

Louisville Floodplain Management Plan – Asses the Hazard



January 18, 2023



Agenda

- Introductions
- Floodplain Management Plan Overview
- Flood Hazard Overview
- Open Discussion
- Next Steps



Floodplain Management Plan Overview



- The objective of the plan is to create an overall strategy of programs, projects, and measures that will reduce the adverse impact of flooding on the community
- Plan will incorporate information from the 2022 Hazard Mitigation Plan
- The Community Rating System 10-step process will be followed



Community Rating System

- Voluntary FEMA program that rates communities efforts to: regulate, educate, and manage the floodplains and stormwater above national standards
- Louisville and Jefferson County began participating in 1990
- Louisville is currently a CRS Class 3
 - 35% discount on flood insurance policies in the floodplain
 - Saves the community approximately \$2.1 million each year in flood insurance premiums



Hazard Mitigation Plan

- Previous Floodplain Management Plans have been consolidated with the Louisville Metro Hazard Mitigation Plan
- Hazard Mitigation Plan is a 5-year plan developed to meet the requirements of the Disaster Mitigation Act of 2000
- Most recent plan approved in January 2023 and identifies other hazards including:
 - Civil Unrest
 - Cyber Incidents
 - Dam/Levee Failure
 - Drought
 - Earthquakes
 - Extreme Heat
 - Floods
 - Hail Storm
 - Hazardous Materials Release
 - Karst Terrain/Land Subsidence/Sinkholes
 - Landslides
 - Public Health Emergencies
 - Severe Weather/Thunderstorms
 - Severe Winter Weather
 - Tornado
 - Wildfires



Meeting Agendas

- January 18, 2023 3-4pm (Assess the Hazard)
- February 1, 2023 3-4pm (Assess the Problem)
- February 15, 2023 3-4pm (Set Goals)
- March 1, 2023 3-4pm (Review Possible Activities)
- March 15, 2023 3-4pm (Draft Action Plan)



Flood Hazard Overview



Louisville Metro Watersheds

- 11 major watersheds/streams
- All streams drain to the Ohio River or the Salt River (which drains to the Ohio River)



Potential Types of Flooding

- Ohio River flooding
- Stream flooding
- Combined sewer flooding
- Levee failure
- Dam failure
- Pluvial flooding



Louisville History

- Established during the Revolutionary War in 1778
- Developed due to the Falls of the Ohio
- Area was a “pond-dotted bottomland” along the Ohio River
- Malaria outbreak in 1822, nicknamed “Graveyard of the West”



Top 10 Ohio River Floods

- (1) 52.15 ft on 01/27/1937
- (2) 42.10 ft on 03/08/1945
- (3) 41.70 ft on 02/16/1884
- (4) 41.20 ft on 03/12/1964
- (5) 39.50 ft on 02/16/1883
- (6) 39.40 ft on 04/02/1913
- (7) 38.76 ft on 03/07/1997
- (8) 36.40 ft on 01/22/1907
- (9) 36.00 ft on 04/19/1948
- (10) 35.72 ft on 02/26/2018



1884 Flood along Broadway east of Shelby Street

Photograph Source:
<https://digital.library.louisville.edu/cdm/ref/collection/p2tcv01115>



Great Flood of 1937

- Flood of record for Louisville
- Covered 60% of the City of Louisville
- 65 square miles of Jefferson County
- 23,000 people were evacuated
- Damages totaled \$1 billion in today's dollars for flood - \$250 million for KY
- River crested 40 feet above normal pool (459.3' elevation)
- Deaths totaled 90 for the flood in Louisville



1937 flood - West end, Coast Guardsmen. University of Louisville Photographic Archives





1937 Flood - Refugee camp erected by WPA workers. University of Louisville Photographic Archives



Jan 1937 - University of Louisville - Eastern Parkway (near 3rd Street). University of Louisville Photographic Archives



1937 - Broadway facing west toward 4th St and the Brown Hotel. University of Louisville Photographic Archives



