FEMA

FLOOD RISK DISCOVERY REPORT

COAL WATERSHED | WEST VIRGINIA

Boone County, Logan County, Kanawha County, Lincoln County, Putnam County, Raleigh County, City of South Charleston, City of Saint Albans, Town of Whitesville, Town of Danville, Town of Sylvester, Town of Madison, Town of Lester

MEETING: May 3, 2023

FINAL REPORT: January 2024

RiskMAP
Increasing Resilience Together

COAL WATERSHED | WEST VIRGINIA

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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 Coal Watershed, which includes six counties, two cities, and five 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 Coal Watershed Discovery process.

Highlights of the Discovery effort are listed on the right.

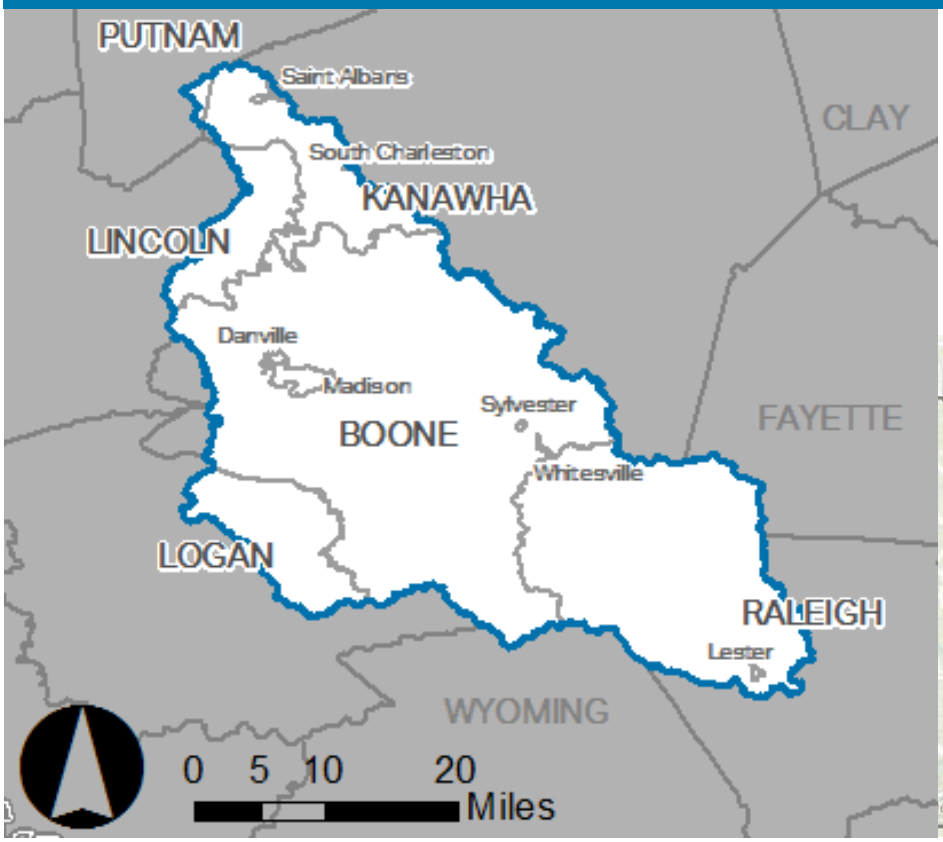
DISCOVERY HIGHLIGHTS:

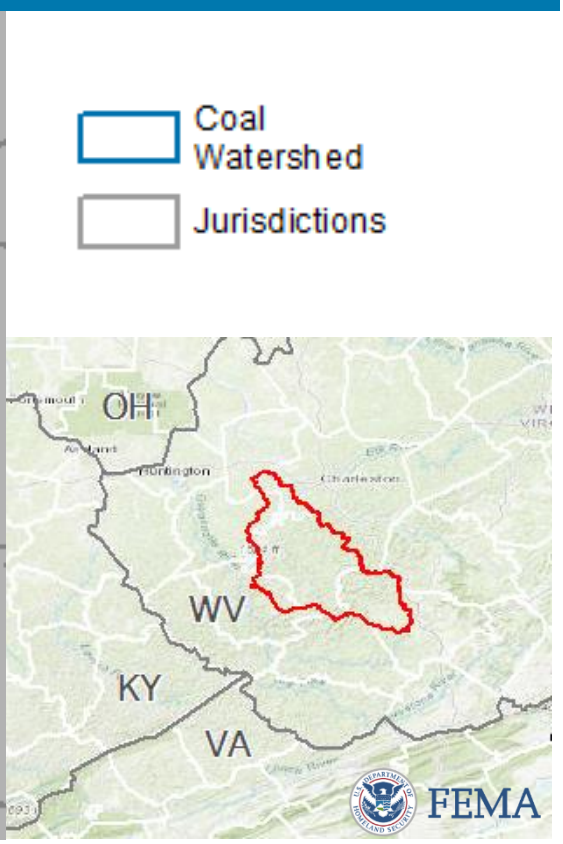
- New Light Detection and Ranging (LiDAR) data available for this watershed will allow for a dramatic increase in the accuracy of flood hazard mapping.
- All communities in the watershed participate in the National Flood Insurance Program (NFIP).
- The watershed is predominantly comprised of established, rural, and suburban areas.
- 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.

COAL WATERSHED | WEST VIRGINIA

PROJECT OVERVIEW

The Coal Watershed includes all the land that drains into the Coal River from Raleigh County in the southeast to the City of Saint Albans, West Virginia in the northwest. FEMA Region III identified the Coal 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 892 square miles.





COMMUNITY	POPULATION[1]	POPULATION IN WATERSHED[2]
BOONE COUNTY	21,809	20,700
CITY OF SAINT ALBANS	10,861	2,800
CITY OF SOUTH CHARLESTON	13,647	240
KANAWHA COUNTY	180,745	14,900
LINCOLN COUNTY	20,463	2,300
LOGAN COUNTY	32,567	4,400
PUTNAM COUNTY	57,440	590

COMMUNITY	POPULATION[1]	POPULATION IN WATERSHED[2]
RALGIEH COUNTY	74,591	30,200
TOWN OF DANVILLE	672	672
TOWN OF LESTER	338	338
TOWN OF MADISON	2,913	2,913
TOWN OF SYLVESTER	171	171
TOWN OF WHITESVILLE	361	361

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

COAL WATERSHED | WEST VIRGINIA

YOUR FLOOD RISK MAPPING TIMELINE

Discovery Meeting
May 3, 2023

NEXT STEPS: POST-DISCOVERY FOLLOW-UP

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

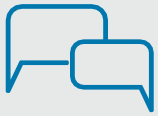
If a flood study is determined to be necessary as a result of the Discovery process, FEMA, State, and local officials will meet to review the draft floodplain mapping and methodologies used.

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 are 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.

COAL WATERSHED | WEST VIRGINIA

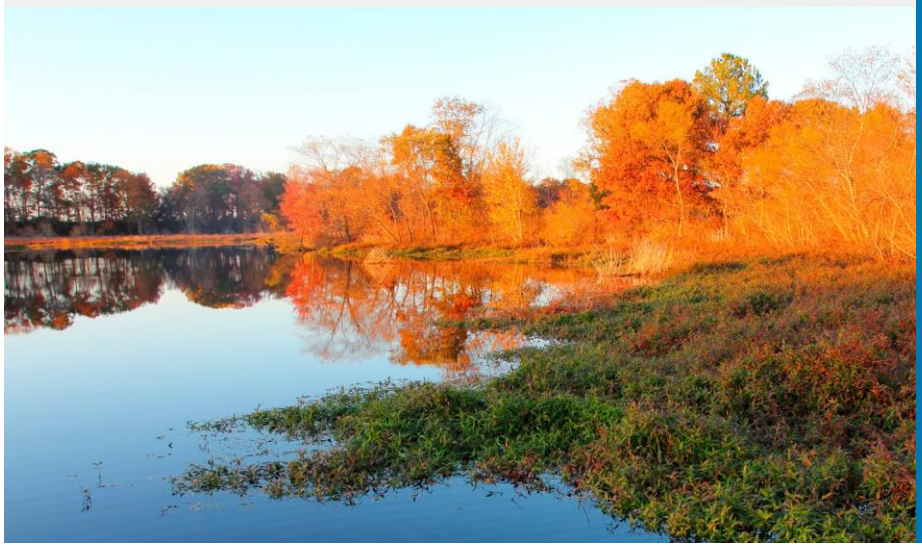
DATA COLLECTION

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

FEMA Region III 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 prior to the 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.

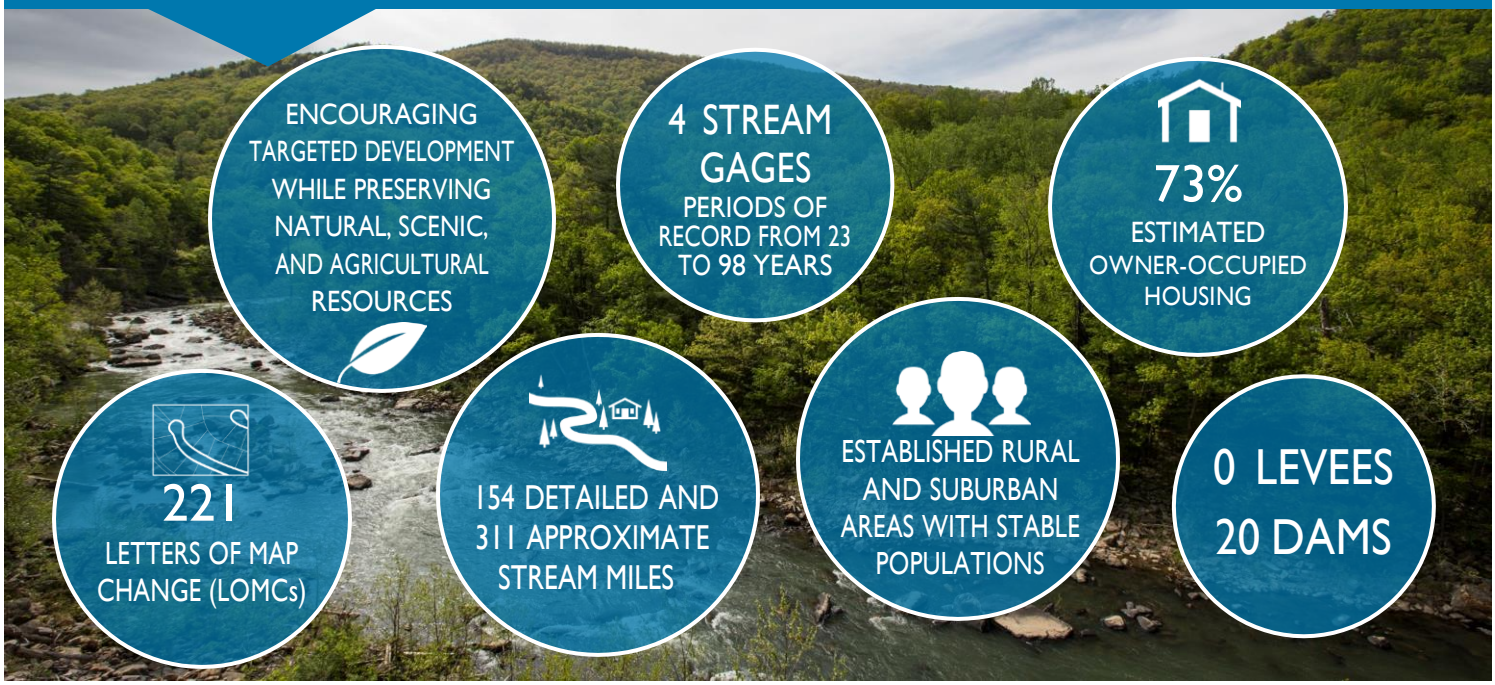


- BASE MAP DATA (political boundaries, streamlines, transportation)
- TOPOGRAPHIC DATA (2018 LiDAR)
- ORTHOPHOTOS (2022 pixel-based)
- DECLARED DISASTERS
- LEVEES, DAMS, STREAM GAGES
- EFFECTIVE FLOODPLAINS
- NFIP & CRS PARTICIPATION
- INDIVIDUAL & PUBLIC ASSISTANCE
- STRUCTURES
- POPULATION & SOCIOECONOMIC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

COAL WATERSHED: CHARACTERISTICS

COMMUNITY CHARACTERISTICS

The Coal Watershed community characteristics information was developed to inform the Discovery Meeting 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.



COAL WATERSHED COMMUNITY CHARACTERISTICS

The Coal Watershed includes all the land that drains into the Coal River from Raleigh County in the southeast to the City of Saint Albans, West Virginia in the northwest. The Coal River runs approximately 19 miles through Kanawha County starting from the southwest border at Whitesville, West Virginia before flowing into the Kanawha River at the City of Saint Albans, West Virginia. The watershed encompasses approximately 892 square miles in the Boone, Kanawha, Lincoln, Putnam, Raleigh, and Logan Counties.

All communities within the Coal 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. Two jurisdictions in the Coal Watershed, Kanawha County (Unincorporated Areas) and Putnam County (Unincorporated Areas), currently participate in the NFIP's CRS program.

COAL WATERSHED: CHARACTERISTICS

COMMUNITY	TOTAL POLICIES	TOTAL CLAIMS	RL[1] BUILDINGS	LEVEL OF NFIP REGS REQ'D	EFFECTIVE DATE OF FIRM/FIS	CAV[2]/ CAC[3] DATES	# OF LOMCS[4]	TOTAL EXPOSURE IN THE FLOODPLAIN 2.1[4,5]
BOONE COUNTY (UNINCORPORATED AREAS)	241	296	38	D	5/16/2013	5/17/2021 7/17/1996	90	$385,241,534.70
DANVILLE, TOWN OF	15	78	11	D	5/16/2013	11/07/1991 10/23/2018	5	$25,506,286
KANAWHA COUNTY (UNINCORPORATED AREAS)	1207	1585	296	D	2/6/2008	8/18/2014 1/25/2018	42	$240,855,981
LESTER, TOWN OF	2	1	0	N/A	9/29/2006	N/A 11/09/2018	1	$2,788,419
LINCOLN COUNTY (UNINCORPORATED AREAS)	141	293	43	D	10/16/2013	N/A 8/04/2016	26	$70,864,219
LOGAN COUNTY (UNINCORPORATED AREAS)	475	2296	491	D	2/6/2008	8/13/2018 10/15/2018	9	$27,995,361
MADISON, TOWN OF	25	87	20	D	5/16/2013	11/06/1991 4/19/2021	10	$84,535,626.63
PUTNAM COUNTY (UNINCORPORATED AREAS)	294	216	46	D	2/2/2012	11/19/2014 7/24/2007	0	$0
RALEIGH COUNTY (UNINCORPORATED AREAS)	148	343	36	D	6/16/2009	8/18/2009 8/19/2015	31	$190,833,455
SAINT ALBANS, CITY OF	56	46	2	D	2/6/2008	3/23/2016 2/17/2016	5	$4,951,281
SOUTH CHARLESTON, CITY OF	65	50	13	D	2/6/2008	11/30/2015 4/22/2010	0	$0
SYLVESTER, TOWN OF	19	15	4	D	5/16/2013	11/06/1991 N/A	2	$16,157,867
WHITESVILLE, TOWN OF	9	9	1	D	5/16/2013	11/07/1991 N/A	0	$11,113,896

[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 watershed.

[5] TEIF 2.1 (County Buildings) was created using local Building Footprint Features. Hazus building value data was subsequently dispersed proportionately to the footprints based on the area of the footprint. TEIF is intended to evaluate potential risk or economic loss in a dollar amount per community based on Hazus General Building Stock (Total Exposure) Values from FEMA's Hazus Version 2.2. VGIN building footprints for Quarter #1 of 2016 were utilized and building duplicates/overlapping buildings were removed prior to distribution of Hazus Building Value.

COAL WATERSHED: CHARACTERISTICS

RECENT FLOOD-RELATED PRESIDENTIAL DISASTER DECLARATIONS (2012-2021)

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.

OCT 2012
EM-3358: HURRICANE SANDY
Lincoln, Boone, Logan, Kanawha, Raleigh, And Putnam Counties

MAR 2015
DR-4210: SEVERE STORMS
Boone, Raleigh, Lincoln, Logan, Kanawha and Putnam Counties

JULY 2016
DR-4273: SEVERE STORMS
Kanawha and Lincoln Counties

MAY 2021
DR-4605: SEVERE STORMS
Boone, Kanawha, Lincoln, and Logan Counties

HISTORY OF FLOOD-RELATED DISASTERS

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

- **March 1963: Severe Storms**
- **May 1996: Severe Storms**
- **July 1998: Severe Storms**
- **February 2000: Severe Storms**
- **June 2001: Severe Storms**
- **June 2004: Severe Storms**

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 received more than $100 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 through G are permanent work projects and are only available for major disasters. Communities in the watershed received approximately $50.2 million in total public assistance since 1998 (approximately $30.6 million for categories A and B and $19.6 million for categories C-G). Funding for these projects is summarized by county below. Project amounts for categories A (debris removal), B(emergency protective measures), and C-G since 1998 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
BOONE COUNTY	$494K	$0	$71K	$218K	$15K
KANAWHA COUNTY	$1.6M	$0	$6.5M	$2.4M	$2.8M
LINCOLN COUNTY	$4K	$0	$304K	$200K	$4K
LOGAN COUNTY	$1.9M	$0	$37K	$279K	$0
PUTNAM COUNTY	$23K	$0	$25K	$157K	$11K
RALEIGH COUNTY	$460K	$0	$84K	$2.1M	$33K

COAL WATERSHED: CHARACTERISTICS

PRINCIPAL FLOOD PROBLEMS BY COUNTY	
BOONE COUNTY	• Due to the steepness of the terrain, most development is located in the floodplain areas adjacent to the rivers and streams. Because of the high development in the floodplains, even the minor flooding results in significant damage.
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, which causes the temporary loss of police, fire, and medical protection. • In July 1998, severe storms caused flooding in western West Virginia resulting in major damage to private property. In February 2000, severe winter storms caused flooding in parts of western West Virginia which also caused major damage to private property. In June 2001, severe storms caused flooding and landslides in parts of southern West Virginia. Southwestern West Virginia was again hit with thunderstorms and subsequent flash flooding in June 2004. The July 1998, February 2000, June 2001 and June 2004 events all resulted in Presidential Disaster declarations for Kanawha County. • The flood of record on the Kanawha River and the Elk River occurred in September 1861. The U.S. Weather Bureau gage at river mile 58.5 on the Kanawha River reached an elevation of 605.5 feet, 5.3 feet higher than the second-highest flood of record at Charleston, which occurred in September 1878 (USACE 1958). The 1861 flood was approximately 1.5 feet lower than the 100-year flood under natural conditions and 9.5 feet higher than the 100-year flood under current modified conditions.
LINCOLN COUNTY	• The history of flooding along the streams in Lincoln County indicates that floods can occur in any season of the year; however, the possibility of flooding is greatly reduced during the winter months. Although most severe floods have been attributed to rainfall alone, floods occurring in spring have been compounded by snow melt and moving ice. The area's major floods in late summer and fall have been associated with tropical storms and hurricanes moving up the Atlantic Coast. The following paragraphs summarize the principal flooding problems within Lincoln County. • Major floods on the Guyandotte River have occurred in 1934, 1948, 1950, 1955 and 1957. More recent flooding events have occurred in May 1996 and most significantly in July of 2001. • Major floods on the Mud River have occurred in 1884, 1913, 1939, 1942, 1943, 1948, 1950, 1951, 1962 and 1967. More recent flooding events have occurred in May 1996 and most significantly in July of 2001. The highest flood of record occurred on February 3, 1939, when it reached an elevation of 601.52 feet (Note: All elevations in this section and FIS report are referenced to the NAVD 88 vertical datum) at the U.S. Geological Survey (USGS) Milton gage (stream mile 24.1).
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.

COAL WATERSHED: CHARACTERISTICS

PRINCIPAL FLOOD PROBLEMS BY COUNTY	
RALEIGH COUNTY	• Most floods occur during late or early spring and result from heavy rainfall on frozen or saturated soil. The steep hillsides and stream gradients quickly convey storm runoff to the developed floodplains, causing floods. Man-made restrictions, primarily at bridges and culverts, add to the flood problems. According to residents of the area, the largest flood occurred in March 1963.
LOGAN COUNTY	• Flooding can occur throughout any time of the year, however, winter and spring floods are more frequent. Summer thunderstorms are usually the result of conventional frontal activity of convectional or orographic origin and are typically confined to small areas and short durations. Precipitation in the late fall, winter, and spring results from passage of low-pressure system over the basin. • Severe flooding has occurred along the main stem of the Guyandotte River in Logan County 8 times since 1875, the most severe occurring in 1963. The confluence of Dingess Run at Stollings, Island Creek at the City of Logan, and the Towns of Man and Chapmanville have experienced the most frequent flood damage. • Major flash floods have caused damage to structures and infrastructure and occurred without sufficient warning. Coal washing wastes piled along streams during operations presented difficult and expensive problems after floods.

