

***“...within a generation, the swampy area practically disappeared and has been made productive....Ornate suburban homes have risen in what was once a morass, and high producing truck farms dot the section that at one time was more or less covered with surface water.”***

- Courier Journal 1929

# Louisville Floodplain Management Plan – Assess the Problem



February 1, 2023



# Meeting 2 Agenda

*Topic: The impact of flooding on people, property, infrastructure, the local economy, and natural floodplain functions.*

- Impacts of Flooding and local vulnerabilities
- Life safety, warnings and evacuation, public health
- Affected buildings, critical facilities and infrastructure
- Economic impacts and major employers
- Substantial Damage Management Plan and Repetitive Loss properties
- Flood insurance claims
- Natural features and open space floodplain functions
- Watershed Master Plan
- Questions

# Overview of the Problem



# MSD

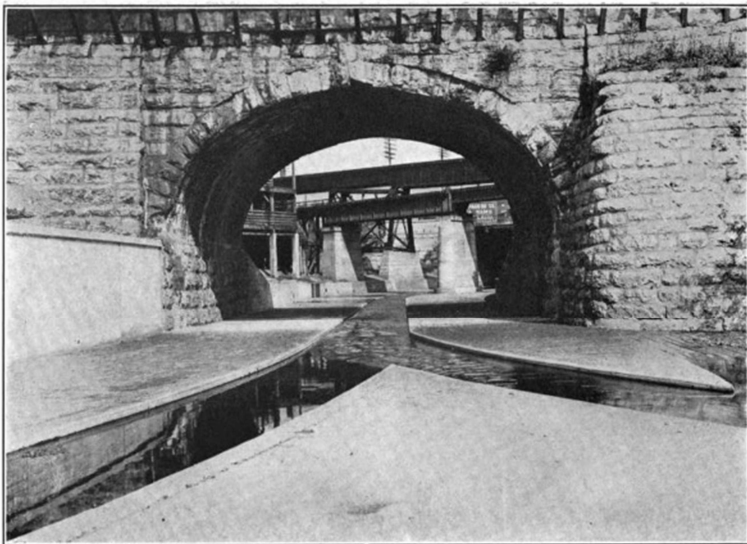
- MSD officially took over drainage in 1987, including:
  - Maintenance responsibilities for public water including public storm sewers and streams
  - Construction of capital projects to reduce flooding and drainage issues
  - Operation and maintenance of the Ohio River Flood Protection System
- Stormwater services are provided locally by St. Matthews, Jeffersontown, Anchorage, and Shively



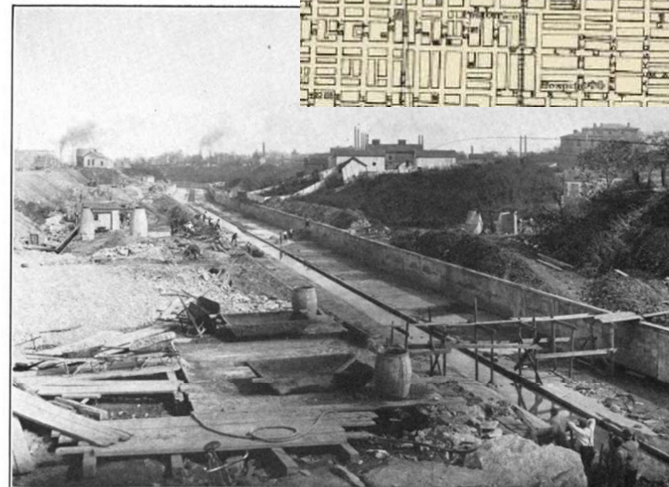


# Historic Ways to Improve Drainage Beargrass Creek

- Construction of “cutoff”
- “Improved” channels



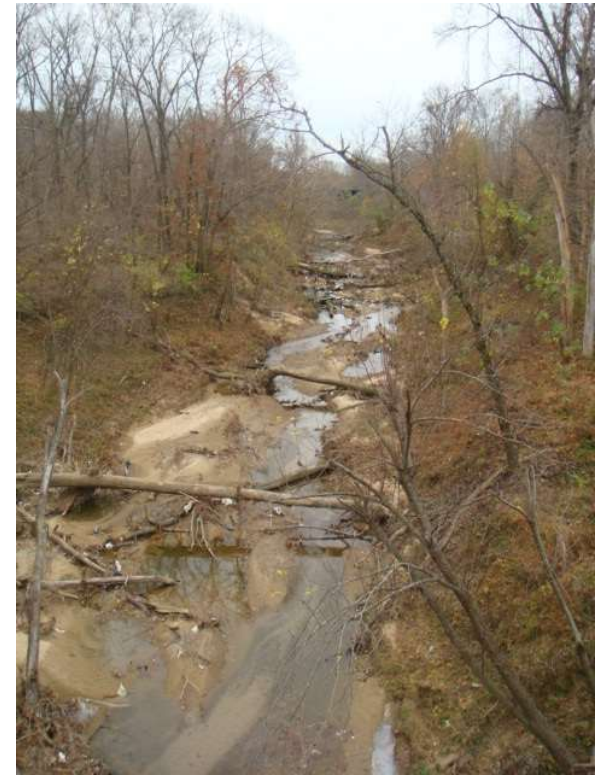
Improved Channel of Beargrass Creek under L. & N. R. R. bridge. Looking North from junction of South and Middle Forks.



Improved Channel of Beargrass Creek. Looking Northeast over Section "B" and "C."

# Historic Ways to Improve Drainage Mill Creek

- A citizens committee formed in the early 1900's to study Mill Creek and Pond Creek watersheds
- A widening of Garrison Ditch was proposed to help with drainage, but the residents did not favor the plan
- The Mill Creek Cutoff was proposed as an alternative and constructed in 1910
  - 7800 ft of new channel constructed to create a "shortcut" to the Ohio River



# Historic Ways to Improve Drainage Pond Creek

- Areas in the south and southwest were originally swamps called the “Wet Woods”
- Jefferson Pond Draining Company was the first organized effort to drain these area in 1838
- Large manmade channels were constructed to make the land usable





# Historic Development

- Converted swamps to farmland in the 19<sup>th</sup> and 20<sup>th</sup> centuries
- Post-World War II, the inexpensive, flat land was attractive to developers
- Court decisions kept local officials from limiting construction in these wet and flood-prone areas
- By the mid-1950s, the area was filling with suburban housing and the drainage problems became even more severe



# Floodplain Regulations



- Joined National Flood Insurance Program in:
  - 1971 (Jeffersontown)
  - 1978 (Louisville and Shively)
  - 1979 (Jefferson County)
  - 1982 (St Matthews)
- Flood regulations were required for the 1<sup>st</sup> time