1937 flood - Pontoon bridge on Baxter Ave near Lexington Road and Hamilton. University of Louisville Photographic Archives



10752 Completely demolished. The "Point" section of Louisville will not be rebuilt 1937 flood, The Point area. University of Louisville Photographic Archives



Ohio River Floodwall

- Construction began in 1948
- Designed by Army Corps of Engineers to the 1937 flood height plus 3 ft
- 1st Phase completed in 1957
- Protected area near Beargrass Creek to just south of Rubbertown
- 2nd Phase completed in 1988 and protected area from existing wall to southern boundary of Jefferson County



Area Protected by Ohio River Levee



- Current flood protection system is maintained by MSD and protects about 110 square miles from flooding
 - 26.1 miles of floodwall and earthen levee
 - 16 flood pumping stations
 - Nearly 150 floodgates
 - 79 floodwall closures
- The system protects:
 - More than 200,000 people
 - 137,000 structures
 - \$34 billion in property



Other Floodwalls

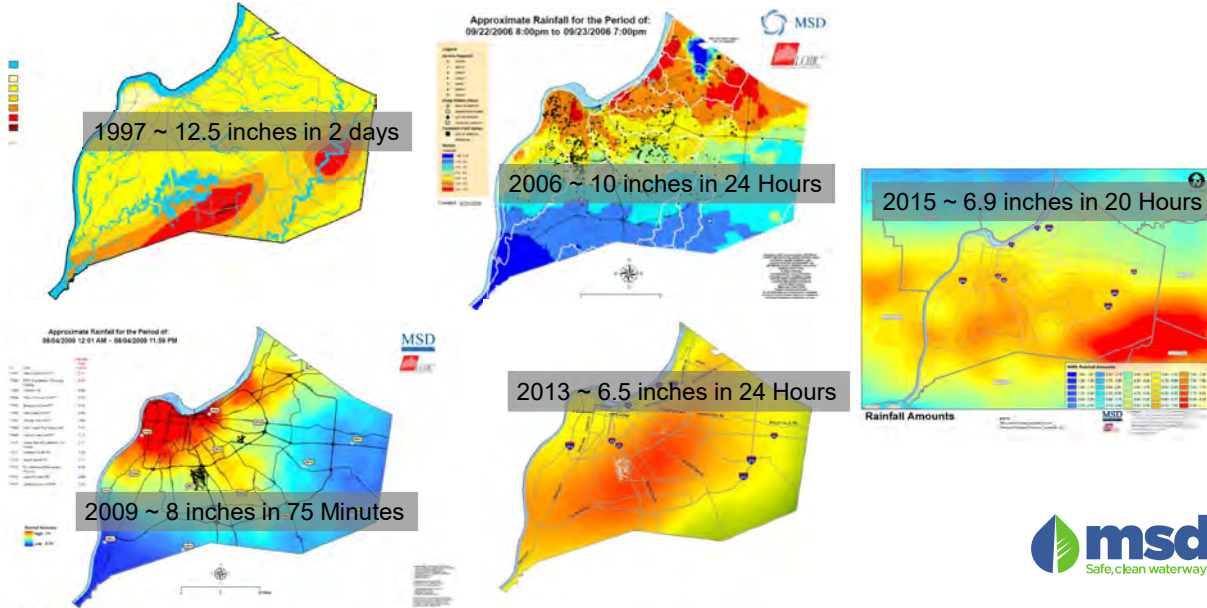
- In 1991, MSD constructed a floodwall to protect the Presbyterian Church Headquarters/Witherspoon St area
- In 2010, the KFC Yum! Center extended the wall to protect the new arena
- Willowbrook Floodwall completed in 2010 to protect an apartment complex



Stream Flooding



Major Rain Events 1997-2015



Floodplains in the East vs. West



- Rolling hills, well-drained
- Narrower floodplains
- Higher velocities and depths
- Smaller number of properties impacted



- Relatively flat terrain, poorly drained
- Wide floodplains
- Lower velocities and depths
- Large number of properties impacted

