



Town Hall Meeting

# September 10, 2020 Flash Flooding Event

September 16, 2020

**District of Columbia Water and Sewer Authority**

David L. Gadis, CEO and General Manager



# Agenda

- Welcome
- DC Water Background
- Rainfall Evaluation & Reported Flooding
- DC Water System Response to Flood
- Preliminary Findings
- Immediate and Short-Term Measures
- Long-Term Mitigation Measures to Address Flooding
- Next Steps
- Q & A





**Welcome**



## Welcome

- Expanding our backflow valve reimbursement program so that it covers every home within the most seriously impacted neighborhoods.
- Rebates of up to \$6,000 per home.
- Creating a new fund to help customers who are struggling with remediation costs, like drying out basements or removing moldy drywall.
- That program will pay up to \$5,000.



Welcome





# Welcome

- **District inherited sewer system from Federal Government.**
- **Existing sewers date back to late 1800's and in some cases are undersized for flow in heavy storms.**
- **Climate change may be contributing to increase in frequency of heavy weather events.**



**Welcome**

- **Sewer infrastructure and deep tunnels functioned as designed.**
- **No underlying issue with construction or malfunction or error that contributed to flooding.**
- **Caused primarily by historically high rain fall – more than 2.2 inches in 75 minutes; flooding reported across the region.**
- **Record rainfall for September 10 recorded at Reagan National Airport.**



## Welcome

- **No stormwater system can account for such a heavy downpour during such a compressed time, but system prevented a much more widespread and destructive flooding event.**
- **Working to reduce the likelihood and severity of floods.**
- **Making progress by improving our infrastructure with investments in reliability and by continuing our progress on the Clean Rivers initiative.**
- **Expanded capability of the system for more than a decade with the tunnel program, including the First Street Tunnel**





# DC Water Background



# DC Water Background

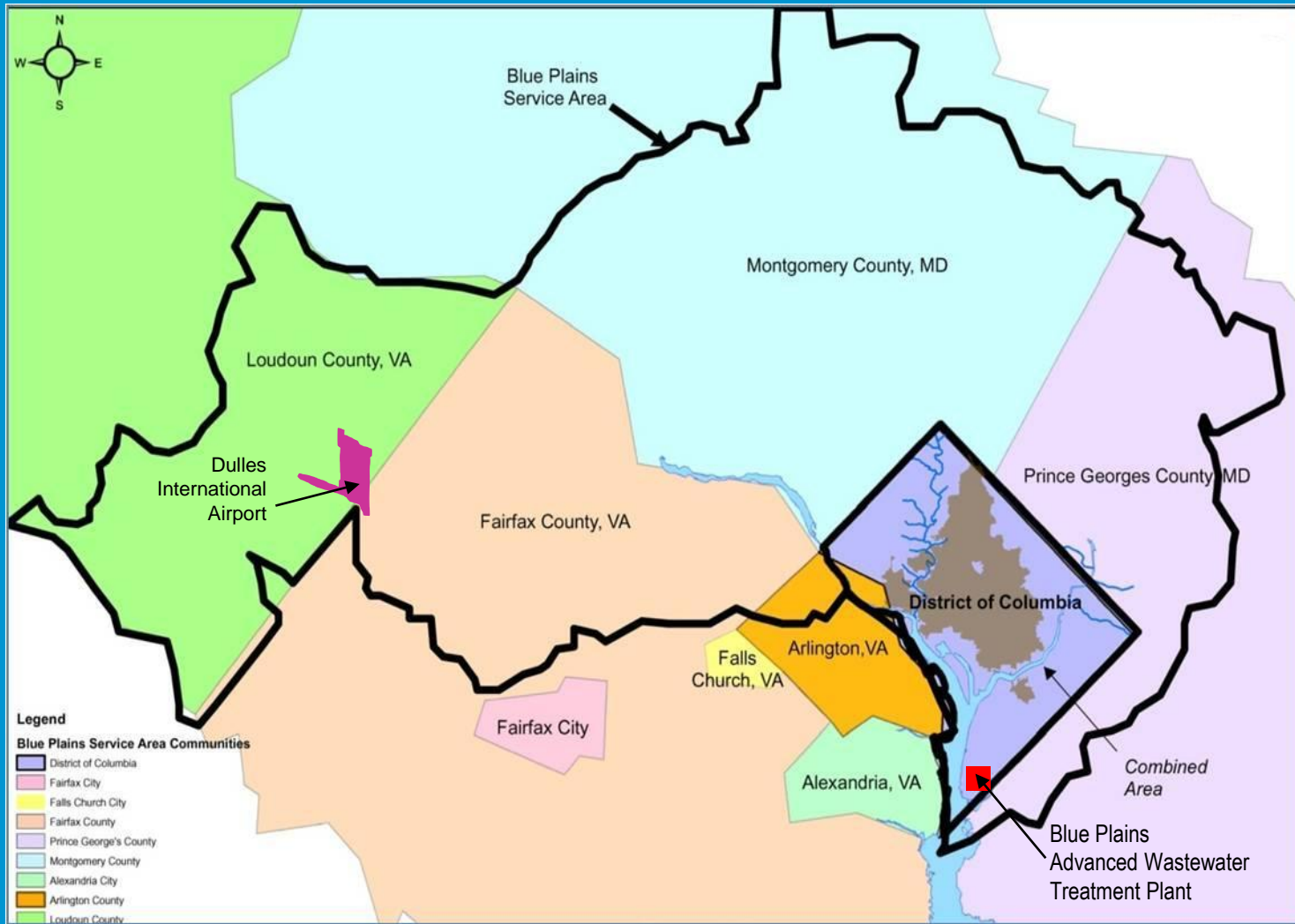


Blue Plains Advanced Wastewater Treatment Plant

- Drinking water distribution for DC
- Wastewater collection and treatment
- Stormwater collection and conveyance
- Treats wastewater for a population of 2.1 million
  - District of Columbia
  - Montgomery & Prince George's Counties, MD
  - Fairfax & Loudoun Counties, VA
- Operates Blue Plains Advanced Wastewater Treatment Plant
  - World's largest advanced treatment plant
  - Average daily capacity, 384 mgd
  - Peak daily capacity, 780 mgd
    - 555 mgd complete treatment
    - 225 mgd tunnel dewatering pump station and treatment
  - Serves a regional area of approximately 725 square miles

