intense, localized rain events occurred in the neighborhoods of Bloomingdale and LeDroit Park in Northwest Washington. These storm events caused stormwater and combined sewage to flood the community. In order to evaluate the return period for each storm, raw rainfall data collected by DC Water's Bryant Street rain gauge (located in the northwest corner of Bloomingdale) was compared to rainfall return frequency data for the District that was provided by the National Oceanic Atmospheric Administration (NOAA).

Flooding at 4800 Block of Georgia Avenue

The evaluation shows:

- The July 10 storm has a nearly 10-year NOAA recurrence interval for 15-min duration storms
- The July 18 storm has a nearly 5-year NOAA recurrence interval for 30-min duration storms
- The July 19 storm has a nearly 5-year NOAA recurrence interval for 15-min duration storms
- The September 2 storm has a more than 10-year NOAA recurrence interval for 2-hour duration storms.

Table 3-1 compares these four rain events, and includes the "Derecho" storm on June 29, 2012, which did not cause flooding in Bloomingdale and LeDroit Park.

Table 3-1: Rainfall Summary for Major 2012 Storms

Date	Duration	Rainfall (inches)	NOAA Point Precipitation Frequency (Nearly)
6/29/12 "Derecho"	30-min	0.50	< 1 year storm
7/10/2012	1-hour	1.96	10 year storm
7/18/2012	30-minute	1.35	5 year storm
7/19/2012	15-min	0.94	5 year storm
9/2/2012	2-hour	2.78	10 year storm
* Recorded by DC Water's Bryant Street Rain Gage			

Source: DC Clean Rivers Project

The Bryant Street rain gauge data for the four storm events (7/10, 7/18, 7/19, 9/2) in 2012 was also compared to historical rainfall data dating back to 1948 (for 2- and 6-hour duration events) from the National Weather Service rain gauge at Ronald Reagan National Airport. This rainfall comparison found instances in the historical record wherein multiple intense storms occurred in the same year. For example, residents experienced three 2- to 5-year storms of a two-hour duration in 1953. The comparison also found that storm events tend to be episodic in nature, with some decades (i.e., 1950's) having many

intense storms and others (i.e., 1990's) experiencing comparatively fewer intense storms at longer durations.

Comparison of the Bryant Street rainfall data to that of other rain gauges throughout the District found that Bloomingdale and LeDroit Park comprised one of the areas with the most intense rainfall and largest storm volumes in the region during the July and September storms. A significant difference in rainfall totals was seen over short distances outside these neighborhoods. For example, only 0.6" of rainfall occurred at Ronald Reagan National Airport (approximately five miles from Bloomingdale), compared to 2.04" at the Bryant Street rain gauge during the July 10, 2012 event. This localized, intense rainfall centered around Bloomingdale was confirmed by Doppler radar estimates of the storm events. The Doppler radar image for the 7/10, 7/18, and 7/19 storm events can be seen in Figure 3-1 below.

Figure 3-1: Doppler radar images for July 2012 storms

Source: Washington Post, National Weather Service

3.2 Sewer System Operation during July and September Flood Events

The flooding events during July and September 2012 strained the local sewer system in the Bloomingdale and LeDroit Park neighborhoods well beyond what is typically observed for the region. The trunk sewers were observed to surcharge and overflow through manholes and catch basins at numerous locations. Many homes and businesses whose sewer laterals connect to the sewer collection system in close proximity to these surcharged sewers were subject to sewer backflow conditions. Some of the flow contributing to the flooding experienced in July and September originated far upstream from Bloomingdale and LeDroit Park.

Based on the reported instances of flooding, the majority of properties in the Bloomingdale and LeDroit Park area experienced sewer backups, or a combination of sewer backups and surface flooding. The locations of properties that experienced flooding provide strong evidence of a sewer trunk line under excessively surcharged conditions. Specifically, the NEBTS was under capacity from the intersection of Florida Avenue and Ninth Street, down to the intersection of Florida Avenue and North Capitol Street. Additionally, it can be concluded that the Flagler Place Trunk Sewer was surcharged between Adams Street and Flagler Place to First and V Streets. Finally, the numerous properties between First and V Streets to Florida Avenue that reported backflow conditions indicate that the First Street Trunk Sewer experienced surcharging during all the storm events discussed. The reported flooding on First Street, as well as on the intersecting streets between V Street and Florida Avenue– U Street, Thomas Street, T Street, Rhode Island Avenue, Seaton Place, Randolph Place, and R Street– further reinforce the conclusion that the First Street Trunk Sewer experienced excessively surcharged conditions.

Observations of surface ponding and manhole overflows in Bloomingdale and LeDroit Park provide further evidence of the sewer system's condition during these wet weather events. Most dramatic are the reports and photographs of the overflowing manhole at the intersection of First Street and V Street. At this particular intersection, three large sewer lines (the Flagler Place Trunk Sewer, First Street Trunk Sewer, and North Capitol Trunk Sewer) meet at a choke point, where flows from all three sewers discharge into a single sewer that is practically the same diameter of each of the individual contributing sewers.

Figure 3-2: Flooding on Rhode Island Avenue at First Street NW

The reported locations of ponding in the area of concern also indicate either conditions of excessive surcharging in the system or possible inadequacies of the inlet structures. Numerous reported observations of flooded intersections at First Street and Rhode Island Avenue, Fourth Street and Florida Ave, Second Street and Florida, Flagler and V Street, and the 1700 block of First Street have been documented.

