

Washington, DC Flooding Protection

- March 3, 2011

Outline



Flooding in Washington

- Understanding flood risks
- Flood management in Washington, DC
- 17th Street Levee improvements and flood mapping
- Storm Sewer Study of the Federal Triangle

Flooding Risks

- Geographic
 - At confluence of 2 major rivers
 - Three buried streams
- Sea level rise exacerbates risk & damage
 - Due to climate change and subsidence
 - For all types of floods
- Structural Limitations
 - Sewer system capacity

Understanding Flood Risks



- Geographic Factors
 - At confluence of 2 major rivers
 - Three buried streams and high water table
 - Development in floodplains

Washington, DC Floods

1889



1936



1942



2006



Understanding Flood Risks



1889 – first flood of record

- Overbank: River-caused
- Tidal: Storm surge-caused
- Urban Drainage (Street) : Sewer capacity-caused
- Interior: Levee-caused

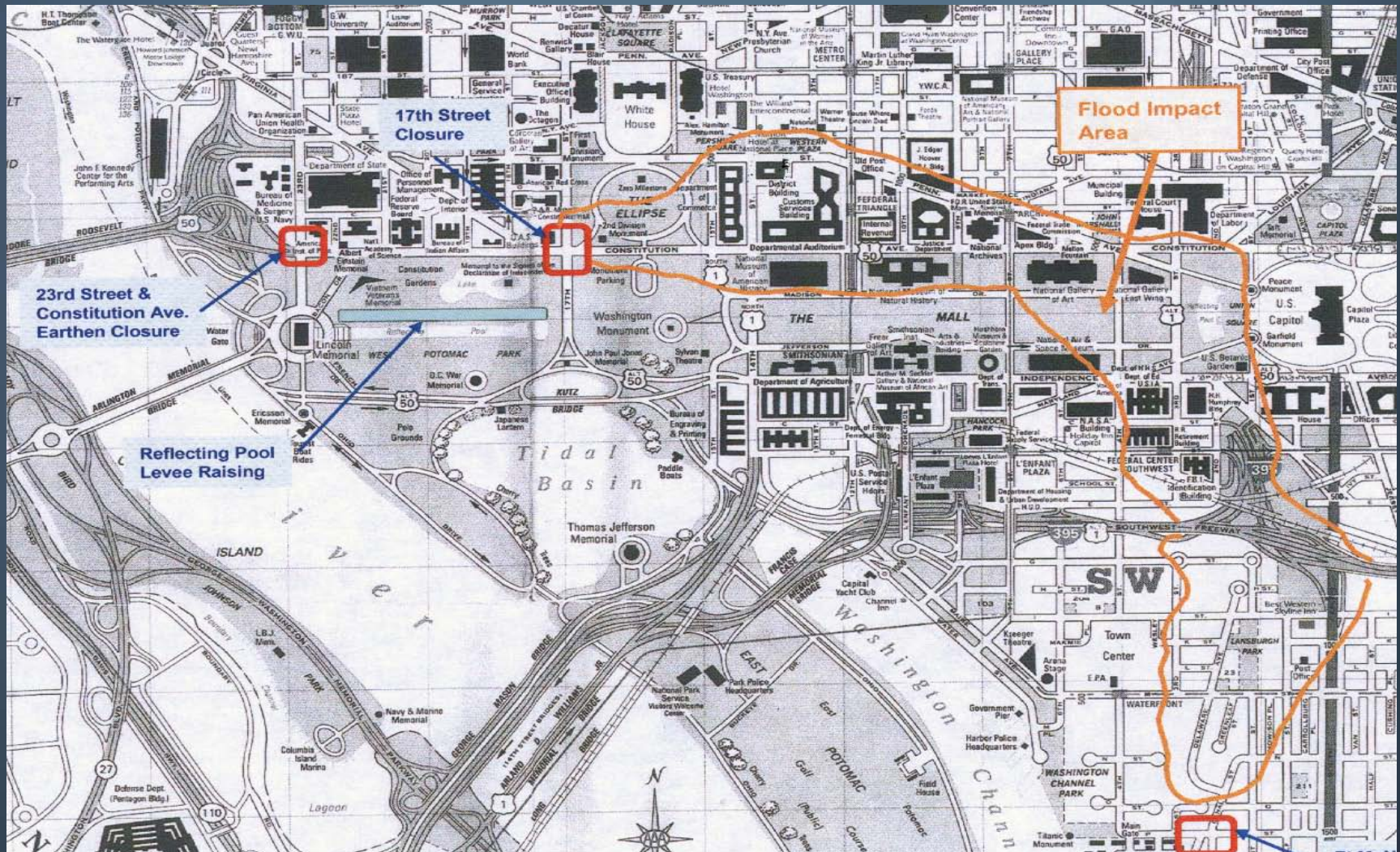
Federal Flood Control

- Federal responsibility since 1927
- National Flood Insurance Program
 - FEMA maps floodplains
 - Private development requirements
 - Federal development requirements –EO 11988
 - Corps designs / builds flood control structures
 - National Mall Levee
 - NPS constructs temporary closures
 - Corps prepares DC Flood Emergency Manual

