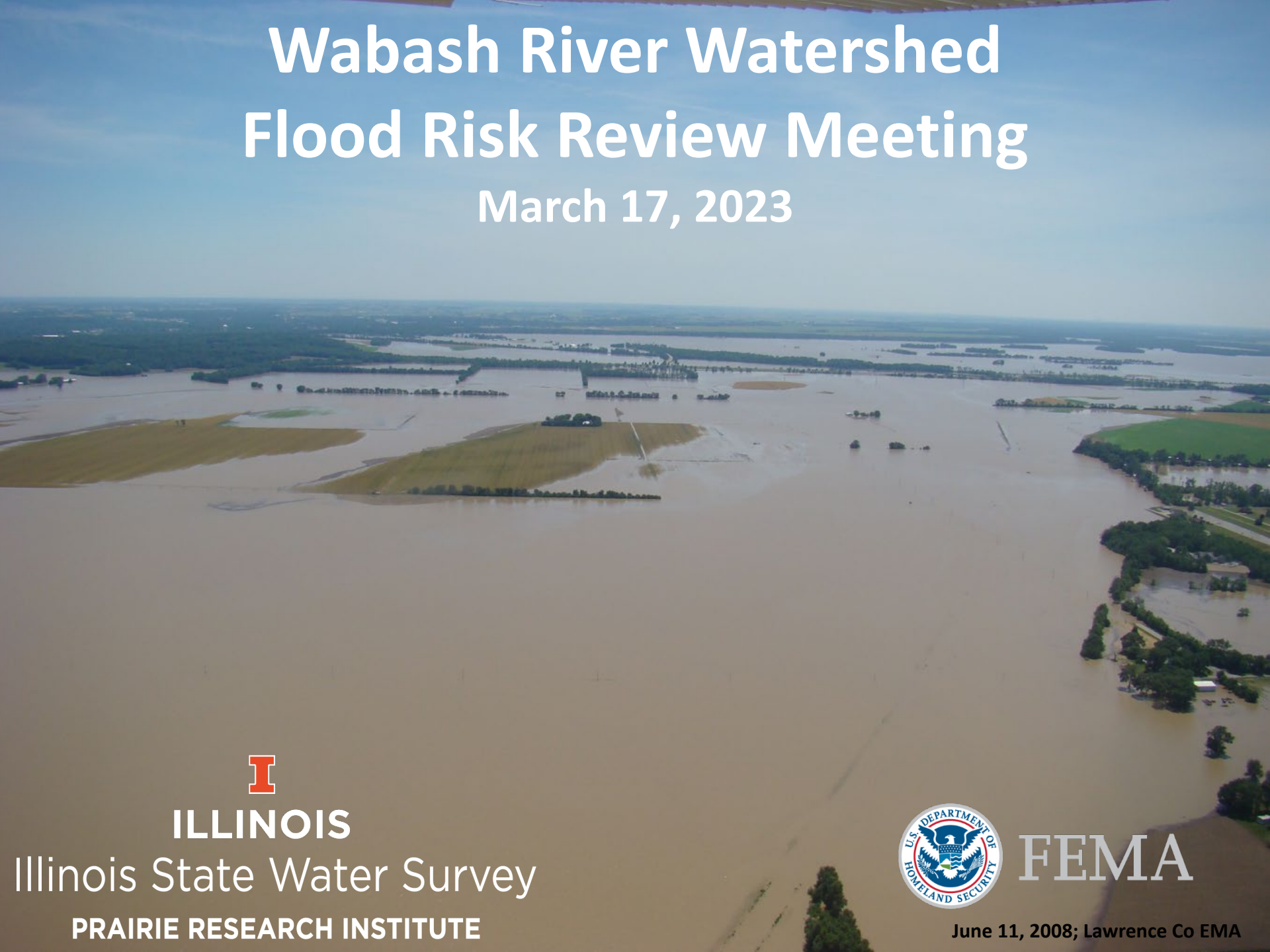
ILLINOIS

Illinois State Water Survey

PRAIRIE RESEARCH INSTITUTE

Wabash River Watershed Flood Risk Review Meeting

March 17, 2023



ILLINOIS
Illinois State Water Survey
PRAIRIE RESEARCH INSTITUTE

FEMA

June 11, 2008; Lawrence Co EMA

ILLINOIS
Illinois State Water Survey
PRAIRIE RESEARCH INSTITUTE

FLOOD RISK REVIEW MEETING -WABASH RIVER WATERSHED, ILLINOIS

MARCH 17, 2023

PRE-MEETING SURVEY

1. **How much do you know about your community's flood risk?**

   ◯ a lot
   ◯ some
   ◯ not much

2. **How much do you know about FEMA Risk Mapping, Assessment and Planning (Risk MAP) process?**

   ◯ a lot
   ◯ some
   ◯ not much

3. **Are you able to communicate flood risk to your community?**

   ◯ yes
   ◯ no

4. **Would you know where to go to get flood mitigation help?**

   ◯ yes
   ◯ no

Agenda

- Rollcall
- Introduction
- Project Goals and Objectives
- Project Scope
- Levees
- Wabash River Flood History
- Hydrologic Study Methods
- Hydraulic Study Methods
- Webmap Results
- Communication and Next Steps
- Risk Communication & Mitigation Actions
- Community Participation
- Questions/Open Discussion

Rollcall

Edwards County*	Wabash County*	Crawford County*
City of Albion	Village of Allendale	Village of Hutsonville*
Village of Bone Gap	Village of Bellmont*	City of Robinson*
Village of Browns*	Village of Keensburg*	Village of Palestine*
City of Grayville*	City of Mount Carmel*	West York CPD
Village of West Salem	White County*	Edgar County*
Gallatin County*	Village of Maunie*	City of Chrisman*
Village of New Haven*	Village of Phillipstown	Village of Metcalf*
Lawrence County	Clark County*	City of Paris*
City of St. Francisville	City of Marshall*	Village of Vermilion*
Village of Russellville	West Union CDP	Vermilion County*
City of Lawrenceville*		Village of Ridge Farm

* Participating in NFIP

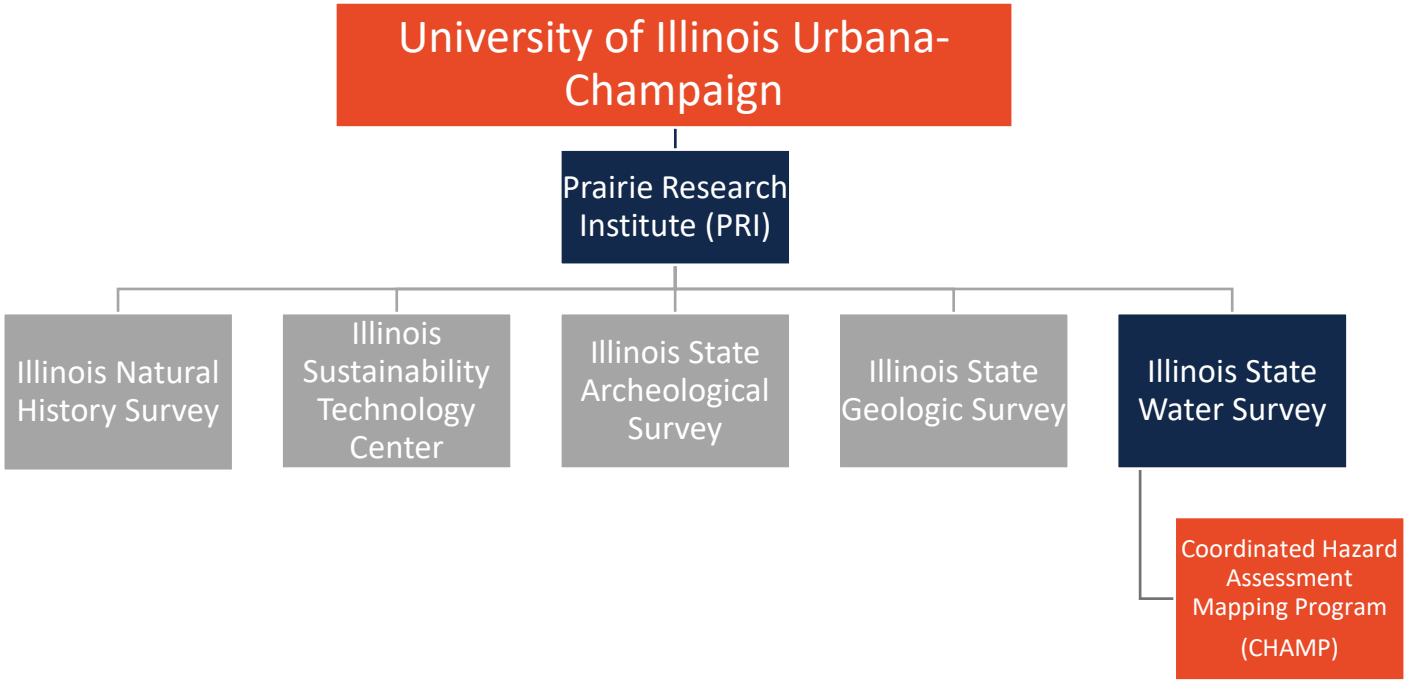
Please note that the data on this slide has been updated since the Flood Risk Review meeting

Introduction

Introduction

Who We Are

ILLINOIS
Illinois State Water Survey
PRAIRIE RESEARCH INSTITUTE



https://www.illinoisfloodmaps.org/

https://www.isws.illinois.edu/champ

Introduction

Our Partners

ILLINOIS
Illinois State Water Survey
PRAIRIE RESEARCH INSTITUTE

FEMA

ISWS is a Cooperating Technical Partner (CTP) with the Federal Emergency Management Agency. (FEMA)

IDNR-OWR

ISWS partners with The Illinois Department of Natural Resources-Office of Water Resources (IDNR-OWR). Together we prioritize Illinois floodplain studies and mapping projects.

Your Community

ISWS provides ongoing engagement with state and local officials and watershed stakeholders to reduce flood risk.

