

**Presentation to Metro Public
Works, Bridges & Transportation
Committee
April 28, 2015**

Spring 2015 Flood Events

MSD history

- **Created in 1946 by KRS 76 to provide sanitary sewer services to the City of Louisville**
- **Acted as agent for City and County during 1950's and 1960's to administer drainage improvements due to knowledge and experience of staff.**
- **Formerly accepted role as Stormwater Utility for Jefferson County in 1987 through Interlocal Agreement, with responsibility for surface drainage and flood protection and authority to establish rate structure through user fees to support this role.**
- **Continue to implement and support additional local regulatory programs related to Clean Water Act and NFIP.**

Community Partners in Drainage and Flood Protection

- **Louisville MSD – designated Stormwater Utility of Jefferson County through Interlocal Agreement with Metro Louisville.**
- **Metro Louisville – Metro Council is the approving authority of local ordinances and of MSD rate increases above 7%; Mayor appoints MSD Board members and Officers of the agency**
- **Kentucky Division of Water – is delegated many administrative and regulatory functions from the federal government**
- **FEMA – Administrator of National Flood Insurance Program and many other programs providing mitigation for disasters, including flood**

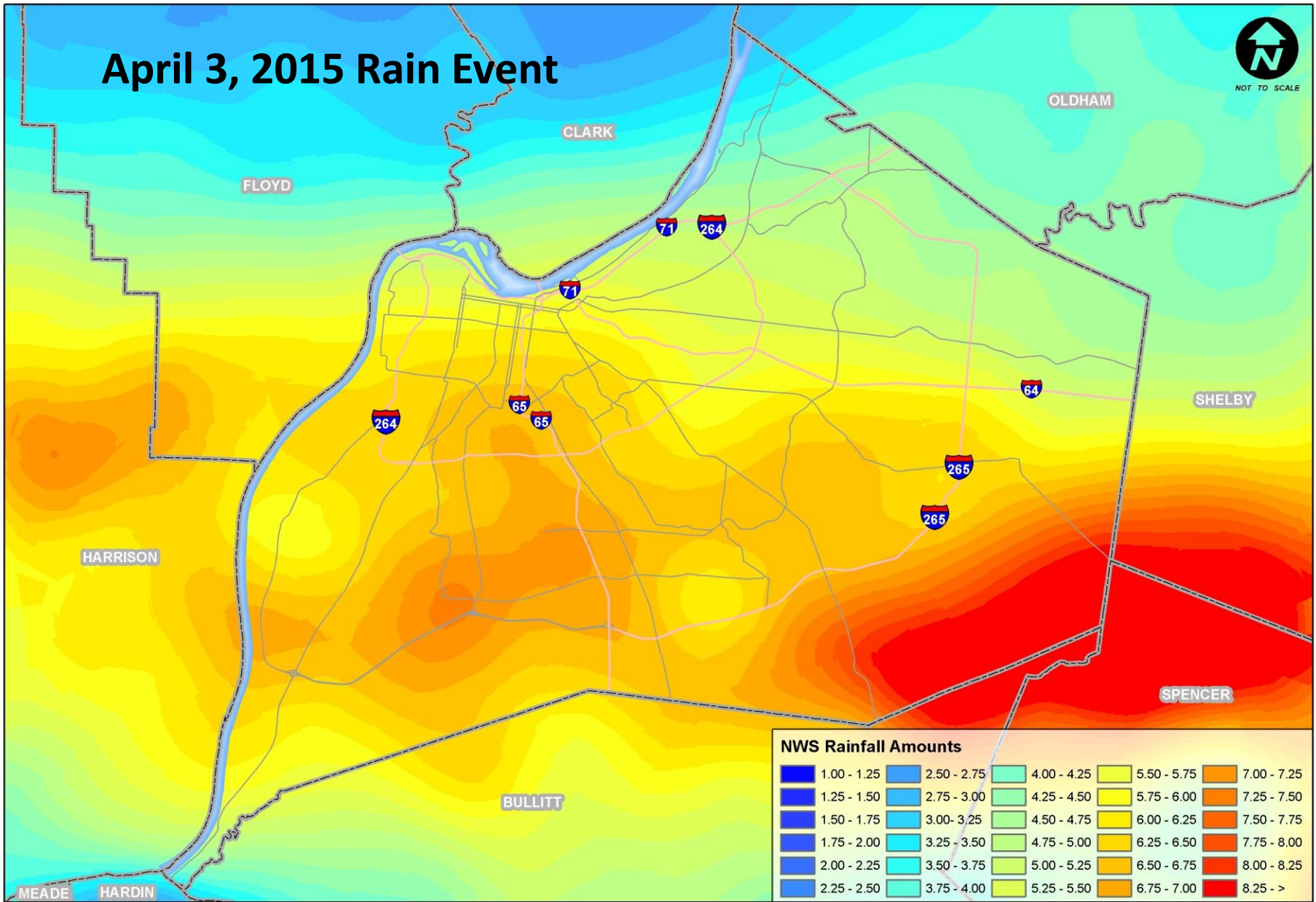
MSD role today in Drainage and Flood Protection

- **Responsible for operations and maintenance activities related of the public drainage system in Jefferson County, except within Shively, Anchorage, St. Mathews and Jeffersontown and as delegated by Memorandums of Understanding (MOU's) with other agencies.**
- **Administering authority of Floodplain ordinance, Erosion Prevention, Sediment Control Ordinance, Hazardous Materials Ordinance and Wastewater Discharge Regulations**
- **Responsible for operation and maintenance of the Ohio River flood protection system in Jefferson County**
- **All functions supported only by drainage user fees collected by customers in Jefferson County.**

April 3, 2015



April 3, 2015 Rain Event



NWS Rainfall Amounts

1.00 - 1.25	2.50 - 2.75	4.00 - 4.25	5.50 - 5.75	7.00 - 7.25
1.25 - 1.50	2.75 - 3.00	4.25 - 4.50	5.75 - 6.00	7.25 - 7.50
1.50 - 1.75	3.00 - 3.25	4.50 - 4.75	6.00 - 6.25	7.50 - 7.75
1.75 - 2.00	3.25 - 3.50	4.75 - 5.00	6.25 - 6.50	7.75 - 8.00
2.00 - 2.25	3.50 - 3.75	5.00 - 5.25	6.50 - 6.75	8.00 - 8.25
2.25 - 2.50	3.75 - 4.00	5.25 - 5.50	6.75 - 7.00	8.25 - >

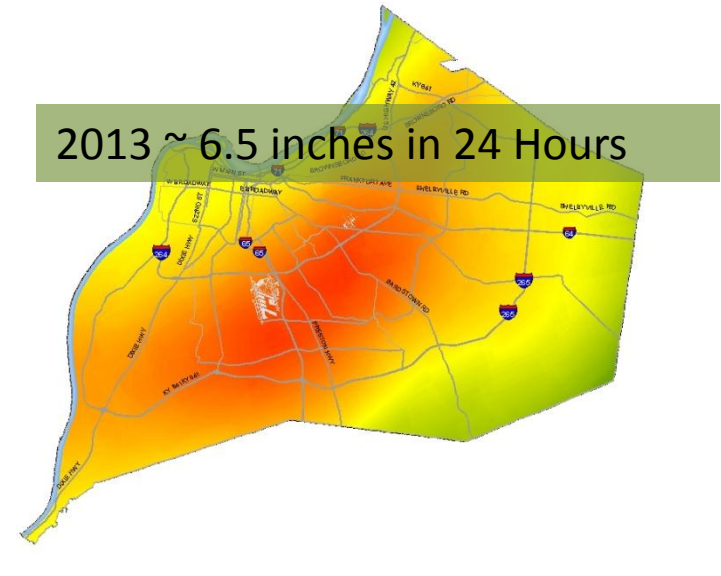
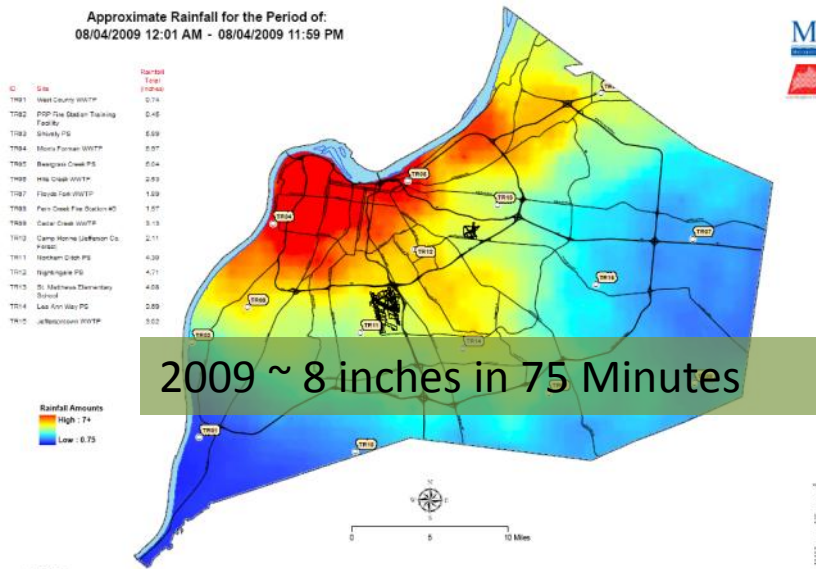
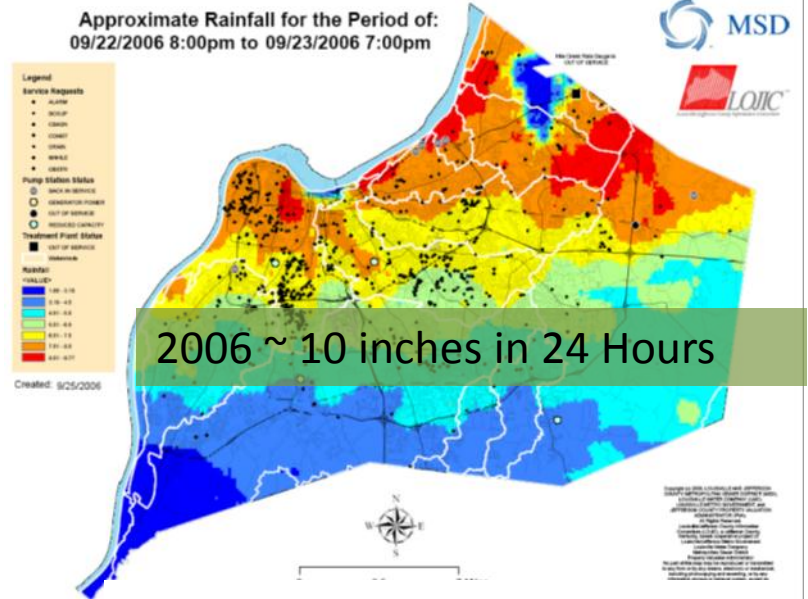
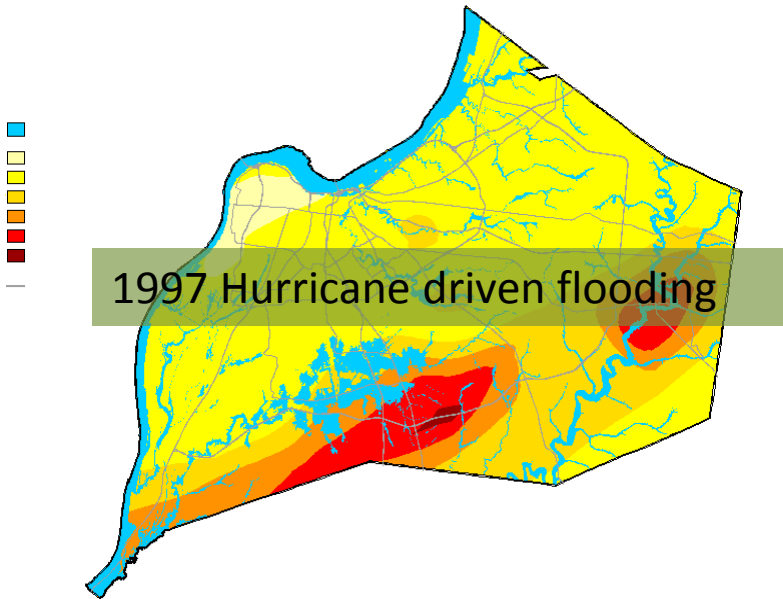
Rainfall Amounts