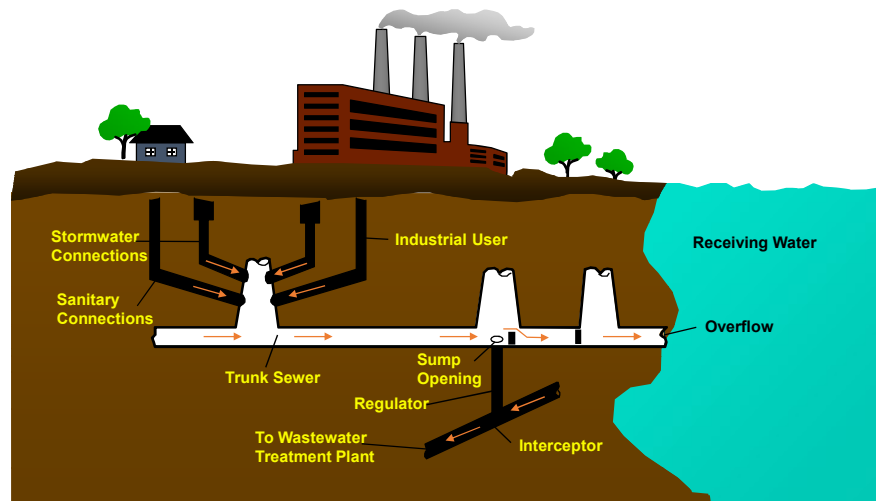


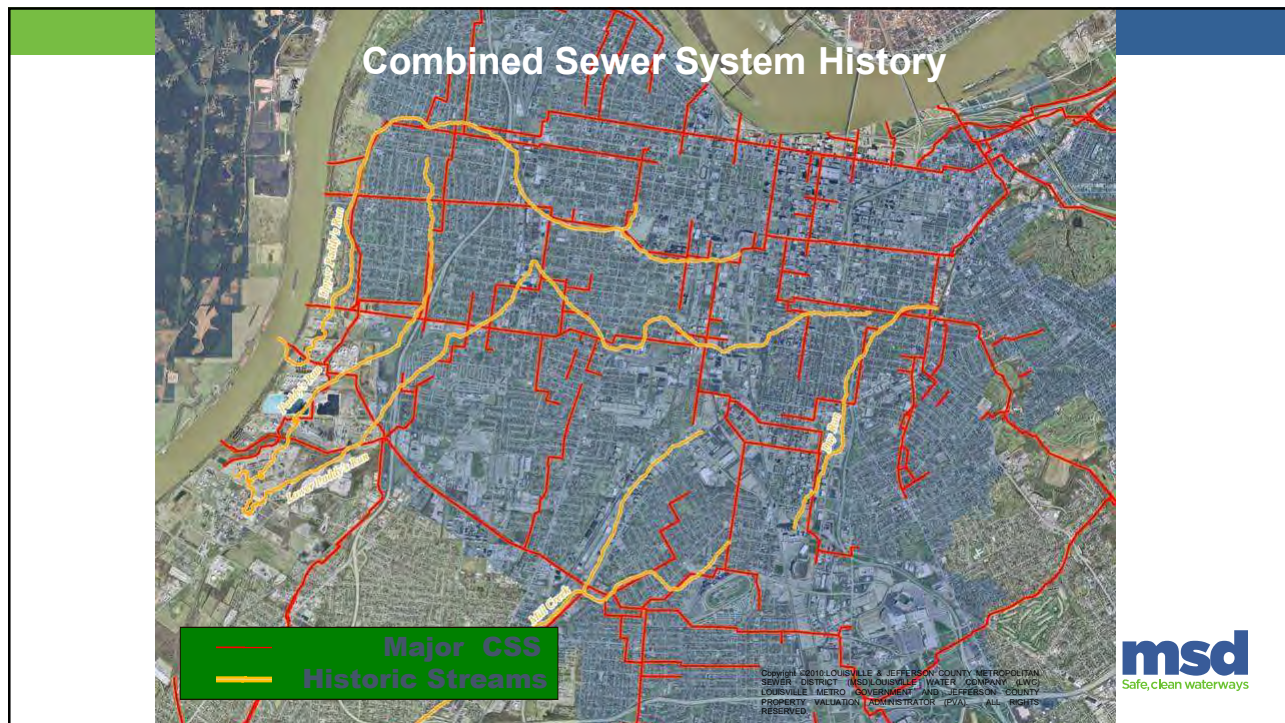
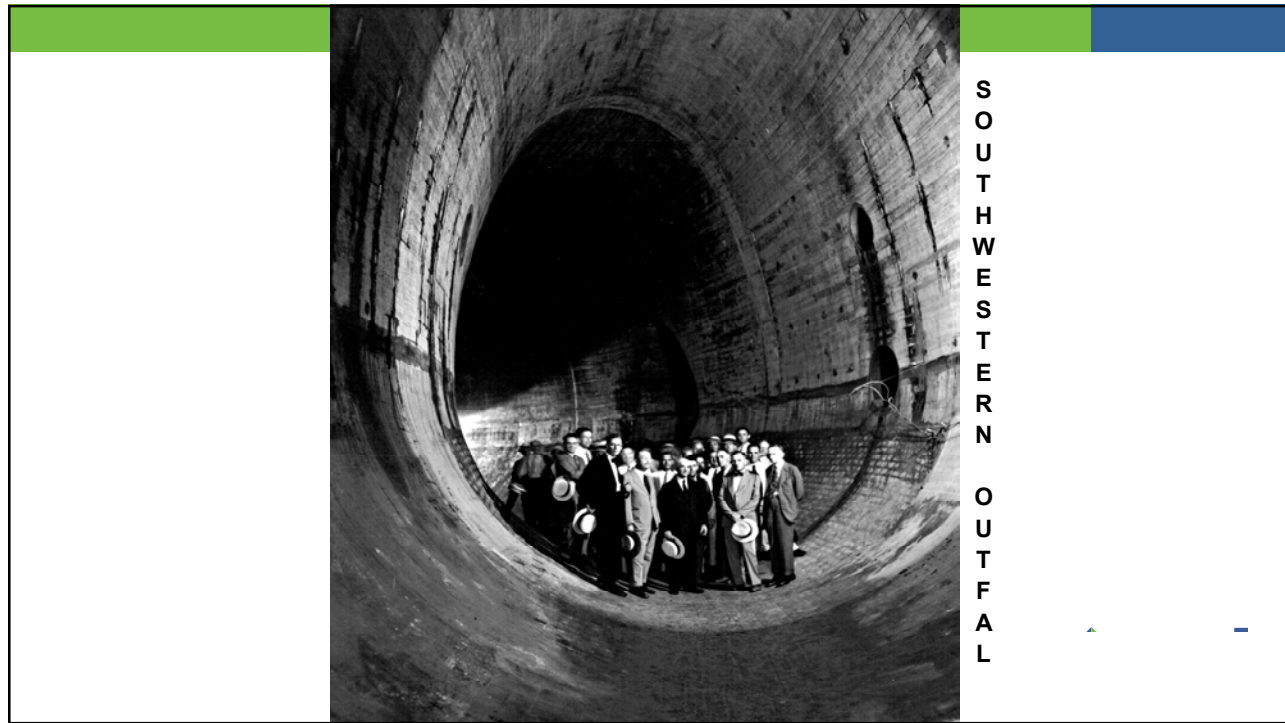
Combined Sewers

- 1st combined sewers were constructed between 1850 and 1860
- 1st wastewater treatment plant in 1958
- Today Louisville's urban areas are still drained by the combined sewer system