Introduction

Our Collaborators

ILLINOIS
Illinois State Water Survey
PRAIRIE RESEARCH INSTITUTE

Indiana DNR

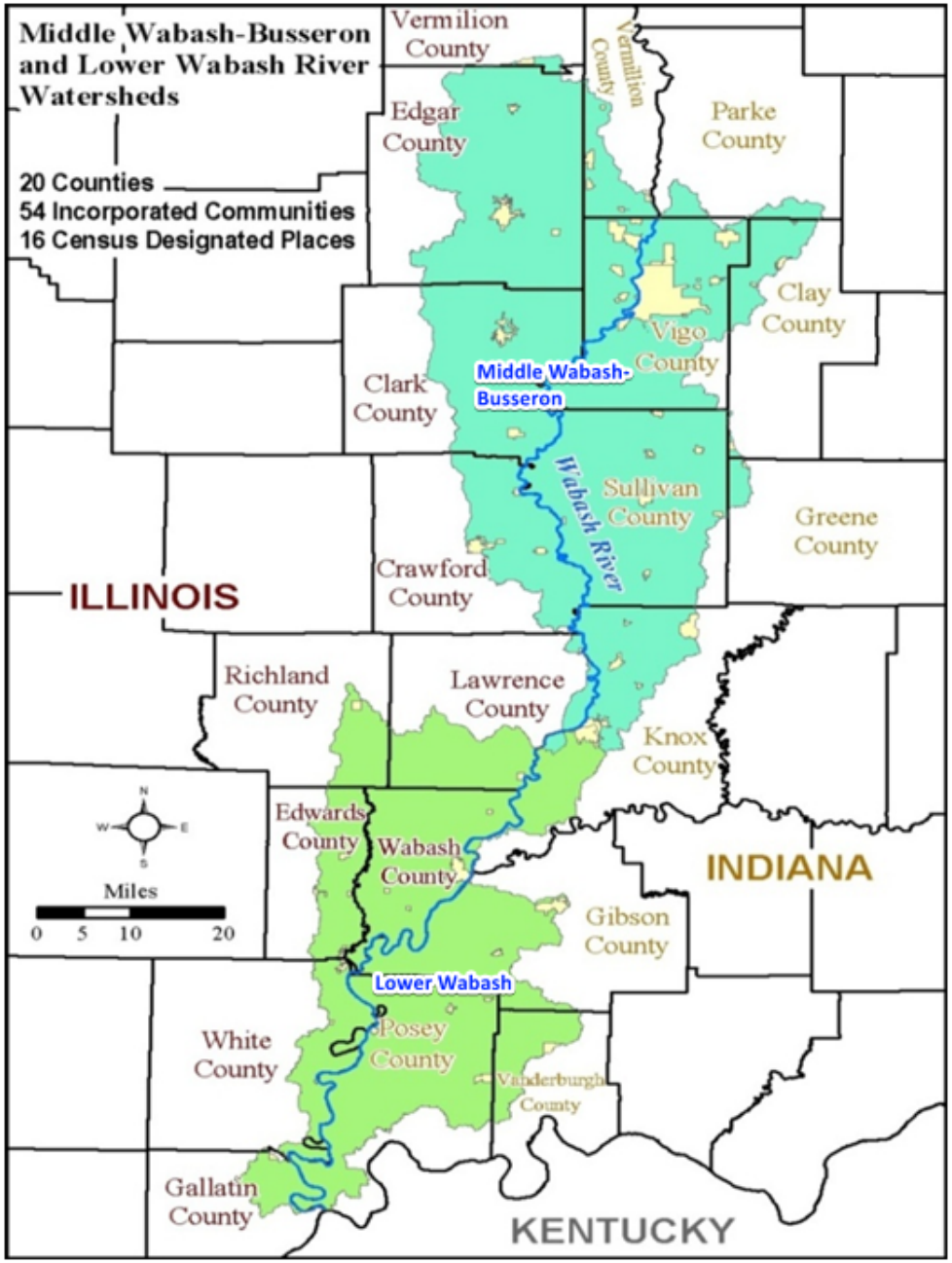
Indiana DNR is a Cooperating Technical Partner (CTP) with the Federal Emergency Management Agency. (FEMA)

Corps of Engineers (Louisville District)

The Corps of Engineers developed a model of the Wabash River that was built upon by Illinois DNR and ISWS. The Corps also developed the hydrology analysis for the Wabash River

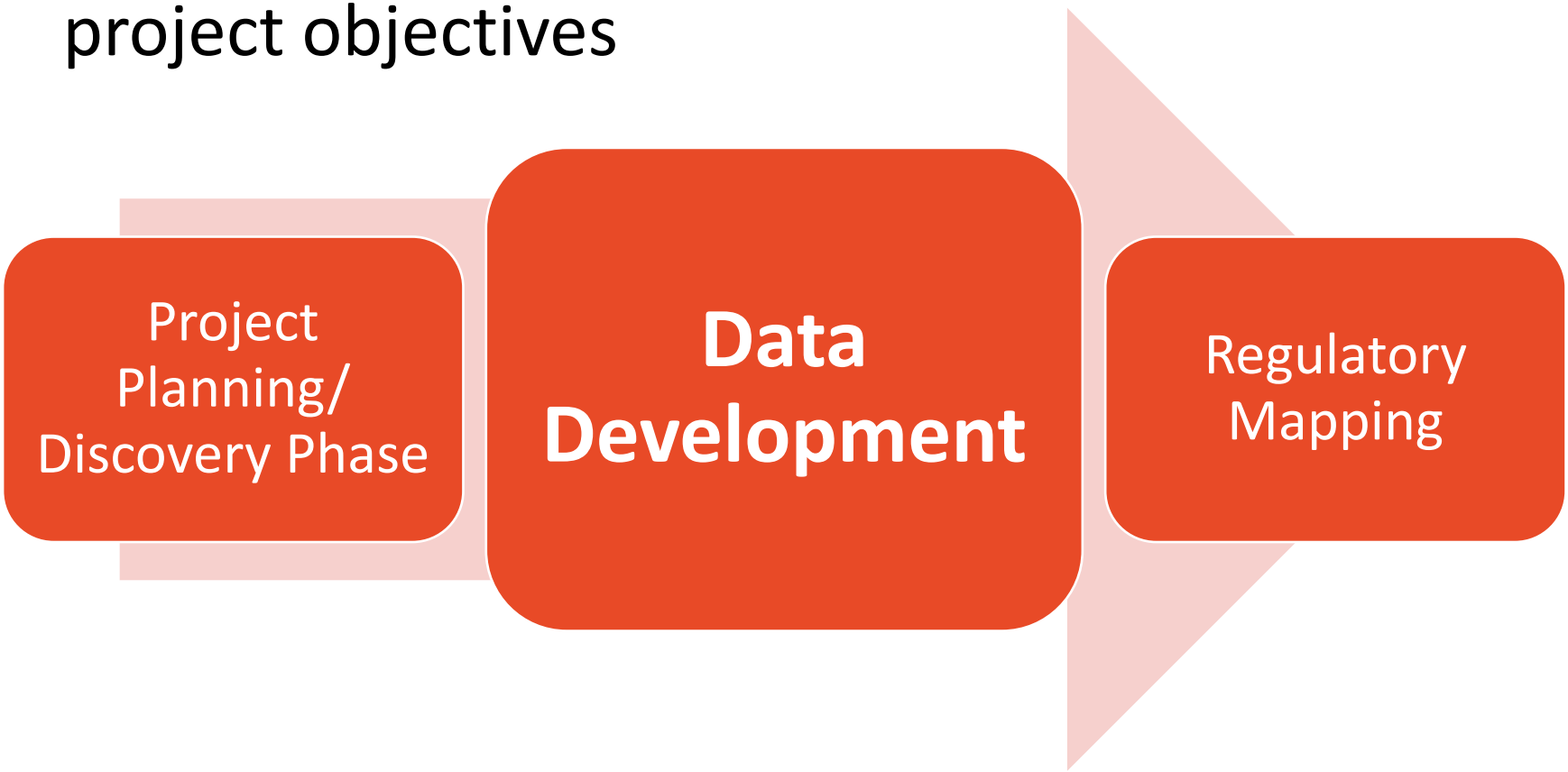
Project Goals and Objectives

Project Goals and Objectives



Project Objectives

Several project phases comprise the overall project objectives



Discovery Meetings and Report

- **Discovery meetings** held on July 19th, 20th, and 21st , 2011 in Paris, Robinson, and Mt. Carmel, respectively.
- **Action Discovery meetings** held on May 6th and 13th, 2015.
- **Discovery reports** were published and undated in 2011 and 2016 respectively


Discovery Report

Middle Wabash-Busseron Watershed, HUC 05120111

Illinois Counties-Clark, Crawford, Edgar, Lawrence, Vermilion
Indiana Counties- Clay, Greene, Knox, Parke, Sullivan, Vermillion, Vigo

12/31/2011
Updated 04/28/2016

FEMA

The Polis Center

ILLINOIS STATE WATER SURVEY

DNR Indiana Department of Natural Resources

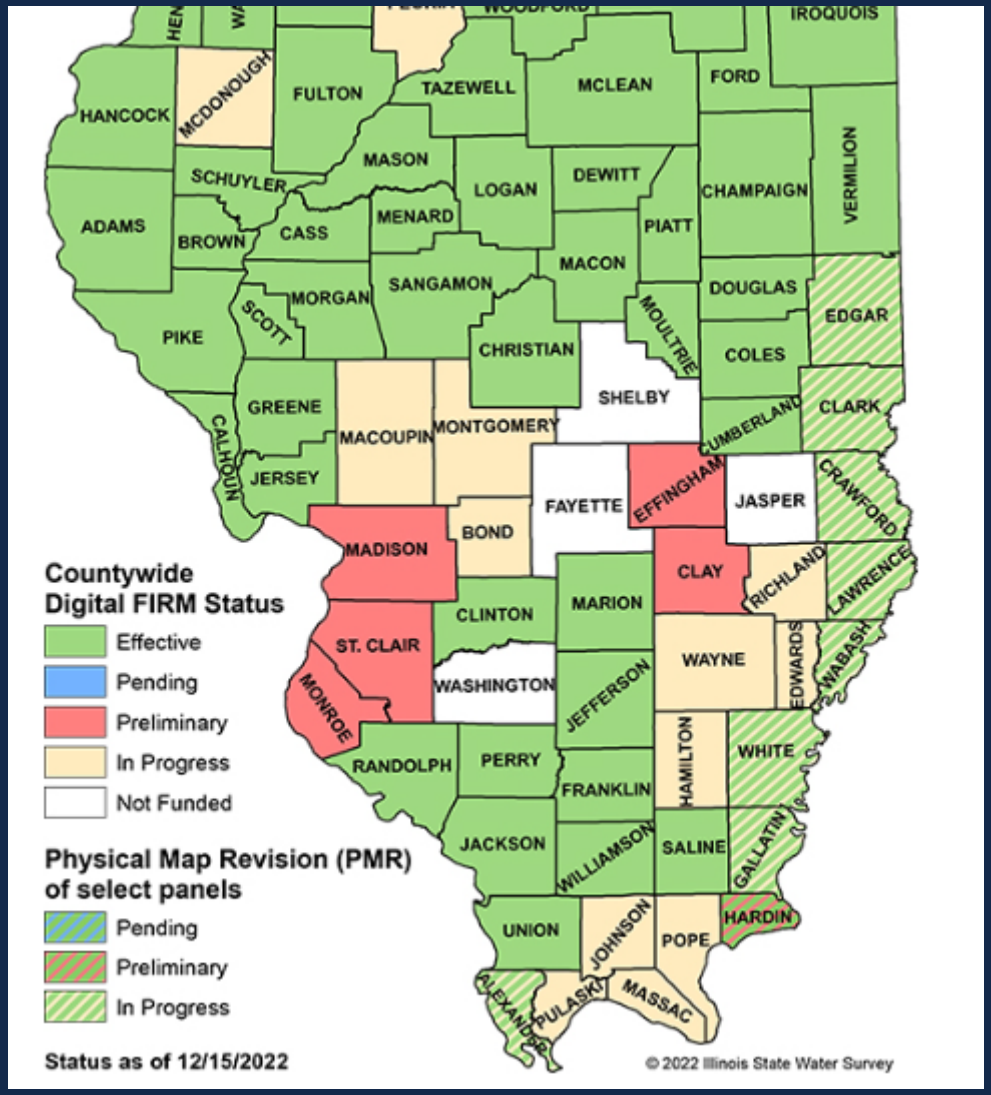
Illinois Countywide Digital FIRM Funding Status

