FEMA

FLOOD RISK DISCOVERY REPORT

LOWER KANAWHA | WEST VIRGINIA

Jackson County, Kanawha County, Mason County, Putnam County, Roane County, City of Charleston, City of Dunbar, City of Hurricane, City of Nitro, City of Point Pleasant, City of Saint Albans, City of South Charleston, Town of Bancroft, Town of Buffalo, Town of Eleanor, Town of Henderson, Town of Leon, Town of Poca, and Town of Winfield

MEETING: May 2, 2023

FINAL REPORT: January 2024

RiskMAP
Increasing Resilience Together

LOWER KANAWHA | WEST VIRGINIA

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LOWER KANAWHA | WEST VIRGINIA

EXECUTIVE SUMMARY

The Federal Emergency Management Agency's (FEMA) Risk Mapping, Assessment, and Planning (Risk MAP) program provides communities with flood information to help them understand their current flood risk and make informed decisions on actions to become stronger and safer against future risk. Discovery is the first phase of the Risk MAP process and begins a dialogue among FEMA and community members about (1) the nature of flooding in the watershed and the actions that communities are taking to address their flood hazards and risk; and (2) the data and information that may be used for developing the regulatory products and Flood Risk Products (for more information, please see page 14).

This report summarizes the Discovery efforts in the Lower Kanawha Watershed in West Virginia, which includes five counties, seven cities, and seven towns. The Discovery phase includes gathering tabular and spatial data and information on past and current flood risk from local communities and regional, State, and Federal entities. See Appendix H for a complete list of the stakeholders involved in Discovery.

The goals of Discovery are to (1) determine what flood hazard information already exists; (2) learn what flood hazard information is still needed to make mitigation decisions; and (3) identify what areas, critical infrastructure, and other resources could potentially be affected during a flood event. This report discusses the risks and needs identified during the Lower Kanawha Watershed Discovery process.

Highlights of the Discovery effort are listed on the right.

DISCOVERY HIGHLIGHTS:

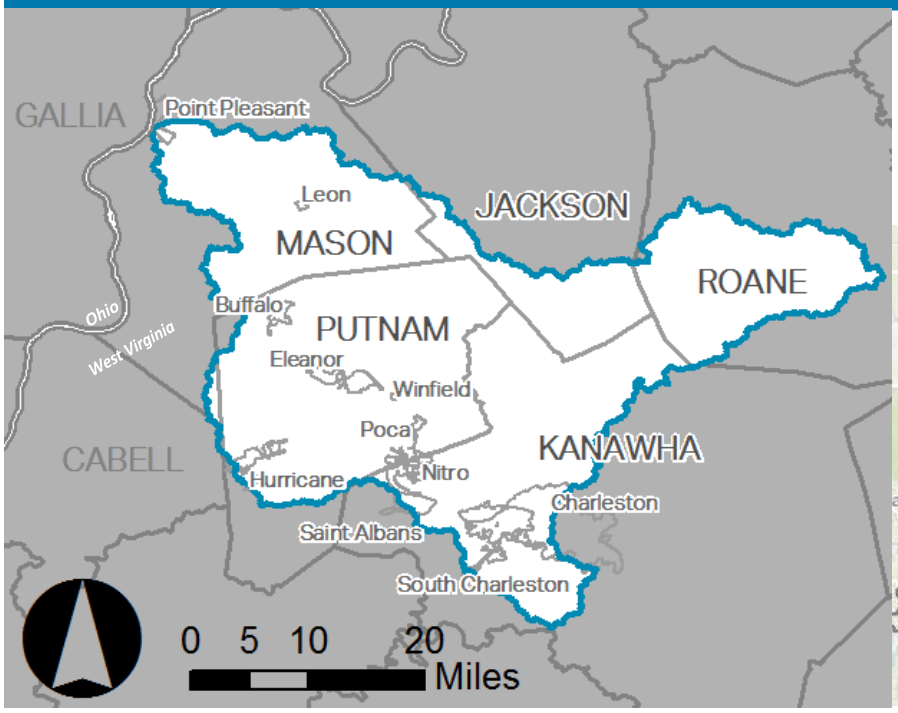
- New Light Detection and Ranging (LiDAR) data available for this watershed will allow for a dramatic increase in the accuracy of flood hazard mapping.
- All communities in the watershed participate in the National Flood Insurance Program (NFIP).
- The watershed is predominantly comprised of established, rural, and suburban communities.
- Specialized flood risk dashboards were distributed to each community within the four watersheds being studied. These dashboards provide communities with a snapshot of their flood risk, as well as their financial risk.

EXECUTIVE SUMMARY

LOWER KANAWHA | WEST VIRGINIA

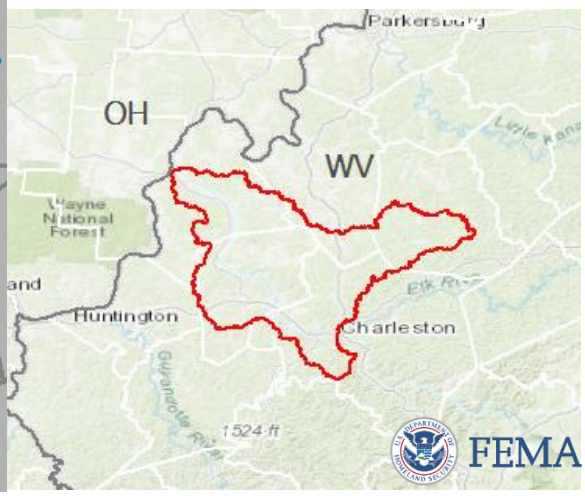
PROJECT OVERVIEW

The Lower Kanawha Watershed includes all the land that drains from the Ohio River from the City of Point Pleasant, West Virginia, to the City of Charleston, West Virginia. FEMA Region III identified the Lower Kanawha Watershed as a priority for the Risk MAP program because newly available data presented an opportunity to better define flood hazards in the area. This watershed encompasses approximately 924 square miles



Lower Kanawha Watershed

Jurisdictions



COMMUNITY	POPULATION[1]	POPULATION IN WATERSHED[2]
CITY OF CHARLESTON	48,864	21,100
CITY OF DUNBAR	7,480	7,480
CITY OF HURRICANE	6,961	6,000
CITY OF NITRO	6,624	6,624
CITY OF POINT PLEASANT	4,070	1,300
CITY OF SAINT ALBANS	10,861	8,000
CITY OF SOUTH CHARLESTON	13,647	13,400
JACKSON COUNTY	27,791	4,200
KANAWHA COUNTY	180,745	44,300
MASON COUNTY	25,453	10,600

COMMUNITY	POPULATION[1]	POPULATION IN WATERSHED[2]
PUTNAM COUNTY	57,440	47,900
ROANE COUNTY	14,028	3,900
TOWN OF BANCROFT	387	387
TOWN OF BUFFALO	1,211	1,211
TOWN OF ELEANOR	1,542	1,542
TOWN OF HENDERSON	228	170
TOWN OF LEON	137	137
TOWN OF POCA	874	874
TOWN OF WINFIELD	2,393	2,393

[1] All populations are derived from the 2020 Census.
[2] Population in Watershed estimates are based on the percentage of jurisdiction's area within the watershed.

LOWER KANAWHA | WEST VIRGINIA

YOUR FLOOD RISK MAPPING TIMELINE

Discovery Meeting
May 2, 2023

NEXT STEPS: REGULATORY STUDY SCOPE DETERMINATION

If the data and research collected and performed during the Discovery phase support the need for a flood map update, the following timeline shows the steps of that process.

Flood Risk Review	If a flood study is determined to be necessary as a result of the Discovery process, FEMA, State, and local officials will meet to review the draft floodplain mapping and methodologies used.
Issue Preliminary Map	FEMA issues preliminary maps and Flood Insurance Study (FIS) reports to the community for review.
Community Coordination and Outreach (CCO)	Preliminary maps are reviewed with community officials at the CCO Meeting. The comment and appeal process is also explained.
Facilitate Public Comment and Appeal Period	Stakeholders have 90 days after the appeal start date to submit comments and/or appeals. Comments and/or appeals are reviewed, and flood maps may be updated appropriately.
Issue Letter of Final Determination	Once a flood map is finalized, it is adopted by the community. A six-month adoption period begins to allow communities time to adopt adequate floodplain management ordinances based on the new flood map.
Manage Your Floodplain	Community leaders monitor and track local development. Letters of Map Revision are required within six months of project completion for projects that change flood hazards in a specific area.

LOWER KANAWHA | WEST VIRGINIA

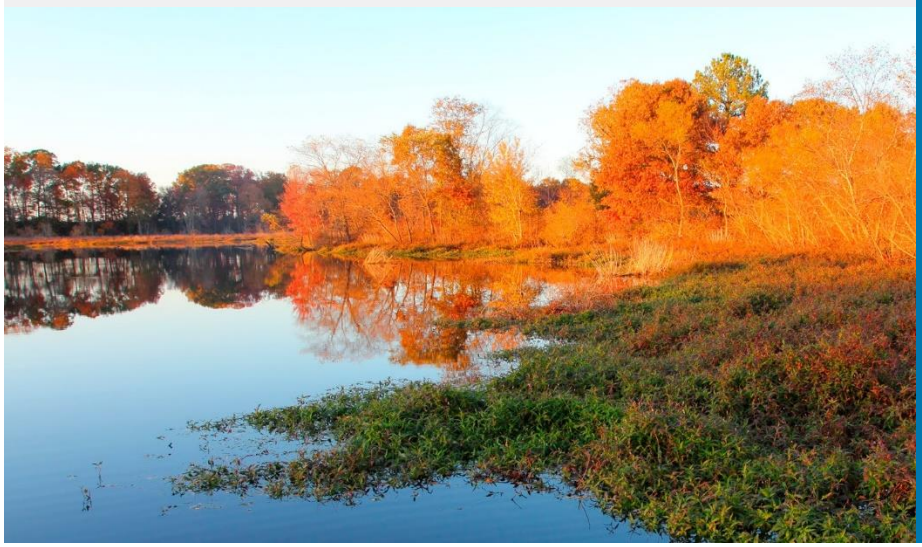
DATA COLLECTION

Discovery is a process of data mining, collection, and analysis through active collaboration with communities.

FEMA Region 3 gathered a significant amount of data before the Discovery Meeting to focus community engagement on identifying more localized information and sources of data. Additionally, the Region led the review of the Hazard Mitigation Plans (HMPs), FIS reports, and Comprehensive Plans for each of the jurisdictions prior to the Discovery Meeting.

The Region sent each community and stakeholder a Discovery Data Questionnaire, post-discovery meeting to collect additional local data such as current land use, zoning plans, risk assessment data, stormwater issues, latest orthophotography, and as-built information for manmade flood retention areas. FEMA also asked communities and stakeholders to identify areas of concern that could be addressed during the flood study through updated flood maps, revised ordinances, and desired mitigation projects.

The data collected were used to produce the Discovery Maps, Community Dashboards, and this Discovery Report. The table on the right provides an overview of the data collected. A complete list of data collected during the Discovery process is included in Appendix E.

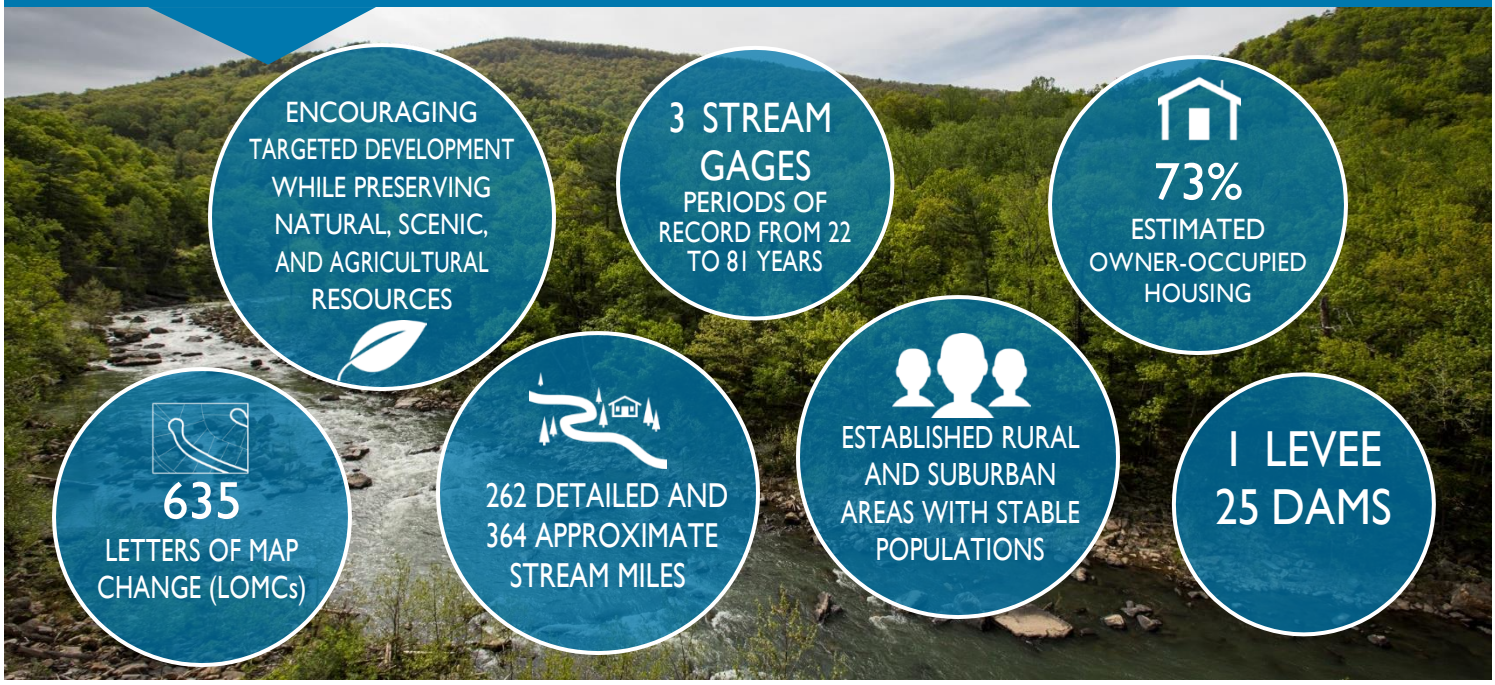


- BASE MAP DATA (political boundaries, streamlines, transportation)
- TOPOGRAPHIC DATA (2016-2018 LiDAR)
- ORTHOPHOTOS (2022 pixel-based)
- DECLARED DISASTERS
- LEVEES, DAMS, STREAM GAGES
- EFFECTIVE FLOODPLAINS
- NFIP & CRS PARTICIPATION
- INDIVIDUAL & PUBLIC ASSISTANCE
- STRUCTURES
- POPULATION & SOCIOECONOMIC CHARACTERISTICS
- MITIGATION ACTIONS

LOWER KANAWHA WATERSHED: CHARACTERISTICS

COMMUNITY CHARACTERISTICS

The Lower Kanawha Watershed community characteristics information was developed to inform the DiscoveryMeeting and, through the flood risk mapping update, will continue to be used to identify technical assistance and tools that could support the community in its needs. For additional information on community characteristics, please see the Community Dashboards in Appendix A.



LOWER KANAWHA WATERSHED COMMUNITY CHARACTERISTICS

Part of the greater Ohio River Watershed, The Lower Kanawha Watershed includes all the land that flows into the Ohio River from the City of Point Pleasant, West Virginia, to the City of Charleston, West Virginia. The Kanawha River is formed from the confluence of the New and Gauley Rivers. It flows northwest approximately 97 miles through West Virginia before joining the Ohio River near the city Point Pleasant in West Virginia. The watershed encompasses approximately 924 square miles in Jackson, Kanawha, Mason, Putnam, and Roane counties.

All communities within the Lower Kanawha Watershed participate in the NFIP. Participating jurisdictions adopt and enforce floodplain management ordinances to implement development standards in flood hazard areas. NFIP regulations represent the minimum standard for floodplain management. Communities are encouraged to consider higher standards and the adoption of more comprehensive regulations, especially when planning for future conditions. These standards can include buffers or setbacks, additional freeboard, regulation of high-risk land uses, conservation and designation of open space areas, and lower thresholds for substantial damage. Higher standards further reduce flood risk and can take advantage of the additional information and knowledge of local conditions available to community officials.

Communities that exceed the minimum requirements of the NFIP may be eligible to participate in the Community Rating System (CRS) program. Three jurisdictions in the Lower Kanawha Watershed currently participate in the NFIP's CRS program, including the City of Charleston, Kanawha County (Unincorporated Areas) and Putnam County (Unincorporated Areas).

LOWER KANAWHA WATERSHED: CHARACTERISTICS

COMMUNITY	TOTAL POLICIES	TOTAL CLAIMS	RL[1] BUILDINGS	LEVEL OF NFIP REGSREQ'D	EFFECTIVE DATE OF FIRM/FIS	CAV[2]/ CAC[3] DATES	# OF LOMCS[4]	TOTAL EXPOSURE IN THE FLOODPLAIN 2.1[4,5]
JACKSON COUNTY (UNINCORPORATED AREAS)	108	202	38	D	02/18/2004	02/11/2013 01/04/2018	63	$12,360,063
KANAWHA COUNTY (UNINCORPORATED AREAS)	1207	1585	296	D	02/06/2008	08/18/2014 01/25/2018	308	$424,121,669
MASON COUNTY (UNINCORPORATED AREAS)	85	109	14	D	12/03/2013	03/28/2014 07/05/2018	21	$34,229,031
PUTNAM COUNTY (UNINCORPORATED AREAS)	294	216	46	D	02/02/2012	11/19/2014 07/24/2007	255	$296,403,885
ROANE COUNTY (UNINCORPORATED AREAS)	90	83	11	D	03/02/2012	N/A 08/22/2017	74	$14,817,966
CITY OF CHARLESTON	273	354	58	D	02/06/2008	10/21/2010 07/24/2017	105	$225,039,460
CITY OF DUNBAR	193	61	9	D	02/06/2008	05/26/2011 04/20/2010	66	$259,808,259
CITY OF HURRICANE	12	16	4	D	02/02/2012	07/13/2010 N/A	14	$4,258,486
CITY OF NITRO	103	47	8	N/A	02/06/2008	04/29/2010 03/02/2007	46	$158,170,838
CITY OF POINT PLEASANT	12	31	6	D	12/03/2013	06/12/1984 07/05/2018	1	$37,184,007
CITY OF SAINT ALBANS	56	46	2	D	02/06/2008	03/23/2016 02/17/2016	18	$38,687,105
CITY OF SOUTH CHARLESTON	65	50	13	D	02/06/2008	11/30/2015 04/22/2010	13	$68,446,123
TOWN OF BANCROFT	9	2	0	D	02/02/2012	04/29/1992 N/A	0	$18,570,386
TOWN OF BUFFALO	35	2	0	D	02/02/2012	04/29/1992 11/07/2011	25	$41,068,808
TOWN OF ELEANOR	0	2	0	D	02/02/2012	11/15/1994 N/A	15	$690,525
TOWN OF HENDERSON	6	22	3	D	12/03/2013	03/11/2016 N/A	0	$15,144,053
TOWN OF LEON	1	6	0	D	12/03/2013	06/02/1983 07/05/2018	0	$7,265,671
TOWN OF POCA	15	17	3	D	02/02/2012	04/27/1992 N/A	14	$5,337,524
TOWN OF WINFIELD	42	4	0	D	02/02/2012	07/15/2010 N/A	28	$28,445,024

[1] RL=Repetitive Loss, [2] CAV=Community Assistance Visits, [3] CAC=Community Assistance Contacts

[4] The number of LOMCs and Total Exposure in Floodplain (TEIF) values are only for areas of these jurisdictions that are located within the Lower Kanawha Watershed.

[5] TEIF 2.0 data was not available for these jurisdictions. The value provided is from TEIF 1.0, which was created using 2000 (Updated 2010 Version) and 2010 Census Data (Building Count and Shapefiles) to perform binomial areal interpolation to calculate risk values per community.

[6] LOMC count reflects the number of LOMCs in the watershed for the entire county, not just the county unincorporated areas.

LOWER KANAWHA WATERSHED: CHARACTERISTICS

RECENT FLOOD-RELATED PRESIDENTIAL DISASTER DECLARATIONS (2005-2021)

There are two forms of Presidential action that authorize Federal disaster assistance. Emergency Declarations (EMs) spur activities to protect property and strengthen public safety through Federal assistance, and Major Disaster Declarations (DRs) provide supplemental coordination and assistance beyond the ability of State and local governments.

SEPT 2005 — EM-3221: HURRICANE KATRINA
Jackson, Kanawha, Mason, Putnam, and Roane Counties

JULY 2012 — DR-4071: SEVERE STORMS
Jackson, Kanawha, Mason, Putnam, and Roane Counties

OCT 2012 — EM-3358: HURRICANE SANDY
Jackson, Kanawha, Mason, Putnam, and Roane Counties

MAY 2021 — DR-4605: SEVERE FLOODING
Jackson, Kanawha, Mason, Putnam, and Roane Counties

HISTORY OF FLOOD-RELATED DISASTERS

The following is a list of past major flood events in the Lower Kanawha Watershed as reported in the effective FIS reports for each jurisdiction.

- March 1967: Severe Storm
- December 1972: Severe Storm
- April 1977: Severe Storm
- July 1998: Severe Storm
- June 2001: Severe Storm
- June 2004: Severe Storm
- Sept. 2005: Hurricane Katrina
- October 2012: Hurricane Sandy

INDIVIDUAL ASSISTANCE & PUBLIC ASSISTANCE

FEMA grant-funded assistance programs for communities with disaster declarations.

Individual Assistance provides community services or individual or household assistance. Communities in the watershed have received approximately $66.8 million in Individual Assistance funds since 1998. Communities that are ineligible for Individual Assistance, or households and individuals ineligible to receive funds under this program, can work with FEMA Disaster Recovery Centers to identify additional programs for financial assistance.

Public Assistance is separated into seven project categories (A-G). Projects in categories C-G are permanent work projects and are only available for major disasters. Communities in the watershed have received approximately $43.7 million in total public assistance since 1998 (approximately $28.1 million for categories A and B and $15.6 million for categories C-G). Funding for these projects is summarized by county below. Project amounts since 1998 for categories A (debris removal), (emergency protective measures), and C-G are also shown on the Community Dashboards in the Appendix.

COUNTY	C - ROADS & BRIDGES	D - WATER CONTROL FACILITIES	E - PUBLIC BUILDINGS	F - PUBLIC UTILITIES	G - RECREATIONAL OR OTHER
JACKSON COUNTY	$49K	$0	$30K	$30K	$0
KANAWHA COUNTY	$1.6M	$0	$6.5M	$2.4M	$2.8M
MASON COUNTY	$46K	$0	$9K	$100K	$5K
PUTNAM COUNTY	$23K	$0	$25K	$157K	$11K
ROANE COUNTY	$360K	$0	$779K	$674K	$52K

LOWER KANAWHA WATERSHED: CHARACTERISTICS

PRINCIPAL FLOOD PROBLEMS BY COUNTY

JACKSON COUNTY	• As floodwaters rise above bankfull stage, the dense growth in and along the streambanks of Mill Creek impedes flood runoff and results in increased flood duration for the stream. • Most of the damage from previous floods are within the corporate limits of the town Ripley. • Most floods in Ohio valley are caused by precipitation of unusual intensity or duration and extent. Floods may also result from a series of ordinary storms which follow one another in rapid succession. General flooding in the basin occurs most frequently during the winter or early spring months.
KANAWHA COUNTY	• Portions of Kanawha County along the Kanawha River and its tributaries are subject to frequent flooding. The principal result is the flooding of basements, garages, lawns, and gardens, and a deposit of mud, filth, and refuse. Street and highway travel is disrupted, causing temporary loss of police, fire, and medical protection. • Severe storms throughout the last 20 years have caused severe property damage, resulting in Presidential Disaster declarations for the county.
MASON COUNTY	• Floods caused by overflow of the Kanawha and Ohio Rivers occur periodically in the Towns of Hartford, Henderson, Leon, Mason, and New Haven, the City of Point Pleasant, and the Unincorporated Areas of Mason County. They generally occur during the winter or early springs as a result of snowmelt and heavy rains. The last major flood that caused structural damage occurred in April of 1977. • Flooding may also occur along Thirteenmile Creek in the Town of Leon, Sliding Hill Creek in the City of Hartford, Ohio River Tributary 1 in the Town of Mason, Broad Run in the Town of New Haven, Crooked Creek in the City of Point Pleasant, and Arbuckle Crab and Eighteenmile Creek in the Unincorporated Areas of Mason County. However, flooding due to Ohio and/or Kanawha Rivers' backwater will generally cause more severe flooding than would be expected in these areas if they were independent of this effect. • Floods caused by the backwater of the Ohio River or Kanawha River have the potential to cause structural damage to structures in the streams' floodplains.
PUTNAM COUNTY	• Floods caused by the overflow of the Kanawha River occur periodically, generally as a result of extremely heavy rains over the lower Kanawha River basin or snowmelt. The last major flood to occur in this area was in March of 1918, though recent floods of lesser magnitude have also been experienced. • Floods caused by the overflow of Hurricane Creek have occurred periodically near the City of Hurricane. Floods generally occur as a result of extremely heavy rains over the upper Hurricane Creek basin coinciding with spring thawing conditions. In this area, the most recent significant flood occurred in 1975. • Since 1999, the average gage height is 15.26 and the peak discharge was 1,770 cfs in 2000.

LOWER KANAWHA: CHARACTERISTICS

PRINCIPAL FLOOD PROBLEMS BY COUNTY

ROANE COUNTY	• Main flood season typically lasts from December through April and most of the floods occurring in this season are the result of heavy rain and snowmelt. • Flooding may occur on Bens Run, a small tributary of Spring Creek, but is not expected to be as serious as the flooding in the Goff Run, Spring Creek, or Tanner Run floodplains as it has a drainage area of 0.40 miles. The floods in those areas occur periodically in the City of Spencer and generally causes more severe flooding on the lower reaches. • Floods caused by overflow of Reedy Creek occur periodically in Town of Reedy. The most recent significant flood that caused structural damage occurred in 2000.

LOWER KANAWHA: CHARACTERISTICS

HAZARD MITIGATION PLANS

FEMA provides communities with resources to help them integrate the flood risk assessment data into their ongoing planning processes, including hazard mitigation planning. Information about the status of HMPs in the Lower Kanawha Watershed is provided in the table below. For more information about mitigation actions identified by each community in these plans, please see the Community Dashboards included in the Appendix.

COMMUNITY	HAZARD MITIGATION PLAN	STATUS
JACKSON COUNTY ROANE COUNTY	**Planning and Development Council Region V Hazard Mitigation Plan**	Expired 12/4/2021 Plan In Progress
MASON COUNTY TOWN OF HENDERSON TOWN OF LEON CITY OF POINT PLEASANT	**Planning and Development Council Region II Hazard Mitigation Plan**	Approved Expires 4/25/2023
KANAWHA COUNTY CITY OF CHARLESTON CITY OF SAINT ALBANS CITY OF DUNBAR CITY OF SOUTH CHARLESTON CITY OF NITRO PUTNAM COUNTY TOWN OF BANCROFT TOWN OF POCA TOWN OF WINFIELD TOWN OF BUFFALO TOWN OF ELEANOR CITY OF HURRICANE	**Planning and Development Council Region III Hazard Mitigation Plan**	Expired 05/22/2022 Plan In Progress

HAZARD MITIGATION ASSISTANCE

FEMA administers three **Hazard Mitigation Assistance (HMA)** programs to provide funding for projects that reduce the risk to individuals and property from natural hazards.

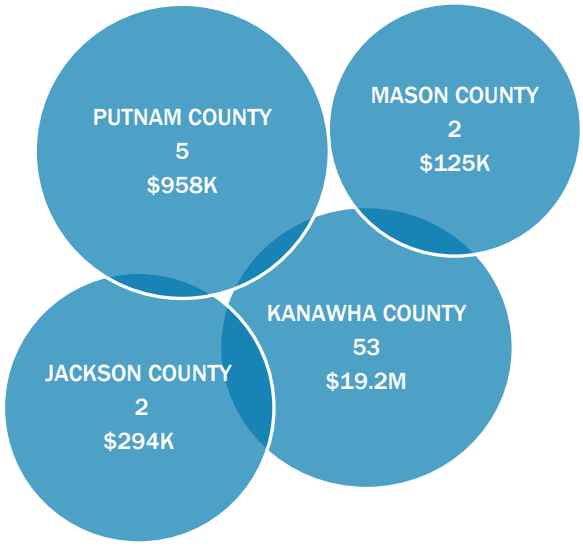
Hazard Mitigation Grant Program (HMGP): Funding to implement long-term hazard mitigation planning and projects after a Presidential Major Disaster Declaration.

Pre-Disaster Mitigation (PDM): Funding to implement hazard mitigation planning and projects that prevent future losses before disaster strikes.

Flood Mitigation Assistance (FMA): Funding to implement planning and projects that reduce or eliminate long-term risk of flood damage to structures insured under the NFIP.

A summary of HMA grants received by county is provided to the right.

HMA GRANTS RECEIVED

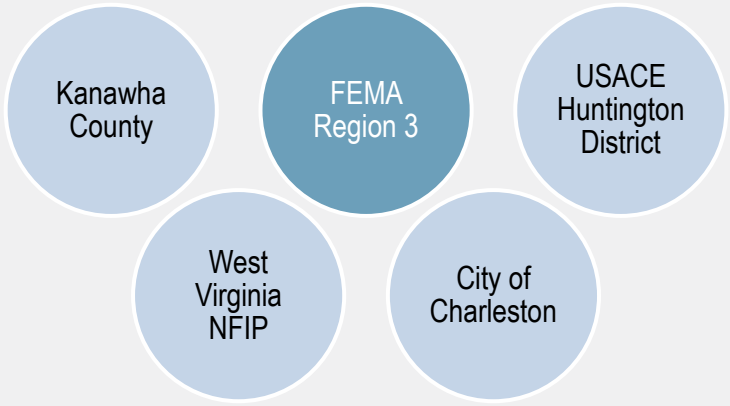


LOWER KANAWHA WATERSHED | WEST VIRGINIA

DISCOVERY MEETING

The Discovery Meeting is an opportunity for FEMA to engage directly with the communities in the study watershed. The meeting serves both to introduce communities to the flood risk mapping process and to gather information on local concerns, resources, and needs.

A Discovery Meeting was conducted for the Lower Kanawha Watershed on May 2, 2023. Representatives of the following communities and agencies attended the meeting:



During the meeting, attendees were asked to provide information on areas of local concern, past risk assessment and mitigation projects, and future risk assessment and mitigation needs. Meeting attendees discussed their priorities with the project team and participated in a mapping exercise to provide information on specific reaches, contributing areas, and structures. Meeting invitees also received questionnaires designed to gather information on local resources, flood hazards, and mapping and mitigation priorities.

Discovery Meeting outcomes based on the meeting, mapping exercise, and questionnaires are summarized on the right.

The Discovery Map and Discovery Meeting minutes are included in Appendices F and G, respectively.

MAP UPDATES REQUESTED:

- **The WV GIS Technical Center, part of West Virginia University, evaluated Approximate A Zone rivers/streams in the Kanawha River Basin to be recommended for more comprehensive Detailed Flood Studies based on clusters of buildings with high flood damage potential.**

  The WV GIS Technical Center published this information in a 2023 report which is included in Appendix J of this Discovery Report.

FLOOD RISK CONCERNS:

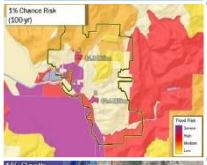
- **Beyond the data analysis shared by the WV GIS Technical Center, no community comments regarding flood concerns were offered during the Lower Kanawha Discovery Meeting or associated comment period.**

LOWER KANAWHA WATERSHED | WEST VIRGINIA

POTENTIAL FLOOD RISK PRODUCTS AND DATASETS

Based on the findings of the Discovery process, FEMA Region 3 will consider a potential flood risk mapping project within the Lower Kanawha Watershed. FEMA Region 3 will explore the possibility of studying all riverine areas or a project studying limited stream reaches within the watershed.

A flood risk mapping project takes about three to five years to complete. When it is final, communities are provided with an updated Flood Insurance Rate Map (FIRM), FIS reports, and FIRM databases, also known as Flood Hazard Products. Additionally, communities may receive a set of non-regulatory tools that they can use to better understand and make informed decisions to reduce risk. The following non-regulatory products may be delivered to the communities at the end of a project.

FLOOD RISK PRODUCT	WHAT IS IT?	HOW IS IT USED?
FLOOD RISK MAP	Illustrates overall flood risk within the project area by including the outcomes of assessments completed during the flood risk mapping project.	Can be used by communities as outreach tools to communicate risk to residents more clearly.
FLOOD RISK DATABASE	Provides communities with geospatial information collected during the risk assessment process and offers effective ways to visualize and communicate flood risk. Four datasets are included.	
 1. Changes Since Last FIRM	Highlights how the latest FIRM differs from the previous maps to help communities understand the changes and prepare for adoption of new maps.	Communities can use this to engage residents and businesses about their changing risk and the implications for flood insurance.
 2. Flood Risk Assessment	Focuses on damage that results from floods of various magnitudes. Identifies flood-prone areas and vulnerable populations and property and provides an estimate of potential losses.	Can help guide community mitigation efforts by highlighting areas where risk reduction actions may produce the most effective results.
 3. Flood Depth and Analysis Grid	Communicates detailed information about the depth and velocity of floodwaters, as well as the probability of an area being flooded over time.	Officials can use depth grids to show individuals the depth of flooding their home might experience at different flood frequencies.
 4. Areas of Mitigation Interest	Explains how various physical factors affect the severity of flooding.	Information can be tied to the local HMP, which can help projects gain traction and help officials secure funding for those projects.

SUMMARY

As the first phase of a flood risk mapping project, Discovery helps commence a coordinated effort within the Lower Kanawha Watershed to ensure communities have information to improve their risk reduction efforts, including their hazard mitigation planning, mitigation action identification and implementation, and community outreach. The findings from the Lower Kanawha Watershed Discovery Report and Maps are based on an analysis of watershed-wide research, information provided by watershed communities and stakeholders, and input from meetings and engagement with the communities and stakeholders. This process and the resulting report and maps serve as the first step toward increasing communities' resilience to flooding within the Lower Kanawha Watershed. The coordination with communities in the watershed and the detailed study of flooding within those communities will continue at the outset of a flood risk mapping project in the Lower Kanawha Watershed.

ACTION ITEMS AND NEXT STEPS

- Communities will provide feedback to FEMA on training and technical assistance needs.
- FEMA will have follow-up discussions with communities to discuss next steps in the flood risk mapping process, should the data and research collected and performed during Discovery support the need for anupdate.
- Communities should continue to explore ideas to increase their resilience to flooding, such as cost-efficient mitigation projects and integration with hazard mitigation planning.
- Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
- Communities should stay in contact with FEMA for any additional mapping and public assistance needs.

QUESTIONS

If you have any questions, please contact the FEMA Region 3 Project Manager, Robert Pierson, at Robert.Pierson@fema.dhs.gov.

