West Virginia Risk Explorer

Localized risk assessment tools for analysis and visualization

West Virginia Flood Resiliency Framework (WVFRF)

August 2025

WV GIS Technical Center
West Virginia University

Flood Risk in WV

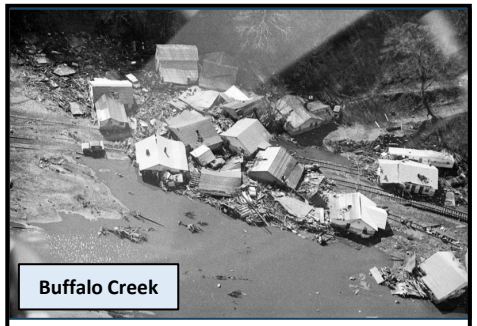
64 Federally-Declared Flood Disasters since 1953

229 Loss of Lives

About 98,000 Buildings (9%) in 1%-annual-chance (100-yr) Floodplain

Nearly 200,000 Persons (11%) reside in 100-yr Floodplain

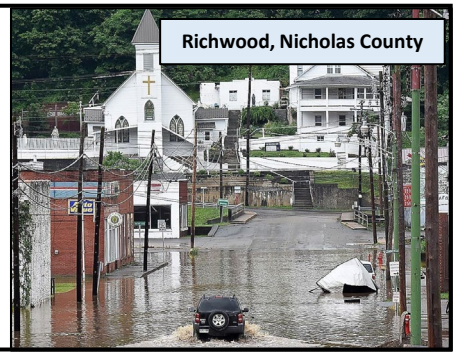
July 1961
(22 + 2 landslide fatalities)



February 1972
(123 fatalities including 4 missing)

November 1985
(49 fatalities)

June 2016
(23 fatalities)



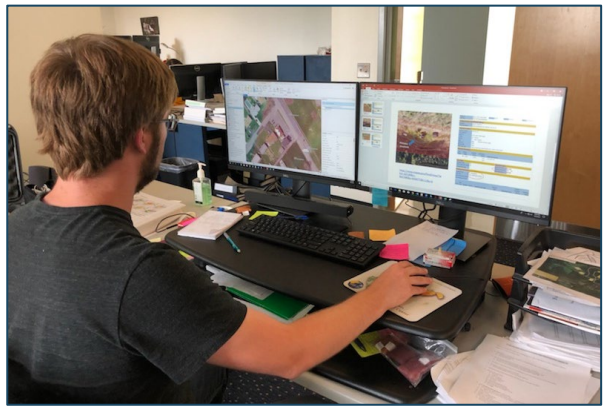
February 2025
(3 fatalities)

WV Floodplain Building Inventory (BI)

Flood Exposure Assessment (Building-Level)

Funded by: FEMA Hazard Mitigation Grant Program (HMGP) and State Hazard Mitigation Office

- All primary (insurable) structures in the 1%-annual-chance (100-yr) floodplain
- Community Assets (Historical & Non-Historical) in the 100-yr floodplain
- Essential Facilities in the 100-yr and 500-yr floodplains