<u>102 Counties</u>

79 effective digital FIRMs ✓

Funded for mapping

Funded for data development

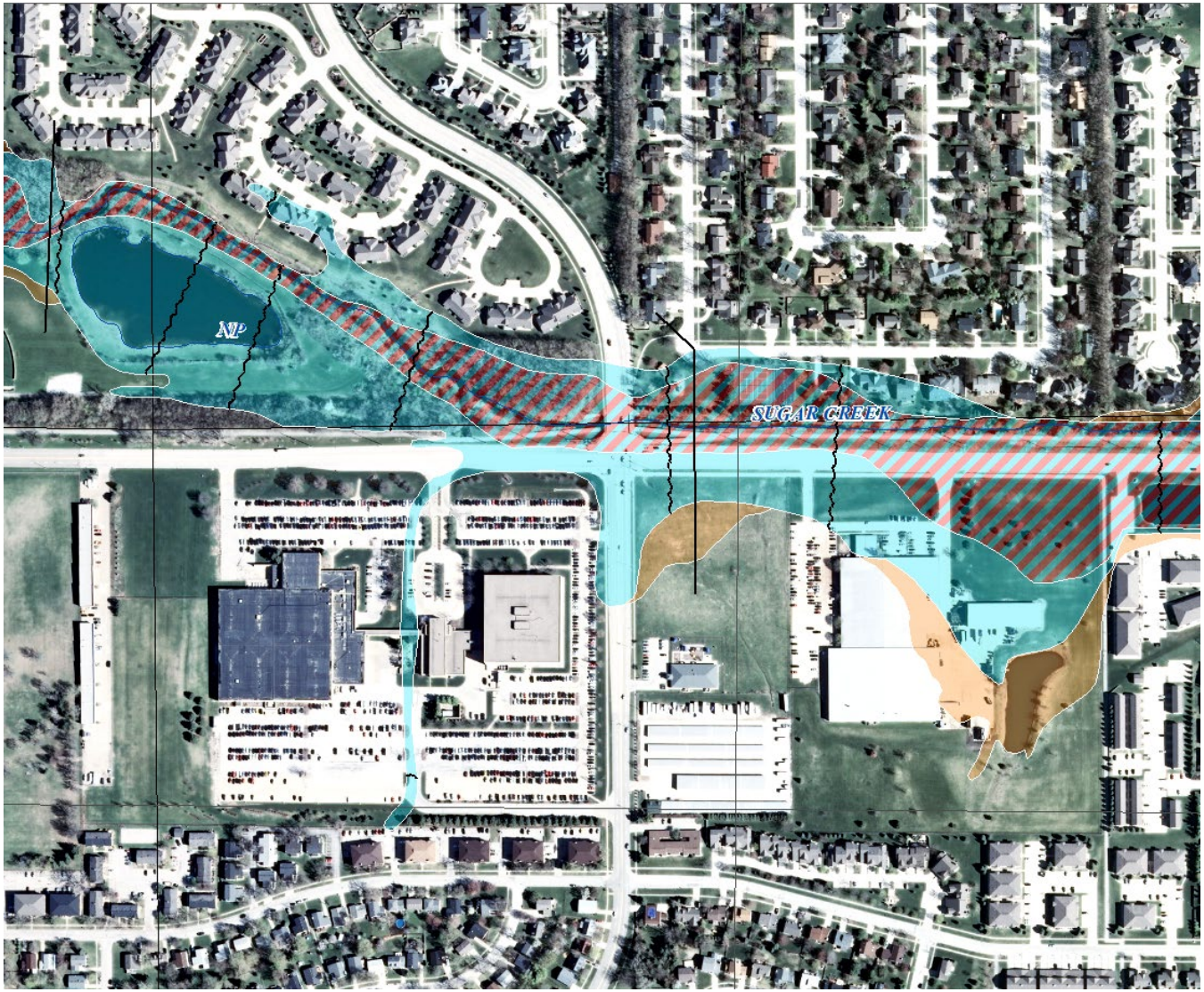


Wabash River WS - Effective Map & FIS Dates

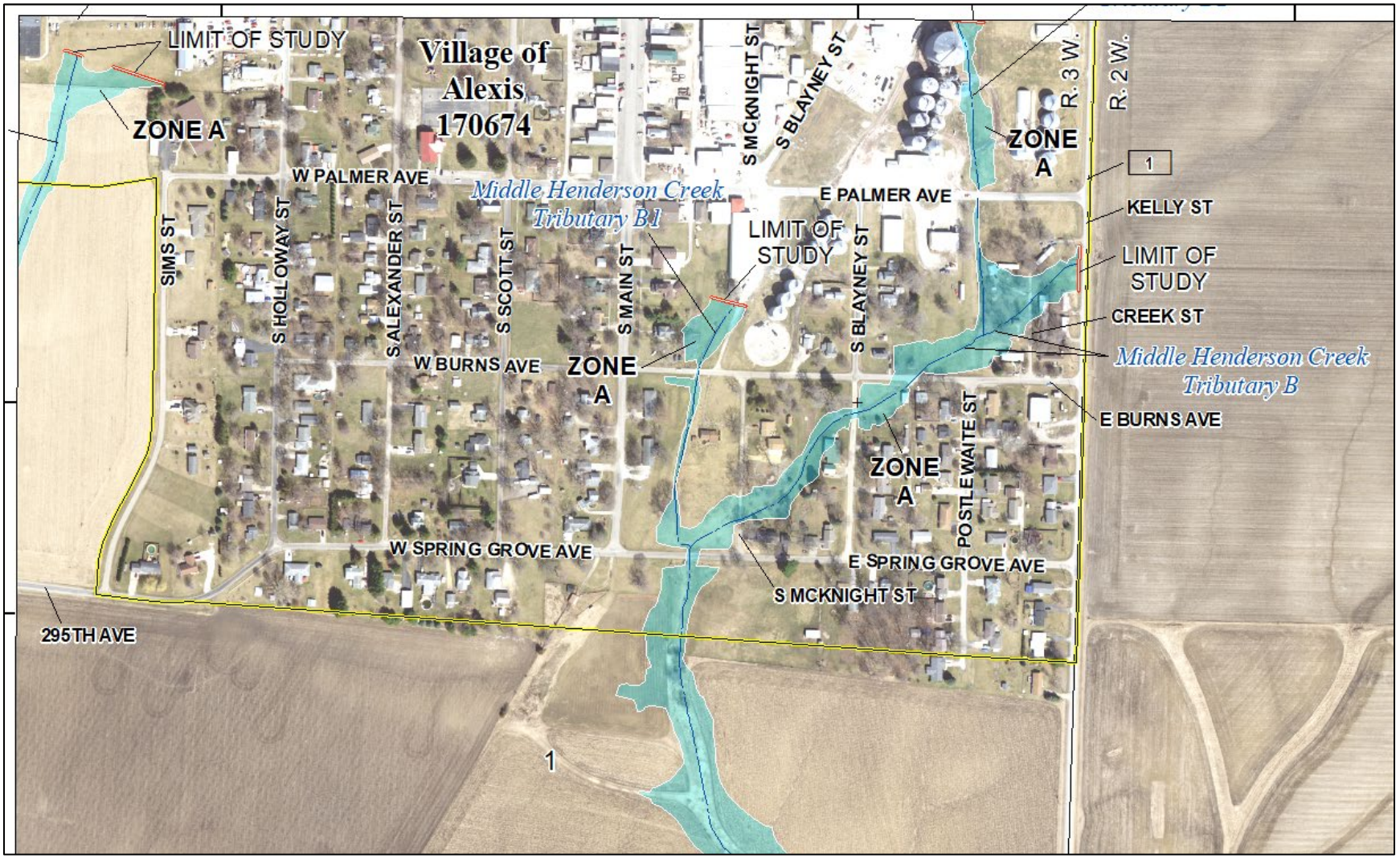
Community Name	Eff Map Date	Eff FIS Date	Comments
Edwards County	12/07/1984	NA	
City of Albion	8/15/1975*	NA	* FHBM
Village of Bone Gap	NA	NA	
Village of Browns	8/24/1984	NA	
Village of West Salem	NA	NA	
Gallatin County	12/02/2011	12/02/2011	
Village of New Haven	12/02/2011	12/02/2011	White Co- 02/16/2012
Lawrence County	07/18/2011	07/18/2011	
City of St. Francisville	07/18/2011	07/18/2011	
City of Lawrenceville	07/18/2011	07/18/2011	
Wabash County	12/16/2011	12/16/2011	
Village of Allendale	12/16/2011	12/16/2011	
Village of Bellmont	12/16/2011	12/16/2011	
Village of Keensburg	12/16/2011	12/16/2011	
City of Mount Carmel	12/16/2011	12/16/2011	

Community Name	Eff Map Date	Eff FIS Date	Comments
White County	02/16/2012	02/16/2012	**White County**
Village of Maunie	02/16/2012	02/16/2012	Village of Maunie
Village of Phillipstown	02/16/2012	02/16/2012	Village of Phillipstown
Clark County	08/02/2007	08/02/2007	
City of Marshall	08/02/2007	08/02/2007	
West Union CDP	NA	NA	
Crawford County	06/02/2011	06/02/2011	
Village of Hutsonville	06/02/2011	06/02/2011	
City of Robinson	06/02/2011	06/02/2011	
Clark County	08/02/2007	08/02/2007	
City of Marshall	08/02/2007	08/02/2007	
West Union CDP	NA	NA	
Crawford County	06/02/2011	06/02/2011	
Village of Palestine	06/02/2011	06/02/2011	
West York CDP	NA		
Edgar County	01/19/2011	01/19/2011	
City of Chrisman	01/19/2011	01/19/2011	
Village of Metcalf	01/19/2011	01/19/2011	
City of Paris	01/19/2011	01/19/2011	
Village of Vermilion	01/19/2011	01/19/2011	
Vermilion County	05/16/2012	05/16/2012	
Village of Ridge Farm	05/16/2012	05/16/2011	