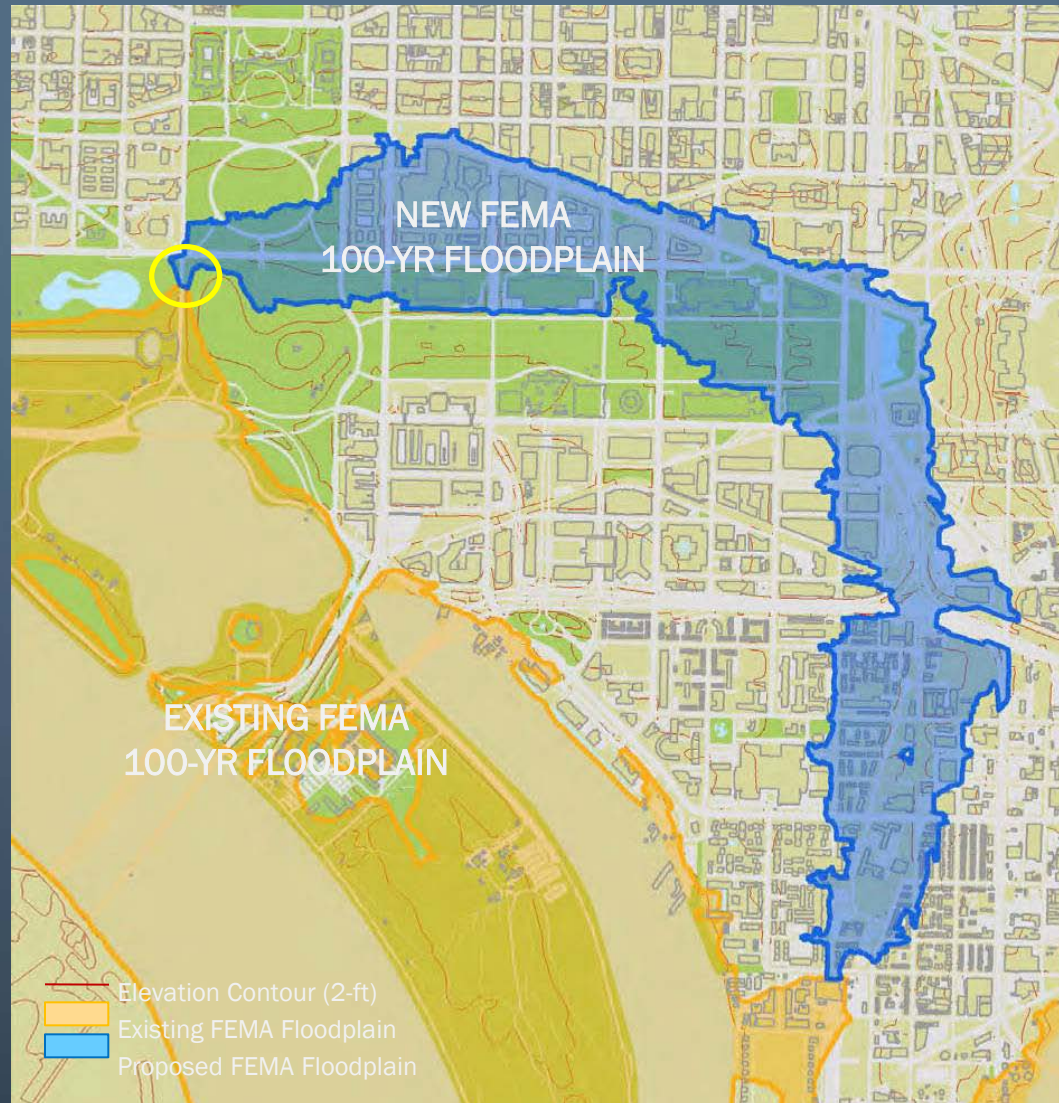
National Mall Levee

- Designed to protect against Potomac overbank flooding
- Authorized in 1936 after Great Flood
- Operational by 1940