NOTE:
 Rain event totals provided by the
 National Weather Service, Louisville Ky



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Major Rain Events Since 1997



Departure from Normal for the First 14 days of April

Wettest Aprils

13.97" (2011)

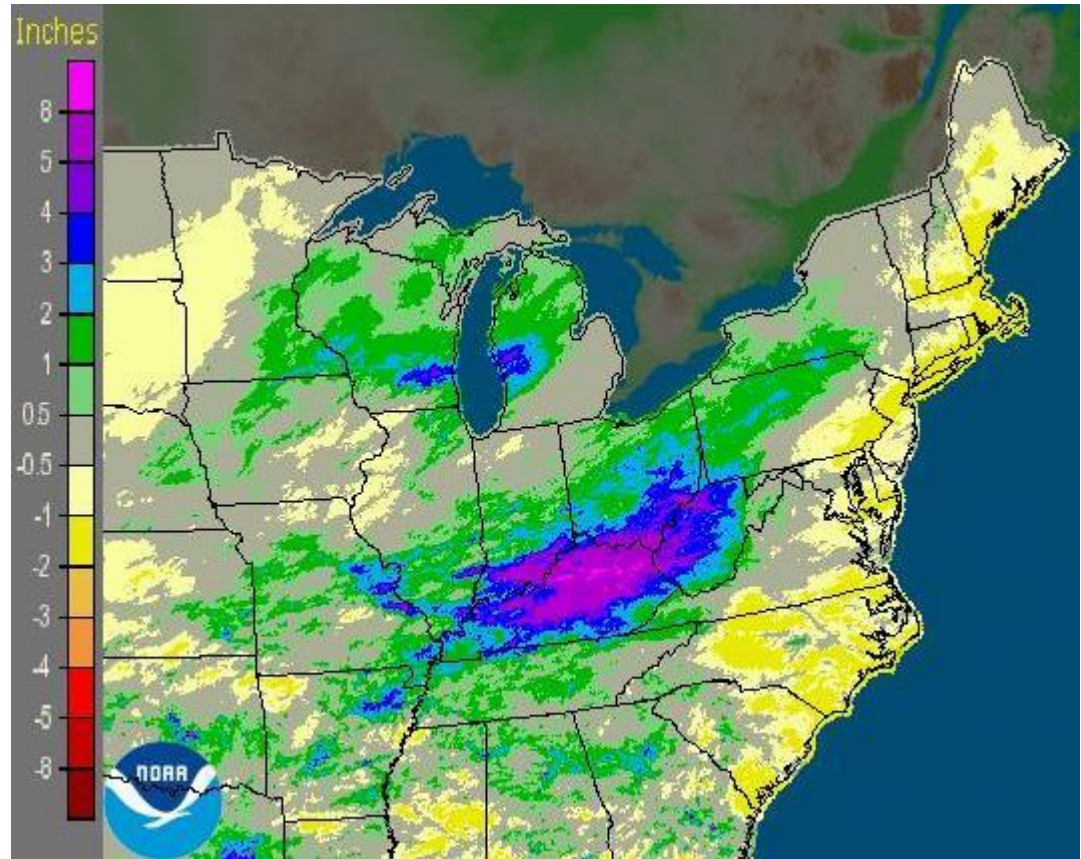
11.10" (1970)

9.56" (1966)

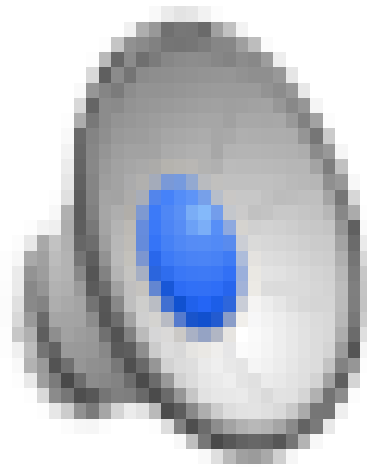
9.49" (2015)*

9.08" (1872)

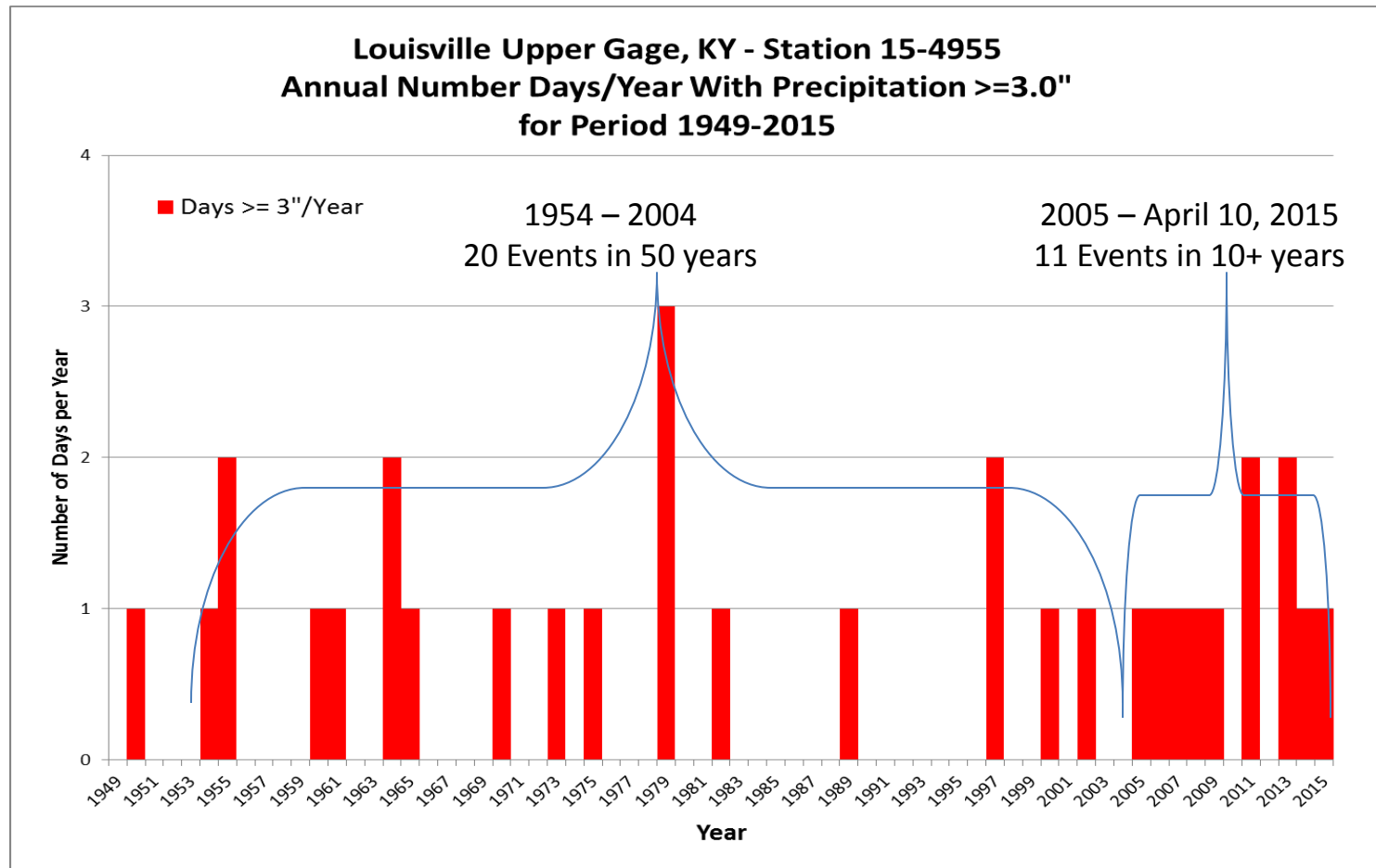
* Through April 14



John Gordon, National Weather Service Louisville



Increased Frequency of Extreme Storms



Photos of 2015 Flooding Event



Preston Hwy & McCawley Road



Fern Valley Hotel (Formerly Holiday Inn)