LOWER KANAWHA WATERSHED | WEST VIRGINIA

FEDERAL AND STATE CONTACT INFORMATION

AGENCY	NAME	TITLE	EMAIL
YOUR PRIMARY FEMA CONTACT	ROBERT PIERSON	FEMA Region 3 Project Manager	robert.pierson@fema.dhs.gov
FEMA REGION 3	ELIZABETH RANSON	FEMA Region 3 Floodplain Management Specialist	elizabeth.ranson@fema.dhs.gov
WEST VIRGINIA EMERGENCY MANAGEMENT DIVISION	TIMOTHY W. KEATON	WV NFIP/CTP Coordinator	tim.w.keaton@wv.gov
WEST VIRGINIA GIS TECHNICAL CENTER	KURT DONALDSON	Project Manager	kurt.donaldson@mail.wvu.edu

APPENDICES

A. Community Dashboards

B. Acronyms and Abbreviations

C. References

D. Glossary

E. Additional Data

   a. Data Collection for the Lower Kanawha Watershed

   b. List of Topographic Data Sources by County

   c. Results of CNMS Showing Flood Study Validity

   d. Dams in the Watershed by County

   e. Levees in the Watershed by County

   f. Stream Gage Information

   g. County Border Special Flood Hazard Area Floodplain Boundary Tie-In Issues

   h. LOMCs Identified in the Watershed by Jurisdiction

F. Discovery Maps

G. Meeting Minutes

H. Meeting Attendance Record

I. Meeting Presentation

J. WV GIS Technical Center – Zone A Building Cluster Analysis for Kanawha Basin Watersheds

APPENDIX A | COMMUNITY DASHBOARDS

Jackson County, WV– Countywide

FEMA

FEMA's Risk Mapping, Assessment, and Planning (Risk MAP) Program helps strengthen communities by identifying actions they can take now to reduce their hazard risk, enhancing local planning, improving outreach through risk communications, and increasing local resilience to natural hazards.

The information presented below are estimates as of August 2022.

Flood insurance is available to
All COMMUNITIES

0 COMMUNITIES
are taking advantage of the flood insurance savings offered through the Community Rating System

7.5%
of the population is in the flood high hazard area

$3.4M
Total paid losses[1]

286
Total paid claims[1]

108
Paid claims outside of the effective flood high hazard area[1]

131
Flood insurance policies in force

79%
in Unincorporated Areas

18,100
Estimated structures in the community

1,510
Estimated structures in the flood high hazard area

24
Flood-related presidential disaster declarations

0 levees and
14 dams

$1,195
Average premium

70%
Higher than the national average

$1.8M
Repetitive Loss (RL) paid losses[1]

56
RL properties[1]

63
Letters of Map Change

74
Policies in the effective flood high hazard area

[1] Since 1978

Note: For the National Flood Insurance Program data provided above, the county totals include figures from incorporated and unincorporated areas.

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE ~YEAR 1 ~YEAR 5

- Discovery Meeting
- Flood Risk Review Meeting
- Preliminary Map Issuance
- Community Coordination & Outreach Meeting
- Appeal Period
- Letter of Final Determination
- Effective Maps

Kanawha County, WV– Countywide

FEMA

FEMA's Risk Mapping, Assessment, and Planning (Risk MAP) Program helps strengthen communities by identifying actions they can take now to reduce their hazard risk, enhancing local planning, improving outreach through risk communications, and increasing local resilience to natural hazards.

The information presented below are estimates as of August 2022.

Flood insurance is available to
All COMMUNITIES

1 COMMUNITY
is taking advantage of the flood insurance savings offered through the Community Rating System

14.9%
of the population is in the flood high hazard area

$39.9M
Total paid losses[1]

2,325
Total paid claims[1]

485
Paid claims outside of the effective flood high hazard area[1]

1827
Flood insurance policies in force

60%
in Unincorporated Areas

93,865
Estimated structures in the community

15,475
Estimated structures in the flood high hazard area

29
Flood-related presidential disaster declarations

0 levees and
18 dams

$1,398
Average premium

99%
Higher than the national average

$15.5M
Repetitive Loss (RL) paid losses[1]

408
RL properties[1]

551
Letters of Map Change

1,397
Policies in the effective flood high hazard area

[1] Since 1978

Note: For the National Flood Insurance Program data provided above, the county totals include figures from incorporated and unincorporated areas.

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE — ~YEAR 1 — ~YEAR 5

- Discovery Meeting
- Flood Risk Review Meeting
- Preliminary Map Issuance
- Community Coordination & Outreach Meeting
- Appeal Period
- Letter of Final Determination
- Effective Maps

Mason County, WV– Countywide

FEMA

FEMA's Risk Mapping, Assessment, and Planning (Risk MAP) Program helps strengthen communities by identifying actions they can take now to reduce their hazard risk, enhancing local planning, improving outreach through risk communications, and increasing local resilience to natural hazards.

The information presented below are estimates as of August 2022.

Flood insurance is available to
All COMMUNITIES

0 COMMUNITIES
are taking advantage of the flood insurance savings offered through the Community Rating System

19
Flood-related presidential disaster declarations

10.1%
of the population is in the flood high hazard area

1 levee and
14 dams

$1.4M
Total paid losses[1]

181
Total paid claims[1]

$817
Average premium

16%
Higher than the national average

59
Paid claims outside of the effective flood high hazard area[1]

$982K
Repetitive Loss (RL) paid losses[1]

25
RL properties[1]

135
Flood insurance policies in force

54%
in Unincorporated Areas

22
Letters of Map Change

18,965
Estimated structures in the community

2,210
Estimated structures in the flood high hazard area

87
Policies in the effective flood high hazard area

[1] Since 1978

Note: For the National Flood Insurance Program data provided above, the county totals include figures from incorporated and unincorporated areas.

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE — ~YEAR 1 — ~YEAR 5

- Discovery Meeting
- Flood Risk Review Meeting
- Preliminary Map Issuance
- Community Coordination & Outreach Meeting
- Appeal Period
- Letter of Final Determination
- Effective Maps

Putnam County, WV– Countywide

FEMA

FEMA's Risk Mapping, Assessment, and Planning (Risk MAP) Program helps strengthen communities by identifying actions they can take now to reduce their hazard risk, enhancing local planning, improving outreach through risk communications, and increasing local resilience to natural hazards.

The information presented below are estimates as of August 2022.

Flood insurance is available to
All COMMUNITIES

1 COMMUNITY
is taking advantage of the flood insurance savings offered through the Community Rating System

10%
of the population is in the flood high hazard area

$3.2M
Total paid losses[1]

309
Total paid claims[1]

123
Paid claims outside of the effective flood high hazard area[1]

454
Flood insurance policies in force

57%
in Unincorporated Areas

32,625
Estimated structures in the community

3,490
Estimated structures in the flood high hazard area

21
Flood-related presidential disaster declarations

0 levees and
12 dams

$1,035
Average premium

47%
Higher than the national average

$1.8M
Repetitive Loss (RL) paid losses[1]

61
RL properties[1]

354
Letters of Map Change

306
Policies in the effective flood high hazard area

[1] Since 1978

Note: For the National Flood Insurance Program data provided above, the county totals include figures from incorporated and unincorporated areas.

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE — Discovery Meeting

~YEAR 1 — Flood Risk Review Meeting; Preliminary Map Issuance; Community Coordination & Outreach Meeting

~YEAR 5 — Appeal Period; Letter of Final Determination; Effective Maps

Roane County, WV– Countywide

FEMA

FEMA's Risk Mapping, Assessment, and Planning (Risk MAP) Program helps strengthen communities by identifying actions they can take now to reduce their hazard risk, enhancing local planning, improving outreach through risk communications, and increasing local resilience to natural hazards.

The information presented below are estimates as of August 2022.

Flood insurance is available to
All COMMUNITIES

0 COMMUNITIES
are taking advantage of the flood insurance savings offered through the Community Rating System

11.2%
of the population is in the flood high hazard area

$3.3M
Total paid losses[1]

174
Total paid claims[1]

64
Paid claims outside of the effective flood high hazard area[1]

113
Flood insurance policies in force

73%
in Unincorporated Areas

10,225
Estimated structures in the community

1,175
Estimated structures in the flood high hazard area

23
Flood-related presidential disaster declarations

0 levees and
8 dams

$855
Average premium

22%
Higher than the national average

$922K
Repetitive Loss (RL) paid losses[1]

26
RL properties[1]

73
Letters of Map Change

66
Policies in the effective flood high hazard area

[1] Since 1978

Note: For the National Flood Insurance Program data provided above, the county totals include figures from incorporated and unincorporated areas.

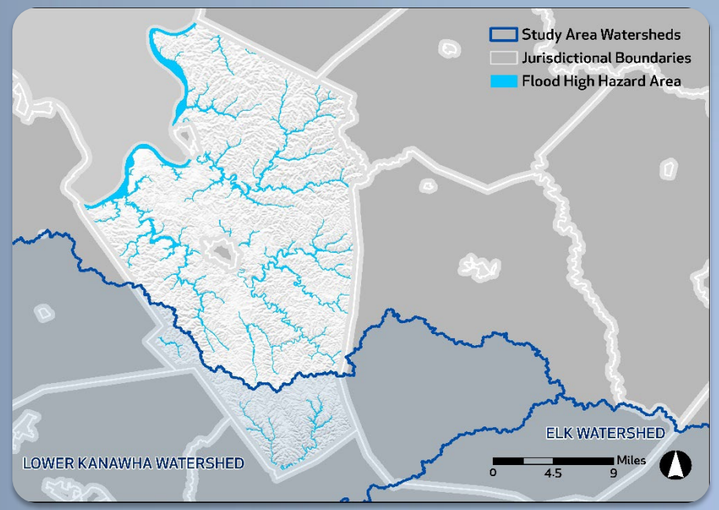
KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE — ~YEAR 1 — ~YEAR 5

- Discovery Meeting
- Flood Risk Review Meeting
- Preliminary Map Issuance
- Community Coordination & Outreach Meeting
- Appeal Period
- Letter of Final Determination
- Effective Maps

Jackson County (Unincorporated Areas)/

Jackson County, WV **KNOW YOUR RISK** (The information presented below are estimates as of August 2022.)



05/01/1985
Initial FIRM[1] date

02/18/2004
Effective FIRM date

$2.8M
Total paid losses[2]

202
Total paid claims[2]

104
Flood insurance policies in force

57
Policies in the effective flood high hazard area

14,720
Estimated structures in the community

1,350
Estimated structures in the flood high hazard area

63
Letters of Map Change

24
Flood-related countywide presidential disaster declarations

77
Paid claims outside of the effective flood high hazard area[2]

$1.4M
Repetitive Loss (RL) paid losses[2]

38
RL properties[2]

19%
of households spend 30% or more of their income on housing

9%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE — Discovery Meeting

~YEAR 1 — Flood Risk Review Meeting; Preliminary Map Issuance; Community Coordination & Outreach Meeting; Appeal Period

~YEAR 5 — Letter of Final Determination; Effective Maps

Jackson County (Unincorporated Areas)/Jackson, WV

Your Hazard Mitigation Plan expired on **December 4, 2021,** and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Jackson County will continue to seek out opportunities to apply for Hazard Mitigation Assistance (HMA) funds for mitigation reconstruction, elevations, relocations, or acquisitions or identified at risk, repetitive loss, non-repetitive loss, substantial damaged, partially or completely demolished or destroyed properties within the County. If mitigation reconstruction is chosen, properties identified as partially or completely demolished, outside of the regulatory floodway, as identified by available flood hazard data, will be reconstructed in accordance with the standards established in the local floodplain ordinance and in accordance with the same conditions as an elevated structure. The County will comply with all acquisition, elevation, relocation, and mitigation reconstruction requirements, as per the HMA Guidance.
- Mitigation flash floods in the Evans Area where water covers the road and can isolate the area.
- Repair, replace, and/or reconstruct low-lying roadway in Kenna area that when flooded cuts off the PSD, EMS, and the VFD.

Find ideas to mitigate flood risk on fema.gov: https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf

Land Use Trend:
Rural

02/11/2013
Date of Last CAV[4]

01/04/2018
Date of Last CAC[4]

PARTICIPATING
in the National Flood Insurance Program

NOT PARTICIPATING
in the Community Rating System

Countywide Public Assistance received

$36K
Category A: Debris Removal

$68K
Category B: Protective Measures

$108K
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

2
Hazard Mitigation Grant Program

0
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

NEXT STEPS:

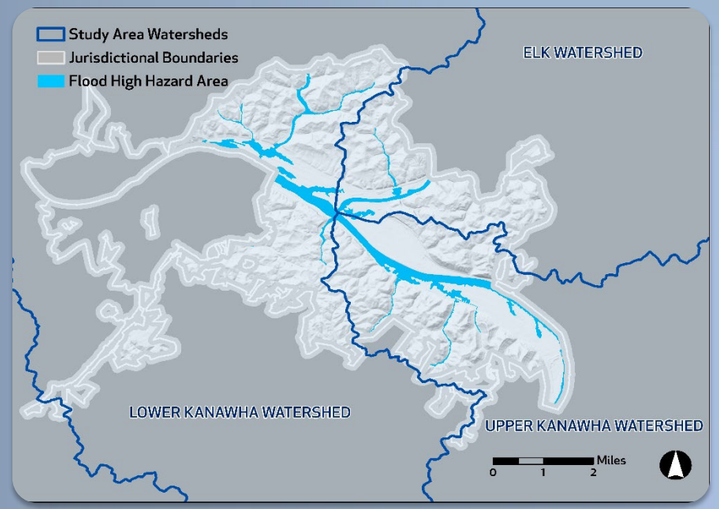
1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

[1] Flood Insurance Rate Map (FIRM)
[2] Since 1978
[3] Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

FEMA

City of Charleston/Kanawha County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)



06/15/1983
Initial FIRM[1] date

02/06/2008
Effective FIRM date

$1.8M
Total paid losses[2]

355
Total paid claims[2]

237
Flood insurance policies in force

147
Policies in the effective flood high hazard area

21,255
Estimated structures in the community

1,770
Estimated structures in the flood high hazard area

104
Letters of Map Change

29
Flood-related countywide presidential disaster declarations

59
Paid claims outside of the effective flood high hazard area[2]

$891K
Repetitive Loss (RL) paid losses[2]

58
RL properties[2]

30%
of households spend 30% or more of their income on housing

8%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE — Discovery Meeting

~YEAR 1 — Flood Risk Review Meeting

Preliminary Map Issuance

Community Coordination & Outreach Meeting

Appeal Period

~YEAR 5 — Letter of Final Determination

Effective Maps

City of Charleston/Kanawha, WV

Your Hazard Mitigation Plan expired on **May 22, 2022,** and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Distribute information to all property owners in repetitive loss areas within the city of Charleston regarding potential flood hazards as required for participation in the Community Rating System.
- Continue to hold local courses on the National Flood Insurance Program (NFIP) for land-use organizations (e.g., realtors, bankers, construction companies, surveyors, and insurers).
- Implement a Geographic Information System with an emphasis on hazard analysis.
- Continue participating in the Community Rating System (CRS).
- As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
- Identify property owners of RL and non-RL properties that may be willing to participate in future property acquisition and demolition projects.
- Add floodplain information to the Charleston Planning website.

Find ideas to mitigate flood risk on fema.gov: https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf

Land Use Trend:
Urban

10/21/2010
Date of Last CAV[4]

07/24/2017
Date of Last CAC[4]

PARTICIPATING
in the National Flood Insurance Program

PARTICIPATING
in the Community Rating System

Countywide Public Assistance received

$3.6M
Category A: Debris Removal

$23.4M
Category B: Protective Measures

$13.2M
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

53
Hazard Mitigation Grant Program

1
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

NEXT STEPS:

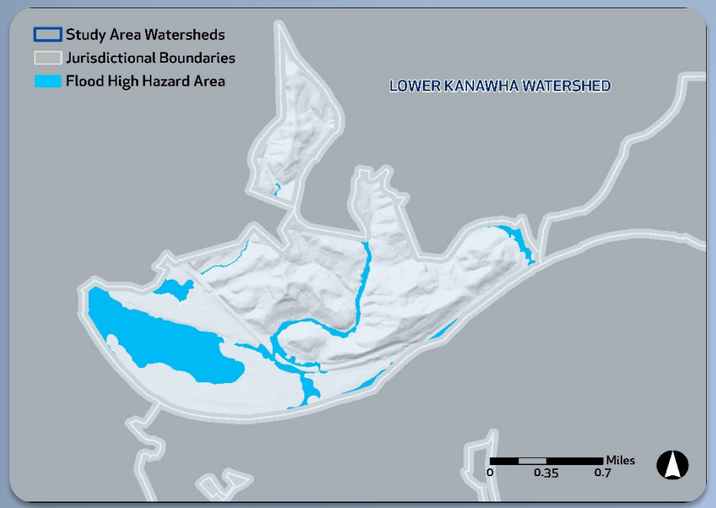
1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

[1] Flood Insurance Rate Map (FIRM)
[2] Since 1978
[3] Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

FEMA

City of Dunbar/ Kanawha County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)



06/01/1982
Initial FIRM[1] date

02/06/2008
Effective FIRM date

$240K
Total paid losses[2]

61
Total paid claims[2]

170
Flood insurance policies in force

159
Policies in the effective flood high hazard area

3,550
Estimated structures in the community

1,180
Estimated structures in the flood high hazard area

66
Letters of Map Change

29
Flood-related countywide presidential disaster declarations

13
Paid claims outside of the effective flood high hazard area[2]

$113K
Repetitive Loss (RL) paid losses[2]

9
RL properties[2]

26%
of households spend 30% or more of their income on housing

26%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE — ~YEAR 1 — ~YEAR 5

- Discovery Meeting
- Flood Risk Review Meeting
- Preliminary Map Issuance
- Community Coordination & Outreach Meeting
- Appeal Period
- Letter of Final Determination
- Effective Maps

City of Dunbar/Kanawha, WV

Your Hazard Mitigation Plan expired on **May 22, 2022,** and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Continue to participate in the National Flood Insurance Program (NFIP).
- Continue to enforce current floodplain regulations
- Continue to participate in the WV MS4 Permit Program.
- Support county efforts to utilize the media for the distribution and publication of hazard information.
- As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.

Find ideas to mitigate flood risk on fema.gov: https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf

Land Use Trend:
Small Town

05/26/2011
Date of Last CAV[4]

04/20/2010
Date of Last CAC[4]

PARTICIPATING
in the National Flood Insurance Program

NOT PARTICIPATING
in the Community Rating System

Countywide Public Assistance received

$3.6M
Category A: Debris Removal

$23.4M
Category B: Protective Measures

$13.2M
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

53
Hazard Mitigation Grant Program

1
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

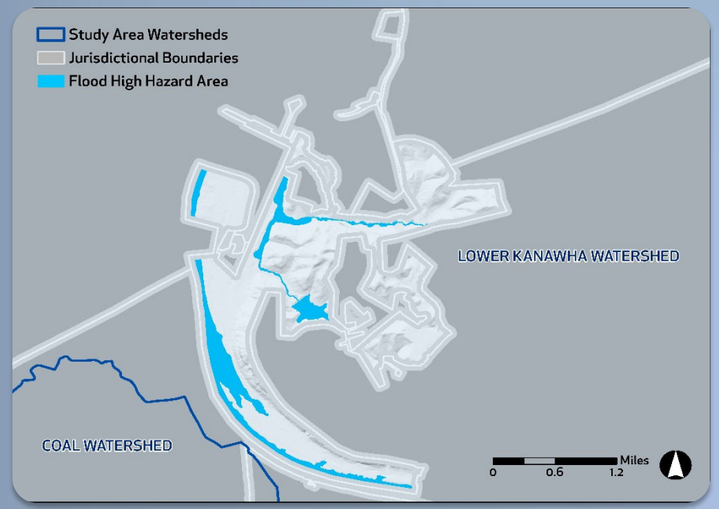
NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

[1] Flood Insurance Rate Map (FIRM)
[2] Since 1978
[3] Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

City of Nitro/Kanawha County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)



04/15/1982
Initial FIRM[1] date

02/06/2008
Effective FIRM date

$190K
Total paid losses[2]

47
Total paid claims[2]

91
Flood insurance policies in force

77
Policies in the effective flood high hazard area

3,300
Estimated structures in the community

635
Estimated structures in the flood high hazard area

46
Letters of Map Change

29
Flood-related countywide presidential disaster declarations

13
Paid claims outside of the effective flood high hazard area[2]

$112K
Repetitive Loss (RL) paid losses[2]

8
RL properties[2]

31%
of households spend 30% or more of their income on housing

17%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE ~YEAR 1 ~YEAR 5

- Discovery Meeting
- Flood Risk Review Meeting
- Preliminary Map Issuance
- Community Coordination & Outreach Meeting
- Appeal Period
- Letter of Final Determination
- Effective Maps

City of Nitro/Kanawha, WV

Your Hazard Mitigation Plan expired on **May 22, 2022,** and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Continue to participate in the National Flood Insurance Program (NFIP).
- Continue to enforce current floodplain regulations
- Relocate or acquire and remove structures from the floodplains and SFHA. Also consider elevation and mitigation reconstruction, as appropriate.

Find ideas to mitigate flood risk on fema.gov: https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf

Land Use Trend:
Small Town

04/29/2010
Date of Last CAV[4]

03/02/2007
Date of Last CAC[4]

PARTICIPATING
in the National Flood Insurance Program

NOT PARTICIPATING
in the Community Rating System

Countywide Public Assistance received

$3.6M
Category A: Debris Removal

$23.4M
Category B: Protective Measures

$13.2M
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

53
Hazard Mitigation Grant Program

1
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

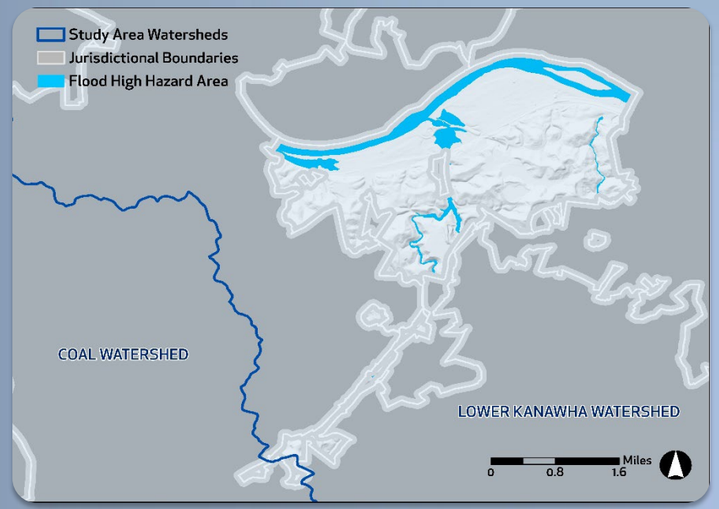
NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

[1] Flood Insurance Rate Map (FIRM)
[2] Since 1978
[3] Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

City of South Charleston/Kanawha County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)



06/15/1982
Initial FIRM[1] date

02/06/2008
Effective FIRM date

$1.9M
Total paid losses[2]

50
Total paid claims[2]

60
Flood insurance policies in force

53
Policies in the effective flood high hazard area

6,125
Estimated structures in the community

420
Estimated structures in the flood high hazard area

13
Letters of Map Change

29
Flood-related countywide presidential disaster declarations

14
Paid claims outside of the effective flood high hazard area[2]

$1.8M
Repetitive Loss (RL) paid losses[2]

13
RL properties[2]

21%
of households spend 30% or more of their income on housing

5%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE — ~YEAR 1 — ~YEAR 5

- Discovery Meeting
- Flood Risk Review Meeting
- Preliminary Map Issuance
- Community Coordination & Outreach Meeting
- Appeal Period
- Letter of Final Determination
- Effective Maps

City of South Charleston/Kanawha, WV

Your Hazard Mitigation Plan expired on **May 22, 2022,** and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Continue to participate in the National Flood Insurance Program (NFIP).
- Continue to enforce current floodplain regulations
- Buy out six residences in low lying areas.
- Support county efforts to utilize the media for the distribution and publication of hazard information.
- As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.

Find ideas to mitigate flood risk on fema.gov: https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf

Land Use Trend:
Urban

11/30/2015
Date of Last CAV[4]

04/22/2010
Date of Last CAC[4]

Countywide Public Assistance received

$3.6M
Category A: Debris Removal

$23.4M
Category B: Protective Measures

$13.2M
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

53
Hazard Mitigation Grant Program

1
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

PARTICIPATING
in the National Flood Insurance Program

NOT PARTICIPATING
in the Community Rating System

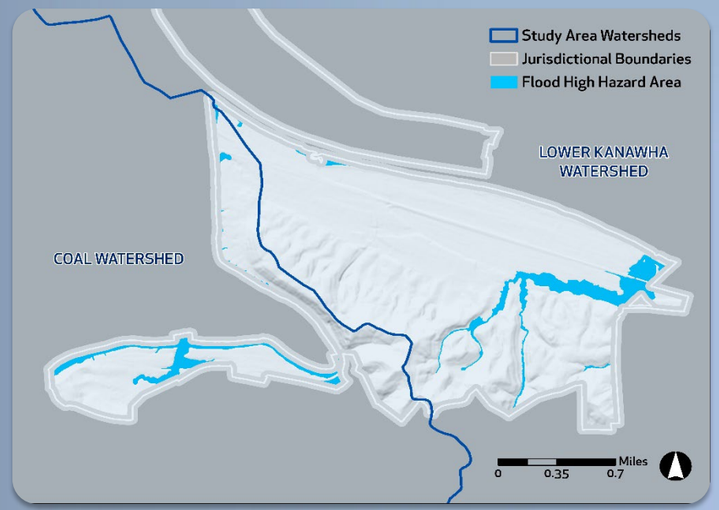
NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

[1] Flood Insurance Rate Map (FIRM)
[2] Since 1978
[3] Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

City of St. Albans/ Kanawha County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)



06/15/1982
Initial FIRM[1] date

02/06/2008
Effective FIRM date

$200K
Total paid losses[2]

46
Total paid claims[2]

49
Flood insurance policies in force

40
Policies in the effective flood high hazard area

5,435
Estimated structures in the community

220
Estimated structures in the flood high hazard area

16
Letters of Map Change

29
Flood-related countywide presidential disaster declarations

22
Paid claims outside of the effective flood high hazard area[2]

$70K
Repetitive Loss (RL) paid losses[2]

2
RL properties[2]

21%
of households spend 30% or more of their income on housing

4%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE — ~YEAR 1 — ~YEAR 5

- Discovery Meeting
- Flood Risk Review Meeting
- Preliminary Map Issuance
- Community Coordination & Outreach Meeting
- Appeal Period
- Letter of Final Determination
- Effective Maps

City of St. Albans/Kanawha, WV

Your Hazard Mitigation Plan expired on **May 22, 2022,** and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Continue to participate in the National Flood Insurance Program (NFIP).
- Continue to enforce current floodplain regulations
- Continue to update municipal website to provide information on storm water management.
- Continue to participate in WV MS4 permitting process.
- Support county efforts to utilize the media for the distribution and publication of hazard information.
- As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.

Find ideas to mitigate flood risk on fema.gov: https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf

Land Use Trend:
Suburban

03/23/2016
Date of Last CAV[4]

02/17/2016
Date of Last CAC[4]

PARTICIPATING
in the National Flood Insurance Program

NOT PARTICIPATING
in the Community Rating System

Countywide Public Assistance received

$3.6M
Category A: Debris Removal

$23.4M
Category B: Protective Measures

$13.2M
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

53
Hazard Mitigation Grant Program

1
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

NEXT STEPS:

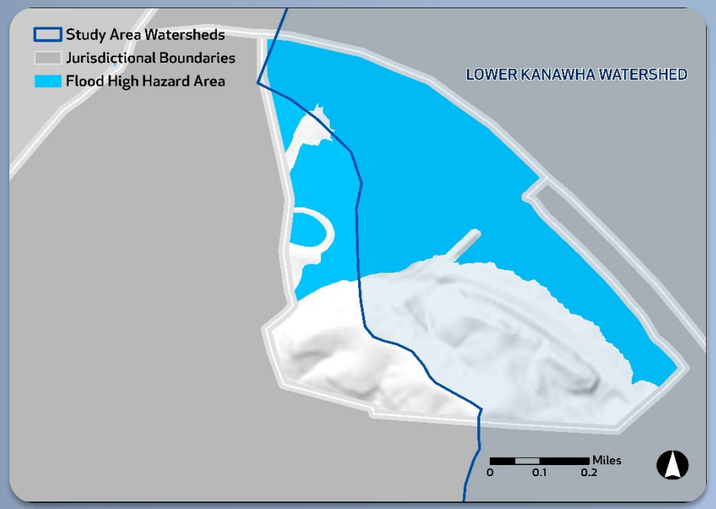
1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

[1] Flood Insurance Rate Map (FIRM)
[2] Since 1978
[3] Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

FEMA

Town of Henderson/Mason County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)



05/15/1978
Initial FIRM[1] date

12/03/2013
Effective FIRM date

$66K
Total paid losses[2]

22
Total paid claims[2]

6
Flood insurance policies in force

1
Policies in the effective flood high hazard area

185
Estimated structures in the community

170
Estimated structures in the flood high hazard area

0
Letters of Map Change

19
Flood-related countywide presidential disaster declarations

8
Paid claims outside of the effective flood high hazard area[2]

$21K
Repetitive Loss (RL) paid losses[2]

3
RL properties[2]

35%
of households spend 30% or more of their income on housing

92%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE — Discovery Meeting

~YEAR 1 — Flood Risk Review Meeting

Preliminary Map Issuance

Community Coordination & Outreach Meeting

Appeal Period

~YEAR 5 — Letter of Final Determination

Effective Maps

Town of Henderson/Mason, WV

Your Hazard Mitigation Plan has been approved through **April 25, 2023**, and now is the time to review it. Some projects you identified to reduce flood risk include the following:

- Identify areas in which storm water backs up and determine the costs of corrective actions.
- Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects.

Find ideas to mitigate flood risk on fema.gov: https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf

Land Use Trend:
Small Town

03/11/2016
Date of Last CAV[4]

N/A
Date of Last CAC[4]

PARTICIPATING
in the National Flood Insurance Program

NOT PARTICIPATING
in the Community Rating System

Countywide Public Assistance received

$37K
Category A: Debris Removal

$187K
Category B: Protective Measures

$160K
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

2
Hazard Mitigation Grant Program

0
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

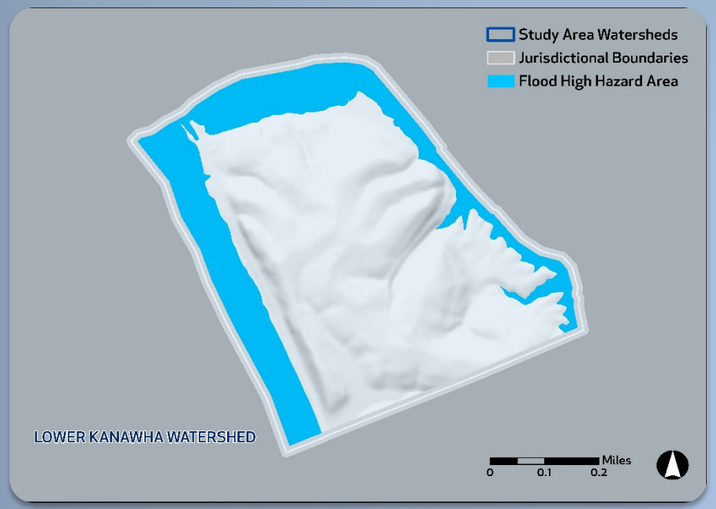
NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

[1] Flood Insurance Rate Map (FIRM)
[2] Since 1978
[3] Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

Town of Leon/ Mason County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)



08/15/1978
Initial FIRM[1] date

12/03/2013
Effective FIRM date

$7.5K
Total paid losses[2]

6
Total paid claims[2]

1
Flood insurance policies in force

1
Policies in the effective flood high hazard area

65
Estimated structures in the community

25
Estimated structures in the flood high hazard area

0
Letters of Map Change

19
Flood-related countywide presidential disaster declarations

1
Paid claims outside of the effective flood high hazard area[2]

$0
Repetitive Loss (RL) paid losses[2]

0
RL properties[2]

31%
of households spend 30% or more of their income on housing

30%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE ~YEAR 1 ~YEAR 5

- Discovery Meeting
- Flood Risk Review Meeting
- Preliminary Map Issuance
- Community Coordination & Outreach Meeting
- Appeal Period
- Letter of Final Determination
- Effective Maps

Town of Leon/Mason, WV

Your Hazard Mitigation Plan has been approved through **April 25, 2023**, and now is the time to review it. Some projects you identified to reduce flood risk include the following:

- Identify areas in which storm water backs up and determine the costs of corrective actions.
- Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects.

Find ideas to mitigate flood risk on fema.gov: https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf

Land Use Trend:
Small Town

06/02/1983
Date of Last CAV[4]

07/05/2018
Date of Last CAC[4]

PARTICIPATING
in the National Flood Insurance Program

NOT PARTICIPATING
in the Community Rating System

Countywide Public Assistance received

$37K
Category A: Debris Removal

$187K
Category B: Protective Measures

$160K
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

2
Hazard Mitigation Grant Program

0
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

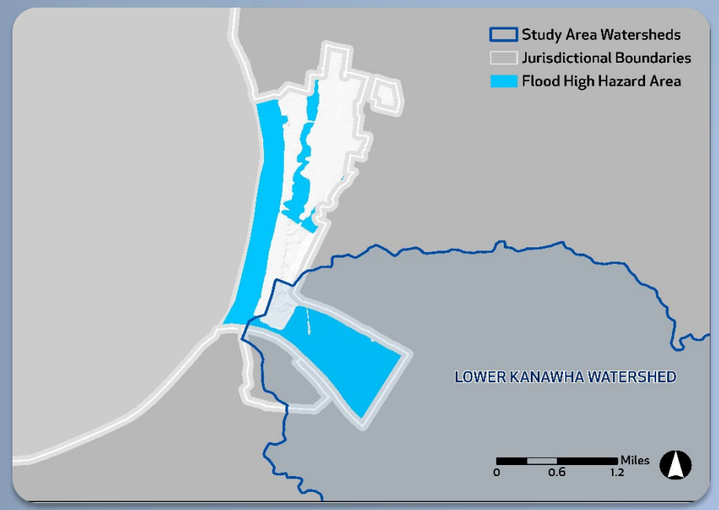
NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

[1] Flood Insurance Rate Map (FIRM)
[2] Since 1978
[3] Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

City of Point Pleasant/ Mason County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)



05/15/1978
Initial FIRM[1] date

12/03/2013
Effective FIRM date

$148K
Total paid losses[2]

31
Total paid claims[2]

8
Flood insurance policies in force

6
Policies in the effective flood high hazard area

2,230
Estimated structures in the community

105
Estimated structures in the flood high hazard area

1
Letters of Map Change

19
Flood-related countywide presidential disaster declarations

22
Paid claims outside of the effective flood high hazard area[2]

$100K
Repetitive Loss (RL) paid losses[2]

6
RL properties[2]

19%
of households spend 30% or more of their income on housing

4%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE ~YEAR 1 ~YEAR 5

- Discovery Meeting
- Flood Risk Review Meeting
- Preliminary Map Issuance
- Community Coordination & Outreach Meeting
- Appeal Period
- Letter of Final Determination
- Effective Maps

City of Point Pleasant/Mason, WV

Your Hazard Mitigation Plan has been approved through **April 25, 2023**, and now is the time to review it. Some projects you identified to reduce flood risk include the following:

- Work with the Army Corps of Engineers, FEMA, and the City of Point Pleasant to bring the flood wall into compliance.
- Identify areas in which stormwater backs up and determine the costs of corrective actions.
- Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects.

