

COMMONWEALTH OF KENTUCKY / LOUISVILLE METRO

CATASTROPHIC URBAN FLOOD PLAN

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for the
Commonwealth and
the Region





MANY AGENCIES ONE SOLUTION

MSD

KyEM

USACE

Louisville EMA

US DHS

NWS

USGS

KyDOW

USCG

FEMA

TARC

USCG

Be Risk Aware!

TEAM

LOUISVILLE METRO FLOOD PROTECTION SYSTEM

- Approximately 29 miles long – 4.6 Miles concrete floodwall
- 16 pumping station – 11,520,000,000 GPD Capacity
- 79 Closures
- 150 flood gates
- 163 process gates
- Directly protects 230,000 lives, 87,000 structures with a value in excess of 24 billion dollars
- Louisville Reach was constructed in the 1940s and 1950s. Southwestern Jefferson County Reach was constructed in the 1980s

LOUISVILLE METRO FLOODING - 1937



LOUISVILLE METRO FLOODING - 1997



LOUISVILLE METRO FLOODING - 2018



TOP TEN FLOODS IN LOUISVILLE METRO

1. **1937 52.15'**
2. 1945 42.10'
3. 1884 41.70'
4. 1964 41.20'
5. 1883 39.50'
6. 1913 39.40'
7. **1997 38.76'**
8. 1907 36.40'
9. 1948 36.00'
10. **2018 35.64'**

- All upper gauge readings

BACKGROUND

- 2014 - \$75K funding through the Silver Jackets was secured for an enhancement to the MSD Flood Protection's Emergency Preparedness Plan (EPP)
- This enhancement included modeling of failures in the in the flood protection system during a flood event.
- An I-Wall failure and a breach in levee were the chosen failures.
- USACE performed modeling of the surface flooding. MSD GIS staff projected where our pipes would convey the flood water.
- The need for a closer working relationship between USACE, MSD and Louisville Metro EMA was identified.