Typical Combined Sewer System Configuration



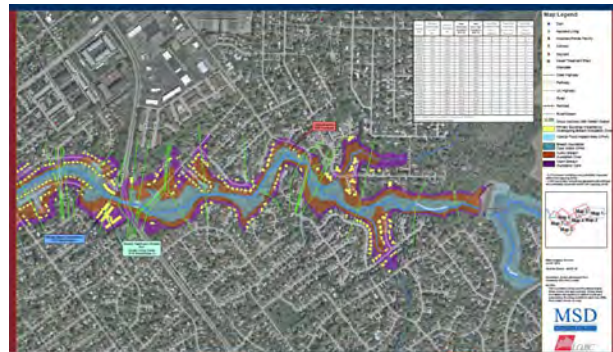


2009 Combined Sewer Flooding



Dams

- 9 high hazard dams within Jefferson County
 - MSD – 3
 - LG&E – 1
 - Metro Parks – 1
 - Private – 4
- Dams are regulated and inspected by Kentucky Division of Water
- Inundation maps have been created for all high hazard dams

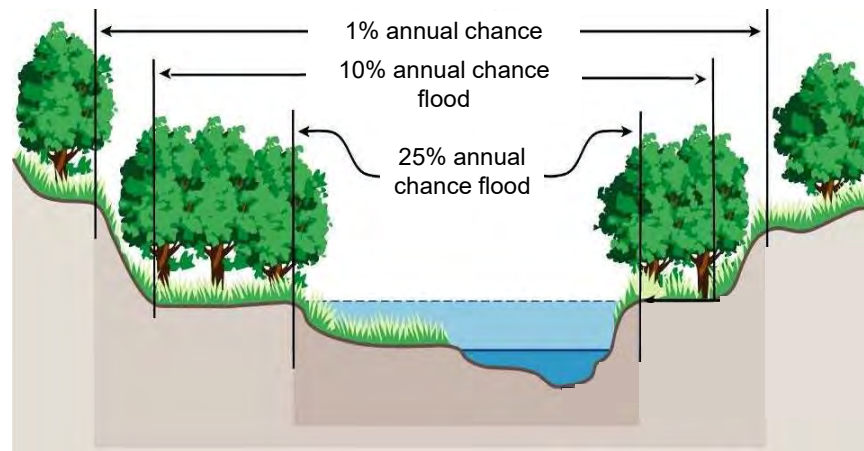


Floodplain Statistics

- Approximately 11% of Jefferson County is located in a regulated floodplain
- Approximately 11,000 homes and businesses are regulated by the Louisville Metro Floodplain Ordinance
- Approximately 7,000 homes and businesses are in the FEMA Special Flood Hazard Area



What Does 1% Annual Chance (100-yr) Flood Mean?



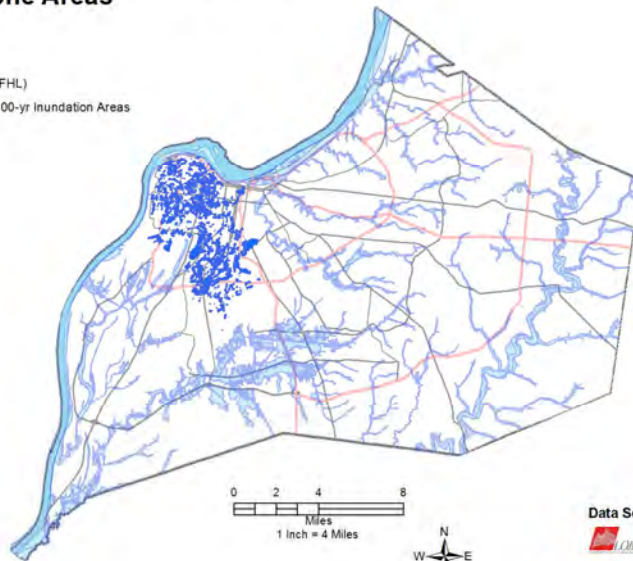
Flood Type Comparison

| Flood Type | Ohio River | Flash Flooding (streams, combined sewer, and dam failure) | Levee Failure |
|----------------|---|---|---|
| Warning Time | 3+ days | Little to no warning | Varies depending on failure |
| Flood Depth | Typically 20'+ deep along low-lying areas adjacent to the river | Flood depths vary, generally less than 6' and frequently less than 2' | Varies depending on proximity to the river |
| Velocities | Very high close to the river, lower in other areas | Velocities are very high near streams, especially in steeper areas | Velocities may be high at failure point, lower in other areas |
| Flood Duration | Floods can last a month or longer | Floods typically recede within 1 or 2 days | Floods can last a month or longer |