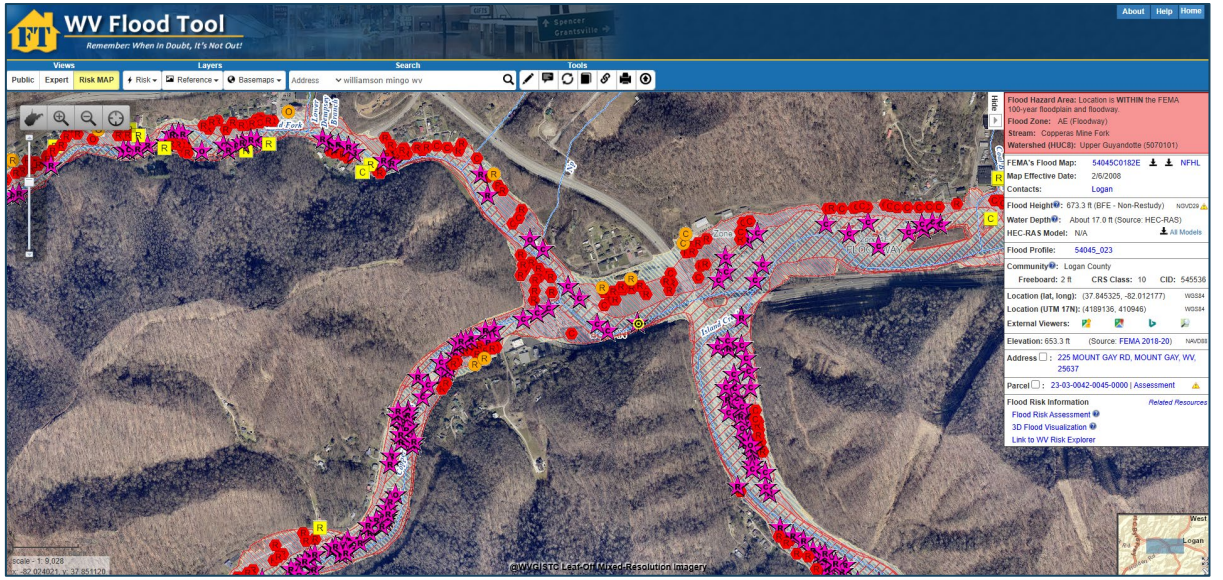
Essential Facilities

Community Assets

Detailed building characteristics from tax assessment
+
Building loss and population displacement estimates (100-yr flood)

Manual process of identification using Arc GIS
+
Programmed scripts to extract and process data

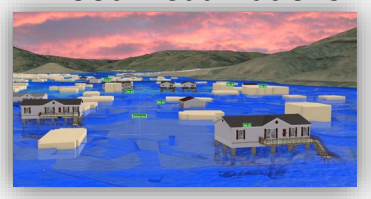
Product: **WV Flood Tool** mapwv.gov/flood



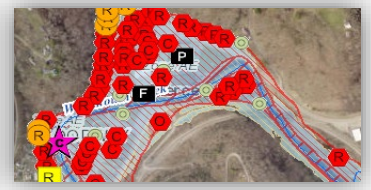
WV Flood Resiliency Framework (WVFRF)

A virtual hub of risk assessment, visualization, planning, and training resources for building community flood resiliency in WV

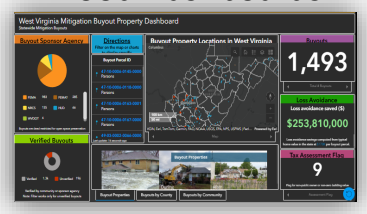
Flood Visualizations



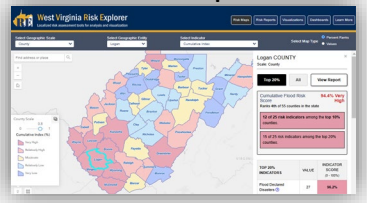
WV Flood Tool



Flood Dashboards



WV Risk Explorer



Example Tools

RISK TOOLS

- WV Risk Explorer
- WV Flood Tool
- Visualizations
- Dashboards

9 Geographic Scales

COMMUNITY ENGAGEMENT

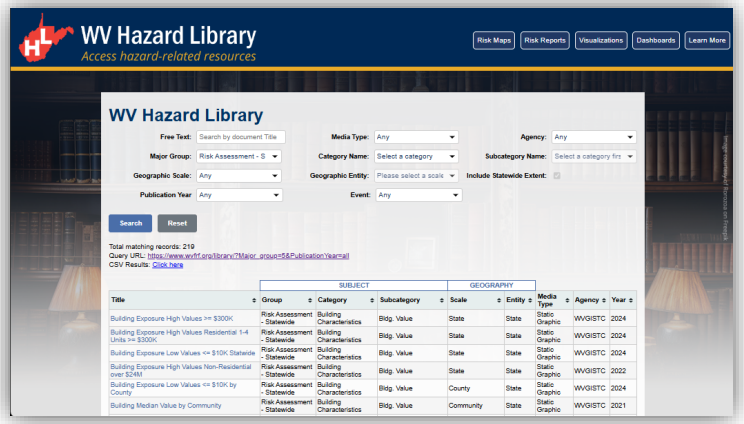
- Focused Outreach Meetings
- Flood Symposium
- Resiliency Tools & Products
- Learning Resources & Reports

