



Assessing Community Resilience

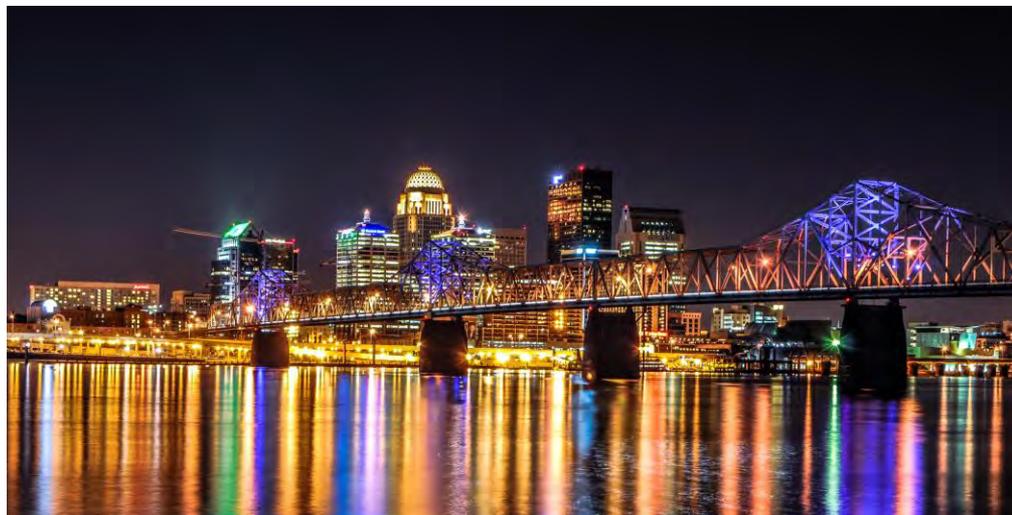
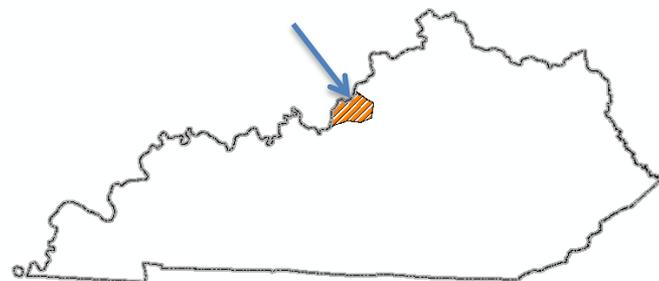
Lori Rafferty, PE, CFM

April 26, 2019



Louisville-Jefferson County, KY

- Largest community in Kentucky
- Population – approximately 770,000



Floodplain Statistics for Jefferson County

- Approximately 15% of Jefferson County is located in a regulated floodplain
- Approximately 8,000 buildings are in the FEMA Special Flood Hazard Area