COAL WATERSHED: 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 Coal 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
RALEIGH COUNTY	Planning and Development Council Region 1 Hazard Mitigation Plan	Expired 1/31/2022 Plan in Progress
TOWN OF LESTER		
LOGAN COUNTY	Planning and Development Council	Approved Expires 4/25/2023
LINCOLN COUNTY		
BOONE COUNTY	Planning and Development Council Region 3 Hazard Mitigation Plan	Expired 5/22/2022 Plan in Progress
TOWN OF MADISON		
TOWN OF WHITESVILLE		
TOWN OF DANVILLE		
TOWN OF SYLVESTER		
KANAWHA COUNTY		
CITY OF SOUTH CHARLESTON		
CITY OF SAINT ALBANS		
PUTNAM COUNTY		

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.

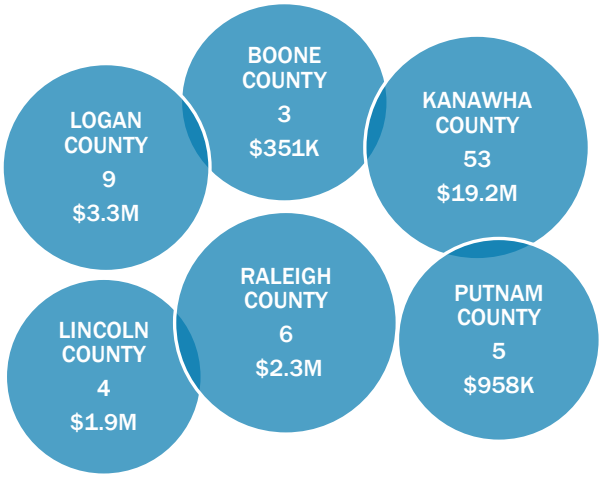
Hazard Mitigation Grant Program (HMGP): Funding to implement long-term hazard mitigation planning and projects after a Presidential Major Disaster Declaration.

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

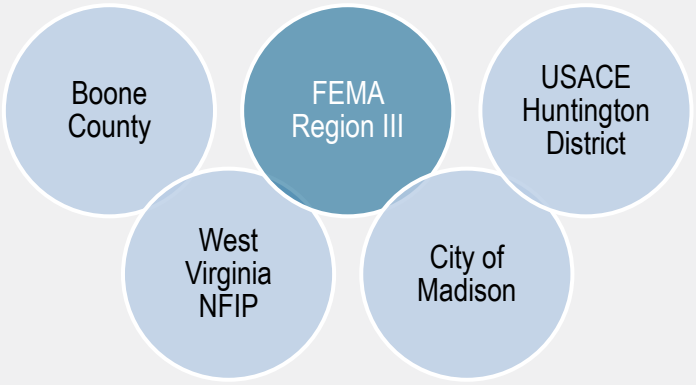


COAL WATERSHED | WEST VIRGINIA

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 Coal Watershed on May 3, 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 comments 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:

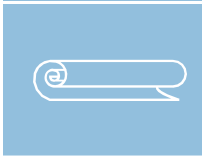
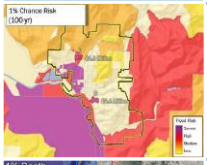
- **Beyond the data analysis shared by the WV GIS Technical Center, no community comments regarding flood concerns were offered during the Coal Discovery Meeting or associated comment period.**

COAL 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 Coal 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 Coal 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 Coal 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 Coal 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 Coal 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 an update.
- 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 III Project Manager, Robert Pierson, at Robert.Pierson@fema.dhs.gov.

COAL 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
VIRGINIA DEPARTMENT OF EMERGENCY MANAGEMENT	KURT DONALDSON	Project Manager	Kurt.Donaldson@mail.wvu.edu

APPENDICES

APPENDIX A | COMMUNITY DASHBOARDS

Logan 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

28%
of the population is in the flood high hazard area

$32.0M
Total paid losses[1]

2,416
Total paid claims[1]

494
Paid claims outside of the effective flood high hazard area[1]

472
Flood insurance policies in force

90%
in Unincorporated Areas

16,570
Estimated structures in the community

4,890
Estimated structures in the flood high hazard area

33
Flood-related presidential disaster declarations

0 levees and
5 dams

$960
Average premium

37%
Higher than the national average

$22.1M
Repetitive Loss (RL) paid losses[1]

501
RL properties[1]

84
Letters of Map Change

365
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

Raleigh 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

5.4%
of the population is in the flood high hazard area

$4.0M
Total paid losses[1]

444
Total paid claims[1]

87
Paid claims outside of the effective flood high hazard area[1]

149
Flood insurance policies in force

81%
in Unincorporated Areas

42,150
Estimated structures in the community

2,725
Estimated structures in the flood high hazard area

27
Flood-related presidential disaster declarations

0 levees and
14 dams

$1,362
Average premium

94%
Higher than the national average

$1.9M
Repetitive Loss (RL) paid losses[1]

55
RL properties[1]

58
Letters of Map Change

101
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

Boone 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

30.9%
of the population is in the flood high hazard area

$3.5M
Total paid losses[1]

485
Total paid claims[1]

22
Paid claims outside of the effective flood high hazard area[1]

252
Flood insurance policies in force

79%
in Unincorporated Areas

10,355
Estimated structures in the community

3,665
Estimated structures in the flood high hazard area

25
Flood-related presidential disaster declarations

0 levees and
12 dams

$998
Average premium

42%
Higher than the national average

$1.6M
Repetitive Loss (RL) paid losses[1]

74
RL properties[1]

112
Letters of Map Change

206
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

Appeal Period

~YEAR 5 — Letter of Final Determination

Effective Maps

Lincoln 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

23.3%
of the population is in the flood high hazard area

$4.3M
Total paid losses[1]

349
Total paid claims[1]

95
Paid claims outside of the effective flood high hazard area[1]

142
Flood insurance policies in force

87%
in Unincorporated Areas

12,760
Estimated structures in the community

3,020
Estimated structures in the flood high hazard area

33
Flood-related presidential disaster declarations

0 levees and
2 dams

$874
Average premium

24%
Higher than the national average

$2.8M
Repetitive Loss (RL) paid losses[1]

50
RL properties[1]

82
Letters of Map Change

91
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.

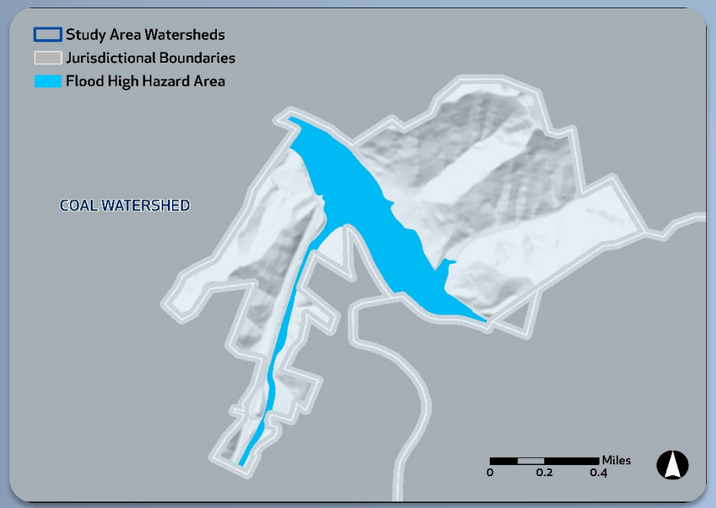
KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

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

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 — 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 Danville/Boone, 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

11/07/1991
Date of Last CAV[4]

10/23/2018
Date of Last CAC[4]

PARTICIPATING
in the National Flood Insurance Program

NOT PARTICIPATING
in the Community Rating System

Countywide Public Assistance received

$35K
Category A: Debris Removal

$514K
Category B: Protective Measures

$798K
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

3
Hazard Mitigation Grant Program

0
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

NEXT STEPS:

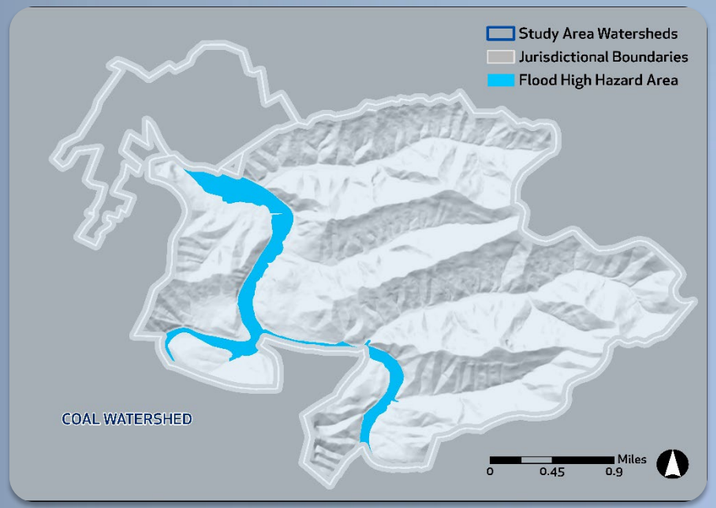
1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

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

FEMA

City of Madison/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

$804K
Total paid losses[2]

87
Total paid claims[2]

18
Flood insurance policies in force

14
Policies in the effective flood high hazard area

1090
Estimated structures in the community

250
Estimated structures in the flood high hazard area

10
Letters of Map Change

25
Flood-related countywide presidential disaster declarations

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

$359K
Repetitive Loss (RL) paid losses[2]

20
RL properties[2]

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

19%
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 Madison/Boone, 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:

- Develop a storm water management plan for existing drainage system and future development.
- Expand and repair or replace current storm water drainage system.
- Place check valves in drains that empty into river to prevent back flow from flooding low lying areas.
- 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.
- Perform channel modifications to increase flow capacities of rivers and streams.

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

11/06/1991
Date of Last CAV[4]

04/19/2021
Date of Last CAC[4]

PARTICIPATING
in the National Flood Insurance Program

NOT PARTICIPATING
in the Community Rating System

Countywide Public Assistance received

$35K
Category A: Debris Removal

$514K
Category B: Protective Measures

$798K
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

3
Hazard Mitigation Grant Program

0
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

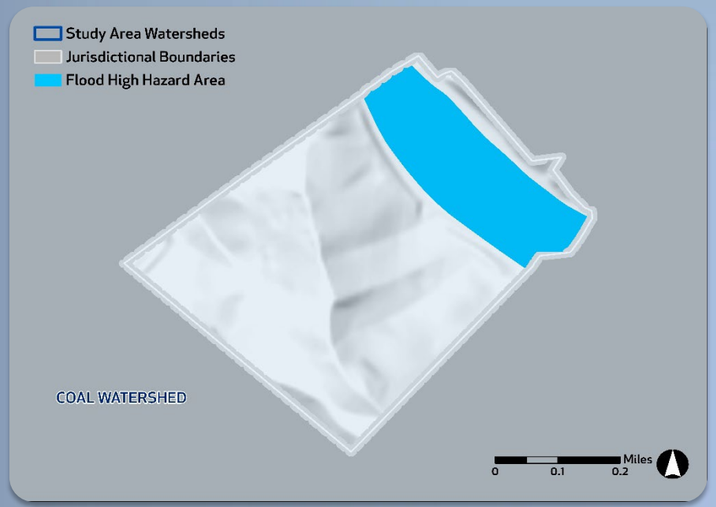
NEXT STEPS:

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 Sylvester/ 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

$84K
Total paid losses[2]

15
Total paid claims[2]

16
Flood insurance policies in force

16
Policies in the effective flood high hazard area

95
Estimated structures in the community

90
Estimated structures in the flood high hazard area

2
Letters of Map Change

25
Flood-related countywide presidential disaster declarations

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

$58K
Repetitive Loss (RL) paid losses[2]

4
RL properties[2]

34%
of households spend 30% or more of their income on housing

99%
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 Sylvester/Boone, 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

11/06/1991
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

$35K
Category A: Debris Removal

$514K
Category B: Protective Measures

$798K
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

3
Hazard Mitigation Grant Program

0
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

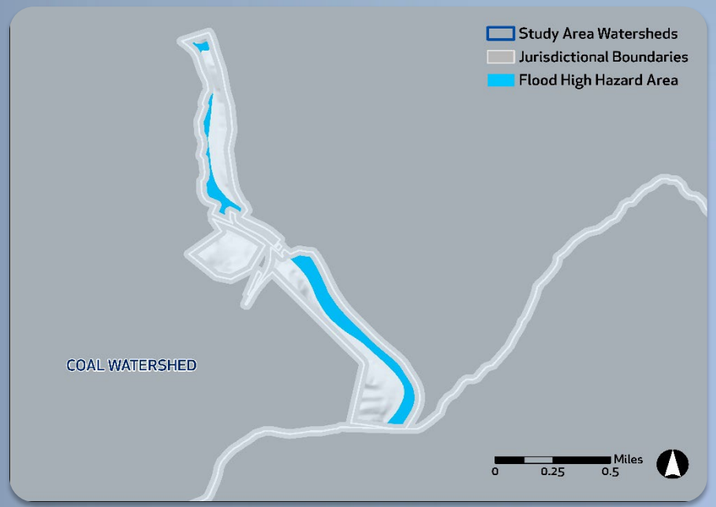
NEXT STEPS:

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 Whitesville/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

$75K
Total paid losses[2]

9
Total paid claims[2]

8
Flood insurance policies in force

8
Policies in the effective flood high hazard area

255
Estimated structures in the community

110
Estimated structures in the flood high hazard area

0
Letters of Map Change

25
Flood-related countywide presidential disaster declarations

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

$7K
Repetitive Loss (RL) paid losses[2]

1
RL properties[2]

28%
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 Whitesville/Boone, 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

11/07/1991
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

$35K
Category A: Debris Removal

$514K
Category B: Protective Measures

$798K
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

3
Hazard Mitigation Grant Program

0
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

NEXT STEPS:

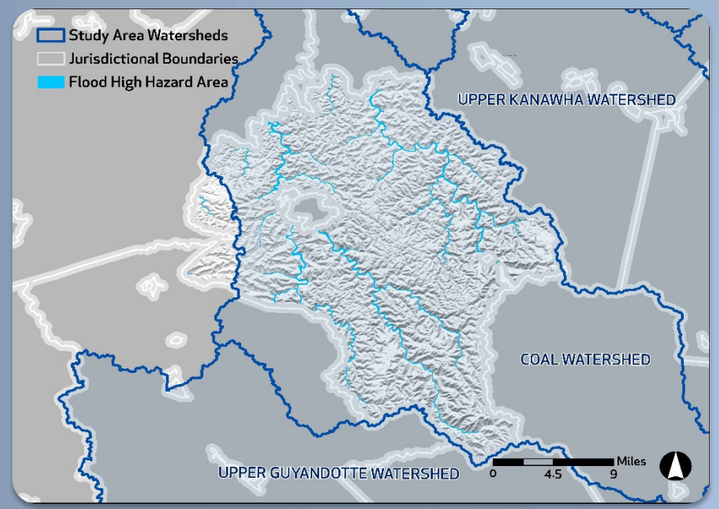
1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

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

FEMA

Boone County (Unincorporated Areas)/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

$1.8M
Total paid losses[2]

296
Total paid claims[2]

198
Flood insurance policies in force

157
Policies in the effective flood high hazard area

8,650
Estimated structures in the community

3,090
Estimated structures in the flood high hazard area

95
Letters of Map Change

25
Flood-related countywide presidential disaster declarations

15
Paid claims outside of the effective flood high hazard area[2]

$712K
Repetitive Loss (RL) paid losses[2]

38
RL properties[2]

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

32%
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

Boone County (Unincorporated Areas)/Boone, 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.
- 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 in Boone County
- Support legislation to fund studies on various issues involving coal waste slurry impoundments.
- Develop an informational package to give to applicants for development permits.

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

05/17/2021
Date of Last CAV[4]

07/17/1996
Date of Last CAC[4]

PARTICIPATING
in the National Flood Insurance Program

NOT PARTICIPATING
in the Community Rating System

Countywide Public Assistance received

$35K
Category A: Debris Removal

$514K
Category B: Protective Measures

$798K
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

3
Hazard Mitigation Grant Program

0
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

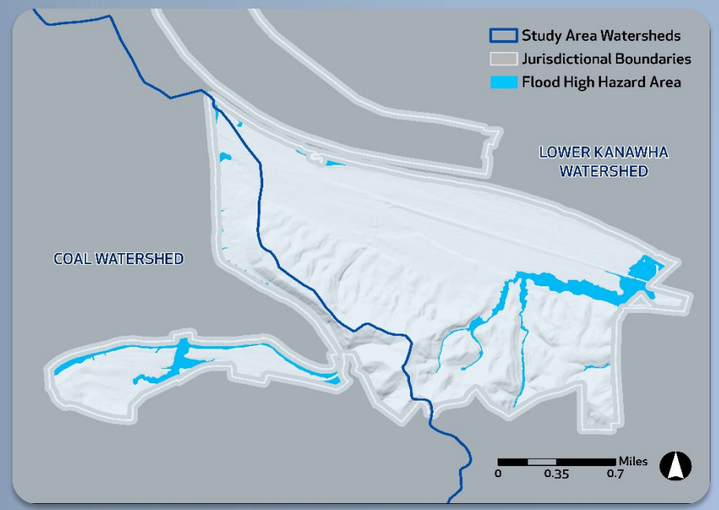
NEXT STEPS:

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 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

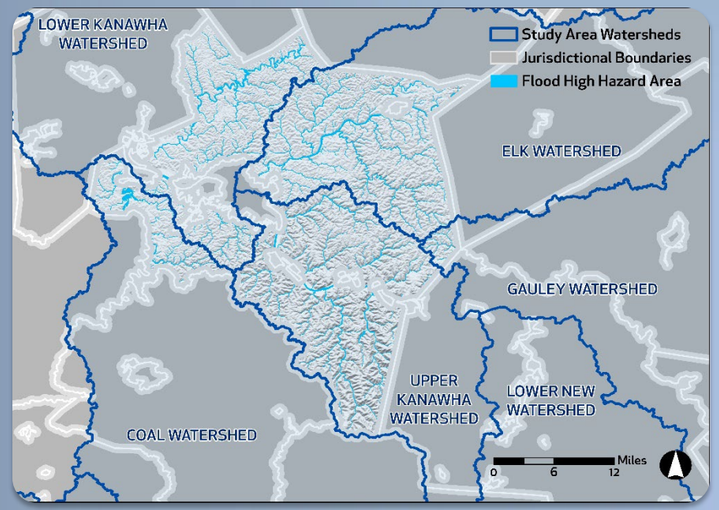
NEXT STEPS:

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)

Kanawha County (Unincorporated Areas)/

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



03/18/1985
Initial FIRM[1] date

02/06/2008
Effective FIRM date

$28.8M
Total paid losses[2]

1587
Total paid claims[2]

1099
Flood insurance policies in force

832
Policies in the effective flood high hazard area

48530
Estimated structures in the community

10135
Estimated structures in the flood high hazard area

308
Letters of Map Change

29
Flood-related countywide presidential disaster declarations

348
Paid claims outside of the effective flood high hazard area[2]

$11.5M
Repetitive Loss (RL) paid losses[2]

296
RL properties[2]

18%
of households spend 30% or more of their income on housing

20%
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

Kanawha County (Unincorporated Areas)/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 hold courses on the National Flood Insurance Program for realtors, banks, and insurers.
- Work with municipalities to update all floodplain ordinances adopted prior to 1987.
- Provide additional training to county and municipal personnel responsible for the enforcement of the floodplain regulations.
- Explore participation in the Community Rating System (CRS).
- Maintain a database of information on all repetitive loss properties including maps.
- As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
- Work with WV Department of Transportation to identify areas of frequent roadway flooding and develop mitigation strategies.