Paper Map to Digital Map

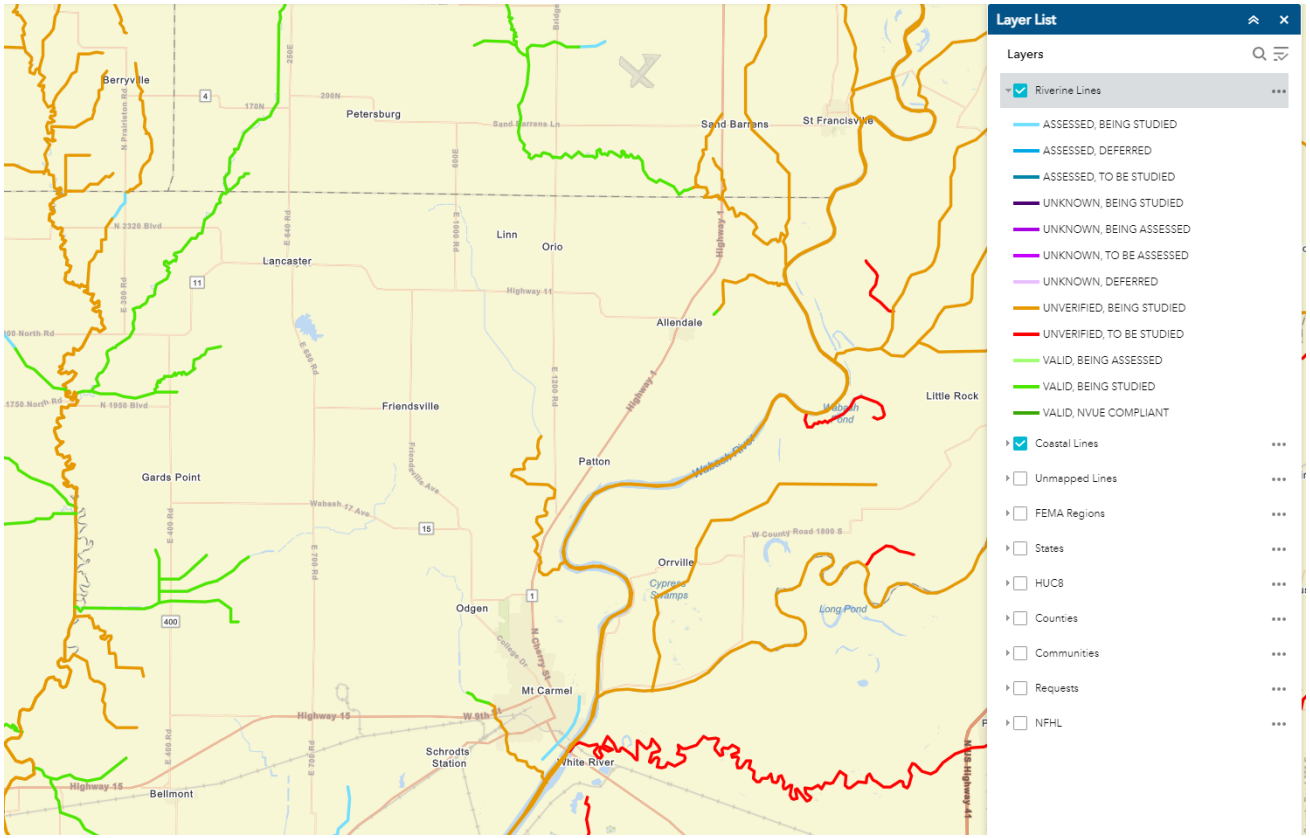


Paper Map to Digital Map



Coordinated Needs Management Strategy (CNMS)

CNMS is a FEMA database of streamlines that have been assessed to determine if mapped floodplains on the effective FIRMs are valid or unverified



Project Scope

What is a Special Flood Hazard Area?

The FEMA Special Flood Hazard Area (SFHA) represents areas mapped as having a 1% annual chance of being inundated by the base flood in any given year.

Riverine hydraulic analysis typically results in SFHA designation as **Zone A** or **Zone AE,** based on the analysis level deemed appropriate for the study area.

The Base Flood Elevation (BFE) is the elevation of surface water resulting from a flood that has a 1% chance of equaling or exceeding that level in any given year.

Zone A	Areas subject to inundation by the 1-percent-annual-chance flood event. **NO** Base Flood Elevations are shown.
Zone AE	Areas subject to inundation by the 1-percent-annual-chance flood event. Base Flood Elevations **ARE** shown.

Vertical Datums

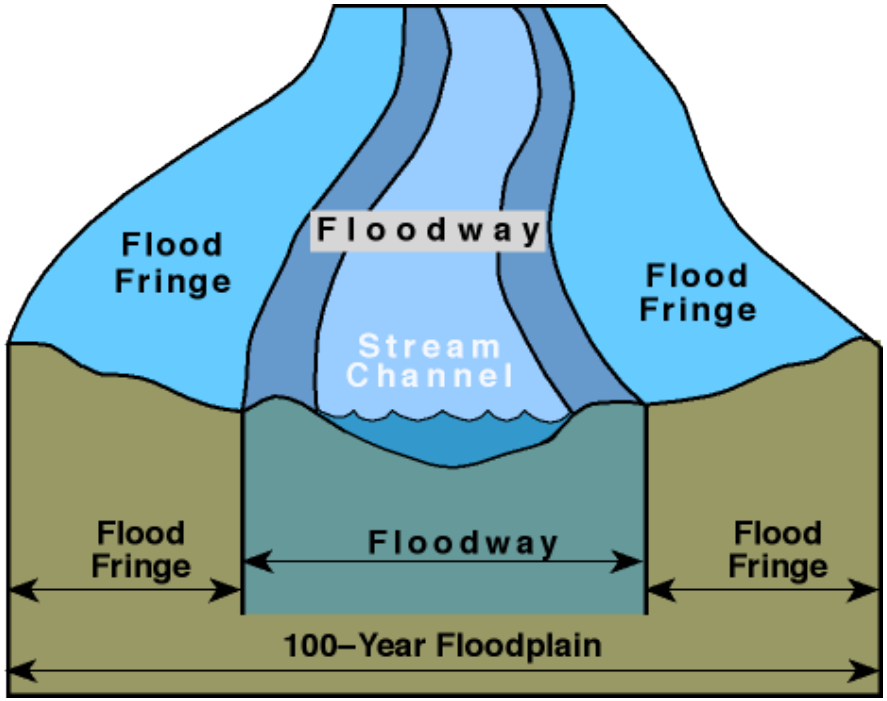
Datums are reference points from which other things are measured.

The effective FIRM maps for Clark, Crawford, Edgar, Gallatin, Lawrence, Wabash, and White Counties use elevations that reference the North American Vertical Datum of 1988 (NAVD88)

The new studies and mapping prepared for this project references the North American Vertical Datum of 1988 (NAVD88)

Floodway

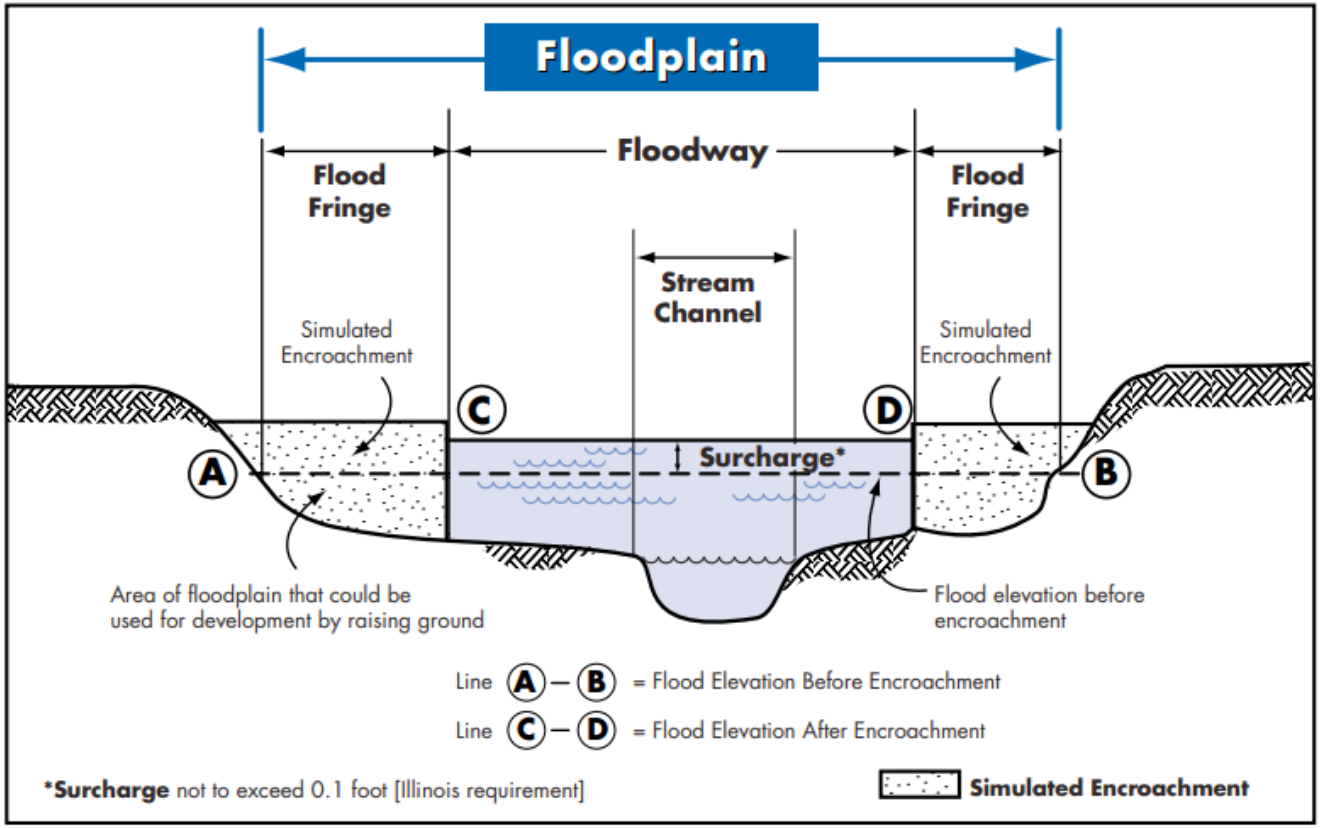
The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.