FLOODWALL FAILURE – NEW ORLEANS



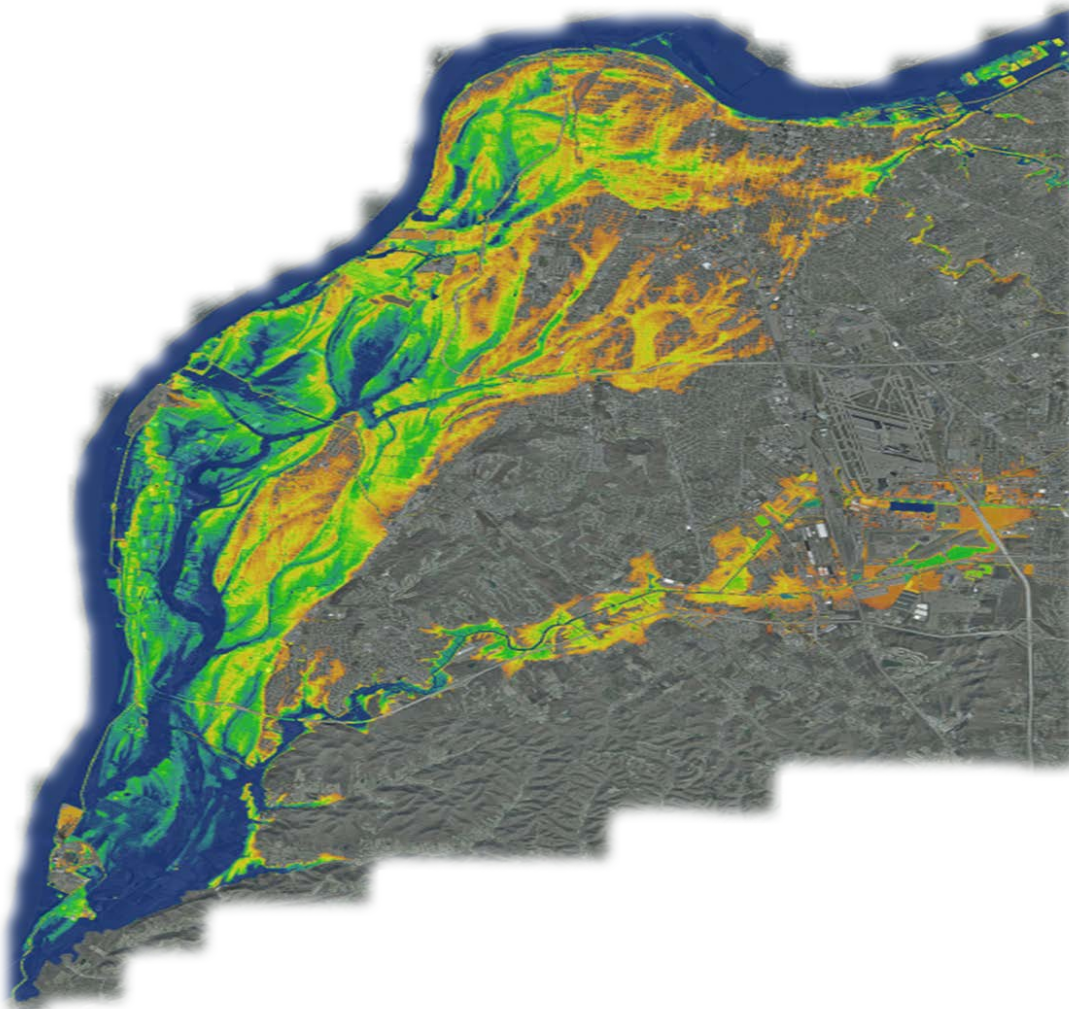
LEVEE FAILURE – NEW ORLEANS



EMERGENCY TABLE TOP EXERCISE

- A breach in the levee at the end of Bells Lane during a .2% annual chance flood event was used for the table top exercise.
- 19 local, state and federal agencies, as well as, private companies took part in the table top exercise.
- If this scenario occurred, it is believed the devastation to Louisville Metro would be greater than what Hurricane Katrina was to New Orleans