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

08/18/2014
Date of Last CAV[4]

01/25/2018
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

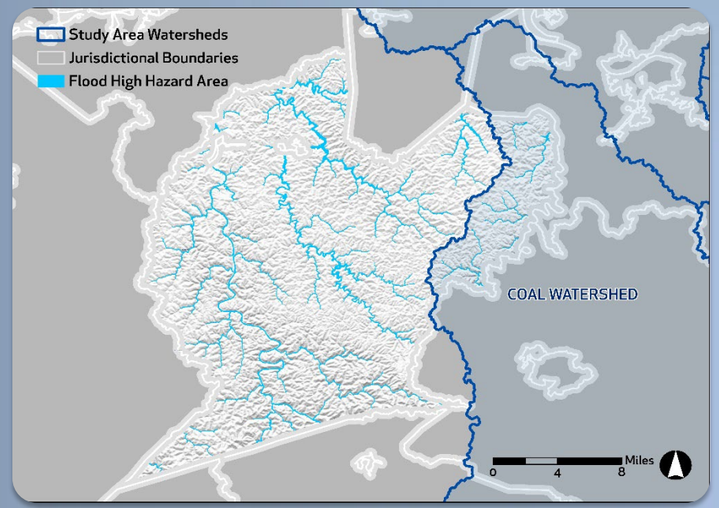
0
Flood Mitigation Assistance

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)

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



09/18/1987
Initial FIRM[1] date

10/16/2013
Effective FIRM date

$4.1M
Total paid losses[2]

293
Total paid claims[2]

123
Flood insurance policies in force

75
Policies in the effective flood high hazard area

11,865
Estimated structures in the community

2,845
Estimated structures in the flood high hazard area

82
Letters of Map Change

33
Flood-related countywide presidential disaster declarations

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

$2.7M
Repetitive Loss (RL) paid losses[2]

43
RL properties[2]

17%
of households spend 30% or more of their income on housing

24%
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

Lincoln County (Unincorporated Areas)/Lincoln, 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:

- Educate the public in non-compliant development areas about permitting in flood zones.
- Acquisition of 7 structures.
- Continue to identify and replace private stream crossings.
- Partner with government agencies on the need for permitting for buildings related to flooding.
- Update the countywide permitting process which requires residents and/or developers to file a permit with the county before beginning any new construction as a means of regulating floodplain development.
- Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects.
- Coordinate to promote buying flood insurance.

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]

08/04/2016
Date of Last CAC[4]

PARTICIPATING
in the National Flood Insurance Program

NOT PARTICIPATING
in the Community Rating System

Countywide Public Assistance received

$41K
Category A: Debris Removal

$1.1M
Category B: Protective Measures

$511K
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

4
Hazard Mitigation Grant Program

0
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

NEXT STEPS:

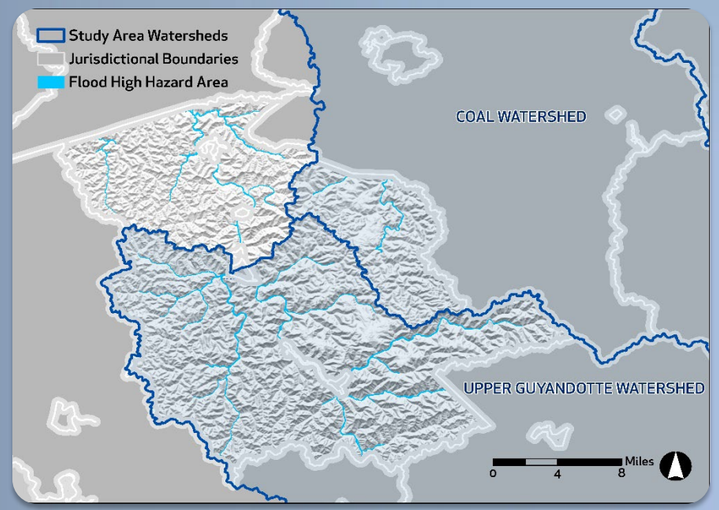
1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

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

FEMA

Logan County (Unincorporated Areas)/Logan County, WV

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



04/07/1972
Initial FIRM[1] date

02/06/2008
Effective FIRM date

$31.6M
Total paid losses[2]

2296
Total paid claims[2]

426
Flood insurance policies in force

338
Policies in the effective flood high hazard area

14,795
Estimated structures in the community

4,630
Estimated structures in the flood high hazard area

80
Letters of Map Change

33
Flood-related countywide presidential disaster declarations

439
Paid claims outside of the effective flood high hazard area[2]

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

491
RL properties[2]

20%
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

Logan County (Unincorporated Areas)/Logan, 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:

- Support the design of roadways at a minimum of the 100-year base flood elevation.
- Elevation of 1 structure; acquisition of 2 structures; reconstruction of 2 structures.
- Mapping.
- Identify private water crossings in the county that could exacerbate flood problems should they fail and seek to replace them.
- Develop a regular stream cleaning schedule.
- Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects
- Complete re-mapping of the Cherry Tree project

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

08/13/2018
Date of Last CAV[4]

10/15/2018
Date of Last CAC[4]

PARTICIPATING
in the National Flood Insurance Program

NOT PARTICIPATING
in the Community Rating System

Countywide Public Assistance received

$654K
Category A: Debris Removal

$201K
Category B: Protective Measures

$2.2M
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

9
Hazard Mitigation Grant Program

1
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

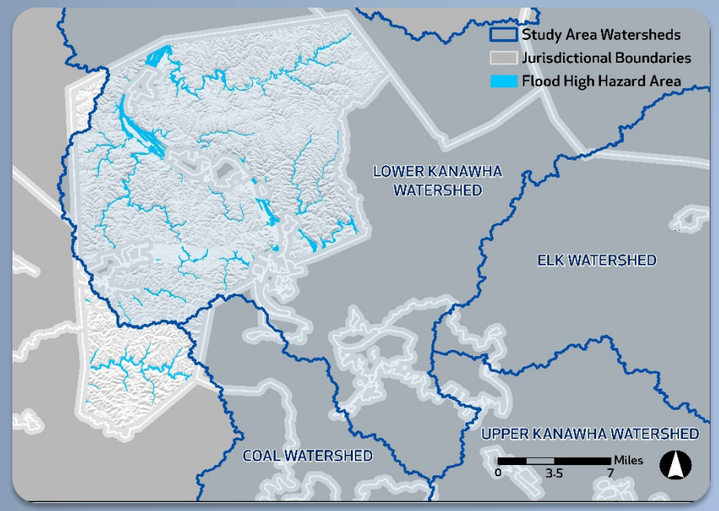
NEXT STEPS:

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)

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

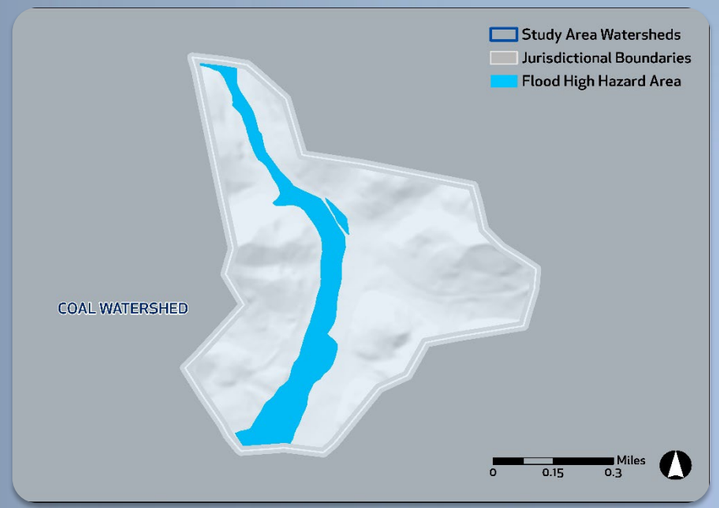
NEXT STEPS:

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)

Town of Lester/Raleigh County, WV

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



04/01/1988
Initial FIRM[1] date

09/29/2006
Effective FIRM date

$1K
Total paid losses[2]

1
Total paid claims[2]

2
Flood insurance policies in force

2
Policies in the effective flood high hazard area

230
Estimated structures in the community

30
Estimated structures in the flood high hazard area

1
Letters of Map Change

27
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

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 Lester/Raleigh, WV

Your Hazard Mitigation Plan expired on **January 31, 2022,** and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Repair and maintain stormwater drain along Central and Virginia Streets.
- Actively seek funding for and encourage the acquisition, elevation, relocation, and mitigation reconstruction of properties susceptible to hazards including but not limited to flooding.
- Work with current floodplain property owners to acquire their structures. This mitigation action would include seeking funds from FEMA under the HMGP. Emphasis would be given to previously un-funded HMGP applications.

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

N/A
Date of Last CAV[4]

11/09/2018
Date of Last CAC[4]

PARTICIPATING
in the National Flood Insurance Program

NOT PARTICIPATING
in the Community Rating System

Countywide Public Assistance received

$121K
Category A: Debris Removal

$671K
Category B: Protective Measures

$2.6M
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

6
Hazard Mitigation Grant Program

0
Pre-Disaster Mitigation

0
Flood Mitigation Assistance

NEXT STEPS:

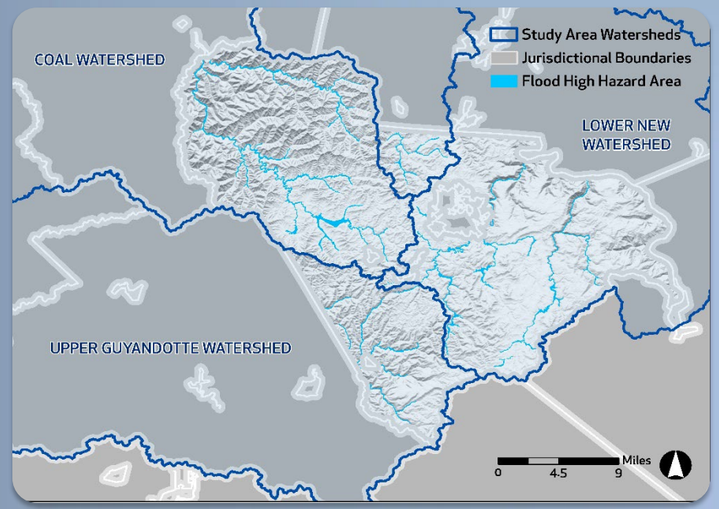
1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

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

FEMA

Raleigh County (Unincorporated Areas)/

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



12/18/1984
Initial FIRM[1] date

06/16/2009
Effective FIRM date

$2.4M
Total paid losses[2]

343
Total paid claims[2]

120
Flood insurance policies in force

86
Policies in the effective flood high hazard area

32,390
Estimated structures in the community

2,455
Estimated structures in the flood high hazard area

53
Letters of Map Change

27
Flood-related countywide presidential disaster declarations

62
Paid claims outside of the effective flood high hazard area[2]

$757K
Repetitive Loss (RL) paid losses[2]

36
RL properties[2]

20%
of households spend 30% or more of their income on housing

7%
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

Raleigh County (Unincorporated Areas)/Raleigh, WV

Your Hazard Mitigation Plan expired on **January 31, 2022,** and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Actively seek funding for and encourage the acquisition, elevation, relocation, and mitigation reconstruction of properties susceptible to hazards including but not limited to flooding.
- Minimize flood damage in the special flood hazard area, especially along the Clear Fork, Marsh Fork, Tommy, and White Stick Creeks.
- Work with current floodplain property owners to acquire their structures. This mitigation action would include seeking funds from FEMA under the HMGP. Emphasis would be given to previously un-funded HMGP applications.
- Flood-protecting treatment plants located in the floodplain.
- Develop and distribute public awareness materials about flood risks and preparedness.
- Undertake "Stream Maintenance" along Clear Fork, Marsh Fork, and Tommy Creeks, as well as near Fairdale.
- Secure roadsides against snowslips and landslides along Rock and Slab Fork Creeks. Also, secure parts of State Route 99 and State Route 3. Problem area at Berry Branch near Helen. Heavy flooding has often resulted in landslides caused by an abandoned mine slate dump.

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

08/18/2009
Date of Last CAV[4]

08/19/2015
Date of Last CAC[4]

PARTICIPATING
in the National Flood Insurance Program

NOT PARTICIPATING
in the Community Rating System

Countywide Public Assistance received

$121K
Category A: Debris Removal

$671K
Category B: Protective Measures

$2.6M
Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

6
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 Coal 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
Boone County	2018 FEMA Region III Southcentral (Central Lot) QL2 LiDAR	2018	Pending
Kanawha County	2018 FEMA Region III Southcentral (Central and West Lot) QL2 LiDAR	2018	Pending
Lincoln County	2018 FEMA Region III Southcentral (Central Lot) QL2 LiDAR	2018	Pending
Logan County	2018 FEMA Region III Southcentral (Central Lot) QL2 LiDAR	2018	Pending
Putnam County	2018 FEMA Region III Southcentral (West Lot) QL2 LiDAR	2018	Pending
Raleigh County	2018 FEMA Region III Southcentral (Central Lot) 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
Boone County	0	0	0	97.99	0	0	89.46	0	2.78
Kanawha County	0	0	7.53	72.04	0	0	28.94	0	0
Lincoln County	0	0	0	0	0	37.8	0	0	5.04
Putnam County	0	0	0	0	0	0	0	0	0
Raleigh County	0	0	20.04	90.04	0	0	0	0	0.69
Logan County	0	0	0	12.75	0	0	0	0	0
Total	0	0	27.57	272.81	0	37.80	118.40	0	8.51

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
Boone County	13
Kanawha County	0
Lincoln County	0
Putnam County	0
Raleigh County	5
Logan County	2
Total	20

e. Levees in the Watershed by County

County	Total
Boone County	0
Kanawha County	0
Lincoln County	0
Putnam County	0
Raleigh County	0
Logan County	0
Total	0

f. Stream Gage Information

Gage ID	Gage Location	County	Years of Record
3198350	Clear Fork at Whitesville, WV	Raleigh	23
3198500	Big Coal River at Ashford, WV	Boone	98
3199000	Little Coal River at Danville, WV	Boone	55
3200500	Coal River at Tornado, WV	Kanawha	65

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

County Border	Issue/Problem	Stream Reach	Latitude	Longitude
Putnam-Kanawha	Flood Zones Mismatch	Adkins Fork	38° 22' 18.094" N	81° 54' 21.129" W
Kanawha-Lincoln	Flood Zones and BFEs Misaligned	Coal River	38° 18' 39.603" N	81° 49' 21.102" W
Kanawha-Lincoln	Flood Zones Misaligned	Little Coal River	38° 16' 16.076" N	81° 48' 22.938" W
Lincoln-Boone	Flood Zones Misaligned	Little Coal River	38° 10' 23.507" N	81° 51' 5.374" W
Lincoln-Boone	Flood Zones Misaligned	Big Horse Creek	38° 9' 54.515" N	81° 52' 17.908" W
Lincoln-Boone	Flood Zones Misaligned	Big Horse Creek	38° 9' 56.640" N	81° 53' 20.030" W
Boone-Kanawha	Flood Zones Misaligned / Gaps in S_Pol_Ar	Dicks Creek	38° 11' 52.668" N	81° 49' 29.706" W
Boone-Kanawha	Gaps / Overlaps in S_Pol_Ar	Big Coal River	38° 12' 13.038" N	81° 48' 0.974" W
Boone-Kanawha	BFEs / XS Misaligned / Gaps in S_Pol_Ar	Big Coal River	38° 12' 13.765" N	81° 44' 57.522" W
Boone-Raleigh	Flood Zones Mismatched	Big Coal River	37° 58' 15.937" N	81° 31' 41.700" W
Boone-Raleigh	Gaps / Overlaps in S_Pol_Ar	Big Coal River	37° 57' 54.467" N	81° 32' 38.692" W
Boone-Logan	Flood Zones Mismatched	Spruce Laurel Fork	37° 56' 48.877" N	81° 48' 52.248" W
Boone-Logan	Flood Zones Misaligned	Hewett Creek	37° 56' 54.100" N	81° 51' 37.995" W
Fayette-Kanawha	Flood Zones Mismatched / Gaps / Overlaps in S_Pol_Ar	Morris Creek	38° 6' 4.432" N	81° 20' 51.868" 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
Boone County	90	0	90
Town of Madison	10	0	10
Kanawha County	42	0	42
City of Saint Albans	5	0	5
Lincoln County	26	0	26
Putnam County	0	0	0
Raleigh County	31	0	31
Town of Lester	1	0	1
City of South Charleston	0	0	0
Town of Whitesville	0	0	0
Town of Danville	5	0	5
Town of Sylvester	2	0	2
Logan County	9	0	9
Total	221	0	221

APPENDIX F | DISCOVERY MAPS

Potential Loss: *Coal Watershed*

MAP SYMBOLOGY

- Watershed Boundary
- State Boundary
- Municipal Boundary
- County Boundary
- Stream Line
- Major Roads and Highways

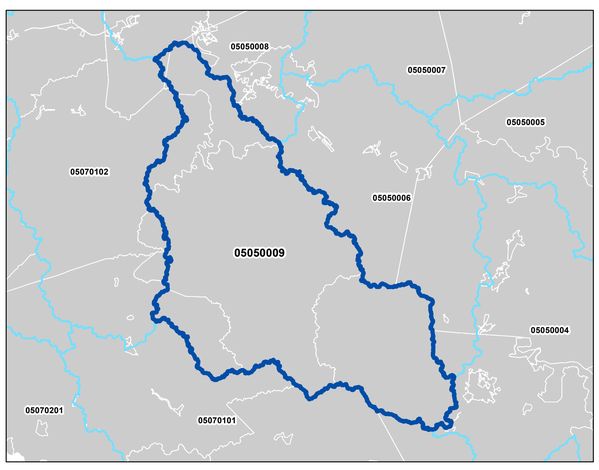
Total Exposure in Floodplain (TEIF) Loss
(per census block):

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

NUMBER OF REPETITIVE LOSSES

NUMBER OF FLOOD INSURANCE POLICIES

WATERSHED LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM

POTENTIAL LOSS DISCOVERY MAP

COAL WATERSHED

Study Area:

BOONE COUNTY, WV
KANAWHA COUNTY, WV
LINCOLN COUNTY, WV
LOGAN COUNTY, WV
PUTNAM COUNTY, WV
RALEIGH COUNTY, WV

FEMA

HUC-8 Code
05050009

RELEASE DATE
JANUARY 2024

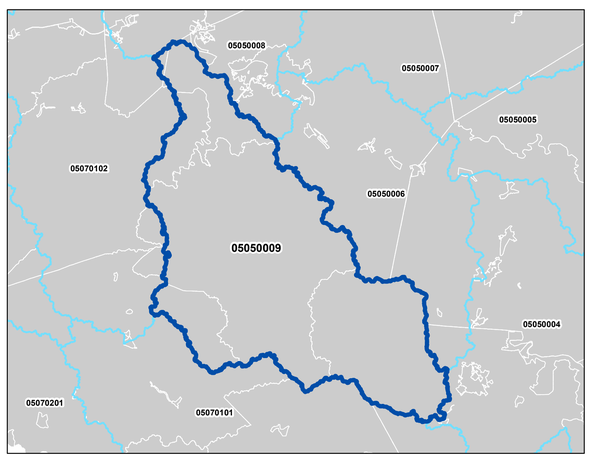
Flood Risk: *Coal Watershed*

MAP SYMBOLOGY

Effective Special Flood Hazard Area

- Zone A (Approximate 1% Annual Chance)
- Zone AE (Detailed 1% Annual Chance)
- 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

COAL WATERSHED

Study Area:

BOONE COUNTY, WV
KANAWHA COUNTY, WV
LINCOLN COUNTY, WV
LOGAN COUNTY, WV
PUTNAM COUNTY, WV
RALEIGH COUNTY, WV

FEMA

HUC-8 Code
05050009

RELEASE DATE
JANUARY 2024

Mapping Needs: *Coal Watershed*

MAP SYMBOLOGY

Coordinated Needs Management Strategy (CNMS) Validation Status

- NVUE COMPLIANT
- TO BE STUDIED

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

FY 2021 RTO Scope

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

FIS Discharge Standard Deviation from Regression Equations

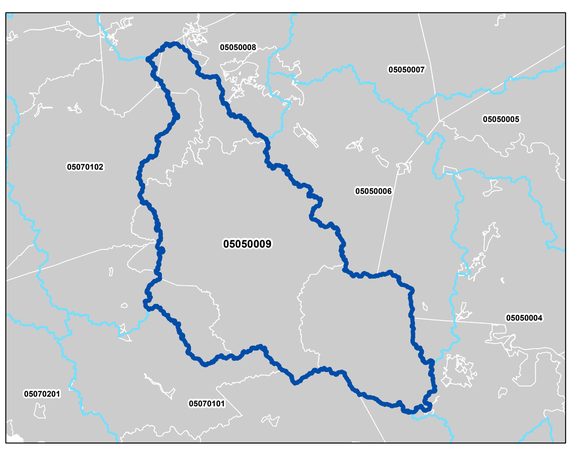
- -2
- -1
- 0
- 1
- 2

ELEVATION DATA AVAILABLE FOR THE COAL WATERSHED

USGS to acquire West Virginia 2018 FEMA Region III Southcentral (Central Lot) QL2 LiDAR for Boone, Kanawha, Lincoln, Logan and Raleigh Counties in 2021.