National Turnpike & Fairdale Road



Grade Lane @ Northern Ditch



Whipps Mill Road @ Beargrass Creek



Outer Loop East of New Cut Road

Photos of 2015 Flooding



Newburg Metro Facility



Newburg Metro Facility



Gardiner Lake Drive



Water Recue at Sutherland



Water Rescue at Sutherland



Road Washout on Hwy 22

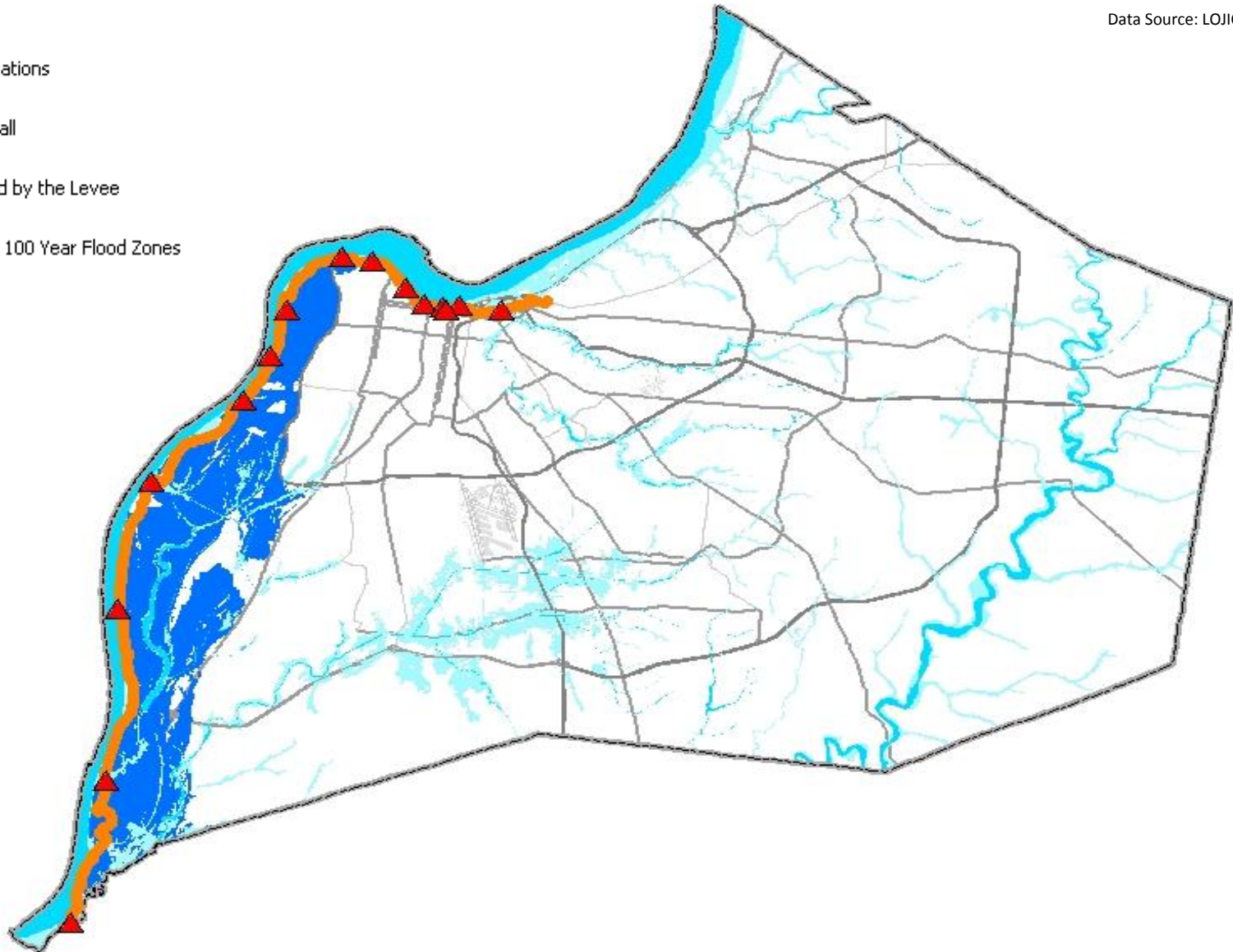
Ohio River Flood Protection System versus Inland Floodplains

Ohio River Flooding vs Internal Stream Flooding



Data Source: LOJIC

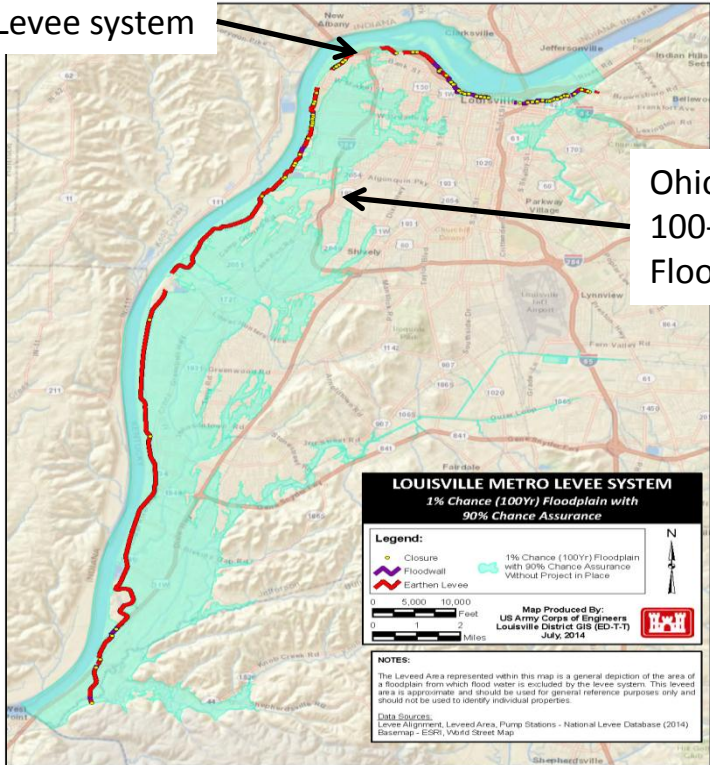
- Flood Pump Stations
 - Levee/Floodwall
 - Area Projected by the Levee
 - Current FEMA 100 Year Flood Zones
- Floodplain
- Floodway



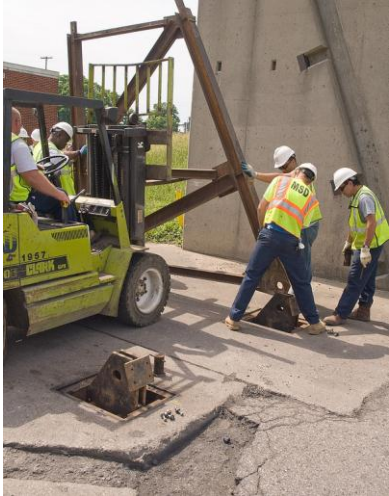
Ohio River Flood Protection System

2015 USACE Levee System Evaluation confirmed flood protection system meets FEMA criteria for protection

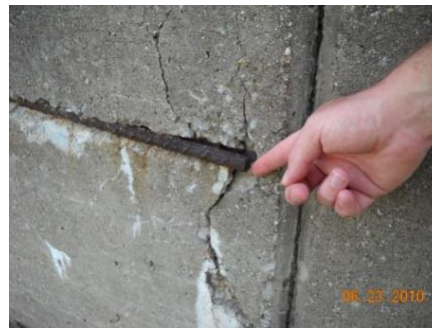
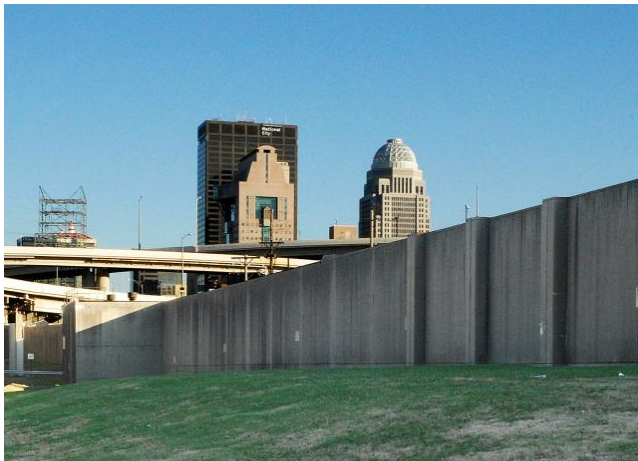
Levee system