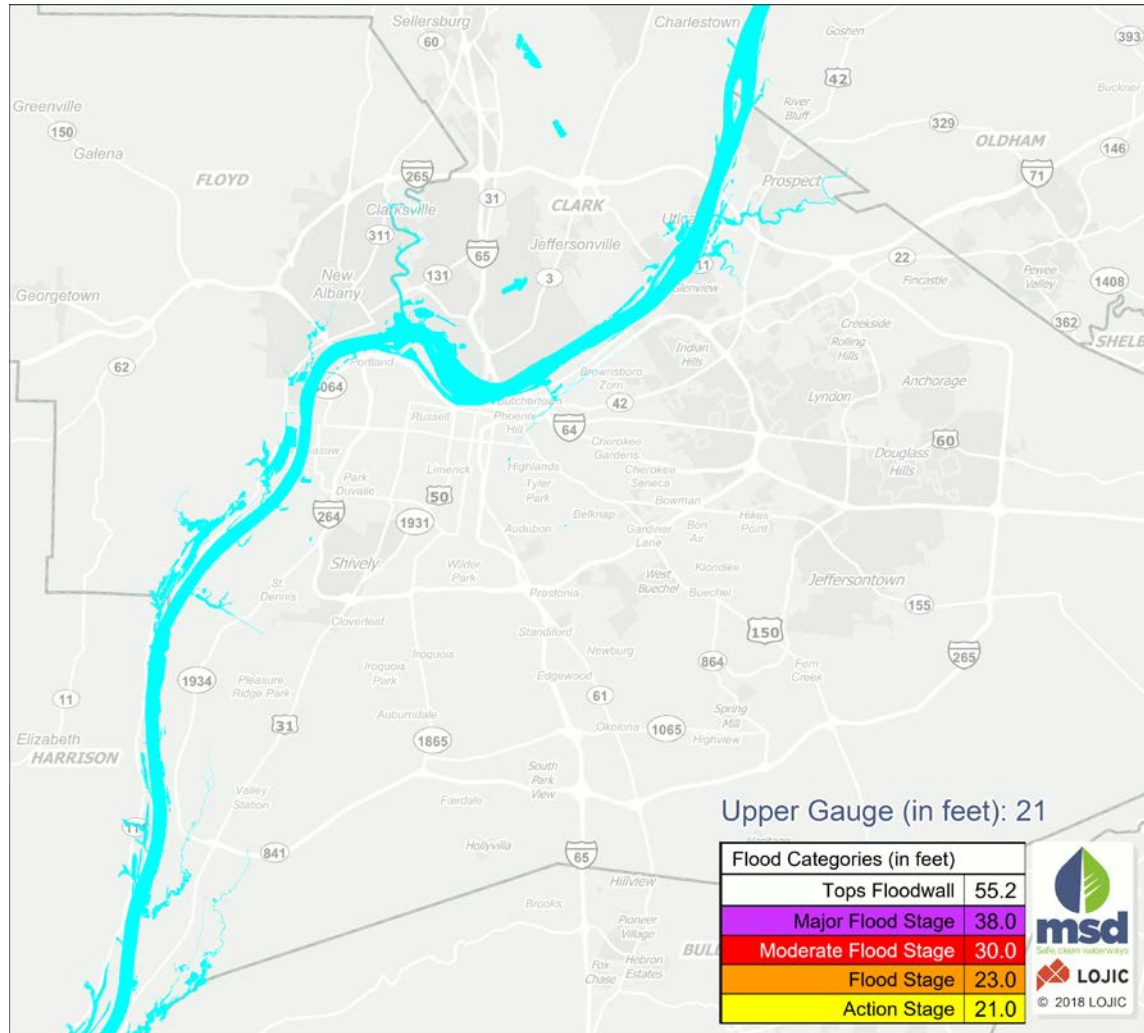
CATASTROPHIC FLOOD



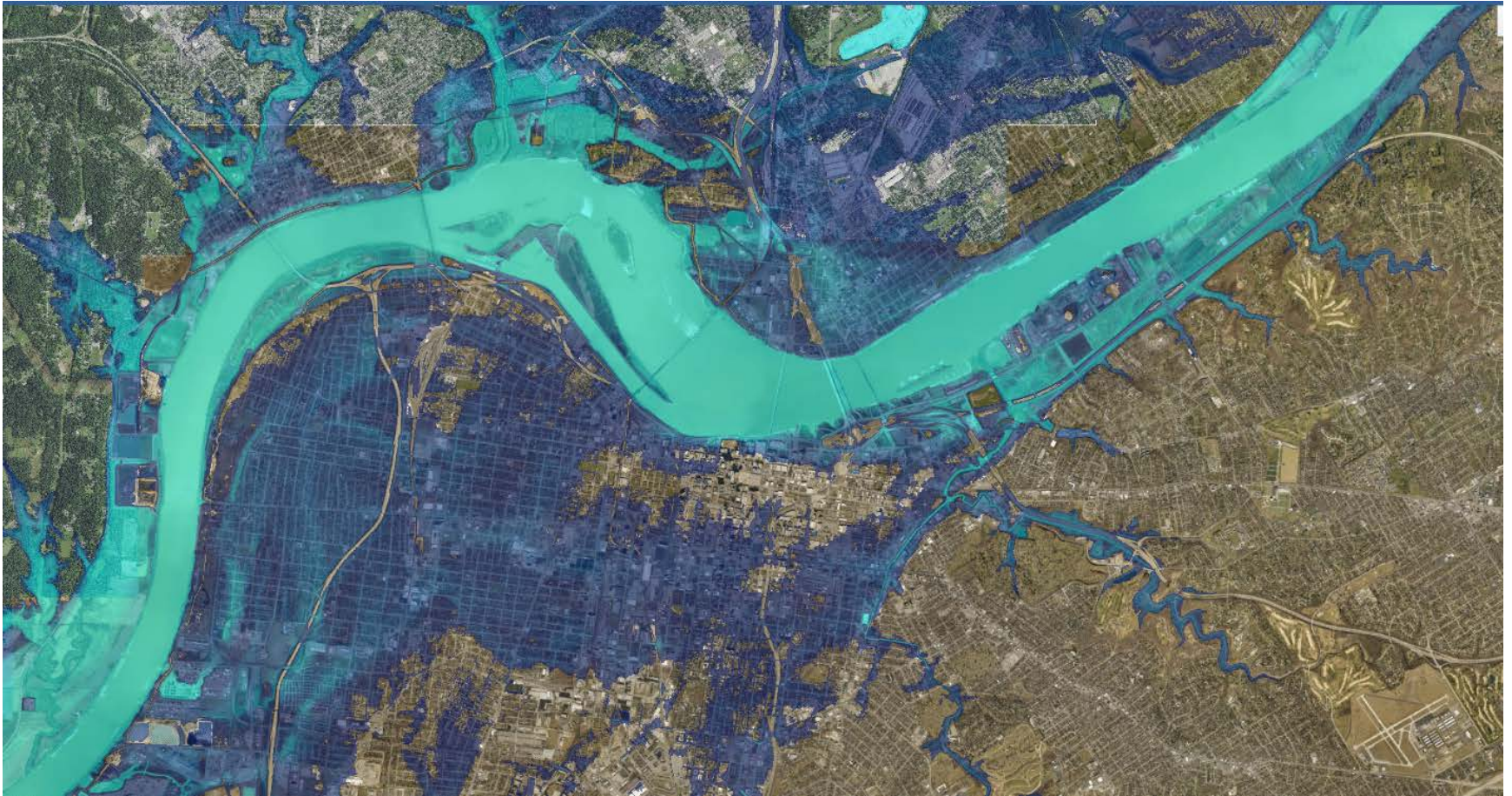
CATASTROPHIC URBAN FLOOD PLAN

- The need for a Catastrophic Urban Flood Plan was identified in the 2013 Commonwealth's Threat and Hazard Identification and Risk Assessment (THIRA) and Louisville Metro's Hazard Mitigation Plan.
- Working through Louisville Metro Silver Jackets Team, a collective of federal, state and local organizations are working on such a plan.
- This plan, when completed, will be reproducible to allow the framework and tools to be shared with other river cities in the Commonwealth and in the region.

Foot By Foot Analysis



OVERVIEW



CLOSE UP VIEW



CATASTROPHIC URBAN FLOOD PLAN

	Upper Gauge			Lower Gauge	
inspect gates 16, 6, 9, 16b, 16c, 59, 62, 63, 64		21.00	55.00	Parks and riverfront areas in Clarksville and New Albany flood. Some yards along US 31W (Dixie Highway) from Pleasure Ridge Park to West Point, KY flood.	Inspect gates 86, 92, 106, 107, 110, 111, 112. Open gate 91.
		22.00	56.00		
inspect gate 30.	Some sections of River Road are closed from 3rd St. to 8th St. Eifler Beach and Juniper Beach areas are cut off. Parts of Campbell St., Frankfort Ave., and Mockingbird Valley Rd. close. Right turns onto River Road from the I-64 ramp are prohibited.	23.00	57.00		Close gates 66, 111, 113. Open gate 110.
		23.40	57.40		Close gate 90