During a rain event, rain enters the sewershed and is collected on roofs and other drains. Flow is then routed to small pipes that connect to the trunk sewers. Once flowing water reaches the trunk sewer, flow is then routed to the low portions of the sewershed. All the evidence discussed indicates that most or all of the major trunk lines in Bloomingdale and LeDroit Park were flowing beyond their capacity during the July and September storm events.

3.3 Impacts to Properties

DC Water has conducted surveys through its Risk Management, Public Affairs, and Customer Service Departments to gain an understanding of the number and location of residents who experienced flooding during the July and September storms. Online links to the DC Water Flooding Survey for Bloomingdale and LeDroit Park Customers were posted on the Bloomingdale Blog and DC Water Bloomingdale webpage. The survey is continually updated through the responses submitted online and through recordkeeping by DC Water Customer Service and Public Affairs. To date, more than 200 properties in total have reported some type of flooding through the DC Water channels. Specifically:

- 147 properties reported sewer backups
- 88 properties reported overland flooding
- 70 properties reported both sewer backups and overland flooding
- 43 properties reported having an unspecified type of flooding (the resident reported flooding, but gave no specific details on the incident(s)).

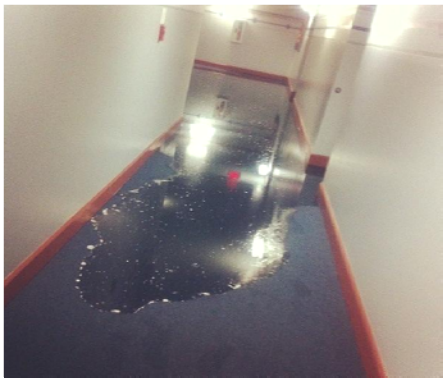
While the survey results are not comprehensive because they are based on self-reported incidents of flooding and sewer backups, they do provide some insight into the key locations where residents were affected by flooding (Figure 3-3).

Consultations conducted by ARCADIS/Malcolm Pirnie engineers also shed light onto the specific damages done to properties as a result of the July and September storm events. Over 40 consultations

were used to inform this report and, although small in number, data from the consultations represented a wide breadth of the impact to properties experienced throughout Bloomingdale and LeDroit Park.

Residents experienced a range of flood heights in their basements as a result of the storms, from 2 to 24 inches of standing water that lasted anywhere from 15 to 180 minutes. On average, residents experienced flood levels of 9.5 inches, at a duration of approximately 55 minutes. Most residents who were consulted stated that the sewer backups occurred through toilets, bathtubs, and sinks that were overtopped with sewage, and up through outside area drains that funneled water into properties by way of low basement door sills. Of the residents who were visited by ARCADIS/Malcolm Pirnie engineers, 71% reported flood waters within their homes, 6% reported flood waters present only in their yards, and 19% experienced flooding both within their homes and yards. Approximately 85% of consulted residents experienced sewer backups, suggesting that the primary source of water entering directly into homes came from either indoor plumbing fixtures located within basements, or area drains located directly outside of basements.

Based on public witness testimonies explaining the damages experienced by individual properties, the costs associated with flood clean-up and repair have ranged from $3,000 to $18,000 per household. Costs were incurred largely by initiating in the following activities:



Flooded Basement

- Mold remediation and other clean-up activities
- Home repairs, including the removal of soiled carpets, walls, floors, and trim
- Installation of backwater valves, sump pumps, and other plumbing fixtures in order to reduce the impact of future storm events
- Installation of flood prevention devices, including rain barrels and cisterns

These costs do not reflect the full financial burden of residents in Bloomingdale and LeDroit Park, nor do they represent the toll on residents who cannot afford to engage in clean-up activities. Additional damages include:

- Damage to and loss of personal property and family heirlooms
- Significant loss of resale value to homes
- Loss of time from work to engage in clean-up activities, oversee home repairs, and meet with DC Water personnel, general contractors, and Master Plumbers
- Loss of income from basement apartment tenants
- Loss of tenants
- Physical and emotional toll of repeated clean-up and mitigation efforts

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DRAWING ID: L:\LTCP\11\1110 - DIV J\01 - PRE-DESIGN\700 - CADD\CURRENT\EXHIBITS\BLOOMINGDALE\FIGURE 3-3-MAP OF REPORTED FLOODING.DWG

water is life

DISTRICT DEPARTMENT OF THE ENVIRONMENT

ONE CITY

DISTRICT OF COLUMBIA DEPARTMENT OF PUBLIC WORKS

MAYOR'S TASK FORCE REPORT ON THE PREVENTION OF FLOODING IN BLOOMINGDALE AND LeDROIT PARK

MAP OF REPORTED FLOODING

DATE: DECEMBER 2012 | FIGURE 3-3

3.4 Storm Response

The following section details actions that the Department of Public Works, District Department of Transportation, Department of Health, and DC Water initiated in response to the June, July, and September 2012 rain events.

3.4.1 Department of Public Works (DPW)

DPW provided coordination and operational support to residents and other government agencies following the June 30, 2012 "Derecho" storm, prior to the July and September flood events. These activities involved close collaboration among multiple operational agencies, including DDOT, HSEMA, and DC Water.