Floodway

Illinois Floodways are unique:

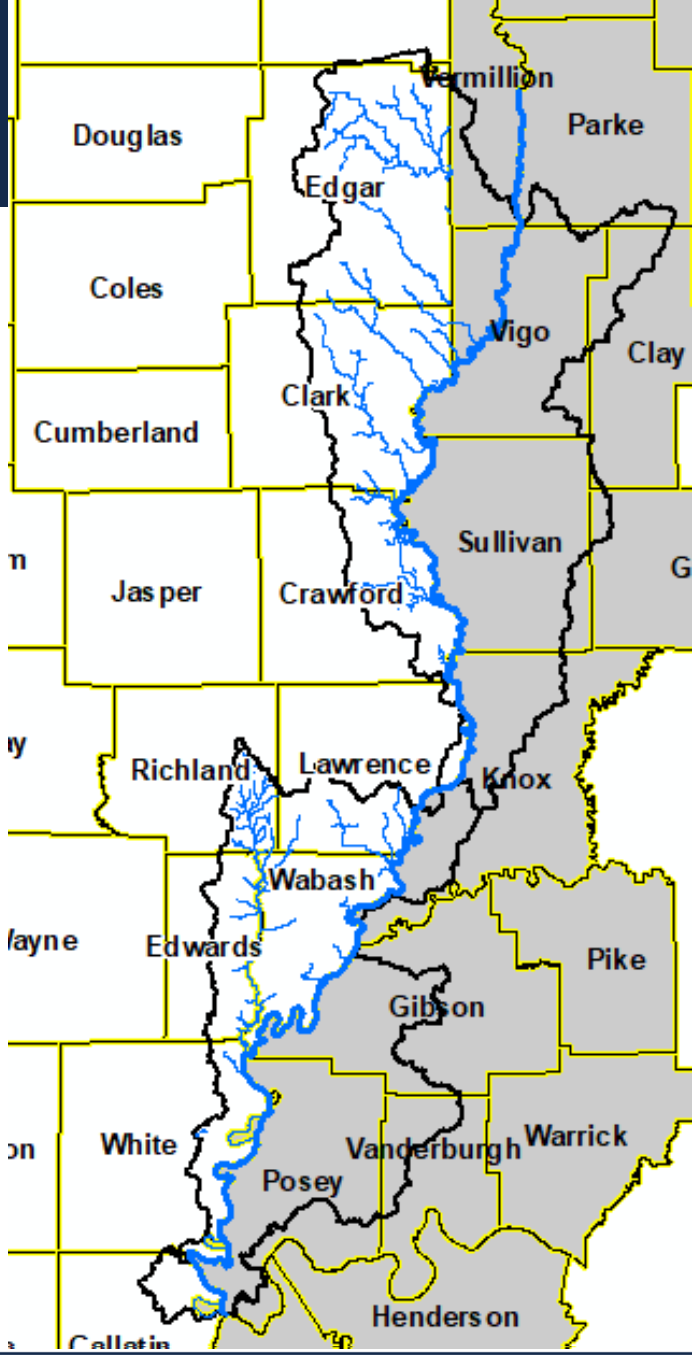
- 0.1-foot maximum surcharge
- Max 10% reduction is storage volume
- Max 10% increase in flow velocity



Credit: https://www2.illinois.gov/dnr/WaterResources/Documents/Resman_ILFPMQuickGuide.pdf

Project Scope

1. Update the Wabash River model originally developed by the Corps of Engineers and Illinois Department of Natural Resources to meet FEMA's regulatory standards
2. Develop new hydrologic and hydraulic models for Zone A and Zone AE tributaries to the Wabash River that are "Unverified" in FEMA's CNMS database



Project Milestones

Discovery meetings for Lower and Middle- Busseron Wabash River were held July 19, 2011, in Paris, July 20, 2011, in Robinson, and July 21, 2011, in Mt. Carmel.

Action Discovery meetings were held and May 6, 2015, in Marshall for the Middle Busseron-Wabash and May 13, 2015, in Albion for the Lower Wabash.

Series of joint coordination meetings with FEMA, Indiana & Illinois DNRs and USACE

SID 620 Proposed Engineering Study Methods Letter – August 23, 2019

Flood Risk Review Meeting (today) - Community Comment Period 30 Days

State Review and Approval

Development of Digital Flood Insurance Rate Maps (Future Project Phase)

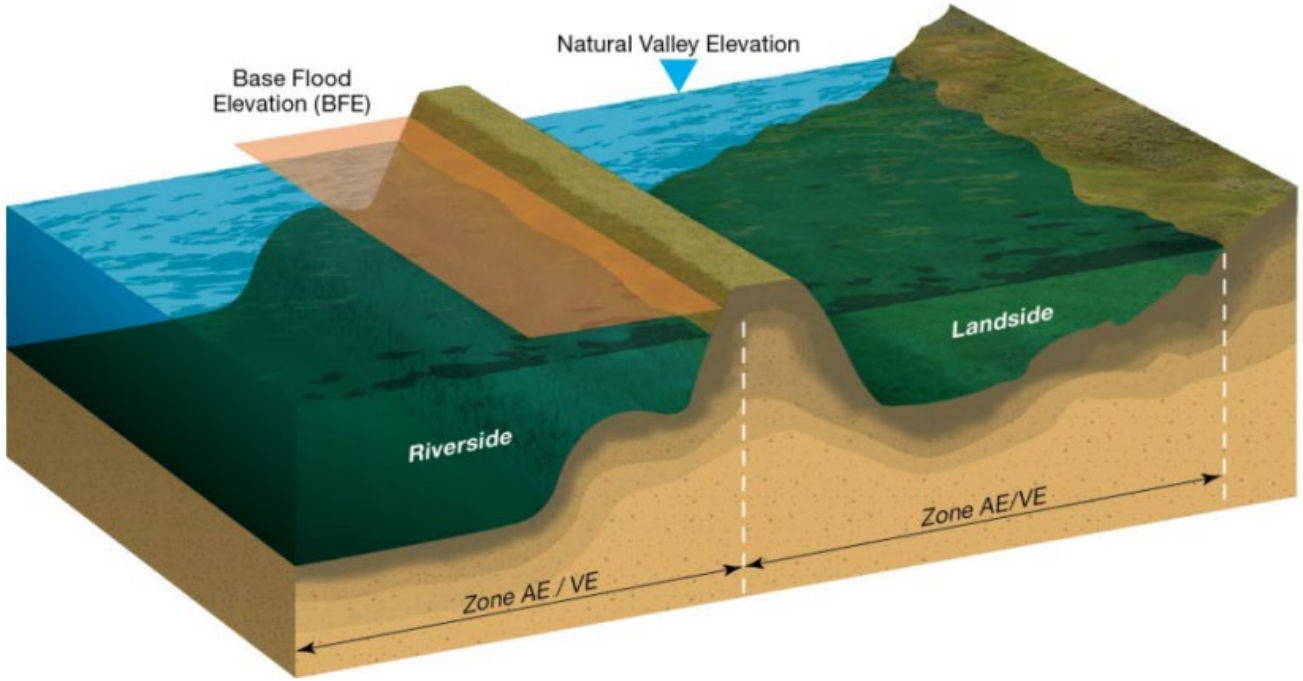
Release of Preliminary DFIRMs and Public Open House (Future Project Phase)

DFIRMs become Effective (Future Project Phase)

Levees

Levee - Definition

Per 44 CFR 59.1, a **levee** is a manmade structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water to reduce flood hazards posed by temporary flooding.



Levees - Accreditation

An **accredited levee system** is a system that FEMA has determined meets requirements of the NFIP regulations as cited in the Code of Federal Regulations (CFR) at Title 44, Chapter 1, Section 65.10 (44 CFR 65.10) and that FEMA has recognized on a FIRM as reducing the flood hazards posed by a base (1-percent-annual-chance) flood.

This determination is based on the submittal of data and documentation as required by 44 CFR 65.10. The area landward of an accredited levee system is shown as Zone X (shaded) on the FIRM except for areas of residual flooding, such as ponding areas, which are shown as SFHA.

Levee - Status

- Of the Illinois Levees on the Wabash River, only the Mt. Carmel Levee was previously shown on the FIRM as providing protection against the 1% annual chance base flood as a Provisionally Accredited Levee
- FEMA's Levee Analysis and Mapping Procedure (LAMP) allows communities with levees showing protection on effective FIRM the opportunity to work directly with FEMA to confirm accreditation compliance or choose from available alternates.
- LAMP was performed with Mt. Carmel through a series of meetings and analysis to determine how to map flood risk for Mt. Carmel. As a result, the Mt. Carmel Levee will no longer be shown to provide protection against the base flood.

Levee - Status

- All other Illinois levees in project area were not previously shown on the FIRM as providing protection against the base flood and their status will not change as a result of this project.
- FEMA wishes to inform levee owners and drainage districts about the new draft floodplain studies. **Please provide contact info for any active levee district or drainage district in you community/county**

Mt. Carmel Levee

Wabash River Flood History

Wabash River Flood History

Wabash River at Mt. Carmel, IL		
Gage No.: 03377500		
Flood Stage: Minor = 19'; Moderate = 25'; Major = 32'		
Historic Stages (ft.)	Elevation (NAVD88)	Date
34.02	403	05/03/2011
33.95	402.93	01/13/2005
33.24	402.22	06/14/2008
33.00	401.98	03/30/1913
32.35	401.33	05/17/2002
31.75	400.73	01/07/1991
30.68	399.66	05/12/1996
30.50	399.48	05/10/2017
30.45	399.43	05/06/1996
30.43	399.41	05/23/1990

Wabash River at Vincennes, IN		
Gage No.: 03343010		
Flood Stage: Minor = 16'; Moderate = 22'; Major = 28'		
Historic Stages (ft.)	Elevation (NAVD88)	Date
29.33	398.31	05/23/1943
29.04	398.02	01/18/1950
27.72	396.7	04/27/2013
27.50	396.48	06/10/2008
27.47	396.45	05/03/2011
27.25	396.23	03/02/1985
27.20	396.18	01/17/1930
27.15	396.13	01/18/2005
27.11	396.09	06/21/1958
26.50	395.48	01/06/1991

Wabash River Flood History

Wabash River at Riverton, IN		
Gage No.: 03342000		
Flood Stage: Minor = 15'; Moderate = 22'; Major = 26'		
Historic Stages	Elevation (NAVD88)	Date
29.36	398.34	05/21/1943
27.20	**396.18**	**04/26/2013**
26.56	**395.54**	**06/10/2008**
26.40	395.38	03/28/1913
26.11	**395.09**	**01/17/2005**
25.83	394.81	06/18/1958
25.78	**394.76**	**05/03/2011**
25.20	394.18	01/18/1950
24.97	**393.95**	**01/03/2016**
24.46	393.44	03/01/1985