# 1997 Floods

- 7<sup>th</sup> highest Ohio River flood (26.6' higher than normal pool)
- Largest 2-day rainfall total – 8 to 12 inches in 33 hours
- Widespread flooding in south central and southwest Louisville and in low-lying areas along creeks
- 2<sup>nd</sup> time the floodwall was substantially tested



# 1997 Floods

- Approximately \$200,000,000 in damage attributed to the flooding in the Louisville metro area
- 50,000 dwellings affected
- Barge traffic was halted due to locks being flooded
- 19 flood-related deaths in KY, including a 16 year old boy that died near Jeffersontown as his van was swept off the road by swollen Chenoweth Creek

Source:

<https://www.weather.gov/lmk/flood97#:~:text=In%20the%20Louisville%20metro%20area,I ndiana%20were%20declared%20disaster%20areas>



1,500 New Ford Explorers damaged by floodwaters (Photo Credit: WAVE3)



# 2009 Flood

- Up to 8 inches of rain in 75 minutes
- Widespread flooding in western and central Louisville
- Nearly 200 people rescued from floodwaters
- Major flooding at University of Louisville, Churchill Downs, and Main Library
- Significant flooding in the combined sewer system







## 2009 Flood

- Numerous vehicles were totaled or sustained damage
- Over 40 Jefferson County public schools and 30 other public buildings were damaged
- The damage total reached \$45.3 million, with no lives lost
  - \$5 million at the Main Library
  - \$4 million in damage at the Kentucky Derby Museum

# Potentially Flooded Structures



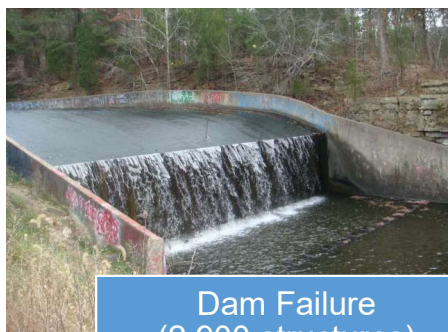
Ohio River Flooding  
(500 structures)



Inland Stream Flooding  
(9,300 structures)



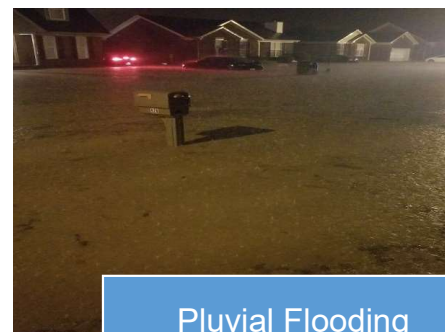
Combined Sewer  
(3,100 structures)



Dam Failure  
(2,900 structures)



Levee Failure  
(167,000 structures)

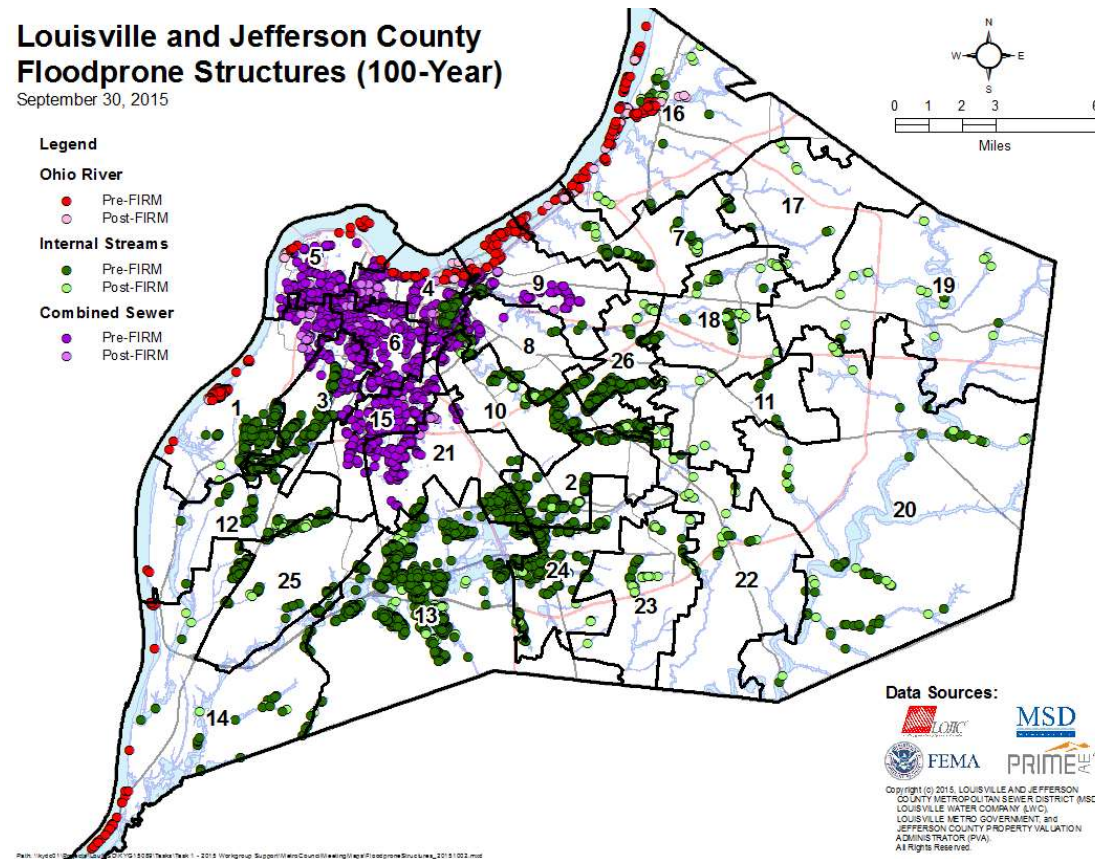


Pluvial Flooding

# Potential Economic Impact

- Approximately 5% of structures in Jefferson County are in the floodplain
- Approximately 4% of estimated property values
- Just over 10% of industrial structures
- Approximately 10% of commercial structures