Immediately following the "Derecho" storm, DPW engaged in the following storm response activities to ensure the safety of residents in the affected neighborhoods:

- Storm debris removal: DPW offered special debris removal services, which included bulk trash pick-up throughout the week and community disposal designations for food that spoiled due to electricity outages. Residents were also encouraged to bring spoiled food to the Ft. Totten Transfer Station, 4900 John F. McCormack Drive NE.
- Downed tree removal: DPW deployed equipment and manpower to assist DDOT with the removal of wind-damaged trees and branches that blocked roadways and otherwise impeded movement or reduced public safety.

Prior to the July and September flood events, DPW provided sandbags to residents experiencing localized flooding.

- Sand bag distribution: On July 20, 2012, DPW distributed sandbags at RFK Stadium, Lot 7. DPW also made sandbags available at its 201 Bryant Street NW site for residents. Distribution was publicized widely through the media.

DPW hands out sandbags from its Bryant Street Garage location

Source: Sarah L. Voisin, The Washington Post

3.4.2 Department of Transportation

DDOT engaged in a suite of emergency response activities that mobilized several of the agency's divisions in response to the June, July, and September storms. DDOT's response, detailed below, involved carrying out the agency's standard protocol for Storm Alerts, which includes restoring traffic signals, roadway lighting, alley lightings, and installing damaged roadway signs.

- Flood monitoring: DDOT staff monitored known flooding areas: Bloomingdale; Nannie Helen Burroughs Avenue, Malcolm X, Canal Road, and Chain Bridge. High water was monitored by camera through DDOT's Transportation Management Control.
- Hazard communications: During the storms, DDOT deployed Variable Message Boards that were used to alert residents of potential areas with high water. Message boards were located in the Bloomingdale and LeDroit Park neighborhoods, and at centralized locations throughout the District.

- Debris and tree removal: Following the "Derecho" storm, DDOT's in-house staff helped clear more than 350 service requests that ranged from small debris to large tree removal. DDOT's Urban Forest Team specifically fielded tree-related activities. DDOT also ensured that construction sites were properly secured during and after the storm events.
- Traffic control: DDOT Traffic Control Officers detoured traffic away from the flooded areas. DDOT Roadway Operations Patrol officers handled roadway emergencies. The agency's evening and third shift crews monitored the impacted areas and took the necessary actions to assist in keeping the area safe and monitored at all known low-lying areas.
- Neighborhood inspections: DDOT's Public Space Regulatory Inspectors carried out inspections in Bloomingdale, LeDroit Park, and other surrounding communities affected by the storms.
- Flooding Investigation: DDOT engaged its Transportation Operations Administration Street and Bridge Maintenance Division, IPMA staff to investigate downed trees and flooding.

DDOT Crews Clear Street from T Street NW near the Intersection of Rhode Island Ave NW

Source: Sarah L. Voisin, The Washington Post

- Interagency coordination: DDOT reported to HSEMA and regional partners about on-the-ground conditions during the storms, and coordinated with DPW when assistance was needed.
- Information sharing: DDOT provided updates to the public, DPW, HSEMA, and the City Administrator through its Communications Team and Director.

3.4.3 Department of Health (DoH)

DoH did not pursue storm response activities in Bloomingdale and LeDroit Park directly following the July 2012 storms. However, the agency engaged in a comprehensive action plan following the September 2, 2012 storm. DoH's objectives for its September flood response were to inform the public of potential health threats and provide appropriate operational response services.

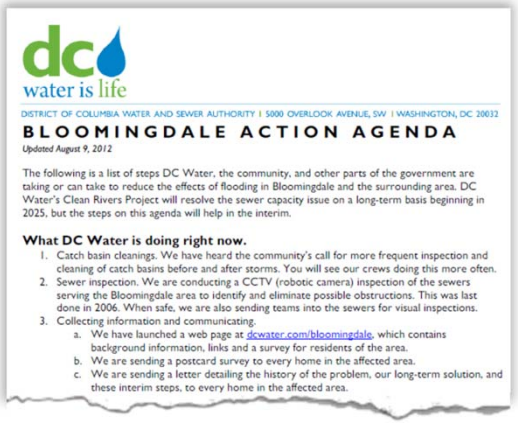
On September 5, 2012, DoH initiated the following response:

- Performing site visits and educating residents: DoH HEPRA visited the affected areas of Bloomingdale and LeDroit Park and distributed approximately 400-500 fliers addressing flood recovery health issues.
- Disseminating knowledge: Residents received information covering clean-up, water and food safety, prevention of mildew/mold growth, elimination of standing water, treatment of wounds, hand washing guidelines, damage to septic tanks, and HVAC systems.
- Surveying the neighborhoods for health hazards: Epidemiological surveillance was reviewed by John Davies Cole, DoH Epidemiologist.
- Offering vector control consultations: Dr. Woldu, Sr. Deputy Director, HRLA, was available to respond to vector control issues, as well as mosquitoes/West Nile Virus.