Find ideas to mitigate flood risk on fema.gov: https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf

Land Use Trend:
Small Town

06/12/1984
Date of Last CAV[4]

07/05/2018
Date of Last CAC[4]

PARTICIPATIN
Gin the National Flood Insurance Program

NOT PARTICIPATING
in the Community Rating System

Countywide Public Assistance received

$37K
Category A: Debris Removal

$187K
Category B: Protective Measures

$160K
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

2
Hazard Mitigation Grant Program

0
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

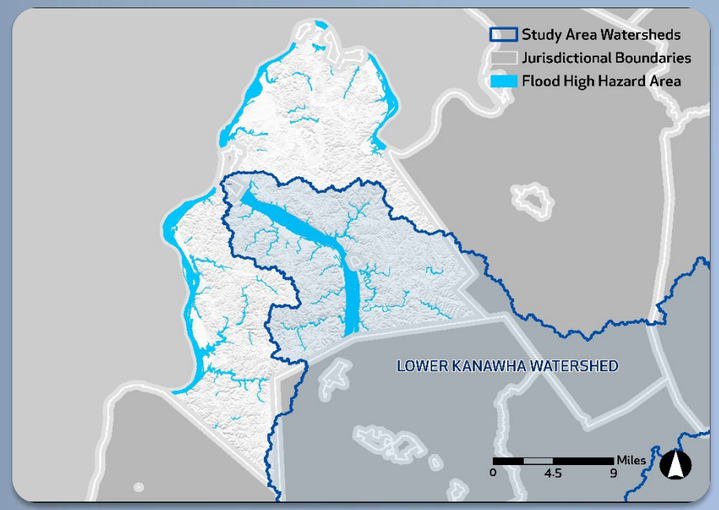
NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

[1] Flood Insurance Rate Map (FIRM)
[2] Since 1978
[3] Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

Mason County (Unincorporated Areas)/
Mason County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)



01/02/1980
Initial FIRM[1] date

12/03/2013
Effective FIRM date

$1.1M
Total paid losses[2]

110
Total paid claims[2]

73
Flood insurance policies in force

54
Policies in the effective flood high hazard area

14,750
Estimated structures in the community

1,430
Estimated structures in the flood high hazard area

21
Letters of Map Change

19
Flood-related countywide presidential disaster declarations

17
Paid claims outside of the effective flood high hazard area[2]

$782K
Repetitive Loss (RL) paid losses[2]

14
RL properties[2]

15%
of households spend 30% or more of their income on housing

8%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE — Discovery Meeting

~YEAR 1 — Flood Risk Review Meeting

Preliminary Map Issuance

Community Coordination & Outreach Meeting

Appeal Period

Letter of Final Determination

~YEAR 5 — Effective Maps

Mason County (Unincorporated Areas)/Mason, WV

Your Hazard Mitigation Plan has been approved through **April 25, 2023**, and now is the time to review it. Some projects you identified to reduce flood risk include the following:

- Work with the Army Corps of Engineers, FEMA, and the City of Point Pleasant to bring the flood wall into compliance.
- Support local government efforts to maintain compliance with the NFIP.
- Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects.
- Coordinate with the WVDOH to clear culverts that are causing flash flooding problems.
- Partner with appropriate agencies to support the 100-year based flood elevation design of critical roadways.

Find ideas to mitigate flood risk on fema.gov: https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf

Land Use Trend:
Rural

03/28/2014
Date of Last CAV[4]

07/05/2018
Date of Last CAC[4]

PARTICIPATING
in the National Flood Insurance Program

NOT PARTICIPATING
in the Community Rating System

Countywide Public Assistance received

$37K
Category A: Debris Removal

$187K
Category B: Protective Measures

$160K
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

2
Hazard Mitigation Grant Program

0
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

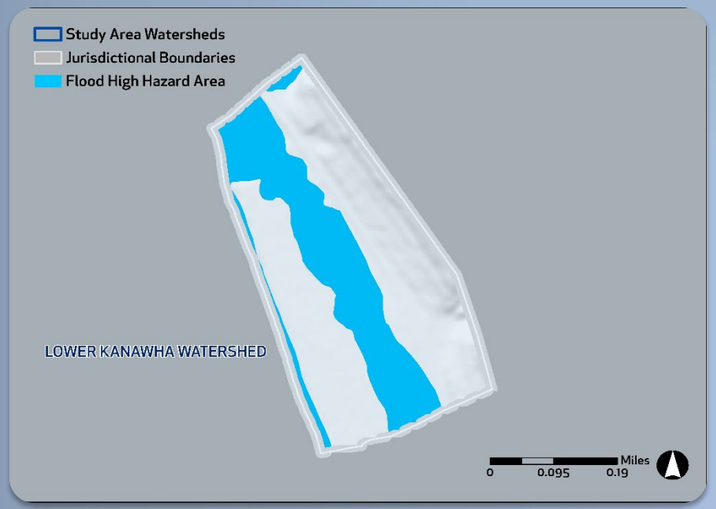
NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

[1] Flood Insurance Rate Map (FIRM)
[2] Since 1978
[3] Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

Town of Bancroft/Putnam County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)



12/18/1985
Initial FIRM[1] date

02/02/2012
Effective FIRM date

$28K
Total paid losses[2]

2
Total paid claims[2]

8
Flood insurance policies in force

8
Policies in the effective flood high hazard area

200
Estimated structures in the community

85
Estimated structures in the flood high hazard area

0
Letters of Map Change

21
Flood-related countywide presidential disaster declarations

0
Paid claims outside of the effective flood high hazard area[2]

$0
Repetitive Loss (RL) paid losses[2]

0
RL properties[2]

32%
of households spend 30% or more of their income on housing

36%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE ~YEAR 1 ~YEAR 5

- Discovery Meeting
- Flood Risk Review Meeting
- Preliminary Map Issuance
- Community Coordination & Outreach Meeting
- Appeal Period
- Letter of Final Determination
- Effective Maps

Town of Bancroft/Putnam, WV

Your Hazard Mitigation Plan expired on **May 22, 2022,** and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Purchase and install a backup generator for the sewer system.
- Continue to participate in the National Flood Insurance Program (NFIP).
- Continue to enforce current floodplain regulations.
- As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.

Find ideas to mitigate flood risk on fema.gov: https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf

Land Use Trend:
Small Town

04/29/1992
Date of Last CAV[4]

N/A
Date of Last CAC[4]

PARTICIPATING
in the National Flood Insurance Program

NOT PARTICIPATING
in the Community Rating System

Countywide Public Assistance received

$42K
Category A: Debris Removal

$281K
Category B: Protective Measures

$215K
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

5
Hazard Mitigation Grant Program

0
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

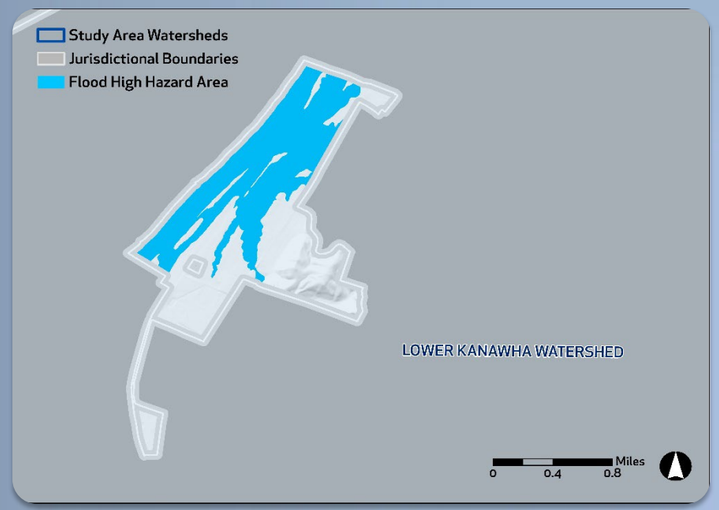
NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

[1] Flood Insurance Rate Map (FIRM)
[2] Since 1978
[3] Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

Town of Buffalo/Putnam County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)



12/18/1985
Initial FIRM[1] date

02/02/2012
Effective FIRM date

$2.5K
Total paid losses[2]

2
Total paid claims[2]

32
Flood insurance policies in force

31
Policies in the effective flood high hazard area

710
Estimated structures in the community

370
Estimated structures in the flood high hazard area

25
Letters of Map Change

21
Flood-related countywide presidential disaster declarations

0
Paid claims outside of the effective flood high hazard area[2]

$0
Repetitive Loss (RL) paid losses[2]

0
RL properties[2]

23%
of households spend 30% or more of their income on housing

51%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE — ~YEAR 1 — ~YEAR 5

- Discovery Meeting
- Flood Risk Review Meeting
- Preliminary Map Issuance
- Community Coordination & Outreach Meeting
- Appeal Period
- Letter of Final Determination
- Effective Maps

Town of Buffalo/Putnam, WV

Your Hazard Mitigation Plan expired on **May 22, 2022,** and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Continue to participate in the National Flood Insurance Program (NFIP).
- Continue to enforce current floodplain regulations.
- As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.

Find ideas to mitigate flood risk on fema.gov: https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf

Land Use Trend:
Small Town

04/29/1992
Date of Last CAV[4]

11/07/2011
Date of Last CAC[4]

PARTICIPATING
in the National Flood Insurance Program

NOT PARTICIPATING
in the Community Rating System

Countywide Public Assistance received

$42K
Category A: Debris Removal

$281K
Category B: Protective Measures

$215K
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

5
Hazard Mitigation Grant Program

0
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

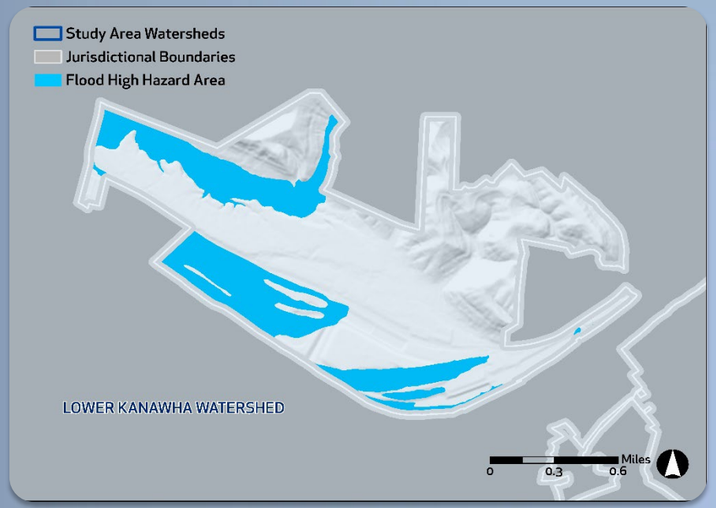
NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

[1] Flood Insurance Rate Map (FIRM)
[2] Since 1978
[3] Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

Town of Eleanor/Putnam County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)



12/06/1984
Initial FIRM[1] date

02/02/2012
Effective FIRM date

$5K
Total paid losses[2]

2
Total paid claims[2]

0
Flood insurance policies in force

0
Policies in the effective flood high hazard area

815
Estimated structures in the community

25
Estimated structures in the flood high hazard area

15
Letters of Map Change

21
Flood-related countywide presidential disaster declarations

0
Paid claims outside of the effective flood high hazard area[2]

$0
Repetitive Loss (RL) paid losses[2]

0
RL properties[2]

16%
of households spend 30% or more of their income on housing

1%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE — Discovery Meeting

~YEAR 1 — Flood Risk Review Meeting

Preliminary Map Issuance

Community Coordination & Outreach Meeting

Appeal Period

~YEAR 5 — Letter of Final Determination

Effective Maps

Town of Eleanor/Putnam, WV

Your Hazard Mitigation Plan expired on **May 22, 2022,** and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Permit process for residents to purchase proper size storm water drains to be installed by the town to reduce residential flooding.
- Continue to participate in the National Flood Insurance Program (NFIP).
- Continue to enforce current floodplain regulations.
- As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.

Find ideas to mitigate flood risk on fema.gov: https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf

Land Use Trend:
Small Town

11/15/1994
Date of Last CAV[4]

N/A
Date of Last CAC[4]

PARTICIPATING
in the National Flood Insurance Program

NOT PARTICIPATING
in the Community Rating System

Countywide Public Assistance received

$42K
Category A: Debris Removal

$281K
Category B: Protective Measures

$215K
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

5
Hazard Mitigation Grant Program

0
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

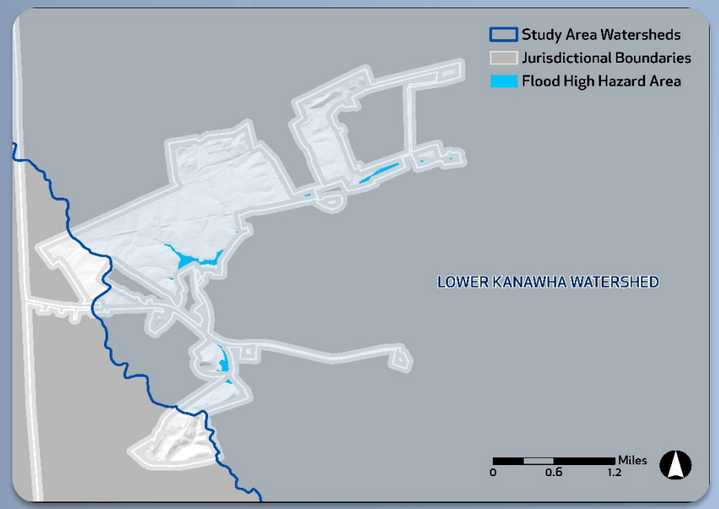
NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

[1] Flood Insurance Rate Map (FIRM)
[2] Since 1978
[3] Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

City of Hurricane/Putnam County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)



03/04/1986
Initial FIRM[1] date

02/02/2012
Effective FIRM date

$332K
Total paid losses[2]

17
Total paid claims[2]

10
Flood insurance policies in force

2
Policies in the effective flood high hazard area

2,805
Estimated structures in the community

25
Estimated structures in the flood high hazard area

14
Letters of Map Change

21
Flood-related countywide presidential disaster declarations

14
Paid claims outside of the effective flood high hazard area[2]

$221K
Repetitive Loss (RL) paid losses[2]

4
RL properties[2]

28%
of households spend 30% or more of their income on housing

1%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE — ~YEAR 1 — ~YEAR 5

- Discovery Meeting
- Flood Risk Review Meeting
- Preliminary Map Issuance
- Community Coordination & Outreach Meeting
- Appeal Period
- Letter of Final Determination
- Effective Maps

City of Hurricane/Putnam, WV

Your Hazard Mitigation Plan expired on **May 22, 2022,** and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Continue to participate in the National Flood Insurance Program (NFIP).
- Continue to enforce current floodplain regulations.
- As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.

Find ideas to mitigate flood risk on fema.gov: https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf

Land Use Trend:
Suburban

07/13/2010
Date of Last CAV[4]

N/A
Date of Last CAC[4]

PARTICIPATING
in the National Flood Insurance Program

NOT PARTICIPATING
in the Community Rating System

Countywide Public Assistance received

$42K
Category A: Debris Removal

$281K
Category B: Protective Measures

$215K
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

5
Hazard Mitigation Grant Program

0
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

[1] Flood Insurance Rate Map (FIRM)
[2] Since 1978
[3] Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

Town of Poca/Putnam County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)

12/18/1985
Initial FIRM[1] date

02/02/2012
Effective FIRM date

$29K
Total paid losses[2]

17
Total paid claims[2]

15
Flood insurance policies in force

8
Policies in the effective flood high hazard area

505
Estimated structures in the community

60
Estimated structures in the flood high hazard area

14
Letters of Map Change

21
Flood-related countywide presidential disaster declarations

1
Paid claims outside of the effective flood high hazard area[2]

$22K
Repetitive Loss (RL) paid losses[2]

3
RL properties[2]

15%
of households spend 30% or more of their income on housing

11%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE — ~YEAR 1 — ~YEAR 5

- Discovery Meeting
- Flood Risk Review Meeting
- Preliminary Map Issuance
- Community Coordination & Outreach Meeting
- Appeal Period
- Letter of Final Determination
- Effective Maps

Town of Poca/Putnam, WV

Your Hazard Mitigation Plan expired on **May 22, 2022,** and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Continue to participate in the National Flood Insurance Program (NFIP).
- Continue to enforce current floodplain regulations
- As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.

Find ideas to mitigate flood risk on fema.gov: https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf

Land Use Trend:
Small Town

04/27/1992
Date of Last CAV[4]

N/A
Date of Last CAC[4]

PARTICIPATING
in the National Flood Insurance Program

NOT PARTICIPATING
in the Community Rating System

Countywide Public Assistance received

$42K
Category A: Debris Removal

$281K
Category B: Protective Measures

$215K
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

5
Hazard Mitigation Grant Program

0
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

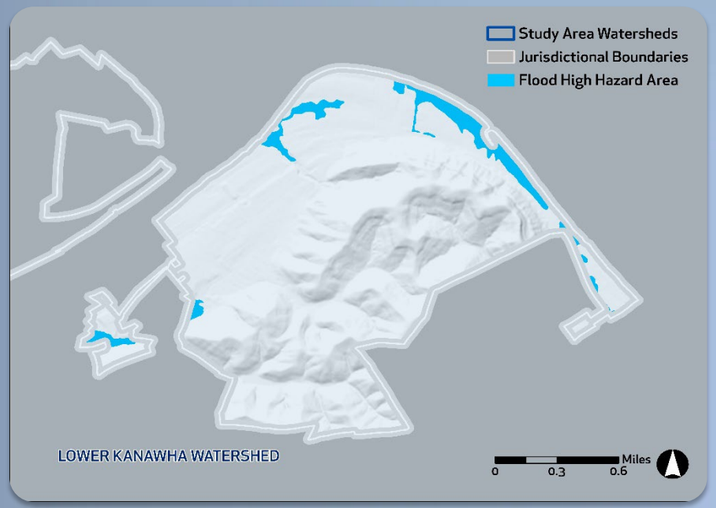
NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

[1] Flood Insurance Rate Map (FIRM)
[2] Since 1978
[3] Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

Town of Winfield/Putnam County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)



12/18/1985
Initial FIRM[1] date

02/02/2012
Effective FIRM date

$15K
Total paid losses[2]

4
Total paid claims[2]

37
Flood insurance policies in force

25
Policies in the effective flood high hazard area

975
Estimated structures in the community

130
Estimated structures in the flood high hazard area

28
Letters of Map Change

21
Flood-related countywide presidential disaster declarations

3
Paid claims outside of the effective flood high hazard area[2]

$0
Repetitive Loss (RL) paid losses[2]

0
RL properties[2]

16%
of households spend 30% or more of their income on housing

10%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE — Discovery Meeting

~YEAR 1 — Flood Risk Review Meeting

Preliminary Map Issuance

Community Coordination & Outreach Meeting

Appeal Period

Letter of Final Determination

~YEAR 5 — Effective Maps

Town of Winfield/Putnam, WV

Your Hazard Mitigation Plan expired on **May 22, 2022,** and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Permit process for new structures to ensure compliance with floodplain regulations.
- Continue to participate in the National Flood Insurance Program (NFIP).
- Continue to enforce current floodplain regulations.
- As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.

Find ideas to mitigate flood risk on fema.gov: https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf

Land Use Trend:
Small Town

07/15/2010
Date of Last CAV[4]

N/A
Date of Last CAC[4]

Countywide Public Assistance received

$42K
Category A: Debris Removal

$281K
Category B: Protective Measures

$215K
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

5
Hazard Mitigation Grant Program

0
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

PARTICIPATING
in the National Flood Insurance Program

NOT PARTICIPATING
in the Community Rating System

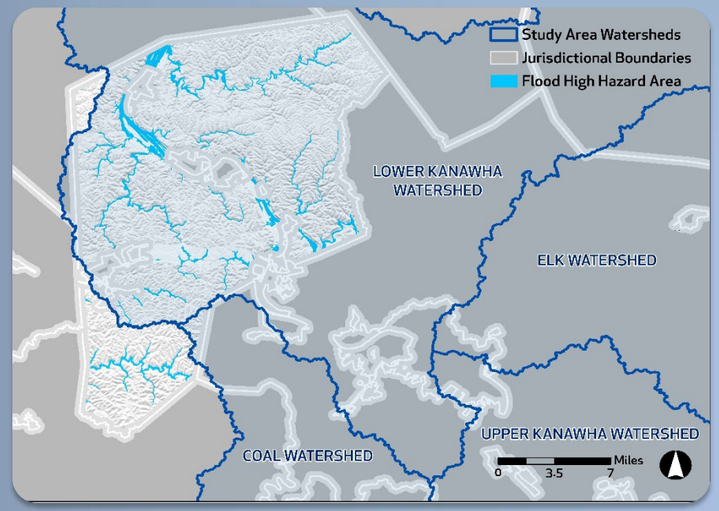
NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

[1] Flood Insurance Rate Map (FIRM)
[2] Since 1978
[3] Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

Putnam County (Unincorporated Areas)/

Putnam County, WV **KNOW YOUR RISK** (The information presented below are estimates as of August 2022.)



06/18/1987
Initial FIRM[1] date

02/02/2012
Effective FIRM date

$2.6M
Total paid losses[2]

218
Total paid claims[2]

261
Flood insurance policies in force

155
Policies in the effective flood high hazard area

23,320
Estimated structures in the community

2,160
Estimated structures in the flood high hazard area

255
Letters of Map Change

21
Flood-related countywide presidential disaster declarations

92
Paid claims outside of the effective flood high hazard area[2]

$1.4M
Repetitive Loss (RL) paid losses[2]

46
RL properties[2]

13%
of households spend 30% or more of their income on housing

9%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE — ~YEAR 1 — ~YEAR 5

- Discovery Meeting
- Flood Risk Review Meeting
- Preliminary Map Issuance
- Community Coordination & Outreach Meeting
- Appeal Period
- Letter of Final Determination
- Effective Maps

Putnam County (Unincorporated Areas)/Putnam, WV

Your Hazard Mitigation Plan expired on **May 22, 2022,** and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
- Support the efforts of volunteer groups, state agencies, and other interested parties to clear stream banks, drainage ditches, and other areas of debris.
- Perform channel modifications to increase flow capacities of rivers and streams when funds are available.
- Continue to work with non-governmental organizations (youth service, professional, etc.) to promote mitigation education and awareness.
- Work with the WV Department of Transportation to identify areas of frequent roadway flooding and develop mitigation strategies.
- Provide training to engineers and surveyors on the new elevation certificate.
- Provide training to the insurance agents and banking institutions within the county.
- Provide outreach to the citizens of Putnam County on flood insurance and mitigation options.

Find ideas to mitigate flood risk on fema.gov: https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf

Land Use Trend:
Rural

11/19/2014
Date of Last CAV[4]

07/24/2007
Date of Last CAC[4]

PARTICIPATING
in the National Flood Insurance Program

PARTICIPATING
in the Community Rating System

Countywide Public Assistance received

$42K
Category A: Debris Removal

$281K
Category B: Protective Measures

$215K
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

5
Hazard Mitigation Grant Program

0
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

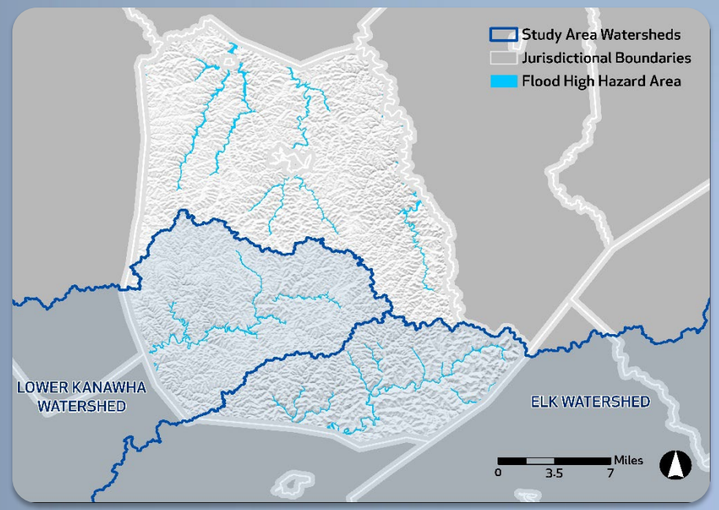
NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

[1] Flood Insurance Rate Map (FIRM)
[2] Since 1978
[3] Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

Roane County (Unincorporated Areas)/Roane County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)



09/10/1984
Initial FIRM[1] date

03/02/2012
Effective FIRM date

$2.2M
Total paid losses[2]

83
Total paid claims[2]

83
Flood insurance policies in force

40
Policies in the effective flood high hazard area

9,095
Estimated structures in the community

910
Estimated structures in the flood high hazard area

73
Letters of Map Change

23
Flood-related countywide presidential disaster declarations

46
Paid claims outside of the effective flood high hazard area[2]

$620K
Repetitive Loss (RL) paid losses[2]

11
RL properties[2]

19%
of households spend 30% or more of their income on housing

9%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE — ~YEAR 1 — ~YEAR 5

- Discovery Meeting
- Flood Risk Review Meeting
- Preliminary Map Issuance
- Community Coordination & Outreach Meeting
- Appeal Period
- Letter of Final Determination
- Effective Maps

Roane County (Unincorporated Areas)/Roane, WV

Your Hazard Mitigation Plan expired on **December 4, 2021,** and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Roane County will continue to seek out opportunities to apply for Hazard Mitigation Assistance (HMA) funds for mitigation reconstruction, elevations, relocations, or acquisitions or identified at risk, repetitive loss, non-repetitive loss, substantial damaged, partially or completely demolished or destroyed properties within the County. If mitigation reconstruction is chosen, properties identified as partially or completely demolished, outside of the regulatory floodway, as identified by available flood hazard data, will be reconstructed in accordance with the standards established in the local floodplain ordinance and in accordance with the same conditions as an elevated structure. The County will comply with all acquisition, elevation, relocation, and mitigation reconstruction requirements, as per the HMA Guidance.
- The Roane County 911/OES and EMS Centers are currently located in a floodplain and were flooded to the point of evacuation 2012. The Center needs to be relocated to a more secure location.
- Evaluate and formulate action plan to conduct flood mitigating buyouts for repeatedly flooded single family properties located in Spencer along Bens Run.
- Relocate the Reedy VFD as it is susceptible to flooding.
- Explore and conduct flood mitigation buyouts in the greater Roane County along Spring Creek, Pidgeon Run, Little Pidgeon Run, Big Sandy Creek, and Hurricane Creek
- Establish position in Roane County to enforce permit requirements for mobile homes to ensure that they are not established in flood plains and are installed or anchored correctly to prevent damage during wind events.

Find ideas to mitigate flood risk on fema.gov: https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf

Land Use Trend:
Rural

N/A
Date of Last CAV[4]

08/22/2017
Date of Last CAC[4]

PARTICIPATING
in the National Flood Insurance Program

NOT PARTICIPATING
in the Community Rating System

Countywide Public Assistance received

$303K
Category A: Debris Removal

$185K
Category B: Protective Measures

$1.9M
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

0
Hazard Mitigation Grant Program

0
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

[1] Flood Insurance Rate Map (FIRM)
[2] Since 1978
[3] Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

APPENDIX B | ACRONYMS AND ABBREVIATIONS

ACRONYM	DEFINITION
CAC	Community Assistance Contact
CAV	Community Assistance Visit
CCO	Consultation Coordination Officer
CHHA	Coastal High Hazard Area
CIS	Community Information System
CNMS	Coordinated Needs Management Strategy
CRS	Community Rating System
DR	Presidential Major Disaster Declaration
EM	Presidential Emergency Declaration
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FMA	Flood Mitigation Assistance
GIS	Geographic Information System
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
IHP	Individual and Households Program
LiDAR	Light Detection and Ranging
LOMA	Letter of Map Amendment
LOMC	Letter of Map Change
LOMR	Letter of Map Revision
MIP	Mapping Information Platform
MLI	Mid-Term Levee Inventory
MSC	Map Service Center
NFHL	National Flood Hazard Layer
NFIP	National Flood Insurance Program
NRCS	Natural Resources Conservation Service
PDM	Pre-Disaster Mitigation
Risk MAP	Risk Mapping, Assessment, and Planning
SFHA	Special Flood Hazard Area
STN	Short-Term Network
TEIF	Total Exposure in Floodplain
TGA	Targeted Growth Area
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
VDEM	Virginia Department of Emergency Management
WSEL	Water-Surface Elevation

APPENDIX C | REFERENCES

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APPENDIX D | GLOSSARY

0.2-Percent-Annual-Chance Flood – The flood elevation that has a 0.2-percent chance of being equaled or exceeded each year. Sometimes referred to as the 500-year flood.

1-Percent-Annual-Chance Flood – The flood elevation that has a 1-percent chance of being equaled or exceeded each year. Sometimes referred to as the 100-year flood.

Approximate Stream Miles – Refers to areas mapped with approximate study methods. Approximate study methods show the approximate outline of the base floodplain, but generally do not produce a base flood elevation. These studies are performed in areas with little or no development or expectation of development.

Base Flood Elevation (BFE) – Elevation of the 1-percent-annual-chance flood. This elevation is the basis of the insurance and floodplain management requirements of the NFIP.

Cfs – Cubic feet per second, the unit by which discharges are measured (a cubic foot of water is about 7.5 gallons).

Community Assistance Contact (CAC) – The CAC is a telephone call or brief visit to an NFIP community for the purpose of establishing or re-establishing contact to determine if any program-related problems exist and to offer assistance.

Community Assistance Visit (CAV) – A CAV is a scheduled visit to an NFIP community for the purpose of conducting a comprehensive assessment of the community's floodplain management program. A CAV typically involves a tour of the floodplain, a meeting with local floodplain management officials, a review of the community's floodplain management ordinances, an examination of the community's floodplain development permit and variance files, and a meeting with the community to discuss any identified deficiencies, offer technical assistance, help address any deficiencies, and identify good floodplain management practices.

Comprehensive Plans – Local comprehensive plans, also referred to as master plans or general plans, provide a framework for the physical design and development of a community over a long-term planning horizon.

Critical Facilities – Facilities that, if damaged, would present an immediate threat to life, public health, and safety. Critical facilities may include hospitals, emergency operations centers, police stations, fire stations, and schools.

Dam – An artificial barrier that has the ability to impound water, wastewater, or any liquid-borne material, for the purpose of storage or control of water.

Detailed Stream Miles – Refers to areas mapped with detailed study methods. Detailed studies use hydrologic and hydraulic methods that produce BFEs, floodways, and other pertinent flood data. These studies are performed in developed areas and in areas experiencing rapid growth.

Flood – A general and temporary condition of partial or complete inundation of normally dry land areas from (1) the overflow of inland or tidal waters or (2) the unusual and rapid accumulation or runoff of surface waters from any source.

Flood Insurance Rate Map (FIRM) – An official map of a community, on which FEMA has delineated both the SFHAs and the risk premium zones applicable to the community.

APPENDIX D | GLOSSARY

Flood Insurance Study (FIS) Report – Contains an examination, evaluation, and determination of the flood hazards of a community and, if appropriate, the corresponding water-surface elevations.

Flood Risk – Probability multiplied by consequence; the degree of probability that a loss or injury may occur as a result of flooding. This is sometimes referred to as flood vulnerability.

Floodplain – The land adjoining the channel of a river, stream, ocean, lake, or other watercourse or water body that is susceptible to flooding.

Floodplain Boundary Tie-Ins – Refers to the contiguity of floodplain boundaries along the edges of the Risk MAP project study area. Areas where a significant mismatch, gap, or overlap is identified must be addressed to create a seamless transition.

Freeboard – A factor of safety usually expressed in feet above a flood level for purposes of floodplain management. "Freeboard" tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed.

Hazard Mitigation Plan (HMP) – A community's HMP documents the findings of its risk assessment and the long-term strategies it will pursue to reduce the effects of disasters on people, property, and the environment.

HEC-RAS – A computer modeling software used to conduct a hydraulic study, which produces flood elevations, velocities, and floodplain widths.

Letter of Map Amendment (LOMA) – One type of LOMC. Typically, a LOMA is issued when the scale of the FIRM does not allow for small areas of natural high ground to be shown outside the SFHA.

Letter of Map Change (LOMC) – A letter that reflects an official revision and/or an amendment to an effective FIRM, which has various uses. If a property owner thinks their property has been inadvertently mapped in an SFHA, property owners or their representatives may submit a request to FEMA for a LOMC. In another use, FEMA issues LOMCs in place of physically revising an effective FIRM.

Letter of Map Revision (LOMR) – One type of LOMC. LOMRs are generally based on the implementation of physical measures that affect the hydrologic or hydraulic characteristics of a flooding source and thus result in the modification of the existing regulatory floodway, the effective BFEs, or the SFHA. The LOMR officially revises the FIRM.

Levee – A human-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to reduce risk from temporary flooding.

Light Detection and Ranging (LiDAR) – A remote sensing technology that produces highly accurate and dense elevation data. FEMA uses LiDAR data to create digital elevation models for hydraulic modeling of floodplains, digital terrain maps, and other NFIP products.

National Flood Insurance Program (NFIP) – The program of flood insurance coverage and floodplain management administered under the National Flood Insurance Act of 1968 and any amendments to it, and

applicable Federal regulations promulgated in Title 44 of the Code of Federal Regulations, Subchapter B.

Orthophotography – Orthophotography data typically are high-resolution aerial images that combine the visual attributes of an aerial photograph with the spatial accuracy and reliability of a planimetric map.

Redelineated Stream Miles – Refers to areas that are remapped using more detailed topographic data than that used to prepare the effective FIRM. Redelineation is a useful technique for updating flood hazard information when effective discharges and BFEs appear accurate, but the SFHA seems inaccurate.

Repetitive Loss (RL) Building – Any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period, since 1978. An RL property may or may not be currently insured by the NFIP.

Risk Mapping, Assessment, and Planning (Risk MAP) – A FEMA strategy to work collaboratively with State, local, and Tribal entities to deliver quality flood data that increases public awareness and leads to action that reduces risk to life and property.

Riverine – Of, or produced by, a river. Riverine floodplains have readily identifiable channels.

Special Flood Hazard Area (SFHA) – Portion of the floodplain subject to inundation by the 1-percent-annual-chance or base flood.

Stafford Act – Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-707, signed into law November 23, 1988; amended the Disaster Relief Act of 1974, PL 93-288. This Act constitutes the statutory authority for most Federal disaster response activities, especially as they pertain to FEMA and FEMA programs.

Substantial Damage – Damage of any origin sustained by a structure whereby the cost of restoring the structure to its pre-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

Total Exposure in Floodplain (TEIF) – An analysis of the total potential economic losses (exposure) in the SFHA.

Watershed – An area that drains into a lake, stream, or other body of water.

Zone A – Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no BFEs or flood depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.

Zone AE – Areas subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods. BFEs are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.

Zone AO – Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet. Average flood depths derived from detailed hydraulic analyses are shown in this zone. Mandatory flood insurance purchase requirements

and floodplain management standards apply. Some Zone AO have been designated in areas with high flood velocities such as alluvial fans and washes. Communities are encouraged to adopt more restrictive requirements for these areas.