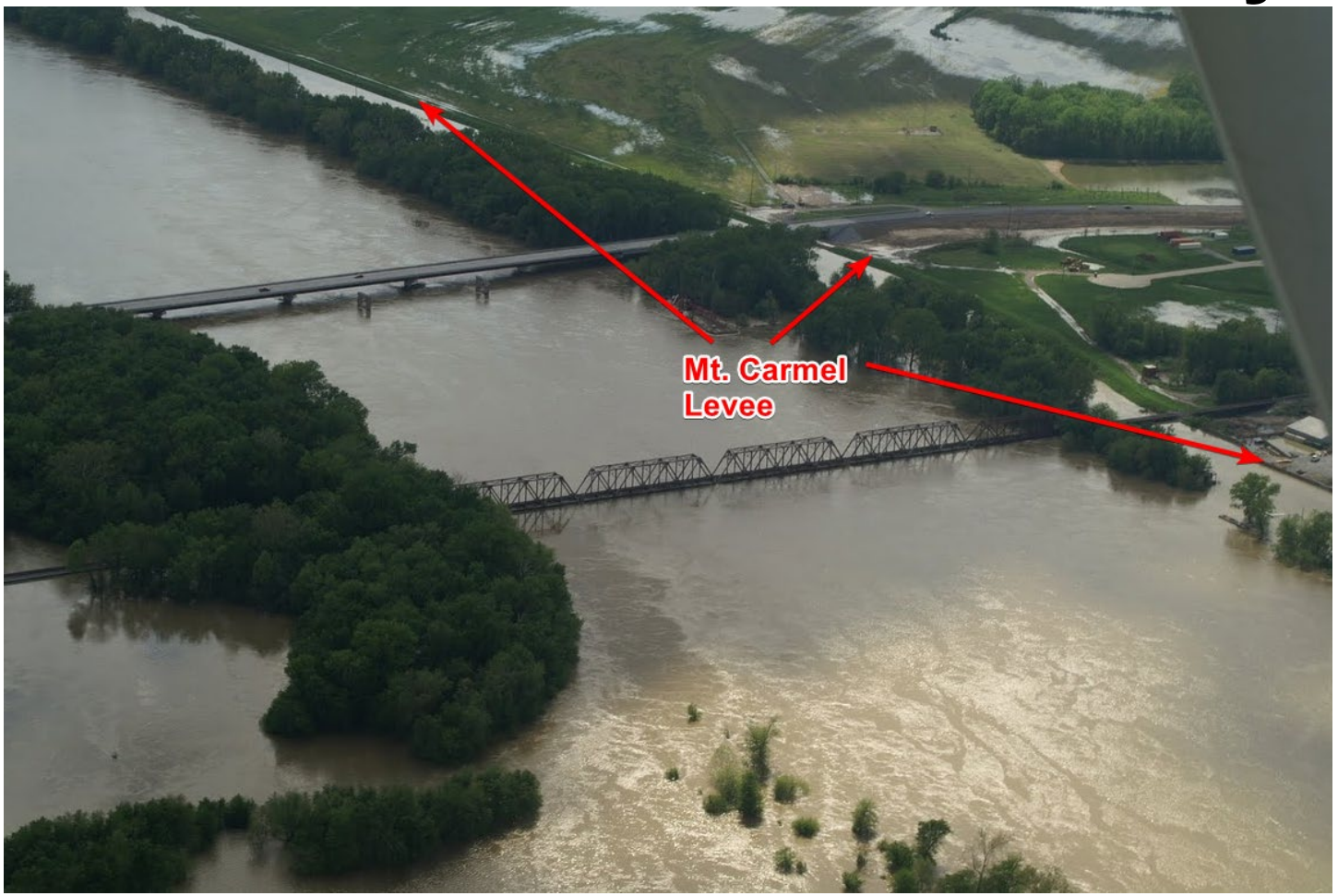
Wabash River Flood History

Mt. Carmel March 1913 River Stage 33 feet (AHPS)

Wabash River Flood History

Mt. Carmel March 1937 River Stage 29 feet (AHPS)

Wabash River Flood History



Mt. Carmel March 2011 River Stage 34 feet (AHPS)

Wabash River Flood History

Unincorporated Westport, IL and Vincennes, IN in 2008 (Lawrence County EMA)

Hydrology Study Methods

Hydrology Study Methods

3 Hydrology methods were used for this project

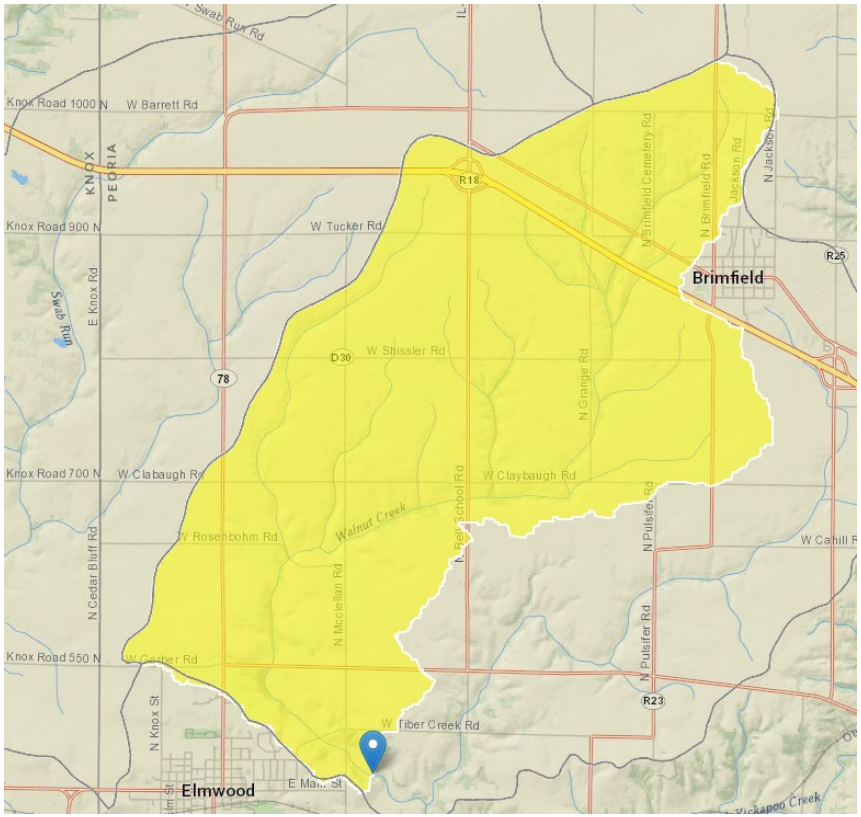
- Zone A floodplain studies used the USGS Regression Equations (Soong et al., 2004) through the StreamStats batch processor
- Zone AE tributaries to the Wabash River used HEC-HMS modeling
- The Wabash River hydrology used stream gage analysis

Hydrology Study Methods

USGS Regression Equations (Soong et al., 2004) used for Zone A studies

Regression equation for peak flows in the Middle and Lower Wabash watershed are a function of:

- Total Drainage Area
- Main Channel Slope
- Average Permeability
- % Open Water

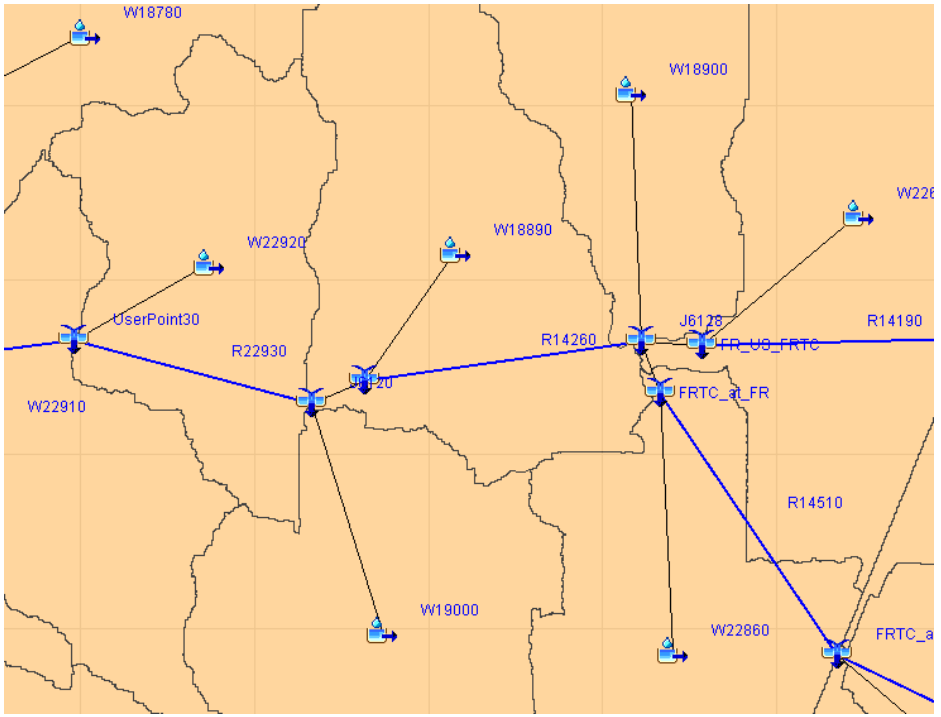


Hydrology Study Methods

HEC-HMS modeling used for tributary Zone AE studies

HMS model uses:

- 2011 LiDAR terrain data for subbasin delineation
- 2019 Land Use and 2018 Soils data for runoff parameters
- Bulletin 75 Rainfall Data (2020)
- Modeling developed for Mill Creek Lake, East Mill Creek Reservoir, and Lincoln Trail State Park to support Zone AE mapping



Hydrology Study Methods

Stream Gage Analysis was conducted by the Corps of Engineers (Louisville District) for Wabash River

Bulletin 17B Gage Analysis based on:

- Gage records from 1969-2015
  - Mt. Carmel, IL Gage
  - Vincennes, IN Gage
  - Riverton, IN Gage
  - Terre Haute, IN Gage
  - Montezuma, IN Gage
- ISWS performed supplement analysis to determine 4% and 1%+ annual chance flows

Hydrology Study Methods

- For all studies, the 10%, 4%, 2%, 1% (base flood), 0.2%, and 1%+ peak flow frequencies were calculated