USGS to acquire West Virginia 2018 FEMA Region III Southcentral (West Lot) QL2 LiDAR for Kanawha and Putnam Counties in 2021.

WATERSHED LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM

MAPPING NEEDS DISCOVERY MAP

COAL WATERSHED

Study Area:

BOONE COUNTY, WV
KANAWHA COUNTY, WV
LINCOLN COUNTY, WV
LOGAN COUNTY, WV
PUTNAM COUNTY, WV
RALEIGH COUNTY, WV

FEMA

HUC-8 Code
05050009

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	*05/03/2023*		**Time**	*10:00 - 11:30 a.m.*
Watershed	*Coal, Elk, Lower Kanawha, Upper Kanawha*		**Location**	*Madison Civic Center* *261 Washington Ave. Madison, WV 25130*
Total Community Sign-Ins	*2*		**Communities Represented**	*Boone County, City of Madison*
Total Non-Community Sign-Ins *(e.g., Federal, State, Regional organizations or NGOs)*	*9*		**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

Wednesday, May 3, 2023
10:00 – 11:30 a.m.

261 Washington Ave, Madison, WV 25130

Attendees

FEMA Region III

- Bob Pierson
- Betsy Ranson

FEMA Region III Outreach Partners

- Crystal Smith
- Madison Matera

West Virginia NFIP

- Ruthie Maniscalchi
- Julia Sears
- Tim Keaton

USACE Huntington District

- Ben Romans
- Hannah Smith

Boone County

- Michael Mayhorn

City of Madison

- Steve Byus

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

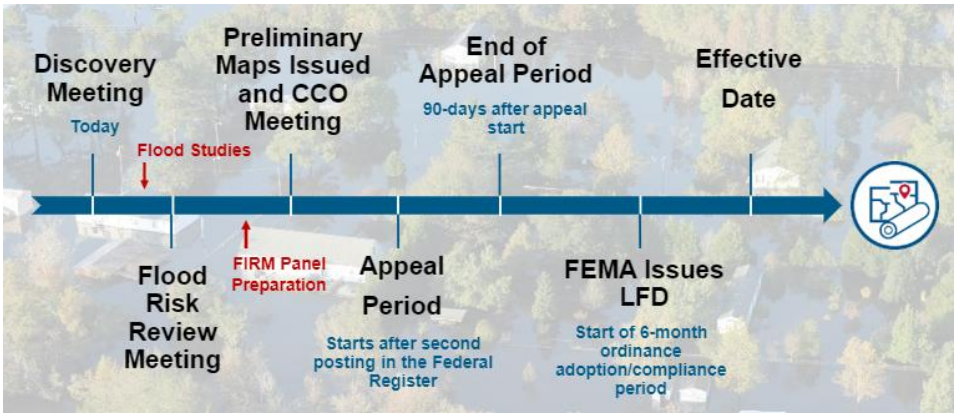
    - Dams and Levees

    - 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 to communities and learn about flood risk and mitigation activities and capabilities.
- Outcomes of the Discovery process include 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
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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

Question: The amount of repetitive loss reported is way less than what has been witnessed in Boone County, why is that?

Answer: This is because only properties with a national flood insurance policy are reported. Other properties that may have repetitive loss but without flood insurance are not reported.

Comment: There is a lack of funding, especially in smaller communities, for positions related to floodplain management. There needs to be a dedicated floodplain administrator position.

APPENDIX H | MEETING ATTENDANCE RECORD

FEMA

Discovery Meeting – Coal, Elk, Lower Kanawha, and Upper Kanawha Watersheds

Date / Time: May 3, 2023 – 10am

Location: Madison Civic Center, 261 Washington Ave. Madison, WV 25130

First Name	Last Name	Affiliation	Email	Sign-In
Steve	Byus	City of Madison	Sbyus@madisonwv.org	
Michael	Mayhorn	Boone County EMA	Mmayhorn@boonewv.com	
Hannah	Smith	USACE	Hannah.g.smith@usace.army.mil	
Ben	Romans	USACE	Benjamin.e.romans@usace.army.mil	
Tim	Keaton	State NFIP	tim.w.keaton@wv.gov	
Ruthie	Maniscalchi	State NFIP	Ruthie.a.maniscalchi@wv.gov	
Julia	Sears	State NFIP	Julia.r.sears@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 Coal 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)

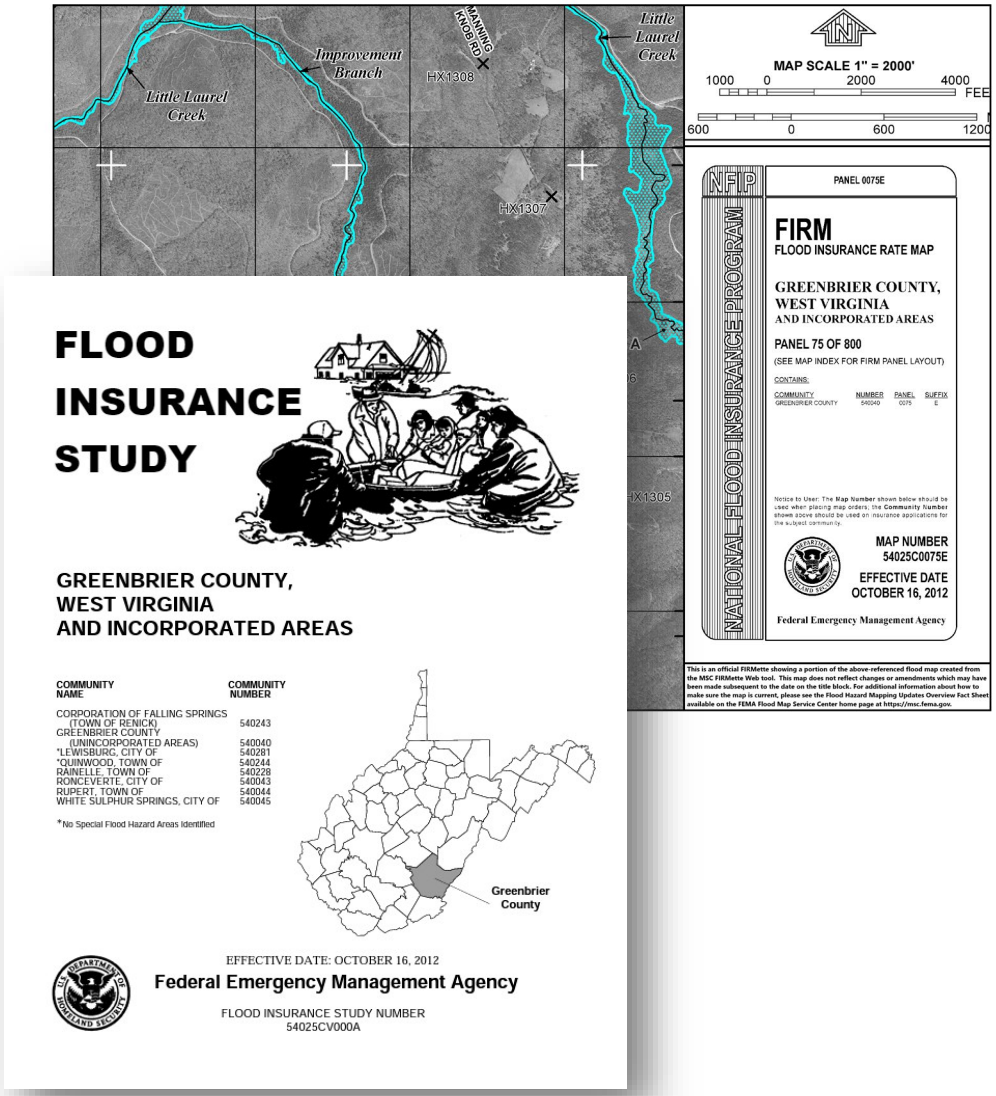
- Allows property owners to purchase flood insurance at reduced rates
- State and local governments agree to adopt and enforce floodplain management ordinances
- Over 22,616 communities participate in the NFIP*
- Over 5 million policies in the NFIP, >14,700 in WV*

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

Flood Insurance Rate Maps and Studies

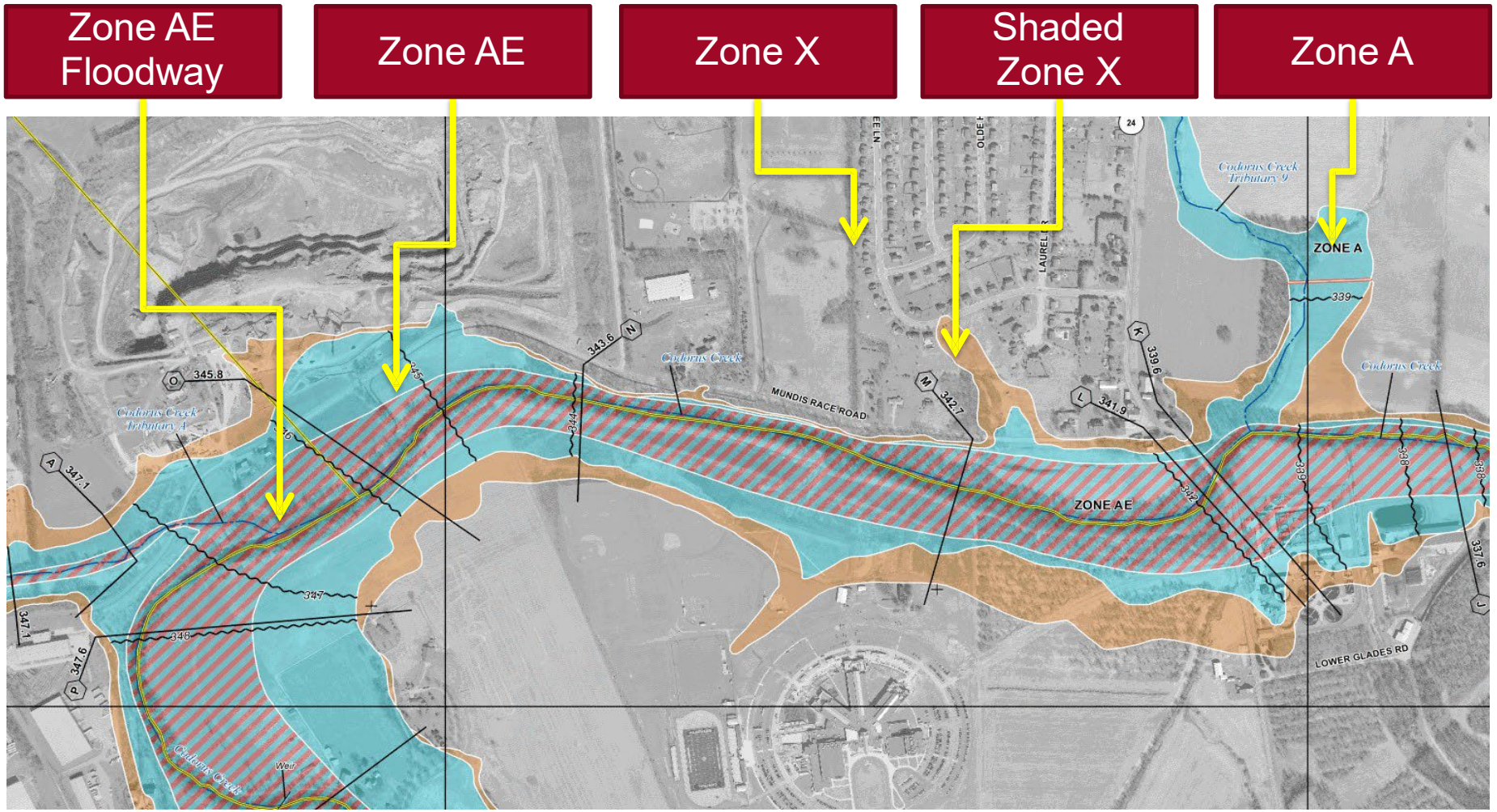
Key Terms:

- 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

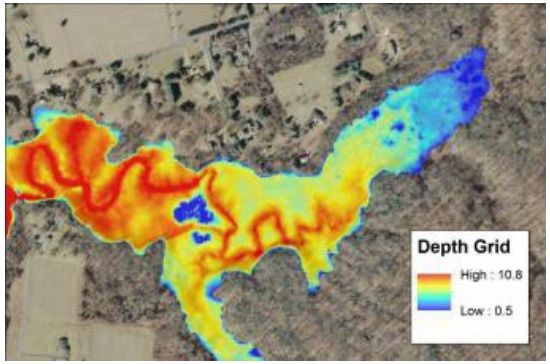


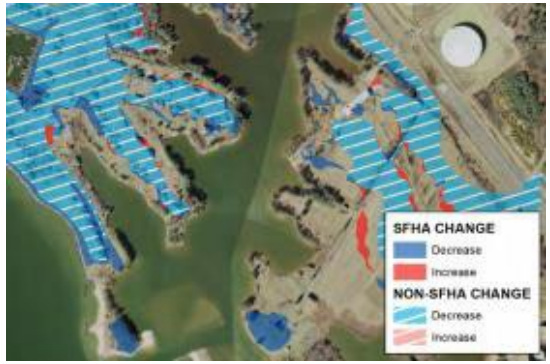
Study Types

		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

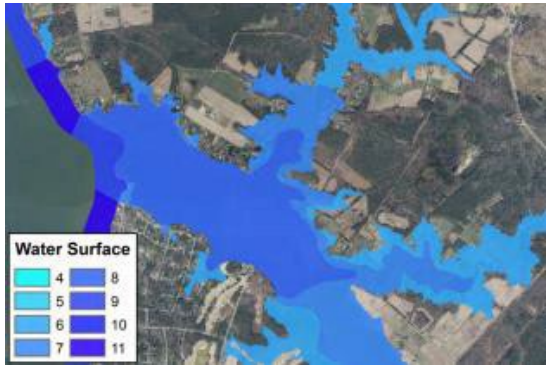
Flood Depth & Analysis Grids





Changes Since Last FIRM

Water Surface Elevation Grids

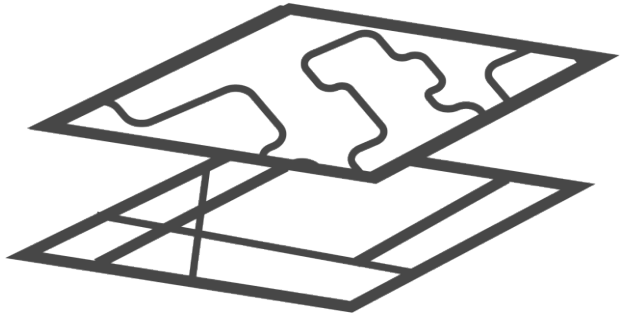


Flood Risk Assessment

FEMA

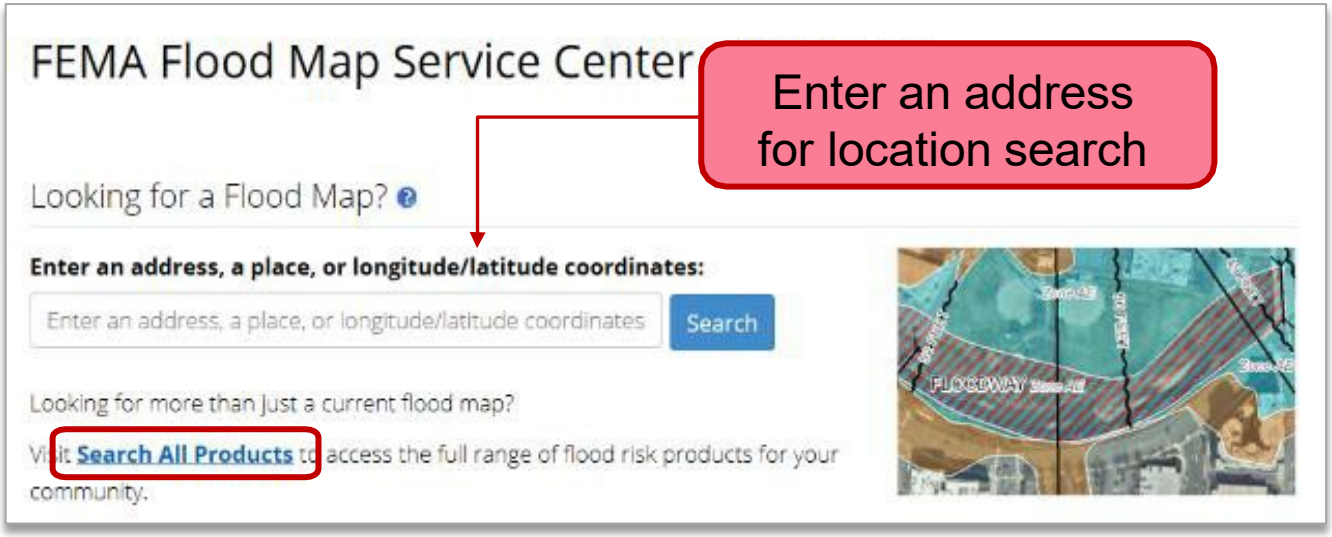
Where to Find Flood Risk Data

- **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



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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