		24.00	58.00	IN 111 floods upstream of Bridgeport	Close gate 118. Paddy's Run pump station in service.
	Waldoah Beach and Transylvania Beach areas are cut off. River Road near Indian Hills Trail floods. Adams St. and Witherspoon Rd. closes.	24.50	58.50		
Close gates 1, 3a, 4, 6. Open gate 3, Inspect gate 5. R.E. Starkey pumping station in service. Beargrass pump station in service.		24.60	58.60		
inspect gates 36, 40, 53, 54, 55		25.00	59.00	Overbrook Rd. floods south of Lake Dreamland Rd.	Open gate 86
		25.40	59.40		Inspect gate 140
Close gate 33c		25.50	59.50		

“THE NEW NORMAL”

- In 1993 the annual average cost of damage from natural disasters in the United States was 3.3 billion (FEMA).
- In 2017, there were 16 weather and climate disaster events with losses exceeding \$1 billion each across the United States. These events included a drought event, 2 flooding events, 8 severe storm events, 3 tropical cyclone event, a wildfire event, and a freeze event (NOAA). Total cost of losses 306.2 Billion.
- The 1980–2017 annual average is 5.8 events (CPI-adjusted); the annual average for the most recent 5 years (2013–2017) is 11.6 events (CPI-adjusted)(NOAA).

2017 AT A GLANCE

U.S. 2017 Billion-Dollar Weather and Climate Disasters



This map denotes the approximate location for each of the 16 billion-dollar weather and climate disasters that impacted the United States during 2017.