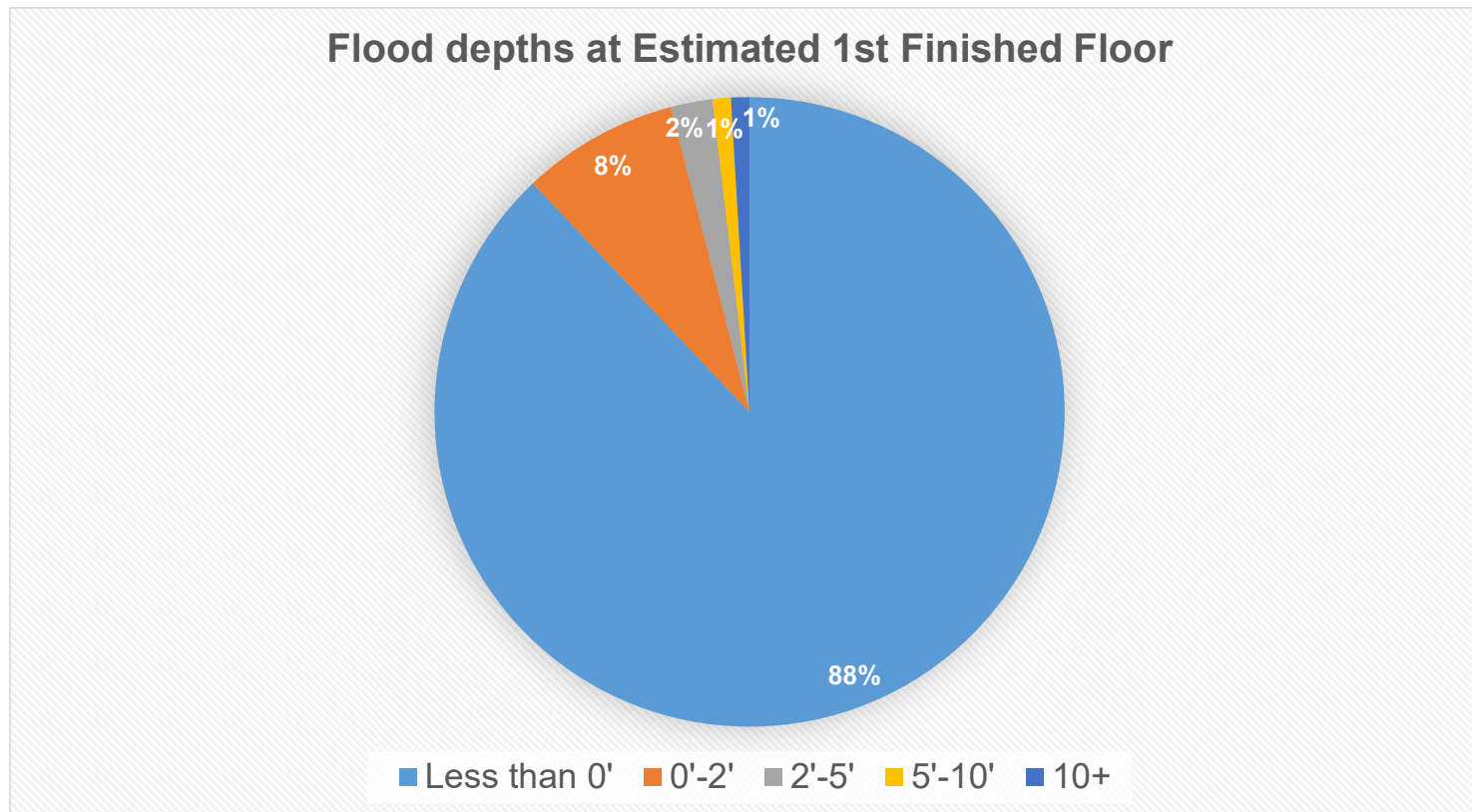
Louisville and Jefferson County  
Floodprone Structures (100-Year)  
September 30, 2015





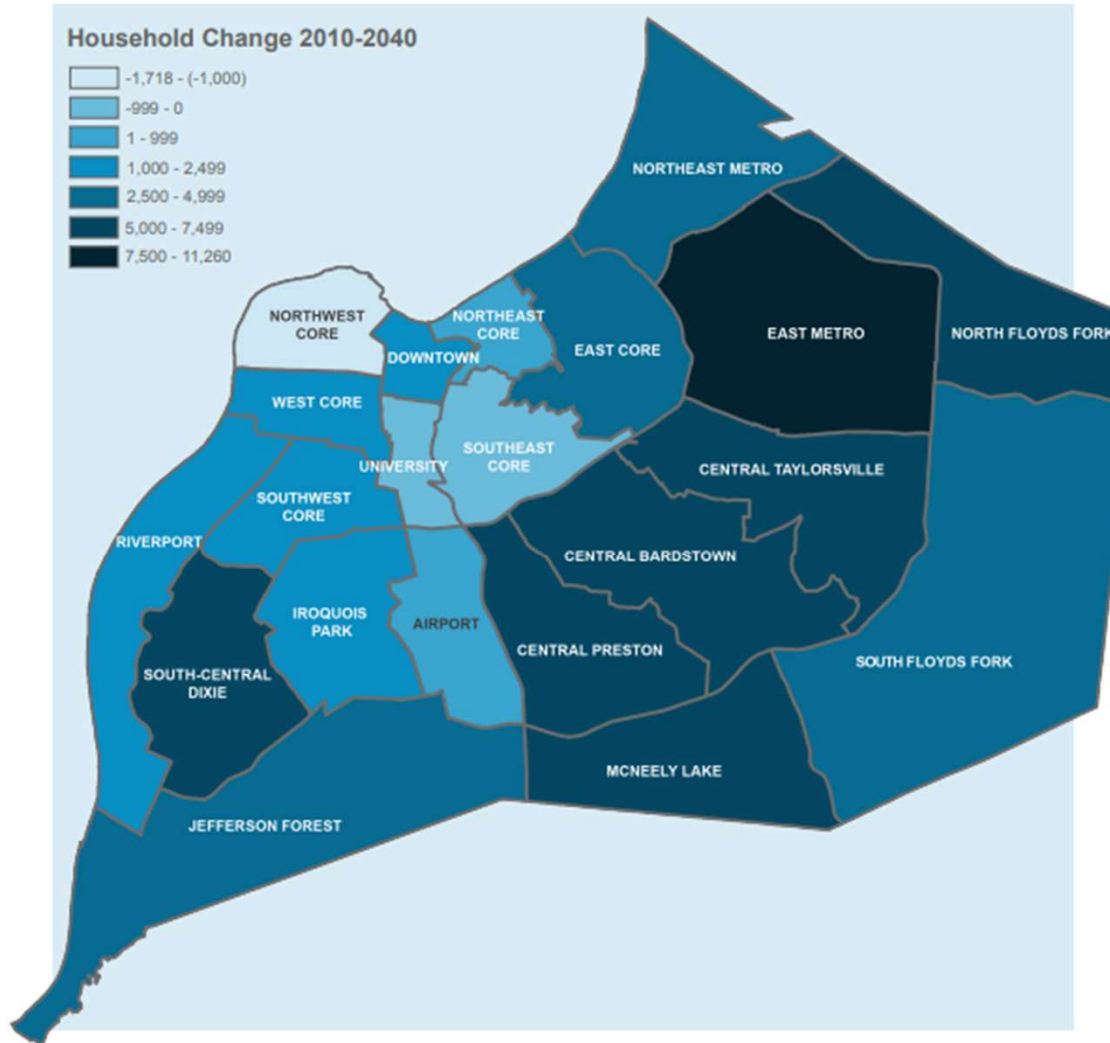
# Structure Flooding

- Approximately 9,300 structures in local regulatory floodplain



# Development Trends

- By 2040 the number of households will increase by:
  - +31% for the Louisville MSA
  - +21% for Jefferson County