HAZARD LIBRARY

Search online hazard resources by title, subject, media, event, geography, data, etc.

STAKEHOLDERS

- Risk Reduction Associates
- Emergency Responders
- Floodplain Managers
- Local Officials
- Volunteers
- Public

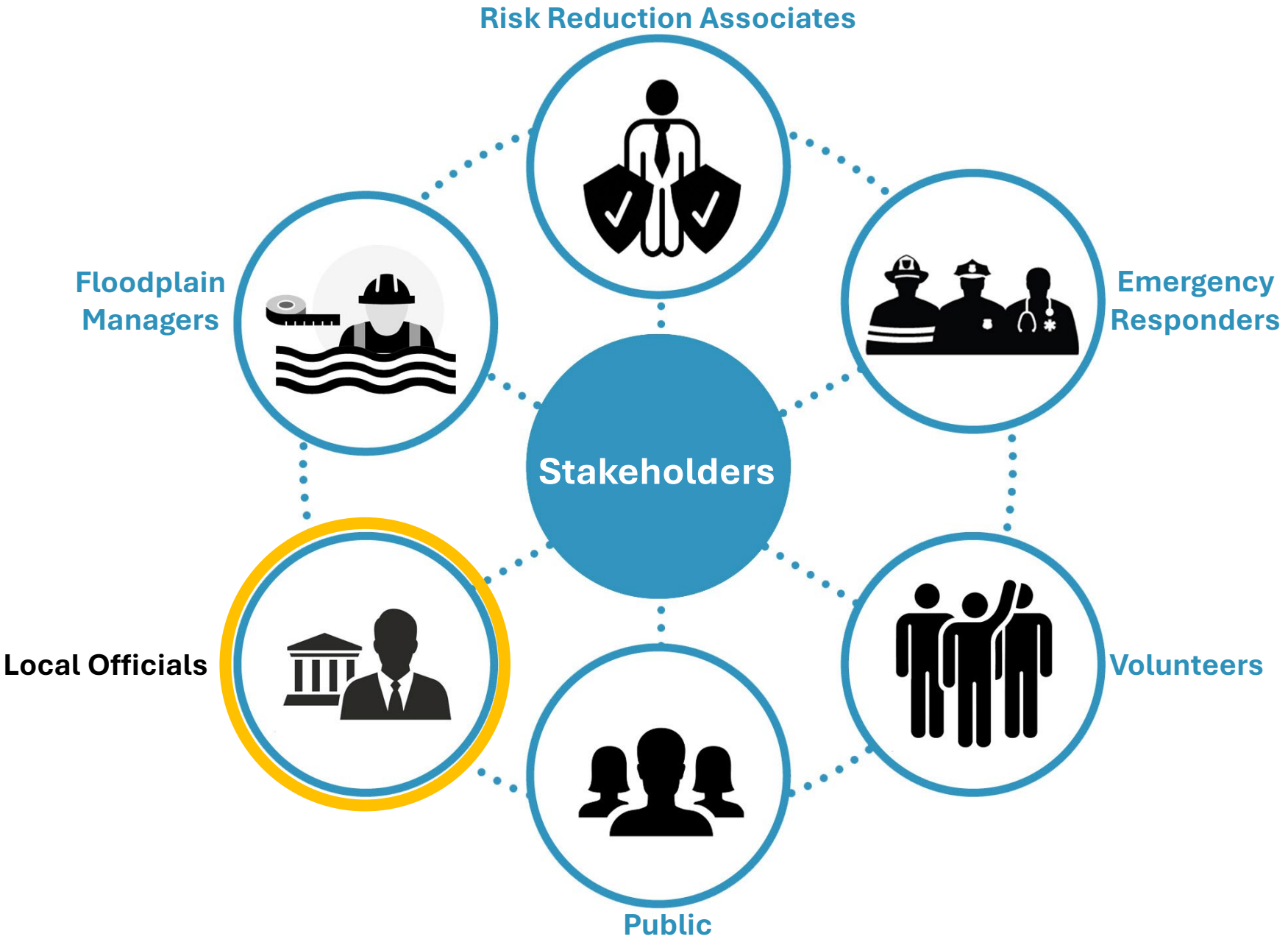


Hazard Library

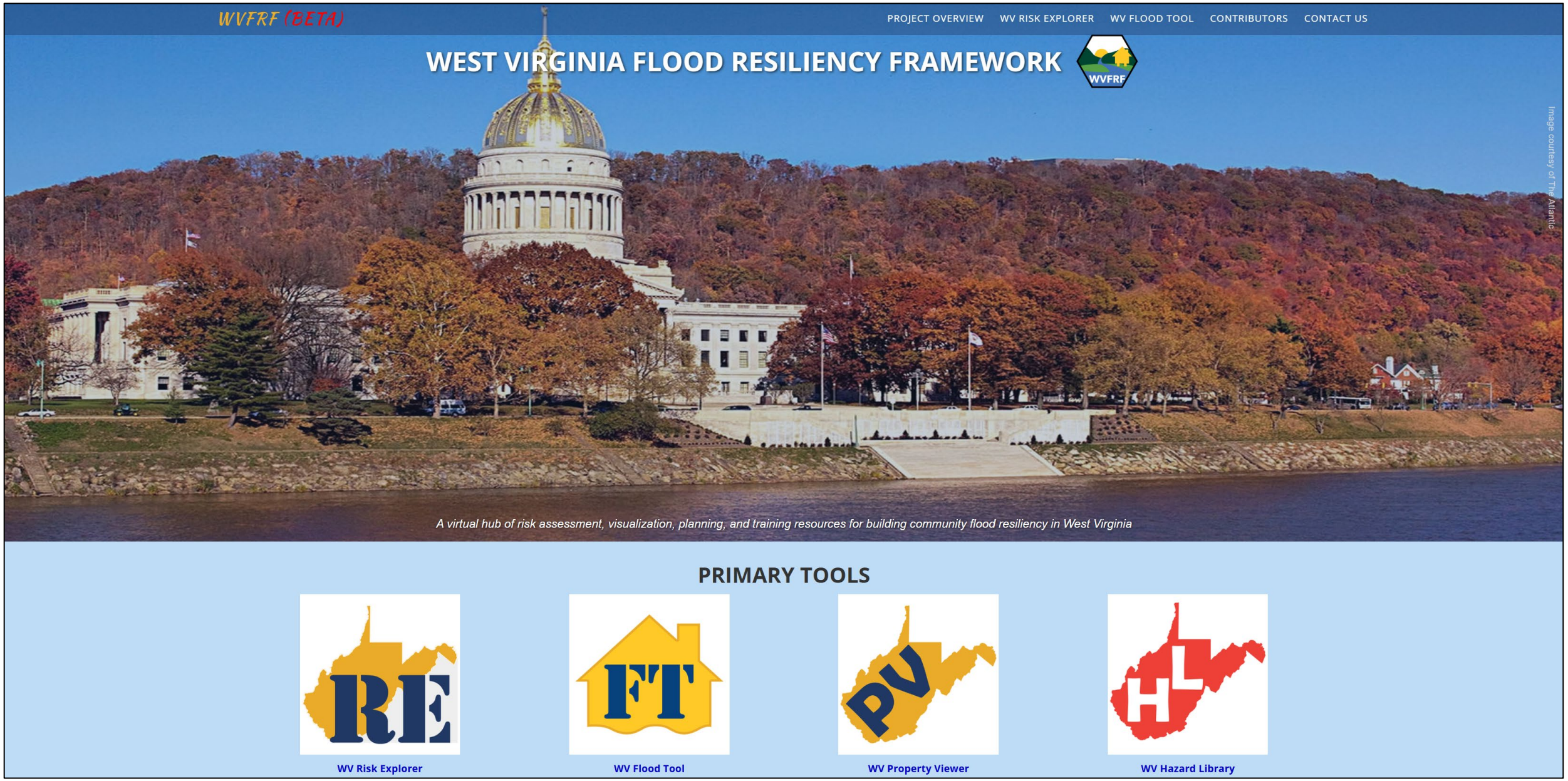
Community Engagement Meeting

Flood Symposium **Stakeholders**

Stakeholders



WVFRF Tools


WVFRF (BETA)
PROJECT OVERVIEW
WV RISK EXPLORER
WV FLOOD TOOL
CONTRIBUTORS
CONTACT US
WEST VIRGINIA FLOOD RESILIENCY FRAMEWORK