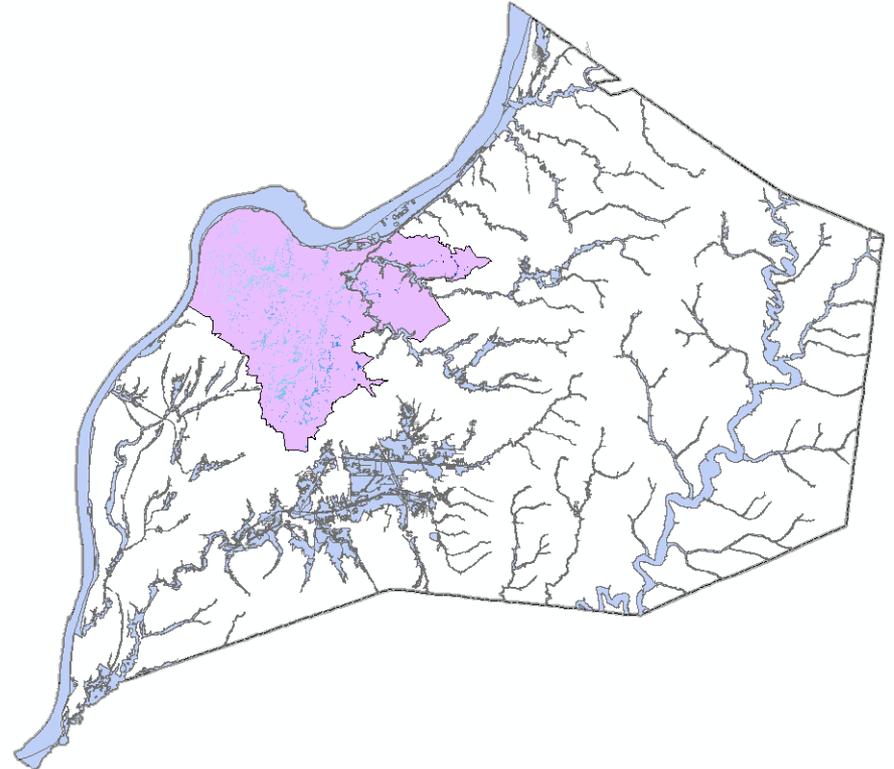
Louisville History

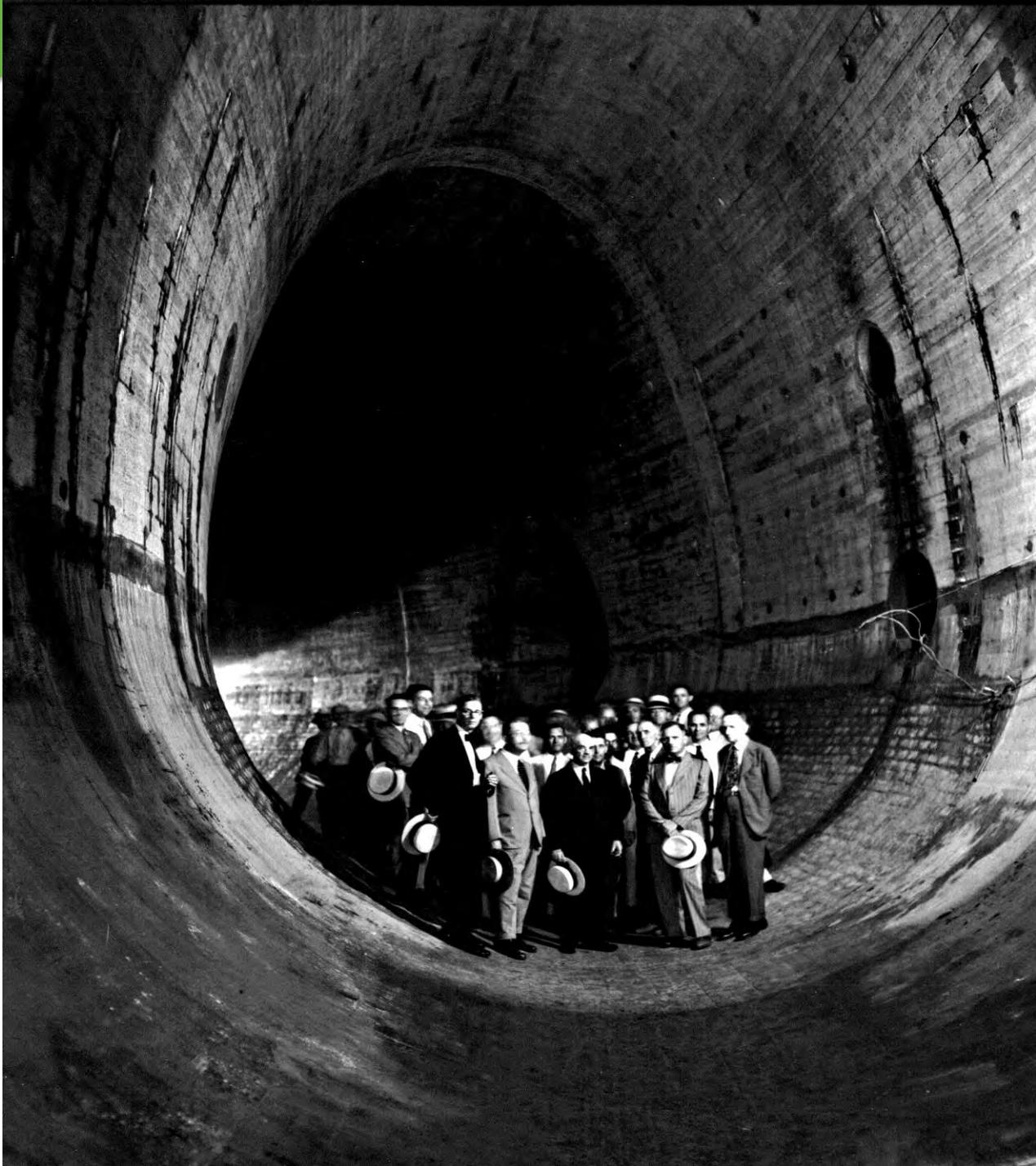
- Established during the Revolutionary War in 1778
- Area was a “pond-dotted bottomland” along the Ohio River
- “Hog and Pond Law”
 - First drainage law in 1805
 - Banned free-roaming pigs
 - Required stagnant ponds to be drained
 - No funding source for the drainage work
- Malaria outbreak in 1822, nicknamed “Graveyard of the West”