3.4.4 DC Water

Since mid-July 2012, DC Water has initiated a range of steps to help reduce the effects of flooding in Bloomingdale, LeDroit Park, and the surrounding area. The DC Water Clean Rivers Project will resolve the sewer capacity issues on a long-term basis beginning in 2025. The following activities were implemented to provide relief in the interim:

- Catch basin cleanings: Based on the community's call for more frequent inspection and cleaning of catch basins before and after storms, DC Water increased the amount of cleanings.
- Sewer inspection: DC Water began conducting CCTV (robotic camera) inspections of the sewers serving the Bloomingdale and LeDroit Park areas to identify and eliminate possible obstructions. This was last done in 2006. When safe, DC Water has also sent teams into the sewers for visual inspections.
- Collecting information and communicating:
  - DC Water provided a briefing to Councilmember Kenyan McDuffie.
  - An email address bloomingdale@dcwater.com and hotline (202) 787-2688 were established for questions.
  - DC Water launched a web page at dcwater.com/bloomingdale, which contains background information, links, and a survey for residents of the area, and information about programs for property owners.
  - A postcard survey was sent to every home in the affected area.
  - DC Water sent a letter detailing the history of the problem, their long-term solution, and interim steps to every home in the affected area.
  - DC Water is providing community updates on a bi-weekly basis, or as needed.
  - DC Water has been responding to every customer who has contacted them with a concern by phone, email or Twitter.
  - DC Water attended the July 16 monthly meeting of the Bloomingdale Civic Association.
  - DC Water attended a special meeting of the Bloomingdale Civic Association on Saturday, August 4.
  - DC Water co-sponsored backwater valve workshops with the Bloomingdale Civic Association on September 6 and September 8.
  - DC Water General Manager George Hawkins is co-chairing the Mayor's Task Force on Bloomingdale flooding.


dc water is life

DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY | 5000 OVERLOOK AVENUE, SW | WASHINGTON, DC 20032

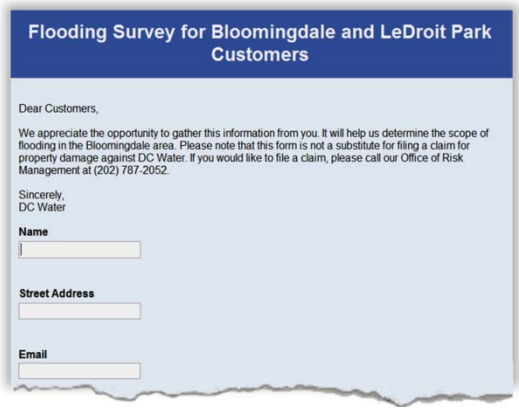
BLOOMINGDALE ACTION AGENDA

Updated August 9, 2012

The following is a list of steps DC Water, the community, and other parts of the government are taking or can take to reduce the effects of flooding in Bloomingdale and the surrounding area. DC Water's Clean Rivers Project will resolve the sewer capacity issue on a long-term basis beginning in 2025, but the steps on this agenda will help in the interim.

What DC Water is doing right now.

1. Catch basin cleanings. We have heard the community's call for more frequent inspection and cleaning of catch basins before and after storms. You will see our crews doing this more often.
2. Sewer inspection. We are conducting a CCTV (robotic camera) inspection of the sewers serving the Bloomingdale area to identify and eliminate possible obstructions. This was last done in 2006. When safe, we are also sending teams into the sewers for visual inspections.
3. Collecting information and communicating.
   a. We have launched a web page at dcwater.com/bloomingdale, which contains background information, links and a survey for residents of the area.
   b. We are sending a postcard survey to every home in the affected area.
   c. We are sending a letter detailing the history of the problem, our long-term solution, and these interim steps, to every home in the affected area.


Flooding Survey for Bloomingdale and LeDroit Park Customers

Dear Customers,

We appreciate the opportunity to gather this information from you. It will help us determine the scope of flooding in the Bloomingdale area. Please note that this form is not a substitute for filing a claim for property damage against DC Water. If you would like to file a claim, please call our Office of Risk Management at (202) 787-2052.

Sincerely,
DC Water

Name

Street Address

Email

- Assisting in preparation: DC Water has begun coordinating with the Department of Public Works to help make sandbag distribution possible in Bloomingdale and LeDroit Park when storms are predicted.
- Offering a backwater valve rebate program (Section 5.1.2).

- Providing consulting services: DC Water retained the services of ARCADIS/Malcolm Pirnie, an engineering consulting firm, to provide advice to customers, at no charge, about steps they can take in their own homes to reduce flooding (Section 5.1.3).
- Offering a rain barrel and cistern program through the District Department of the Environment (Section 5.1.5).
- Collaborating with the District Department of Transportation on two initiatives:
  - Catch basin upgrades at select locations
  - Improving surface water retention at select locations

3.5 Cause of Flooding

During and following the rain events of July and September, various agencies of DC government received numerous reports of flooding in the form of sewer backups, surface, and overland flooding into basements and flooded intersections. Based on the locations and nature of the flooding reported to DC Water, possible causes of flooding included:

- Inadequate sewer capacity
- Inadequate inlet capacity
- Sewer blockages
- Effects from inflatable dams
- Sources of flow or new storm connections to the system which have not been accounted for

Each of these causes of flooding is analyzed in this section.

3.5.1 Sewer Capacity Exceeded

The most plausible explanation behind the flooding that occurred in Bloomingdale and LeDroit Park is that stormwater runoff, combined with sanitary sewer flow, exceeded the capacity of the sewer collection system. Many prior engineering studies have concluded that the Northeast Boundary Trunk Sewer and the Flagler and First Street Trunk Sewers do not have adequate capacity to properly handle the flow generated during storms of the magnitude and duration experienced in July and September.