- Temporary closures for 3 segments
 - 23rd & P Streets
 - 17th Street
 - Fort McNair

Flood Control: Monumental Core Levee



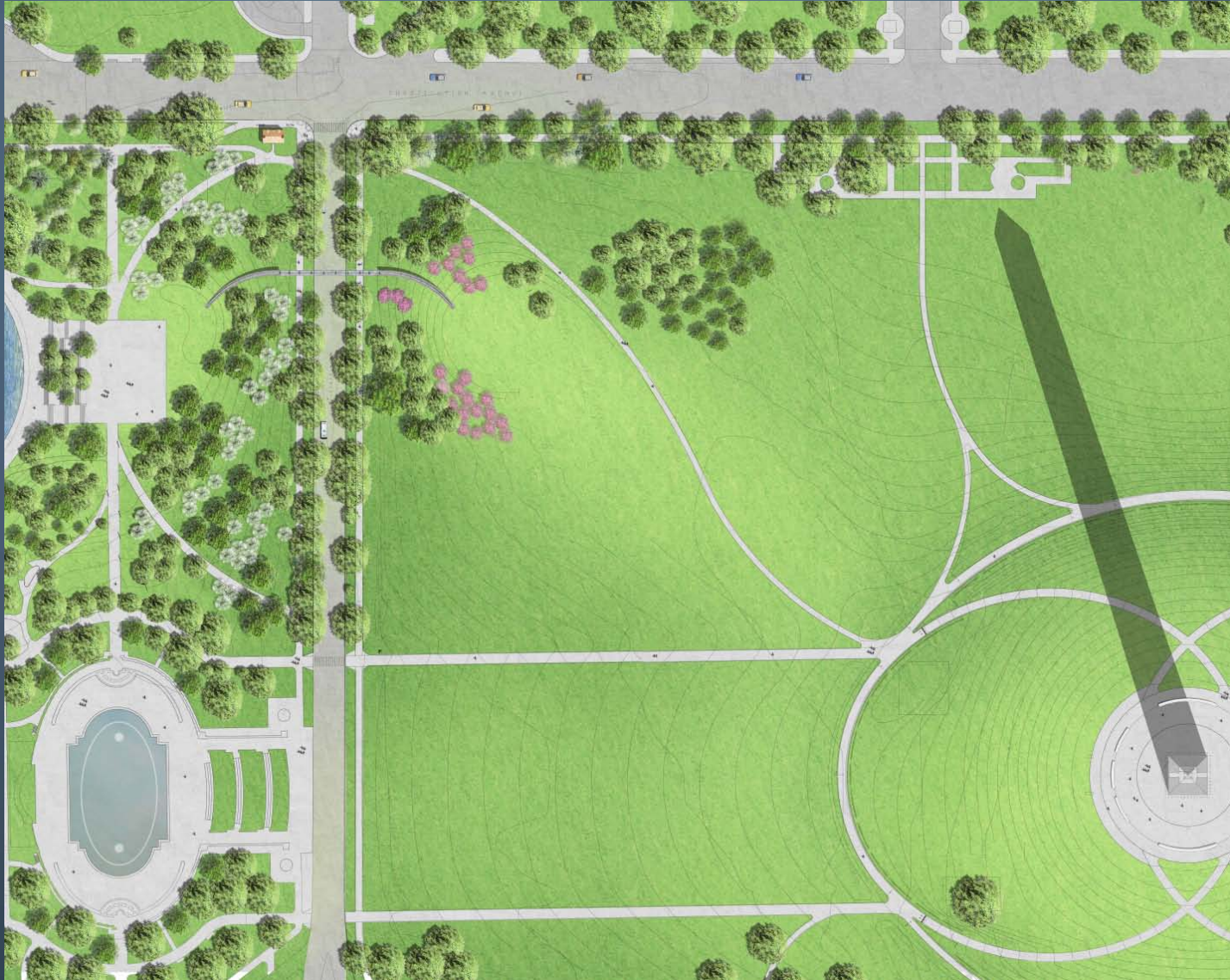
17th Street Levee in the Monumental Core