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

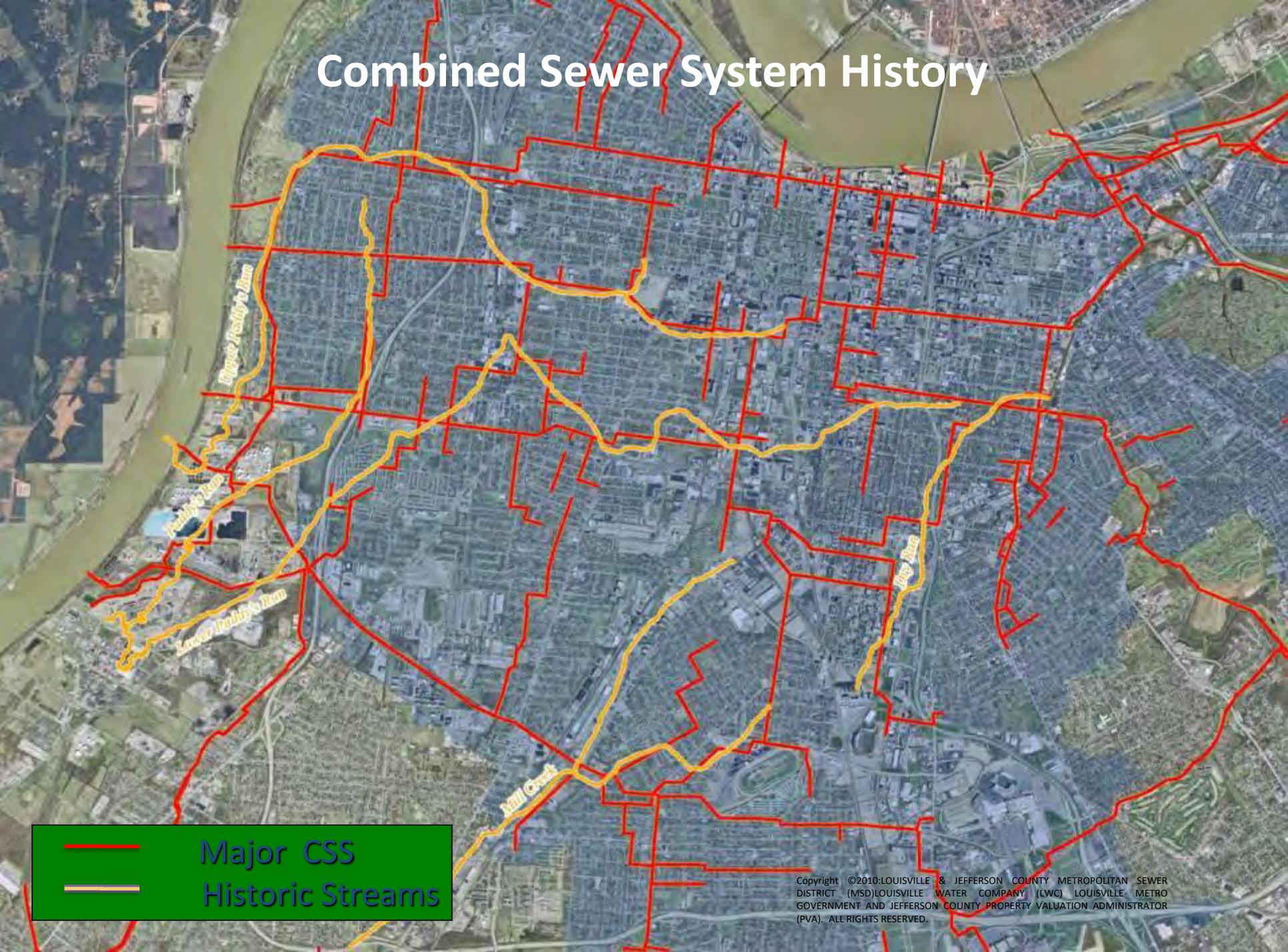




S
O
U
T
H
W
E
S
T
E
R
N

O
U
T
F
A
L
L

Combined Sewer System History

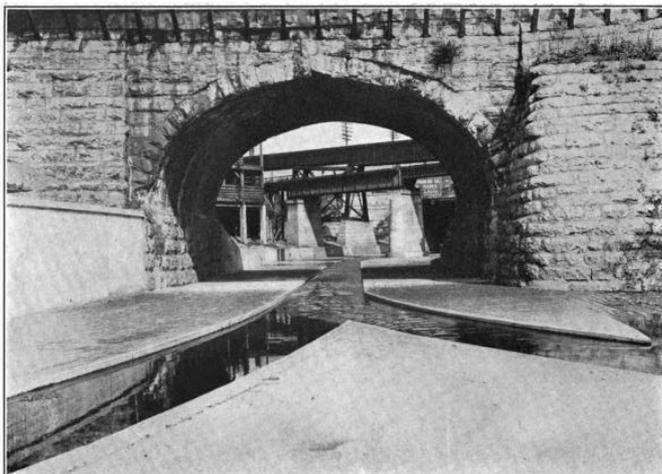


— Major CSS
— Historic Streams

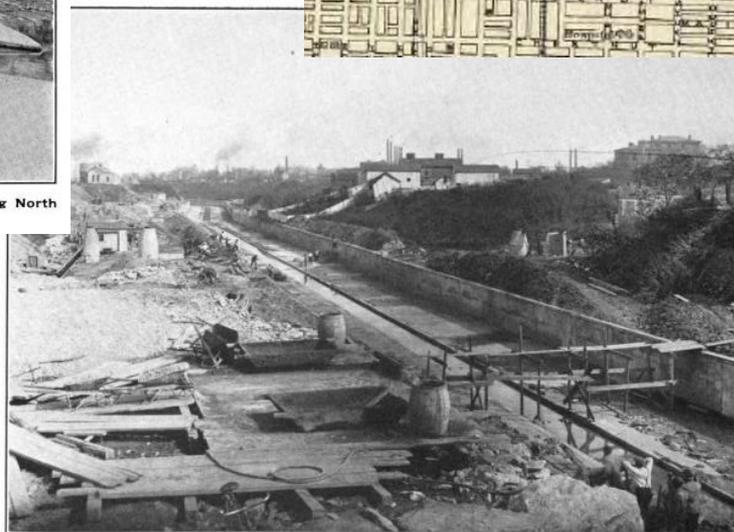
Copyright ©2010 LOUISVILLE & JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD) LOUISVILLE WATER COMPANY (LWC) LOUISVILLE METRO GOVERNMENT AND JEFFERSON COUNTY PROPERTY VALUATION ADMINISTRATOR (PVA). ALL RIGHTS RESERVED.

Historic Ways to Mitigate Flash Flooding

- Construction of “cutoffs”
- “Improved” channels



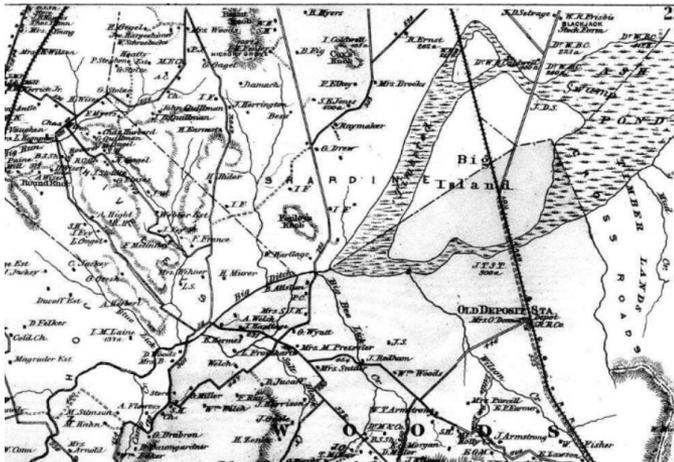
Improved Channel of Beargrass Creek under L. & N. R. R. bridge. Looking North from Junction of South and Middle Forks.



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

Draining the Swamps

- 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



Wet Woods

- 1929 Courier Journal article
“...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.”



Wet Woods aka Pond Creek

- Converted swamps to farmland in the 19th and 20th 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



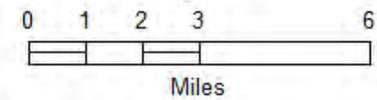
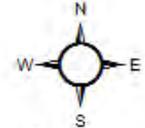
Floodplain Regulations



- In 1965, the Kentucky Court of Appeals ruled that the county could not prohibit construction in floodplains without specific regulations on the subject of flooding.
- “Wildcat” development continued until 1978 with passage of 1st floodplain regulations

Louisville and Jefferson County Floodprone Structures (100-Year)

