District of Columbia Water and Sewer Authority

Briefing on:

Federal Triangle Flood Risk

Briefing for:

Federal Triangle Area Flood Workshop #1

June 6, 2018
2011 Federal Triangle Drainage Study

- Developed as part of follow-up to June 2006 storm that caused flooding in Federal Triangle
  - 14 inches of rain over 3 days
  - >200-year return period
- Flood Protection Steering Committee
  - DOEE
  - DC Office of Planning
  - DC Water
  - NCPC
  - GSA
  - Smithsonian Institute
  - FEMA
- Additional Partner Agencies
  - Smithsonian
  - DOJ
  - National Archives
  - National Park Service
  - WMATA
- Completed by DC Water via its CSO Long Term Control Plan Consultant
2011 Federal Triangle Drainage Study

Goals and Objectives:

- Identify capacity of the existing sewer system
- Identify areas at risk for flooding
- Identify and evaluate potential alternatives to mitigate flood risk (including cost estimates)
- Propose alternatives for an early warning system

Today’s Workshop

September Workshop
Watershed
Federal Triangle is the Low Point for a Large Area

- Total Drainage Area Tributary to Federal Triangle = 5.83 square miles (about 3,732 acres)
- Total Federal Triangle Area = 153 acres
Federal Triangle is Low Point of a Topographic “Bowl”

- Developed using a combination of GIS and field survey data
- Constitution Avenue represents the low point for the entire watershed
Survey Results: Constitution Ave is not Much Higher than Potomac River

Based on DC Water Topographic Survey, D.C. Engineering Department Datum
Two Types of Flooding Can Affect Federal Triangle: Rainfall (Interior) and River Floods

- Analyzed in 2011 Study
- Due to Rainfall
- Due to High River Levels

- Runoff
- Federal Triangle
- Potomac River or Tidal Basin

- 2011 Study also analyzed probability and impact of intense interior rain while river was flooding
  - Minimal impact on interior flooding
  - Low probability of simultaneous river and interior flooding
- Water levels associated with river flooding are higher than those associated with interior flooding for the same return period
Two Ways to Drain Runoff From Federal Triangle
Overland flow when capacity of upstream sewers is exceeded

B St/NJ Ave

Constitution Ave Storm Sewer

Tidal Basin

Fed. Triangle

B St/NJ Ave Siphons

Str 15

Str 15a

Str 14

Str 16

Main Pumping Station

O St Pumping Station

Storm Sanitary

Anacostia River

Storm Sanitary

Tiber Creek

Sewer System Flow Pathways
Existing Sewer System Capacity

Constitution Avenue Storm Sewer
- Discharges by gravity
- Capacity limited by low grade of Federal Triangle relative to river
- At high flood stages, stop logs installed to block sewer (prevent backflow)
- Approximate design capacity: 2- to 5-year storm

B Street/New Jersey Avenue Trunk Sewer and Main and O Street Pumping Stations
- Discharge is pumped
- Capacity not limited by typical river stages
- Capacity is limited by the conveyance capacity of sewers, not pumps
- Approximate design capacity (sewers): 15-year storm
June 2006 Flood Event – Rainfall

Main & O Pumping Station Rain Gage vs NOAA Precipitation Frequency Data - June 25, 2006 Event

- NOAA 10-yr
- NOAA 25-yr
- NOAA 50-yr
- NOAA 100-yr
- NOAA 200-yr
- NOAA 500-yr
- Main & O P.S. Rain Gage

Inches of Rain

Duration of Rain (min)

Rain Starts
~9:00 pm,
6/25/06

Approx 10:30 pm
6/25/06

Approx 11:00 pm
6/25/06

500-yr

200-yr

100-yr

50-yr

25-yr

10-yr

dc
water is life
June 2006 Flood Event – Inundation

Higher water marks at planter height of approximately 2.5 feet
Higher water marks at planter height of approximately 3 feet
2011 Federal Triangle Drainage Study Modeling

- Sewers – Mike Urban
  - Same model used to develop LTCP
  - Added detail in Federal Triangle area

- Ponding on Street – Mike Flood
  - Routes flood waters on street to downstream location

- Models are connected so flow can go into and out of sewers based on capacity

- Calibrated to June 2006 storm
Baseline Ponding Predictions
15th Street and Constitution Ave

Predicted Ponding Levels at 15th & Constitution

- 500 yr Rain
- 200 yr Rain
- 100 yr Rain
- 50 yr Rain
- 15 yr Rain
- 5 yr Rain
- Grade
- Top of Sidewalk

Legend:
- Avg tide
- 1 yr flood
- 10 yr flood
- River WSEL
- 100 yr flood

El 0.1
El 4.58
El 6.8
El 12.2

Graph showing predicted ponding levels at 15th & Constitution with various rainfall events.
Baseline Ponding Predictions: 15-Year Storm

Approx. ponding depths above top of sidewalk:
- 7”
- 0”
- 0”
- 6”
- 0”
- 0”

Approx. WSEL: 7.0

 Assumes average tide conditions
Baseline Ponding Predictions: 50-Year Storm

Assumes average tide conditions

Approx. WSEL: 7.5

Approx. ponding depths above top of sidewalk:

- 13”
- 4”
- 0”
- 12”
- 3”
- 0”
Baseline Ponding Predictions: 100-Year Storm

Assumes average tide conditions
Baseline Ponding Predictions: 200-Year Storm

Assumes average tide conditions
Questions