17th Street Temporary Levee



17th Street Levee Design





Oblique view of levee improvements looking southwest, without trees





- Sandbag, earthen berm & Jersey barrier closure at 17th Street
- Reflecting Pool levee
- Sandbag closure at 23rd Street

Anacostia River Flooding

- Hydrologic Factors
 - Originates in Bladensburg, MD
 - 8.4 miles long, tidal from headwaters
 - Highly urbanized
 - “Flashy” upstream -- quick response to rainfall
 - Normally sluggish – flow can take 30 days, 100 days in low water flow periods
 - 90% wetlands loss

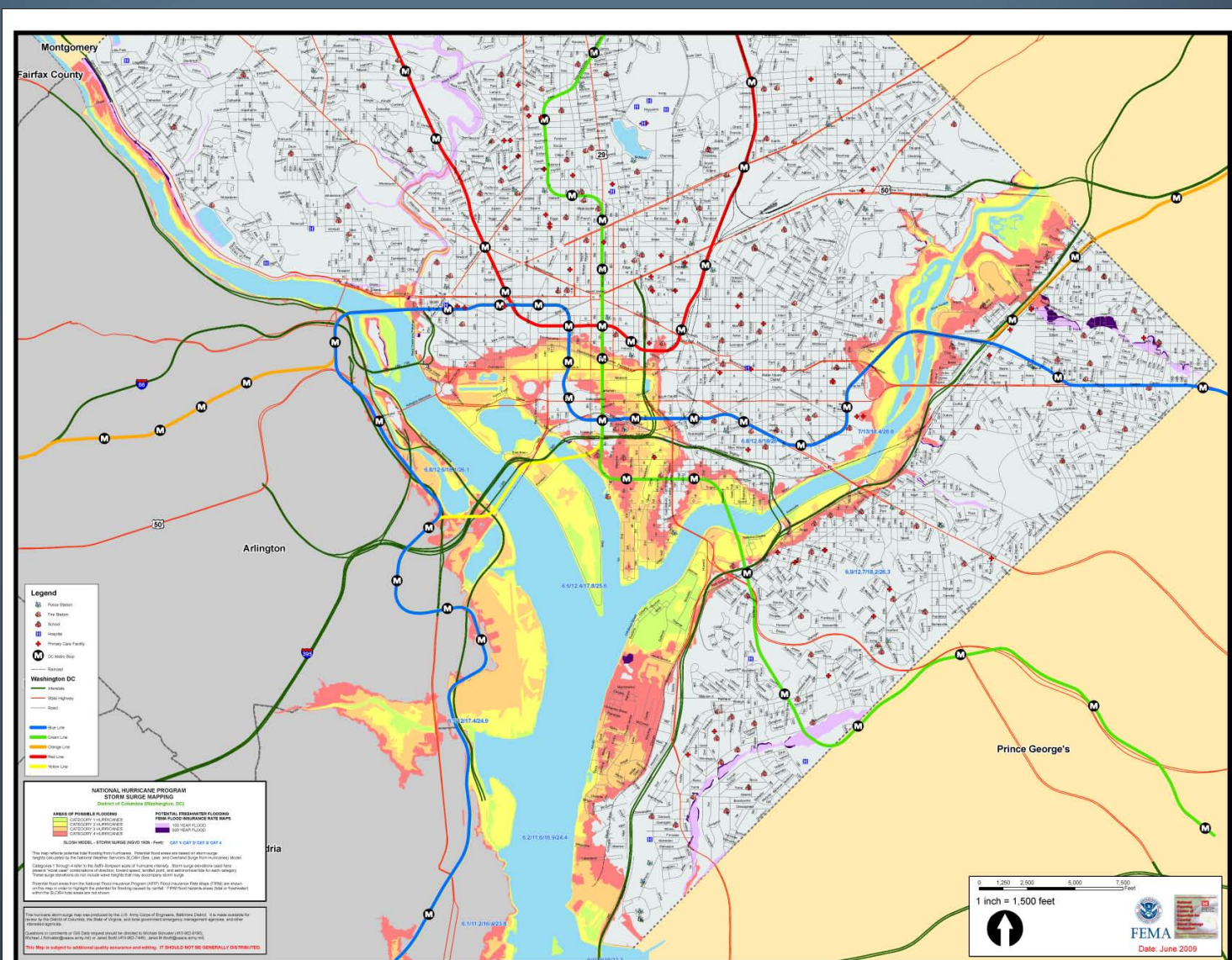
Anacostia River Flooding



Flood Control: Washington Levees



Hurricane Storm Surge Map



June 2006 Urban Drainage Flood

- June 19th started a wet weather pattern
- June 25th - June 27th -- intense tropical downpours
- Heaviest rainfall Sunday evening June 25th - early Monday, June 26th
 - Total rainfall on June 25th was 7.09 inches