Zone AH – Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between one and three feet. BFEs derived from detailed hydraulic analyses are shown in this zone. Mandatory flood insurance purchase requirements and floodplain management standards apply.

APPENDIX E | ADDITIONAL DATA

a. Data Collection for the Lower Kanawha Watershed

Data Types	Deliverable/Product	Source
Average Annual Loss	Discovery Map Geodatabase	FEMA's Hazus Average Annualized Loss Viewer
Boundaries: Community	Discovery Map Geodatabase	Flood Insurance Rate Map (FIRM) Databases
Boundaries: County and State	Discovery Map Geodatabase	U.S. Census
Boundaries: Watershed	Discovery Map Geodatabase	U.S. Geological Survey (USGS)
Census Blocks	Discovery Map Geodatabase	U.S. Census
Comprehensive Plan Summary	Discovery Report, Community Dashboards	City, County, and Town Planning Commissions
CRS Participation	Discovery Report, Community Dashboards	FEMA Community Information System (CIS)
Dams	Discovery Map Geodatabase, Discovery Report, Community Dashboard	U.S. Army Corps of Engineers (USACE) National Dam Inventory
Declared Disasters	Discovery Report, Community Dashboards	Disaster Declaration Database
Effective Floodplains: Special Flood Hazard Areas (SFHAs)	Discovery Map Geodatabase	FEMA's National Flood Hazard Layer (NFHL) from the Flood Map Service Center (MSC)
Hazard Mitigation Assistance Grants	Discovery Report, Community Dashboards	FEMA Region III's Database
Identified Mitigation Actions	Discovery Map Geodatabase, Discovery Report, Community Dashboard	Planning District Commission Hazard Mitigation Plans
Individual Assistance	Discovery Report	FEMA Individuals and Households Program Database
Letters of Map Change	Discovery Map Geodatabase, Discovery Report, Community Dashboard	FEMA's Mapping Information Platform (MIP)
Levee Inventory	Discovery Map Geodatabase, Discovery Report, Community Dashboard	FEMA's National Levee Inventory Map
Mitigation Plan Status and Summary	Discovery Report, Community Dashboard	Planning District Commissions
National Hydrography Stream Data	Discovery Map Geodatabase	FEMA's NFHL
NFIP Participation	Discovery Report, Community Dashboard	CIS
Population and Socioeconomic Characteristics	Discovery Report, Community Dashboard	U.S. Census Bureau
Public Assistance	Discovery Report	FEMA Public Assistance Database
Stream Gages	Discovery Map Geodatabase, Discovery Report, Community Dashboard	USGS
Structures	Discovery Map Geodatabase, Community Dashboard	FEMA's NFHL
Study Needs: FEMA	Discovery Map Geodatabase, Discovery Report	CNMS
Topography	Discovery Map Geodatabase	See Table b.
Total Exposure in Floodplain (TEIF)	Discovery Map Geodatabase, Discovery Report	Region III TEIF Database
Transportation: Roads and Railroads	Discovery Map Geodatabase	U.S. Census

APPENDIX E | ADDITIONAL DATA

b. List of Topographic Data Sources by County

County or City	Source	Date	Website
Jackson County	2018 FEMA Region III Southcentral (West Lot) QL2 LiDAR	2018	Pending
Kanawha County	2018 FEMA Region III Southcentral (Central Lot) QL2 LiDAR	2018	Pending
Kanawha County	2018 FEMA Region III Southcentral (West Lot) QL2 LiDAR	2018	Pending
Kanawha County	2016 FEMA Region III 3DEP WV East QL2 LiDAR	2016	http://data.wvgis.wvu.edu/elevation/
Mason County	2017 FEMA Region III QL2 LiDAR	2017	Pending
Mason County	2018 FEMA HQ QL2 LiDAR	2018	Pending
Putnam County	2017 FEMA Region III QL2 LiDAR	2020	Pending
Putnam County	2018 FEMA HQ QL2 LiDAR	2018	Pending
Roane County	2018 FEMA HQ QL2 LiDAR	2018	Pending

c. Results of CNMS Showing Flood Study Validity

County	Detailed Study Stream Mileage			Approximate Study Stream Mileage			Redelineated Study Stream Mileage		
	Unverified	Unknown	Valid	Unverified	Unknown	Valid	Unverified	Unknown	Valid
Jackson County	5.22	0	12.22	30.63	0	0	0	0	0
Kanawha County	5.53	0	11.52	172.82	0	0.75	81.15	0	0
Mason County	0	0	1.18	37.21	0	0	1.86	0	48.83
Putnam County	88.86	0	0	79.68	0	0	5.56	0	12.39
Roane County	0	0	0	42.52	0	0	0	0	0
Total	99.61	0	12.70	362.85	0	0.75	88.56	0	61.22

Valid: Study is accurate per known data
Unknown: Validity needs to be assessed
Unverified: Study needs to be updated

APPENDIX E | ADDITIONAL DATA

d. Dams in the Watershed by County

County	Total
Cabell County	0
Jackson County	1
Kanawha County	10
Mason County	0
Putnam County	12
Roane County	2
Total	25

e. Levees in the Watershed by County

County	Total
Cabell County	0
Jackson County	0
Kanawha County	0
Mason County	1
Putnam County	0
Roane County	0
Total	1

f. Stream Gage Information

Gage ID	Gage Location	County	Years of Record
03198000	Kanawha River at Charleston, WV	Kanawha	81
03201000	Pocatalico River at Sissonville, WV	Kanawha	59
03201405	Hurricane Creek at Hurricane, WV	Putnam	22

g. County Border Special Flood Hazard Area Floodplain Boundary Tie-In Issues

County Border	Issue/Problem	Stream Reach	Latitude	Longitude
Putnam-Mason	Flood Zones Misaligned / Mismatched	Kanawha River	38° 39' 14.828" N	81° 57' 41.082" W
Putnam-Mason	Flood Zones Mismatched	Mudlick Fork	38° 40' 34.082" N	81° 48' 38.572" W
Mason-Jackson	Flood Zones Mismatched	Thirteenmile Creek	38° 43' 21.064" N	81° 48' 14.822" W
Mason-Jackson	Flood Zones Misaligned	NP	38° 44' 36.429" N	81° 48' 0.230" W
Putnam-Kanawha	Flood Zones Misaligned	Pocatalico River	38° 27' 57.969" N	81° 43' 39.785" W
Putnam-Kanawha	Flood Zones Mismatched	Pocatalico River	38° 26' 46.765" N	81° 46' 45.433" W
Putnam-Kanawha	Flood Zones Mismatched	Kanawha River	38° 25' 12.365" N	81° 51' 20.316" W
Kanawha-Jackson	Flood Zones Mismatched	Dog Fork	38° 36' 55.770" N	81° 41' 14.087" W
Kanawha-Jackson	Flood Zones Misaligned	Pocatalico Creek	38° 33' 30.769" N	81° 37' 54.786" W
Kanawha-Roane	Flood Zones Mismatched	Pocatalico River	38° 34' 37.710" N	81° 29' 57.520" W

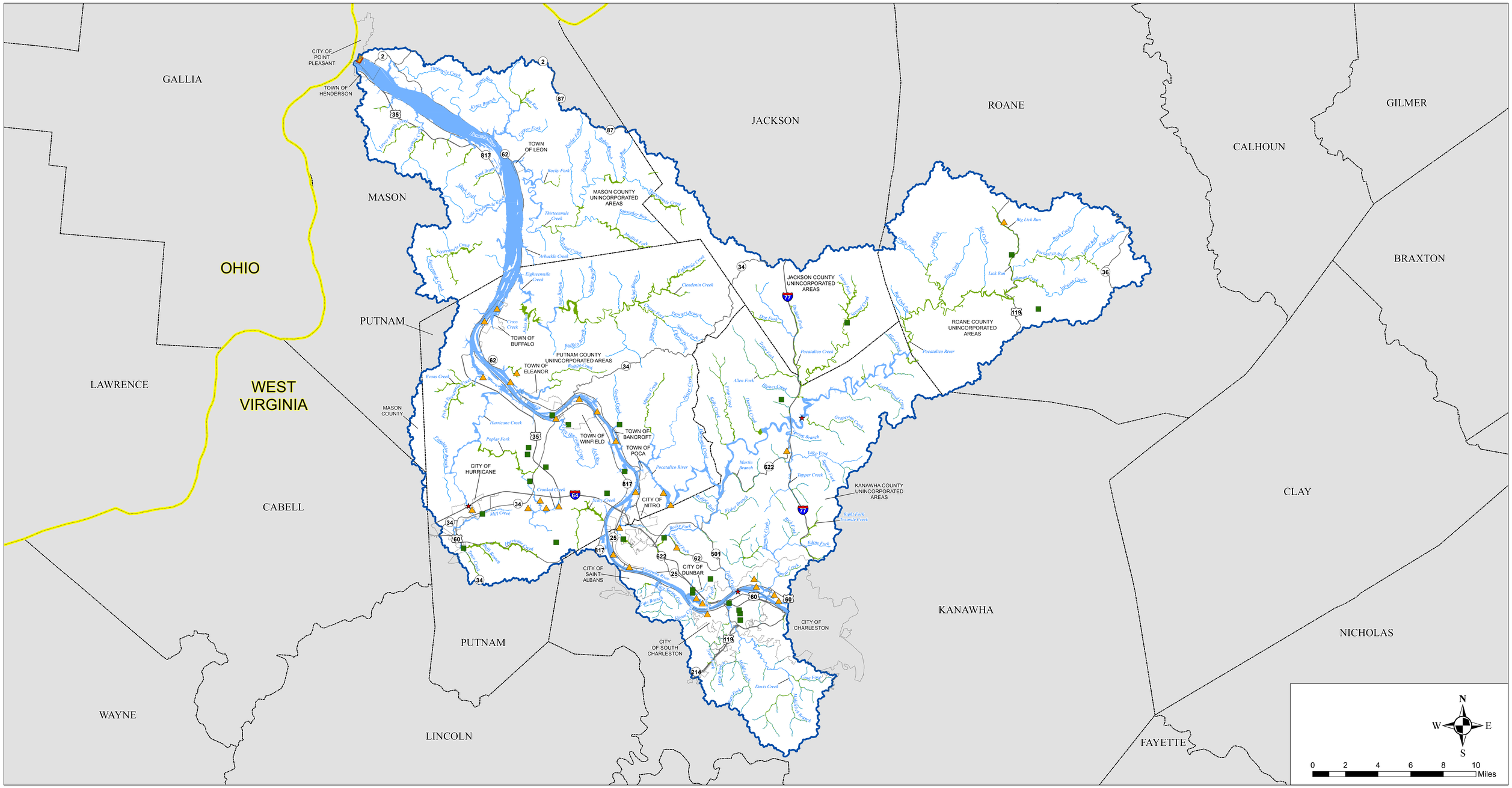
h. LOMCs Identified in the Watershed by Jurisdiction

Jurisdiction	Number of Letters of Map Amendment	Number of Letters of Map Revision	Number of Letters of Map Change
Jackson County	6	0	6
Kanawha County	96	1	97
Mason County	2	0	2
Putnam County	240	0	240
Roane County	12	0	12
City of Charleston	45	0	45
City of Dunbar	66	0	66
City of Hurricane	15	0	15
City of Nitro	47	0	47
City of Point Pleasant	0	0	0
City of Saint Albans	11	0	11
City of South Charleston	13	0	13
Town of Bancroft	0	0	0
Town of Buffalo	25	0	25
Town of Eleanor	15	0	15
Town of Henderson	0	0	0
Town of Leon	0	0	0
Town of Poca	14	0	14
Town of Winfield	27	0	27
Total	634	1	635

[1] Count reflects the number in the watershed for the entire county, not just the county unincorporated areas.

APPENDIX F | DISCOVERY MAPS

Flood Risk: *Lower Kanawha Watershed*

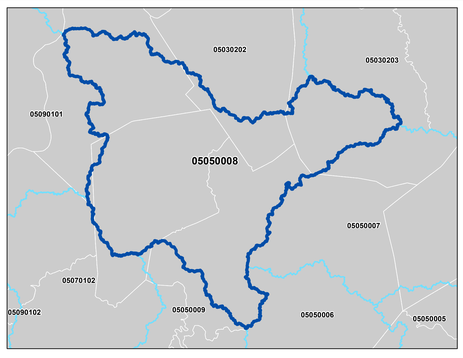


MAP SYMBOLOGY

Effective Special Flood Hazard Area

- Zone A (Approximate 1% Annual Chance)
- Zone AE (Detailed 1% Annual Chance)
- Zone X (Reduced Flood Risk Due to Levee)
- Dam (National Inventory of Dams)
- LOMC (Letter of Map Change) Clusters (4+)
- USGS Stream Gage
- Watershed Boundary
- State Boundary
- Municipal Boundary
- County Boundary
- Stream Line
- Major Road and Highway
- Levee (National Levee Inventory)

WATERSHED LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD RISK DISCOVERY MAP

LOWER KANAWHA WATERSHED

Study Area:

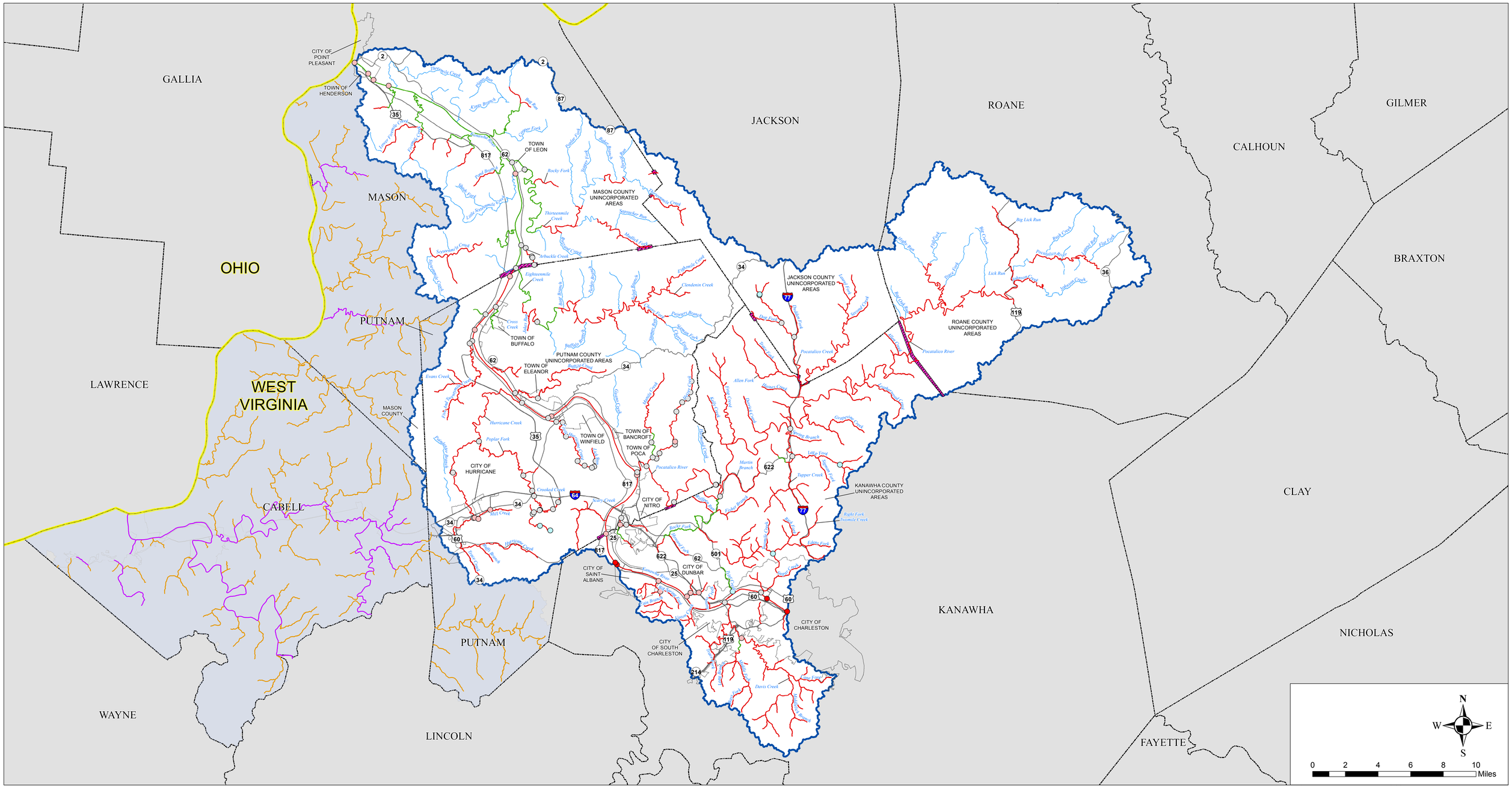
JACKSON COUNTY, WV
KANAWHA COUNTY, WV
MASON COUNTY, WV
PUTNAM COUNTY, WV
ROANE COUNTY, WV

FEMA

HUC-8 Code
05050008

RELEASE DATE
JANUARY 2024

Mapping Needs: *Lower Kanawha Watershed*



MAP SYMBOLOGY

Coordinated Needs Management Strategy (CNMS) Validation Status

- NVUE COMPLIANT
- TO BE STUDIED

FIS Discharge Standard Deviation from Regression Equation

-2 -1 0 1 2

FY 2021 RTO Scope

- BEING STUDIED - ZONE AE
- BEING STUDIED - ZONE A

Other

- Watershed Boundary
- State Boundary
- Municipal Boundary
- County Boundary
- Stream Line
- Major Road and Highway
- Special Flood Hazard Area Matching Issues
- FY 2021 RTO Project Area

ELEVATION DATA AVAILABLE FOR THE LOWER KANAWHA WATERSHED

USGS acquired FEMA Region III 3DEP WV Northeast QL2 LiDAR data for Kanawha County in 2016.

USGS acquired FEMA Region III QL2 LiDAR data for Putnam and Mason County in 2017.

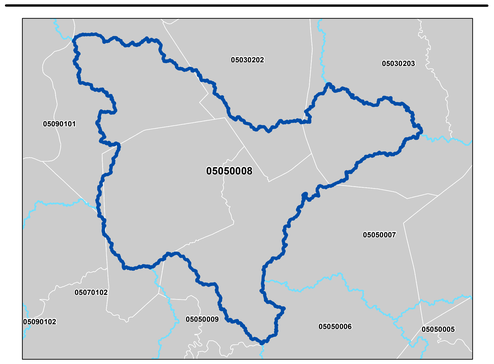
USGS acquired FEMA HQ QL2 LiDAR data for Putnam, Roane, and Mason County in 2018.

USGS acquired FEMA Region III Southcentral (Central Lot) QL2 LiDAR data for Kanawha County in 2018.

USGS acquired FEMA Region III Southcentral (West Lot) QL2 LiDAR data for Jackson and Kanawha County in 2018.

All sources listed above are pending publication.

WATERSHED LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD RISK DISCOVERY MAP

LOWER KANAWHA WATERSHED

Study Area:

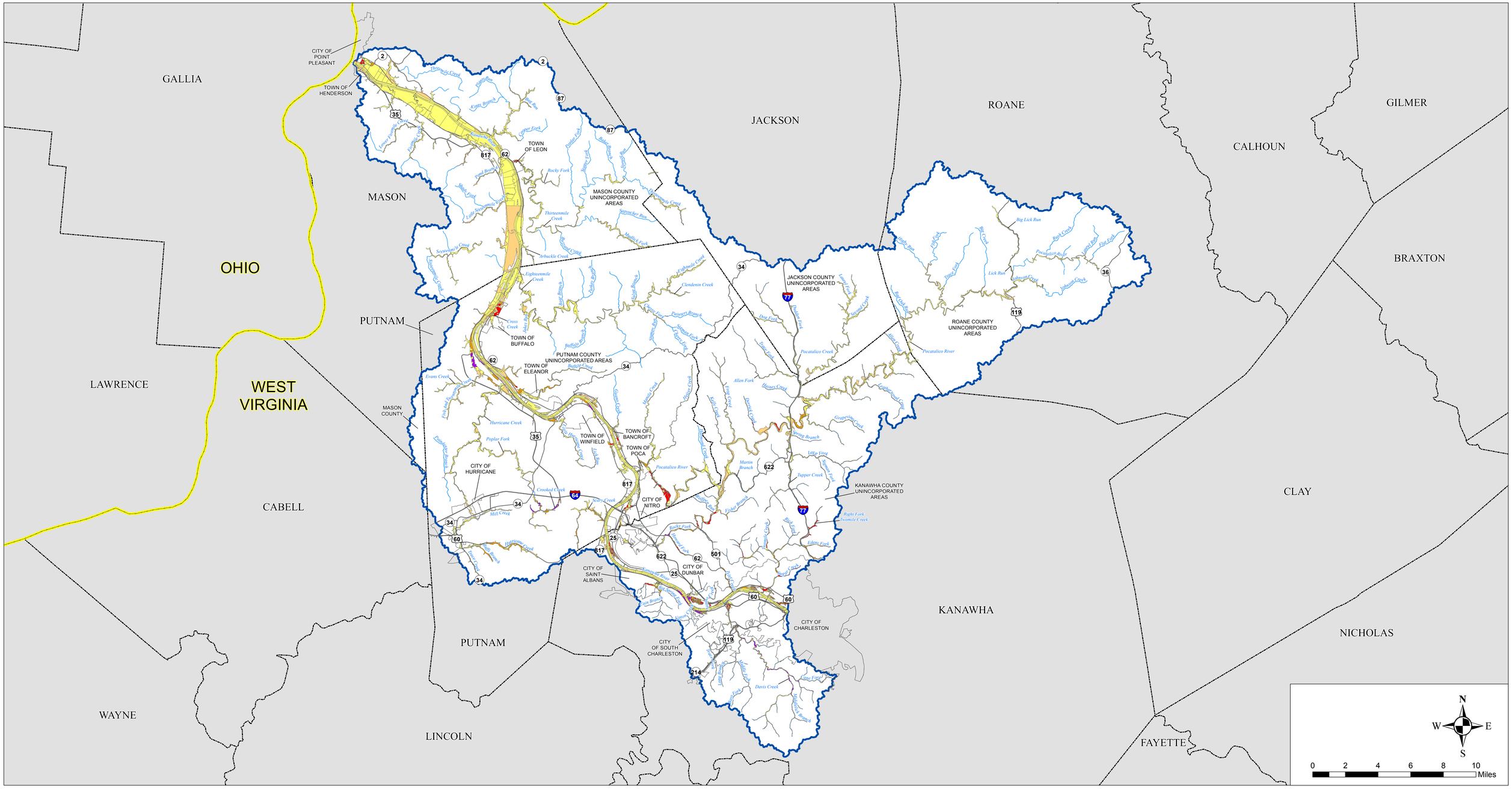
JACKSON COUNTY, WV
KANAWHA COUNTY, WV
MASON COUNTY, WV
PUTNAM COUNTY, WV
ROANE COUNTY, WV

FEMA

HUC-8 Code
05050008

RELEASE DATE
JANUARY 2024

Potential Loss: *Lower Kanawha Watershed*



MAP SYMBOLOGY

Total Exposure in Floodplain (TEIF) Loss
(per census block):

- Very Low
- Low
- Medium
- High
- Very High

- Watershed Boundary
- State Boundary
- Municipal Boundary
- County Boundary
- Stream Line
- Major Road and Highway

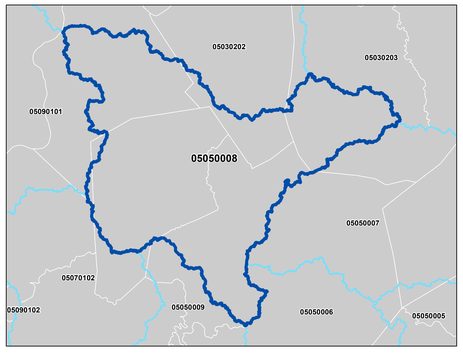
NUMBER OF REPETITIVE LOSSES

Jackson County	
Kanawha County	
Mason County	
Putnam County	
Roane County	
City of Charleston	
City of Dunbar	
City of Hurricane	
City of Nitro	
City of Point Pleasant	
City of Saint Albans	
City of South Charleston	
Town of Bancroft	
Town of Buffalo	
Town of Eleanor	
Town of Henderson	
Town of Leon	
Town of Poca	
Town of Winfield	

NUMBER OF FLOOD INSURANCE POLICIES

Jackson County	
Kanawha County	
Mason County	
Putnam County	
Roane County	
City of Charleston	
City of Dunbar	
City of Hurricane	
City of Nitro	
City of Point Pleasant	
City of Saint Albans	
City of South Charleston	
Town of Bancroft	
Town of Buffalo	
Town of Eleanor	
Town of Henderson	
Town of Leon	
Town of Poca	
Town of Winfield	

WATERSHED LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD RISK DISCOVERY MAP

LOWER KANAWHA WATERSHED

Study Area:

JACKSON COUNTY, WV
KANAWHA COUNTY, WV
MASON COUNTY, WV
PUTNAM COUNTY, WV
ROANE COUNTY, WV

FEMA

HUC-8 Code
05050008
RELEASE DATE
JANUARY 2024

APPENDIX G | MEETING MINUTES

MEETING SYNOPSIS:
COAL, ELK, LOWER KANAWHA, AND UPPER KANAWHA WATERSHEDS FLOOD RISK DISCOVERY MEETING

Meeting Details

Date	*05/02/2023*		**Time**	*2:00 - 3:30 p.m.*
Watershed	*Coal, Elk, Lower Kanawha, Upper Kanawha*		**Location**	*Kanawha County Courthouse Henry C. "Hoppy" Shores Commission Courtroom 409 Virginia St. East, Charleston, WV 25301*
Total Community Sign-Ins	*6*		**Communities Represented**	*Kanawha County, City of Charleston*
Total Non-Community Sign-Ins *(e.g., Federal, State, Regional organizations or NGOs)*	*8*		**Entities Represented**	***Federal:*** *FEMA Region III* ***State:*** *West Virginia State NFIP* ***Regional:*** *Huntington District USACE*
Format	*The meeting opened with a formal presentation/slide-show followed by a Discovery Map review and comment exercise.*		**Materials Shared**	• *Agenda* • *PowerPoint Presentation: Agenda, Introductions, the NFIP and Flood Risk Data, Project Area Overview, Risk MAP Program and Discovery Overview, Reducing Risk in Communities, Next Steps, Watershed Discovery Maps, Risk and Action Identification Exercise* • *Discovery Maps: Flood Risk, Mapping Needs, Potential Loss* • *Community Dashboards*

Coal, Elk, Lower Kanawha, and Upper Kanawha Watersheds Flood Risk Discovery Meeting Minutes

Tuesday, May 2, 2023
2:00 – 3:30 p.m.

409 Virginia St. East, Charleston, WV 25301

Attendees

FEMA Region III

- Bob Pierson
- Betsy Ranson

FEMA Region III Outreach Partners

- Crystal Smith
- Madison Matera

West Virginia NFIP

- Ruthie Maniscalchi
- Julia Sears

USACE Huntington District

- Ben Romans
- Hannah Smith

Kanawha County

- Stephanie Petruso
- Bruce White
- Steve Neddo
- David Armstrong

City of Charleston

- Charles Grishaber
- Steve Birurakis

Welcome and Introductions

- Introductions were made for the presenters of the meeting:
  - Crystal Smith, Program Specialist
  - Bob Pierson, FEMA Project Officer

- Agenda Overview
  - Welcome and Overview
  - The National Flood Insurance Program and Flood Risk Data
  - Flood Risk Study Project and Discovery Overview
  - Reducing Flood Risk in Communities
  - Next Steps
  - Risk and Action Identification Exercise

Presentation

See the presentation for the slides that align with the notes throughout this section.

The National Flood Insurance Program and Flood Risk Data

- An overview was provided of the National Flood Insurance Program (NFIP), which allows property owners to purchase flood insurance at a reduced rate when communities adopt and enforce floodplain management ordinances based on current flood maps.

- Over 22,616 communities participate in the NFIP, with over 5 million policies. There are around 14,700 policies in West Virginia.

- Flood Risk Data for West Virginia can be accessed by the following platforms:

  - The West Virginia Flood Tool at https://www.mapwv.gov/flood/

  - FEMA's Flood Map Service Center (MSC) at https://msc.fema.gov/portal/home

  - National Flood Hazard Layer (NFHL) at https://www.fema.gov/flood-maps/national-flood-hazard-layer

Flood Risk Study Project and Discovery Overview

- The goal of the Risk MAP program is to deliver quality flood hazard data that helps communities increase public awareness and leads to action that reduces risk to life and property.

- FEMA has decided to update the existing maps due to factors such as the recent availability of high-resolution elevation data (Light Detection and Ranging [LiDAR]), the advanced age of effective flood studies for non- coastal areas, new hydrologic calculations, affordable model-backed Zone A flood studies, and ability to provide new flood risk products.

- Many different types of data are collected and analyzed before the Discovery meeting, including:

  - Watershed and Jurisdiction Boundaries

  - Dams and Levees

  - Stream Data

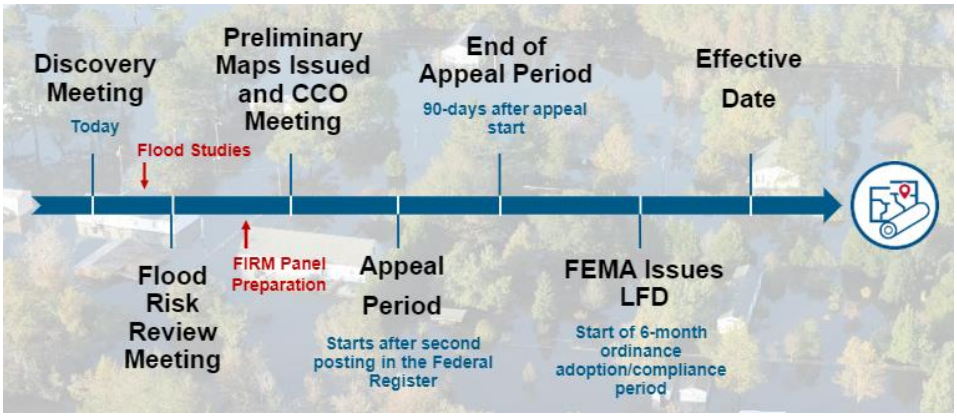
  - Declared Disasters

- Effective Floodplains: Special Flood Hazard Areas

- The typical Risk MAP project takes an average of 3-5 years to complete.

- The goal of the Discovery phase is to share information with communities and learn about risk and flood mitigation activities and capabilities

- The Discovery process includes a Discovery Report, Discovery Maps and identification of potential study areas.



Reducing Flood Risk in Communities

- Specialized flood risk dashboards are available and will be distributed to each community within the four watersheds being studied. These dashboards provide communities with a snapshot of their flood risk as well as their financial risk.

- Ways a community can improve their resilience to flooding were shared, including:
  - Improving and implementing Hazard Mitigation Plans
  - Influencing decisions about development, ordinances, and flood mitigation projects
  - Communicating with citizens about flood risk

- Implementing hazard mitigation actions can save communities money in the long run. By implementing higher standards in a floodplain management ordinance, communities can experience a benefit-cost ratio of $5: $1. Additionally, for every $1 spent on federally funded actions that reduce riverine flood risk, $7 is saved.

Next Steps

- Information provided by communities is crucial to the Risk MAP process. Requested information includes:
  - Completed Discovery data questionnaire, with GIS contact
  - Areas of Concern
  - Areas of historical flooding and other flood risks
  - Mitigation projects addressing flood risks
  - Ideas about ways to increase resilience

Closing

Project contacts were provided to meeting attendees, and a quick live demo was preformed of the West Virginia Flood Tool.

Action Items

1. Participants will:
    a. Complete and submit Discovery data questionnaires to FEMA, with GIS contact information
    b. Provide areas of concern, including areas of recent or planned development and areas of high growth or other significant land changes
    c. Provide information about areas of historical flooding and other flood risks
    d. Provide information about mitigation projects that address flood risks
    e. Provide ideas to increase their community's resilience to flooding, such as training, cost-efficient mitigation, and integration with hazard mitigation planning
2. FEMA and Partners will:
    a. Have follow-up discussions with communities regarding areas to be updated
    b. Provide a copy of the final Discovery report and meeting materials to all meeting participants and communities

Contacts

FEMA Region III

Robert Pierson
Project Officer
Robert.Pierson@fema.dhs.gov
267-319-6340

Elizabeth Ranson
Mitigation Planning
Elizabeth.Ranson@fema.dhs.gov
215-347-0686

State Partners

Timothy W. Keaton
State NFIP Coordinator
Tim.W.Keaton@wv.gov
304-414-7659

Kurt Donaldson, GISP, CFM
Manager, WVGISTC
Kurt.Donaldson@mail.wvu.edu
304-293-9467

Mapping Partners

Crystal Smith
Program Specialist
Crystal.Smith@wsp.com

Madison Matera
Program Specialist
Madison.Matera@wsp.com

Questions/Comments

Comment: Discussion regarding spending money on studying national parks and rural land where there are no people or structures. One meeting participant found that it does not make sense to spend money studying those areas. Another participant pointed out that it is beneficial if that land is used for camping/recreation.

Comment: Comment and discussion around the worry of effectively messaging to community members whose properties are getting mapped into the floodplain.

Question: When Kanawha County went through Map Modernization, the county was required to hold many public hearings where they told community members that the technology has improved and that is why the maps changed. What should the county tell them now?

Answer: There is brand new topographic data for the whole state of West Virginia that is much higher quality and more accurate. Also, the way that federal, state, and local now all work together to collect the data and get input from the community makes it even more accurate.

Comment: There is a need for funding to fix the bridges and culverts that are causing a lot of the flooding in the area.

APPENDIX H | MEETING ATTENDANCE RECORD

FEMA

Discovery Meeting – Lower Kanawha Watershed

Date / Time: May 2, 2023 – 2pm

Location: Kanawha County Courthouse Henry C. "Hoppy" Shores Commission Courtroom
409 Virginia Street East, Charleston, WV 25301

First Name	Last Name	Affiliation	Email
Stephanie	Petruso	Kanawha County	Stephaniepetruso@kanawha.us
Bruce	White	Kanawha County	Brucewhite@kanawha.us
Steve	Neddo	Kanawha County	Steveneddo@kanawha.us
David	Armstrong	Kanawha County	Davidarmstrong@kanawha.us
Charles	Grishaber	City of Charleston	Charles.grishaber@cityofcharleston.org
Steve	Birurakis	City of Charleston	Stephen.birurakis@cityofcharleston.org
Hannah	Smith	USACE	Hannah.g.smith@usace.army.mil
Ben	Romans	USACE	Benjamin.e.romans@usace.army.mil
Julia	Sears	State NFIP	Julia.r.sears@wv.gov
Ruthie	Maniscalchi	State NFIP	Ruthie.a.maniscalchi@wv.gov

Bob	Pierson	FEMA R3	Robert.Pierson@fema.dhs.gov
Betsy	Ranson	FEMA R3	Elizabeth.Ranson@fema.dhs.gov
Madison	Matera	WSP	Madison.matera@wsp.com
Crystal	Smith	WSP	Crystal.smith@wsp.com

** For a complete list of all invited stakeholders, please refer to the Community Contact List – CERC.xlsx that is delivered to FEMA's Mapping Information Platform (MIP) in conjunction with this report under case number 19-03-0005S (within the Lower Kanawha Discovery Preparation subfolder).