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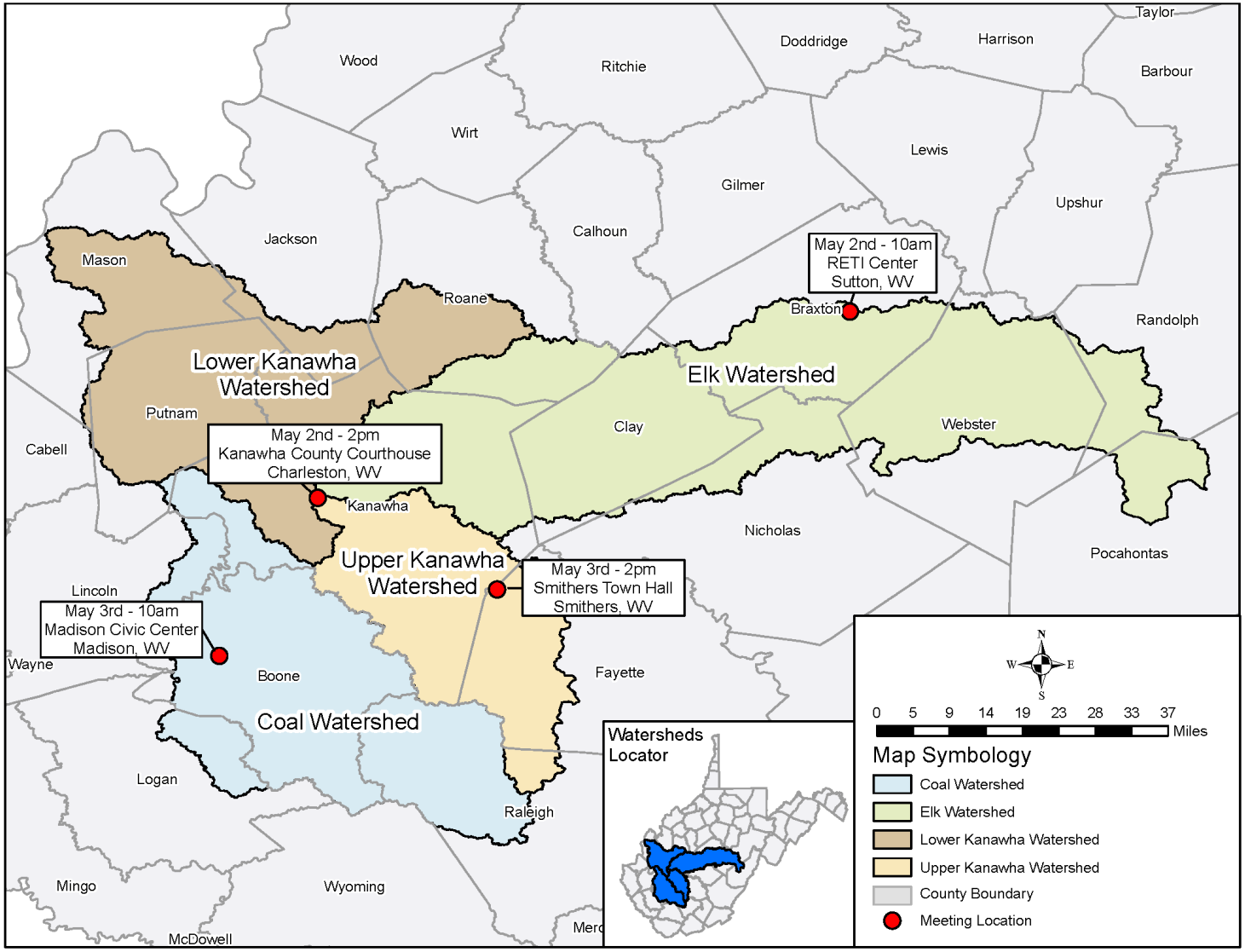
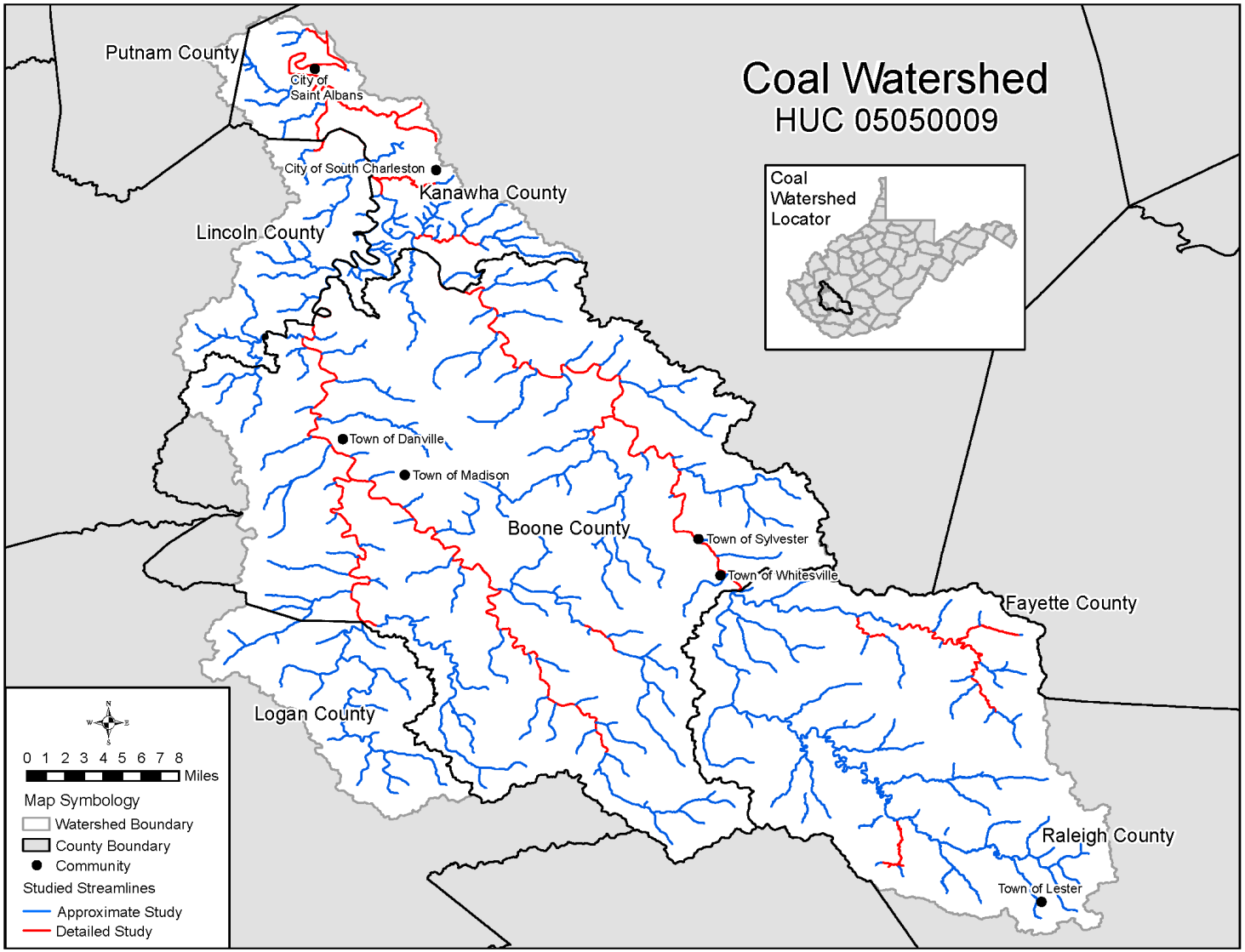
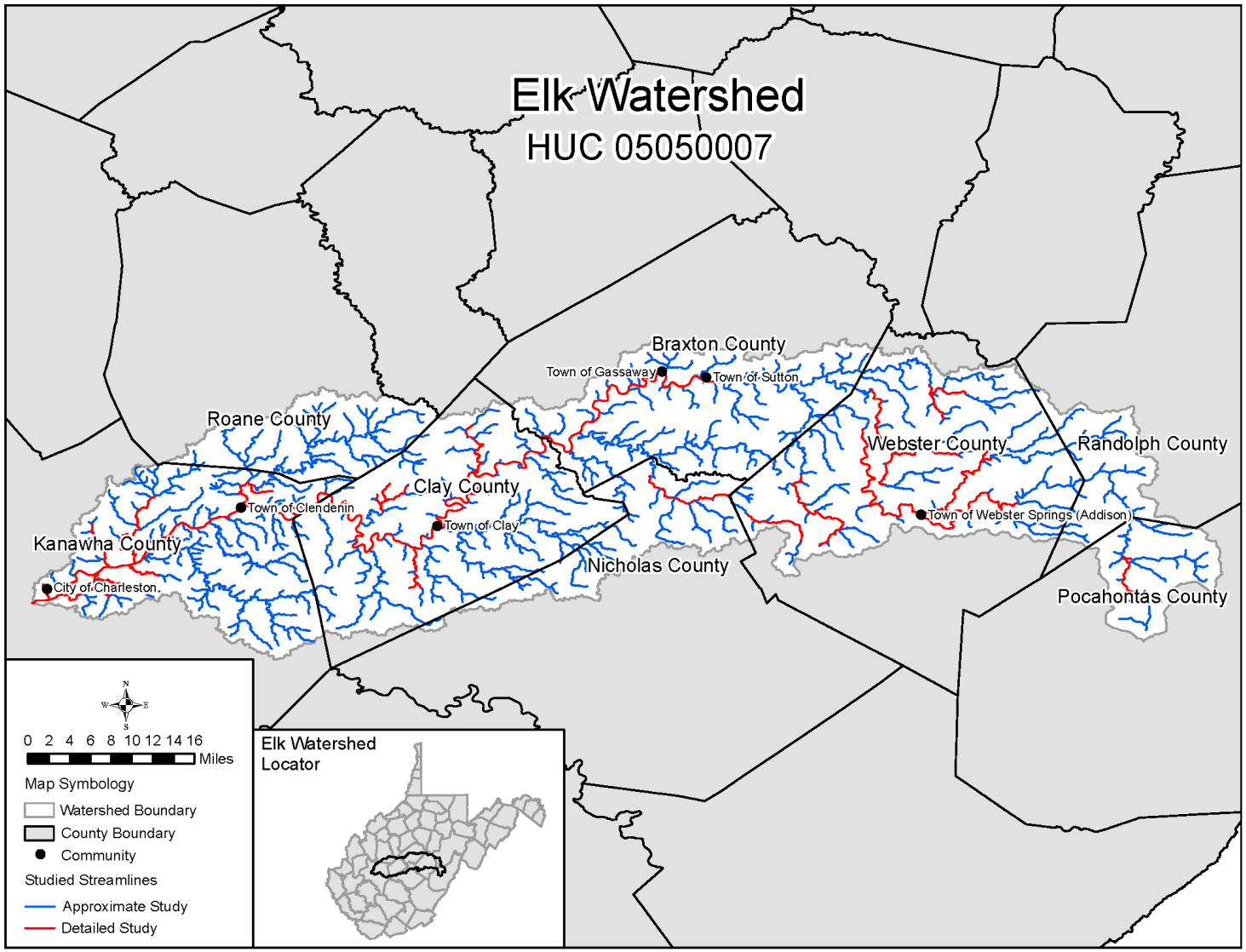
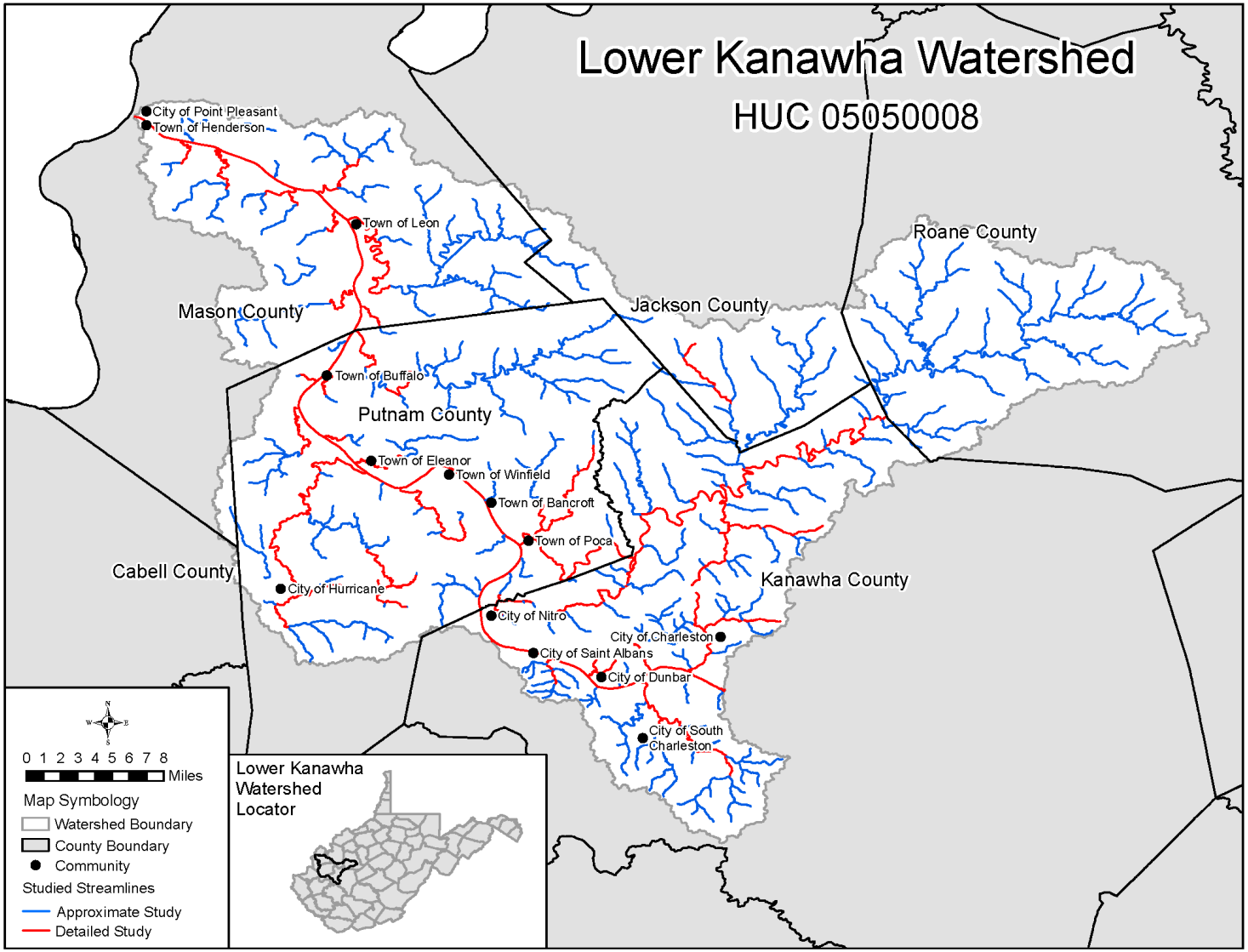
Why Are We Here?

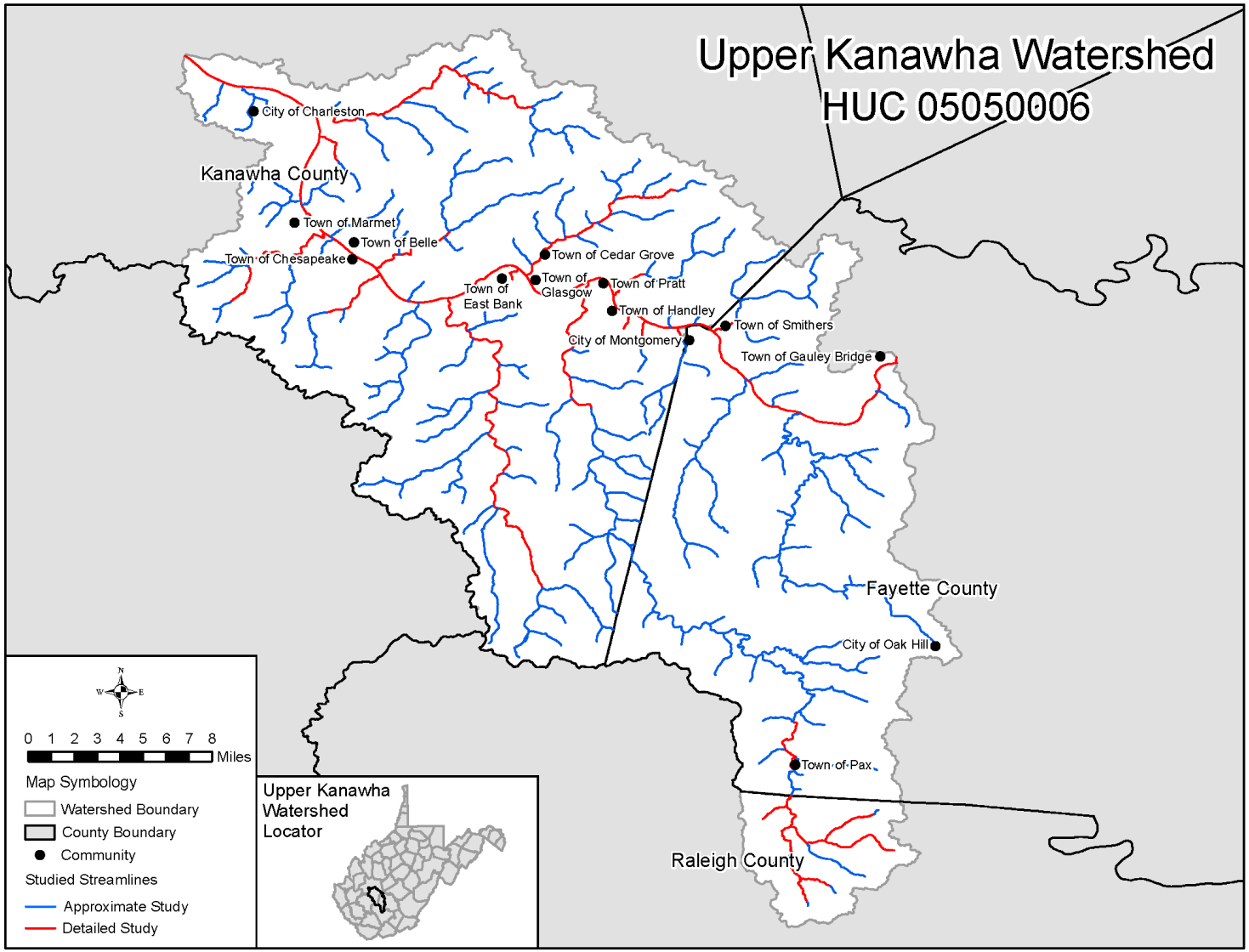
Through collaboration with State and local partners like yourselves, our goal is to deliver **quality flood hazard data** that helps you **increase public awareness** and **leads to action** that reduces risk to life and property.


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
E
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
N
W
E
S
0 2 4 6 8 10 12 14 16
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
N
W
E
S
0 1 2 3 4 5 6 7 8
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.)**

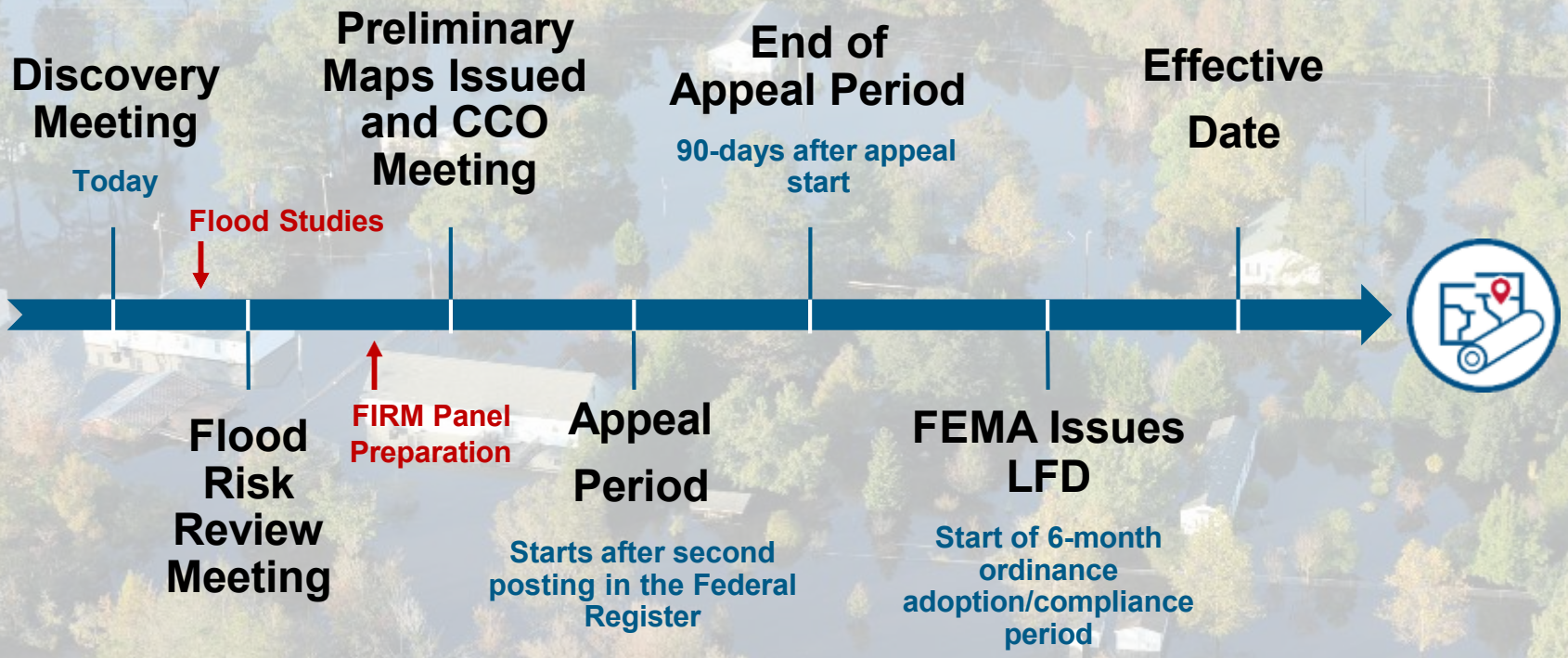
Discovery: Data Collection & Collaboration

- **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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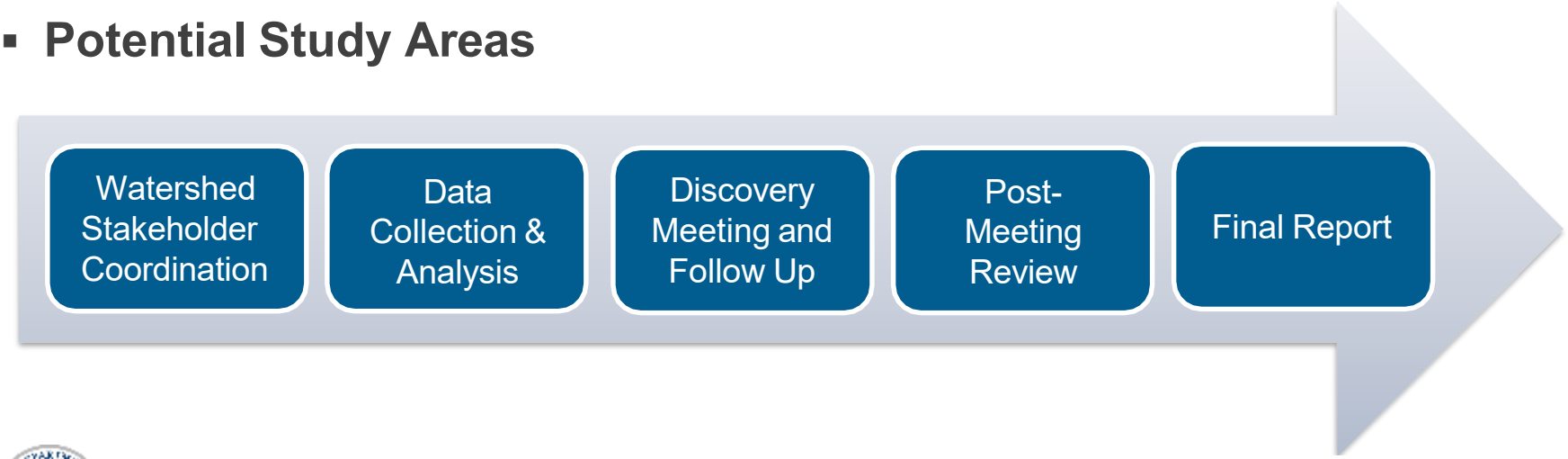
Discovery: Outcomes