September 30, 2015



Legend

Ohio River

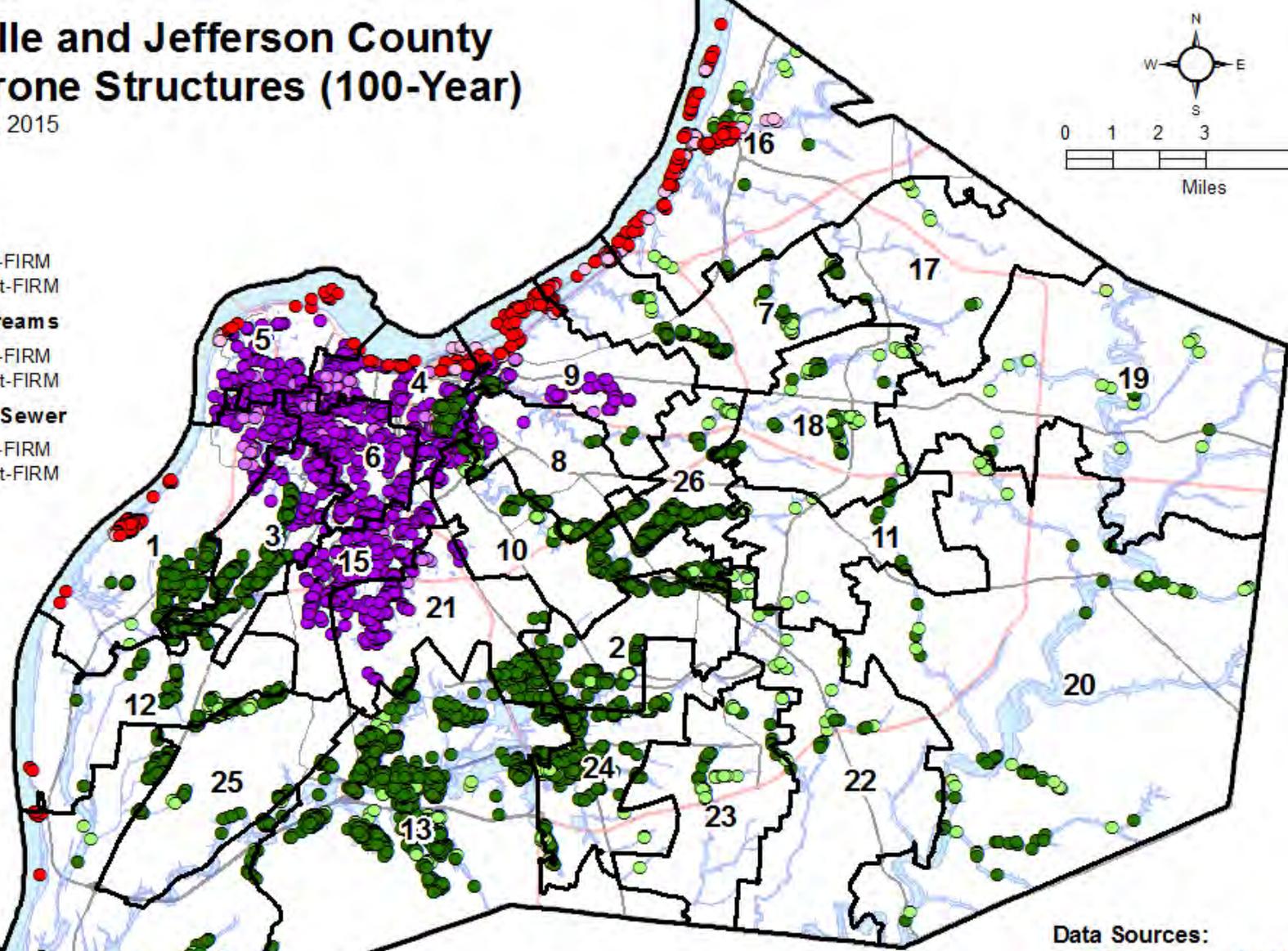
- Pre-FIRM
- Post-FIRM

Internal Streams

- Pre-FIRM
- Post-FIRM

Combined Sewer

- Pre-FIRM
- Post-FIRM



Data Sources:



Copyright (c) 2015, LOUISVILLE AND JEFFERSON COUNTY METROPOLITAN SEWER DISTRICT (MSD), LOUISVILLE WATER COMPANY (LWC), LOUISVILLE METRO GOVERNMENT, and JEFFERSON COUNTY PROPERTY VALUATION ADMINISTRATOR (PVA). All Rights Reserved.

Frequent Flooding

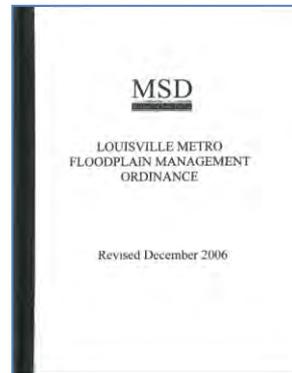


Community Rating System

- The Community Rating System (CRS) is a voluntary program that provides discounts on flood insurance when communities go above minimum requirements for activities such as outreach, regulatory standards, maintenance, mapping, etc
- Louisville began participating in the CRS program in 1990
- Class 3 community as of October 1st, 2015 – tied for 8th in the U.S.
- Saves 35% for all properties in the floodplain, which is more than \$2 million each year in flood insurance premium costs