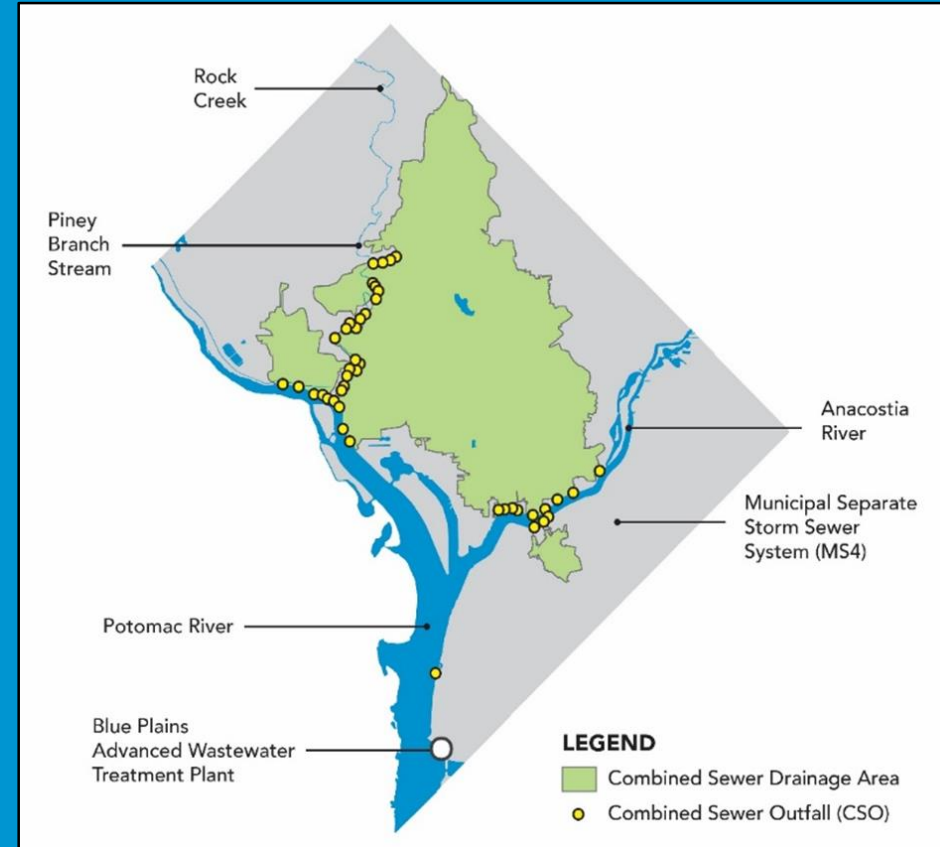
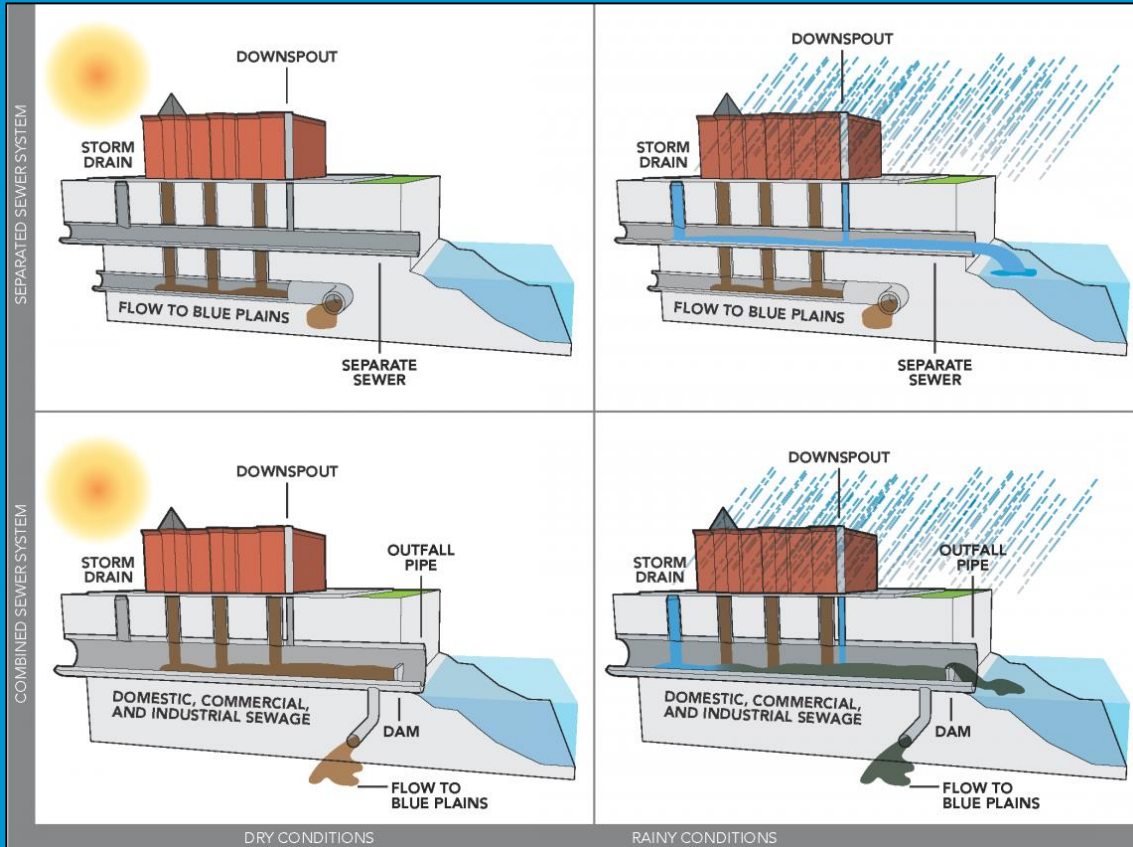


# DC Water Service Area





# Separate and Combined Sewer Systems



- 1/3 of area within the District is served by combined sewers (12,478 acres)
- 48 active Combined Sewer Overflow (CSO) outfalls (15 to Anacostia River • 10 to Potomac River • 23 to Rock Creek)



# DC Water Pumping and Sewer Assets

- 16 Stormwater Pumping Stations
- 9 Wastewater Pumping Stations
- 50,000 Manholes
- 1901 miles of collection pipes
  - combined sewers (603)
  - separate sanitary sewers (722)
  - storm water (576)
- 25,000 Catch basins
- 9 Inflatable dams

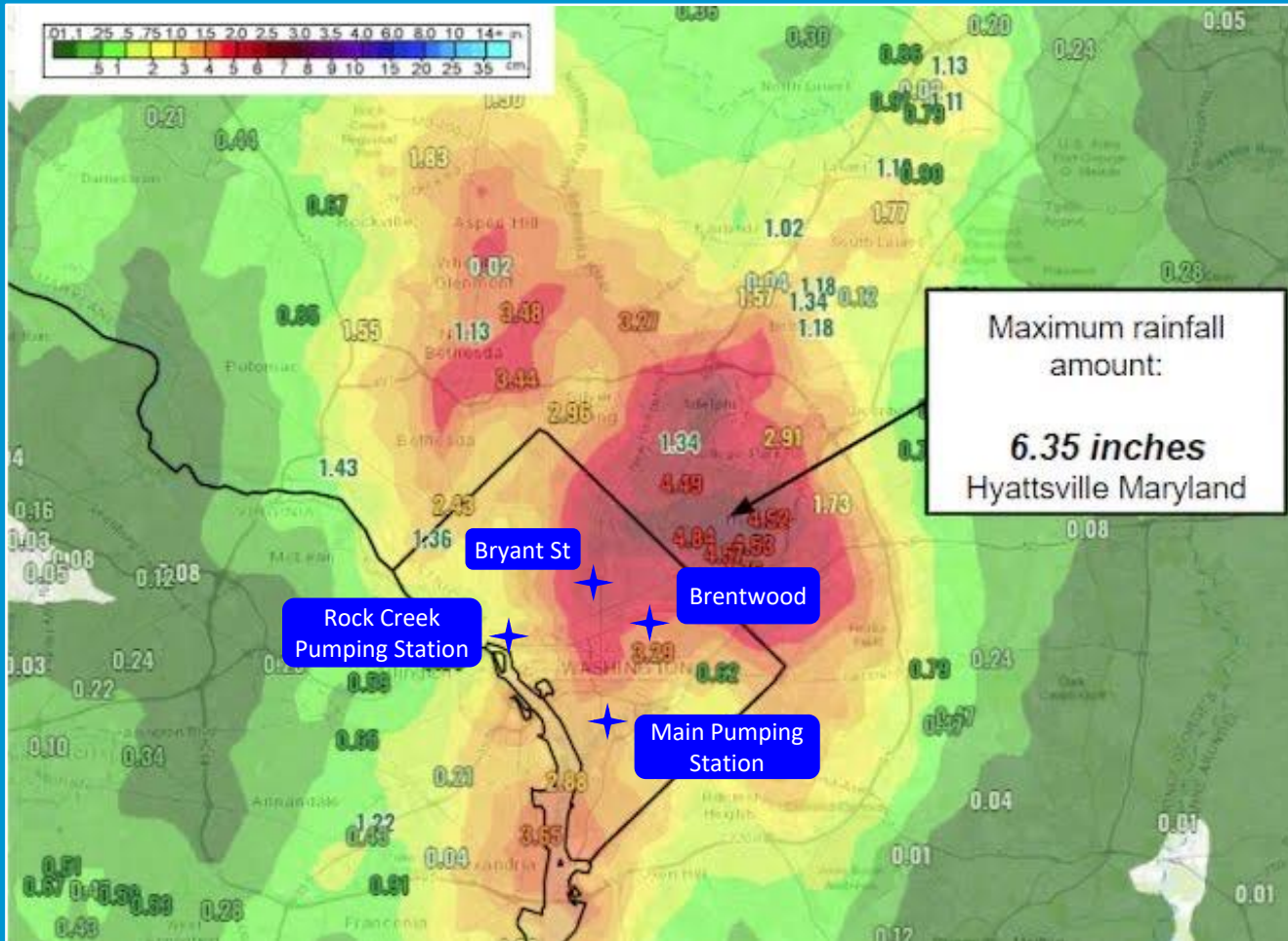




# Rainfall Evaluation



# September 10, 2020 Rainfall



- Extreme rainfall began after noon on September 10, 2020
- Peak rainfall occurred between 1:00 and 2:30 pm
- Most extreme rain occurred in Northeast DC that feeds the impacted areas
- DC Water operates 4 rain gauges in the combined sewer area