Ohio River
100-year
Flood Plain



Ohio River Flood Protection System



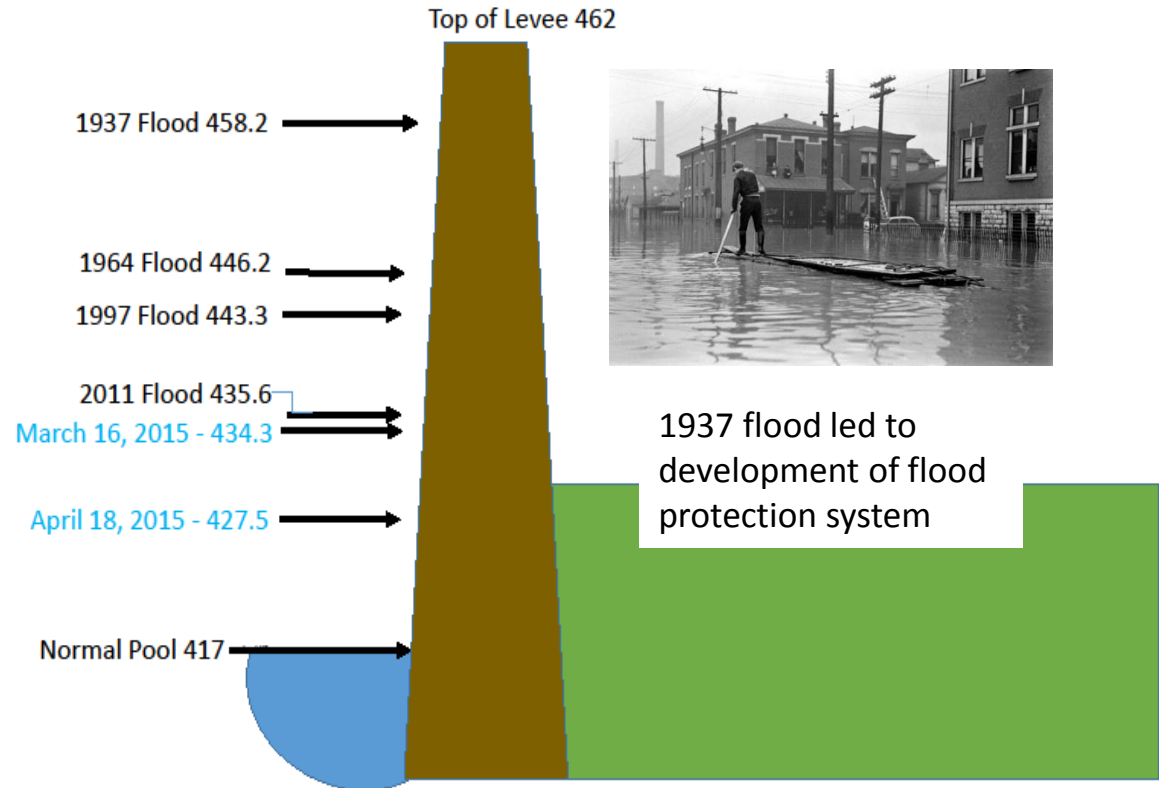
When are Flood Pumping Stations activated?

- **During the April 3, 2015 flood event, the Ohio River was below an elevation on the Upper and Lower gauge that would require Flood Pump Stations to be in service.**
- **At these river elevations, more flow can be discharged by gravity through the streams to the river than the flood pumping stations can pump; closing gates and activating flood pump stations in this scenario would cause additional internal flooding.**
- **When the Ohio is below flood stage, there are no pumps that can relieve flooding within Jefferson County.**
- **All flood control facilities in Jefferson County rely on gravity to fill them; not pumps.**

Levee System Protects Against Maximum Flood Recorded (1937)

Historic flood elevations
at McApline Locks (Upper)

Levee system has perfect
record keeping Ohio River
out of Louisville



Continued Flood Protection System Investment Required

Levee System Evaluation identified need for continued rehabilitation and repair

Louisville - 1937



New Orleans - 2005



No flood protection system



Failed flood protection system

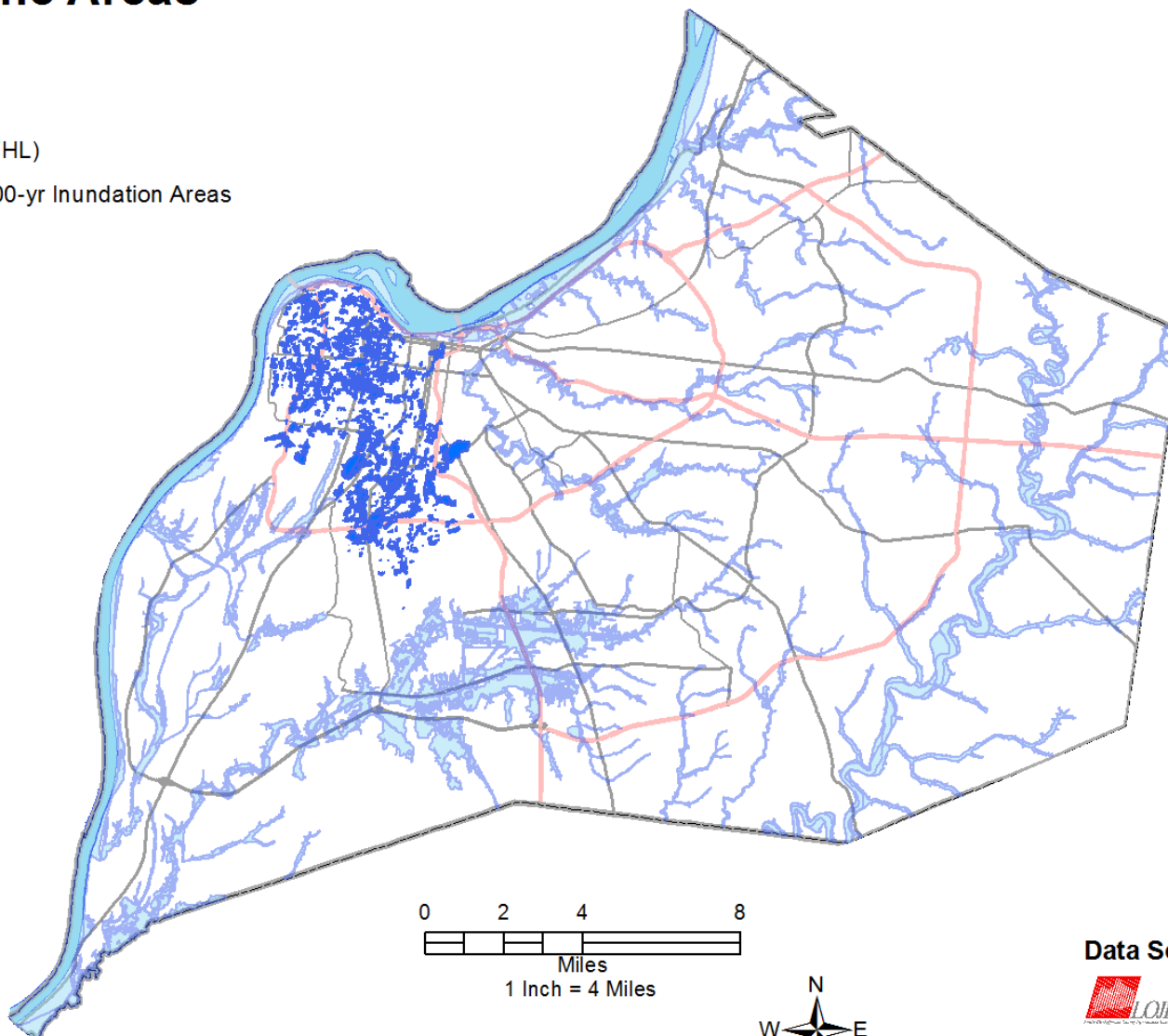
The consequences of failure justify increased investment for renewal and replacement of 60-year old facilities

Where and Why are portions of Jefferson County more prone to flooding?

Louisville and Jefferson County Floodprone Areas

Legend

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



0 2 4 8
Miles
1 Inch = 4 Miles



Data Sources:



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Louisville and Jefferson County Floodprone Structures (100-Year)

4/23/2015

Ohio River

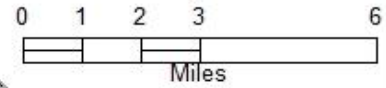
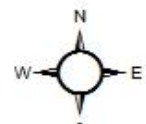
- Pre-FIRM
- Post-FIRM

Internal Streams

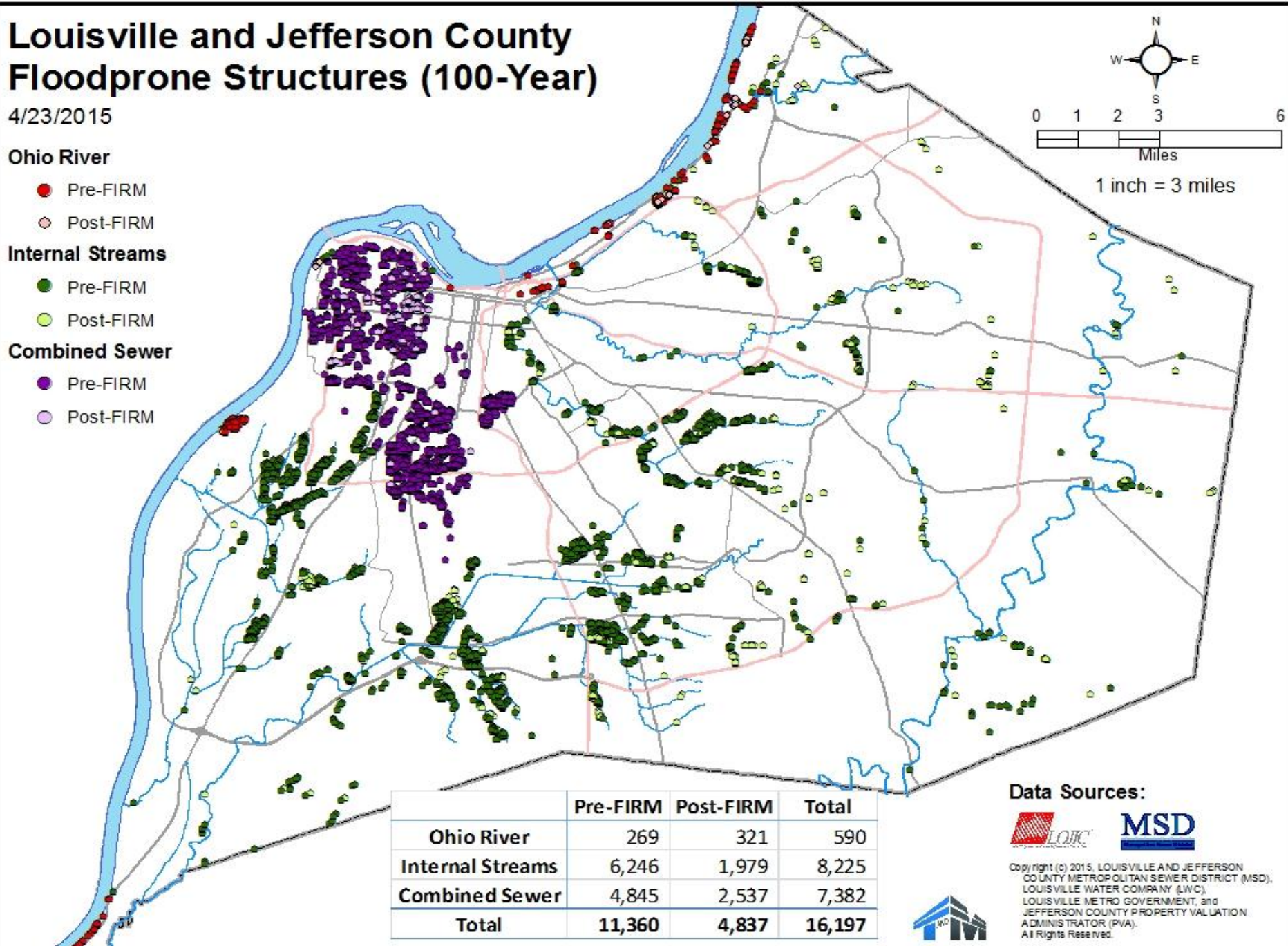
- Pre-FIRM
- Post-FIRM

Combined Sewer

- Pre-FIRM
- Post-FIRM



1 inch = 3 miles



	Pre-FIRM	Post-FIRM	Total
Ohio River	269	321	590
Internal Streams	6,246	1,979	8,225
Combined Sewer	4,845	2,537	7,382
Total	11,360	4,837	16,197