# Floodplain Regulations

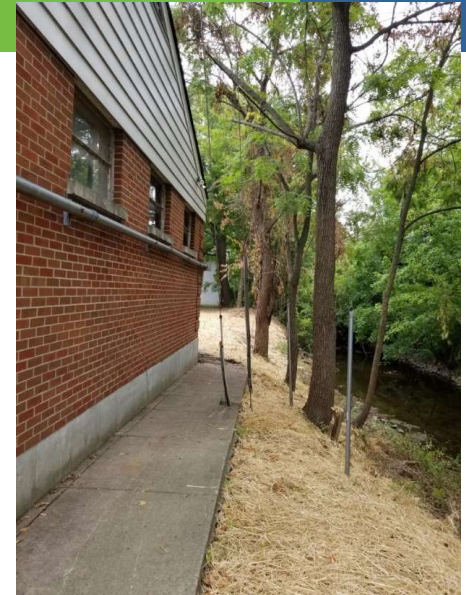
- New and substantially improved buildings must be elevated (or non-residential building may be floodproofed)
  - 2' above flood elevation for residential
  - 1' above flood elevation for non-residential
- Mechanical and electrical equipment must be elevated 2' above flood elevation
- Existing buildings are limited to 50% improvements/repairs unless the building meets current floodplain regulations



# Floodplain Regulations

## Streams

- Streams shall not be relocated or channelized
  - Exceptions: public projects such as road crossings, installation of utilities, flood control measures, drainage and outfall pipes, detention basins, retention basins or water impoundments and for projects with benefit to the public in preventing flooding provided
  - Projects that are exempted must be the only alternative which is viable
- A natural vegetation buffer strip shall be preserved at least 25 feet on each side of the stream bank from the top of the bank



# Floodplain Regulations Conveyance Zone & Compensation

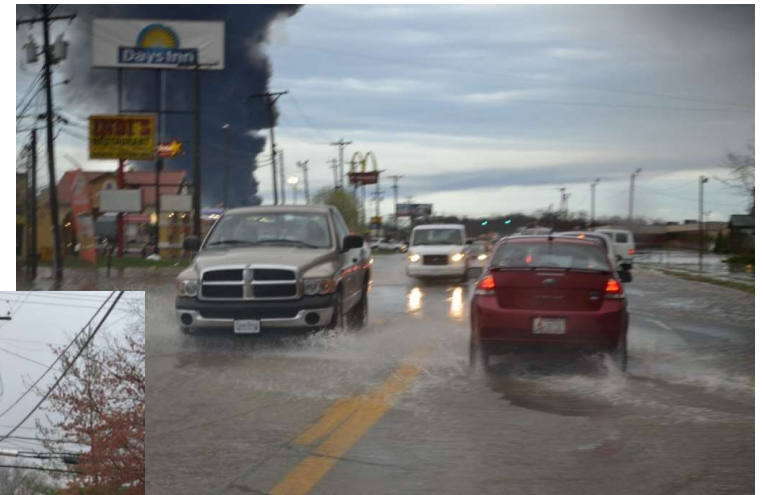


- All fill must be compensated at 1.5 to 1
- No development allowed in the conveyance zone except:
  - Detention, retention, or other stormwater, flood control, or water quality facilities
  - Uses consisting of open space
  - Uses necessary for navigation and waterborne freight handling
  - Transportation or utility crossings
  - Functionally dependent facilities



# Floodplain Regulations – Access

- New roads must be elevated above the flood elevation
- Critical facilities must have flood-free access