DC Water rain gauges

Source: Wash Post

# Rainfall Analysis 2020

Storm Duration	Main PS		Bryant St PS		Brentwood Res.		Rock Creek PS	
	Depth (in)	Approx. Return Freq. (yrs)	Depth (in)	Approx. Return Freq. (yrs)	Depth (in)	Approx. Return Freq. (yrs)	Depth (in)	Approx. Return Freq. (yrs)
5-min	0.27	<1	0.75	100	0.40	1-2	0.22	<1
15-min	0.69	<1	1.17	10	1.01	5	0.50	<1
30-min	1.17	2	1.49	5	1.74	10-25	0.88	<1
1-hr	1.98	5-10	2.14	10	2.44	10-25	1.66	2-5
2-hr	2.42	5-10	2.87	10-25	2.78	10-25	1.90	2-5
3-hr	2.74	10	2.99	10-25	3.02	10-25	2.20	2-5
4-hr	2.81	5-10	2.99	10	3.07	10-25	2.32	2-5
6-hr	2.82	5	3.02	5-10	3.08	5-10	2.36	2-5

**Sept 10  
10-25 Year Storm**

Storm Duration	Main PS		Bryant St PS		Brentwood Res.		Rock Creek PS	
	Depth (in)	Approx. Return Freq. (yrs)	Depth (in)	Approx. Return Freq. (yrs)	Depth (in)	Approx. Return Freq. (yrs)	Depth (in)	Approx. Return Freq. (yrs)
5-min	0.34	1	0.14	<1	0.16	<1	0.18	<1
15-min	0.54	<1	0.26	<1	0.32	<1	0.34	<1
30-min	0.64	<1	0.46	<1	0.60	<1	0.48	<1
1-hr	1.18	1	0.82	<1	1.02	<1	0.88	<1
2-hr	1.72	2	1.14	<1	1.56	1-2	1.26	<1
3-hr	1.96	2-5	1.34	<1	1.78	1-2	1.48	1
4-hr	2.18	2-5	1.58	1	2.00	2	1.74	1-2
6-hr	2.74	2-5	2.14	1-2	2.52	2-5	2.06	1-2
8-hr	3.06	5	2.36	2	2.86	2-5	2.26	1-2
10-hr	3.12	2-5	2.41	1-2	2.91	2-5	2.30	1-2
12-hr	3.16	2-5	2.45	1-2	2.94	2-5	2.34	1-2
24-hr	4.00	5	2.85	1-2	3.53	2-5	2.88	1-2
48-hr	4.40	2-5	2.90	<1	3.62	2	2.88	<1

**Hurricane Isaias:  
July 30  
August 4  
2-5 Year Storm**

Storm Duration	Main PS		Bryant St PS		Brentwood Res.		Rock Creek PS	
	Depth (in)	Approx. Return Freq. (yrs)	Depth (in)	Approx. Return Freq. (yrs)	Depth (in)	Approx. Return Freq. (yrs)	Depth (in)	Approx. Return Freq. (yrs)
5-min	0.28	<1	0.12	<1	0.20	<1	0.22	<1
15-min	0.60	<1	0.31	<1	0.47	<1	0.52	<1
30-min	0.64	<1	0.40	<1	0.52	<1	0.70	<1
1-hr	1.12	<1	0.52	<1	0.64	<1	0.82	<1
2-hr	1.16	<1	0.56	<1	0.68	<1	0.88	<1
3-hr	1.19	<1	0.60	<1	0.73	<1	0.91	<1
4-hr	1.31	<1	0.74	<1	0.84	<1	1.01	<1
6-hr	1.47	<1	0.84	<1	0.95	<1	1.13	<1

**Hurricane Laura:  
August 28 – 29  
< 1 Year Storm**





# Prior Storm Events that Led to Flooding in DC

Date	Duration	Rainfall (inches)	NOAA Point Precipitation Frequency (Nearly)
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			

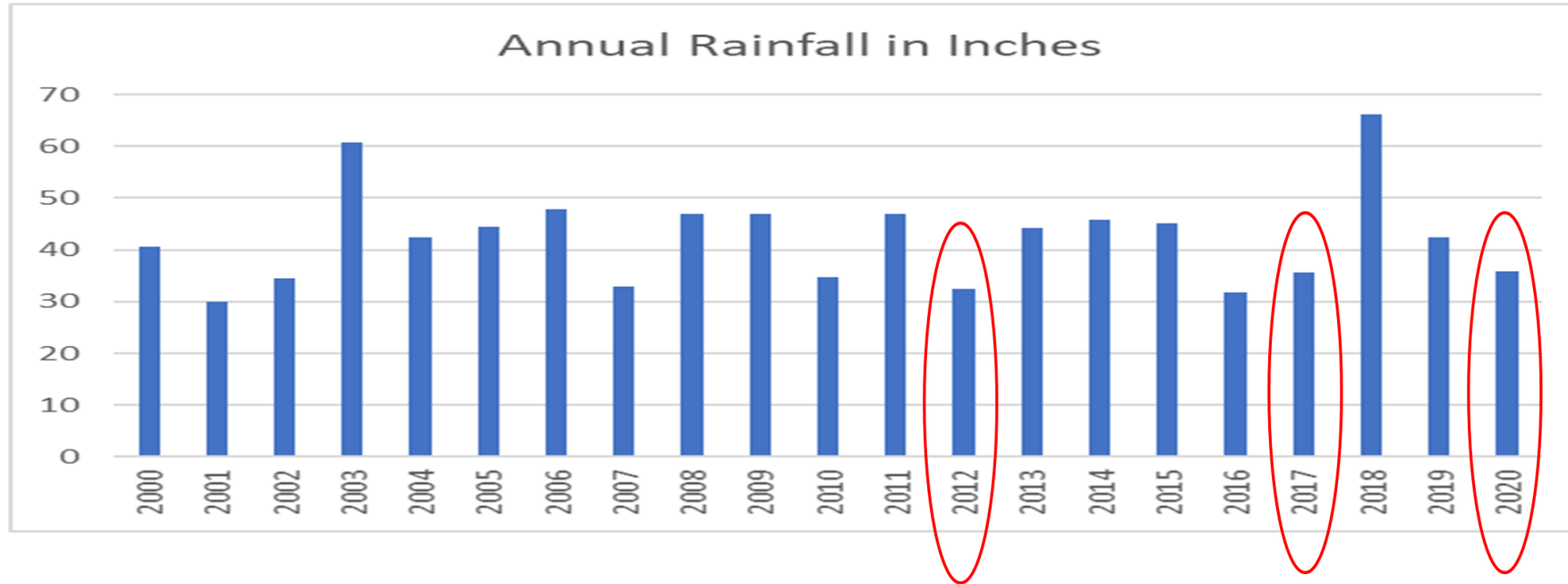
Bloomingdale  
Floods

Date	Rainfall (in)	Approx Duration (min)	Approx. return frequency based on NOAA	Rain gage
8/12/17	1.33	20	5 yr	14th and Riggs St NW
	1.19	20	5 yr	17th and Kalorama Rd NW
	1.16	30	2 yr	Eckington & Florida Ave NE
	1.02	30	2 yr	14th and K St NW
	1.08	30	2 yr	NOMA, 4th and L St NE