HURRICANE KATRINA NEW ORLEANS - 2005



CUMBERLAND RIVER FLOODING NASHVILLE - 2010



HURRICANE HARVEY HOUSTON - 2017



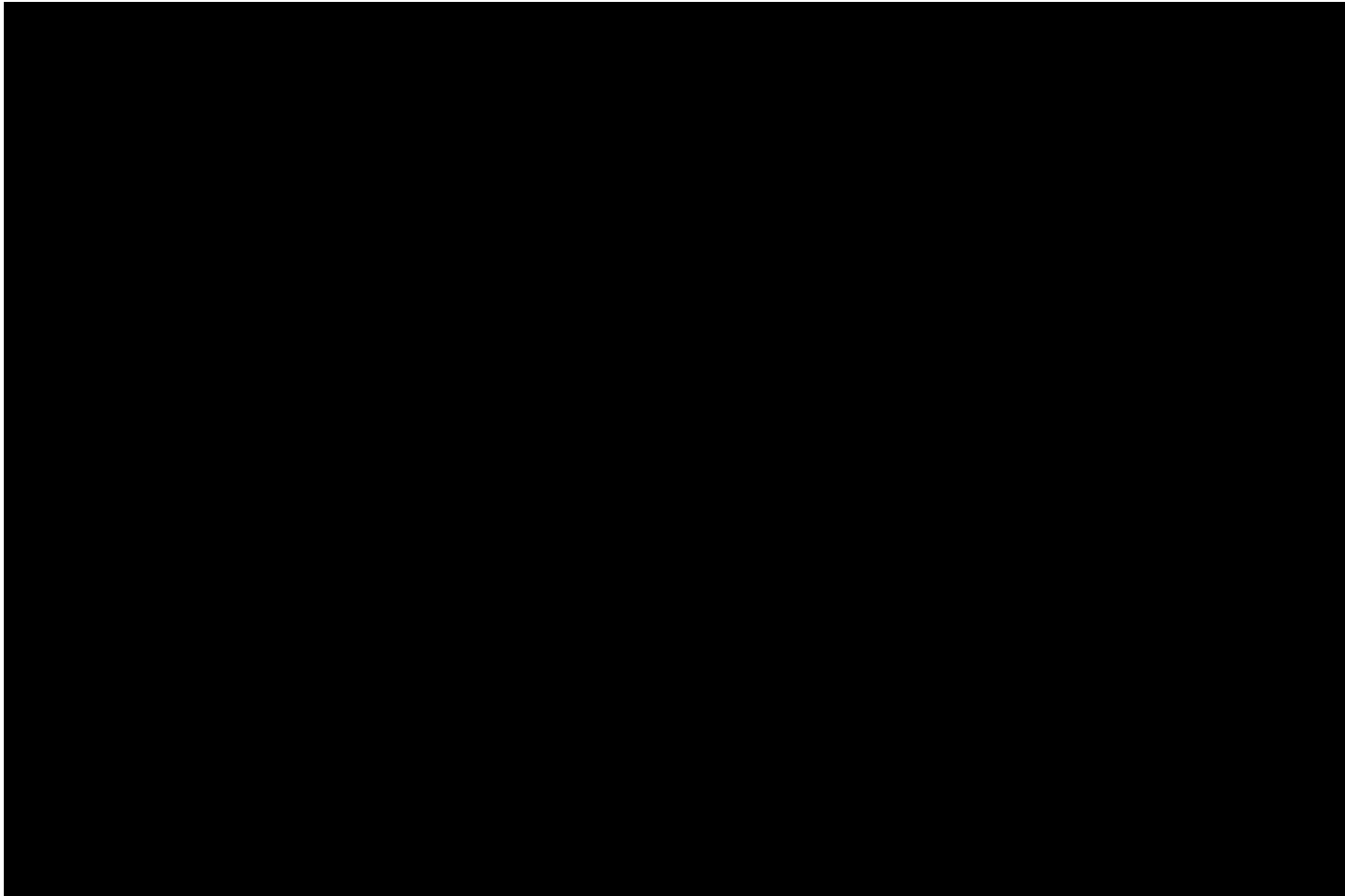
HURRICANE FLORENCE NORTH CAROLINA - 2018