Louisville and Jefferson County Floodprone Areas

Legend

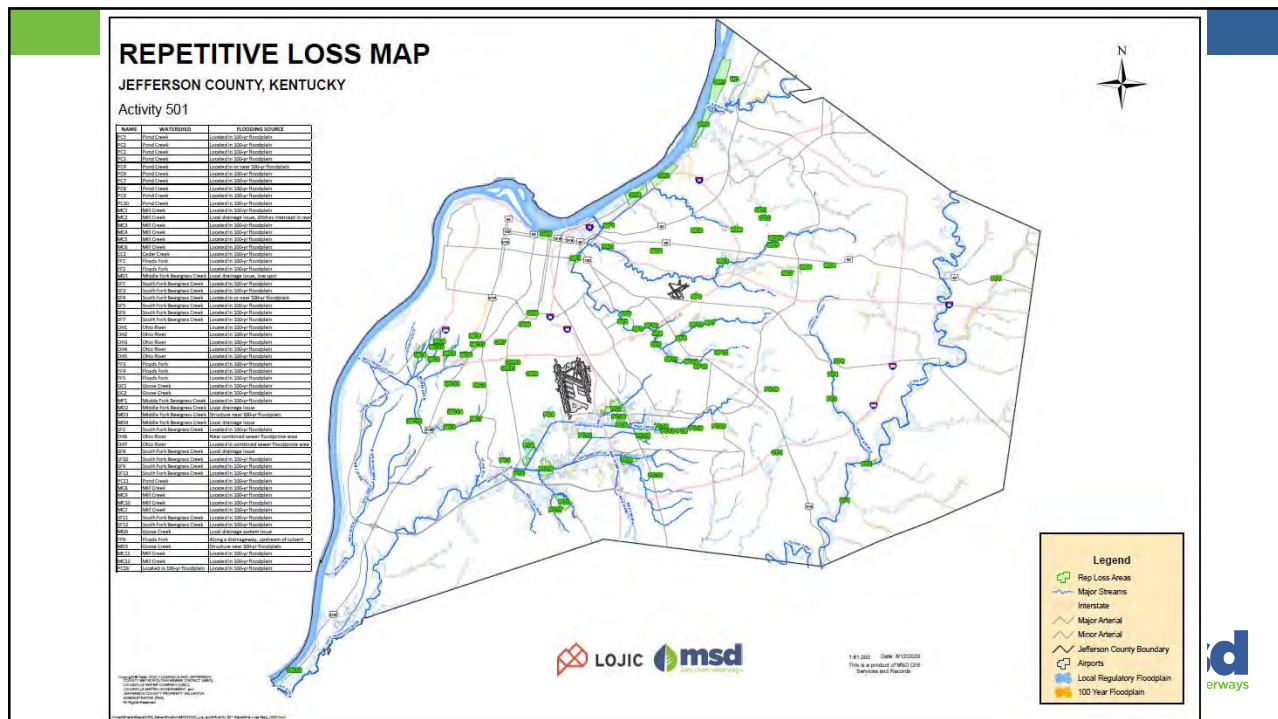
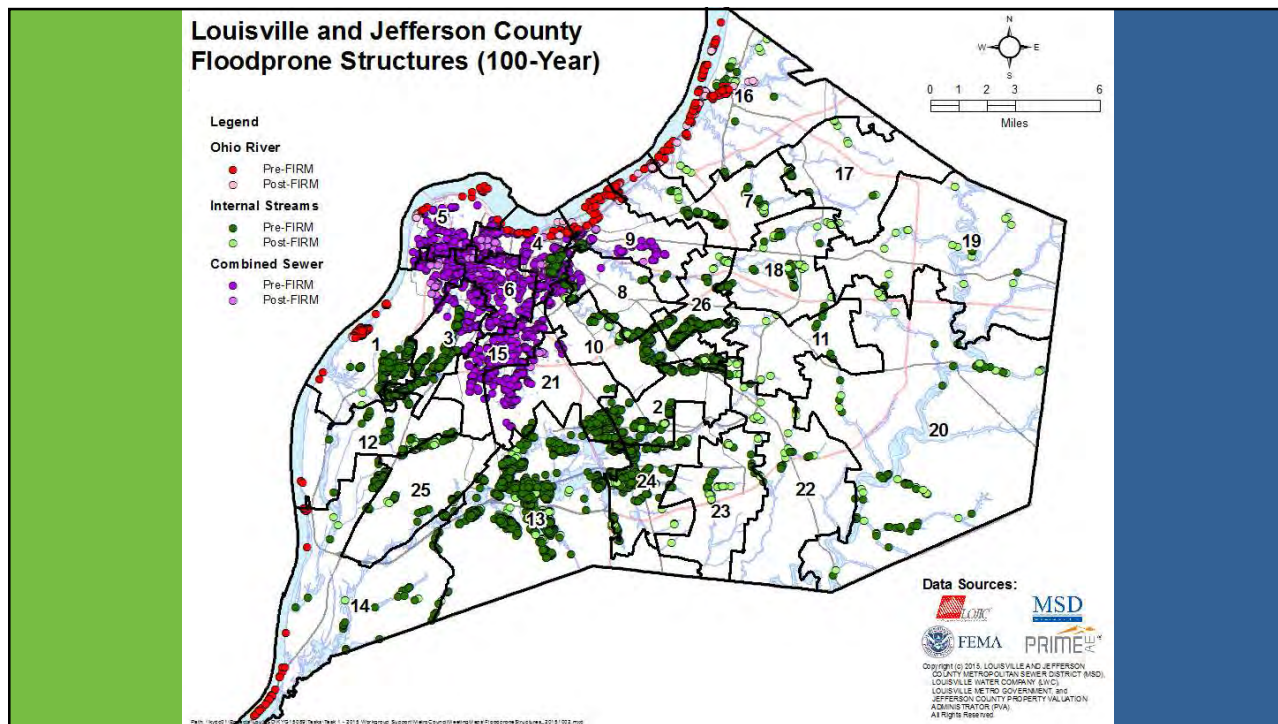
- SFHA (NFHL)
- CSSA - 100-yr Inundation Areas