Recent  
Floods



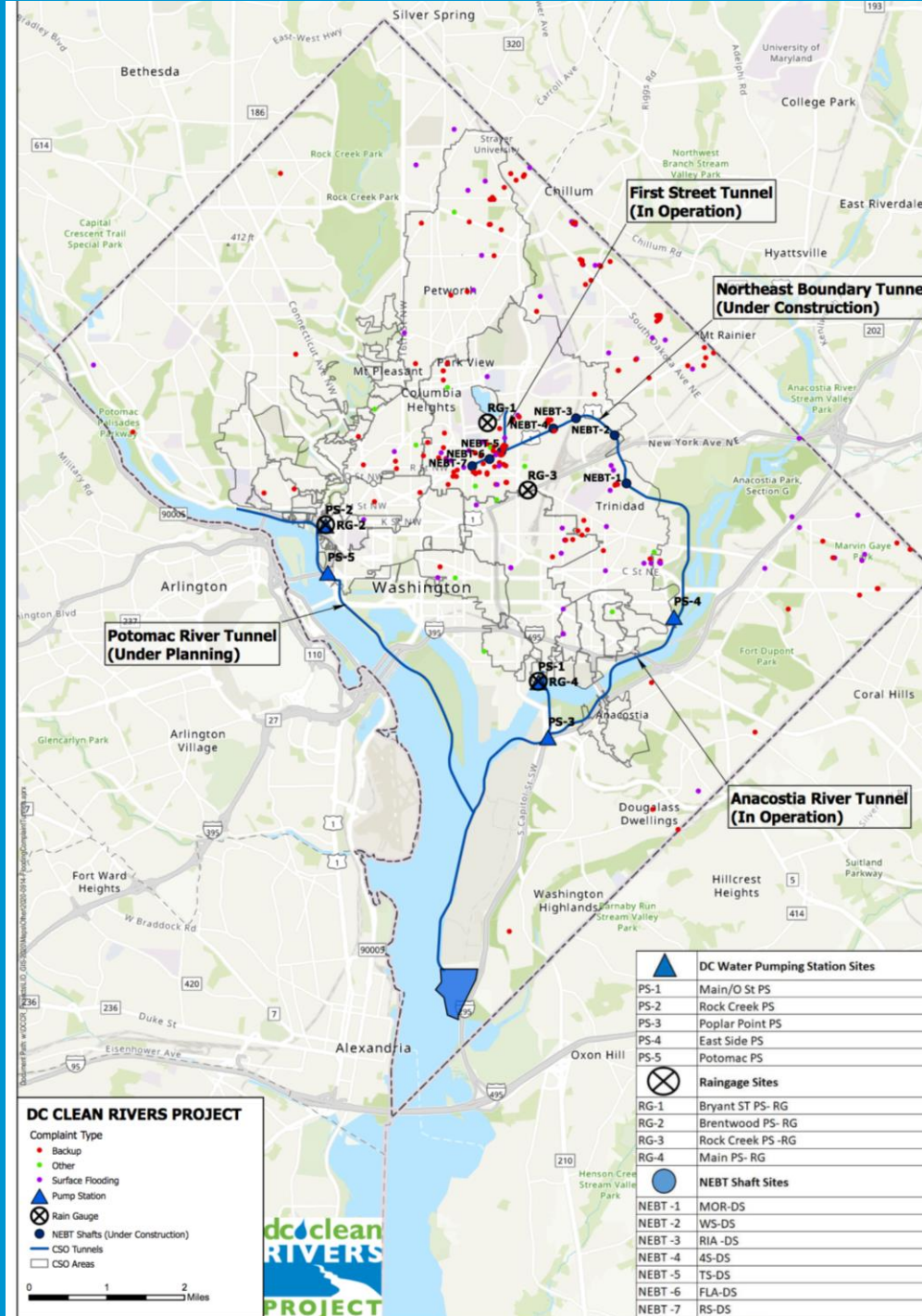
# DC Area Rainfall Data



Flooding events in DC have not occurred in years of High Rainfall  
Climate change is resulting in frequent short duration high intensity rain events



# Reported Flooding





# Reported Flooding

Rhode Island Ave Metro



Nicholson St/Riggs Park



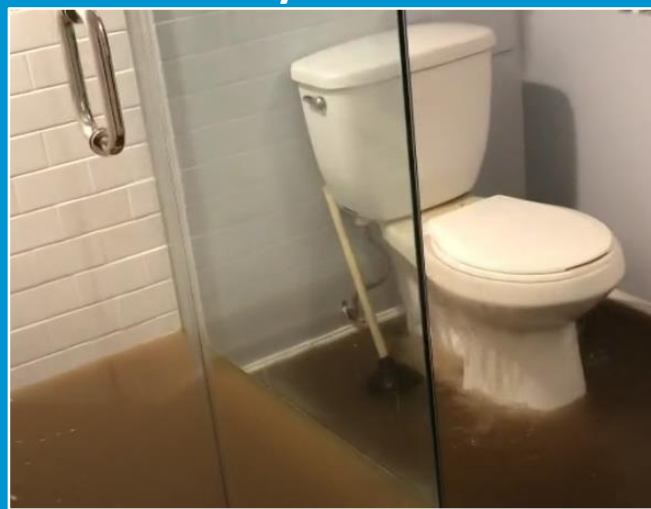
Mt Olivet Road



Florida Ave



300 Block Bryant St



Edgewood/Bryant St





# DC Water System Response to Flood



# Combined Sewage Pumping Stations

Tag Name	Firm Pumping Capacity (mgd)	Maximum Pumped During Event(mgd)
Main Pumping Station	240	286
O Street Pumping Station	45	75
Poplar Point Pumping Station	45	55
Potomac Pumping Station	460	470
Rock Creek	50	75