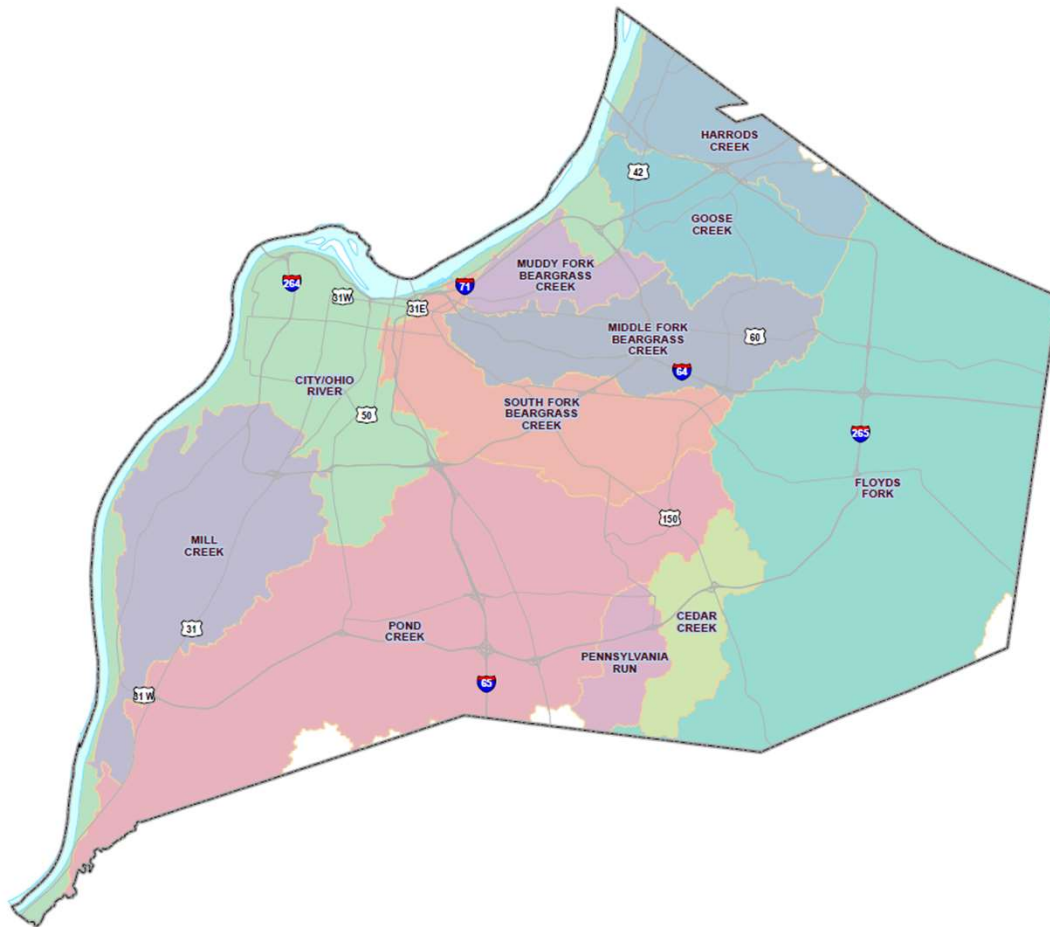
# Stormwater Regulations

- Detention requirements in MSD Design Manual
  - Post-developed drainage runoff flows reduced to match pre-developed runoff for the 2, 10, 25, and 100-yr storms
  - Runoff volume compensation is sometimes required as an alternative to detention in the floodplain
- Water Quality requirements
  - During construction - Erosion prevention and sediment control must treat the runoff from a 10-yr, 24 hr storm event (80% removal of total suspended solids)
  - Post-construction requirements – must treat runoff from a 0.6” rainfall





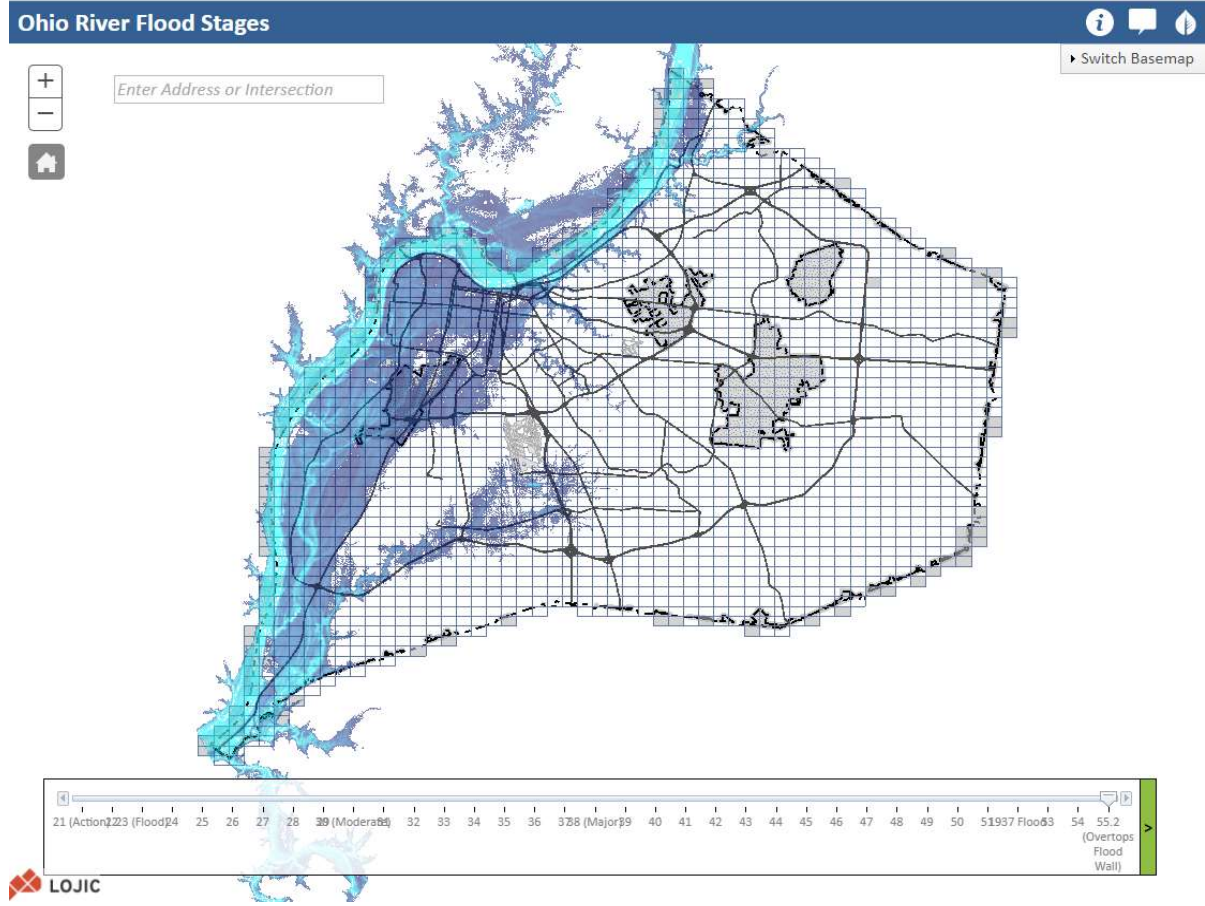
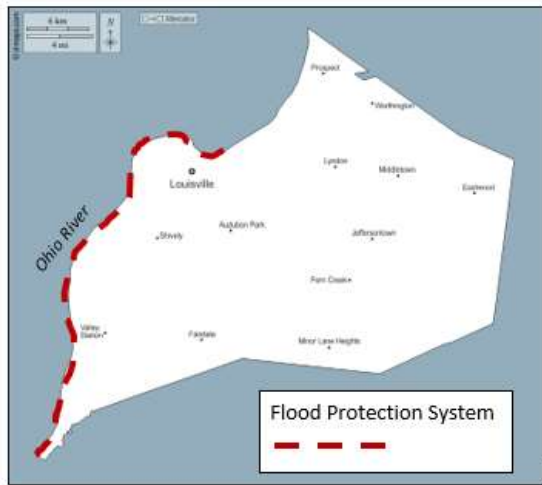
# Watershed Master Plan



- Updated every 5 years
- Covers stormwater management policies and master plans for each of the 11 watersheds

# Life Safety - Warning and Evacuation Needs

## Riverine vs. Flash Flooding



# Flood Cleanup & the Air in Your Home

**Flood water can make the air in your home unhealthy.**



This is because when things get wet for more than 2 days they usually get moldy. There may also be germs and bugs in your home after a flood.



Portable Generator

**Use portable generators OUTSIDE and far away from the building.**

The exhaust, or fumes, from a portable generator could kill you in minutes if you breathe it in!