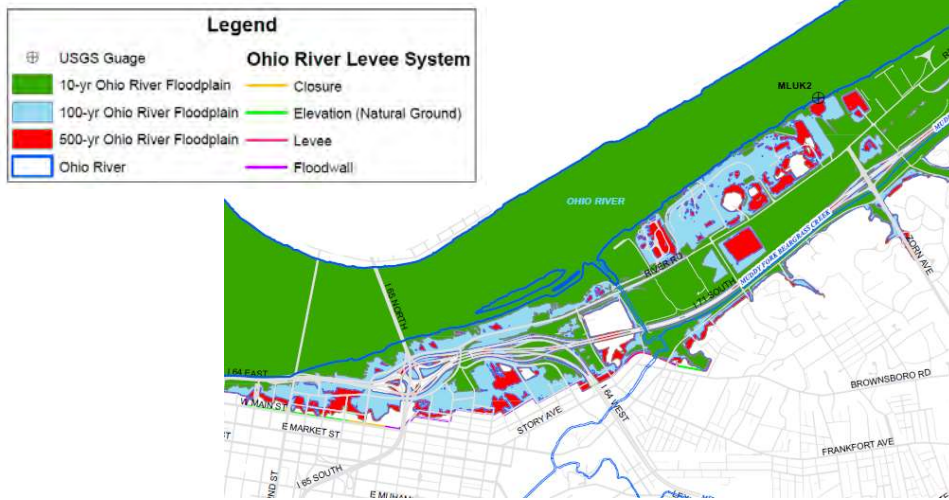
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 Path: \\eng9\Projects\LMSW00030\GIS\Task04_Inventory\FloodProneAreas.mxd