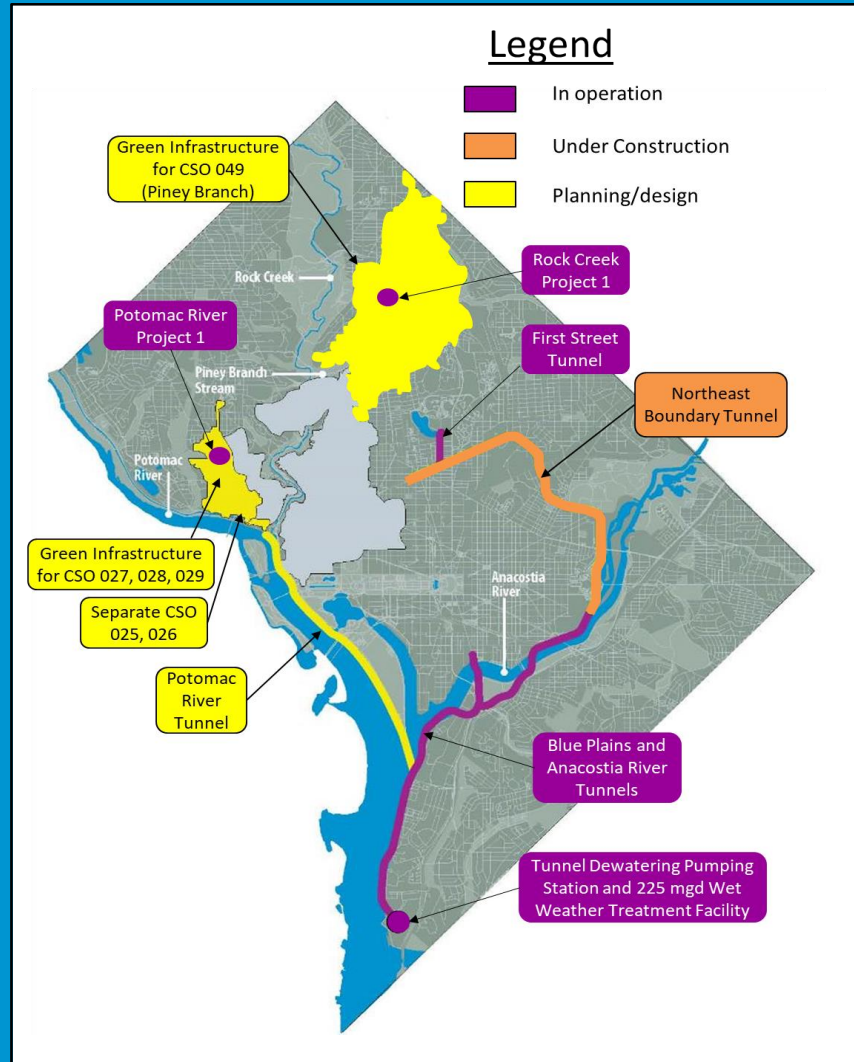


# Stormwater Pumping Stations

- Typically serve bridge underpasses
- Capacity of pumping stations exceeded by intensity of rain at many locations
- Storm impacts at stormwater pumping stations
  - Deane Avenue – A creek in the area overflowed its banks. Station was still operable.
  - Eastern Avenue – Pumping operation disrupted due to power outage
  - Portland Street – catch basin and jet truck used to clear debris caused by flooding. Water receded and underpass cleared after debris cleared



# First Street Tunnel



- 9 million gallons of storage placed in operation
- Temporary pumping station at end of tunnel
- Will be connected to Northeast Boundary Tunnel by gravity in 2023
- Tunnel filled to capacity and overflowed as designed
- Prevented 9 million gallons of sewage in homes and on street

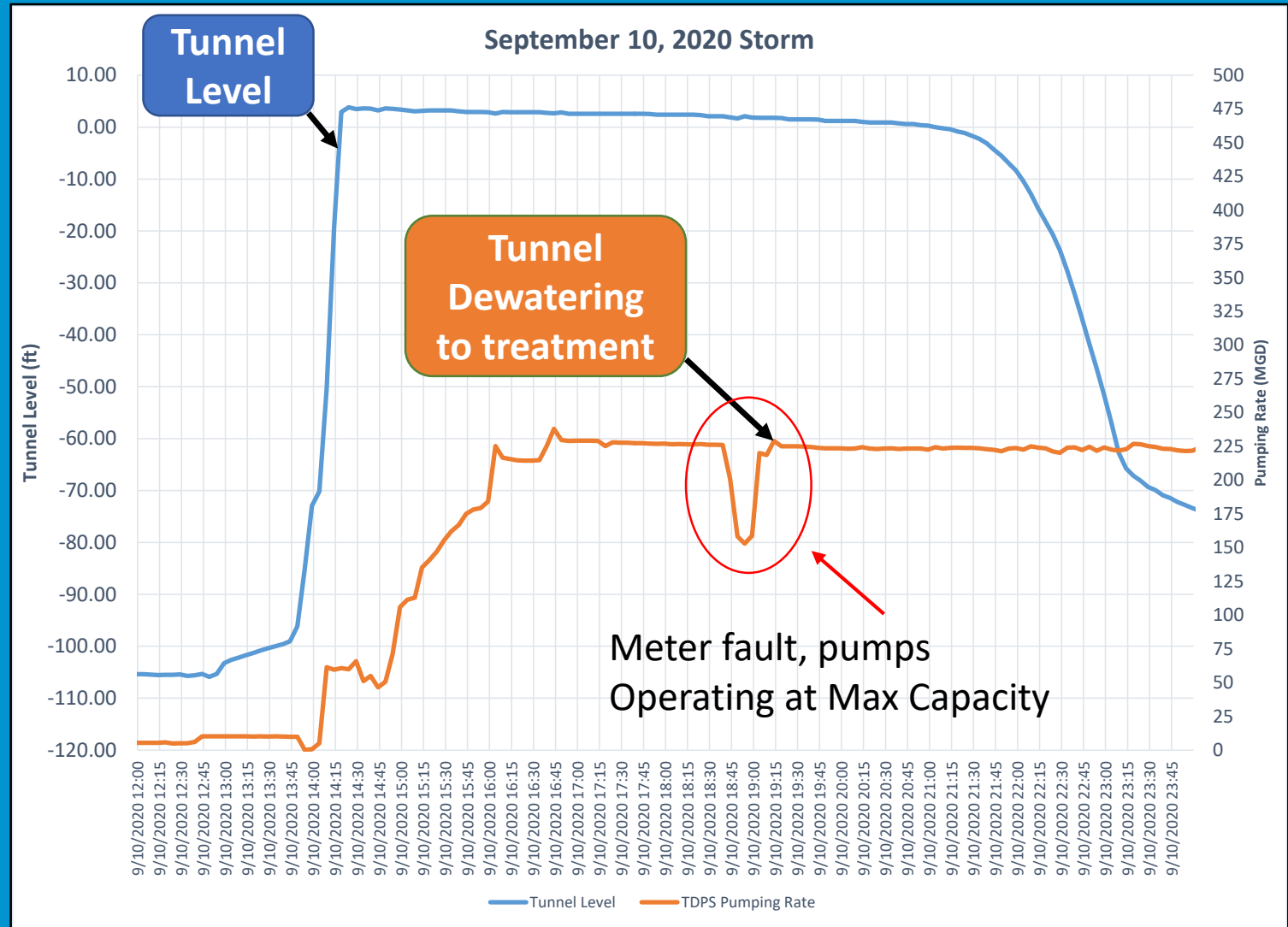




# Anacostia River Tunnel System

- System constructed so far has capacity of about 124 million gallons
- Tunnel filled to capacity in about 35 minutes – full by about 2:20 pm
- Tunnel was emptied to Wet Weather Treatment Facility as designed
- Volumes
  - 195 mg captured
  - 108 mg overflowed from tunnel
  - Additional amounts overflowed from existing CSOs

**Tunnel operated as designed – filled to capacity and then overflowed to river.**





# Blue Plains Wastewater Treatment Plant



- Blue Plains has two treatment trains
  - Complete Treatment
  - Wet Weather Treatment Facility at end of Tunnel system

Treatment train	NPDES Permit Capacity (mgd)	Peak Operated Rate During Sept 10, 2020 Event (mgd)
Complete Treatment	555 first 4 hours 511 after 4 hours	628
Wet Weather Treatment Facility	225	225

**Blue Plains operated as designed and flows to plant were maximized**



# Preliminary Findings



- **September 10 rainfall exceeded the design capacity of the sewer system**
- **Storm Peak Frequencies observed in the District**
  - 100 year frequency on a 5 minute increment
  - 10-25 year frequency on a 4 hour increment
- **Hurricane Isaias and Hurricane Laura**
  - Roughly same amount of rain as Isaias; more rain than Laura; both storms occurred over a long period of time and was much less intense
  - System was able to accommodate less intense rain
- **Tunnels (Anacostia, First Street and Blue Plains) and McMillan Storage reached maximum capacity in first half hour of storm and system remained surcharged**
- **Mix of sewer back up concerns and surface flooding**
- **System performed per compliance requirements**