- **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

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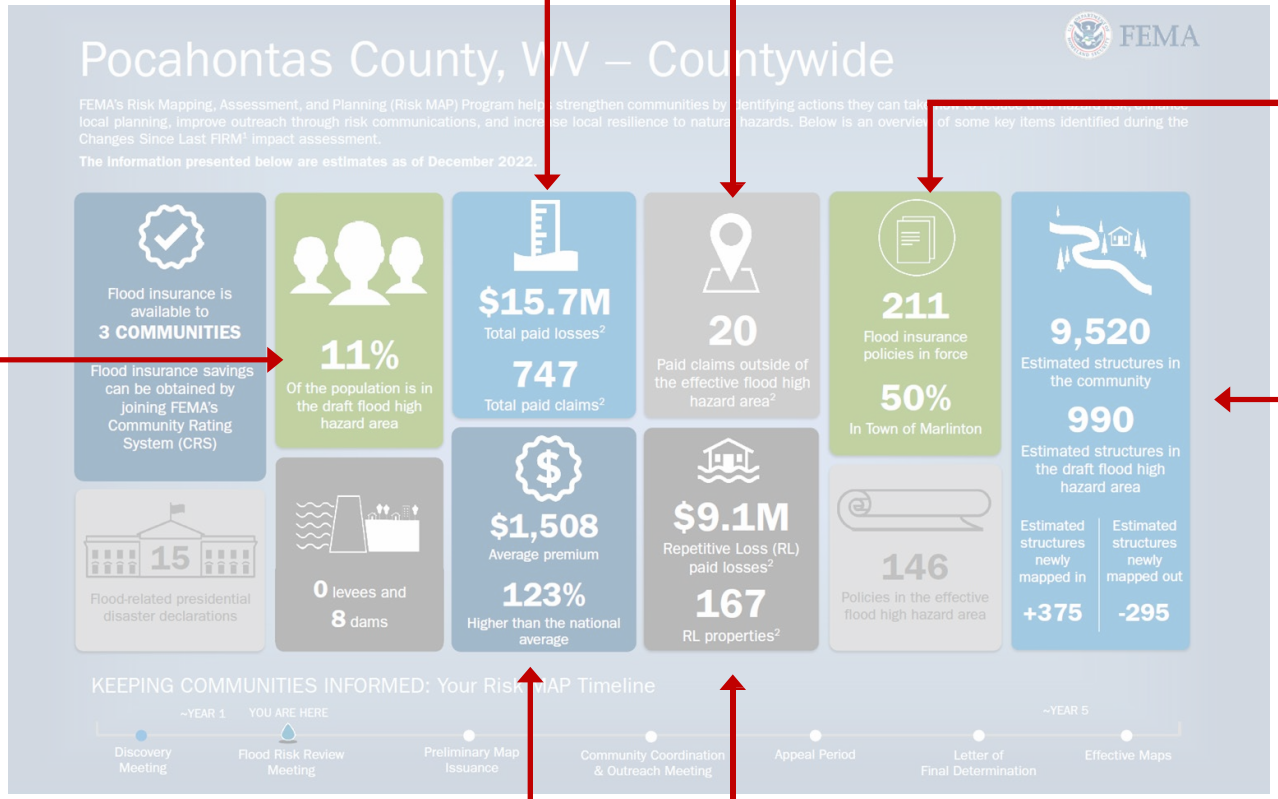
Flood Risk Dashboard



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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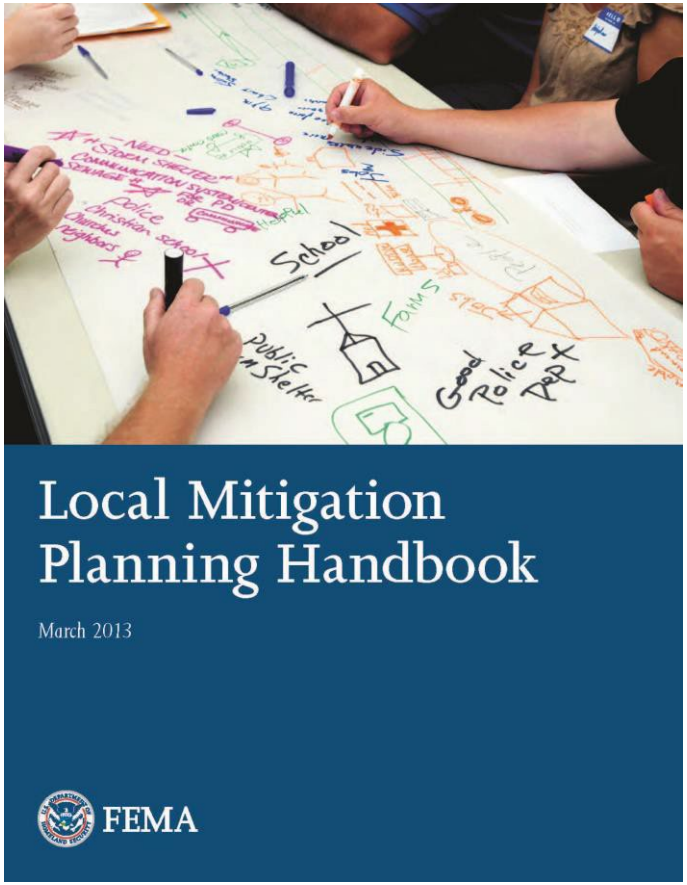
Hazard Mitigation Plans

- **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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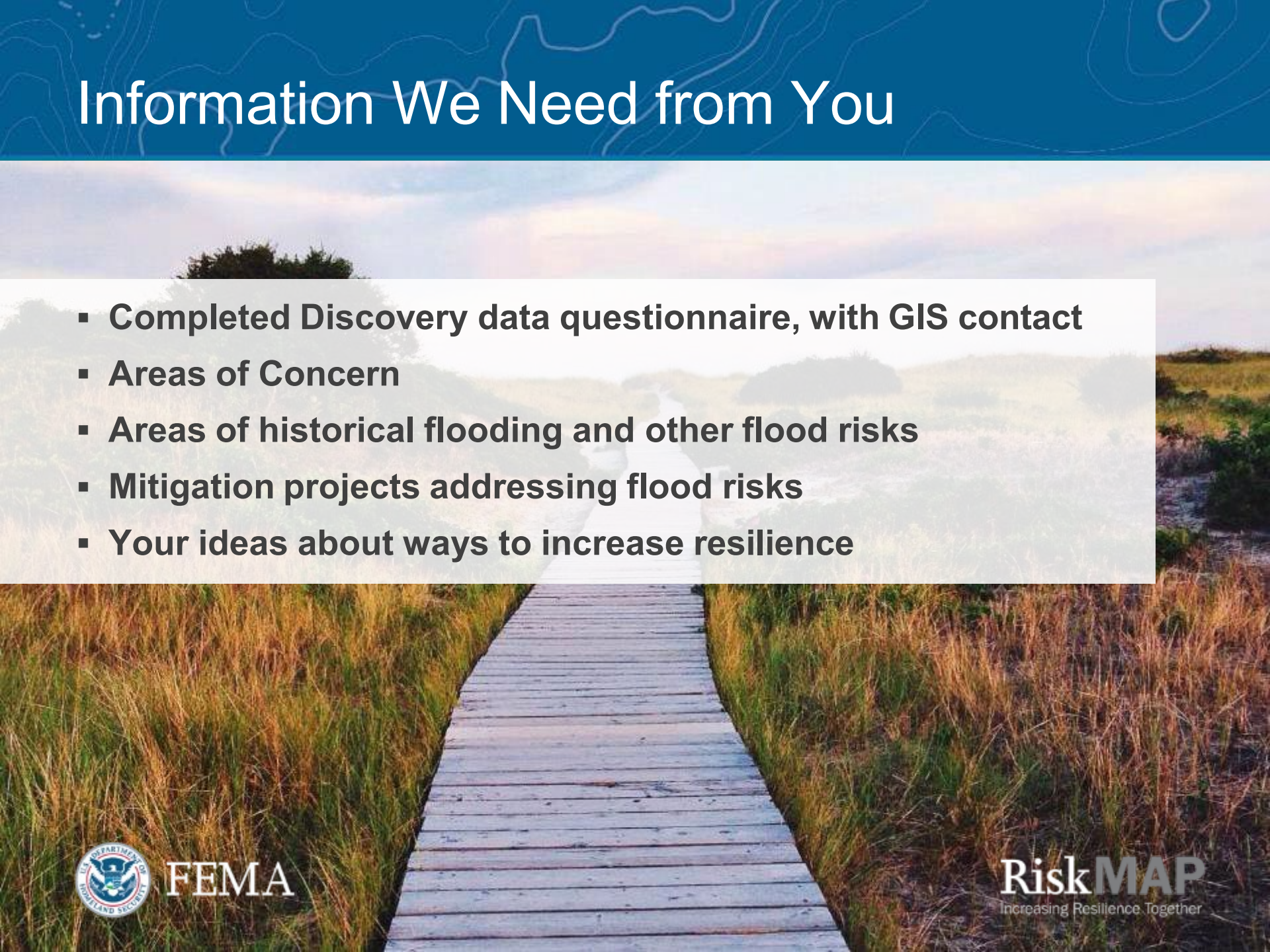
Information We Need from You

- 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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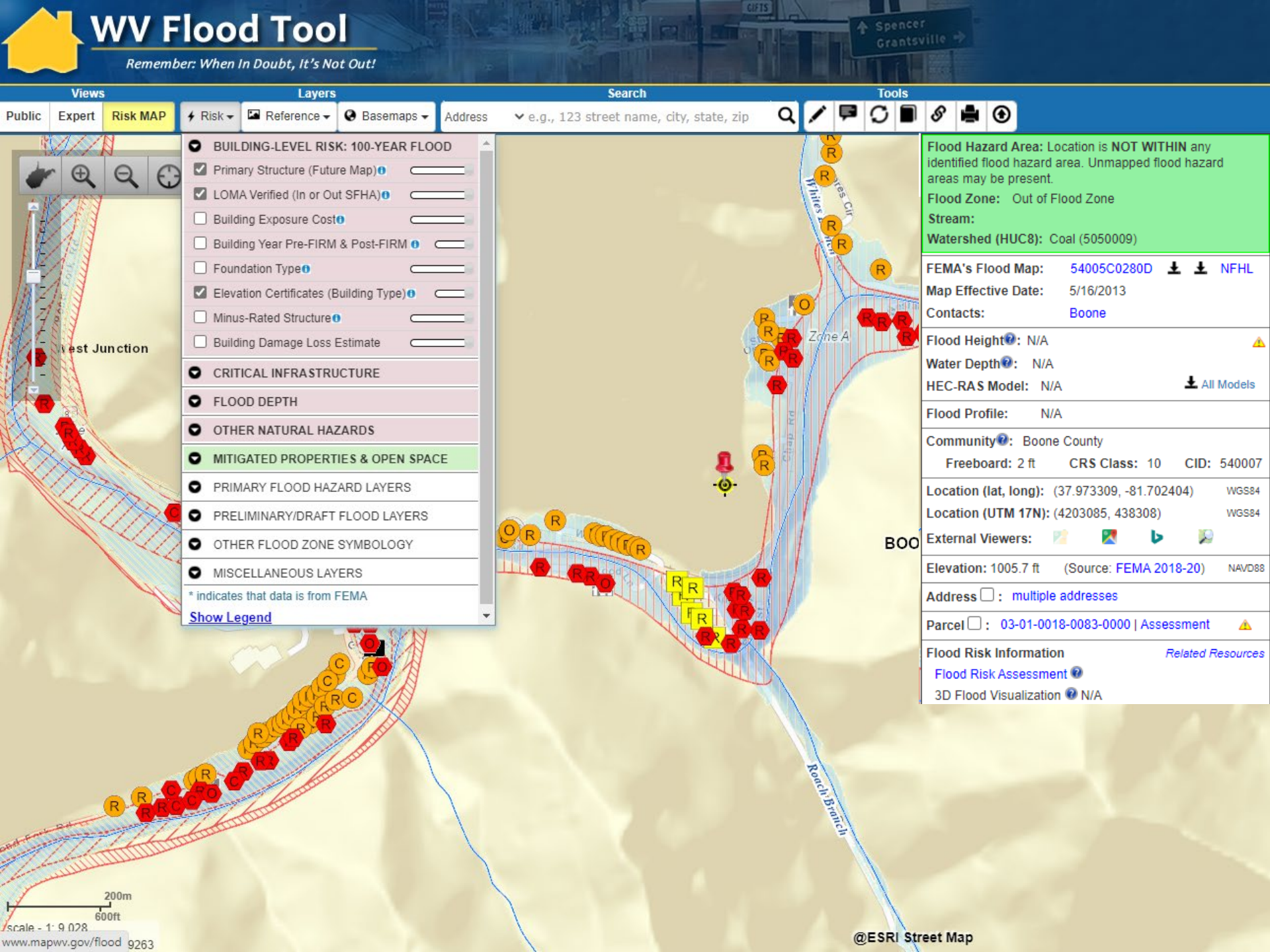
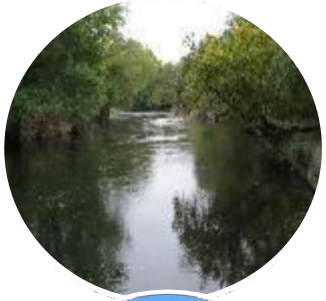

WV Flood Tool
Remember: When In Doubt, It's Not Out!
Views
Public
Expert
Risk MAP
Layers
Risk
Reference
Basemaps
Search
Address
e.g., 123 street name, city, state, zip
Tools
BUILDING-LEVEL RISK: 100-YEAR FLOOD
Primary Structure (Future Map)
LOMA Verified (In or Out SFHA)
Building Exposure Cost
Building 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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State NFIP Coordinator
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Tim.w.keaton@wv.gov

WVGISTC:

Kurt Donaldson, GISP, CFM
Manager
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FEMA Project Officer
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Elizabeth Ranson
Mitigation Planning
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Mapping Partners:

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Crystal.Smith@wsp.com

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

FEMA

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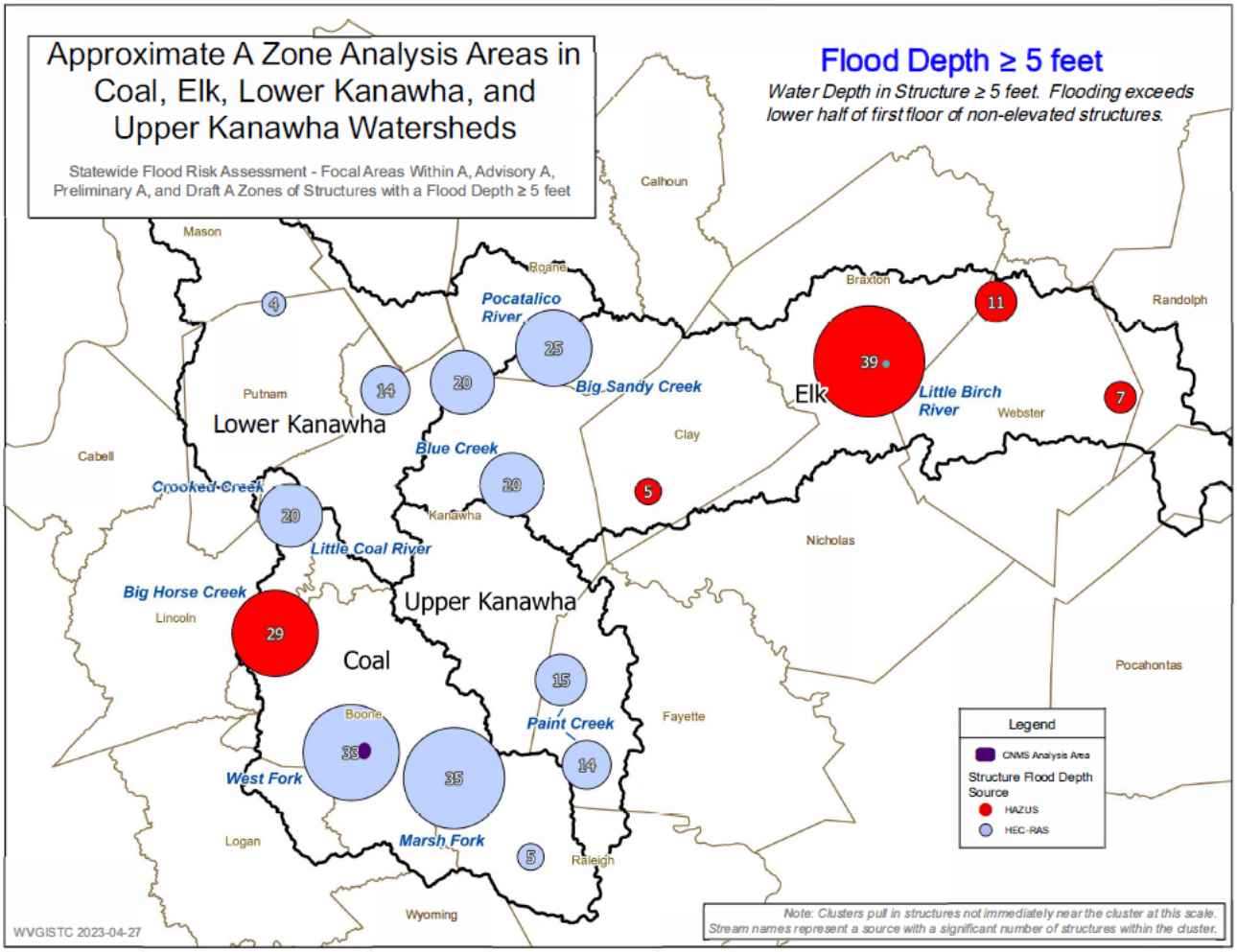
APPENDIX J | WV GIS TECHNICAL CENTER