Data Sources:


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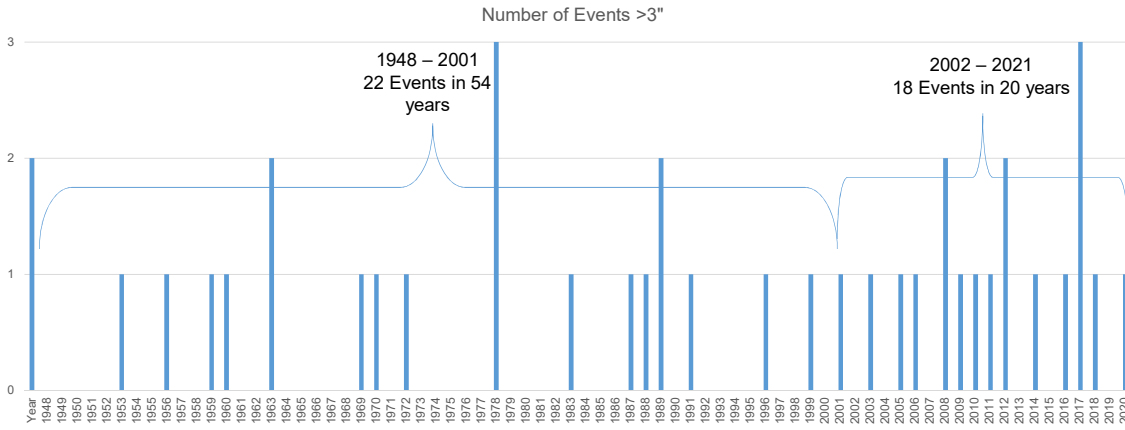
Flood map (10-yr, 100-yr, and 500-yr floods)



Future Conditions

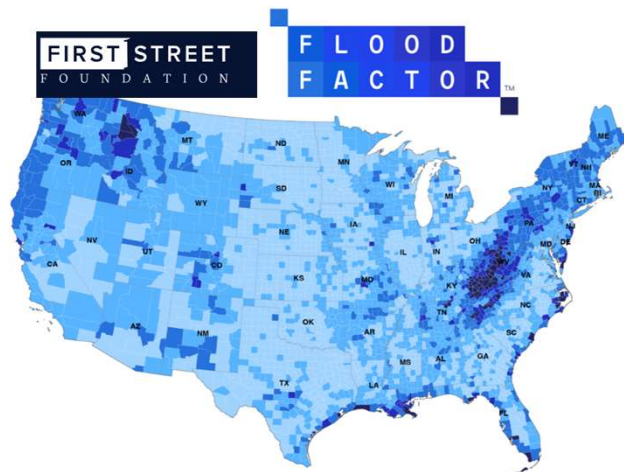
- Local regulatory floodplain
 - Floodplain regulations are administered for the local regulatory floodplain
 - Larger area is mapped than FEMA Special Flood Hazard Area
 - Based on fully developed conditions
 - Drainage areas smaller than 1 square mile are mapped in some cases
- Climate Change
 - Floodplains are not impacted by sea level rise
 - More frequent and extreme storms are expected

Increased Frequency of Extreme Storms



Flood Factor

Flood Factor data includes property level data for future climate scenarios and pluvial flooding that may not be captured by current floodplain mapping



Flood Factor Data



Flood Factor Data



FEMA and MSD Flood Data



Questions?



Next Meeting

- Topic: Assess the Problem
- Date: February 1, 2023 3-4pm
- Location: MSD Main Office, 700 W Liberty St