# Immediate and Short-Term Measures



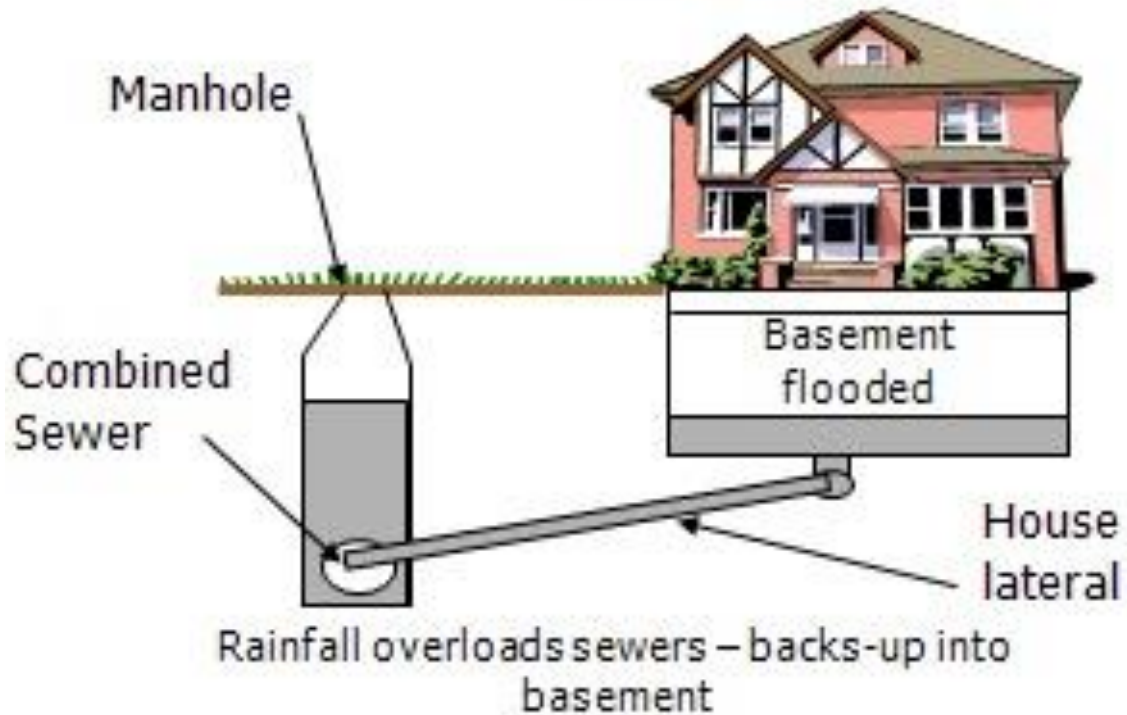
# Emergency Clean Up Relief Funding

- **DC Water recognizes significant hardships experienced because of the unexpected flooding event**
  - Impacts of COVID-19 on our community
  - Heightened public health concerns
  - Significant number of impacted homes
- **DC Water is committing \$1.5 million for clean-up relief for those who need immediate relief and have been unable to dewater their property**
  - Dewatering, cleaning and sanitizing with a per property limit of \$5,000
  - DC Water will pay the company directly for these services
  - For more information please see [dcwater.com/storm-and-flooding-september-10-2020](https://dcwater.com/storm-and-flooding-september-10-2020)

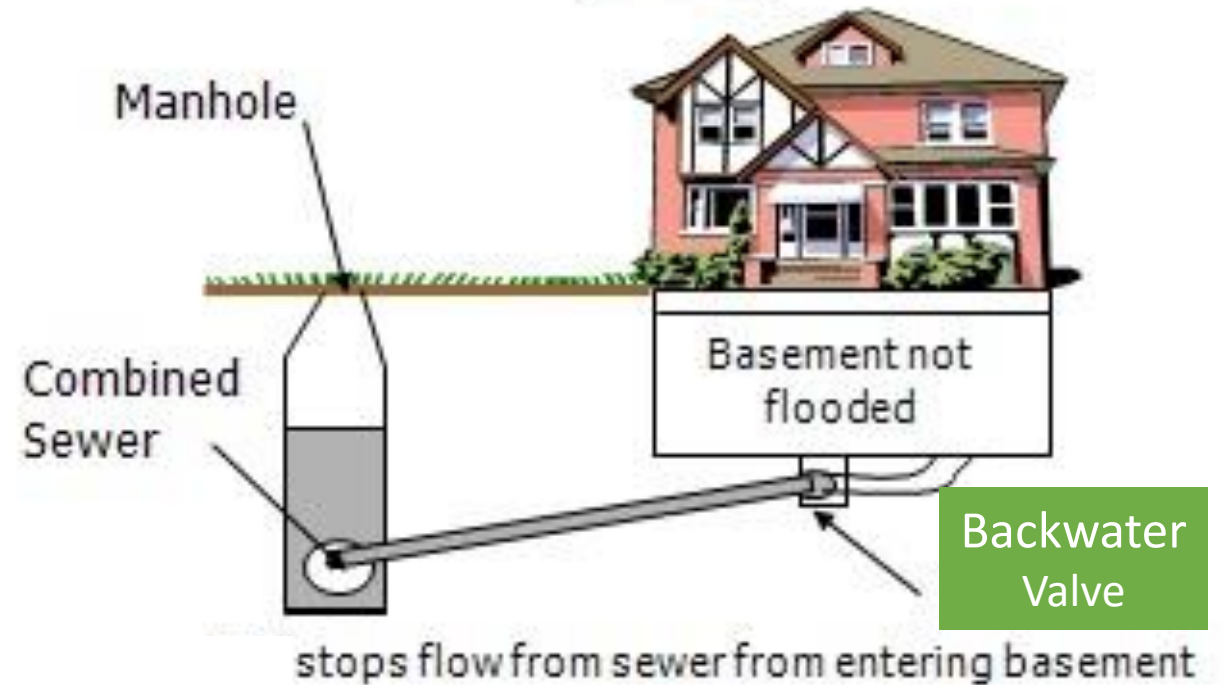


# Expansion of Backwater Valve Program

Without Backwater Valve



With Backwater Valve



[dcwater.com/backwater-valve-information-and-rebate-program-application](http://dcwater.com/backwater-valve-information-and-rebate-program-application)



# **Long-Term Mitigation Measures to Address Flooding**



# What is the design capacity of the system?

When the Bloomingdale flooding occurred during 4 storms in 2012, DC Water determined the design capacity of the existing system was about a **2 year storm**.

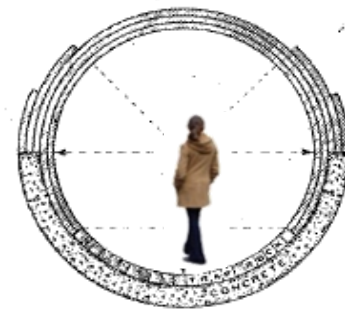
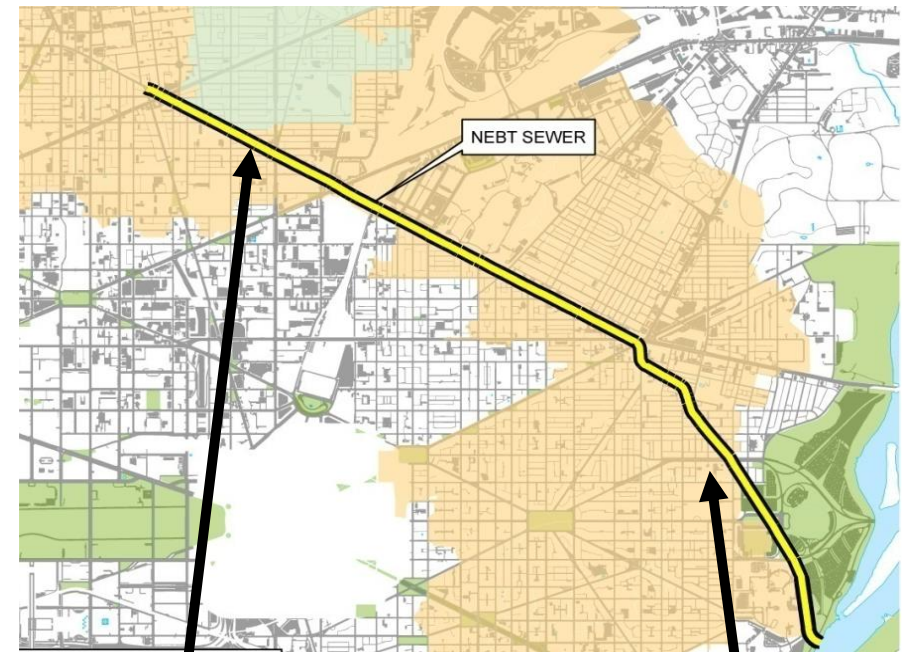
After the 2012 Bloomingdale flooding, DC Water implemented short and medium term retrofits, including the First Street Tunnel and McMillan stormwater storage which added about 9 million gallons of storage capacity. Those improvements were predicted to increase the capacity of the system to between a **5 and 7 year storm**.