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



Contents

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

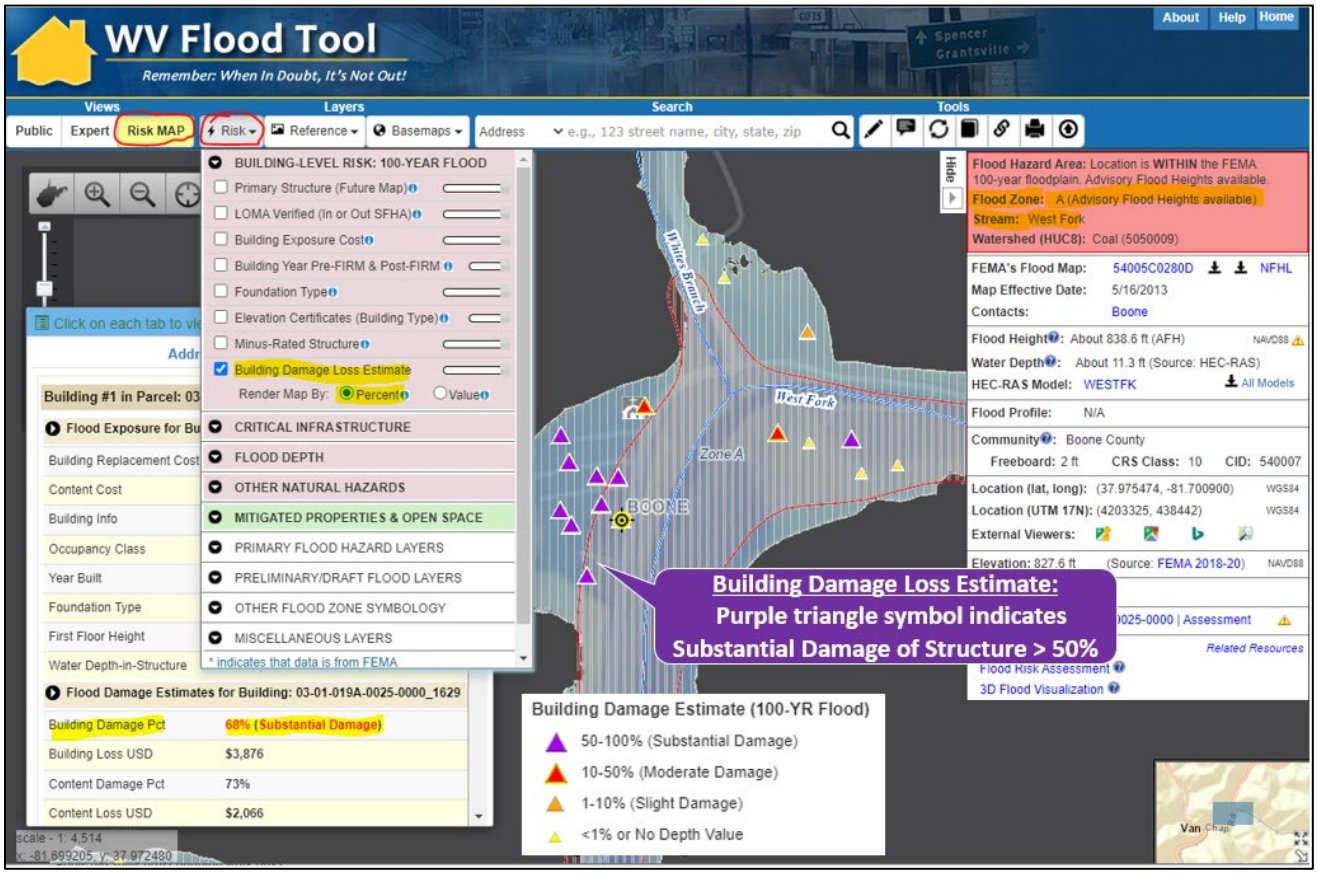
- **Depth Grids Factors: Extreme Flood Depths, Depth Grid Accuracy**
  6) Extreme flood depths of structures ≥ 10 feet (verify not flood study error)
  7) Depth Grid Accuracy
     - Model-backed HEC-RAS depth grid (more accurate)
     - 2010 Hazus depth grid (less accurate)

- **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

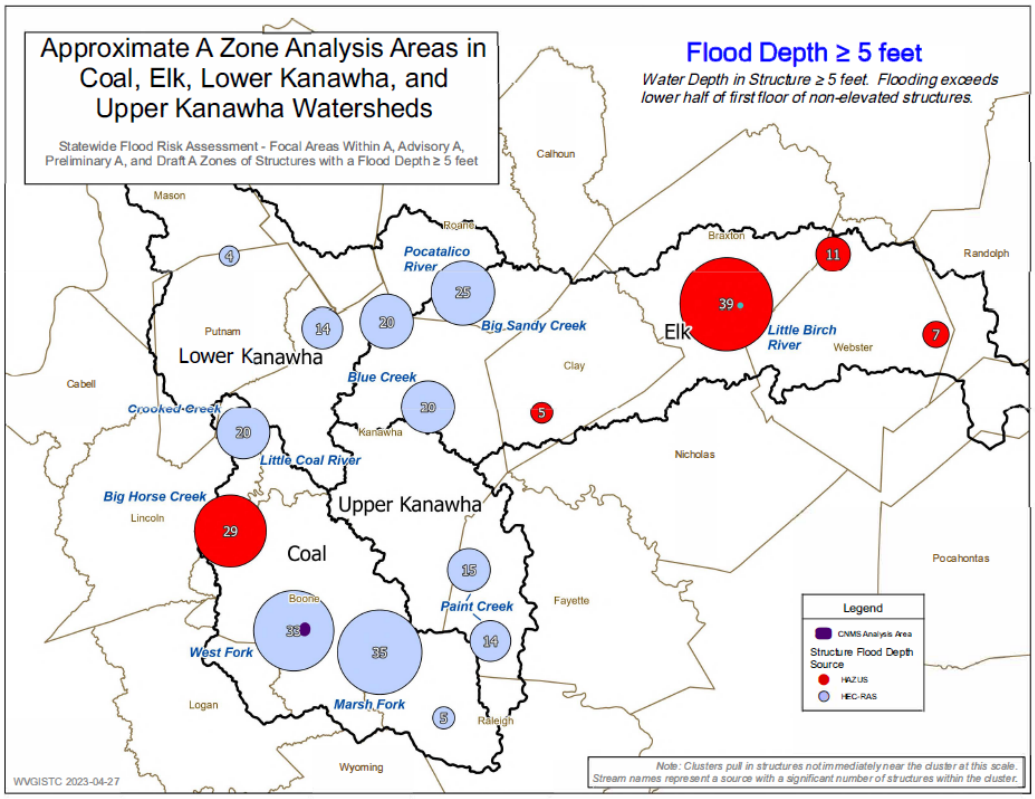


Figure 2. Building Cluster Zone A Analysis for Flood Depth ≥ 5 feet

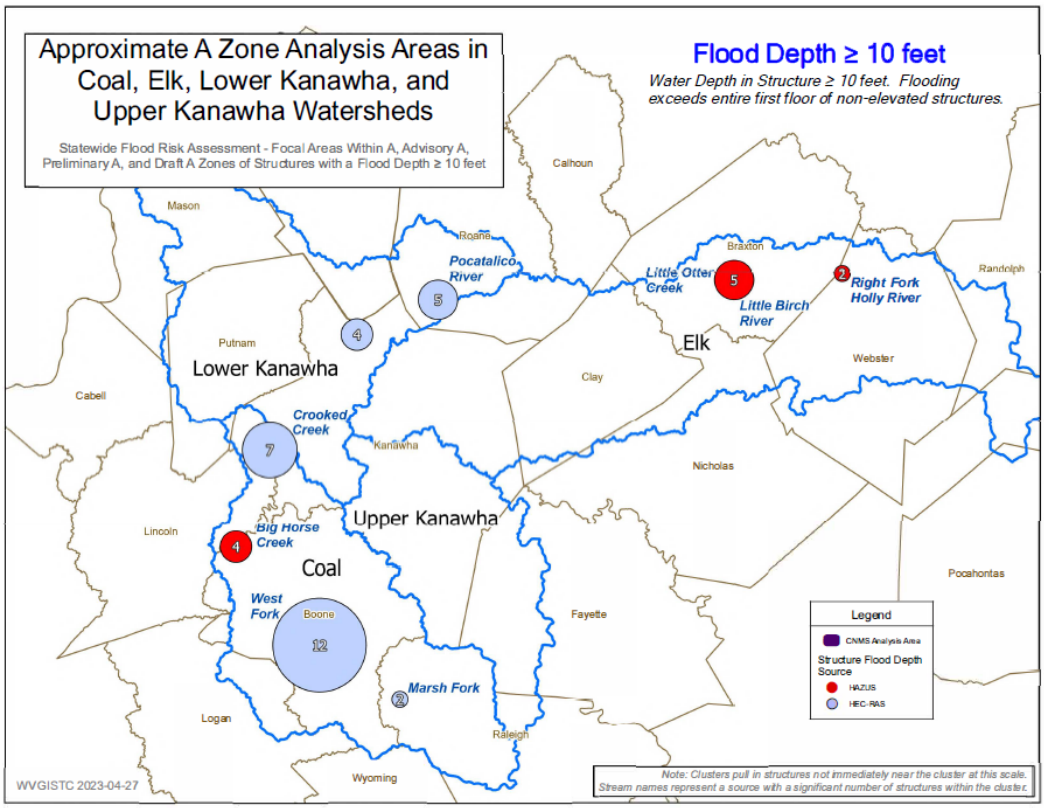


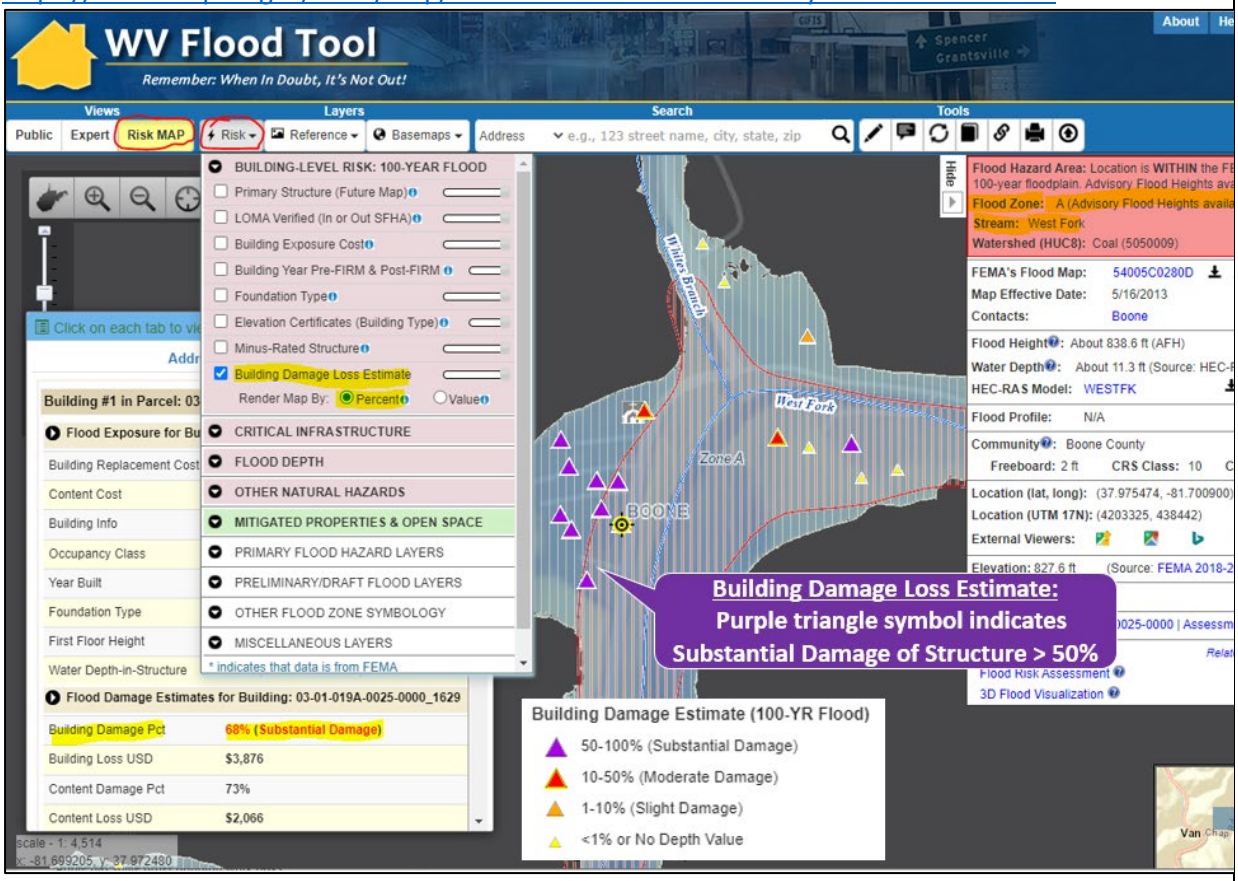
Figure 3. Building Cluster Zone A Analysis for Flood Depth ≥ 10 feet

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

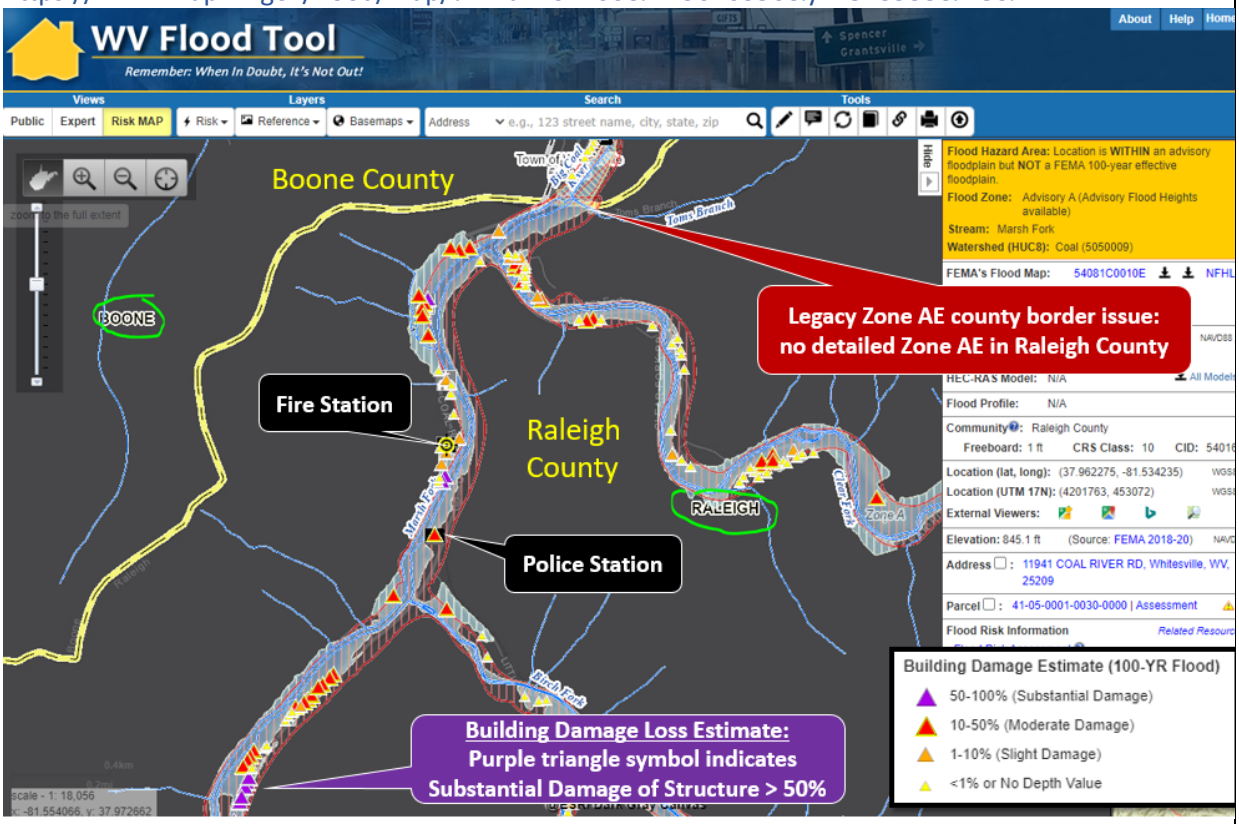


Building Damage Estimate (100-YR Flood)
50-100% (Substantial Damage)
10-50% (Moderate Damage)
1-10% (Slight Damage)
<1% or No Depth Value

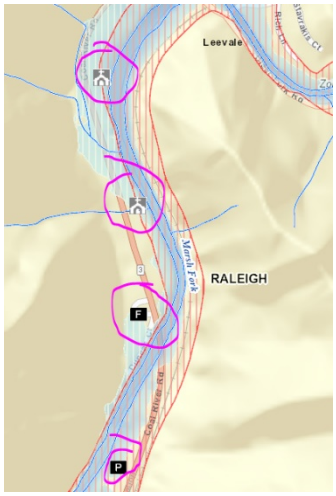
Marsh Fork, Coal Watershed, Raleigh County (border mapping issue)

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



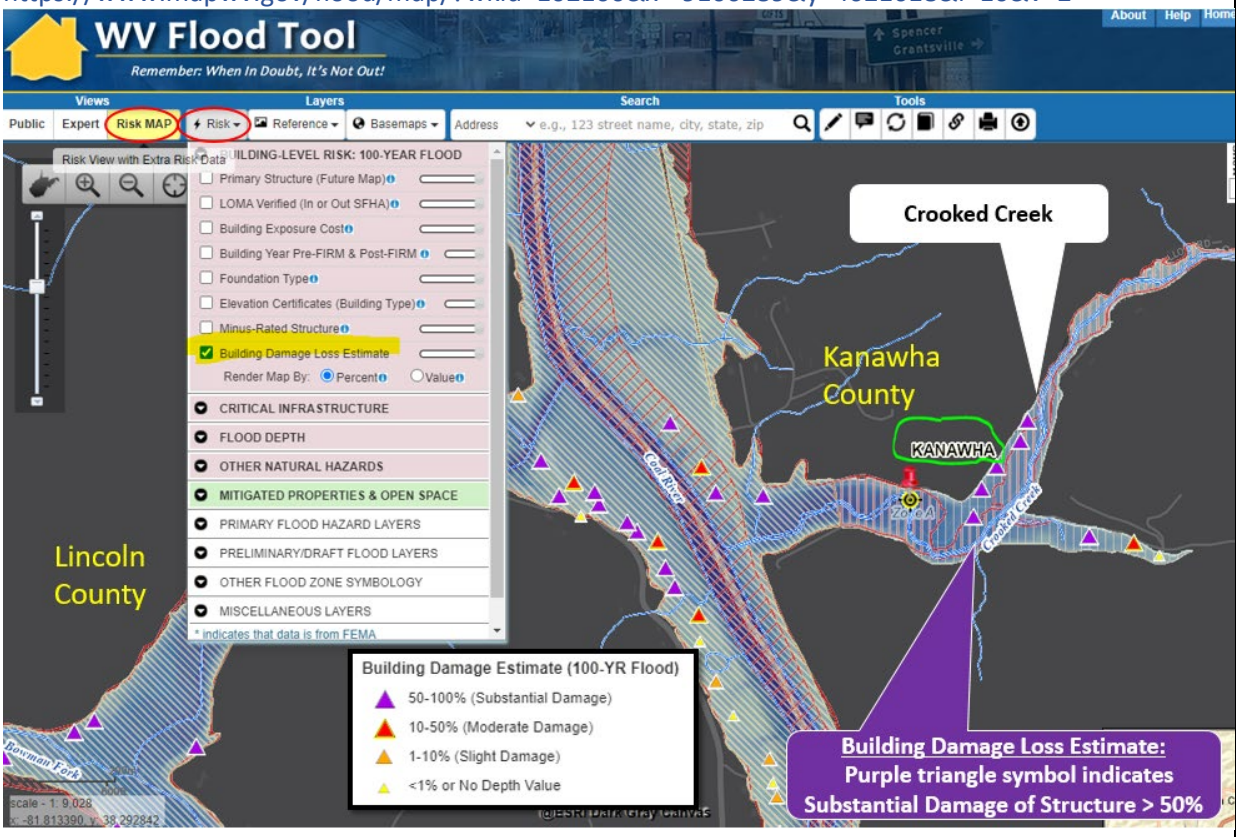
Four structures of significance - two essential facilities and two community assets - are located in the building cluster.



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.