Data Sources:



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Internal Flood Protection System/Components



Bashford Manor Basin



Drainage channel and retention basin



Whipps Mill Basin



Green infrastructure

Internal Flood Protection System/Components



Additional Flood Mitigation Tools Utilized by MSD

Plumbing Modification Program (PMP)

- **Program started in 1993 (moved program in house in 2003) in response to basement flooding caused by surcharged sewers in the combined sewer area during rain events**
- **Pays for installation of modifications protecting against basement flooding from sewer backup.**
- ***Modifications can include installation of back flow prevention valves, sump pumps or ejector pumps***
- **Program is available to any MSD customer that has experienced a sewer related backup in their basement or live in area with history wet weather basement backup.**

Plumbing Modification Program (PMP)

Process for application

- Information packet sent to customer upon request
- Customer solicits 3 bids from licensed plumbers
- MSD reviews bids
- Approval letter sent
- Homeowner contact plumber
- Plumber obtain permits
- Plumber contact MSD for inspection
- Check sent to customer

Plumbing Modification Program

Helping protect homes from sewer backups

Backflow Prevention

MSD's Plumbing Modification Program (PMP) is available to MSD customers who have experienced a wet-weather related sewer backup in their basement, or live in a geographic area with a history of wet-weather backups. Through this program, MSD will cover the cost of having a licensed plumber install a backflow device in the customer's basement to reduce the risk of sewers backups caused by heavy rains.

Sump Pump Disconnection

Sump pumps connected to the sanitary sewer add hundreds of gallons of rainwater to the sanitary sewer system. The typical 8-inch neighborhood sanitary sewer pipe

can become overwhelmed with as few as eight sump pumps connected to the system. The PMP allows a licensed plumber to disconnect the sump pump from the sanitary sewer and re-direct the water in a safe and effective way. This licensed plumber can also disconnect your downspouts if needed.*

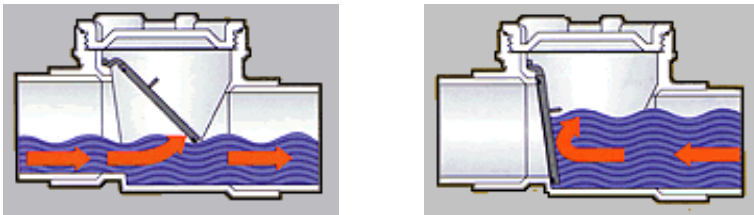
For more information concerning these programs, residential customers should call MSD's Customer Relations Department— at 502-587-0603— or email CustomerRelations@LouisvilleMSD.org.



Plumbing Modification Program (PMP)

How it Works

Backflow Prevention Valve



Allows wastewater to leave the structure, but prevents wastewater from backing into the structure with the use of a flap valve. Flap valve must be maintained by the property owner.

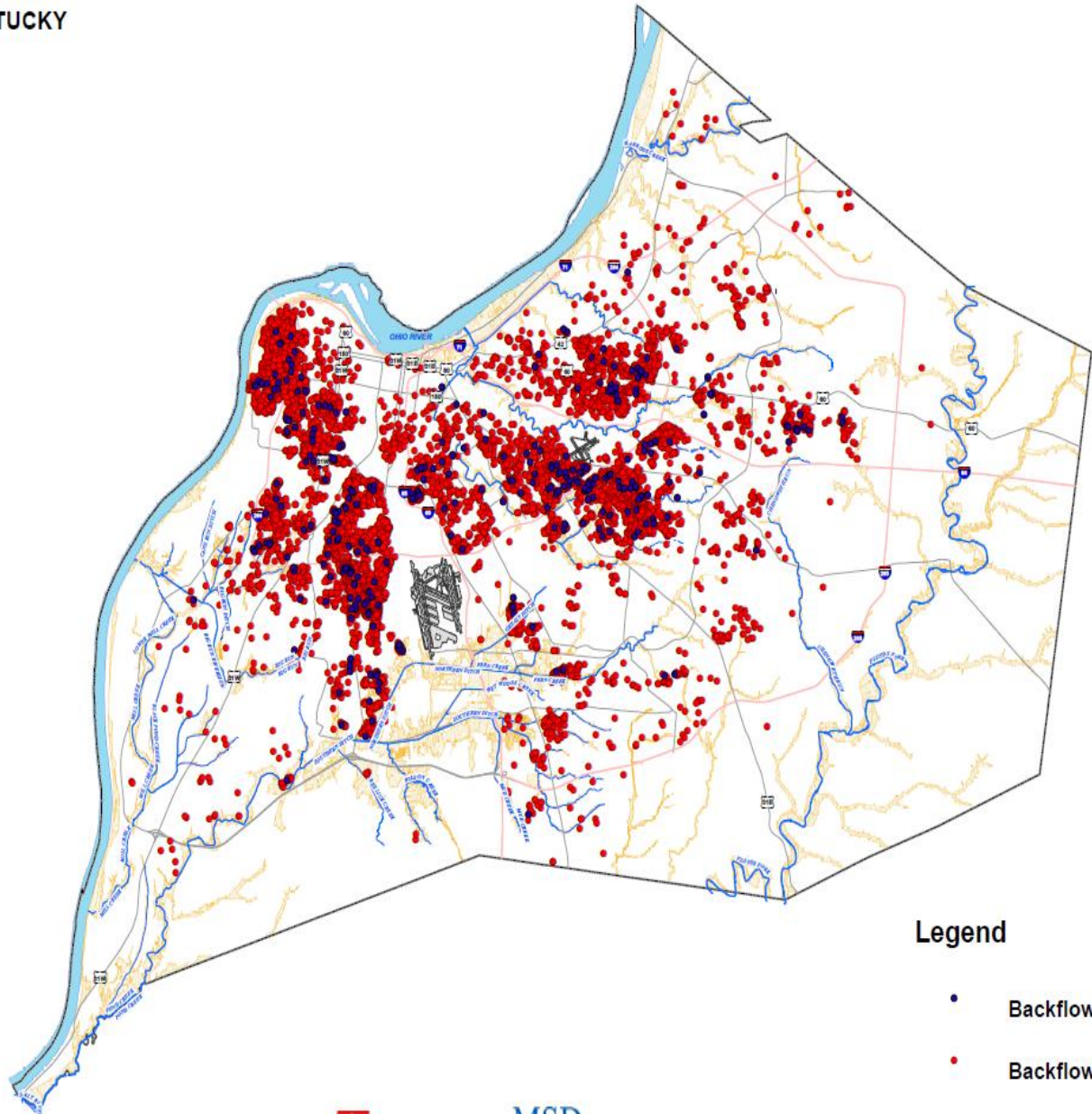
Completely cut the structure off from the main sewer line. No wastewater can leave or enter the structure.

Emergency Shutoff Valve



Plumbing Modification Program

JEFFERSON COUNTY, KENTUCKY



Legend

- Backflow Preventer (In Floodplain)
- Backflow Preventer (Out of Floodplain)