The long term improvement is the Northeast Boundary Tunnel, to be completed in 2023. That tunnel was designed to bring the capacity of the system up to a **15 year storm**, which is DC Water's current design standard for the sewer system. Flooding would still be possible for storms that exceed a 15 year return frequency, but the magnitude would be greatly reduced.

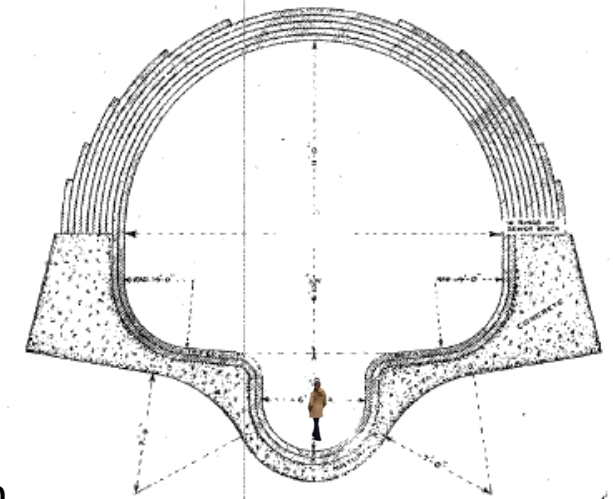


# History of Flooding – Federal Government Legacy

- Flooding occurred soon after North East Boundary Sewer construction in late 1800's
- Recognition that sewer capacity was too low
- Sewers were constructed by Federal Government and turned over to the District in 1973 via Home Rule
- Many studies have identified longstanding flooding issues in Northeast Boundary



Existing NEBT Sewer Section  
(10'-0" Diameter)



Existing NEBT Sewer Section  
(22'-0" × 23'-6")



# Deficient Conditions Caused by but Never Addressed by Federal Government

Ledroit Park and Bloomingdale Flooding

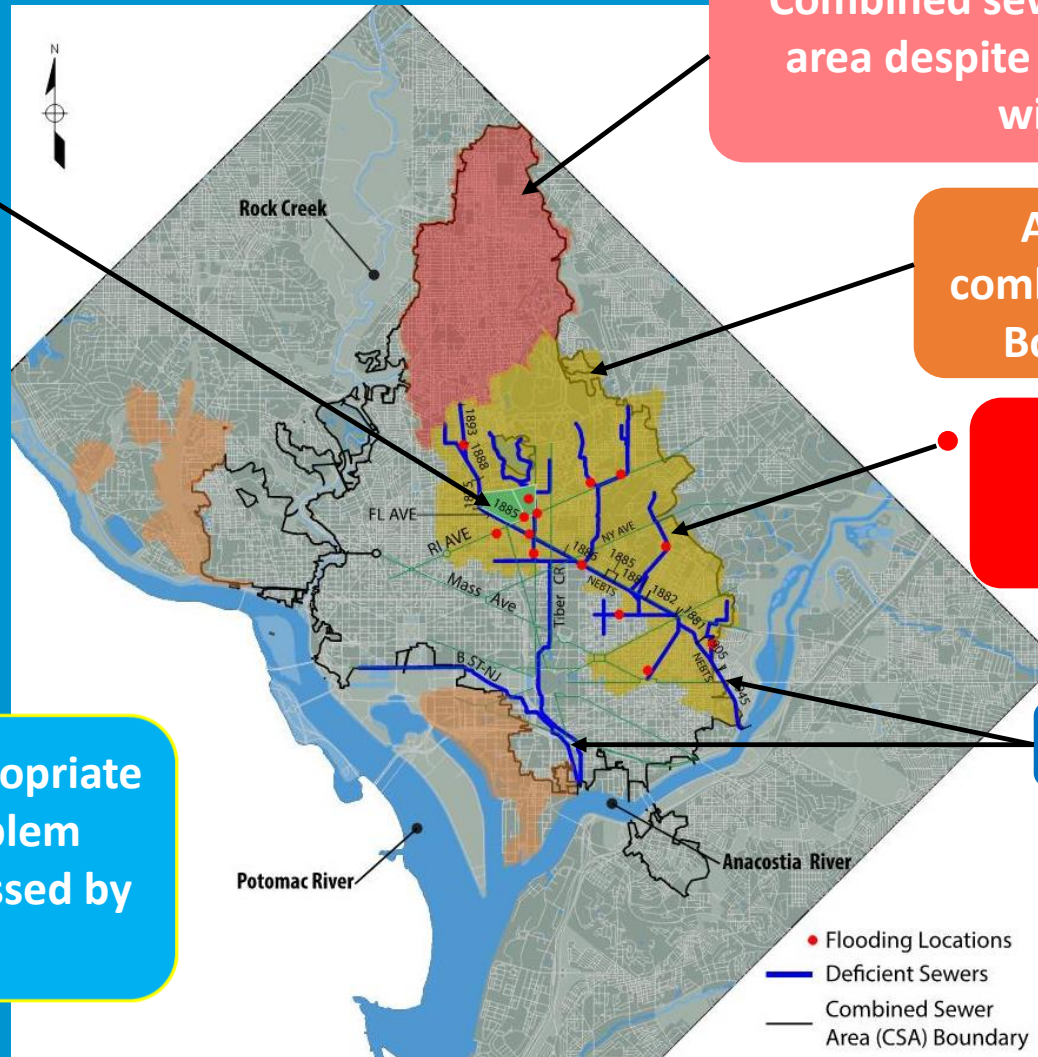
Combined sewers constructed in Piney Branch area despite BOE recommendations to serve with a separate system

Area northeast of Florida Ave where combined sewers expanded against Federal Board of Engineers Recommendations

Chronic flood areas in Northeast Boundary area due to inadequate design and construction