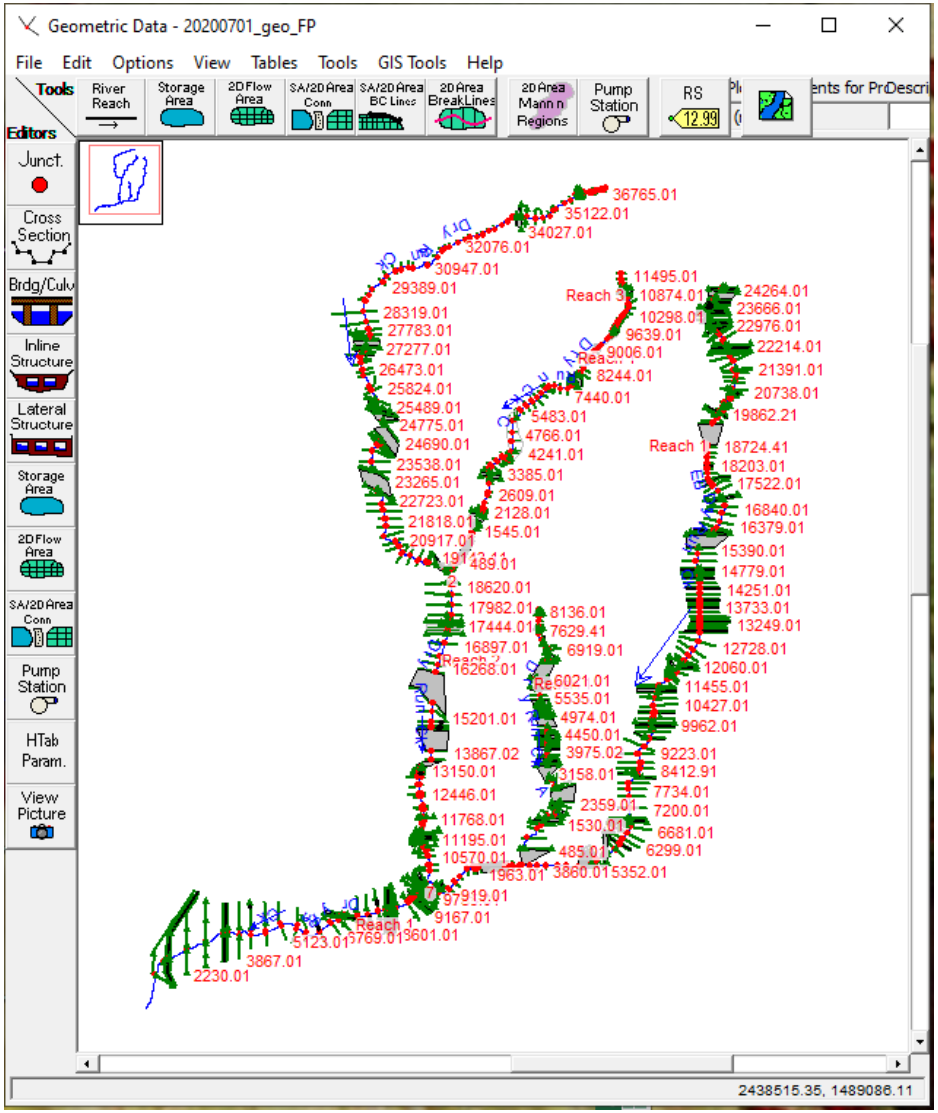
		Annual Chance Frequency Peak Flow (cfs)					
Location	**Drainage Area (sq. miles)**	**10%**	**4%**	**2%**	**1%**	**0.20%**	**1%+**
At Montezuma, IN (USGS Gage No. 03340500)	11,118	104,300	122,300	135,100	147,400	174,800	165,000
At Terre Haute, IN (USGS Gage No. 03341500)	12,263	101,500	118,400	130,200	141,400	165,600	158,200
At Riverton, IN (USGS Gage No. 03342000)	13,161	100,300	115,400	125,600	135,200	155,300	150,100
At Vincennes, IN (USGS Gage No. 03343010)	13,721	87,500	99,900	108,400	116,400	133,400	128,200
At Mt. Carmel, IL (USGS Gage No. 03377500)	28,635	224,500	259,500	283,700	306,300	354,900	340,700

Hydraulic Study Methods

Hydraulics

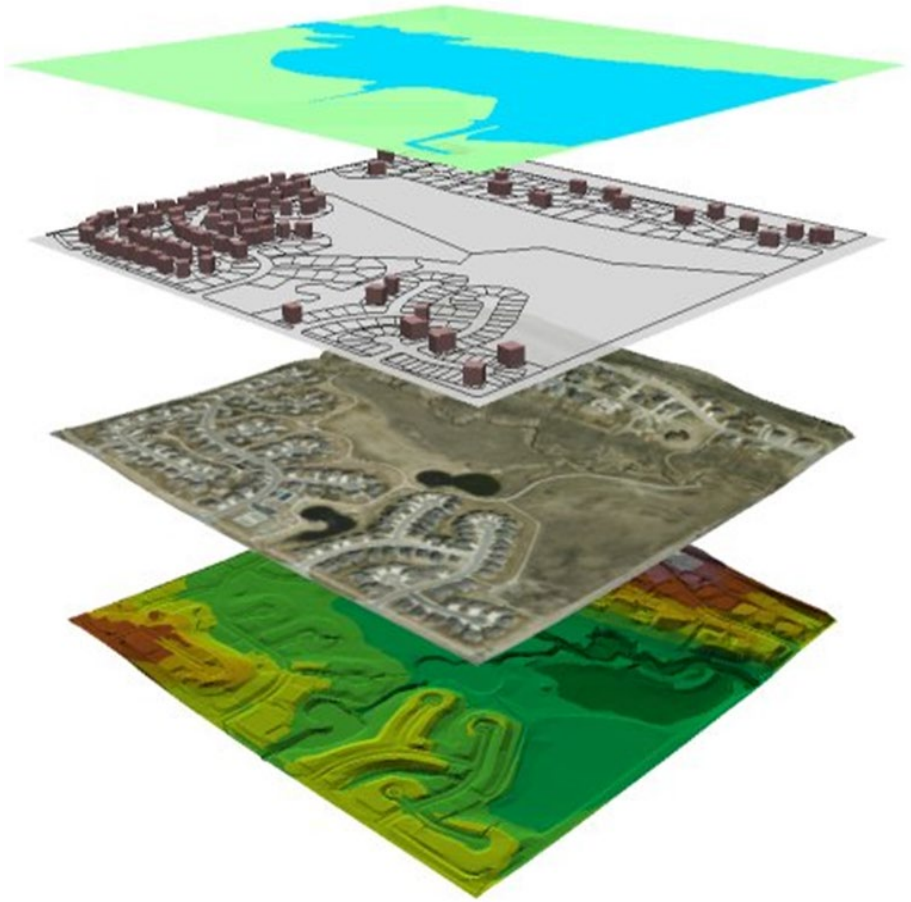
Hydraulics

- Army Corps of Engineers Hydrologic Engineering Center River Analysis System (HEC-RAS)
- 1D Steady State Analysis (Modeling to all FEMA Standards, Technical References, and Guidelines



Hydraulic Data

- Zone A Models
  - LiDAR elevation data
  - National Land Cover
  - Orthophotos
- Zone AE Models
  - LiDAR elevation data
  - National Land Cover
  - Orthophotos
  - As-built bridge/culvert plans
  - Field Survey for bridge/culverts and channel
  - Bathymetric data

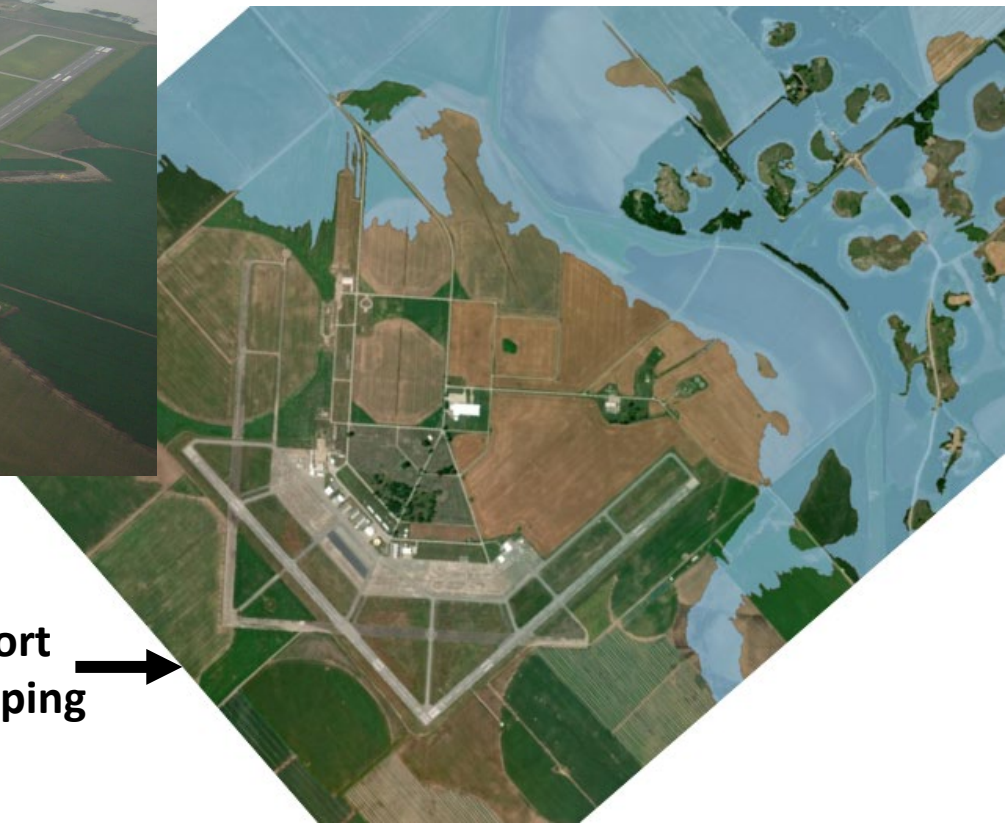


Hydraulics – Wabash River

- The Wabash River HEC-RAS model was originally developed by the Corps of Engineers (Louisville District) and by the Illinois DNR.
  - This model was calibrated to flood events from 2005, 2011, 2013, and 2015
- In 2018 ISWS obtained the Wabash River model from Illinois DNR to add the 4%, 1%+, and 0.2% flood frequencies to the model
- ISWS also developed scenarios to model the effect of hydraulically significant levees
- ISWS also developed a floodway encroachment analysis to meet both Illinois and Indiana floodway requirements.