Community Rating System

- Public Information
- Mapping and Regulations
- Flood Damage Reduction Activities
- Warning & Response



Public Information

- Elevation certificates
- Map information
- Hazard Disclosure
- Flood Protection Assistance
- Flood Insurance Promotion



Home » Programs » Programs and Projects » Floodplain Management

Floodplain Management

As a River City, Louisville has its fair share of floodplain and drainage issues. Flooding can occur from Ohio River flooding, flash flooding from interior streams, and flooding from overloaded storm systems. Louisville Metro is a participant in the [National Flood Insurance Program \(NFIP\)](#), and MSD is responsible for [enforcing the local Floodplain Management Ordinance](#) and for administering both the [National Flood Insurance Program](#) and [Floodplain Management Program](#). Tasks include issuing floodplain permits and maintaining the flood protection system, Flood Insurance Rate Maps, Flood Insurance Studies, drainage system, as well other stormwater related tasks.

To encourage communities to establish sound floodplain management programs that go beyond the NFIP minimum requirements, in 1990 the Community Rating System (CRS) was created by FEMA. Louisville Metro participates in the CRS program and as of 2016, has achieved a Class 3 Rating, which awards residents in the community with up to a 35% discount on flood insurance premiums. Click [Community Rating System - CRS](#) icon below to learn more about the program.

Flood related Links: www.fema.gov | www.floodsmart.gov | www.ready.gov/floods



We Can Help

- [Report a Problem >](#)
- [Contact Us >](#)
- [Pay My Bill >](#)

Call us 24/7: (502) 540-6000

Quick Links

- [Consent Decree](#)
- [Doing Business with Us](#)
- [Current Projects](#)

[Floodplain Management](#) [Stormwater & Drainage](#) [LOJIC Online](#) [Related Links](#)

Floodplain Determination

Welcome to MSD's "Floodplain Determination Application" for Jefferson County, Kentucky. MSD is the Official Map Repository of the Jefferson County, Kentucky Flood Insurance Rate Maps (FIRM). Using the power of the LOJIC GIS, you can determine if a primary structure is located in the FEMA floodplain.

?

Address

Parcel ID

Submit

In the form above, please enter the information requested and click the **Submit** button. You have the option to enter either your address or Parcel ID. If a determination cannot be made for your request, then further review by MSD staff is required. Once MSD staff has completed the review, the determination will be sent to you **within 2 business days** via the provided email address.

Stormwater Outreach



MAKE A DIFFERENCE FOR OUR WATERWAYS...



...by planting a rain garden

Going green today means healthy waterways tomorrow. Rain gardens help infiltrate rainwater before it reaches the drainage system, and reduce the amount of stormwater and pollutants running into storm drains, combined sewers or streams. **Contact us for your FREE Rain Garden Guide.**

Together we can achieve safe, clean waterways for our community.

Learn more at LouisvilleMSD.org.



24/7/365
Customer Relations
502.587.0603

CustomerRelations@LouisvilleMSD.org

LouisvilleMSD



LouisvilleMSD @louisvillemsd Oct 19
More than 67,000 catch basins...billions of leaves! If you see a clogged catch basin, contact us at 502.587.0603.



Making a difference in the health of our streams

Working together, all of us can help achieve safe, clean waterways. Delaying the use of your washer and dishwasher during periods of heavy rain can help. The extra water these



machines use can overload the sanitary sewers and cause them to overflow. If possible delay that load of laundry or dishes to give the sewer system time to catch up.



Visit msdprojectwin.org for more information concerning ways that you can be part of the solution for decreasing and eliminating sewer overflows.

Making a difference in the health of our streams

Dogs in Jefferson County produce four dump-truck loads of waste EVERY day. Pet waste that is left behind on sidewalks, in parks and at home finds its way to local waterways when it rains. Please do your part to help by scooping the poop no matter where you are!

Remove pet waste from your lawn, and properly dispose of it in the trash.

Working together, we can achieve safe, clean waterways for our community.