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1" = 4700' 22-SEP1-2014

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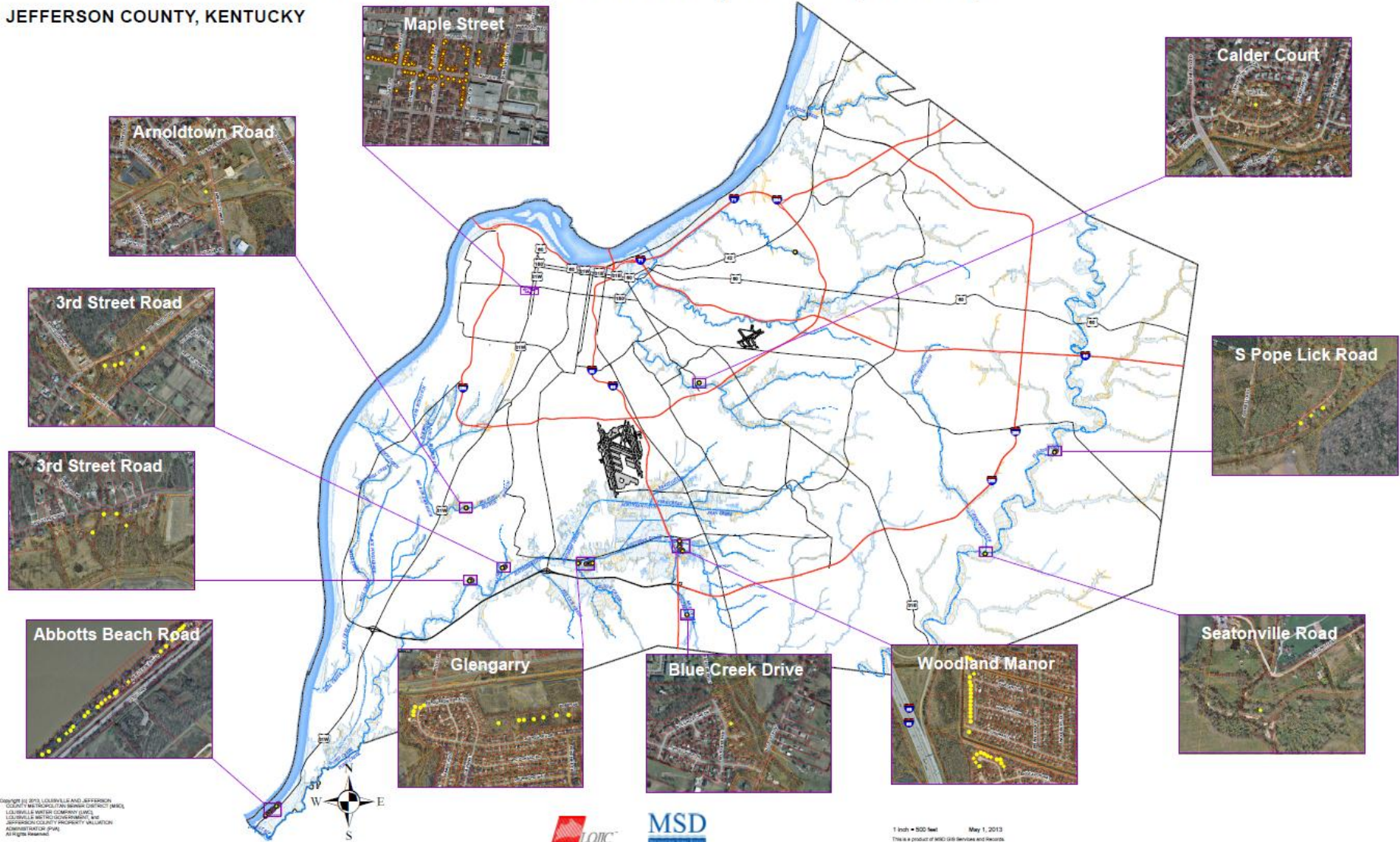
Plumbing Modification Program (PMP)

- **Nearly 20,000 installations since program initiation (\$39.5M)**
- **Costs and completed projects (Past 5 Years)**
 - **FY10 – \$4.7 Million/1782 installations completed**
 - **FY11 – \$4.0 Million/1400 installations completed**
 - **FY12 – \$4.4 Million/1708 installations completed**
 - **FY13 – \$4.1 Million/1557 installations completed**
 - **FY14 – \$3.8 Million/1153 installations completed**

**Total \$21 million investment over last 5 years
benefitting 7,600 properties**

Deed Restricted Floodplain Acquisitions (190 properties)

JEFFERSON COUNTY, KENTUCKY

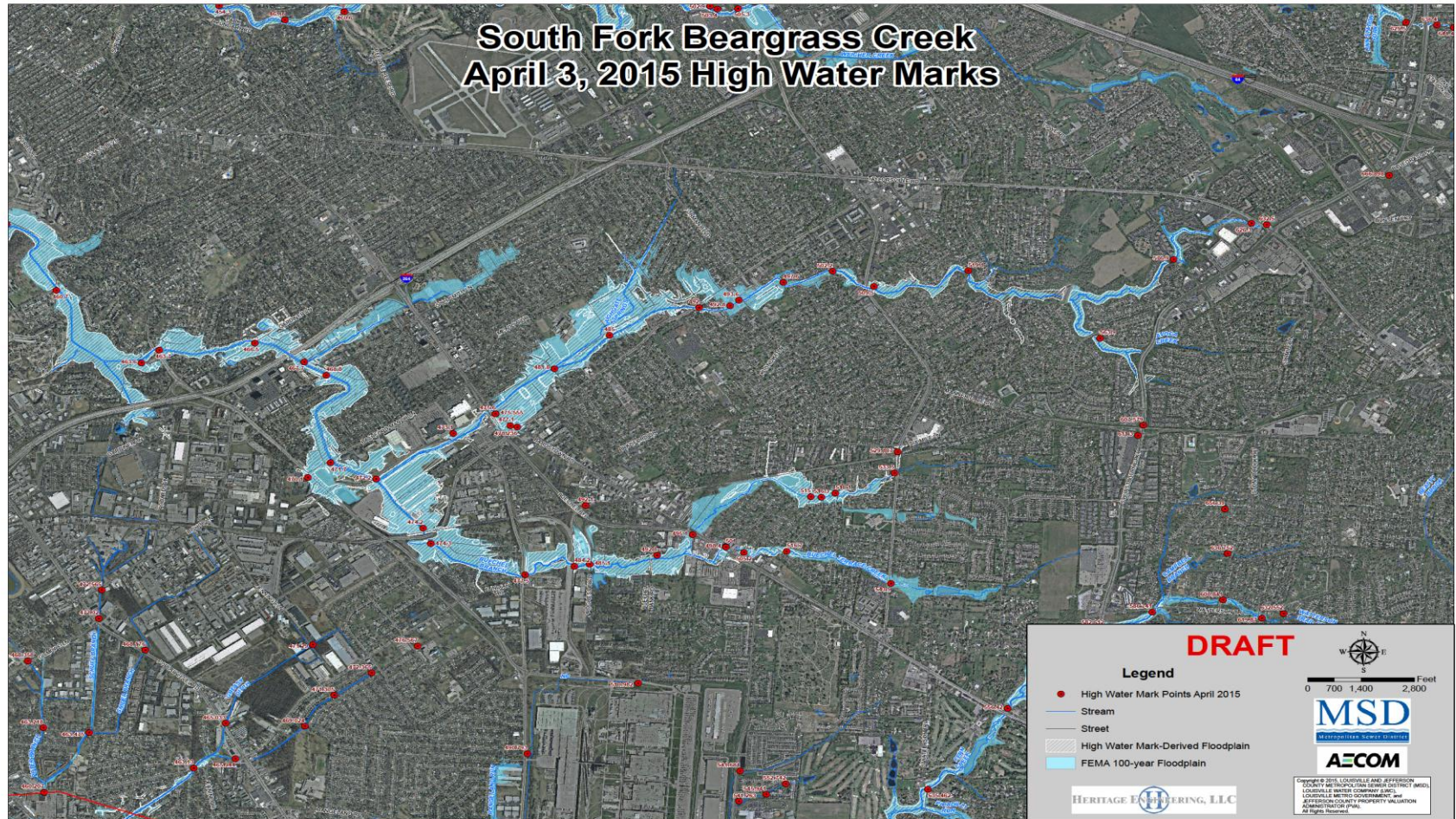


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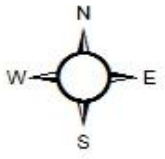
1 inch = 500 feet May 1, 2013
This is a product of MSD GIS Services and Records.

Floodplain Modeling



Louisville and Jefferson County Grant Areas (2009 - Present)