APPENDIX I | MEETING PRESENTATION

RiskMAP
Increasing Resilience Together

Coal, Elk, Lower & Upper Kanawha Watershed Flood Risk Discovery Meeting

FEMA REGION III
May 2 - 3, 2023

FEMA

Why Are We Here?

- Discuss flood risk changes
- Gather local information
- Collaborate on planning, taking action, and communicating risk

FEMA

RiskMAP
Increasing Resilience Together

Agenda

- Welcome and Overview
- The National Flood Insurance Program and Flood Risk Data
- Flood Risk Study Project and Discovery Overview
- Reducing Flood Risk in Communities
- Next Steps
- Risk and Action Identification Exercise

FEMA

RiskMAP

Increasing Resilience Together

Introductions

- Name
- Municipality or organization
- Role in floodplain management

FEMA

Risk MAP
Increasing Resilience Together

The National Flood Insurance Program and Flood Risk Data

FEMA

RiskMAP
Increasing Resilience Together

National Flood Insurance Program (NFIP)

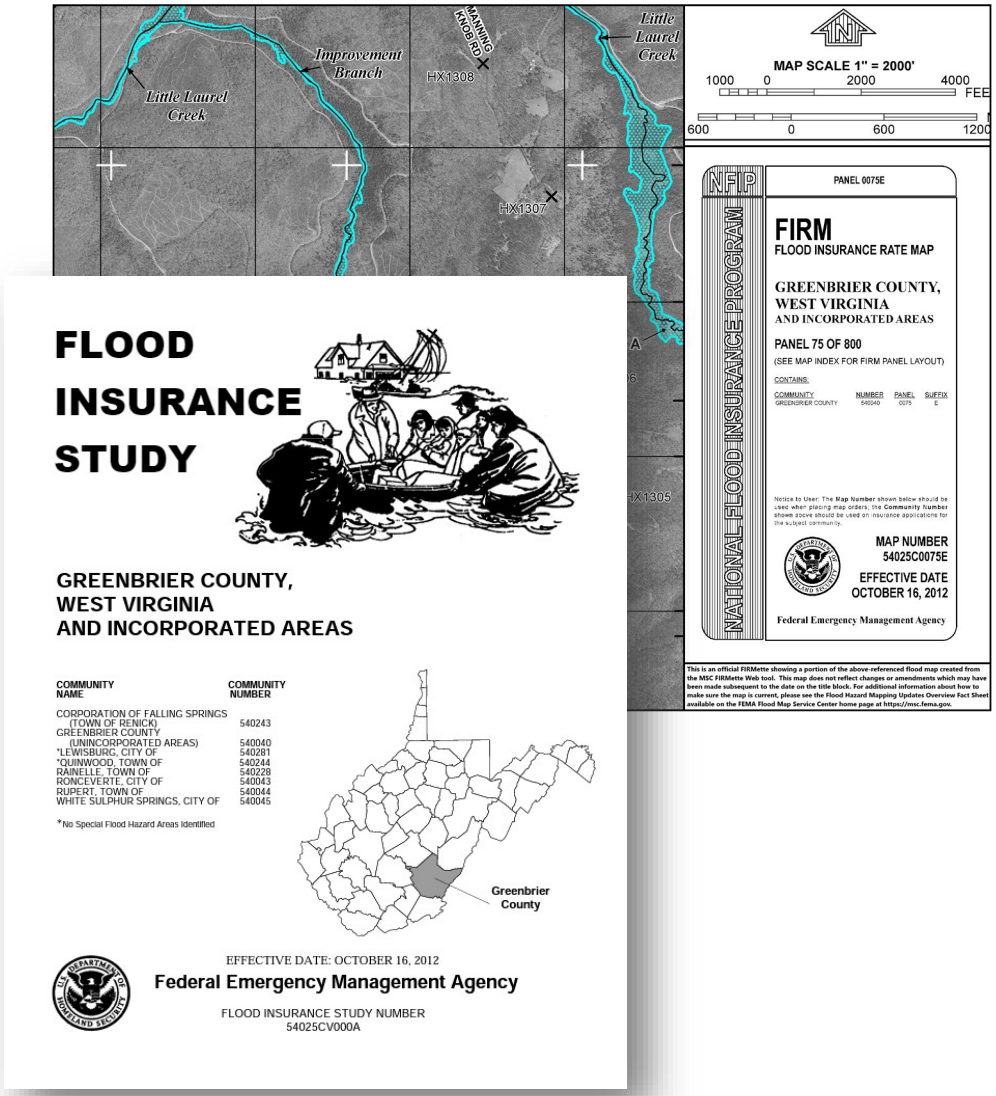
- Allows property owners to purchase flood insurance at reduced rates
- State and local governments agree to adopt and enforce floodplain management ordinances
- Over 22,616 communities participate in the NFIP*
- Over 5 million policies in the NFIP, >14,700 in WV*

*Data current as of April 2023: FEMA Community Status Book.

Flood Insurance Rate Maps and Studies

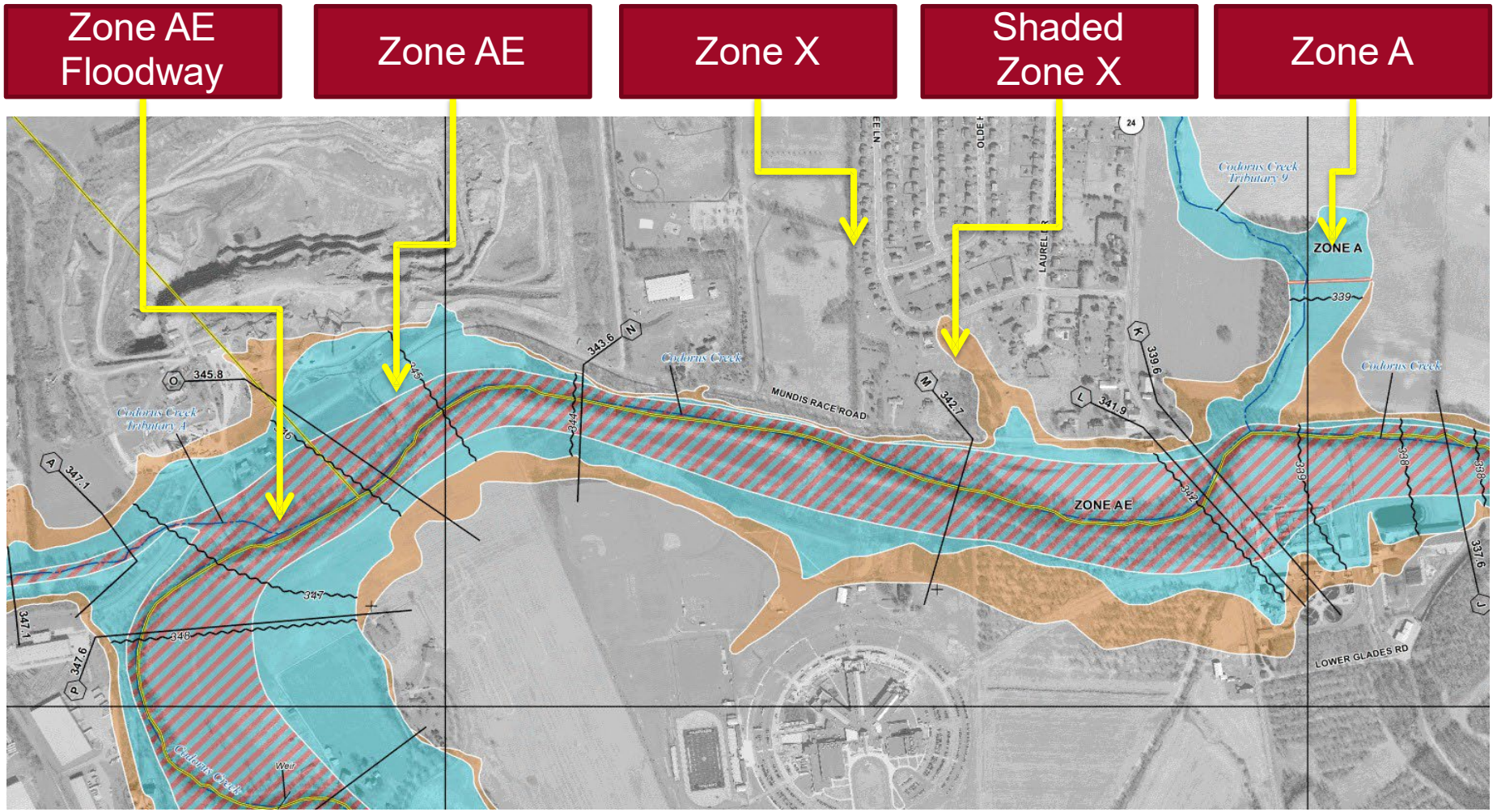
Key Terms:

- Flood Insurance Rate Map (**FIRM**)
- Flood Insurance Study (**FIS**) Report
- Special Flood Hazard Area (**SFHA**)
- Flood Zone
- Base Flood Elevation (**BFE**)
- Regulatory Floodway
- Cross Section



FEMA

Typical FIRM Panel and Flood Zones

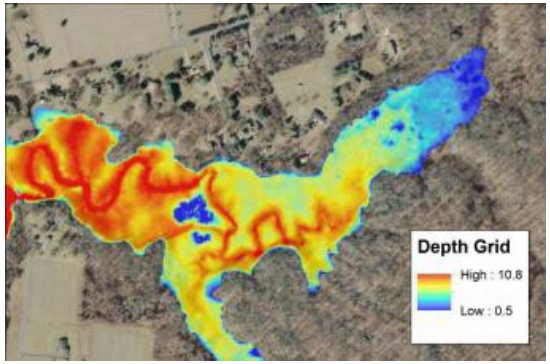


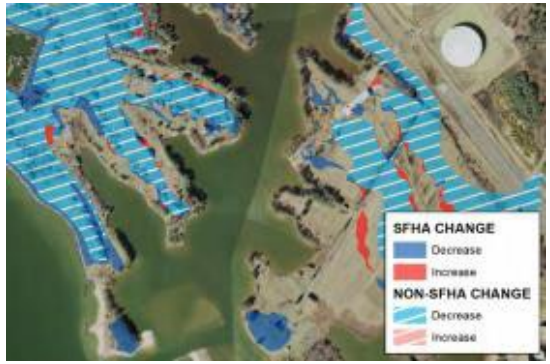
Study Types

		Approximate (Zone A)	Detailed (Zone AE)
Survey	Channel XS	None	Field survey at road crossings
	Hydraulic Structures	None	Field survey
Hydrology	Methodology	Historically regression equations with gage analysis where applicable - Alternate methods such as HEC-HMS or Rainfall Run off	
Hydraulics	Recurrence Interval	10%, 4%, 2%, 1%, 1%+ and 0.2% annual chance	
	Manning's "n"	Aerial Imagery (Horizontal Variation)	
	Channel Geometry	LiDAR	LiDAR; Supplemented with field survey
Mapping	Boundaries	1% annual chance	1% and 0.2% annual chance
	Flood Zones	Zone A (no published BFEs)	Zone AE (all XS with labeled WSELs, and Floodways) and 'Shaded' Zone X
FIS Report	Tables	Study Summaries, Summary of Discharges	Study Summaries, Summary of Discharges, Floodway Data, Roughness Coefficient
	Profiles	None	10-, 4-, 2-, 1-, 1+, and 0.2% annual chance

FEMA Flood Risk GIS Datasets

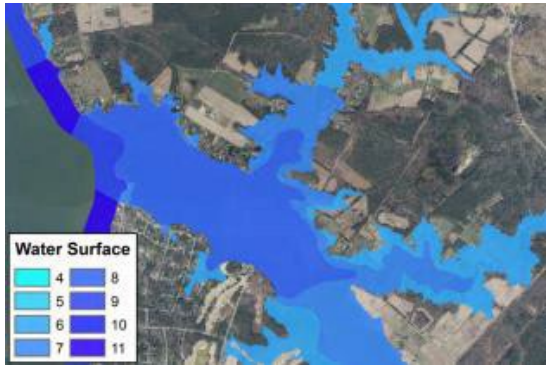
Flood Depth & Analysis Grids





Changes Since Last FIRM

Water Surface Elevation Grids

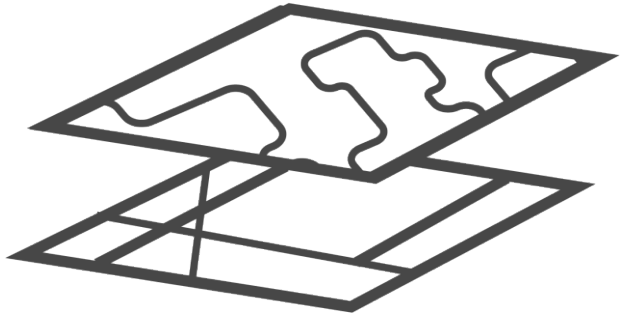


Flood Risk Assessment

FEMA

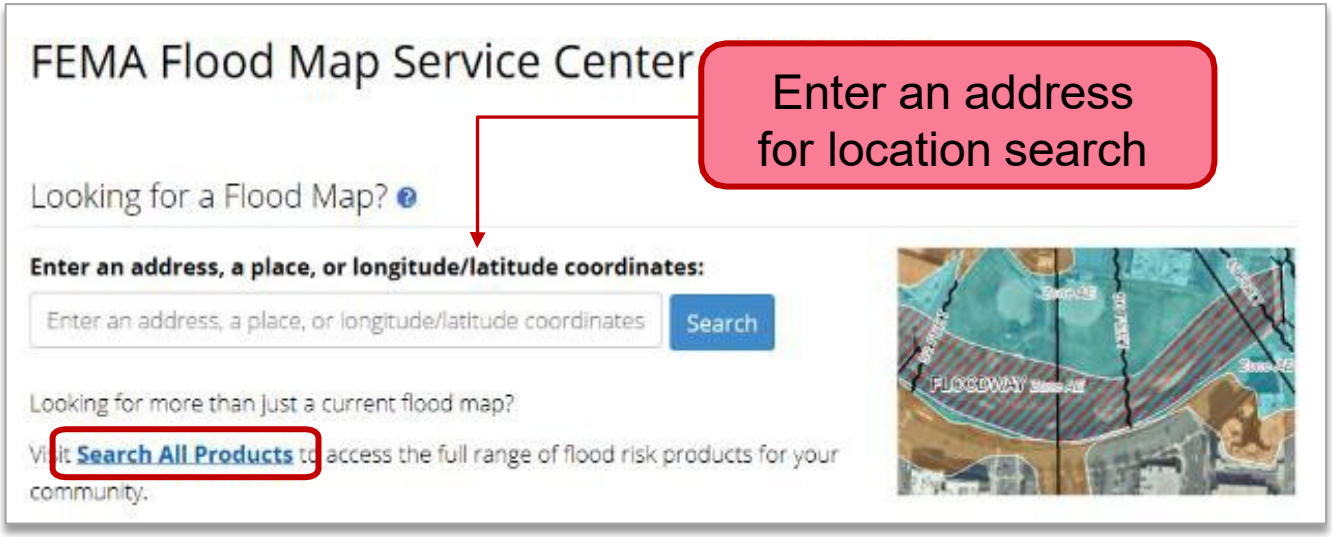
Where to Find Flood Risk Data

- **WV Flood Tool**
  - Digital mapping source publicly available that shows property-level flood risk
- **FEMA's Flood Map Service Center (MSC)**
  - Where you can view effective maps online for free
- **National Flood Hazard Layer (NFHL)**
  - Geospatial database that contains current effective flood hazard data



Where Can I Find My Flood Maps?

The FEMA Map Service Center (MSC) is the official public source for flood hazard information: https://msc.fema.gov/portal/home



FEMA

RiskMAP
Increasing Resilience Together

National Flood Hazard Layer

Visit https://www.fema.gov/national-flood-hazard-layer-nfhl for multiple options to view and download NFHL data.

Accessing the National Flood Hazard Layer

Map Service Center

Access localized National Flood Hazard Layer data by searching FEMA's Map Service Center.

FEMA's Map Service Center ↗

NFHL ArcGIS Viewer

Or you may view, download, and print current local digital effective flood hazard data in an ArcGIS map.

NFHL Viewer ↗

In the NFHL Viewer, you can use the address search or map navigation to locate an area of interest and the NFHL Print Tool to download and print a full Flood Insurance Rate Map (FIRM) or FIRMette (a smaller, printable version of a FIRM) where modernized data exists. Technical GIS users can also utilize a series of dedicated GIS web services that allow the NFHL database to be incorporated into websites and GIS applications. For more information on available services, go to the NFHL GIS Services User Guide.

You can also use the address search on the FEMA Flood Map Service Center (MSC) to view the NFHL data or download a FIRMette. Using the "Search All Products" on the MSC, you can download the NFHL data for a County or State in a GIS file format. This data can be used in most GIS applications to perform spatial analyses and for integration into custom maps and reports. To do so, you will need GIS or mapping software that can read data in shapefile format.

FEMA also offers a download of a KMZ (keyhole markup file zipped) file, which overlays the data in Google Earth™. For more information on using the data in Google Earth™, please see Using the National Flood Hazard Layer Web Map Service (WMS) in Google Earth™.

Draft National Flood Hazard Layer

The Draft National Flood Hazard Layer is for early awareness of possible changes to regulatory flood map information. Until the data becomes effective and it appears in the National Flood Hazard Layer, the data cannot be used to rate flood insurance policies or enforce the federal mandatory purchase requirement.

Preliminary Flood Hazard Data

Preliminary flood hazard data provides the public an early look at their home or community's projected risk to flood hazards. Preliminary data may include new or revised Flood Insurance Rate Maps (FIRM), Flood Insurance Study (FIS) Reports and FIRM Databases. View your community's preliminary flood hazard data.

Pending Flood Hazard Data

Pending flood hazard data provides the public an early look at their home or community's projected risk to flood hazards. Pending data may include new or revised Flood Insurance Rate Maps (FIRM), Flood Insurance Study (FIS) Reports and FIRM Databases. View your community's preliminary flood hazard data.

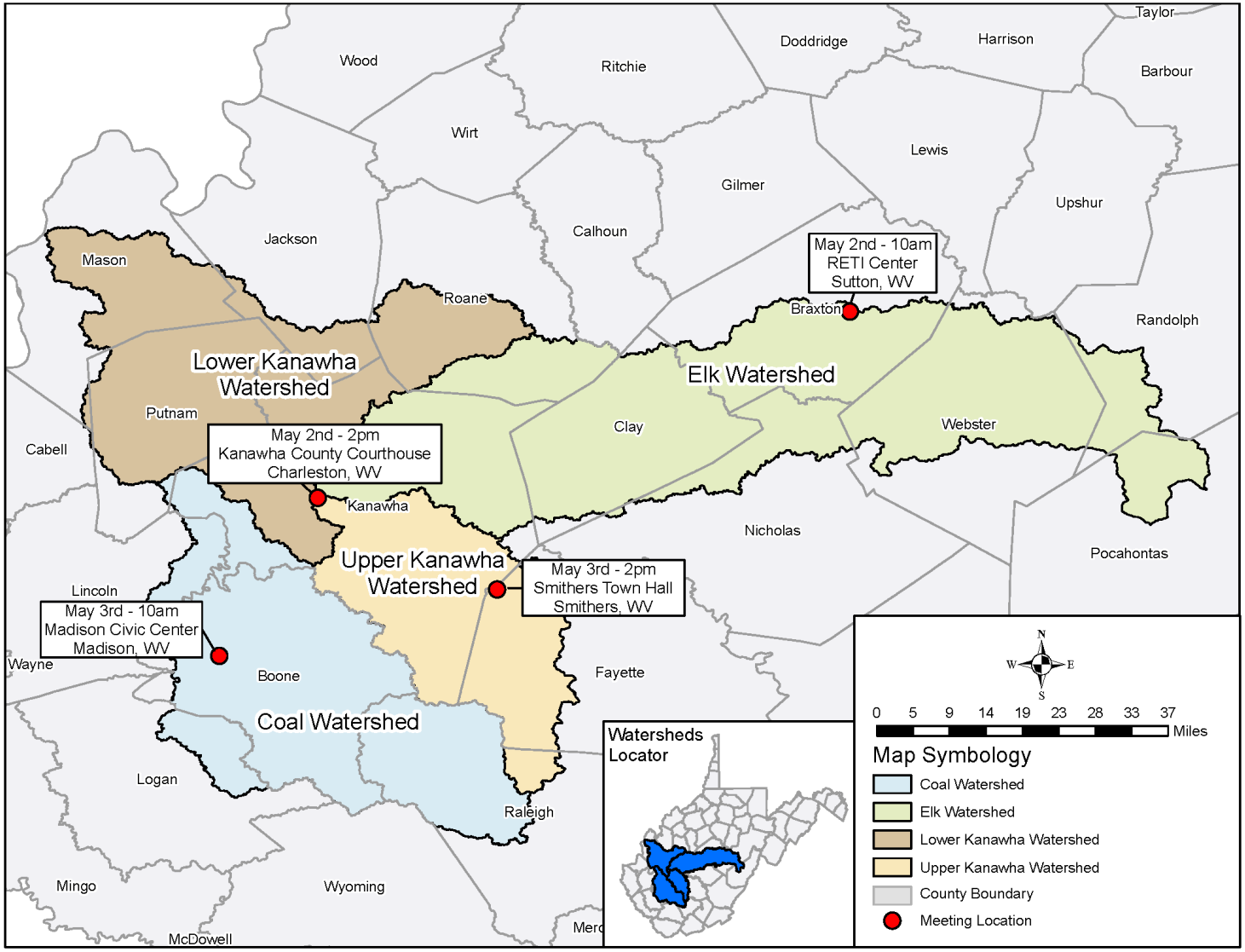
Flood Risk Study Project and Discovery Overview

FEMA

RiskMAP
Increasing Resilience Together

Why Are We Here?

Through collaboration with State and local partners like yourselves, our goal is to deliver **quality flood hazard data** that helps you **increase public awareness** and **leads to action** that reduces risk to life and property.


Taylor
Wood
Ritchie
Doddridge
Harrison
Barbour
Wirt
Lewis
Gilmer
Upshur
Jackson
Calhoun
Mason
May 2nd - 10am
RETI Center
Sutton, WV
Braxton
Roane
Randolph
Lower Kanawha
Watershed
Elk Watershed
Putnam
Clay
Webster
Cabell
May 2nd - 2pm
Kanawha County Courthouse
Charleston, WV
Kanawha
Nicholas
Pocahontas
Upper Kanawha
Watershed
May 3rd - 2pm
Smithers Town Hall
Smithers, WV
Lincoln
May 3rd - 10am
Madison Civic Center
Madison, WV
Wayne
Boone
Fayette
Coal Watershed
Logan
Raleigh
Mingo
Wyoming
McDowell
Watersheds
Locator
N
W
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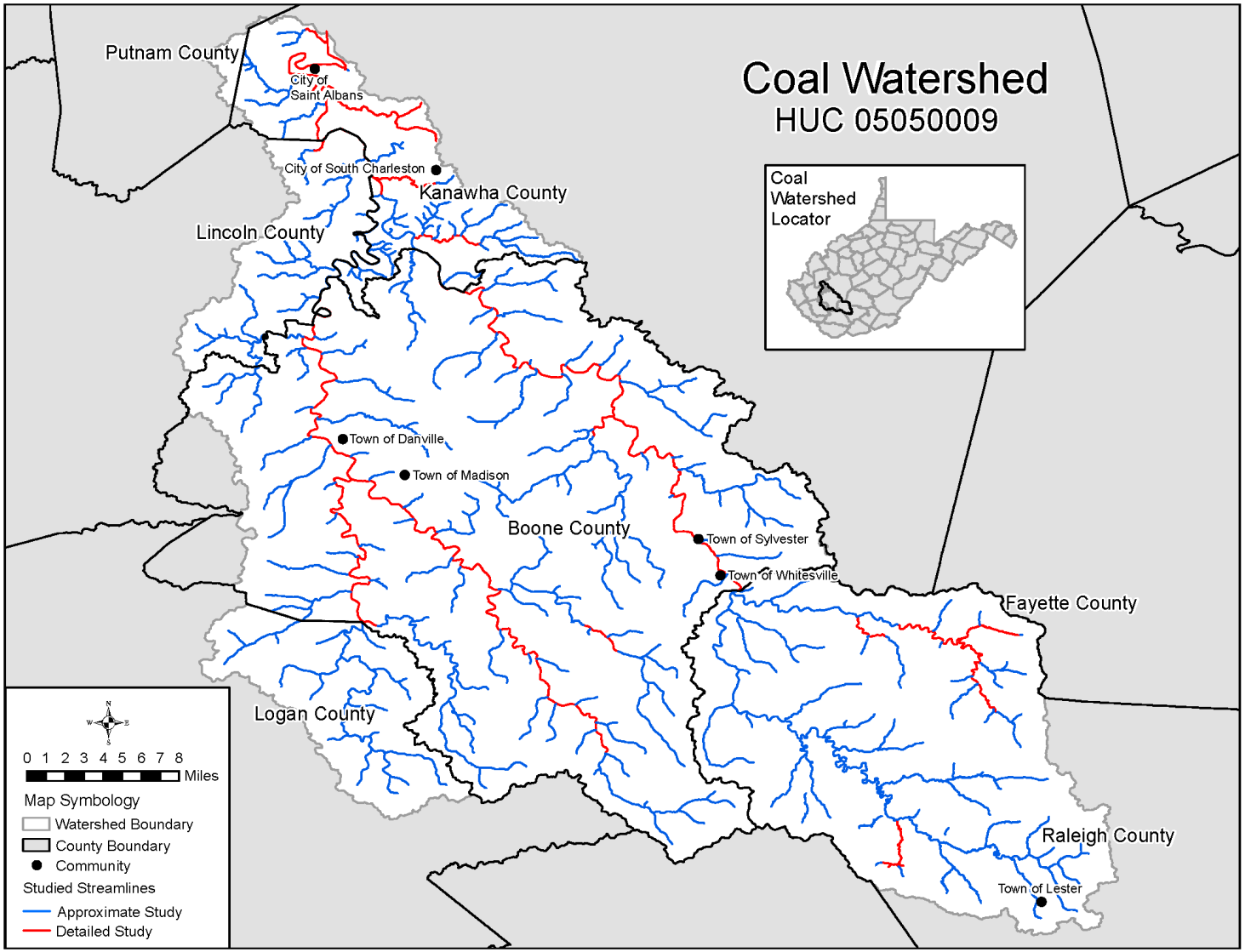
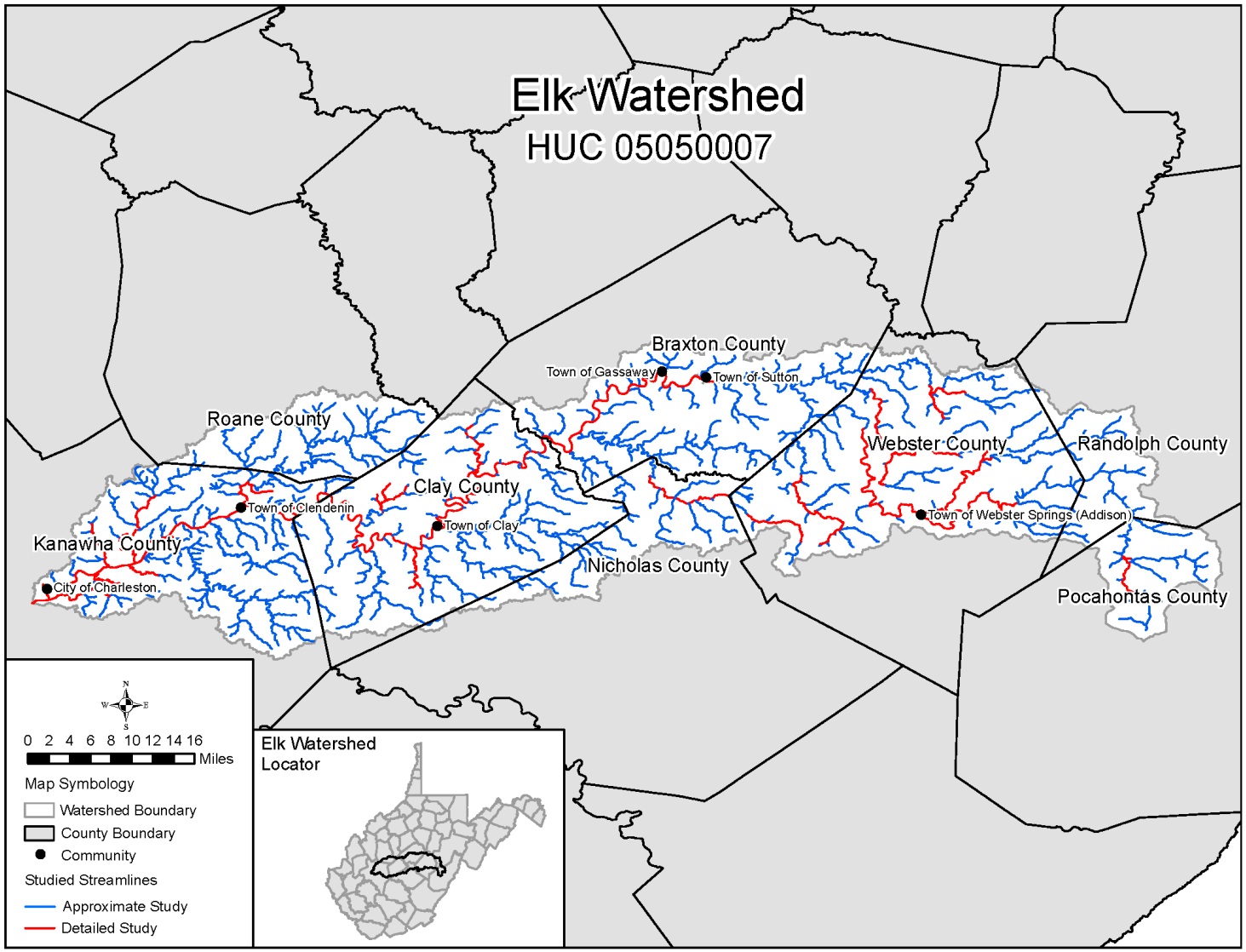
S
0 5 9 14 19 23 28 33 37
Miles
Map Symbology
Coal Watershed
Elk Watershed
Lower Kanawha Watershed
Upper Kanawha Watershed
County Boundary
Meeting Location


Coal Watershed
HUC 05050009
Coal Watershed Locator
Putnam County
City of Saint Albans
City of South Charleston
Kanawha County
Lincoln County
Town of Danville
Town of Madison
Boone County
Town of Sylvester
Town of Whitesville
Fayette County
Logan County
Raleigh County
Town of Lester
0 1 2 3 4 5 6 7 8
Miles
Map Symbology
Watershed Boundary
County Boundary
Community
Studied Streamlines
Approximate Study
Detailed Study


Elk Watershed
HUC 05050007
Braxton County
Town of Gassaway
Town of Sutton
Roane County
Webster County
Randolph County
Clay County
Town of Clendenin
Town of Clay
Town of Webster Springs (Addison)
Kanawha County
Nicholas County
City of Charleston
Pocahontas County
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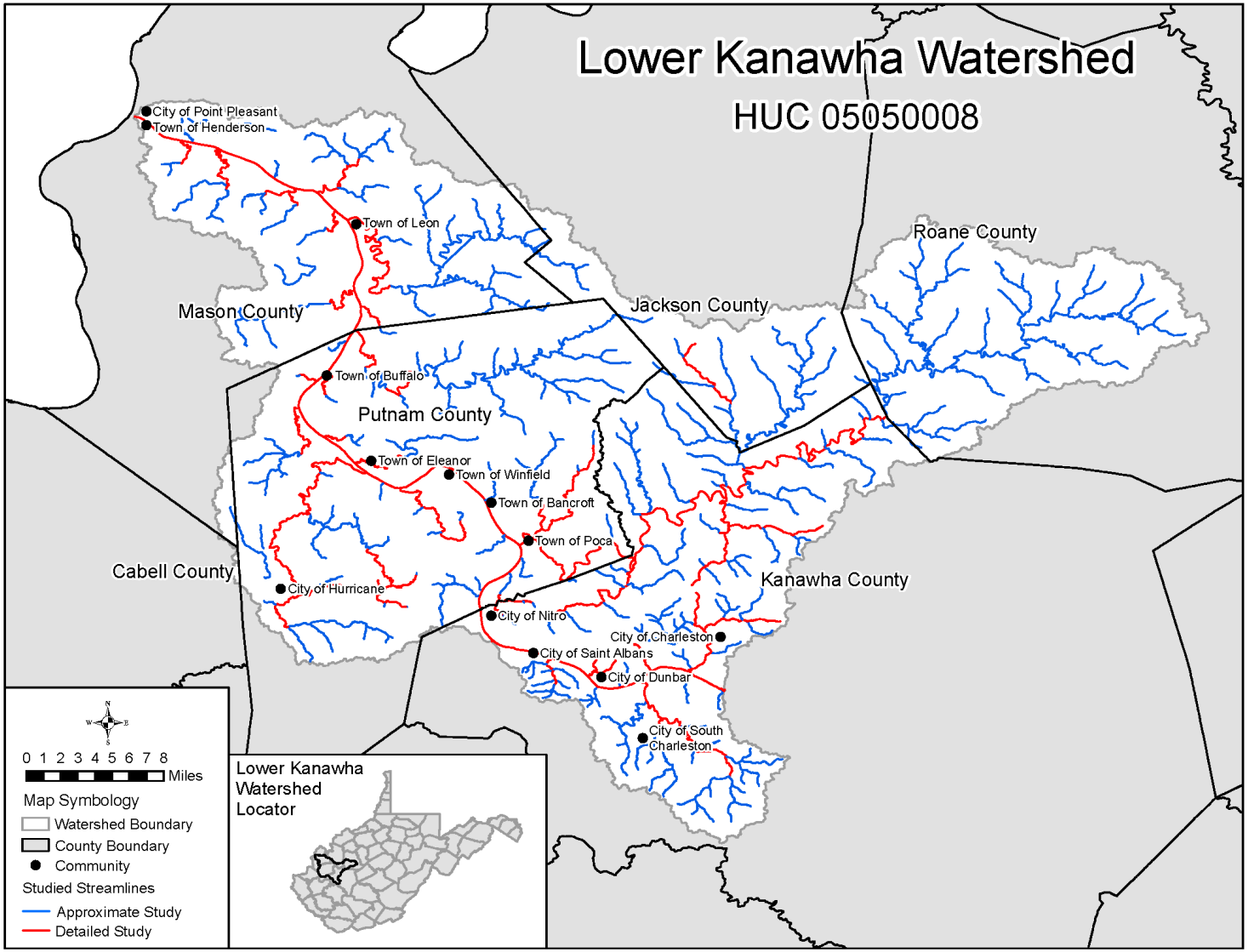
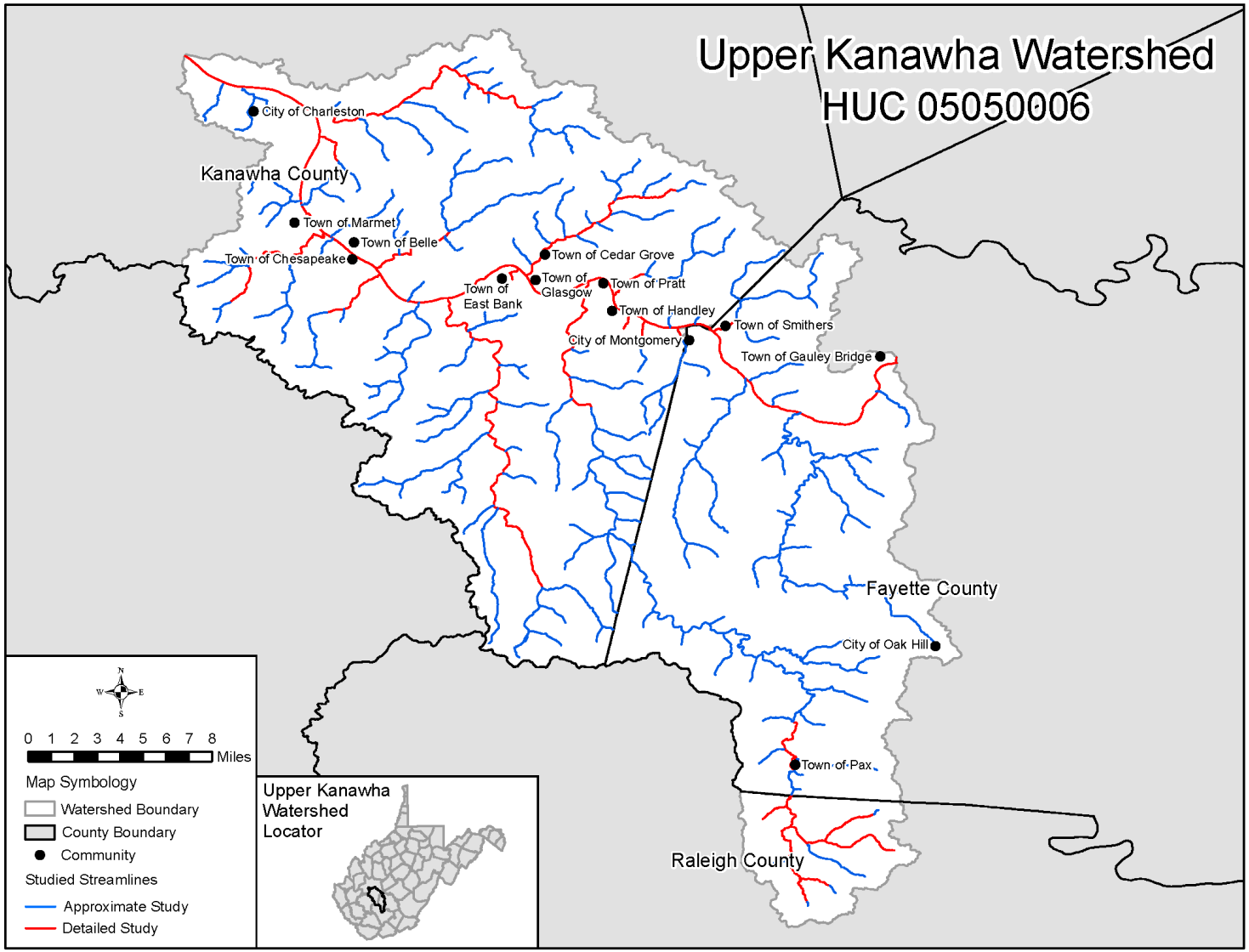
Miles
Map Symbology
Watershed Boundary
County Boundary
Community
Studied Streamlines
Approximate Study
Detailed Study
Elk Watershed
Locator


Lower Kanawha Watershed
HUC 05050008
City of Point Pleasant
Town of Henderson
Town of Leon
Mason County
Jackson County
Roane County
Town of Buffalo
Putnam County
Town of Eleanor
Town of Winfield
Town of Bancroft
Town of Poca
Cabell County
City of Hurricane
Kanawha County
City of Nitro
City of Charleston
City of Saint Albans
City of Dunbar
City of South Charleston
0 1 2 3 4 5 6 7 8
Miles
Map Symbology
Watershed Boundary
County Boundary
Community
Studied Streamlines
Approximate Study
Detailed Study
Lower Kanawha Watershed Locator


Upper Kanawha Watershed
HUC 05050006
City of Charleston
Kanawha County
Town of Marmet
Town of Belle
Town of Chesapeake
Town of Cedar Grove
Town of East Bank
Town of Glasgow
Town of Pratt
Town of Handley
Town of Smithers
City of Montgomery
Town of Gauley Bridge
Fayette County
City of Oak Hill
Town of Pax
Raleigh County
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Miles
Map Symbology
Watershed Boundary
County Boundary
Community
Studied Streamlines
Approximate Study
Detailed Study
Upper Kanawha Watershed Locator

Flood Insurance Rate Map (FIRM) Status

Jurisdiction	Effective FIRM Date	Jurisdiction	Effective FIRM Date
Town of Athens	3/2/2005	Monroe County (Unincorporated Areas)	6/17/2002
City of Bluefield	3/2/2005	Town of Oakvale	3/2/2005
Town of Bramwell	3/2/2005	Town of Peterstown	6/17/2002
City of Hinton	2/3/2010	City of Princeton	3/2/2005
Town of Matoaka	3/2/2005	Summers County (Unincorporated Areas)	2/3/2010
Mercer County (Unincorporated Areas)	3/2/2005	Town of Union	6/17/2002

Why Now? Better Data!