**When cleaning wear**

- ✓ An N-95 respirator (Hardware stores usually sell them.)
- ✓ Goggles
- ✓ Gloves
- ✓ Long pants, long-sleeved shirt, and boots or work shoes



**Clean and dry your house and everything in it.**

Clean and dry hard surfaces. Throw away anything that was wet with flood water and can't be cleaned.



Contamination:

- Limit Contact with Flood Water

Chemical Exposure:

- Septic Systems and Wells

Building Safety:

- Structural Integrity
- Mold Remediation
- Electrical Safety
  - Turn off power

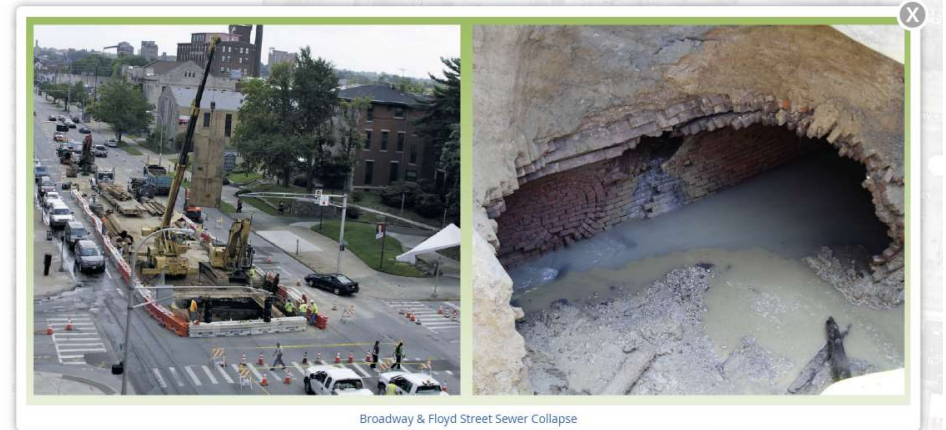
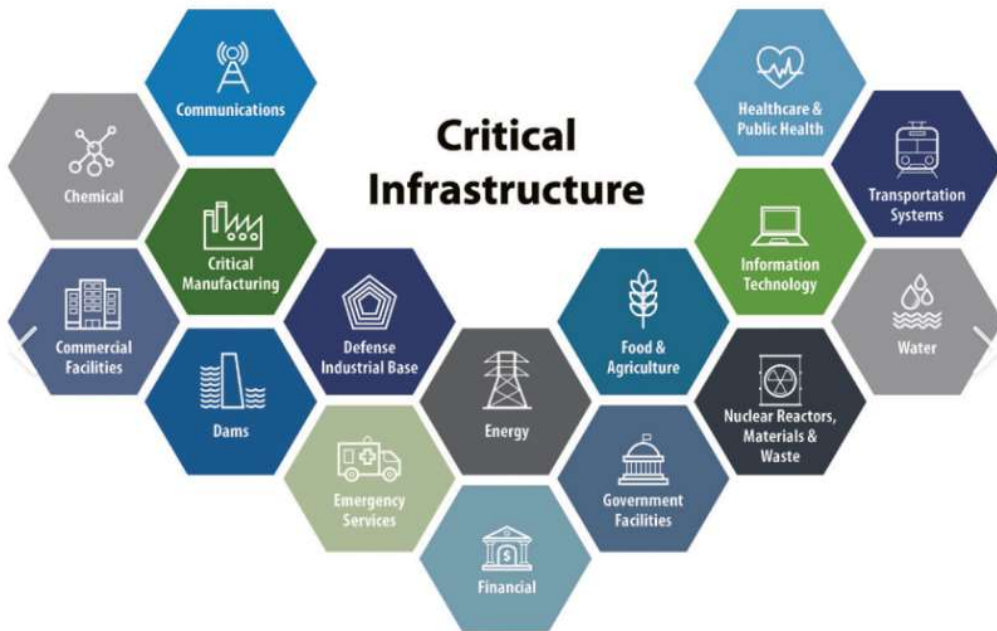
Vector Borne Diseases



# Critical Facilities and Infrastructure



Typical **critical facilities** include hospitals, schools, nursing homes/long-term care facilities, fire stations, police stations, chemical storage facilities, storage of critical records, and similar facilities.



Broadway & Floyd Street Sewer Collapse



**CYBERSECURITY & INFRASTRUCTURE SECURITY AGENCY**



# Economy and Major Employers

## Major Employers

COMPANY	LOCAL EMPLOYMENT
United Parcel Service	25,090
Jefferson County Public Schools	14,484
Norton Healthcare	13,828
Ford Motor Co. (2 plants)	13,020
Humana Inc.	12,360
UofL Health	12,000
The Kroger Co.	9,300
Baptist Healthcare System Inc.	7,346
Walmart Inc.	6,650
University of Louisville	6,000
GE Appliances, a Haier company	6,000
Amazon.com	5,700
Louisville-Jefferson County Metro Government	5,646
Spectrum	2,330
Manna Inc.	2,300
LG&E and KU Energy LLC	2,240