When a gravity sewer pipe has adequate capacity (in other words, it experiences flows at or below its rated capacity), all the flow is contained within the cross-section of the pipe. However, when the flow entering the collection system exceeds the pipe's rated capacity, the pipe quickly fills up and begins to flow under pressure or surcharged conditions. The pressurized conditions of the surcharged trunk sewer lead to increased sewage depth in the manholes and catch basins, in some cases to the point of overflow. Additionally, the pressure results in sewage backing up into the pipes that connect to the trunkline. The pressure forces sewage to flow back up into these pipes, and in extreme cases, can result in sewage overflowing out of drainage fixtures in the homes and businesses connected to the same pipes. In the case of the flooding observed in Bloomingdale and LeDroit Park, the pipes which normally served to carry sanitary waste away from homes and business became the pathway by which combined sewage entered and flooded numerous properties.

The evidence regarding capacity issues can be summarized as follows:

Past engineering studies conclude that the main sewers in the NEB drainage area have significant capacity limitations. For a detailed discussion on past engineering studies, refer to Section 2.4 Prior Studies. Studies dating back to 1955 support the conclusion that the flooding experienced this summer was due to inadequate capacity in the trunk sewers of the NEB drainage area.

For storm collection and conveyance, DC Water established the 15-year storm as the design standard for the system. Most of the pipes in the Northeast Boundary drainage area were constructed before 1910, well before the current design standard was established. The existing NEBTS and many of its trunk sewers do not have the capacity to convey storms with a 2- to 15-year return frequency without surcharging and leading to backflow conditions.

Computer model simulations (performed between 2006 and 2012) indicate that the NEB trunk sewers do not have adequate capacity to properly handle the type of storms experienced this summer. These simulations of the NEB collection system reinforce the conclusions of past studies, namely that the trunk sewers in Bloomingdale and LeDroit Park do not have the capacity to carry storm flows such as those experienced in July and September of 2012. The computer simulations also predicted many of the locations where street flooding and surface ponding would be expected to occur.

The location and nature of flooding in Bloomingdale and LeDroit Park provide a strong indication that the flooding originated from surcharged trunk sewers, which manifested in manhole overflows and basement backups. Further evidence of the capacity issues along the NEBT can be seen in the distribution of properties which reported flooding (primarily due to sewer backups). As can be seen in Figure 3-3, the residents who reported flooding were primarily located along Flagler Street, First Street, Florida Avenue, and numerous side streets which are in close proximity to the trunk sewer. Many residents also observed overflowing manholes and flooded intersections corresponding to locations on or near the trunk sewer, including Second and Florida, 1700 block of First Street, First and V, and First and Flagler.

3.5.2 Inadequate Inlet Capacity

Accounts of flood waters overtopping curbs and sidewalks, and other reports of flooding at various intersections indicate that the capacity of the inlet structures to intercept flow from the paved streets was exceeded. This could be attributed to the size and quantity of inlets, or blockages in the inlets due to accumulated debris. Such blockages would likely reduce the rate at which flow could enter the sewer collection system, since inlets (also referred to as catch basins) function primarily to route surface flow from streets into the sewer system. Inhibited flow into inlets would make the problem of surface flooding worse, in addition to reducing the amount of flow into pipes that may have already exceeded their capacity.

Typical Catch Basin, Clear of Debris and Trash

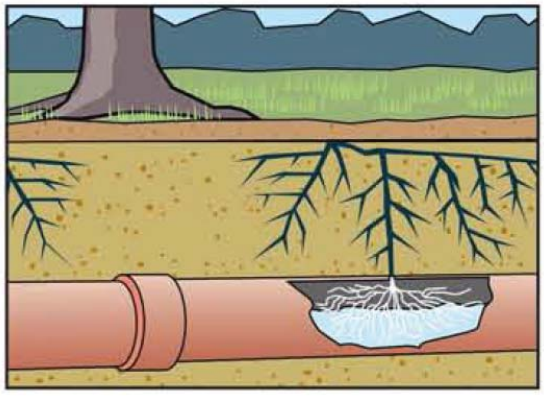
Even though it is extremely unlikely that inlet capacity limitations were the cause of overflowing manholes and neighborhood sewer backups, in the days and weeks following the storms, DC Water took steps to ensure that all catch basins in the area were flowing free of obstructions. As described in their Bloomingdale Flooding Action Agenda, DC Water implemented an accelerated program to clean the catch basins in Bloomingdale and LeDroit Park.

3.5.3 Other Possible Causes Investigated

3.5.3.1 Sewer Blockages

Sewer blockages are caused by roots, grease, debris, or collapsed pipes that obstruct flow within a given section of the sewer system. Sewer blockages can result in sewer backups and flooding in the areas upstream of the blockage. In some cases, blockages completely obstruct the flow in a pipe and cause flooding during dry weather and small storms. Consequently, a complete blockage in Bloomingdale and LeDroit Park can be ruled out as a cause of the flooding that occurred in the neighborhoods due to the fact that all of the flooding reported has been correlated with capacity exceedances associated with large storm events.

Partial pipe blockages also may occur when roots, grease, or debris block a portion of a pipe, allowing normal daily flows to pass through while restricting the capacity of the pipe when peak flow occurs (i.e. during large storm events). Reports of flooding in Bloomingdale and LeDroit Park could only be caused by one or more partial blockages, since reported flooding only occurred either during or directly following the July and September storms.