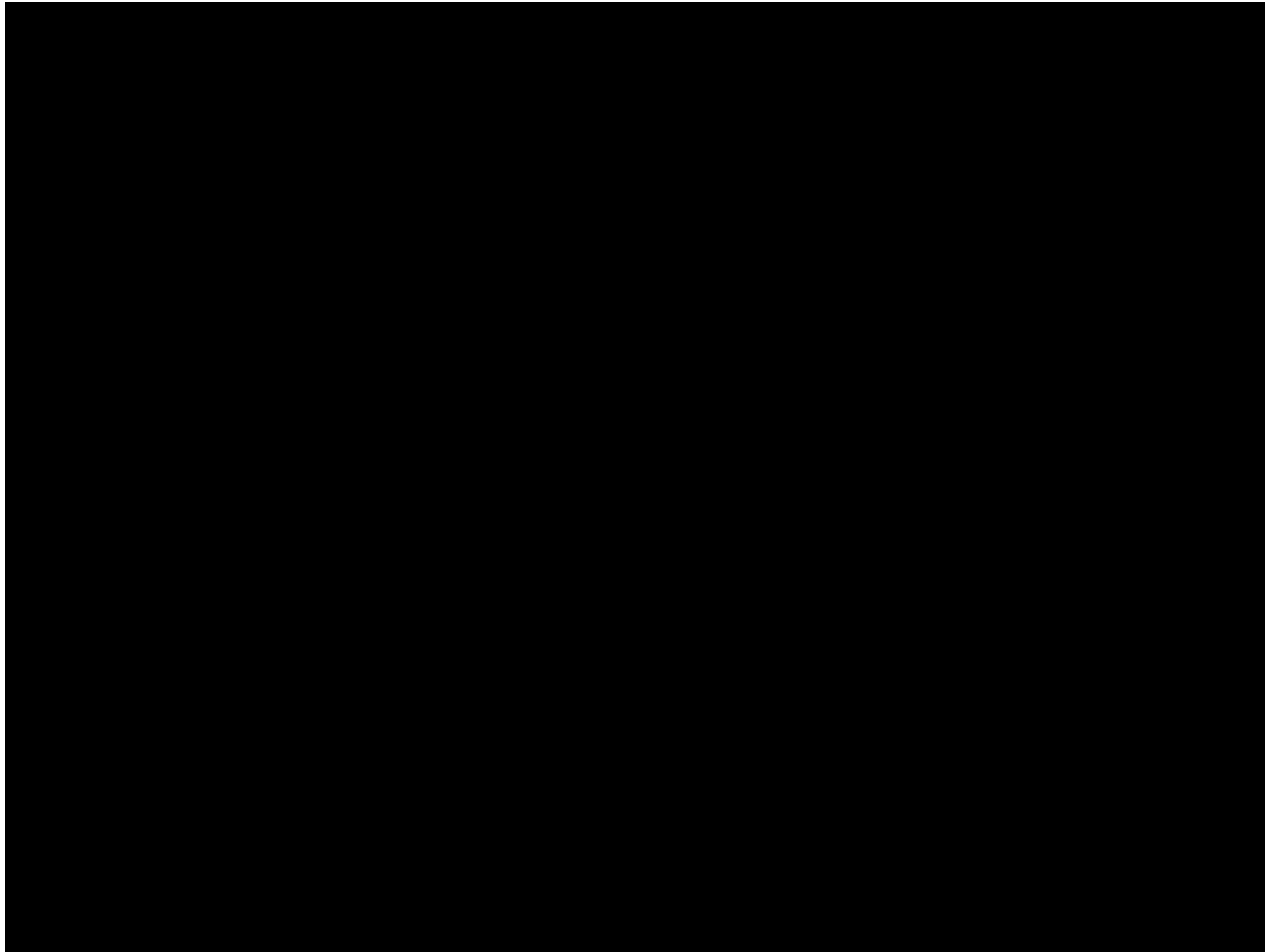
SAINT LAWRENCE RIVER MONTREAL - 2017



SAND LEVEE BREACH



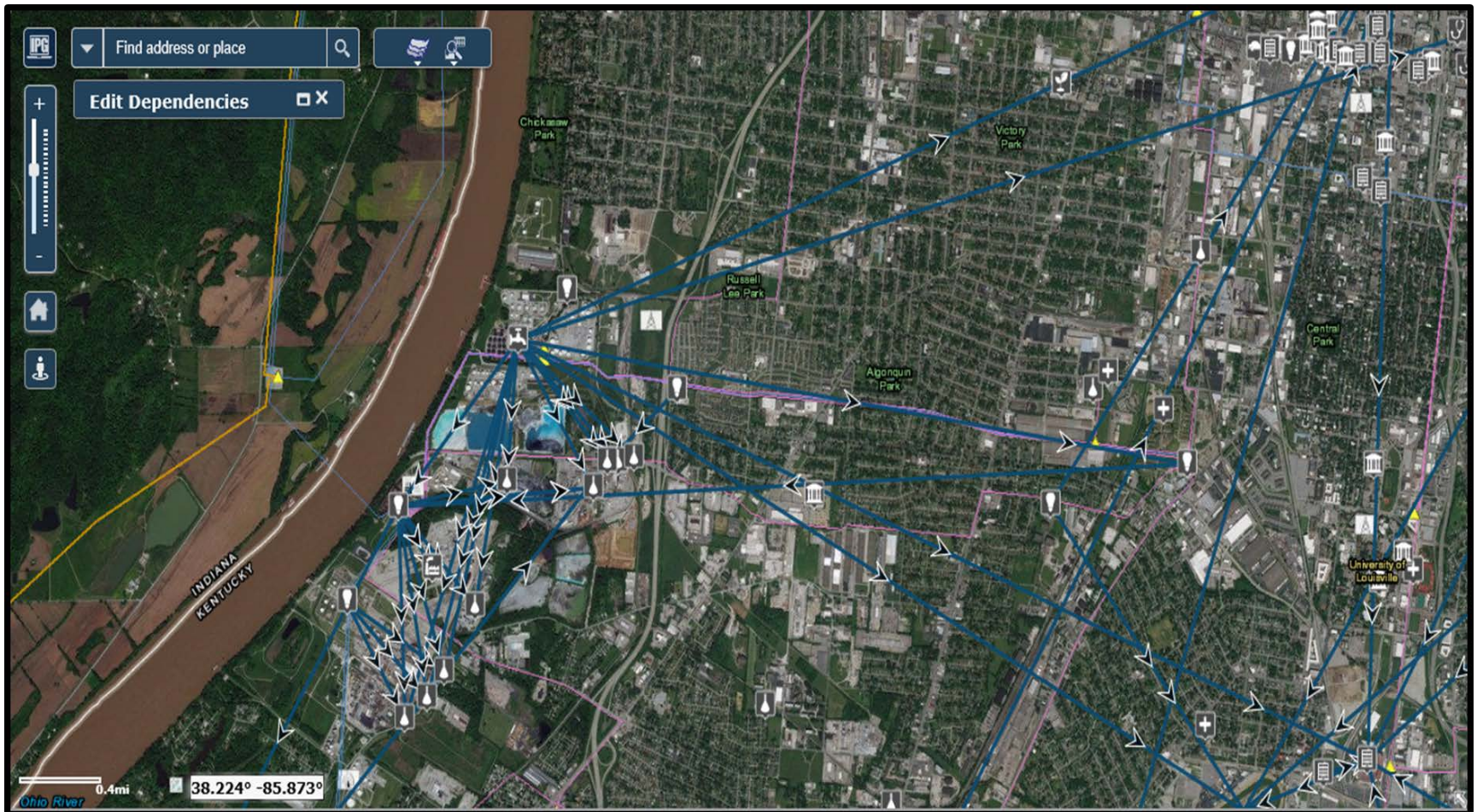
CLAY LEVEE BREACH



DEPARTMENT OF HOMELAND SECURITY REGIONAL RESILIENCY ASSESSMENT PROGRAM

- Catastrophic Urban Flood Plan is one of twelve projects chosen nationwide for DHS's FY17RRAP
- Three year process. Eighteen months of assessment and eighteen months of implementation assistance and follow up.
- Will provide a deep assessment to impacts to critical or life-line infrastructure, Rubbertown and hospitals for failure in our flood protection system in a .2% annual chance flood event.