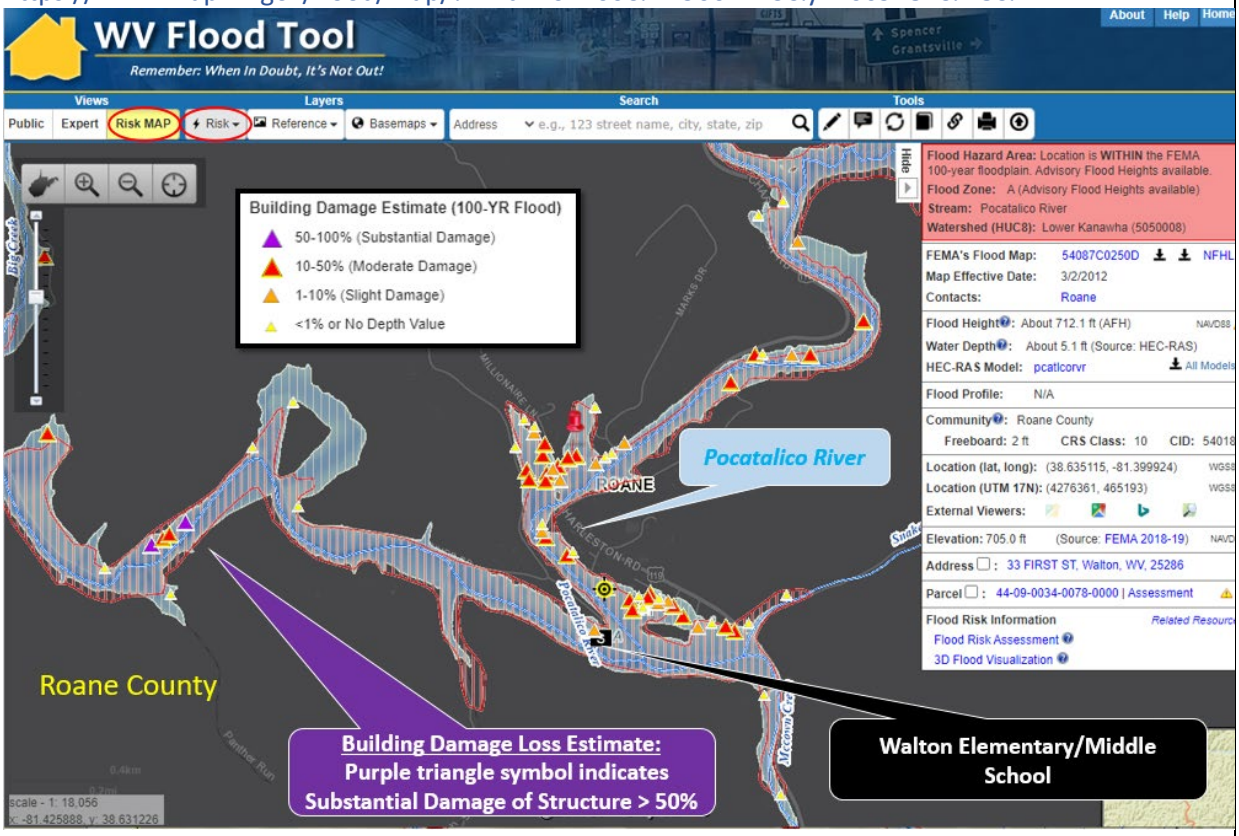
https://www.mapwv.gov/flood/map/?wkid=102100&x=-9106289&y=4621618&l=10&v=2

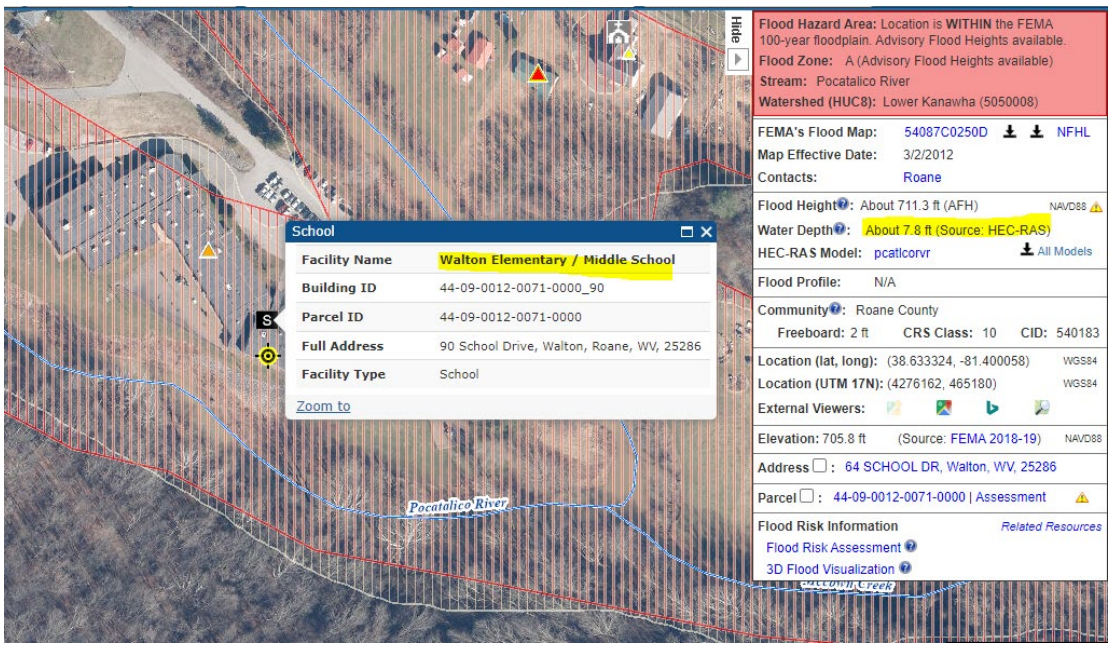


Pocatalico River, Lower Kanawha Watershed, Roane County

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

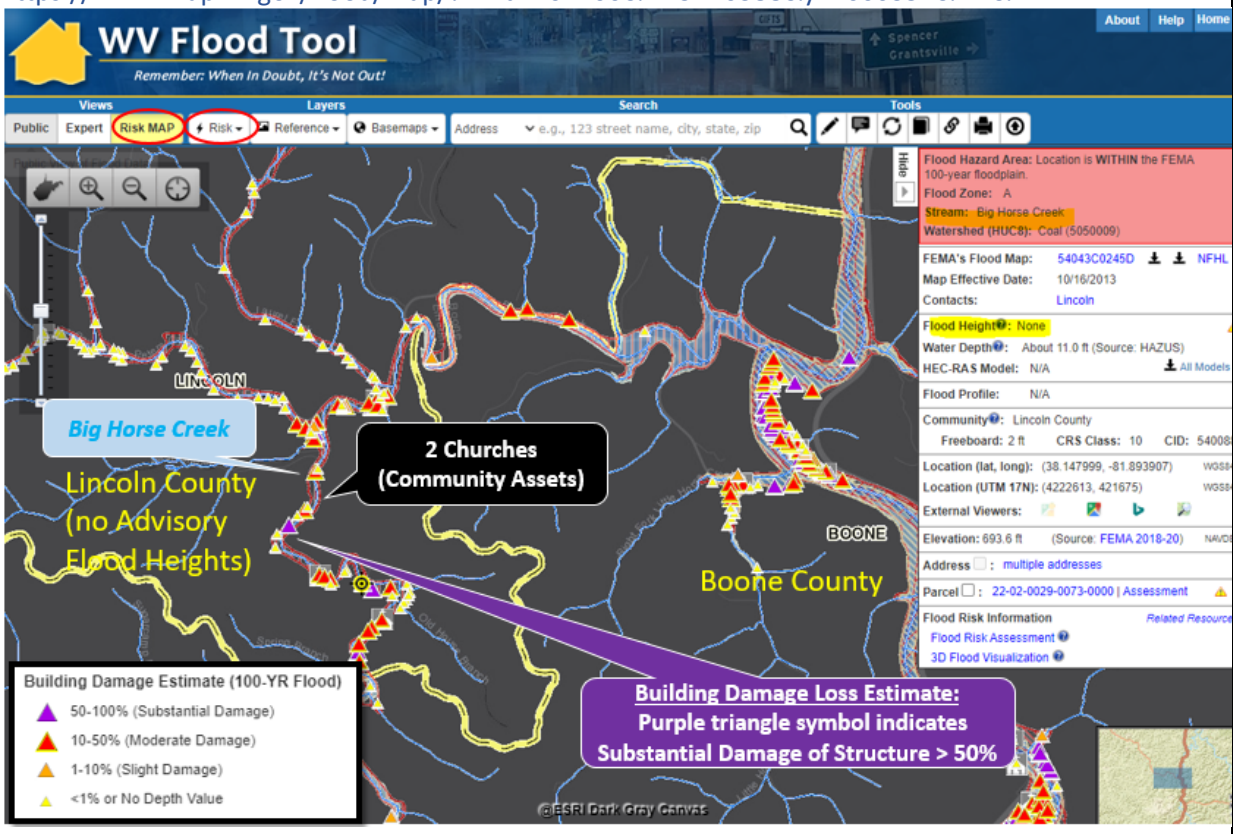




Big Horse Creek, Coal Watershed, Boone County

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.

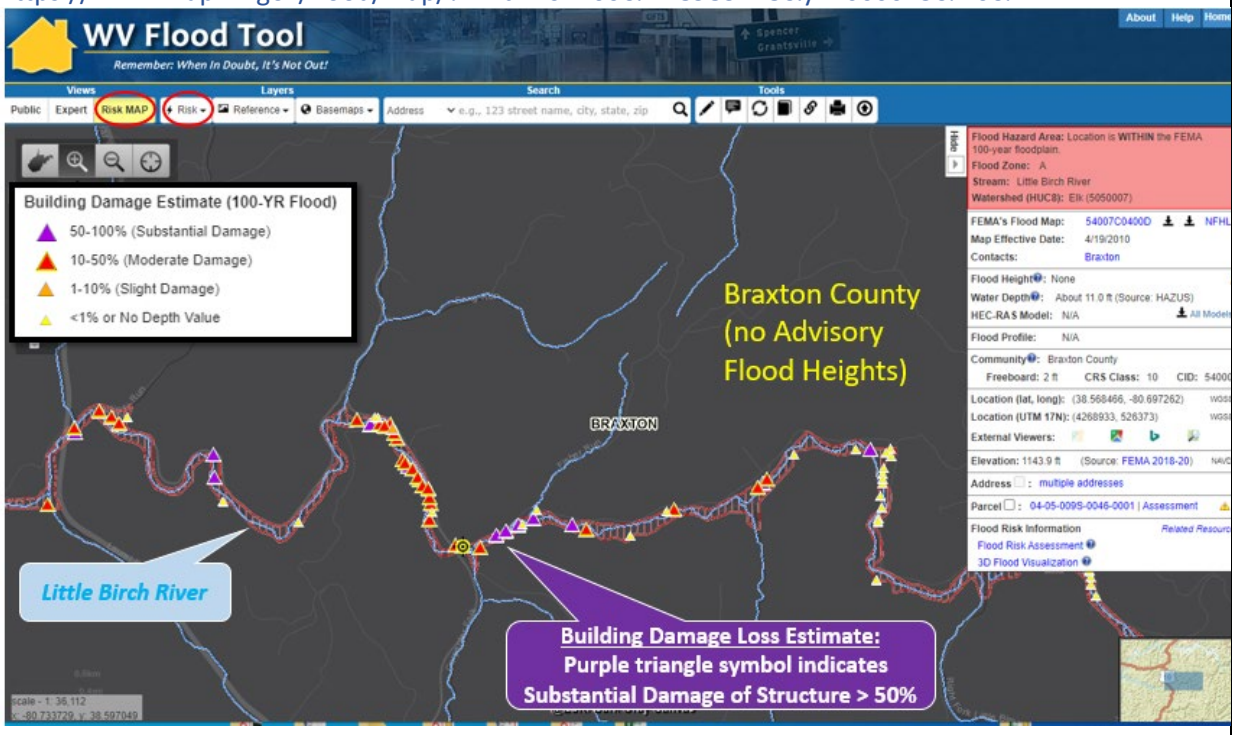
https://www.mapwv.gov/flood/map/?wkid=102100&x=-9116388&y=4600354&l=7&v=2

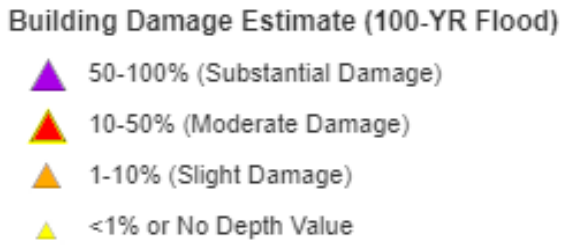


Little Birch River, Elk Watershed, Braxton County

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

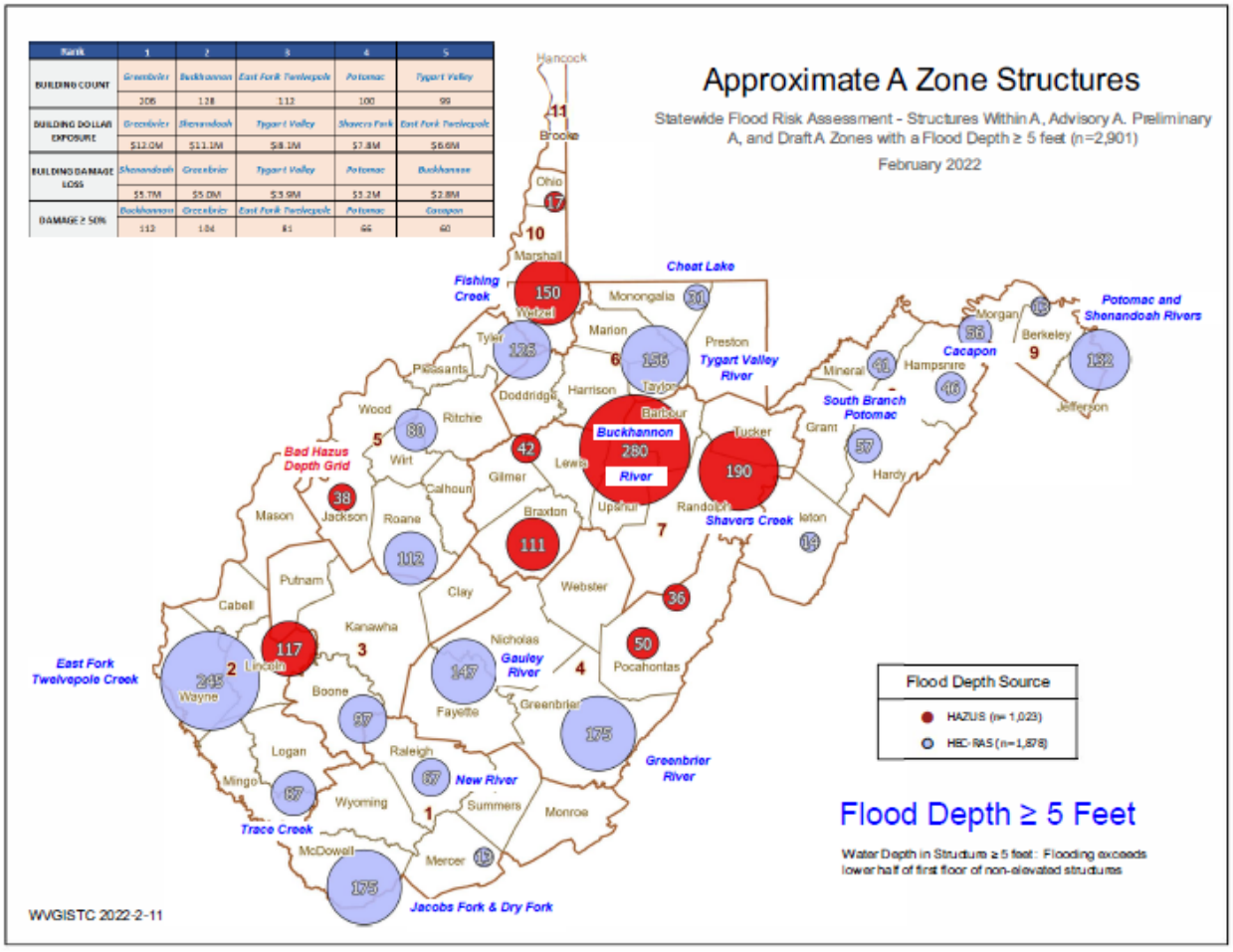
Table 5. Evaluation factor values for Zone A stream reaches to consider for detailed Zone AE conversion

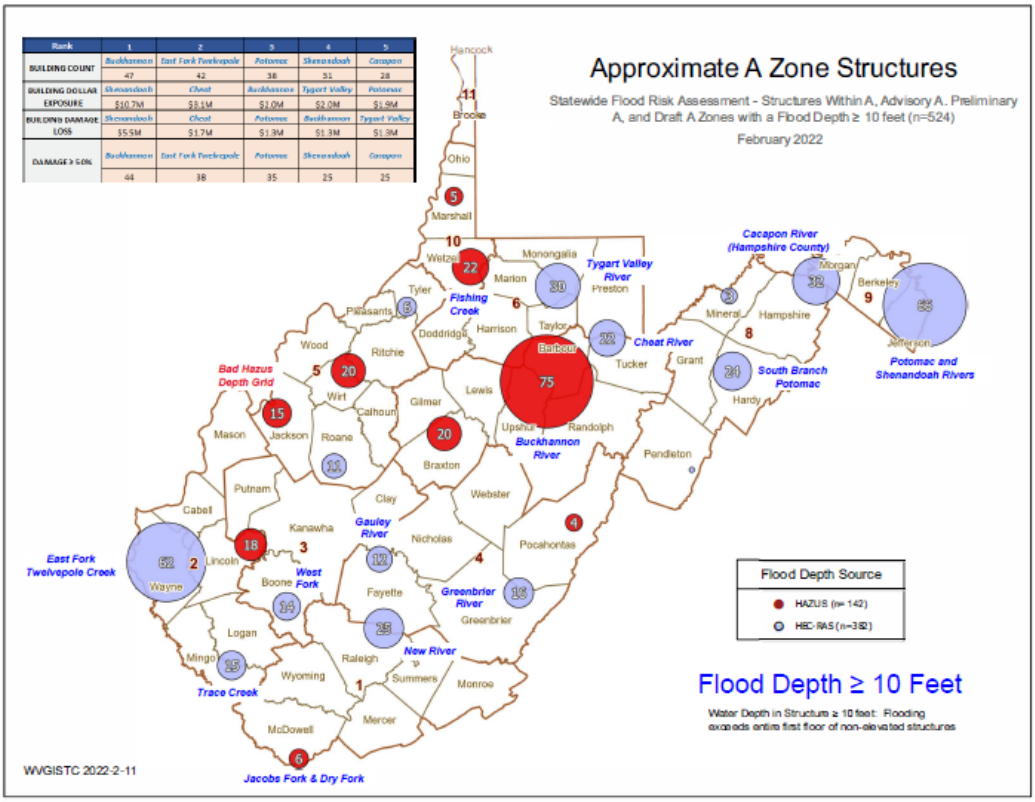
Stream Name	Watershed with A Zone Structures at ≥ 5 ft. Flood Depth	Total Structures	Total Building Exposure ($)	Total Building Loss ($)	Structures with Damage ≥ 50%	Structures In CNMS Analysis Area	Notes	Stream Lengths of Potential AE Zones (miles)	Building Density per stream mile	Estimated Zone AE 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**

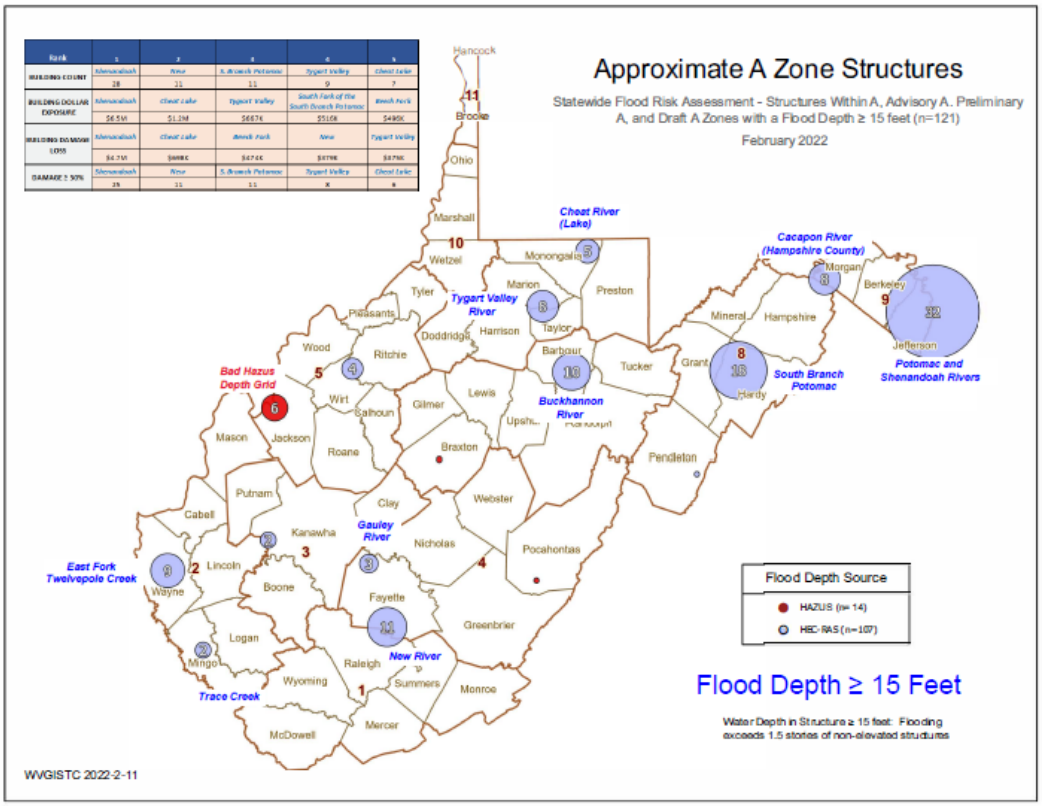
Appendix A: Statewide Analysis - Zone A Structure Cluster Analysis

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