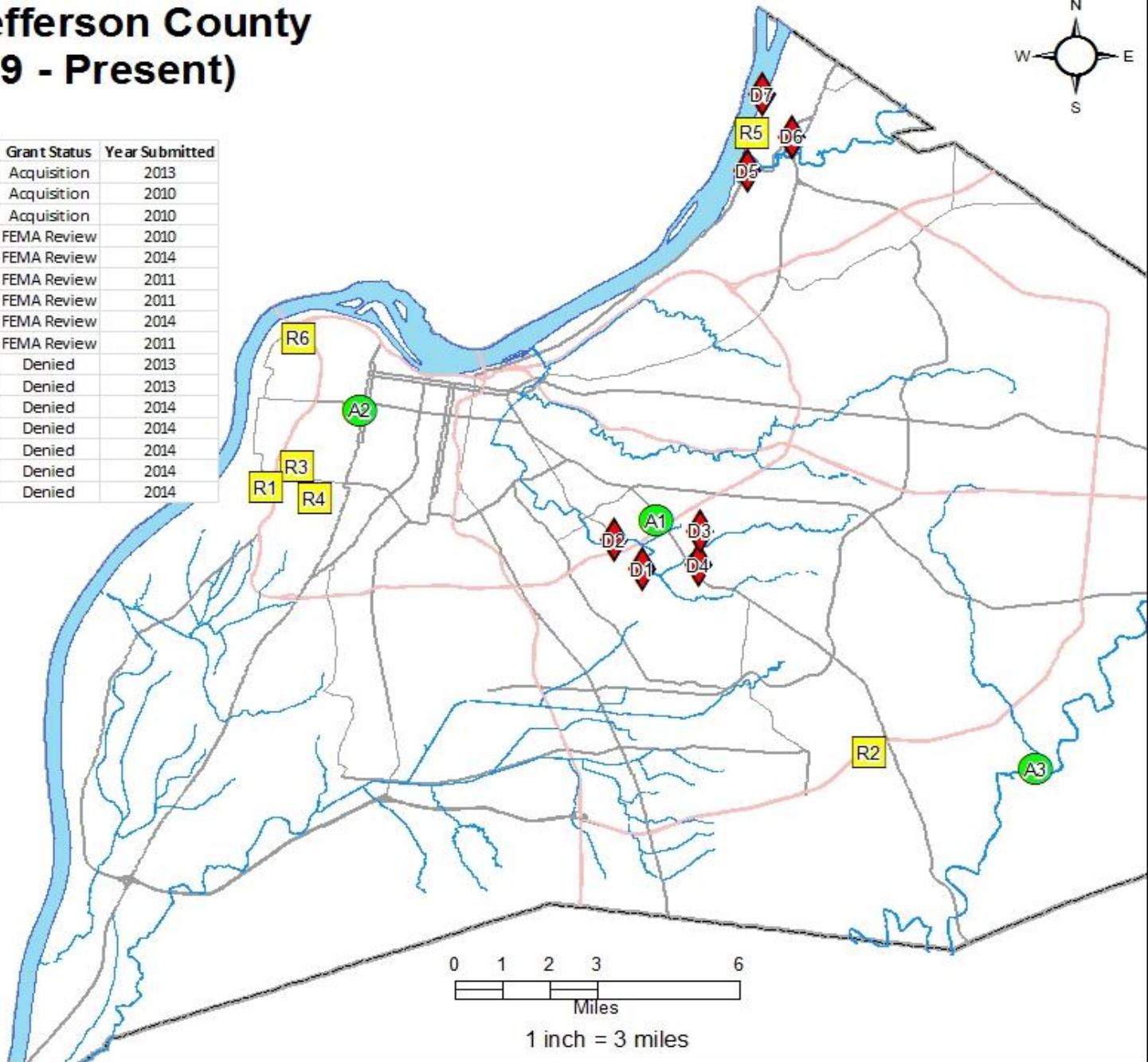
4/23/2015



Area Number	Grant Name	Grant Status	Year Submitted
A1	Elba Dr (Single Lot)	Acquisition	2013
A2	Maple Street (4 Phases)	Acquisition	2010
A3	Seatonville Rd	Acquisition	2010
R1	Algonquin Meadows	FEMA Review	2010
R2	Bartley Dr	FEMA Review	2014
R3	Belquin Ave	FEMA Review	2011
R4	Linwood Ave - Phase 3	FEMA Review	2011
R5	Transylvania Beach Rd SRL	FEMA Review	2014
R6	Wewoka/West Park	FEMA Review	2011
D1	Bashford Manor (Elba Dr)	Denied	2013
D2	Hayfield - Dundee	Denied	2013
D3	Medford Lane Area - Insured	Denied	2014
D4	Medford Lane Area - RL	Denied	2014
D5	Transylvania Beach Rd Insured	Denied	2014
D6	Transylvania Beach Rd RL - North	Denied	2014
D7	Transylvania Beach Rd RL - South	Denied	2014

Grant Status

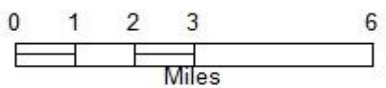
- Acquisition
- FEMA Review
- ◆ Denied



Data Sources:



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1 inch = 3 miles

Louisville MSD FEMA Grant Application Status

Status Category	Project Name	Application Type	Cost Share	# of Properties	Open Space Acreage	Project Cost	MSD Share	Status	District	Council Person
Approved / Acquisition	Seatonville Rd	HMGP	75/25%	1	7.00	\$450,000	\$58,500	Acquisition	20	STUART BENSON
	Elba Drive	SRL	100%	1	0.40	\$175,375		Approved	10	JIM KING
	Maple Street (4 Phases)	HMGP	75/25%	128	14.75	\$9,905,000	\$1,287,650	Acquisition	4 & 6	DAVID JAMES & DAVID TANDY
Approved/Acquisition Subtotal					22.15	\$10,530,375	\$1,346,150			
Grants Under Review	Belquin Ave	HMGP	75/25%	43	6.70	\$3,181,000	\$413,530	Environmental & Historic Preservation Review	1	ATTICA SCOTT
	Algonquin Meadows	HMGP	75/25%	26	5.50	\$1,980,000	\$257,400	Environmental & Historic Preservation Review	1	ATTICA SCOTT
	Wewoka / West Park	PDM	75/25%	26	7.60	\$1,980,000	\$257,400	Environmental & Historic Preservation Review	5	CHERI HAMILTON
	Linwood Ave – Phase 3	HMGP	75/25%	48	6.90	\$3,354,503	\$436,085	Environmental & Historic Preservation Review	1	ATTICA SCOTT
	Bartley Dr.	SRL	100%	1	0.46	\$189,756		Under FEMA Review	22	ROBIN ENGEL
	Transylvania Beach Rd. SRL	SRL	100%	7	4.04	\$1,640,538		Under FEMA Review	16	KELLY DOWNARD
Grants Under Review Subtotal					31.20	\$12,325,797	\$1,364,415			
TOTALS				281	53.35	\$22,856,172	\$2,710,565			
Denied Applications	Bashford Manor	RL	90/10%	8	2.06	\$1,440,165	\$144,017	Denied (2013)	10	JIM KING
	Hayfield-Dundee	RL	90/10%	6	1.83	\$1,665,644	\$166,564	Denied (2013)	8	TOM OWEN
	Transylvania Beach Rd. RL - South	RL	90/10%	5	2.82	\$2,581,526	\$258,153	Denied (2014)	16	KELLY DOWNARD
	Transylvania Beach Rd. RL - North	RL	90/10%	5	1.65	\$1,283,803	\$128,380	Denied (2014)	16	KELLY DOWNARD
	Transylvania Beach Rd. - Insured	Insured	75/25%	2	1.14	\$483,414	\$62,844	Denied (2014)	16	KELLY DOWNARD
	Medford Lane Area - RL	RL	90/10%	4	0.66	\$606,493	\$60,649	Denied (2014)	26	BRENT ACKERSON
	Medford Lane Area - Insured	Insured	75/25%	12	1.97	\$1,857,782	\$241,512	Denied (2014)	26	BRENT ACKERSON
Denied Applications Subtotal					12.13	\$9,918,827	\$1,062,119			

Flood Mitigation Prioritization

- **Risk evaluation and prioritization of flood-prone areas, ~12,500 primary structures**
 - Ohio River**
 - Internal streams
 - Combined Sewer System
- **Criteria**
 - Flood depth
 - Population density
 - Sewage hazard factor for Combined Sewer System
- **Define Mitigation Options for top 50 areas**
 - Acquisition/Demolition
 - Relocation
 - Elevation
 - Basin



Key FEMA Grant Factors

- **FEMA grant process for acquisition is completely voluntary**
- **Because of Privacy Act (1974-5U.S.C.552a) requirements, general grant areas may be referenced, but not specific properties or personal identifiers.**
- **Purchase offer determinations are either the pre-event or current market value.**
- **Deed restrictions will conserve the property as open space for natural floodplain functions; no new structures or improvements may be built.**

FEMA Grant Limitations / Challenges

- **Applications are subject to funding availability**
- **Competitive distribution of funds with priority given to disaster areas and Severe Repetitive Loss (SRL) applications**
- **Not a quick fix (four grant applications under review since 2010)**
- **Eligibility challenges for properties without flood insurance**
 - **Properties not in floodplain (Combined Sewer System)**
 - **Owners who elect to drop flood insurance**

Historic Preservation Programmatic Agreement (PA)

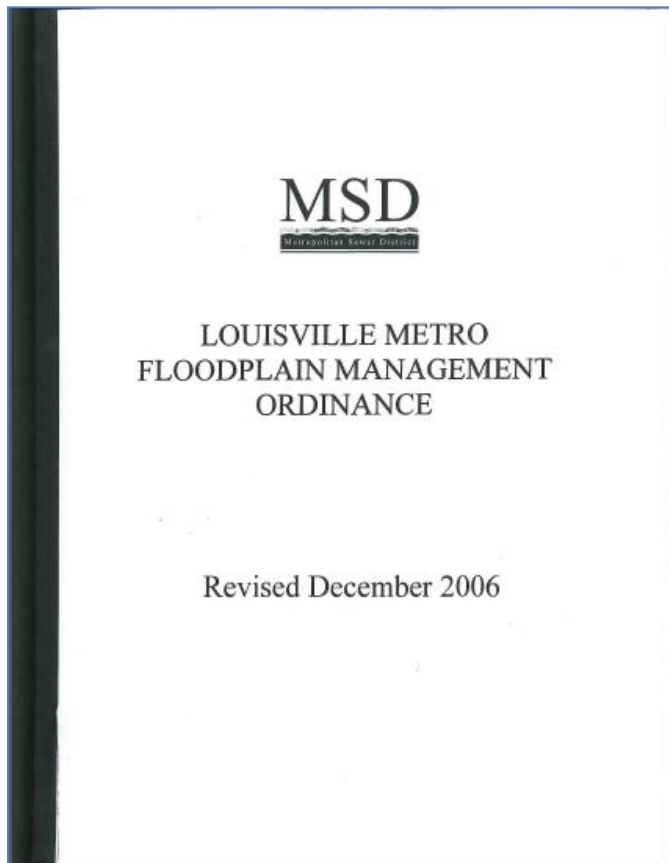
- **Environmental and historic reviews are required by NEPA; triggered by federal funding**
- **To streamline the review process, MSD is negotiating a Historic Preservation PA with FEMA. Draft currently under review**
 - **Covers county-wide acquisition and demolition activities**
 - **Includes public involvement methods, treatment measures to mitigate potential adverse historical impacts, and measures to minimize disturbance effects on archaeological resources.**
 - **Consultation for this agreement has been underway for over a year.**
- **FEMA is additionally compiling a Programmatic Environmental Assessment.**
- **Public Meeting in June 2015, followed by 30-day public comment period.**
- **All additional grant approvals are on hold until PA is finalized. Unknown how it will actually affect the time frame for review.**

National Flood Insurance Program

- **Federally-backed flood insurance made available to property owners**
- **Disaster assistance available after major flooding**



National Flood Insurance Program/ Floodplain Ordinance



- **1978 – Louisville joined National Flood Insurance Program – Floodplain regulations in Article 13 of the Land Development Code**
- **1987 - Local Ordinance establishes MSD as local stormwater utility**
- **1997 – 1st Floodplain Ordinance passed**
- **2006 – Current version of Floodplain Ordinance passed**

Community Rating System (CRS)

- **Voluntary program that recognizes floodplain management activities that go beyond the minimum standards of the National Flood Insurance Program**
- **Louisville joined the CRS in 1990**
- **Currently Class 4 Community**
- **Saves \$1.7 million each year in flood insurance premiums**