June 2006 Urban Drainage Flooding



- Flooded Federal Facilities:
 - National Archives, IRS HQ, Justice, Commerce
 - Smithsonian, Zoo, National Gallery
- Study Results
 - Rainfall > 200-year event in 6-hour period
 - Started earlier than expected
 - Dissipated without clear explanation
 - Rivers did not exceed flood stage

Federal Triangle Storm Sewer Study

○ Partner Agencies

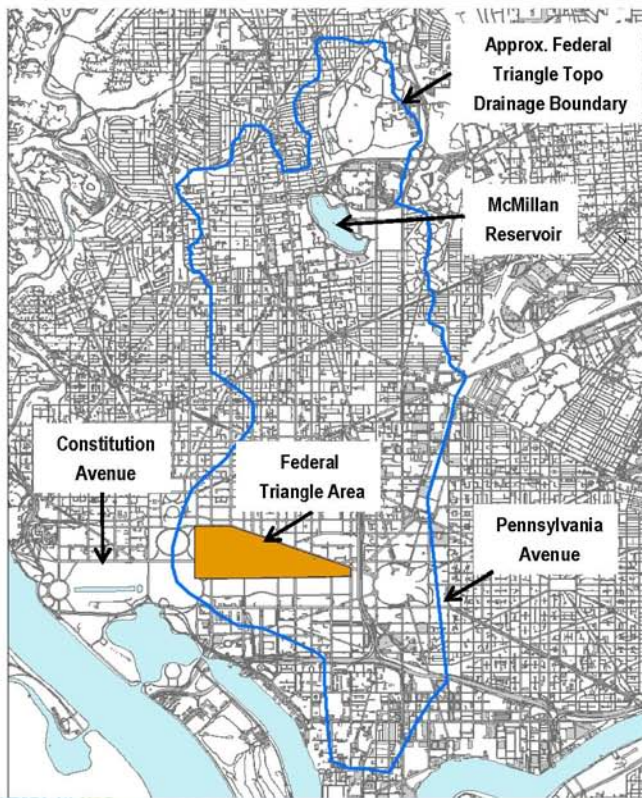
- MOU: GSA, Smithsonian, DCOP, DC Water, DDOE, FEMA and NCPC
- WMATA, NPS, Archives, NGA involved

Purpose

- Understand the cause of the 2006 flood
- Study possibility of early warning system
- Identify a range of flood mitigation alternatives and evaluate each in terms of cost and effectiveness

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

June 24-26, 2006 Storm: Extent of Flooding Based on Water Level at Planters (Flood Waters also Entered Buildings/Metro)



Questions?

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