- **Availability of High Resolution Elevation Data (LiDAR)**
- **Age of effective flood studies (non-coastal)**
- **New hydrologic calculations (30-40 more years of rainfall data)**
- **Affordable model-backed Zone A flood studies (HEC-RAS)**
- **Ability to provide new Flood Risk Products (depth grids, etc.)**

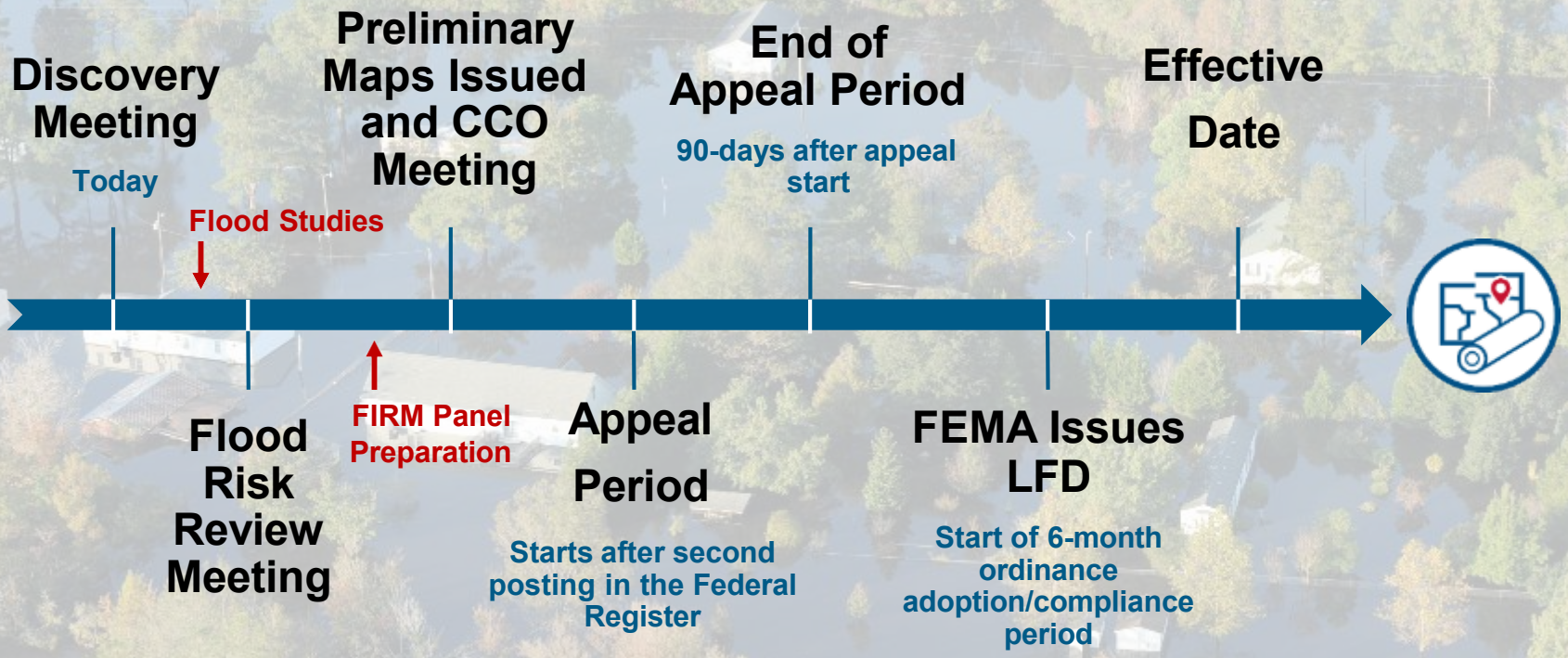
Discovery: Data Collection & Collaboration

- **Examples of data gathered and analyzed before the meeting include the following:**
  - Watershed and Jurisdiction Boundaries
  - Dams and Levees
  - Stream Data
  - Declared Disasters
  - Effective Floodplains: Special Flood Hazard Areas
  - Letters of Map Change
  - NFIP Participation
  - Individual and Public Assistance
  - Mitigation Plan Status and Summary
  - Population and Socioeconomic Characteristics

Flood Risk Data Questions

- **Data**
  - What data do you already have available?
  - What is your data wish list?
- **Technical Assistance**
  - What technical challenges are you facing, and what assistance could support your efforts right now?
- **Training and Outreach**
  - What trainings and outreach would help support your existing or planned efforts?

Typical Flood Study Timeline



See Flood Study Process Banners around the room for a more detailed flood study update process description and timeline.

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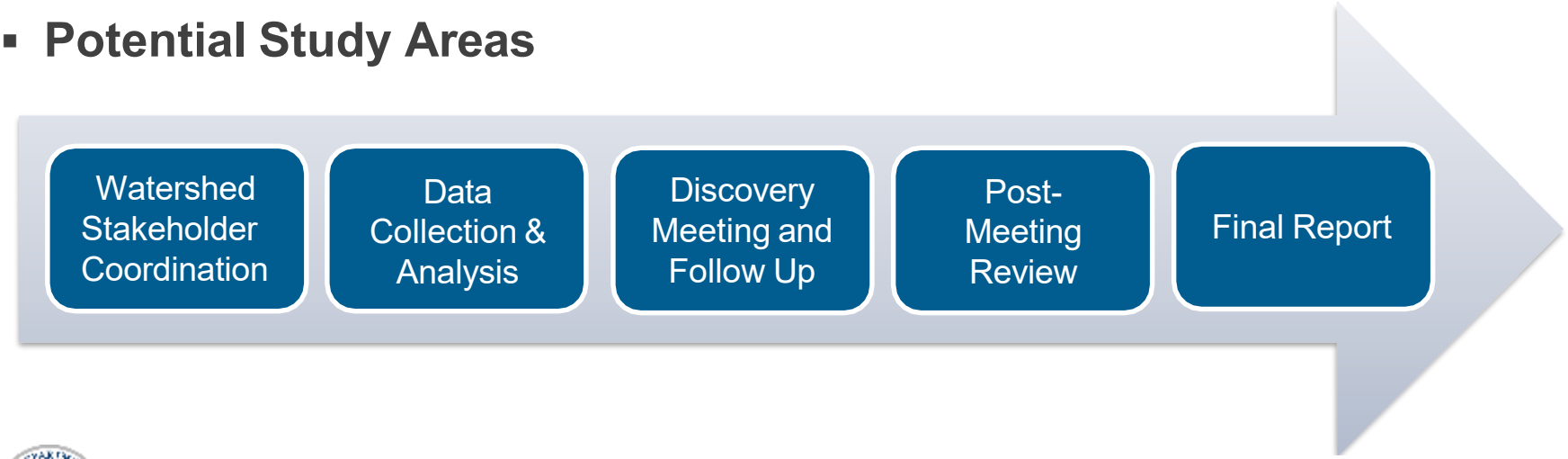
Discovery: Outcomes

- **Discovery Report**
  - Summary of data, analysis, meetings, and action items or decisions
- **Discovery Maps**
  - Flood Hazards
  - Potential Economic Loss
  - Mapping Needs
- **Potential Study Areas**

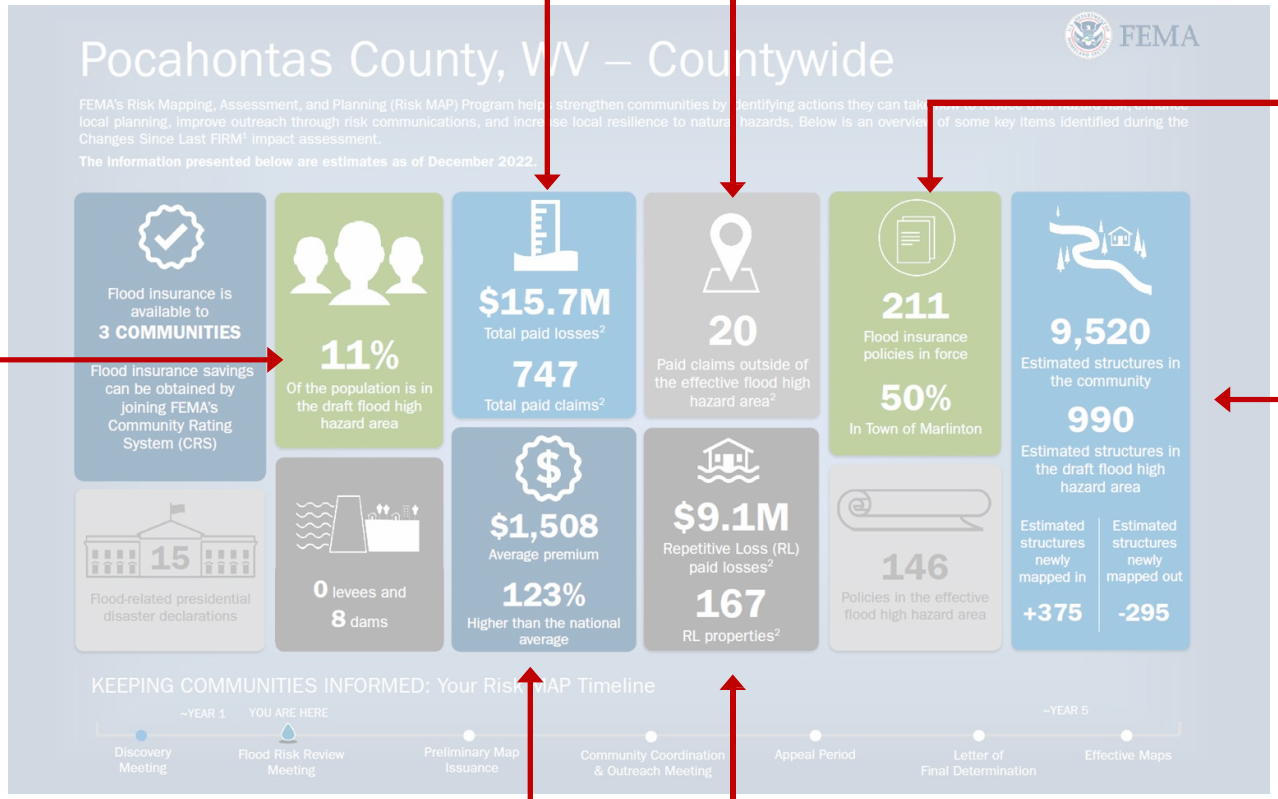


Reducing Flood Risk in Communities

FEMA

RiskMAP
Increasing Resilience Together

Flood Risk Dashboard



NFIP FLOOD CLAIM PAYOUTS

CLAIMS OUTSIDE OF SFHA

NFIP FLOOD POLICIES

AFFECTED RESIDENTS

HIGH-RISK STRUCTURES

AVERAGE PREMIUM

REPETITIVE LOSSES

FEMA

Dashboard of Your Community Profile

FEMA

Town of Danville/Boone County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)

04/16/1991
Initial FIRM[1] date

05/16/2013
Effective FIRM date

$749K
Total paid losses[2]

78
Total paid claims[2]

12
Flood insurance policies in force

11
Policies in the effective flood high hazard area

265
Estimated structures in the community

125
Estimated structures in the flood high hazard area

5
Letters of Map Change

25
Flood-related countywide presidential disaster declarations

7
Paid claims outside of the effective flood high hazard area[2]

$459K
Repetitive Loss (RL) paid losses[2]

11
RL properties[2]

28%
of households spend 30% or more of their income on housing

47%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

YOU ARE HERE ~YEAR 1 ~YEAR 5

Discovery Meeting → Flood Risk Review Meeting → Preliminary Map Issuance → Community Coordination & Outreach Meeting → Appeal Period → Letter of Final Determination → Effective Maps

How Can You Improve Your Community's Resilience to Flooding Now?

Improve and implement your Hazard Mitigation Plans

Influence decisions about development, ordinances, and flood mitigation projects

Help to maintain the sustainability of your community by **increasing resilience to flooding**

Communicate with citizens about flood risk

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Hazard Mitigation Actions Save

National Benefit-Cost Ratio (BCR) Per Peril *BCR numbers in this study have been rounded	Beyond Code Requirements	Federally Funded
Overall Hazard Benefit-Cost Ratio	$4:1	$6:1
Riverine Flood	$5:1	$7:1
Hurricane Surge	$7:1	Too few grants
Wind	$5:1	$5:1
Earthquake	$4:1	$3:1
Wildland-Urban Interface Fire	$4:1	$3:1

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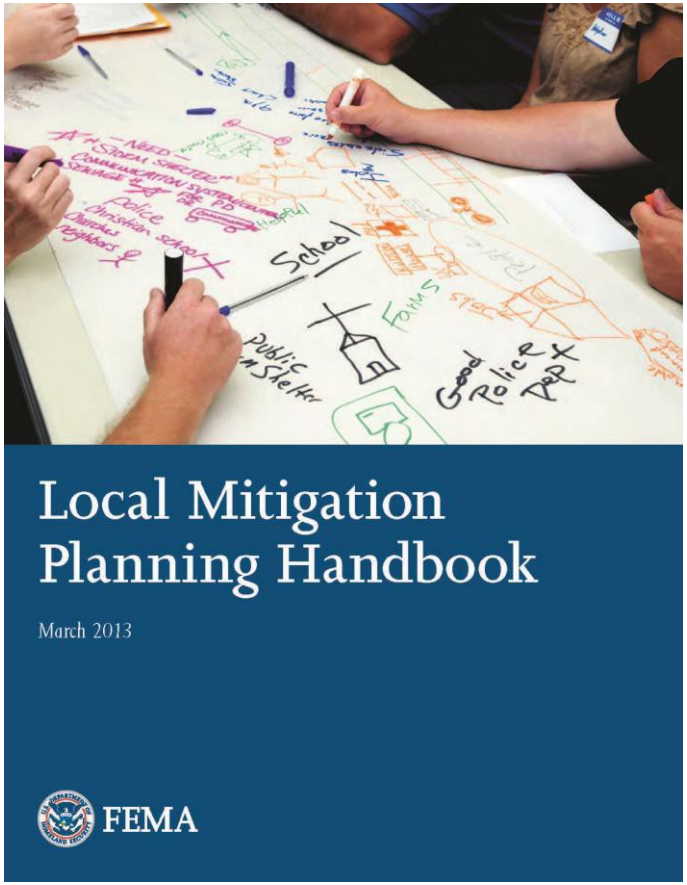
Hazard Mitigation Plans

- **Hazard Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters**
  - Occurs before, during, and after disasters and serves to break the cycle of damage and repair
  - Long-term risk reduction
  - Essential part of community resilience



Next Steps

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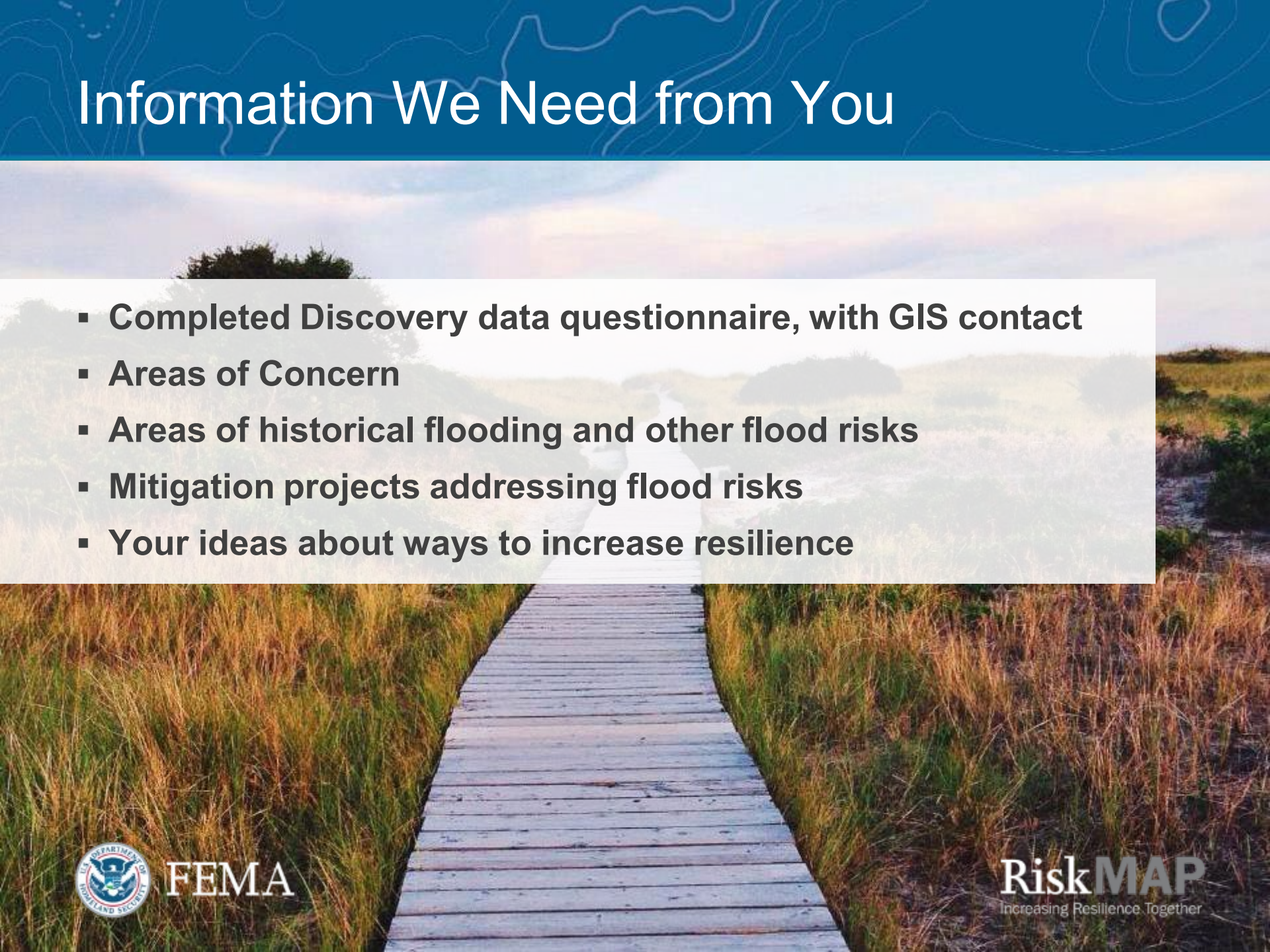
Information We Need from You

- Completed Discovery data questionnaire, with GIS contact
- Areas of Concern
- Areas of historical flooding and other flood risks
- Mitigation projects addressing flood risks
- Your ideas about ways to increase resilience



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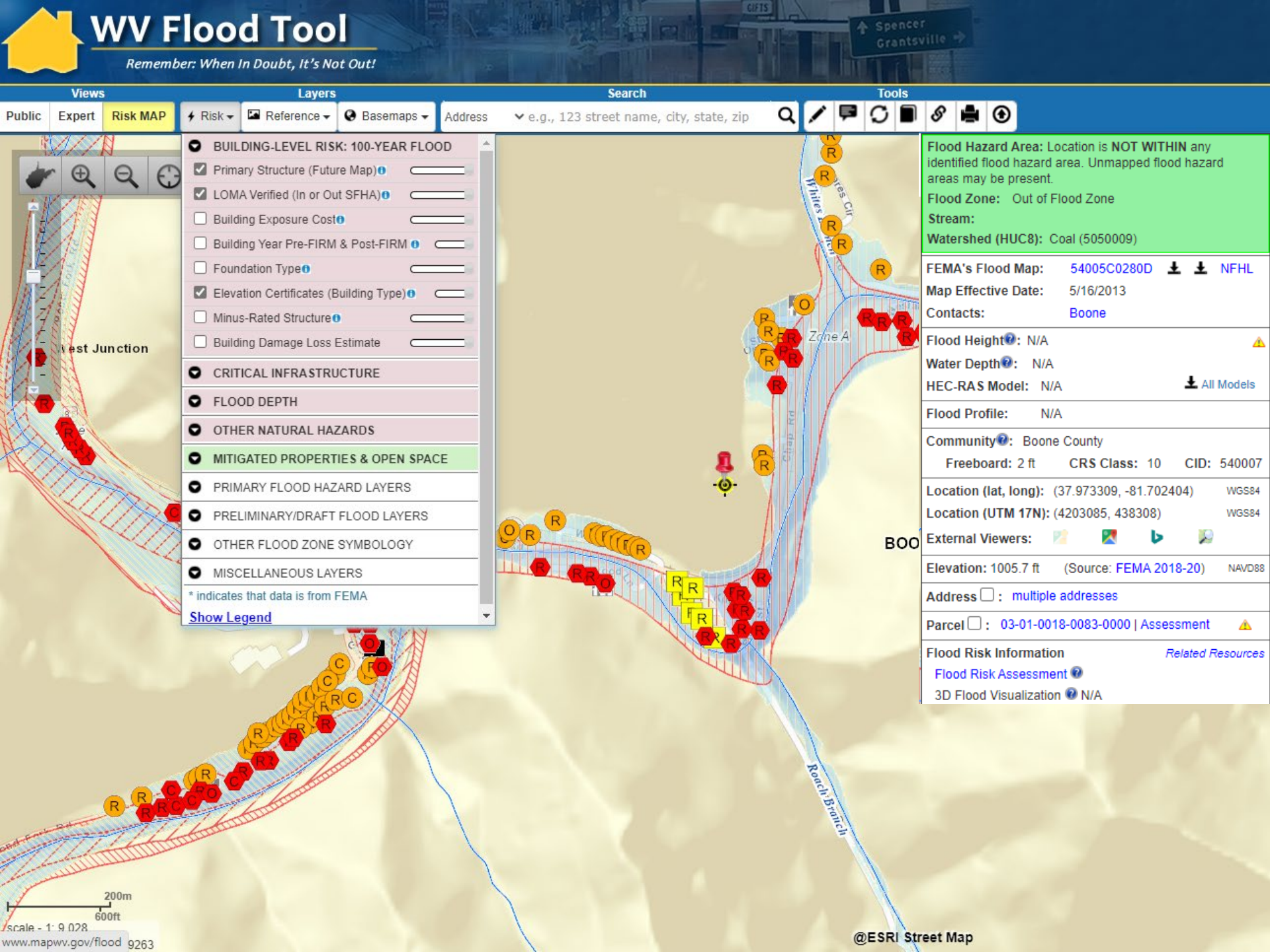
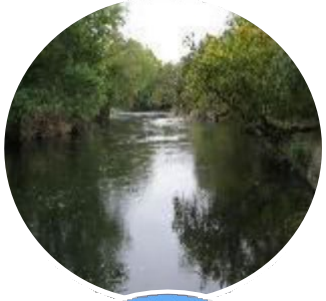

WV Flood Tool
Remember: When In Doubt, It's Not Out!
Views
Public
Expert
Risk MAP
Layers
Risk
Reference
Basemaps
Search
Address
e.g., 123 street name, city, state, zip
Tools
BUILDING-LEVEL RISK: 100-YEAR FLOOD
Primary Structure (Future Map)
LOMA Verified (In or Out SFHA)
Building Exposure Cost
Building Year Pre-FIRM & Post-FIRM
Foundation Type
Elevation Certificates (Building Type)
Minus-Rated Structure
Building Damage Loss Estimate
CRITICAL INFRASTRUCTURE
FLOOD DEPTH
OTHER NATURAL HAZARDS
MITIGATED PROPERTIES & OPEN SPACE
PRIMARY FLOOD HAZARD LAYERS
PRELIMINARY/DRAFT FLOOD LAYERS
OTHER FLOOD ZONE SYMBOLOGY
MISCELLANEOUS LAYERS
* indicates that data is from FEMA
Show Legend
Flood Hazard Area: Location is NOT WITHIN any identified flood hazard area. Unmapped flood hazard areas may be present.
Flood Zone: Out of Flood Zone
Stream:
Watershed (HUC8): Coal (5050009)
FEMA's Flood Map: 54005C0280D NFHL
Map Effective Date: 5/16/2013
Contacts: Boone
Flood Height: N/A
Water Depth: N/A
HEC-RAS Model: N/A
All Models
Flood Profile: N/A
Community: Boone County
Freeboard: 2 ft
CRS Class: 10
CID: 540007
Location (lat, long): (37.973309, -81.702404) WGS84
Location (UTM 17N): (4203085, 438308) WGS84
External Viewers:
Elevation: 1005.7 ft (Source: FEMA 2018-20) NAVD88
Address : multiple addresses
Parcel : 03-01-0018-0083-0000 | Assessment
Flood Risk Information
Related Resources
Flood Risk Assessment
3D Flood Visualization N/A
Zone A
Roach Branch
200m
600ft
scale - 1: 9,028
www.mapwv.gov/flood 9263
@ESRI Street Map

Project Contacts



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Madison Matera
Stakeholder Engagement Specialist
Madison.Matera@wsp.com

FEMA

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Increasing Resilience Together

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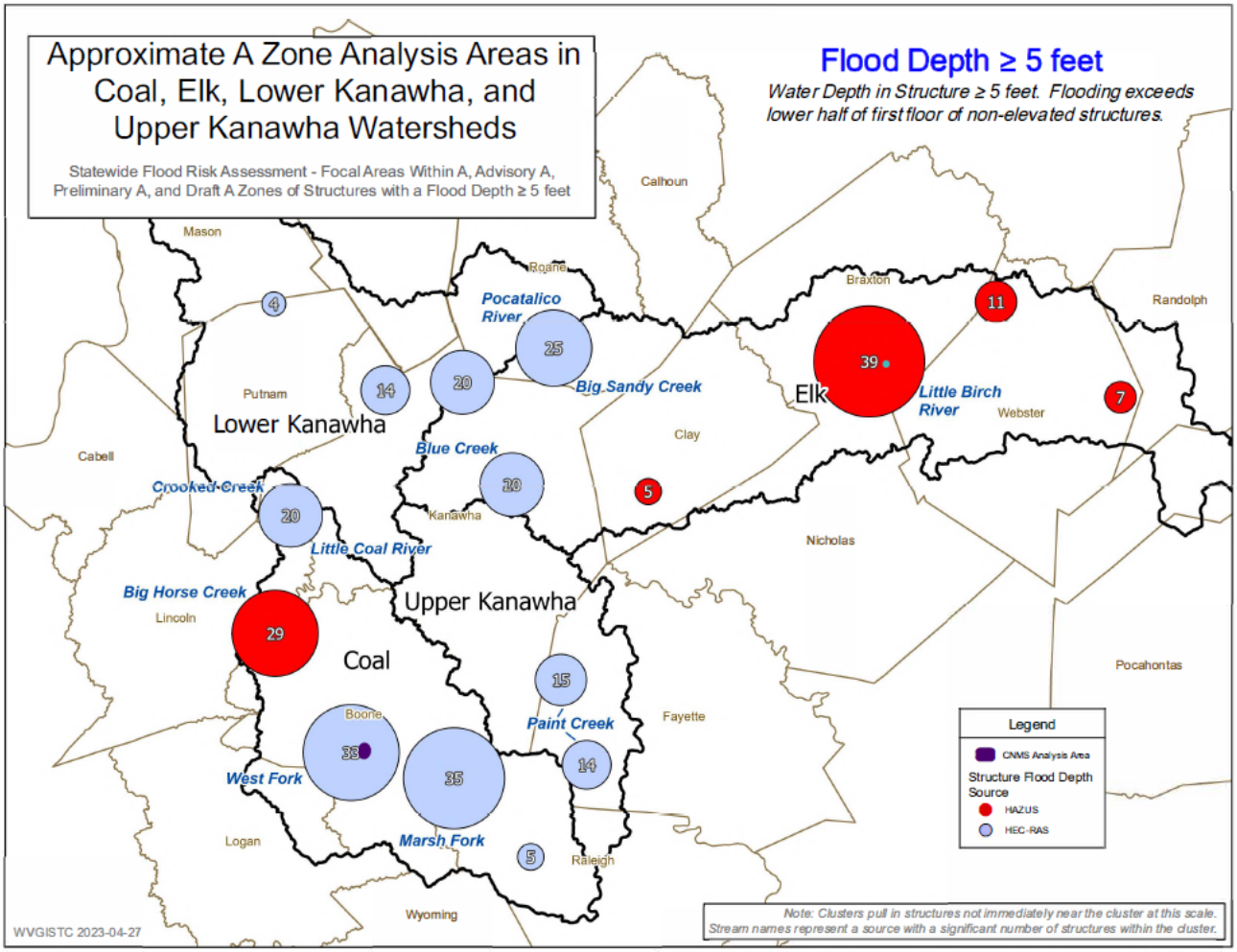
APPENDIX J | WV GIS TECHNICAL CENTER

2023

Zone A Building Cluster Analysis for Kanawha Basin Watersheds, WV

RANKING APPROXIMATE A ZONE STREAM REACHES FOR DETAILED ZONE AE MAPPING

WV GIS TECHNICAL CENTER, WEST VIRGINIA UNIVERSITY



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WV Flood Tool's Risk Map View 3
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Zone A Stream Candidates for Upgrading with Detailed Studies 4
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Spatial Cluster Analysis of Structures in Approximate A Zones at 5 and 10-foot Flood Depths for Kanawha River Basin.

5/12/2023

Kurt Donaldson & Sara Lusher, WV GIS Technical Center, WVU

Introduction

Objective: This study evaluates potential Approximate A Zone rivers/streams in the **Kanawha River Basin** for more comprehensive Detailed Flood Studies for clusters of buildings with high flood damage potential. The Kanawha River Basin consists of four watersheds named after their primary rivers: Upper and Lower Kanawha, Coal, and Elk watersheds. A statewide Approximate Zone A cluster analysis with high flood depths was performed in February 2022 in which the **West Fork** of the Coal Watershed was added to the FEMA's Coordinated Needs Management Strategy (CNMS) geospatial database. This Kanawha River Basin study provides a more refined and detailed analysis for these four watersheds and identifies an additional five Zone A streams for detailed mapping consideration. The five additional streams are **Marsh Fork**, **Crooked Creek**, and **Big Horse Creek** of the Coal Watershed; **Pocatalico River** of the Lower Kanawha Watershed; and **Little Birch River** of the Elk Watershed.