Local Floodplain Ordinance – Substantial Improvement/Damage



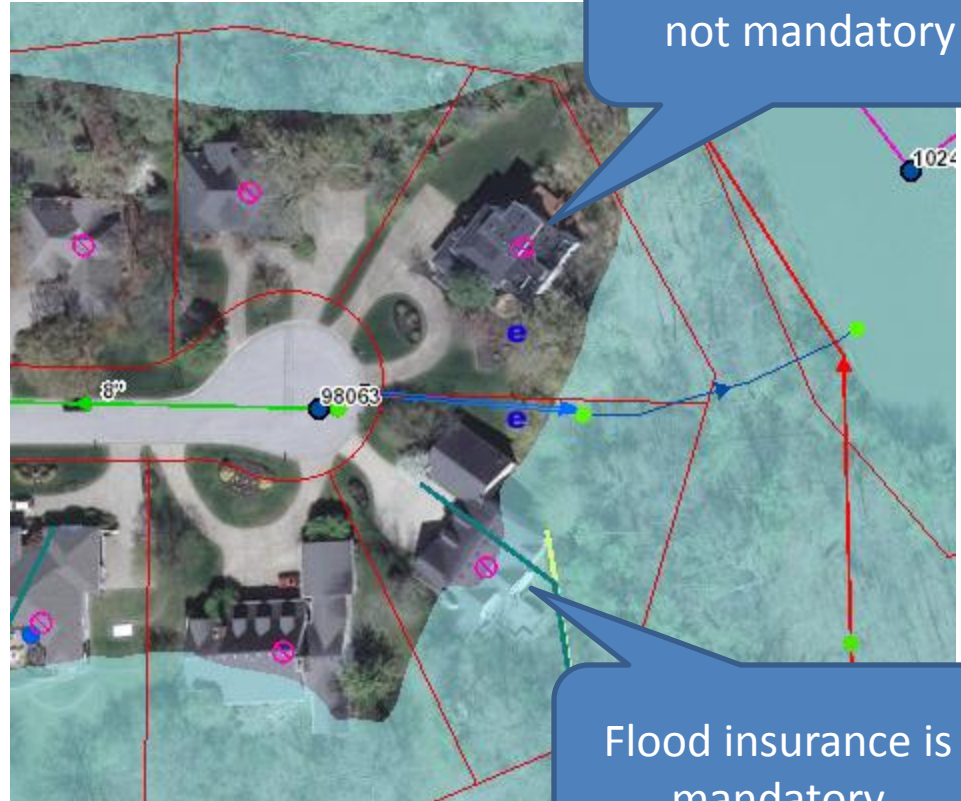
- Buildings can be improved or repaired up to 50% of the value of the building (not including land) in a 10-year rolling period
- If a building is substantially improved/damaged, the building must meet the current code (elevation, flood vents, etc.)



Changes to National Flood Insurance Program

Flood Insurance

- **Anyone in Jefferson County can buy flood insurance**
- **Flood insurance is required if:**
 - **Any part of the building is within FEMA floodplain**
 - **There is a federally backed mortgage on the property**



Flood insurance is not mandatory

Flood insurance is mandatory

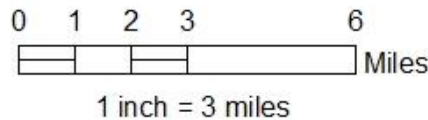
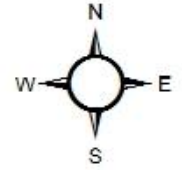
Biggert-Waters Act 2012/ HFIAA 2014

- **Biggert-Waters Act of 2012**
 - Phased out subsidized rates for flood insurance quickly or immediately in certain situations
 - Flood insurance premiums to be based on “real risk”
- **Homeowner Flood Insurance Affordability Act (HFIAA) of 2014**
 - Phases out subsidies more slowly, but eventually based on “real risk”
 - 18% max for primary residences
 - 25% max for non-primary residences, repetitive loss, and commercial buildings
 - Added a surcharge on all policies

Jefferson County BW 12 Impacts

Insurance Premium Changes Percentage Changed

- 500% and Above
- 200% to 500%
- 100% to 200%
- 75% to 100%
- 50% to 75%
- 25% to 50%
- No Change to 25%
- 25% to No Change
- 50% to -25%
- 50% and Below



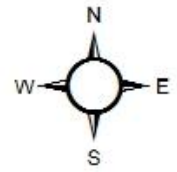
Data Sources:



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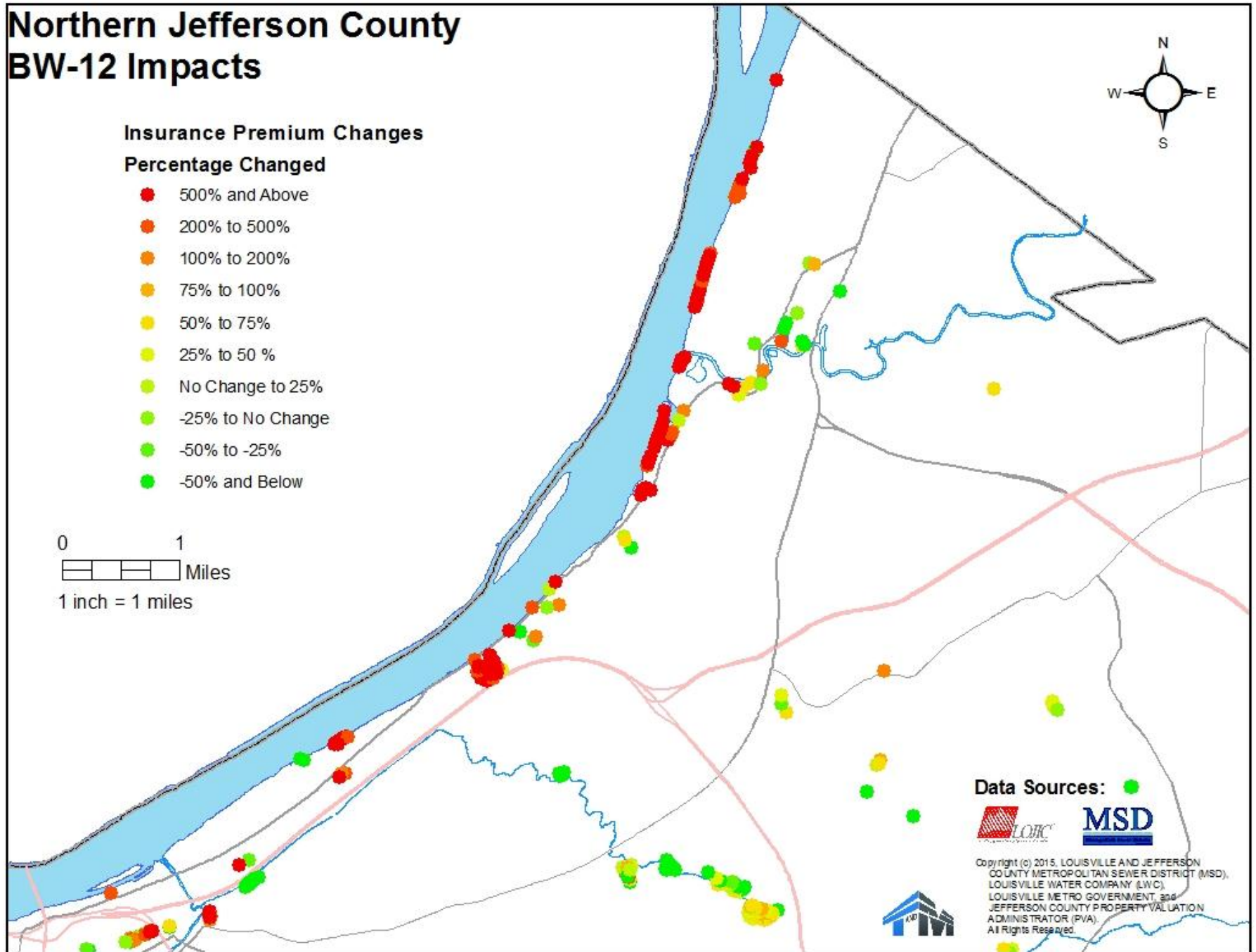
Northern Jefferson County BW-12 Impacts



Insurance Premium Changes Percentage Changed

- 500% and Above
- 200% to 500%
- 100% to 200%
- 75% to 100%
- 50% to 75%
- 25% to 50%
- No Change to 25%
- -25% to No Change
- -50% to -25%
- -50% and Below

0 1
Miles
1 inch = 1 miles



Data Sources:



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Flood Insurance Example

- Getting to “full-risk” rate assuming 18% increase:



- **Reaches “full-risk” rate in Year 7**
- **Assumes pre-FIRM home, 3’ below flood elevation, AE zone, Slab, \$200,00 building, \$80,000 contents**

Funding Sources for Buyouts

Existing Funding Sources



- **National Flood Insurance Program**
 - Up to \$30,000 reimbursement
 - Included with standard flood insurance
 - Must be substantially damaged
 - To elevate, relocate or demolish structure
- **FEMA Grants**
 - Pre-disaster Grants (i.e, Elba Dr)
 - Flood Mitigation Grant
 - Hazard Mitigation Grants (i.e., Maple St)
- **State and Federal Cooperation**
 - **Silver Jackets Program**
 - Interagency approach
 - Reduce flood risk
 - MSD Application Pending



FEMA



Other Buyout Programs

King County, WA

- Properties listed in Flood Hazard Management Plan and those with flood insurance and repetitive flooding are given priority
- Two types of mitigation:
 - Home buyouts
 - Elevation of homes
- Funded through:
 - Federal grants
 - State grants
 - King County Flood Control District



King County

Other Buyout Programs

Charlotte-Mecklenburg Floodplain Buyout Program

- Risk Assessment completed for all 5,000 floodplain properties that ranked each property to determine priority
- 2 types of buyouts
 - Quick buys – after destructive flood
 - Grant-funded – as funding is available from federal, state, and local sources



Recommendations

Plan of Action

- 1. Form work group to evaluate short-term mitigation alternatives**
 - Quick-Buy Program
 - Variance/amendment to Floodplain Ordinance
- 2. Work Group to evaluate long-term mitigation alternatives**
 - Evaluate national best practices for flood mitigation/buyouts
 - Evaluate state/federal funding/loan opportunities
 - Evaluate local funding options
 - Review and update Floodplain Ordinance if necessary
- 3. Mayor/Metro Council/MSD convene work group to evaluate alternatives and provide recommendations**
 - Short-term recommendations in 30-45 days
 - Long-term recommendations in 6 months

Questions and Discussion