Hydraulics – Wabash River

Lawrenceville-Vincennes Airport
2008 Flood



Lawrenceville-Vincennes Airport
ISWS draft 1% floodplain mapping

Hydraulics – Wabash River

- Hydraulically significant levees affect the base flood
- Riverside floodplain mapping assumes significant levees contain all river flow on riverside
- Landside floodplain mapping removes hydraulically significant levees from modeling resulting in lower base flood elevation (Natural Valley Analysis)
- Illinois Levees that received Natural Valley mapping:
  - Rochester-McCleary's Bluff Levee, Mt. Carmel Levee, England Pond Levee, and Russel-Allison-Ambraw Levee System

Hydraulics – Wabash River Tributaries

- ISWS developed hydraulic models for many of the tributary streams to the Wabash River
- Mill Creek (Hutsonville), Mill Creek Tributary, Lamotte Creek Tributary A (Palestine), and Greathouse Creek (Mt. Carmel) are Zone AE streams that were restudied as new Zone AEs
- Hutson Creek (Hutsonville), Sugar Creek (Palestine), and Lamotte Creek (Palestine) are Zone AE stream that are listed as “Valid” in CNMS and therefore were not restudied.
- All Zone A stream were modeled

Hydraulics: Results

- The Wabash River 1% annual chance BFEs increases and decreased compared to effective map
  - Maximum increase approximately 3.5 feet near river mile 161 (~4 mile upstream of Route 154/Hutsonville Bridge)
  - Maximum decrease approximately 5.2 feet near river mile 38 (Illinois Route 14)

Hydraulics: Results

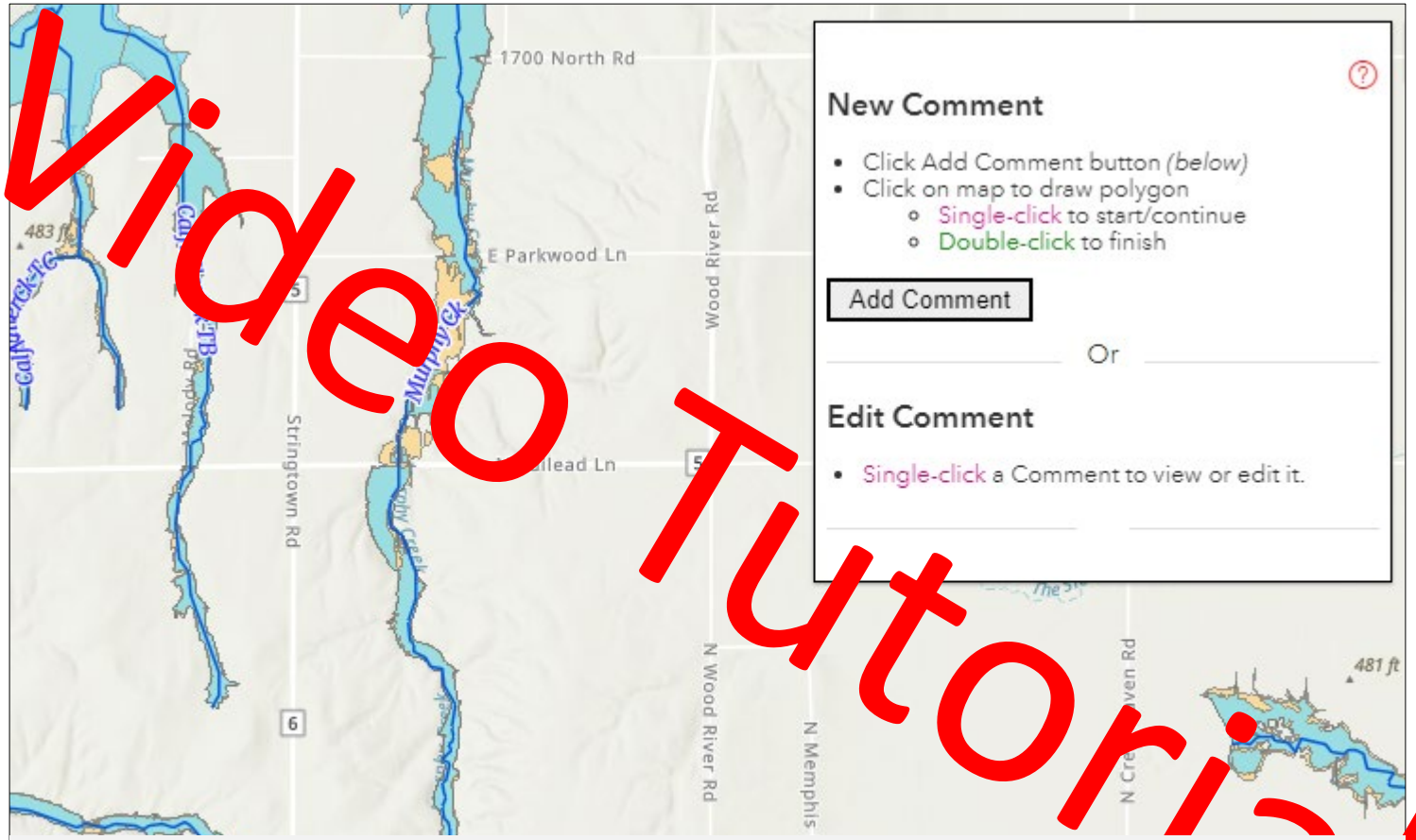
- Mill Creek 1% annual chance BFEs decreased compared to effective map (except for Wabash Backwater)
  - Maximum decrease approximately 2.0 feet just downstream of 1800th Avenue
- Mill Creek Tributary 1% annual chance BFEs increased compared to effective map.
  - Maximum increase approximately 0.4 feet about 1,300 feet upstream of confluence with Mill Creek

Hydraulics: Results

- Greathouse Creek 1% annual chance BFEs increased compared to effective map
  - Maximum increase approximately 1.6 feet just downstream of 9th Street

Webmap Results

Webmap Comment Feature



Video Tutorial

Webmap URL: https://www.illinoisfloodmaps.org/commentmap/wabash.htm
Login: watershed
Password: illinoisfloods!123

Communication and Next Steps

Communication Plan

- Discovery Meetings- July 2011 held in Paris, Robinson and Mt. Carmel
- Action Discovery Meetings- held May 2015 in Marshall and Albion
- Proposed Engineering Methods Notification (FEMA SID 620) letter- dated August 23, 2019
- Flood Risk Review Meeting (today); 30-Day Comment Period starts today
- Data Submission Notification (FEMA SID621) Letter; 30- day comment period

Data Submission Notification Letter FEMA SID 621

Mailed to community CEO's

Informs the communities that the data collection and analysis (Data Development) phase of the project is concluding, and the FIRM database is being validated by FEMA

Gives Communities 30 days to comment on the data in the FIRM database30-Day Comment Period starts today

Schedule

Flood Risk Review Meeting (today)

Submit Flood Studies to IDNR for State review Spring 2023

Complete draft FIRM database to conclude data development phase of project by Summer 2023

Digital Flood Insurance Rate Map Project to follow pending conclusion of data development

Risk Communication and Mitigation Actions

Hazard Mitigation- Declarations 2005-2022

fema.gov/disaster

Declaration	Date of Declaration	Disaster Description/Counties	Type of Assistance
DR-4489-IL	March 26, 2020	COVID-19 Pandemic All counties	PA
EM-3435-IL	March13, 2020	COVID-19 All counties	PA
DR-4157-IL	November 26, 2013	Sever Storm, Straight-line Winds & Flooding Wabash, Vermilion	IA
DR-1991-IL	June 7, 2011	Severe Storms & Flooding Lawrence, Wabash, White, Gallatin	IA & PA
DR-1960-IL	March 17, 2011	Sever Winter Storm & Snowstorm Edgar, Clark, Crawford	PA
DR-1850-IL	July 2, 2009	Sever Storm, Flooding & Tornadoes Gallatin	PA
DR-1826-IL	March 2, 2009	Severe Winter Storm Gallatin	PA
DR-1771-IL	June 24, 2008	Severe Storms & Flooding Edgar, Clark, Crawford, Lawrence	IA & PA
EM-3230-IL	September 7, 2005	Hurricane Katrina Evacuation	PA

County CIS data 3/10/23023	Community	Property Damage Claims Since 1978, $	No. Claims	No. Rep Loss
Edwards	Albion	0	1	NA
Edwards	Grayville	0	0	0
Gallatin	Gallatin Co	580,544	23	8 (30 buyout structures)
Gallatin	New Haven	220,128	11	0 (3 buyout structures)
Lawrence	Lawrence Co	17,133	3	0
Lawrence	St. Francisville	NA	0	0
Lawrence	Lawrenceville	129,757	13	6
Wabash	Mt. Carmel	30,378	10	6
White	Carmi	349,071	48	16
White	Crossville	19,317	2	0
White	Maunie	27,450	2	0
White	White Co	776,207	24	5
Clark	Clark Co	208,531	18	11
Crawford	Crawford Co	118,819	9	6
Crawford	Hutsonville	401,449	14	8
Crawford	Palestine	19,395	6	2
Crawford	Robinson	17,353	3	1
Edgar	Chrisman	3,152	1	NA
Edgar	Paris	5,135	2	0

Risk Communication and Mitigation Actions

https://www.fema.gov/ https://www.floodsmart.gov/

Floodsmart.gov

- Community Resources
  - Flood Maps
  - Cost of Flooding
  - What is Covered?
  - How to Reduce Your Costs
  - Tools

FEMA.gov

- National Flood Insurance Program (NFIP)
- Hazard Mitigation Planning
  - Mitigation Best Practices
  - Mitigation Planning and Grants
  - Regulations and Guidance

Community Participation

Community Impact

Why a New Floodplain Map Can Affect a Community:

Can affect which residents are required to carry flood insurance

Depicts areas of communities which are subject to floodplain management regulations

Can affect community planning and flood mitigation

Community Participation

- Now is the time to review the draft floodplain mapping for your community
- Who is affected?
- Is the mapping reasonable and/or consistent with your community's experience with flooding?
- Make comments if something does not look right or make sense.
- Provide data or information if it could support a change in the draft mapping
- Provide contacts of Levee Owners

ILLINOIS
Illinois State Water Survey
PRAIRIE RESEARCH INSTITUTE

FLOOD RISK REVIEW MEETING -WABASH RIVER WATERSHED, ILLINOIS

MARCH 17, 2023

POST-MEETING SURVEY

1. **After this meeting how much more do you know about your community's flood risk?**

   ◯ a lot
   ◯ some
   ◯ not much

2. **After this meeting how much do you know about FEMA Risk Mapping, Assessment and Planning (Risk MAP) process?**

   ◯ a lot
   ◯ some
   ◯ not much

3. **Has this meeting provided new information and resources to help communicate flood risk to your community?**

   ◯ yes
   ◯ no

4. **Has this meeting helped you know where to go to get flood mitigation help?**

   ◯ yes
   ◯ no

ILLINOIS

Illinois State Water Survey

PRAIRIE RESEARCH INSTITUTE

Project Manager: Chris Hanstad, P.E., CFM
hanstad@Illinois.edu – (217) 244-3371
Project Engineering: Brian Chaille, P.E., CFM
bchaille@illinoios.edu – 217-244-3522
Outreach: Mary Richardson, CFM
mjr@Illinois.edu – (217) 300-3479
Mitigation: Lisa Graff, GISP, CFM
lgraff@Illinois.edu – (217) 265-9430

www.illinoisfloodmaps.org

Additional Contacts

FEMA Project Engineer: John Wethington, P.E.
john.wethington@fema.dhs.gov – (312) 408-5485
Illinois NFIP Coordinator: Erin C. Conley
erin.c.conley@Illinois.gov – (217) 782-4428

ILLINOIS

Illinois State Water Survey

PRAIRIE RESEARCH INSTITUTE

Questions?