WVFRF
Image courtesy of The Atlantic
A virtual hub of risk assessment, visualization, planning, and training resources for building community flood resiliency in West Virginia
PRIMARY TOOLS
RE
WV Risk Explorer
FT
WV Flood Tool
PV
WV Property Viewer
HL
WV Hazard Library

WV Flood Risk Index

Overall Flood Risk

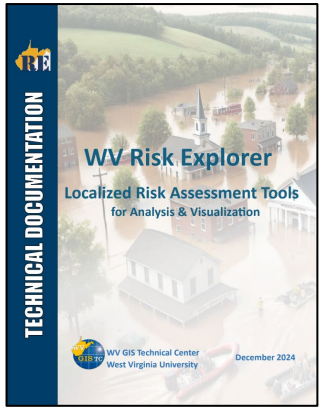
(1) FLOODPLAIN CHARACTERISTICS	(2) BUILDING EXPOSURE	(3) BUILDING CHARACTERISTICS	(4) CRITICAL INFRASTRUCTURE	(5) COMMUNITY ASSETS	(6) BUILDING DAMAGE LOSS	(7) PEOPLE / SOCIAL VULNERABILITIES	(8) OTHER HAZARDS
Floodplain Area	Building Floodplain Count[1 2]	Building Value[1 2]	Essential Facilities	Historical Assets	Substantial Damage Estimates*[1 2]	Population in Floodplain	Landslides
Floodplain Length[1 2]	Building Floodway Count[1 2]	Mobile Homes	Roads Inundated	Non-Historical Assets	Previous Claims	Population Displaced	Karst**
Floodplain Depth[1 2]	Building Floodplain Ratio[2]	Basement			Repetitive Losses	WV Social Vulnerability Index	Dam/Levee Failure**
Flood Disaster Frequency	Building Density[1 2]	One Story					
		Building Year*					