Zone A Candidates for Detailed Studies. Twelve evaluation factors were utilized for ranking clusters of Approximate A Zone structures based on physical building, depth grid, and mapping cost factors. Using spatial cluster and building-level risk analyses, three streams in the **Coal Watershed** – **West Fork**, **Marsh Fork**, and **Crooked Creek** – ranked high per the evaluation factors to be restudied as Zone AE including minimal mapping cost. All these Zone A building clusters are adjacent to existing Zone AE streams. The next stream to be considered in the priority rankings should be the **Pocatilico River** where the Walton Elementary/Middle School is exposed to flooding. The final two Zone A streams to consider for upgrading to Zone AEs should be the **Big Horse Creek** and **Little Birch River**.

Depth Grids

Best Available Depth Grids: Where no model-backed HEC-RAS depth grids existed for Approximate A Zones, the less accurate 2010 Hazus depth grid was substituted. Refer to the Advisory A Zone status graphic.

The Hazus depth grid created using FEMA's Hazus software may have anomalies and thus be less accurate; therefore, the depth grid type and its accuracy should be a factor in the Zone A conversion to Zone AE evaluation. Also note that the Zone A depth grids utilized in this study were developed most likely from a 3-meter DEM and hence not as accurate as the current, statewide LiDAR-derived 1-meter DEM.

12 Evaluation Factors for Zone A Building Cluster Analysis

Methodology and Rankings: A spatial cluster analysis of structures in Approximate A Zones was performed for flood depths of ≥ 5 feet and ≥ 10 feet using building-level risk assessment data from the TEIF/TEAL Statewide Risk Assessment project and the best available flood depth grids. A detailed analysis was conducted for building clusters of flood depths of ≥ 5 feet and ranked according to 12 evaluation factors (Figure 1). **Physical building factors** are based on (1) building counts, (2) building dollar exposure, (3) building damage dollar exposure estimates, (4) substantially damaged estimates, and (5) building types. **Depth grids factors** are (6) extreme flood depths ≥ 10 feet and (7) depth grid accuracy. **Mapping cost-effectiveness factors** are the (8) stream length of building clusters for Zone AE, (9) building density per square mile, (10) estimated Zone AE study cost per mile, (11) Zone A building cluster adjacent an existing Zone AE study, and (12) legacy county boundary mapping issues.
The twelve evaluations factors listed below were utilized for ranking clusters of Approximate A Zone structures as candidates for Zone AE Detailed Flood Studies. Refer to Table 3 that lists Zone A stream candidates for Zone AE mapping with seven of the evaluation factors.

Figure 1. Evaluation Factors

12 Evaluation Factors for Ranking Zone A Building Clusters with High Flood Depths

- **Physical Building Factors: Type, Exposure, & Damage**
  1) Building Count
  2) Building Dollar ($) Exposure
  3) Building Damage Dollar ($) Loss Estimates
  4) Substantially Damaged Loss (%) Estimates
  5) Building Types
     - Residential versus Non-Residential
     - Essential facilities and Community Assets

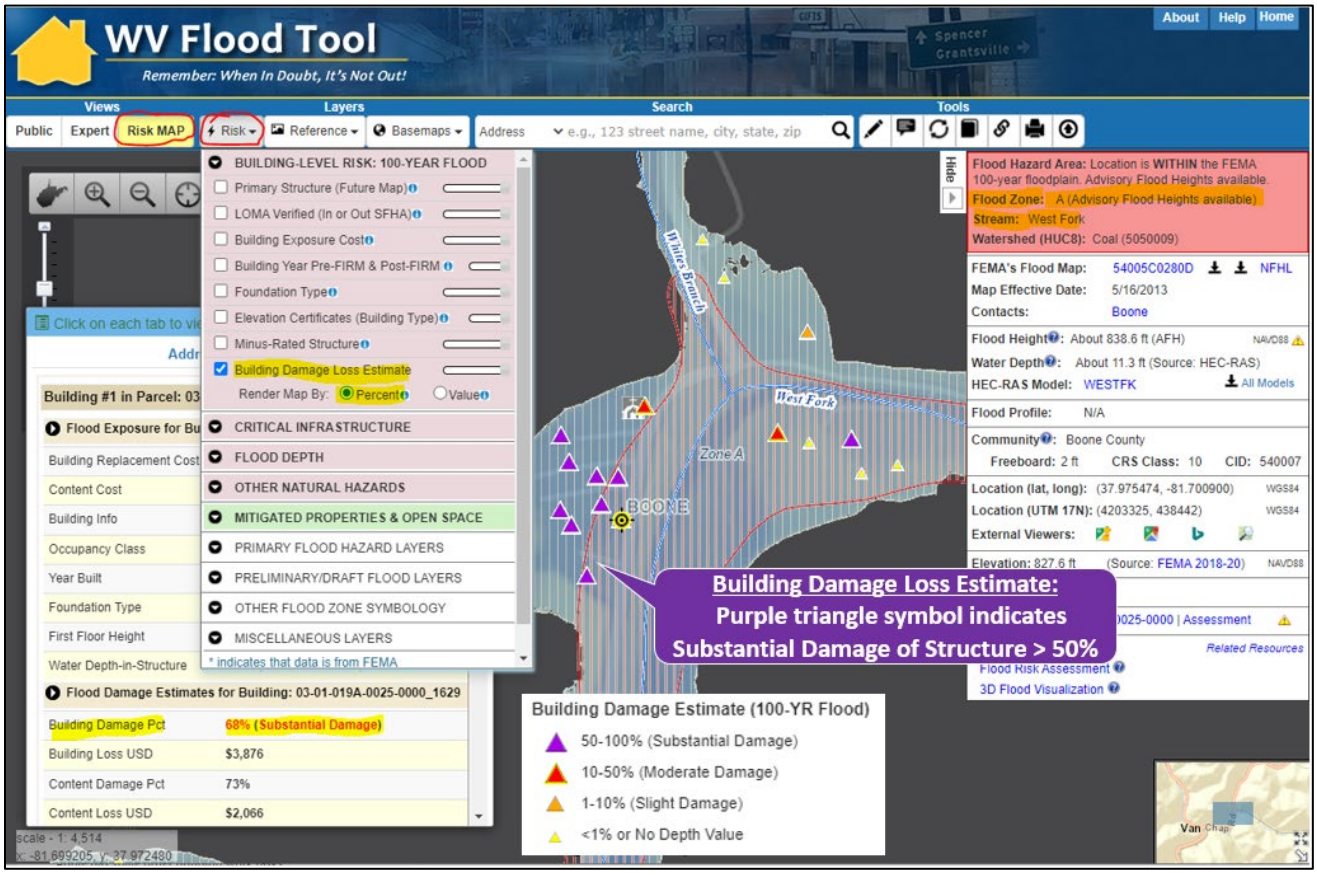
- **Depth Grids Factors: Extreme Flood Depths, Depth Grid Accuracy**
  6) Extreme flood depths of structures ≥ 10 feet (verify not flood study error)
  7) Depth Grid Accuracy
     - Model-backed HEC-RAS depth grid (more accurate)
     - 2010 Hazus depth grid (less accurate)

- **Mapping Cost Effectiveness Factors**
  8) Stream length of building clusters for Zone AE conversion
  9) Building density per square mile (Building Count / Cluster Stream Length)
  10) Estimated Zone AE study cost per mile ($2,500 per mile)
  11) Zone A building cluster adjacent to existing Zone AE
  12) Legacy county boundary mapping issue (Zone AE mapping stopped at county border)

WV Flood Tool's Risk Map View

WV Flood Tool's Risk MAP View – Building Damage Loss Estimate Percent Layer: In the Risk MAP View of the WV Flood Tool, the risk assessment layer, **Building Damage Loss Estimate (%),** provides a relationship between high flood depths and flood loss estimates of substantially damaged buildings (> 50% damage) for a 1% annual chance flood (Figure 2). High building-level damage percentages typically correlate to structures in Approximate A Zones with high base flood depths. The graphical view of the Building Damage Loss Estimates map layer of the WV Flood Tool's RiskMAP View helps one to visually confirm the spatial cluster analysis and tabular building loss estimates.

Figure 2. WV Flood Tool's RiskMAP View showing correlation between high flood depths and substantially damaged structures (purple triangles – building damage loss > 50%) for a 1% flood event



Findings & Rankings of Zone A Cluster Analysis – Kanawha Basin

Zone A Stream Candidates for Upgrading with Detailed Studies

Using spatial cluster and building-level risk analyses, below is a list of Approximate A Zones with map links to the WV Flood Tool to consider upgrading for detailed flood studies. The **boldfaced streams** (Crooked Creek, Marsh Fork, West Fork), all in the Coal Watershed, rank high on the evaluation factors and can be restudied as Zone AE at a minimal mapping cost.

Table 2. Priority Ranked Zone A Streams for Upgrading to Zone AE

- TOP RANKING – FIRST TIER
  - **West Fork** (Coal Watershed)
  - **Marsh Fork** (Coal Watershed)
  - **Crooked Creek & Crook Creek Tributary No.2** (Coal Watershed)
- MEDIUM RANKING – SECOND TIER
  - Pocatalico River (Lower Kanawha Watershed)
- LOWER RANKING – THIRD TIER
  - Big Horse Creek (Coal Watershed)
  - Little Birch River (Elk Watershed)

Description of Factors to Consider Zone A Streams for Detailed Mapping Conversion

West Fork: The West Fork of the Coal Watershed has the highest cluster number of structures greater ≥ 10 ft. flood depth (n=12) and the highest estimated number of substantially damaged structures (n=20) for a 1%-annual-chance flood event. Typically, high flood depths correlate to high building damage loss estimates. The West Fork also has the highest density of structures of 22.1 buildings per square mile and low Zone AE mapping cost. First Baptist Church, a community asset, is located in this Zone A building cluster.

Marsh Fork: The Marsh Fork building cluster has the highest number of structures ≥ 5-foot flood depth. Flood study mapping issues defined by the Raleigh-Boone county boundary border resulted in mapping Boone County as Zone AE and Raleigh County as Zone A. An essential facility, the WV State Police Troop 6 (Whitesville Detachment), is located within this Zone A building cluster. Four structures of significance – two essential facilities and two community assets – are located in the building cluster.

Crooked Creek: A small Zone AE mapping extension along Crooked Creek and Crooked Creek Tributary and lowest mapping cost of $1,275 ($2,300 mapping cost per Zone AE mile) should be considered. Almost all five structures in this building cluster are ≥ 10-foot flood depth. This creek has the lowest estimated Zone AE mapping cost of $1,275. Backwater flooding from Coal River may be a factor for high flood depths.

Pocatalico River: The building cluster along this river has the highest building dollar exposure of $6.7M and damage loss estimate of $867K, primarily because the high-value Walton Elementary/Middle School

is located in a 1%-annual chance floodplain with building cluster flood depths ≥ 5 feet. The school's building footprint edge closest to the flood source is nearly 8 feet. A negative factor may be that the cluster of Zone A structures in not adjacent to an existing Zone AE.

Big Horse Creek: This building cluster follows a longer 5.5 mile reach from Zone AE at the Little Coal River confluence southward to the boundary of Lincoln County. The estimated Zone AE mapping cost is $13,750. No advisory flood heights or advisory BFEs exist for A Zones in Lincoln County; consequently, the less accurate Hazus flood depth grid available for building-level risk assessment cluster analysis.

Little Birch River: A high cluster number of structures ≥ 5-foot flood depth (n=28) with a building dollar exposure of 1.6 million exists along Little Birch Run. This Zone A building cluster is not adjacent to existing Zone AE and is based on less accurate Hazus flood depth grid. In addition, this Zone A stream candidate for detailed mapping has the most scattered building cluster spread over 6.0 miles.

Listed Evaluation Factors of Priority Ranked Zone A Streams for Detailed Mapping

West Fork, Coal Watershed, Boone County

- High cluster number of structures ≥ 5 ft. flood depth (n=21)
- High building dollar exposure of $682K (if don't include Walton School on Pocatalico River)
- **Highest number of structures ≥ 10 ft. flood depth (n=12). More than double the number of structures of any other Zone A stream reach candidates for detailed mapping.** Engineering flood models of extreme flood depths should be verified.
- **Highest number of and substantially damaged structures (n= 20) for a 1%-annual-chance flood event.** High building damage dollar loss estimate ($460K).
- **Highest density of structures of 22.1 buildings per square mile.**
- **Small Zone AE mapping distance less than 1 mile for building cluster**
- **Low estimated Zone AE mapping cost of $2,375 (less than $5,000)**
- Adjacent to existing Zone AE
- Model-backed flood depth grid
- Already incorporated into CNMS database from statewide analysis in February 2022
- Community asset, First Baptist Church, located in Zone A building cluster.

Marsh Fork, Coal Watershed, Raleigh County (border mapping issue)

- **Highest cluster number of structures ≥ 5 ft. flood depth (n=31)**
- High building dollar exposure of $1.45 million
- High density of structures of 14.1 buildings per square mile.
- High ranked stream for building damage dollar loss ($415K) and substantially damaged structures (n= 17) for a 1%-annual-chance flood event.
- **Essential facility WV State Police Troop 6 (Whitesville Detachment) is located within this Zone A building cluster. Another essential facility, the Whitesville Volunteer Fire Department (Pettus Substation), is also located in the high-risk Advisory Zone A of the building cluster.**
- **Two community assets, Pettus Baptist Church and New Life Assembly Church, are also in the building cluster located on Coal River Road (State Route 3) south of Whitesville.**
- Zone AE mapping distance less than 2.2 mile for building cluster

- Estimated Zone AE mapping cost of $5,500
- Adjacent to existing Zone AE
- Model-backed flood depth grid
- **Legacy Raleigh-Boone county boundary mapping issue in which Boone County has Zone AE and Raleigh County Zone A.**

Crooked Creek & Crooked Creek Tributary, Coal Watershed, Kanawha County

- Cluster number of structures ≥ 5 ft. flood depth (n=6)
- **Almost all structures in cluster ≥ 10 ft. flood depth (n=5).**
- Building dollar exposure of $350K
- High density of structures of 11.1 buildings per square mile.
- High ranked stream for building damage dollar loss ($250K) and substantially damaged structures (n= 7) for a 1%-annual-chance flood event.
- **Smallest Zone AE mapping distance less than 0.51 miles for building cluster**
- **Lowest estimated Zone AE mapping cost of $1,275 (less than $5,000)**
- Adjacent to existing Zone AE
- Model-backed flood depth grid

Pocatalico River, Lower Kanawha Watershed, Roane County

- Cluster number of structures ≥ 5 ft. flood depth (n=13)
- **Highest building dollar exposure of $6.7 million since it includes Walton Elementary/Middle School valued at $6.1 million.**
- Density of structures of 4.0 buildings per square mile.
- **Highest ranked stream for building damage dollar loss ($867K)** and substantially damaged structures (n= 7) for a 1%-annual-chance flood event.
- **Essential facility: Walton Elementary/Middle School, Pre-FIRM building, building value $6.1 million, flood depth higher than nearly 8 feet for school's building footprint edge closest to flood source. Estimated building loss $551K or higher for a 1% flood event.**
- Zone AE mapping distance 3.28 miles for building cluster
- Estimated Zone AE mapping cost of $8,200
- NOT Adjacent to existing Zone AE
- Model-backed flood depth grid

Big Horse Creek, Coal Watershed, Boone County

- Cluster number of structures ≥ 5 ft. flood depth (n=15)
- Building dollar exposure of $778K
- Density of structures of 3.6 buildings per square mile.
- Two churches (community assets) are part of building cluster.
- High ranked stream for building damage dollar loss ($250K) and substantially damaged structures (n= 7) for a 1%-annual-chance flood event.
- A longer 5.5 mile reach from Zone AE at the Little Coal River confluence southward to the boundary of Lincoln County. Estimated Zone AE mapping cost of $13,750.
- No advisory flood heights or advisory BFEs exist for A Zones in Lincoln County; therefore, the less accurate Hazus flood depth grid is utilized for the Zone A building cluster analysis.

Little Birch River, Elk Watershed, Braxton County

- **High cluster number of structures ≥ 5 ft. flood depth (n=28)**
- High Building dollar exposure of $1.6M
- Density of structures of 4.7 buildings per square mile.
- High ranked stream for building damage dollar loss ($683,020) and substantially damaged structures (n= 14) for a 1%-annual-chance flood event.
- Zone AE mapping distance less than 4.7 miles for building cluster
- Estimated Zone AE mapping cost of $14,975
- Longest building cluster stream reach of 6.0 miles.
- NOT Adjacent to existing Zone AE
- Hazus flood depth grid (less accurate) because no model-backed depth grids or Advisory Flood Heights exist.

Boldfaced Text: Highlighted evaluation factors of Zone A building cluster analysis

Red Text: Potential negative evaluation factors for Zone A building cluster analysis.

Summary Table of Zone A Cluster Analysis including Rankings

Table 3. Summary table of ranked Zone A cluster analysis rivers/streams according to building-level loss estimates.

Rank	1	2	3	4	5	6
BUILDING COUNT	***Marsh Fork***	***Little Birch River***	***West Fork***	***Big Horse Creek***	***Paint Creek***	***Blue Creek***
	31	28	21	20	18	17
BUILDING DOLLAR EXPOSURE	***Pocatalico River***	***Little Birch River***	***Marsh Fork***	***Elk River***	***Big Horse Creek***	***West Fork***
	$6.74M	$1.61M	$1.45M	$1.18M	$778K	$682K
BUILDING DAMAGE LOSS	***Pocatalico River***	***Little Birch River***	***West Fork***	***Marsh Fork***	***Big Horse Creek***	***Blue Creek***
	$867K	$683K	$460K	$415K	$264K	$238K
DAMAGE ≥ 50%	***West Fork***	***Marsh Fork***	***Little Birch River***	***Pocatalico River****	***Big Horse Creek****	***Blue Creek***
	20	17	14	7	7	7
BUILDING DENISTY per mile	***West Fork***	***Marsh Fork***	***Crooked Creek***	***Little Birch River***	***Pocatalico River***	***Big Horse Creek***
	22.1	14.1	11.5	4.7	4.0	3.6
Zone AE Cost per mile	***Crooked Creek***	***West Fork***	***Marsh Fork***	***Pocatalico River***	***Big Horse Creek***	***Little Birch River***
	$634	$2,375	$5,500	$8,200	$13,750	$14,975

**Pocatalico River, Big Horse Creek, Blue Creek, and Paint Creek all have 7 structures with damage ≥ 50%*

Red stream names indicate less accurate HAZUS depth grids

Graphics of Zone A Cluster Analysis

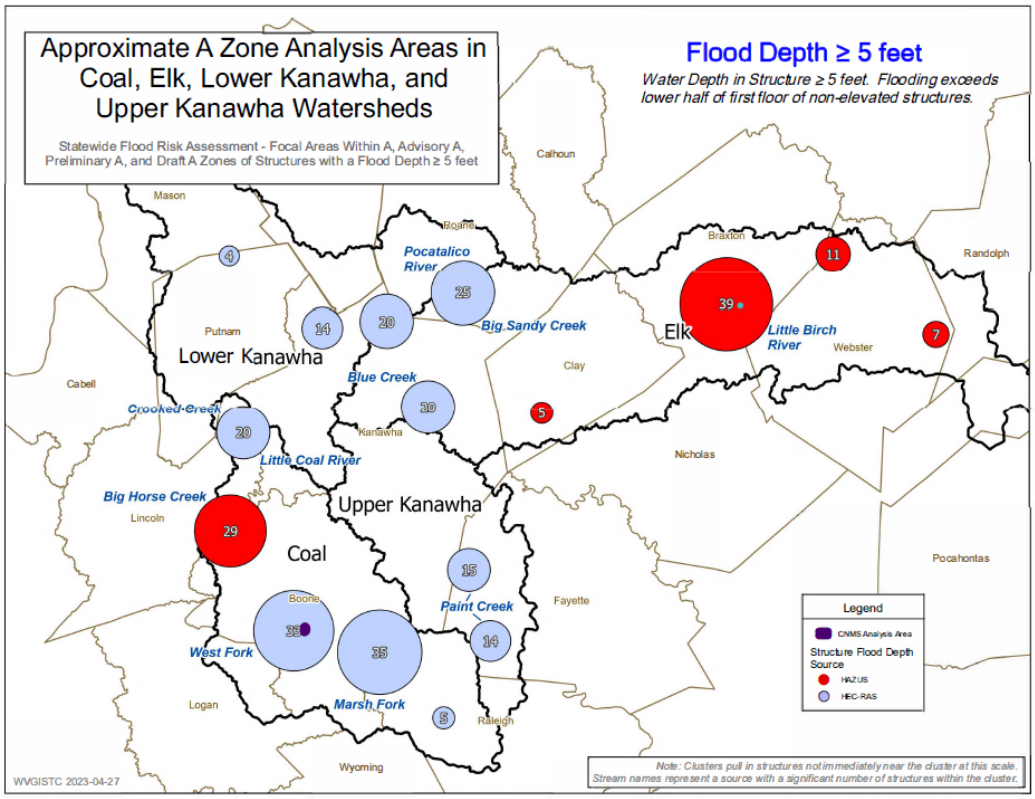


Figure 2. Building Cluster Zone A Analysis for Flood Depth ≥ 5 feet

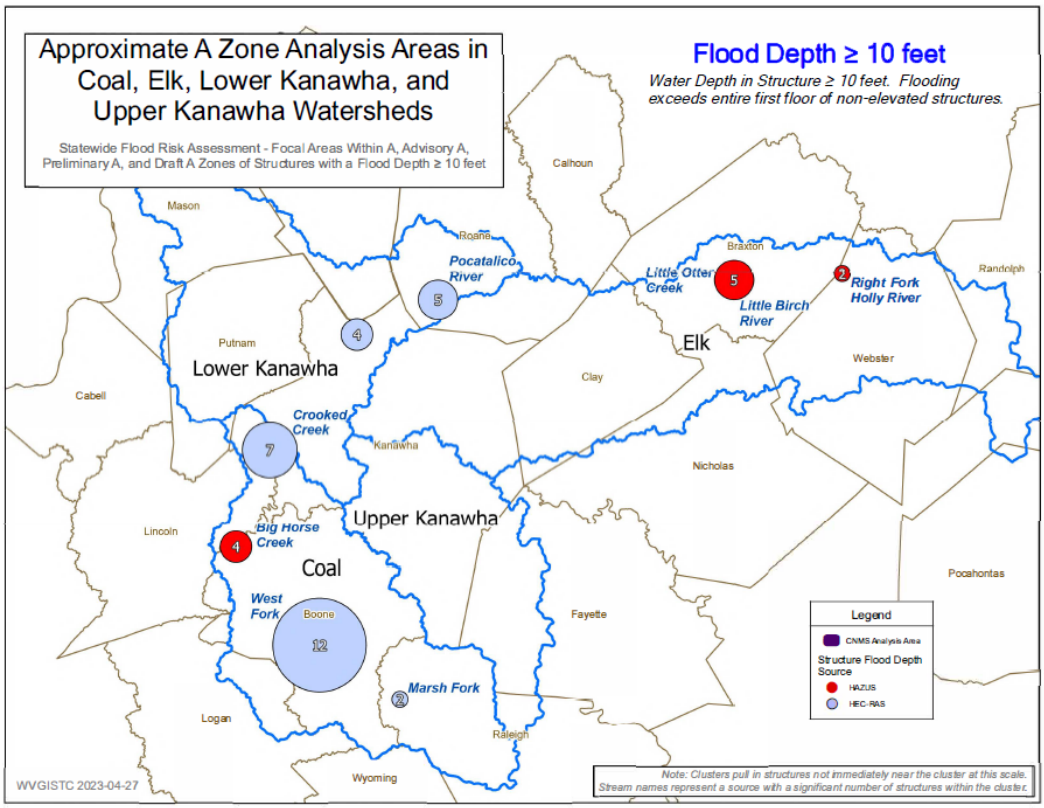


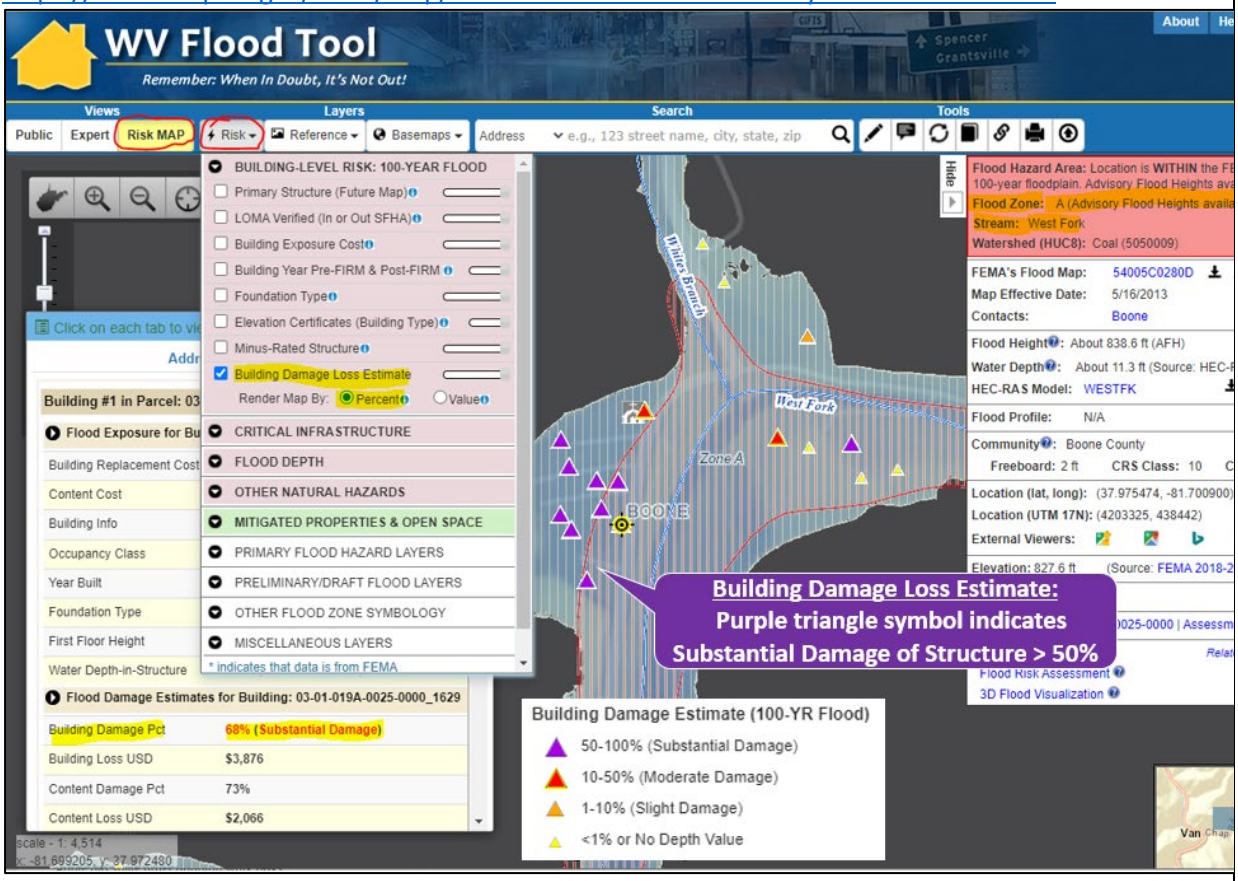
Figure 3. Building Cluster Zone A Analysis for Flood Depth ≥ 10 feet

Summary Table/Graphics of Zone A Cluster Analysis including Rankings

West Fork, Coal Watershed, Boone County

West Fork: The West Fork of the Coal Watershed has the highest cluster number of structures greater ≥ 10 ft. flood depth (n=12) and the highest estimated number of substantially damaged structures (n=20) for a 1%-annual-chance flood event. Typically, high flood depths correlate to high building damage loss estimates. The West Fork also has the highest density of structures of 22.1 buildings per square mile and low Zone AE mapping cost. First Baptist Church, a community asset, located in Zone A building cluster.

https://www.mapwv.gov/flood/map/?wkid=102100&x=-9094825&y=4575656&l=9&v=2

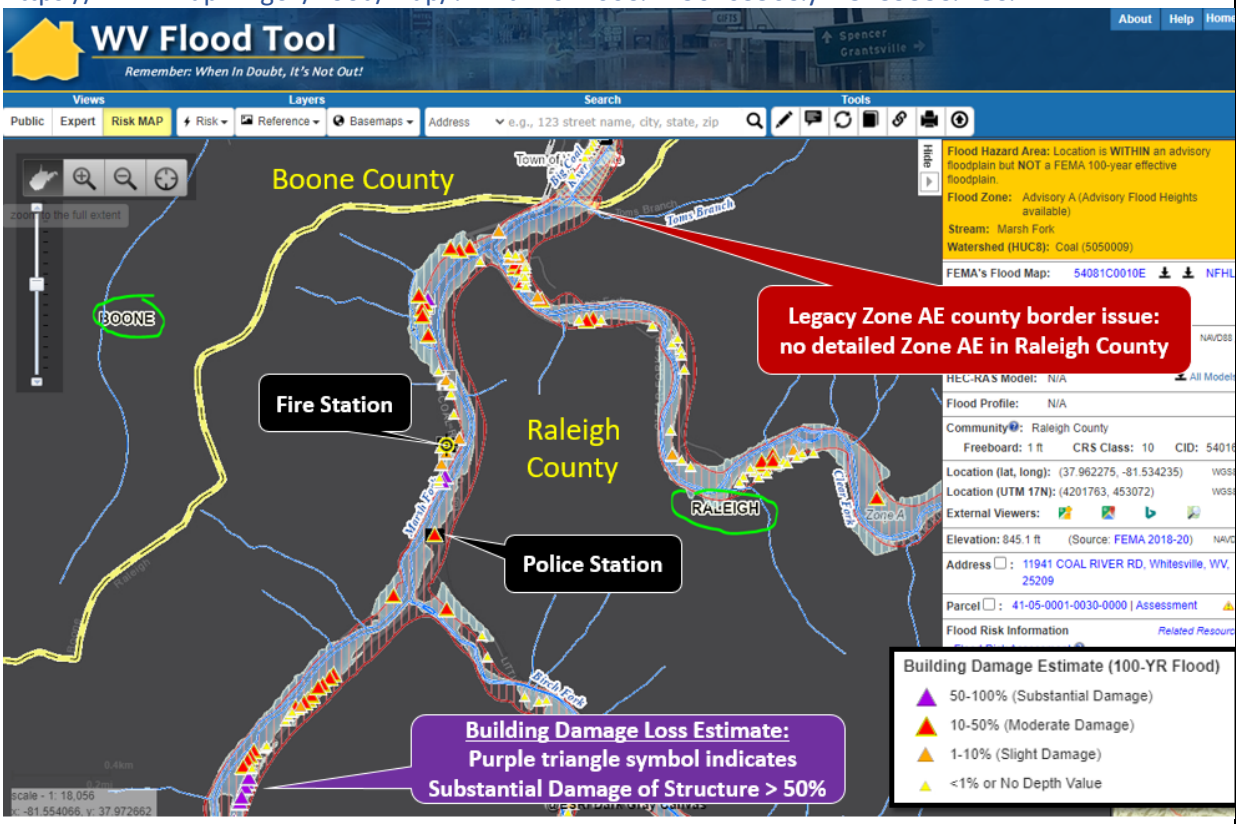


Building Damage Estimate (100-YR Flood)
50-100% (Substantial Damage)
10-50% (Moderate Damage)
1-10% (Slight Damage)
<1% or No Depth Value

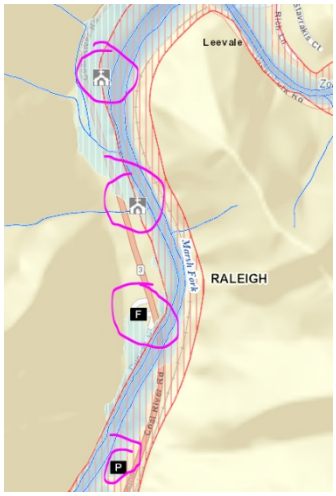
Marsh Fork, Coal Watershed, Raleigh County (border mapping issue)

Marsh Fork: The Marsh Fork has the highest number of structures ≥ 5 ft. flood depth. Legacy Raleigh-Boone county boundary mapping issue defined by county boundary mapping in which Boone County has Zone AE and Raleigh County Zone A. Essential facility WV State Police Troop 6 (Whitesville Detachment) is located within this Zone A building cluster. Another essential facility, the Whitesville Volunteer Fire Department (Pettus Substation), is also located in the high-risk Advisory Zone A of the building cluster. Two community assets, Pettus Baptist Church and New Life Assembly Church, are also in the building cluster located on Coal River Road (State Route 3) south of Whitesville.

https://www.mapwv.gov/flood/map/?wkid=102100&x=-9076356&y=4573933&l=8&v=2



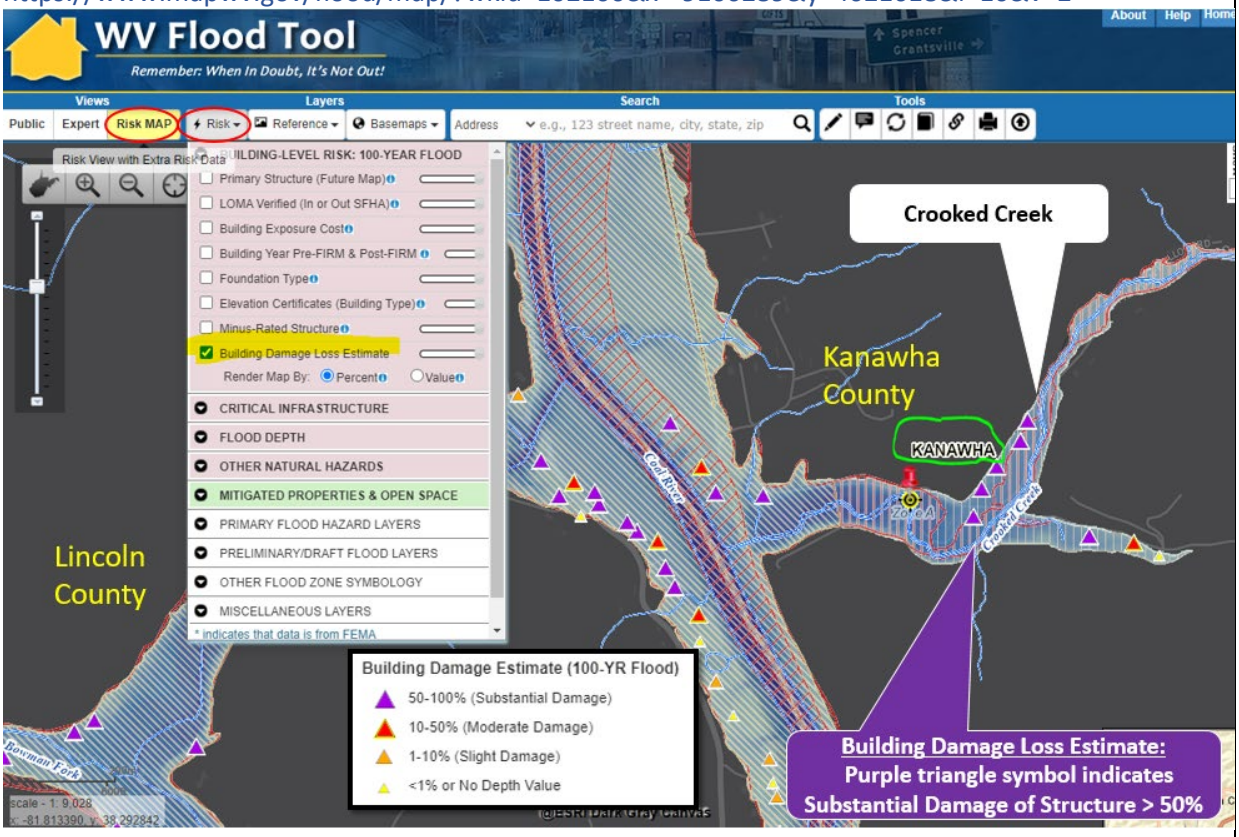
Four structures of significance - two essential facilities and two community assets - are located in the building cluster.