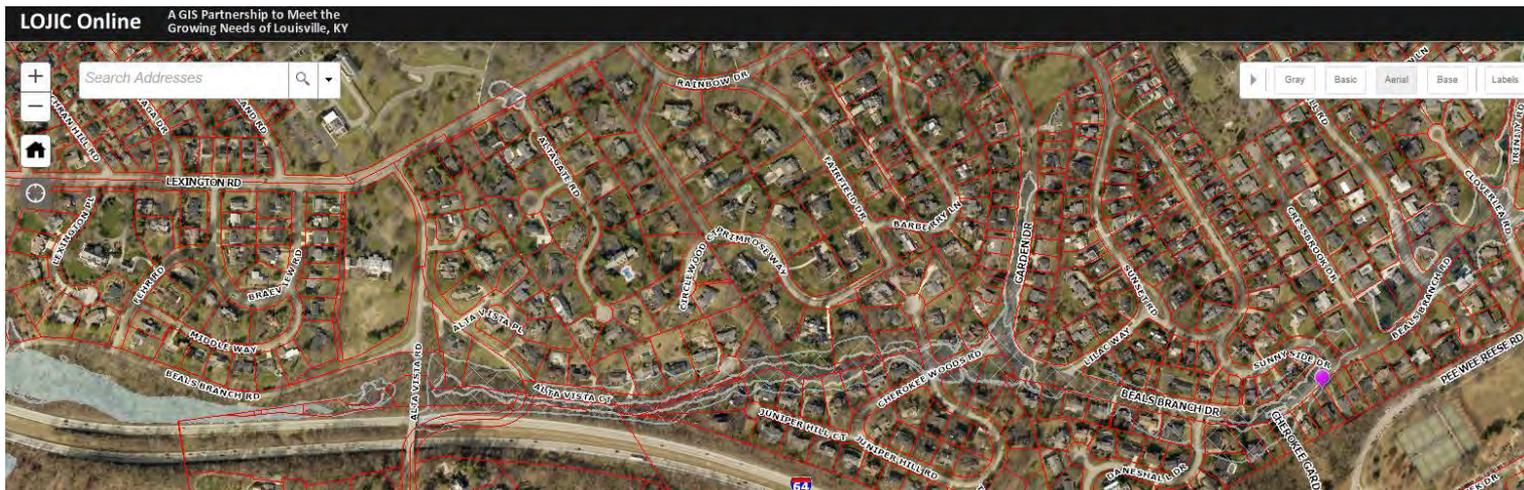
Stormwater Outreach

- CRS credits are available in Outreach Projects section
- Presentations to the public, school age children, engineers, contractors, real estate agents, and developers
 - Annual “Field Day” with engineers, contractors, and developers
 - Adventures in Water Festival
 - Earth Day at the Zoo
 - How-to Festival
- River/creek cleanups



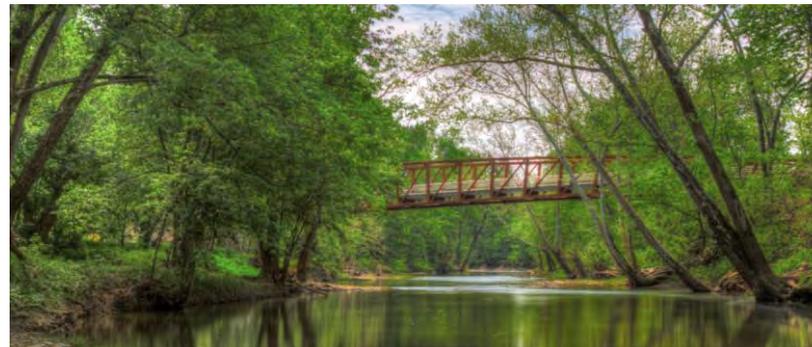
Mapping and Regulations

- Additional Flood Data
- Open Space Preservation
- Higher Regulatory Standards
- Flood Data Maintenance
- Stormwater Management



Open Space

- Louisville has 7,678 acres of open space in the floodplain (approximately 30%)
- Largest open space is the Parklands of Floyds Fork
 - 21st Century Park and the City of Louisville have acquired over 3,200 acres of land for the Floyds Fork Greenway
 - Project restored and maintains streamside buffers, added new wetlands, forest, and meadow
 - Over 80% of the parkland is preserved as natural habitat



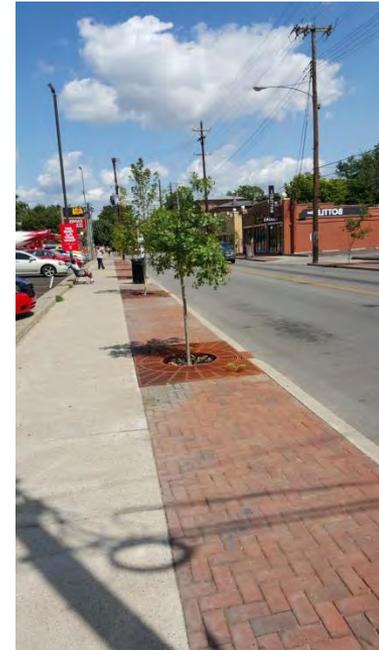
Higher Regulatory Standards

- 2' freeboard for new and substantially improved/damaged residential buildings and additions, 1' for non-residential
- Deed restrictions for any enclosures below the floodplain
- 1.5:1 fill compensation requirements in most of the county, 1:1 compensation required in remaining areas
- Prohibition of hazardous material storage in the floodplain
- Prohibition of critical facilities in the floodplain
- New parking lots maximum of 6" below flood elevation
- New roads must be at least 1' above flood elevation