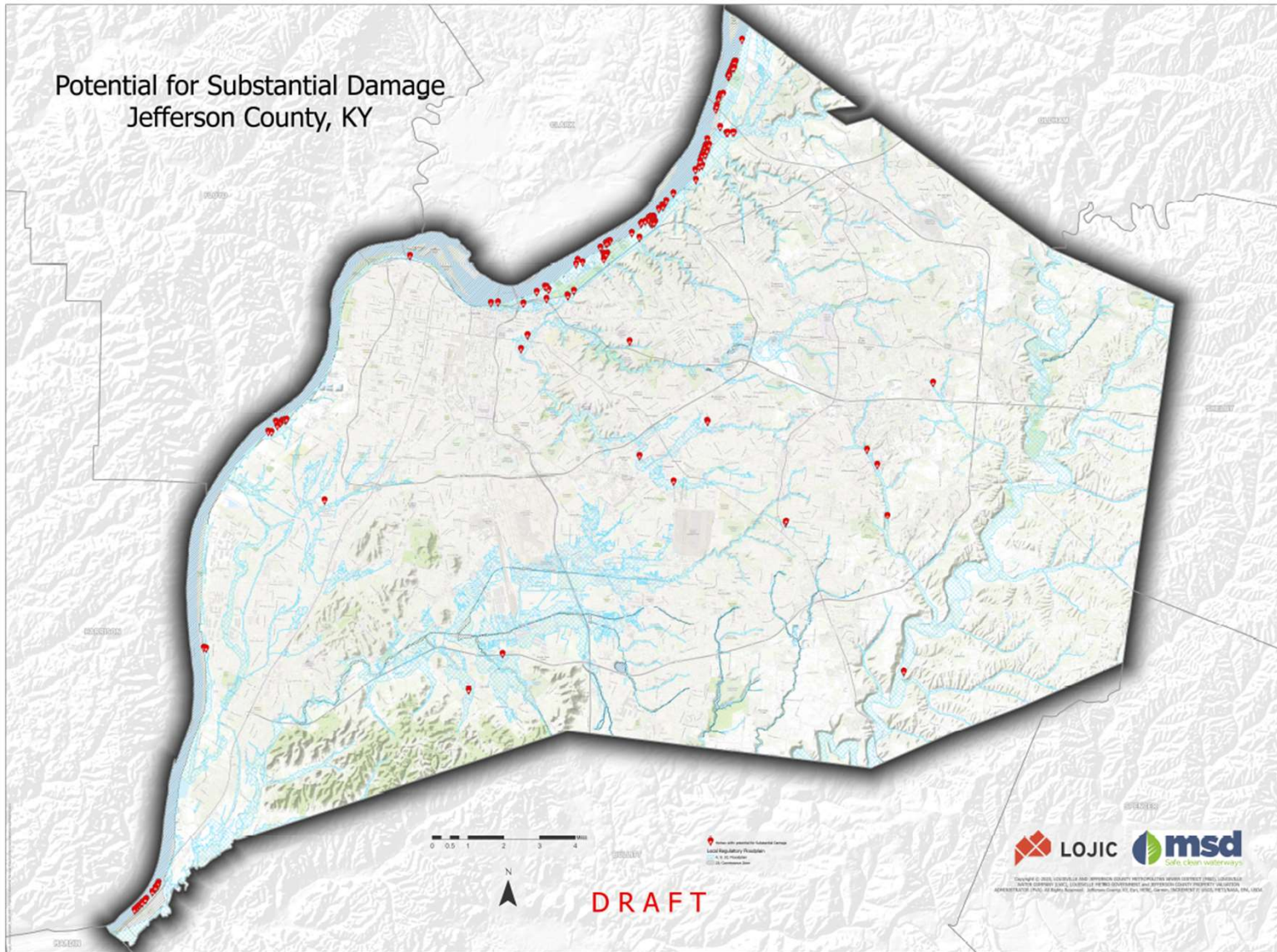
# Substantial Damage Management Plan

**Table 1  
Structure  
One Story, With Basement**

Depth	Mean of Damage	Standard Deviation of Damage
-8	0%	0
-7	0.7%	1.34
-6	0.8%	1.06
-5	2.4%	0.94
-4	5.2%	0.91
-3	9.0%	0.88
-2	13.8%	0.85
-1	19.4%	0.83
0	25.5%	0.85
1	32.0%	0.96
2	38.7%	1.14
3	45.5%	1.37
4	52.2%	1.63
5	58.6%	1.89
6	64.5%	2.14
7	69.8%	2.35
8	74.2%	2.52
9	77.7%	2.66
10	80.1%	2.77
11	81.1%	2.88
12	81.1%	2.88
13	81.1%	2.88
14	81.1%	2.88
15	81.1%	2.88
16	81.1%	2.88

- Currently in development
- Substantial damage applies to a structure in a FEMA 1% Floodplain for which the total cost of repairs is 50 percent or more of the structure's market value before the disaster occurred, regardless of the cause of damage.
- Use GIS to anticipate depth of flooding and identify homes most likely to be substantially damaged

# Potential for Substantial Damage Jefferson County, KY



# Basic Flood Insurance Facts



- Standard homeowner policies do not cover flood damage.
- Homeowners can buy National Flood Insurance Program (NFIP) flood insurance only if the community participates in the NFIP.
- Every property owner in a participating community is eligible to buy flood insurance.
- Properties in FEMA designated flood zones are required to purchase flood insurance if there is a federally backed mortgage.
- Structural and contents coverage are separate.

# Flood Insurance

- Approximately 7,000 properties are located in the FEMA Special Flood Hazard Area
- 3,162 flood insurance policies in force in 2022
- Flood insurance claims between 1978-2018:
  - 4,309 total number of paid claims
  - \$69.3 million total closed paid losses





# Repetitive Loss Properties

## **288 Repetitive Loss (RL) properties**

Two or more claims of more than \$1,000 paid within any rolling ten-year period

## **26 Severe Repetitive Loss (SRL) properties**

Either four or more separate claim payments, with the amount of each such claim exceeding \$5,000, and with the cumulative amount of such claims payments exceeding \$20,000; or

At least 2 separate claims payments made, with the cumulative amount of such claim payments exceed the fair market value of the insured building on the day before each loss.



# Flood Risk



- 5% chance that a house will catch fire during the life of a 30-year mortgage



- For a house located within the special flood hazard area, there is a 26% chance that it will be affected by a 1% annual chance flood during the life of a 30-year mortgage