INTERDEPENDENCIES



FULL DEPTH INUNDATION

Flooding Scenarios

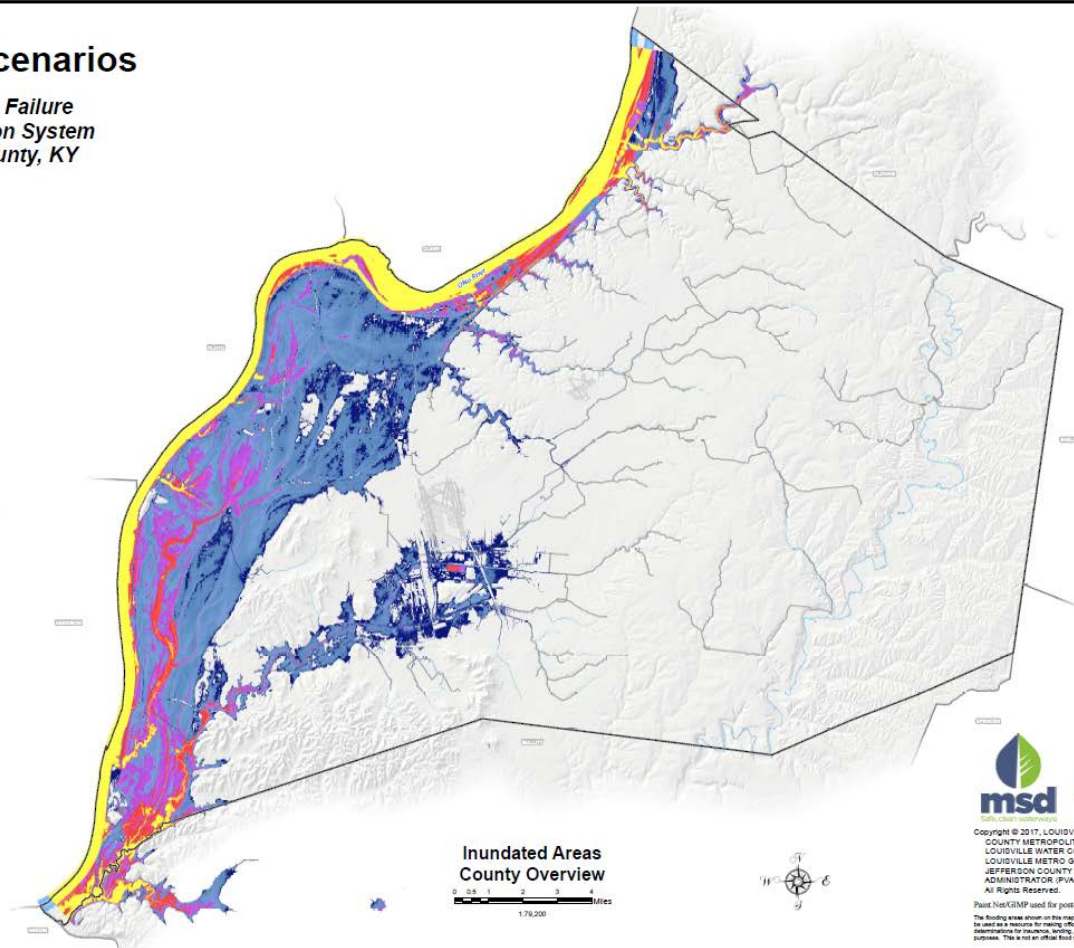
*Catastrophic Failure
Flood Protection System
Jefferson County, KY*

Legend

- Major Streams
- Sewer Interceptors
- Jefferson County Boundary

Ohio Flooding

- Action Stage
- Flood Stage
- Moderate Flood Stage
- Major Flood Stage
- 1937 Flood
- Tops Flood Wall



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Point NetGIMP used for post-processing.
The flooding areas shown on this map SHOULD NOT be used as a resource for making official flood zone determinations for insurance, zoning, or other related purposes. This is not an official flood map.

Date: 1/11/2017

FEMA EVACUATION PLANNING



MITIGATION MATTERS

- According to FEMA, every one dollar spent on planning and mitigation activities equates to a six dollar savings in recovery and economic costs in a natural disaster.
- FEMA's new policy for reimbursement of funds relating to natural disaster recovery will institute State-by-state "deductible". Plans like this one will help reduce that deductible.

NEXT STEPS

- Implementation of the RRAP starting with an Emergency Table Top Exercise in March 2019.
- Development of the evacuation plans by FEMA hurricane evacuation planners late winter/early spring 2019.
- Using the GIS tools developed by US DHS and MSD determine at what different gauge levels would flood waters due to a failure begin impacting lifeline infrastructure, etc.
- Further define the roles and responsibilities of the responding agencies during such of an event

QUESTIONS