Green Infrastructure Program

- Downspout Disconnection
 - \$100 per downspout disconnected in combined sewer area
 - Approximately \$30,000/year
- Urban Reforestation
 - MSD committed to planting 1,000 trees each year over a 15-year period
 - MSD has planted more than 11,000 trees since 2011
- Incentive Program
 - Green infrastructure projects within the combined sewer area
 - Public/Private Partnerships
- Capital Projects



Credited Basin Program



- Credit received for:
 - Stormwater quantity
 - Stormwater volume
 - Green Infrastructure signage
- Up to 50% total credit on stormwater fee
- Annual inspections by MSD
- Maintenance performed by owner
- Only commercial, industrial, and multi-family properties are eligible

Flood Damage Reduction

- Acquisition and Relocation
- Retrofitting/Flood Protection
- Drainage System Maintenance



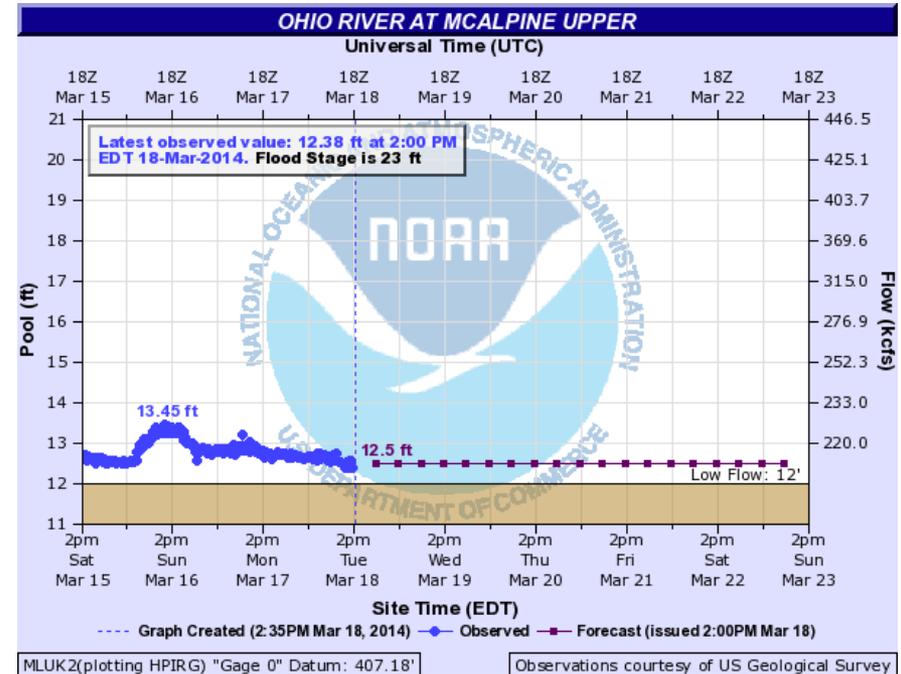
Floodplain Buyouts

- Approximately 300 floodprone homes have been purchased
- Funding from FEMA, State, and MSD
- Buyouts are located throughout the county
- Areas become deed restricted and must remain open space
- Potentially can be used for future stormwater/green infrastructure/stream restoration projects



Warning & Response

- Flood Warning Program
- Levee Safety
- Dam Safety



Future Stormwater/Floodplain Management

- Continue to improve CRS class
- Construction of more capital drainage projects
 - Regional Basins
 - Creek/ditch widening
 - Upsizing culverts/drainage systems
- Additional floodplain buyouts
- Public/private partnerships for green infrastructure



Future Stormwater/Floodplain Management

- Continue to update flood mapping
- Potential Future regulations
 - 2' freeboard for all projects
 - 1.5 to 1 fill compensation county-wide
 - Additional water quality regulations
 - Design to larger storm event
 - Required infiltration/stormwater capture



Lessons Learned

- CRS participation can help with ideas and organization
- Community outreach
 - MSD attends monthly meeting with Building Industry Association
 - MSD works with environmental groups
 - Annual “Field Day” conference with engineers, contractors, developers
 - Create stakeholder groups for new rule changes
 - Outreach to general public about green infrastructure, water quality, flooding
- Credit and incentive programs
 - Green infrastructure projects
 - Detention basin credits



Questions?



Lori Rafferty, PE, CFM
Floodplain & MS4 Manager
Louisville Metropolitan Sewer District
lori.rafferty@louisvillemsd.org