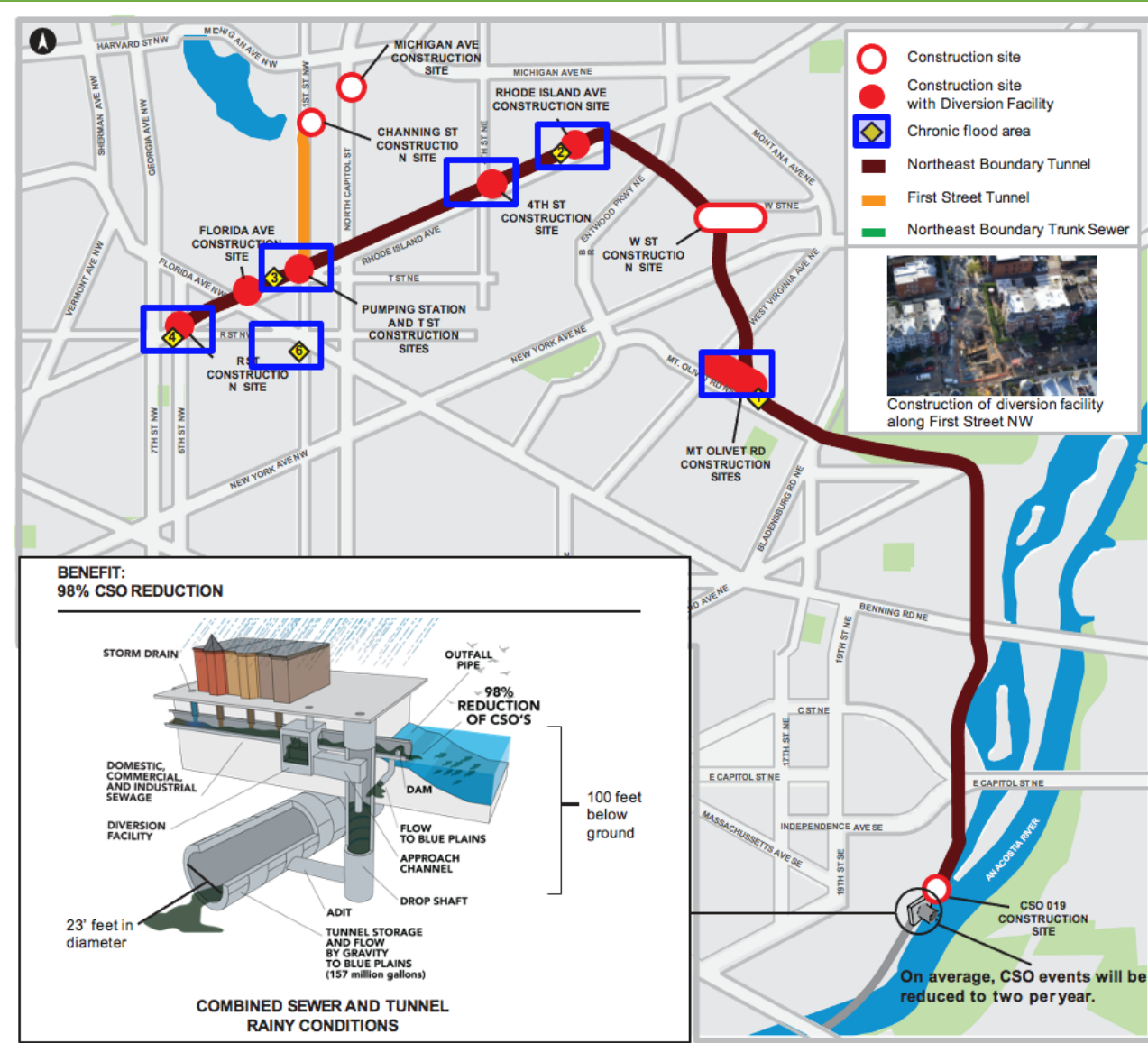
Deficient sewers

Federal funding is appropriate to mitigate the problem caused and not addressed by Federal Gov



- Flooding Locations
- Deficient Sewers
- Combined Sewer Area (CSA) Boundary

# Future Improvement - Northeast Boundary Tunnel

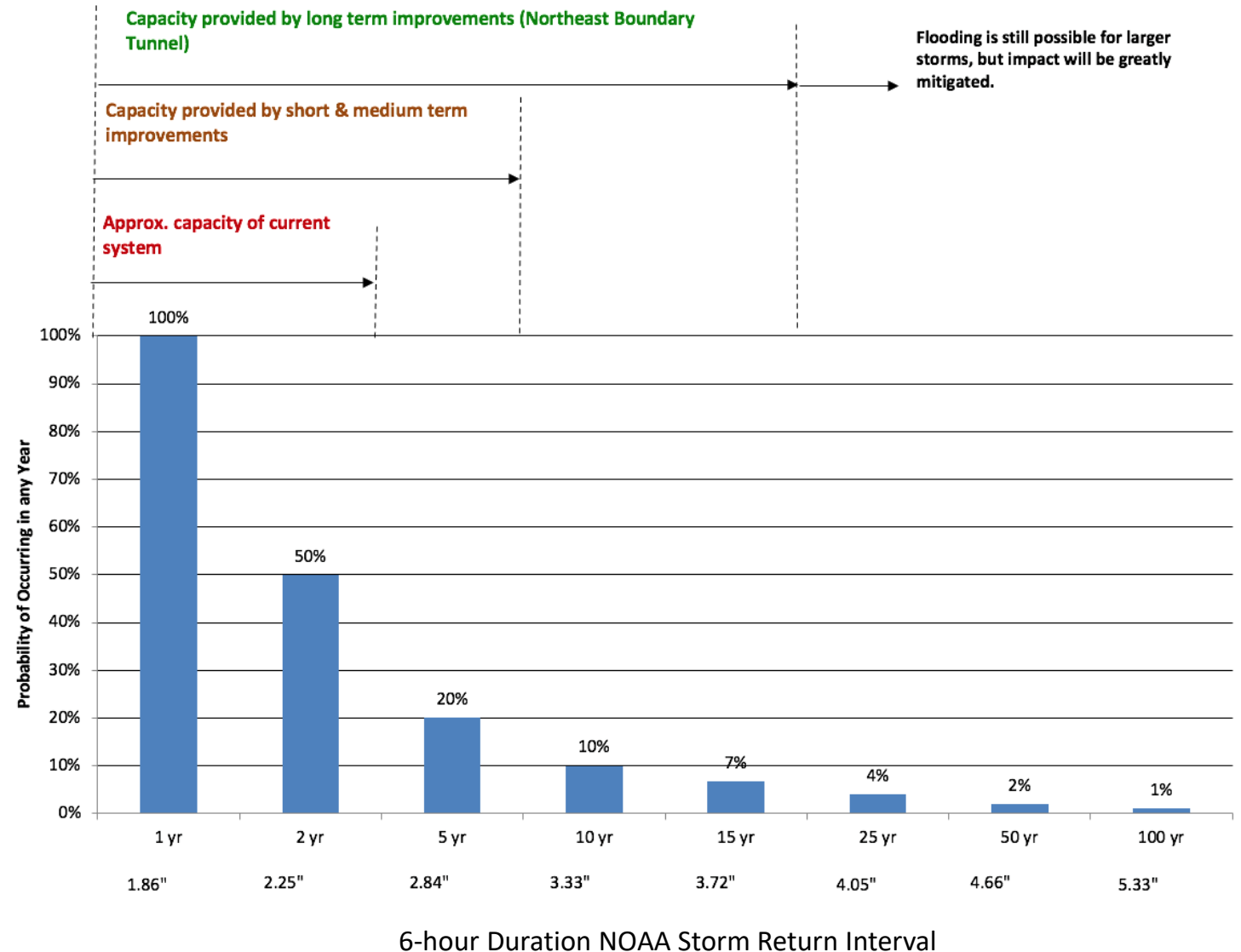


- \$580 Construction Project funded by primarily by ratepayers
- Largest project DC water has ever constructed
- Place in operation in 2023, ahead of 2025 Consent Decree deadline



# Project Benefits

- Significantly mitigate the frequency, magnitude and duration of sewer flooding and basement backups in the Northeast Boundary drainage area
- Control combined sewer overflow (CSO) discharges to the Anacostia River, significantly improving water quality
- Reduce the frequency and magnitude of flooding
- Reduce risks to human health
- Greatly reduce the discharge of untreated wastewater into the District's receiving waterbodies
- Prevent deterioration of historic resources from water damage caused by flooding





**Next Steps**



## Next Steps

- **Prepare after action report for review with the Mayor's Office and HSEMA**
- **Further investigate impacted communities to identify additional mitigation measures**
- **Implement expanded Backwater Valve Program**
- **Construct Northeast Boundary Tunnel**
- **Evaluate resiliency – storms in response to climate change**



## Resources

For more information about the flooding and the resources available: [dcwater.com/september10flooding](https://dcwater.com/september10flooding)

Sewer Back-ups and the Claim Process: [dcwater.com/sewer-backup](https://dcwater.com/sewer-backup)

Customer Service **202-354-3600**.

Non-English-speaking customers can call our Customer Service line, **202-354-3600**, for translation into more than 94 languages. Hearing-impaired customers can call **202-354-3677** for TDD-TYY services

Q & A





**Thank You**