Tree Root Migrating into Pipe

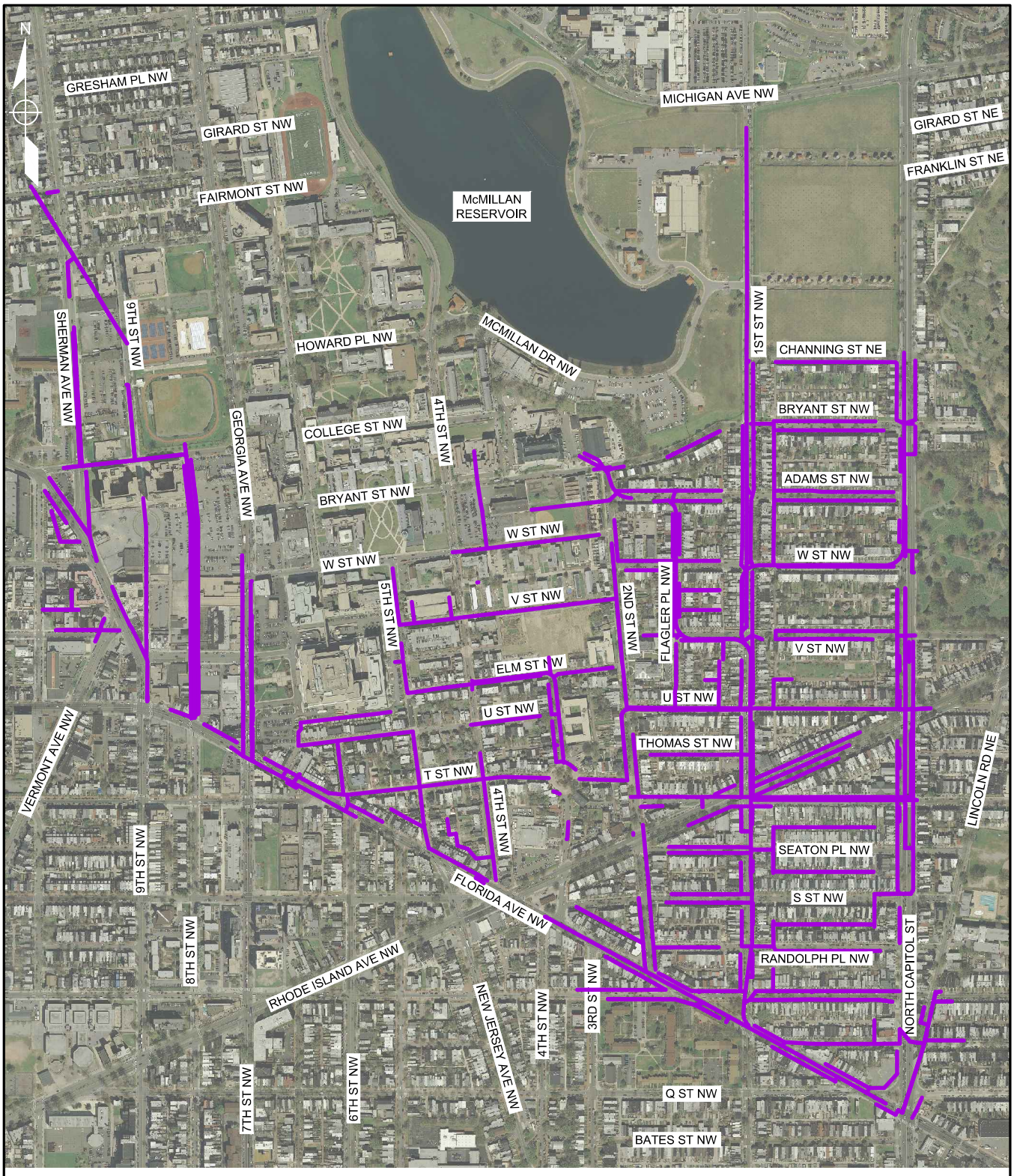
In order to investigate where such partial pipe blockages may have led to flooding during the July and September storm events, sewer condition assessments have been initiated by DC Water. When investigating a suspected blockage, engineers and system operators compare the location of reported flooding to maps of the collection system. Flooding observed on separate branches of the collection system can only be explained by either numerous blockages at each of the observed locations occurring simultaneously, or a blockage in a common downstream pipe. Multiple blockages occurring simultaneously are not likely; it is more likely that the flooding was caused by a blockage in a downstream pipe that is common to the drainage area of Bloomingdale and LeDroit Park.

In the days following the storms, DC Water personnel visually inspected the large trunk sewers on First Street by entering the pipes and performing a walk-through inspection. As a result of these inspections, no trunk sewer obstructions were found that would explain the flooding observed this summer.

While it is extremely unlikely that flooding resulted from blockages in the numerous small diameter sewer pipes which collect flow from each neighborhood block in the area, DC Water undertook an accelerated program to inspect all pipe segments within the affected region. The goal of the pipe inspections is to ensure that all pipes in the area continue to flow free and unobstructed.

Investigation of the Bloomingdale sewer system utilizing closed-circuit television (CCTV) began on July 23, 2012 and is currently underway (Figure 3-4). To date, two subcontractors have been employed to do this work: Video Pipe Services (VPS) and GOEL Services. Sewer lines are inspected in two stages; prioritized lines– lines that are located near the homes that reported flooding during the July, 2012 storms– were inspected first. ARCADIS/Malcolm Pirnie engineers are currently reviewing video footage for quality control purposes. The footage will be reviewed rigorously to further assess the condition of the sewers in the Bloomingdale and LeDroit Park area. This additional review will allow engineers and the relevant stakeholders to make appropriate recommendations on technologies and techniques to rehabilitate specific sewer pipes, as necessary.