Crooked Creek & Crooked Creek Tributary, Coal Watershed, Kanawha County

Crooked Creek: Small Zone AE mapping extension along Crooked Creek and Crooked Creek Tributary and lowest mapping cost of $1,275 ($2,300 mapping cost per Zone AE mile). Almost all five structures in cluster ≥ 10 ft. flood depth. Lowest estimated Zone AE mapping cost of $1,275. Backwater from Coal River may be a factor.

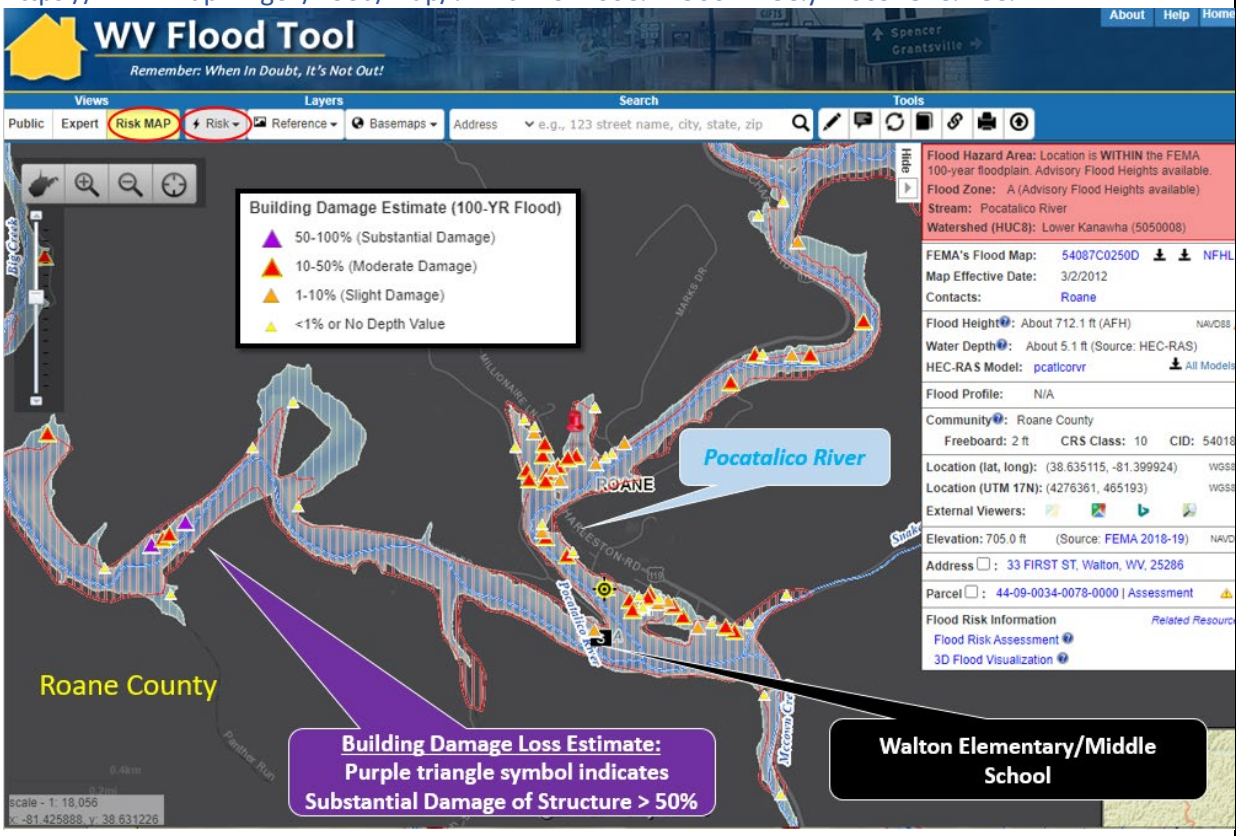
https://www.mapwv.gov/flood/map/?wkid=102100&x=-9106289&y=4621618&l=10&v=2

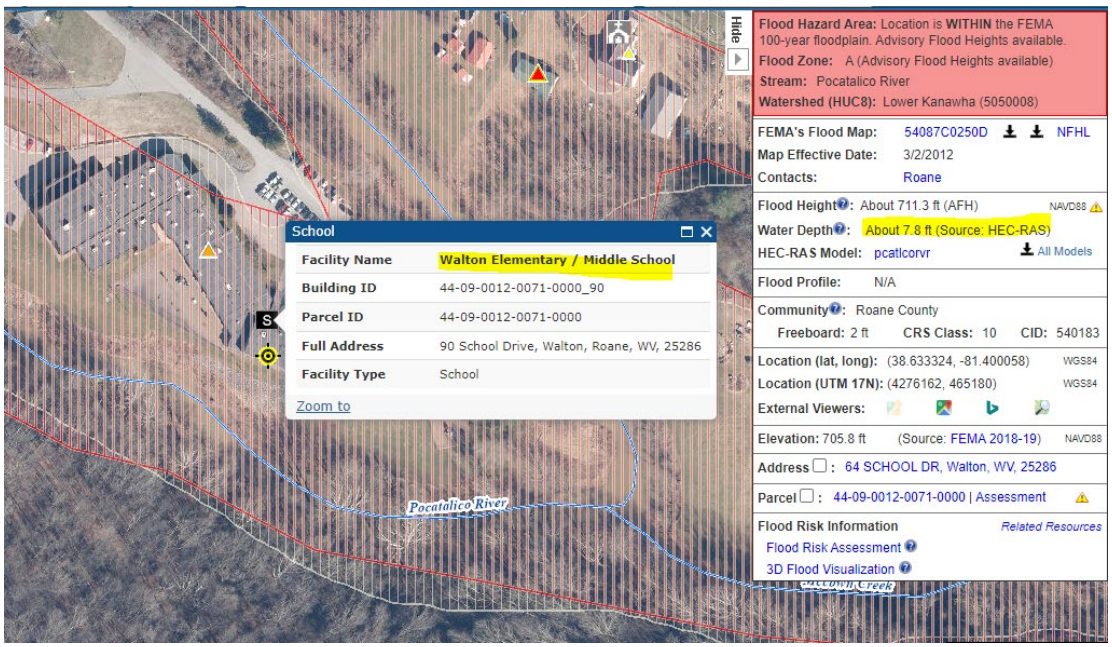


Pocatalico River, Lower Kanawha Watershed, Roane County

Pocatalico River: Highest building dollar exposure of $6.7M and damage loss estimate of $867K, primarily because the high-value Walton Elementary/Middle School is located within a 1% flood depth ≥ 5 ft. building cluster; building footprint edge closest to flood source nearly 8-foot flood depth. The cluster of Zone A structures in not adjacent to an existing Zone AE.

https://www.mapwv.gov/flood/map/?wkid=102100&x=-9061413&y=4669284&l=8&v=2

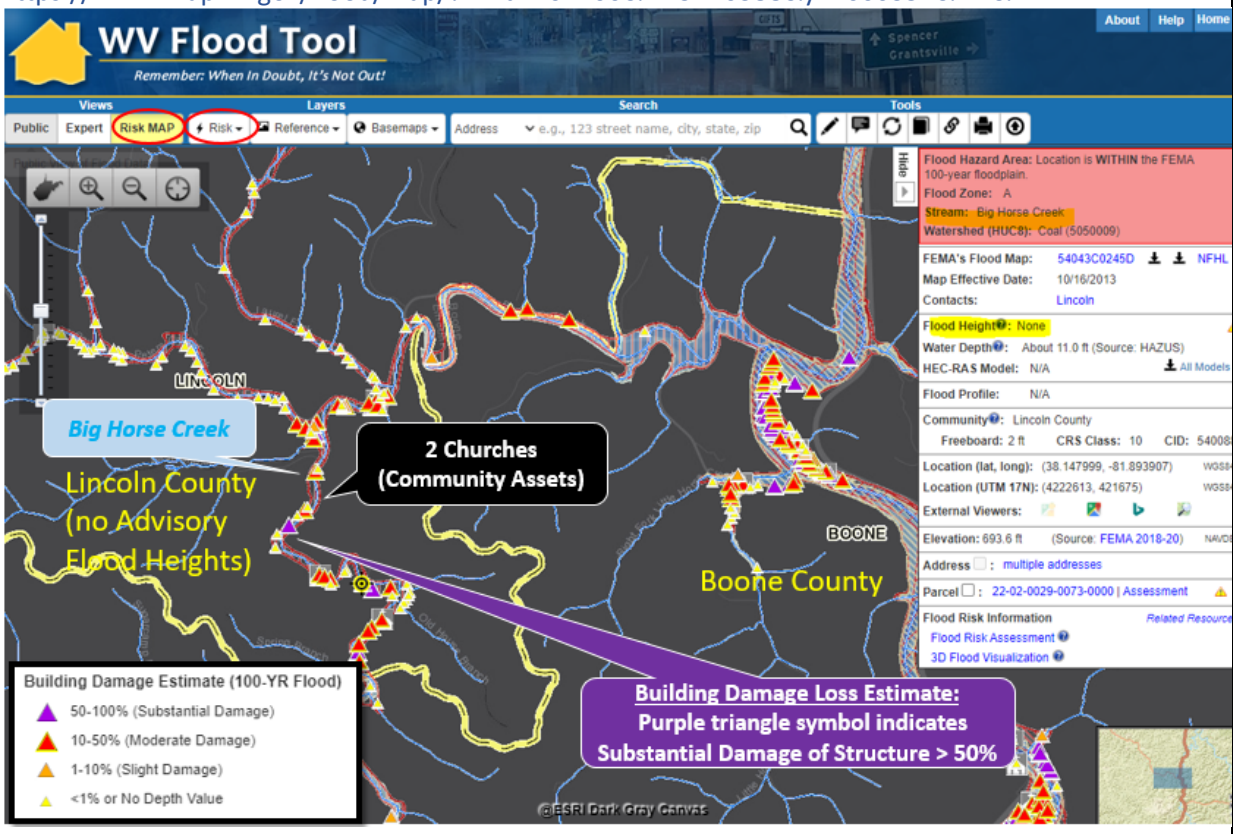




Big Horse Creek, Coal Watershed, Boone County

Big Horse Creek: A longer 5.5 mile reach from Zone AE at the Little Coal River confluence southward to the boundary of Lincoln County. Estimated Zone AE mapping cost of $13,750. No advisory flood heights or advisory BFEs exist for A Zones in Lincoln County. Only less accurate Hazus flood depth grid available for building-level risk assessment cluster analysis.

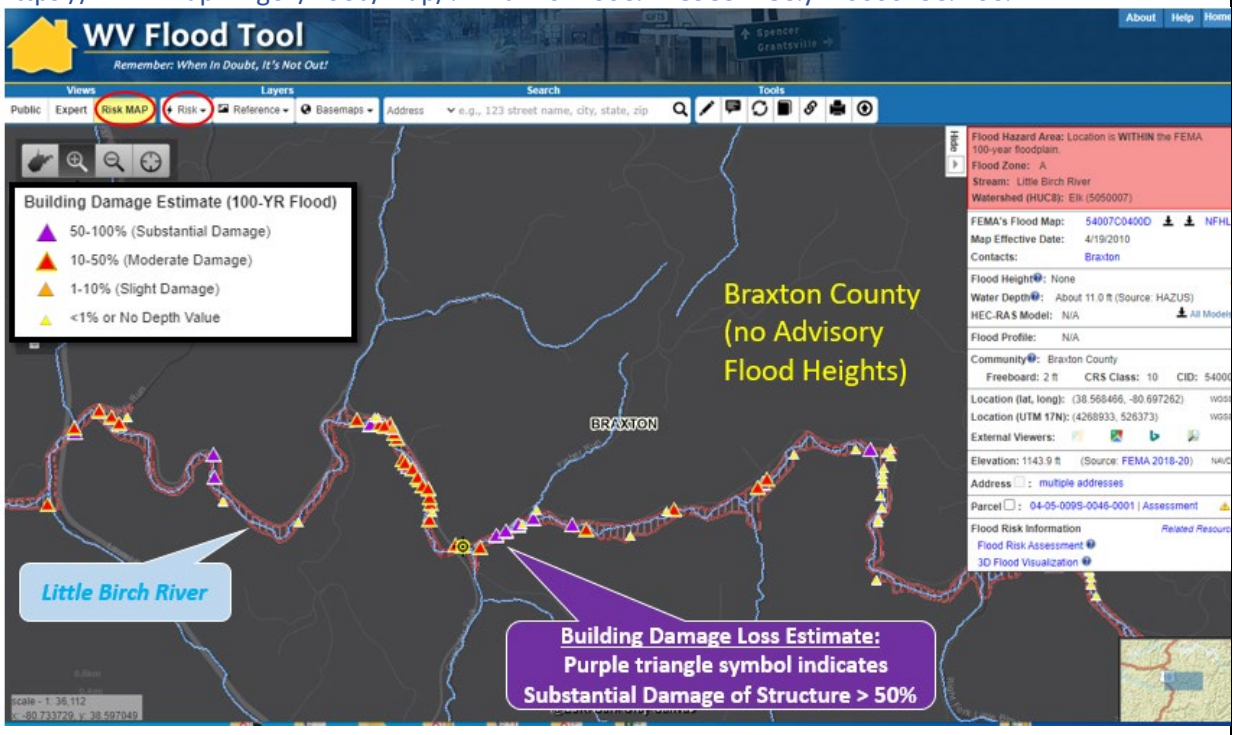
https://www.mapwv.gov/flood/map/?wkid=102100&x=-9116388&y=4600354&l=7&v=2

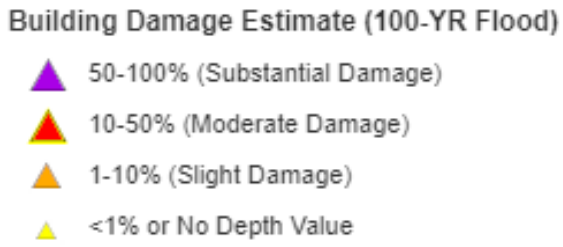


Little Birch River, Elk Watershed, Braxton County

Little Birch River: High cluster number of structures ≥ 5 ft. flood depth (n=28) and building dollar exposure of 1.6 million. Zone A building cluster not adjacent to existing Zone AE and based on less accurate Hazus flood depth grid. Longest building cluster stream reach of 6.0 miles.

https://www.mapwv.gov/flood/map/?wkid=102100&x=-8983178&y=4660045&l=6&v=2





Source Documents for Zone A Structure Cluster Analysis: Zone A structure vulnerability and spatial density analyses were performed for three flood depths at ≥ 5 feet and ≥ 10 feet.

- Zone A Cluster Analysis Graphics: Flood Depths for ≥ 5 feet and ≥ 10 feet
- Spreadsheet Flood Source Tables: Summary Building-Level Risk Assessment Factors per River/Stream Cluster and Top Building Flood Depths per River/Stream
- Report: Methodology and map links to potential candidates for AE Zone Detailed Studies
- BLRA: Statewide Building-Level Risk Assessment (BLRA) source geodatabase for cluster analysis

Table 4. Highest Building Flood Depth for Approximate A Zone Rivers/Streams. Sorted on building flood depth. Click on Flood Tool map link to view location.

Stream Name	Watershed	**Flood Depth Value (ft.)**	Web Link	County	Flood Depth Source	Hazard Occupancy Code	Building Exposure ($)	Flood Zone Designation
Angel Fork	Coal	**14.1**	FT	KANAWHA COUNTY	HEC-RAS	RES2	39,700	A
Big Sandy Creek	Elk	**11.3**	FT	ROANE COUNTY	HEC-RAS	RES1	36,600	A
Crooked Creek	Coal	**17.1**	FT	KANAWHA COUNTY	HEC-RAS	RES1	90,200	Advisory A
Crooked Creek	Coal	**15.1**	FT	KANAWHA COUNTY	HEC-RAS	RES1	91,500	A
Crooked Creek	Coal	**12.1**	FT	KANAWHA COUNTY	HEC-RAS	RES2	45,700	Advisory A
Crooked Creek	Coal	**12.0**	FT	KANAWHA COUNTY	HEC-RAS	RES2	6,500	Advisory A
Crooked Creek	Coal	**11.8**	FT	KANAWHA COUNTY	HEC-RAS	RES1	22,400	Advisory A
Little Otter Creek	Elk	**17.0**	FT	BRAXTON COUNTY	Modified	RES1	58,500	A
Marsh Fork	Coal	**12.0**	FT	RALEIGH COUNTY	HEC-RAS	RES1	26,700	A
Pocatalico Creek	Lower Kanawha	**14.1**	FT	KANAWHA COUNTY	HEC-RAS	RES1	102,500	A
Pocatalico River	Lower Kanawha	**11.4**	FT	ROANE COUNTY	HEC-RAS	RES1	49,700	A
Raccoon Creek	Lower Kanawha	**11.8**	FT	KANAWHA COUNTY	HEC-RAS	RES2	23,700	Advisory A
Right Fork Holly River	Elk	**14.0**	FT	WEBSTER COUNTY	HAZUS	RES2	39,190	A
West Fork	Coal	**14.0**	FT	BOONE COUNTY	HEC-RAS	RES1	58,000	A
West Fork	Coal	**13.1**	FT	BOONE COUNTY	HEC-RAS	RES2	72,500	A
West Fork	Coal	**12.4**	FT	BOONE COUNTY	HEC-RAS	RES1	15,900	A
West Fork	Coal	**11.9**	FT	BOONE COUNTY	HEC-RAS	RES2	26,300	A
West Fork	Coal	**11.6**	FT	BOONE COUNTY	HEC-RAS	RES1	23,600	A
West Fork	Coal	**11.4**	FT	BOONE COUNTY	HEC-RAS	RES1	29,100	A
West Fork	Coal	**11.3**	FT	BOONE COUNTY	HEC-RAS	RES1	5,700	A

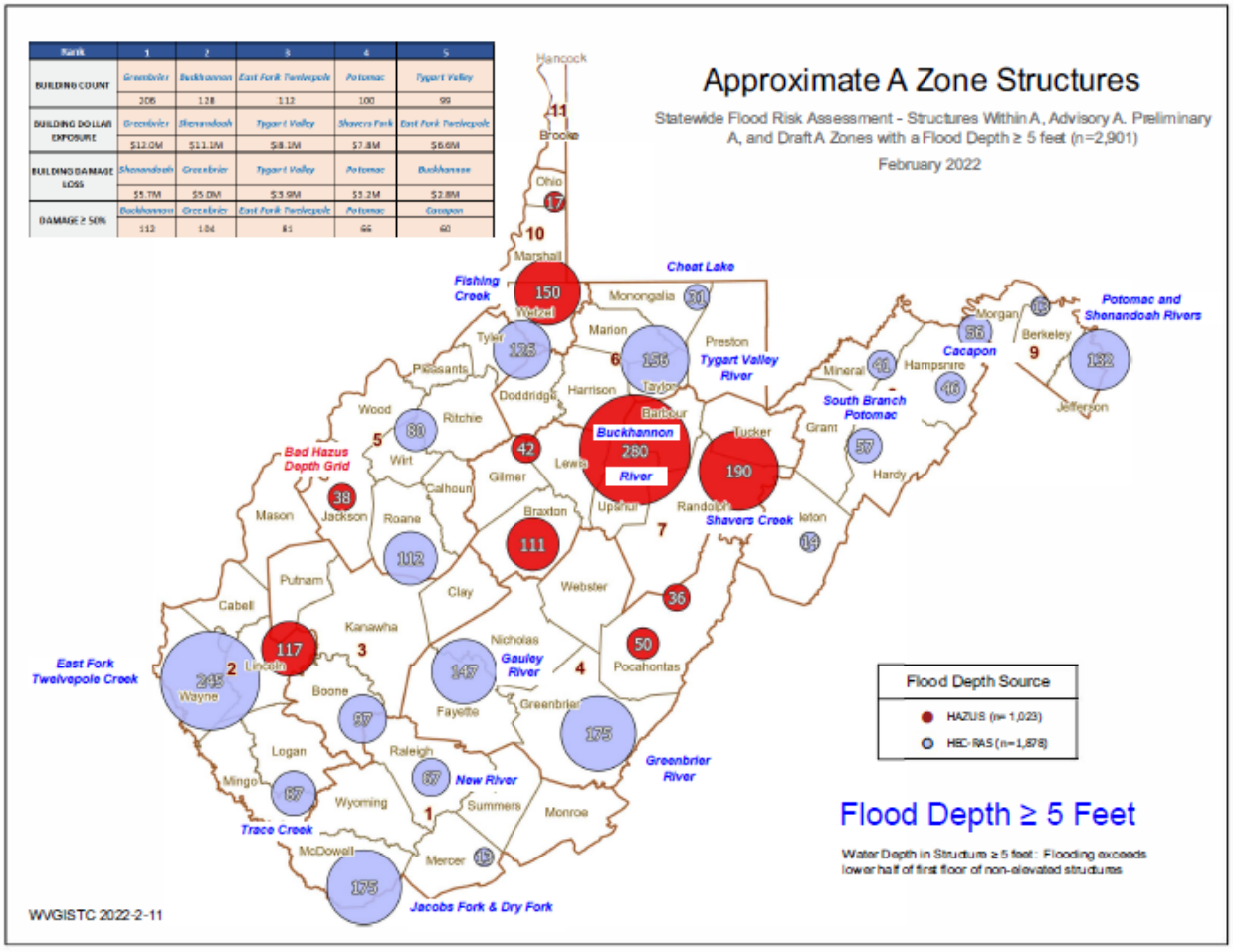
Table 5. Evaluation factor values for Zone A stream reaches to consider for detailed Zone AE conversion

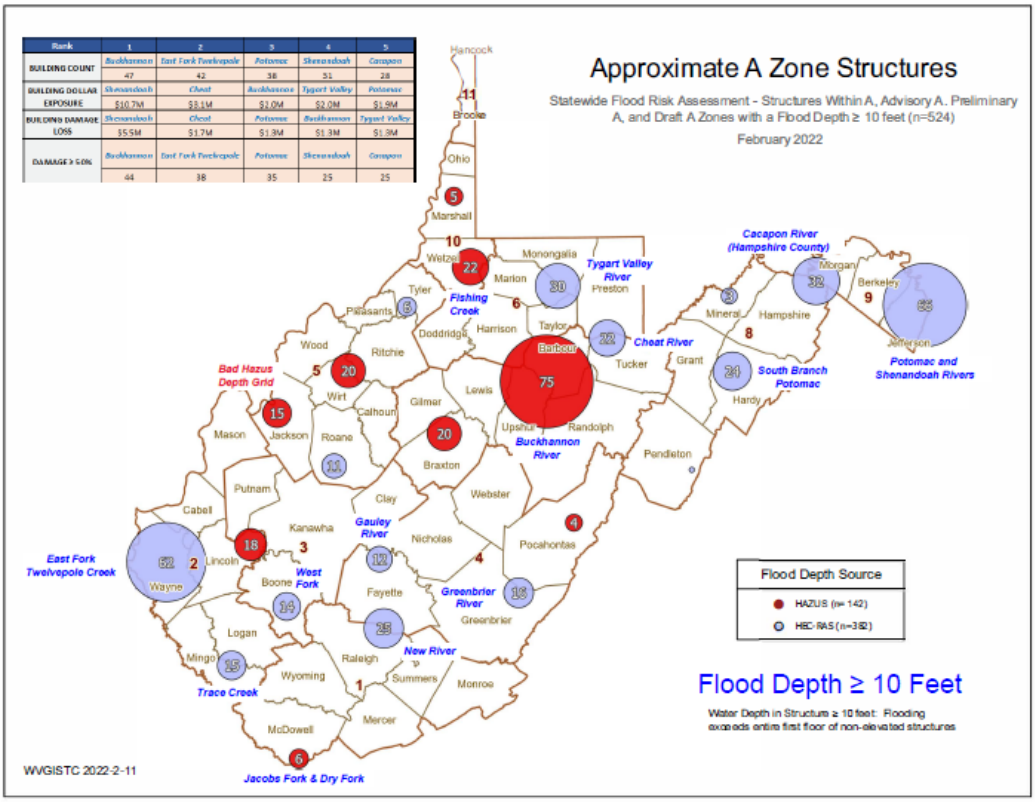
Stream Name	Watershed with A Zone Structures at ≥ 5 ft. Flood Depth	Total Structures	Total Building Exposure ($)	Total Building Loss ($)	Structures with Damage ≥ 50%	Structures In CNMS Analysis Area	Notes	Stream Lengths of Potential AE Zones (miles)	Building Density per stream mile	Estimated Zone AE Cost ($2,500 per mile)
Big Horse Creek	Coal	20	$778,003	$264,414	**7**	0	Boone-Lincoln county Boundary Issue - no AFH for Boone, HAZUS depth grid. **Four structures with a flood depth ≥ 10 ft.**	5.50	3.6	$13,750
Crooked Creek	Coal	5	$256,300	$192,388	**5**	0	Also Crooked Creek Tributary. **Small distance mileage for mapping AE. Five structures with flood depth > 10 ft.**	0.42	**11.9**	$1,050
Crooked Creek Tributary No.2	Coal	1	$93,500	$57,603	1	0	Part of Crooked Creek	0.09	**11.1**	$225
Little Birch River	Elk	**28**	**$1,612,637**	$683,020	**14**	0	HAZUS depth grid. **Highest building exposure and damage estimates for HAZUS depth grids. Buildings dispersed over longer 6 mile reach. Two structures with a flood depth ≥ 10 ft.**	5.99	4.7	$14,975
Marsh Fork	Coal	**31**	**$1,448,655**	$415,082	**17**	0	**Raleigh-Boone County boundary issue**, Boone: AE zone, Raleigh: A zone. **Highest building count and building dollar value for model-backed depth grids. Two structures with a flood depth ≥ 10 ft. Four structures of significance - two essential facilities and two community assets - are located in the building cluster.**	2.20	**14.1**	$5,500
Pocatalico River	Lower Kanawha	13	**$6,740,850**	**$867,449**	**7**	0	**Essential Facility: Walton Elem/Middle School** - $6M, Bldg. Loss Estimate $550K (underestimated based on selected site flood depth, flood depth estimates as high as 8 ft.), **not adjacent to a detailed AE zone. Four structures with a flood depth ≥ 10 ft.**	3.28	4.0	$8,200
West Fork	Coal	21	$681,790	460,205	**20**	**17**	**Twelve structures with flood depth > 10 ft.**; Cluster of properties in high base flood depth areas with a potential of substantial flood damage; candidate area to consider an AE study; **only CNMS record in Kanawha River Basin. Highest damage estimates and high flood depths for model-backed depth grids.**	0.95	**22.1**	**$2,375**

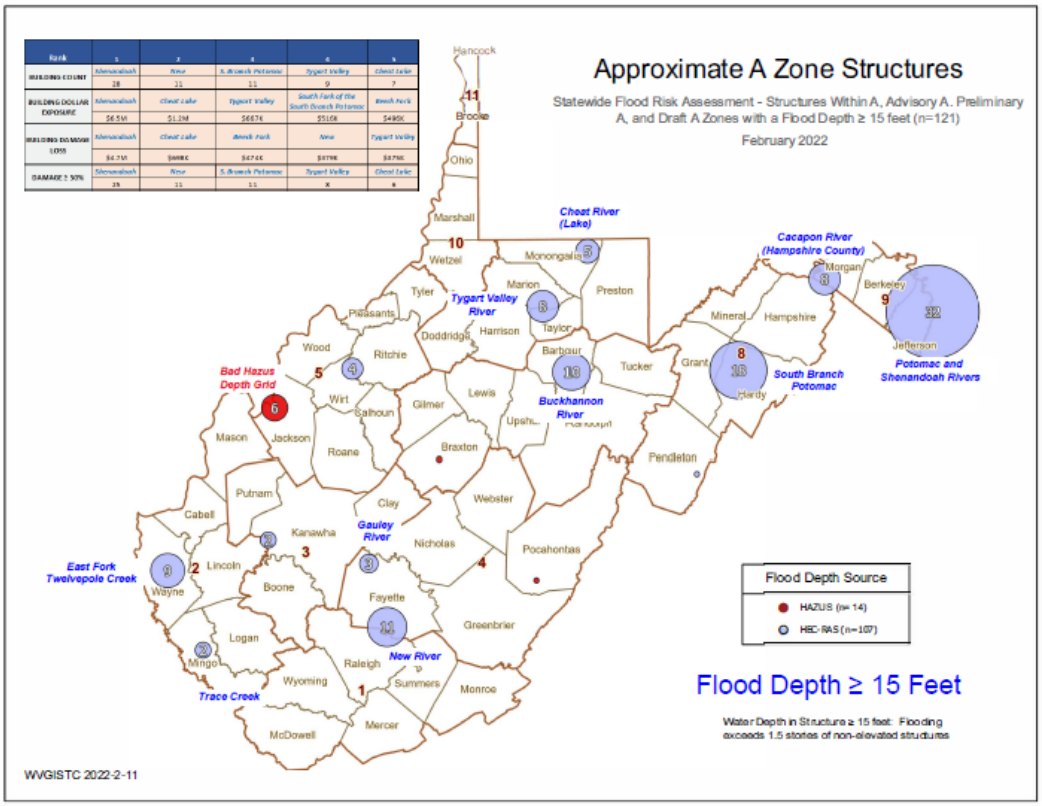
Appendix A: Statewide Analysis - Zone A Structure Cluster Analysis

Zone A Structure Cluster Analysis: Zone A structure vulnerability and spatial density analyses were performed for three flood depths at ≥ 5 feet, ≥ 10 feet, and ≥ 15 feet. West Fork of the Coal Watershed was discovered as part of the statewide analysis. Statewide analysis performed February 2022.

- Zone A Cluster Analysis Graphics: Flood Depths for ≥ 5 feet, ≥ 10 feet, and ≥ 15 feet
- Spreadsheet Flood Source Tables: Summary Building-Level Risk Assessment Factors per River/Stream Cluster and Top Building Flood Depths per River/Stream
- Report: Methodology and map links to potential candidates for AE Zone Detailed Studies
- BLRA: Statewide Building-Level Risk Assessment (BLRA) source geodatabase for cluster analysis




Approximate A Zone Structures
Statewide Flood Risk Assessment - Structures Within A, Advisory A. Preliminary A, and Draft A Zones with a Flood Depth ≥ 10 feet (n=524)
February 2022
Flood Depth Source
HAZUS (n= 142)
HEC-RAS (n=382)
Flood Depth ≥ 10 Feet
Water Depth in Structure ≥ 10 feet: Flooding exceeds entire first floor of non-elevated structures
WVGISTC 2022-2-11
Bad Hazus Depth Grid
East Fork Twelvepole Creek
Trace Creek
Jacobs Fork & Dry Fork
Fishing Creek
Buckhannon River
Tygart Valley River
Cheat River
Gauley River
West Fork
Greenbrier River
New River
Cacapon River (Hampshire County)
South Branch Potomac
Potomac and Shenandoah Rivers


Approximate A Zone Structures
Statewide Flood Risk Assessment - Structures Within A, Advisory A. Preliminary A, and Draft A Zones with a Flood Depth ≥ 15 feet (n=121)
February 2022
Flood Depth Source
HAZUS (n= 14)
HEC-RAS (n=107)
Flood Depth ≥ 15 Feet
Water Depth in Structure ≥ 15 feet: Flooding exceeds 1.5 stories of non-elevated structures
WVGISTC 2022-2-11
Cheat River (Lake)
Bad Hazus Depth Grid
East Fork Twelvepole Creek
Trace Creek
Tygart Valley River
Buckhannon River
Gauley River
New River
Cacapon River (Hampshire County)
South Branch Potomac
Potomac and Shenandoah Rivers

Statewide Findings: Refer to the graphics, spreadsheet table, and WV Flood Tool when evaluating the TEIF data for this analysis. Analysis performed February 2022.

Flood Depth ≥ 5 Feet

Approximate A Zone Structures with **Flood Depth ≥ 5 Feet.** Water Depth in Structure ≥ 5 feet: Flooding exceeds lower half of first floor of non-elevated structures.

- **Greenbrier River**: Greenbrier River in Greenbrier County is ranked first as having the highest Building Count (206) and Building Dollar Exposure ($12M). Greenbrier River is ranked second for Building Damage Loss Estimate ($5.0M) and Substantially Damaged Structures Estimate (104)
- Other Rivers/Streams of Interest: **Buckhannon, East Fork Twelvepole, Potomac, Tygart Valley, Shenandoah, Shavers Fork, Cacapon**, and **West Fork**.

Flood Depth ≥ 10 Feet

Approximate A Zone Structures with **Flood Depth ≥ 10 Feet.** Water Depth in Structure ≥ 10 feet: Flooding exceeds entire first floor of non-elevated structures.

- **Buckhannon River**: Buckhannon River in Barbour and Upshur counties is ranked first with the highest Building Count (47) and Substantially Damaged Loss Estimate (44).
- **Shenandoah River** (Harpers Ferry): Shenandoah River is ranked first in Building Dollar Exposure ($10.7M) and Building Damage Loss Estimate ($5.5M).
- Other Rivers/Streams of Interest: **East Fork Twelvepole, Potomac, Cacapon, Cheat, Tygart Valley,** and **West Fork.**

Flood Depth ≥ 15 Feet

Approximate A Zone Structures with **Flood Depth ≥ 15 Feet.** Water Depth in Structure ≥ 15 feet: Flooding exceeds 1.5 stories of non-elevated structures.

- **Shenandoah River** (Harpers Ferry): Shenandoah River is ranked first in all risk factors: Building County (28), Building Dollar Exposure ($6.5M), Building Damage Loss Estimate ($4.7M), and Substantially Damaged Loss Estimate (25).
- Other Rivers/Streams of Interest: **New, South Branch Potomac, Tygart Valley, Cheat Lake, South Fork of the South Branch Potomac,** and **Beech Fork**.

Appendix B: Differences in Specifications & Costs for AE and A Zones

Specifications: Detailed Studies versus Approximate A Studies

- Detailed studies use more refined hydrologic modeling in a lot of cases instead of just using regression equations.
- Detailed studies includes floodway and a hydraulic model with structure survey and bathymetric survey.
- Detailed studies have extra FEMA products such as a "floodway data table" and "flood profiles" in the FIS reports.
- FEMA can't publish BFE's on their products unless it is "a detailed study" per federal regulations. Consequently, FEMA utilizes States' websites to display BFE's for Approximate A Zones.

Price Differences: Detailed Studies versus Approximate A Studies

- Prices are different for every company. Approximately $300 per Zone A mile and $2,500 per Zone AE mile.
- Zone AE costs have come down in price much in the last 10 years.

Source: Personal communications, FEMA Region III