# Open Space Floodplain Functions



- Wetlands
- Riparian Areas
- Sensitive areas
- Habitat



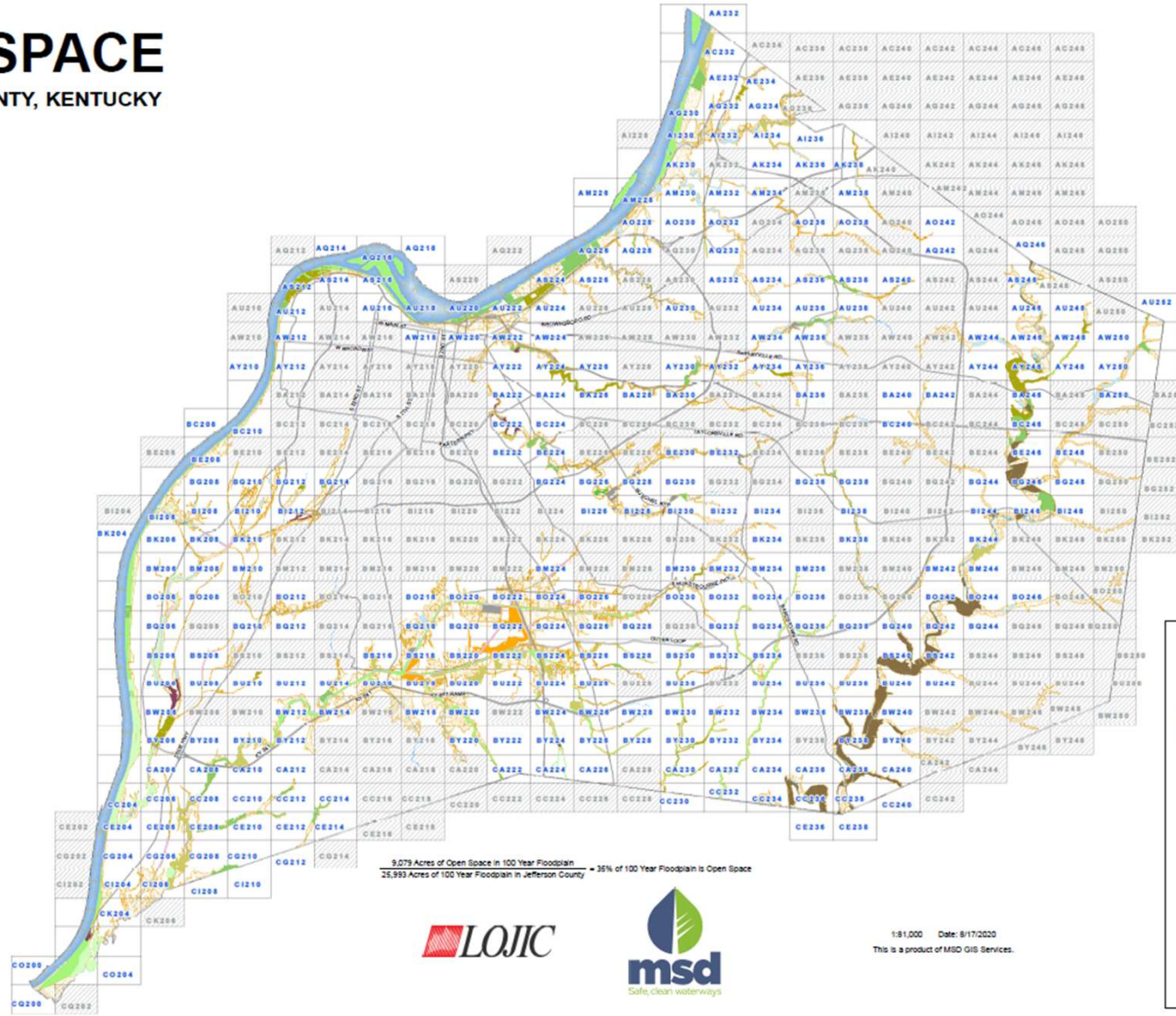


# OPEN SPACE

JEFFERSON COUNTY, KENTUCKY

Map Index

Activity 420



9,079 Acres of Open Space in 100 Year Floodplain  
25,993 Acres of 100 Year Floodplain in Jefferson County = 35% of 100 Year Floodplain is Open Space

- Major Road
- Jefferson County Boundary
- No Data Pages
- Mapped Pages
- Current FEMA Flood Zones
- Open Space**
  - Acquisitions
  - CID Properties
  - Cemeteries
  - Conveyance Zone
  - Future Fund & 21st Century Parks
  - MSD Easements
  - Other Open Space
  - Private Easements
  - Private Golf Courses
  - Public Golf Courses
  - Public Park
  - Regional Basins
  - Subdivision Open Space
  - Waste Management

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1:81,000 Date: 8/17/2020  
This is a product of MSD GIS Services.

# Stream, Wetland & Stream Buffer Benefits - Reduced Flooding



- Streams and wetlands absorb significant amounts of rainwater, runoff and snowmelt before flooding
- Streams buffers allow more room for the floodwaters to flow and spread out, reducing erosion



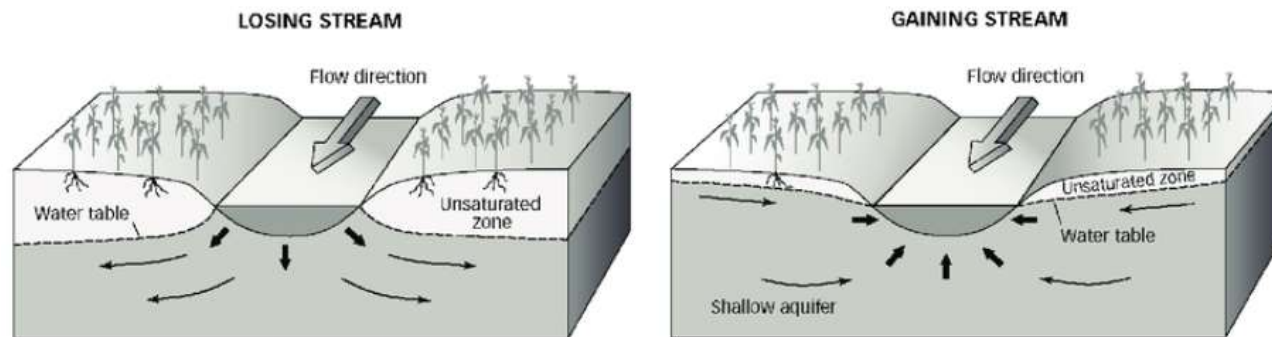
# Stream, Wetland & Stream Buffer Benefits - Pollution Reduction

- Retain sediments and excess nutrients, such as nitrogen and phosphorus, and prevent these pollutants from traveling further downstream where they could cause algal blooms or dead zones.



# Stream, Wetland & Stream Buffer Benefits - Groundwater Recharge

- Water enters the groundwater through the stream bed. Even during dry periods, groundwater replenishes flow in the stream to feed downstream waterways



Aquifer-stream relationships showing an influent, or losing, stream at left and an effluent, or gaining, stream at right. Thomas C. Winter et al., Groundwater and Surface Water, A Single Resource, 1139 U.S. Geological Survey Circular 9 (1998), available at <http://pubs.usgs.gov/circ/circ1139>.

# Stream, Wetland & Stream Buffer Benefits - Wildlife Habitat

- Streams and wetlands are unique and diverse habitats that can support thousands of species, including plants, fish, amphibians, birds and mammals.
- Streams and wetlands are important as:
  - Spawning and nursery habitats
  - Seasonal feeding areas
  - Refuge from predators and competitors
  - Shelter from extreme weather



# Stream, Wetland & Stream Buffer Benefits

## Drinking Water & Economic Benefits

- Streams and wetlands play a critical role in the quality and supply of our drinking water by ensuring a continuous flow of clean water to surface waters and helping recharge underground aquifers.
- Protecting streams is important for the economy, particularly for their key role in fishing, hunting, agriculture, and recreation.





# Questions?



# Next Meeting

- Topic: Create goals to address flood-related problems
- Date: February 15, 2023 3-4pm
- Location: MSD Main Office, 700 W Liberty St