All of the critical sewer lines within Bloomingdale and LeDroit Park, including the NEBTS and Flagler Place Trunk Sewer, have been inspected for defects. As indicated by the preliminary condition assessment results for sewer pipe surveyed to date, no pipes were identified to be collapsed or near collapse. Additionally, no large-diameter pipes were identified to have blockages that would inhibit flow to the degree that could cause manhole overflows, basement back up, and street flooding, as were seen in Bloomingdale and LeDroit Park during the July and September floods. Remaining inspection work within the region is for non-priority lines– lines that could not contribute to severe flooding.



INSPECTED PIPES TO DATE

MAYOR'S TASK FORCE REPORT ON THE PREVENTION OF FLOODING IN BLOOMINGDALE AND LeDROIT PARK

CCTV INSPECTION PROGRESS

DATE: DECEMBER 2012 | FIGURE 3–4

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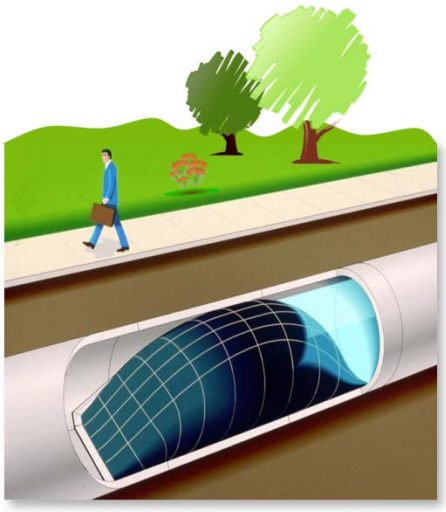
DRAWING ID: L:\LTCP\11\1113.6 – DIV P\01 – PRE-DESIGN\700 – CADD\CURRENT\EXHIBITS\FIGURE 3-4 CCTV INSPECTIONS.DWG

3.5.4 Effects of Inflatable Dams

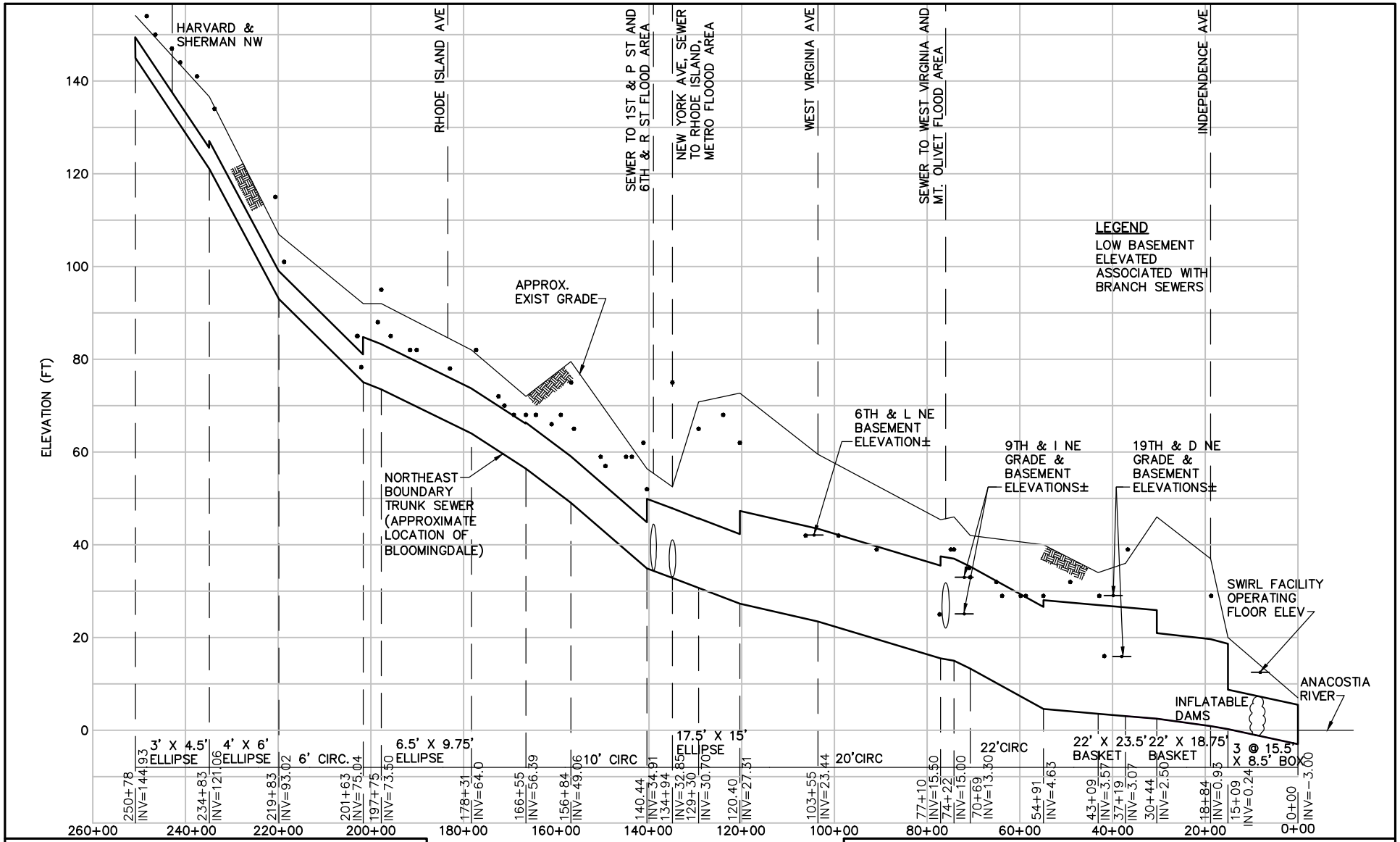
Many Bloomingdale and LeDroit Park residents have expressed concern over the role of the inflatable dams, located in the Northeast Boundary sewer outfall, in contributing to flooding. To respond to this concern, DC Water released the following information assessing the possible impact of the inflatable dams on the flooding in Bloomingdale and LeDroit Park:



Rendering of Inflatable Dam

Inflatable dams comprise one component of DC Water's CSO control program. The inflatable dams are located at the end of the NEBTS, about 3.25 miles away from Bloomingdale, before the sewer discharges to the Anacostia River. The dams prevent high river levels from backing up into the sewer, and also store combined sewage during small rain events to reduce pollution to the Anacostia River. During large rain events, the dams are designed to release combined sewage to the Anacostia River. DC Water has investigated the July and September flood events and has determined that the dams did deflate and did not cause the flooding. Figure 3-5 shows a profile (i.e. side view) of the Northeast Boundary Trunk Sewer and the Flagler Street Trunk Sewer serving Bloomingdale. The profile shows that the ground surface near the inflatable dams is approximately at elevation 15 (note that "elevation" means distance in feet above mean sea level). Bloomingdale has a ground surface elevation ranging from about elevation 60 to elevation 105, which is much higher than the inflatable dams and many other locations in the Northeast Boundary. If the inflatable dams failed and blocked the Northeast Boundary Sewer outlet, many locations between Bloomingdale and the inflatable dams would have severely flooded. The flooding would have been worse closer to the outlet to the river because of substantially lower elevations than that of Bloomingdale. This did not occur.

In addition to the difference in elevation between Bloomingdale and the inflatable dams discussed above, the recorded water level in the NEBTS also supports the conclusion that the inflatable dams did not contribute to flooding. DC Water operates a level sensor that measures depth in the NEBTS near the intersection of 18th and D Street NE. This location is approximately 4,500 feet upstream of the inflatable dams and 9,500 feet downstream of the intersection of First and Florida Ave NW, near Bloomingdale. At this location, the NEBTS is 22 feet wide by 23.5 feet tall. During the flood events of July 10, 18 and 19 and September 2, the maximum depth in the NEBTS ranged from 9.5 feet to 12.5 feet deep at this location. If the inflatable dams contributed to the Bloomingdale flooding, the water level in the NEBTS would have been much higher, probably above the top of the sewer (sewer surcharged). This also did not occur. The NEBTS was not full in this downstream section because it serves a large drainage area (more than 4,900 acres) and it did not rain as intensely in the whole sewershed as it did in Bloomingdale and LeDroit Park. While DC Water's investigations did indicate that the agency can improve the monitoring and data collection process associated with the operation of the inflatable dams, they also clearly demonstrated that the operation of the dams did not cause the flooding.



HORIZONTAL SCALE: 1" = 3,000'
VERTICAL SCALE: 1" = 30'

MAYOR'S TASK FORCE REPORT
ON THE PREVENTION OF FLOODING
IN BLOOMINGDALE AND LeDROIT PARK

NORTHEAST BOUNDARY TRUNK SEWER PROFILE

DATE: DECEMBER 2012 | FIGURE 3–5

3.6 Summary of Public Input

Public input has been solicited through various channels since the beginning of the July 2012 storm events. In addition to sharing personal accounts of how flooding has impacted their individual properties and homes, residents within Bloomingdale and LeDroit Park have submitted several suggestions for improving DC Water and other DC government agencies' response to future flood events. These comments and insights are documented here. Although not exhaustive in capturing the full range of opinions carried by residents in the affected neighborhoods, this section contains public witness testimonies from residents, condominium association representatives, and businesses that were submitted into the public record on August 25, 2012.

Residents have suggested that DC Water and other relevant agencies engage in the following actions:

1. Engineer a massive water retention plan or diversion plan north of the NEBTS.
2. Compensate residents to pay for damage to homes;
   - The Backwater Valve Rebate Program is a welcome first step, but should not require a Master Plumber;
   - The Backwater Valve Rebate Program should be revised to consider multi-family residences and businesses, and to include sump pumps;
   - The Backwater Valve Rebate Program should increase the $3000 rebate maximum;
   - The Rain Barrel Program should include compensation for installation because of associated construction costs that come with rerouting downspouts.
3. Improve agency-resident communications; DC Water was ineffective, negligent, and slow in handling calls, requests for catch basin information, and following through with appointments for residents who had backup issues.
4. Address concern that backwater valves are exacerbating surface ponding and flooding, making pipes below highly pressurized, raising flood waters, and causing damage to vehicles and businesses.
5. Implement a sewer construction moratorium on adding additional load to the NEBTS through future development projects, particularly in Bloomingdale and LeDroit Park.
6. Develop a solution for over the curb flooding at certain intersections.
7. Develop a solution to address physical injury from manhole blowouts, damage to vehicles, and public health hazards.
8. Install permeable pavers upstream of Bloomingdale and LeDroit Park.
9. Rewrite permitting legislation for new condominium development.
10. Explore more traditional avenues of information sharing about meetings and workshops, such as a weekly newsletter, in order to ensure that residents who lack access to new technologies are included in the process.
11. Provide protection from insurance rate increases for affected residents.