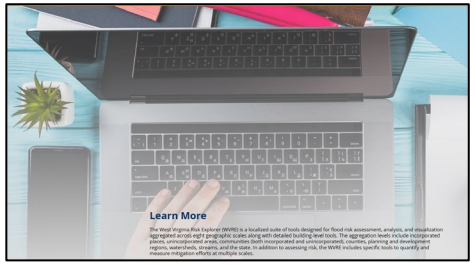
* Multiple Indicators

** In Progress

[1] River/Stream Indicator

[2] Watershed Indicator



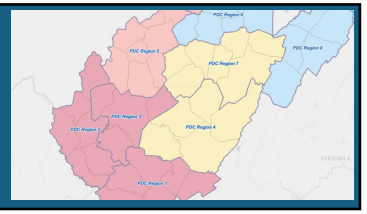


Analytical & Visualization Tools at Multiple Scales

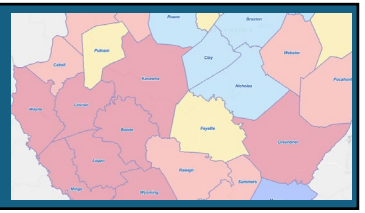
Political Boundaries

State

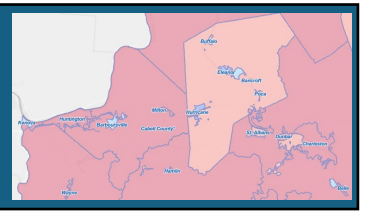
PDC Regions (11)



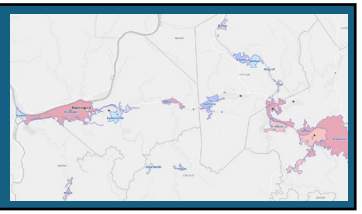
Counties (55)



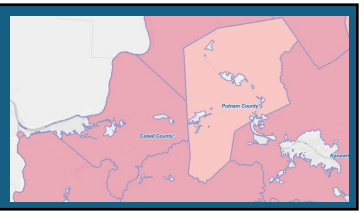
Communities (284)



Incorporated Places (229)

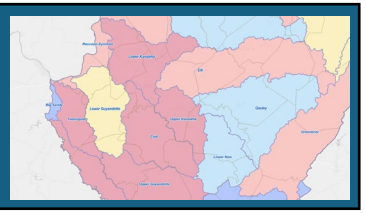


Unincorporated Areas (55)

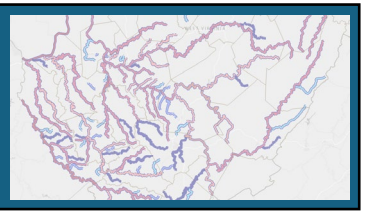


Drainage Areas / Streams

Watersheds (33)



Streams/Rivers (156)



Property Levels

Parcels

Buildings

Geographic Entities at VERY HIGH Risk (Top 10%)

RANK	All Communities	Index Score
1	New Martinsville - Incorporated	100.0%
2	Boone County* - Unincorporated	99.6%
3	Clendenin - Incorporated	99.2%
4	Marlinton - Incorporated	98.9%
5	Wheeling** - Incorporated	98.5%
6	McDowell County* - Unincorporated	98.2%
7	Alderson** - Incorporated	97.8%
8	Wayne County* - Unincorporated	97.5%
9	Parsons - Incorporated	97.1%
10	Kanawha County* - Unincorporated	96.8%
11	Madison - Incorporated	96.4%
12	Kimball - Incorporated	96.1%
13	Lincoln County* - Unincorporated	95.7%
14	Milton - Incorporated	95.4%
15	Mingo County* - Unincorporated	95.0%
16	Logan County* - Unincorporated	94.6%
17	Danville - Incorporated	94.3%
18	Wellsburg - Incorporated	93.9%
19	Oceana - Incorporated	93.6%
20	Rowlesburg - Incorporated	93.2%
21	Northfork - Incorporated	92.9%
22	Gary - Incorporated	92.5%
23	Wyoming County* - Unincorporated	92.2%
24	Welch - Incorporated	91.8%
25	Summers County* - Unincorporated	91.5%
26	Buckhannon - Incorporated	91.1%
27	Richwood - Incorporated	90.8%
28	Ceredo - Incorporated	90.4%
29	Mannington - Incorporated	90.1%

Incorporated Places	Index Score
Clendenin - Incorporated	100.0%
New Martinsville - Incorporated	99.5%
Alderson** - Incorporated	99.1%
Marlinton - Incorporated	98.6%
Kimball - Incorporated	98.2%
Parsons - Incorporated	97.8%
Wheeling** - Incorporated	97.3%
Northfork - Incorporated	96.9%
Danville - Incorporated	96.4%
Madison - Incorporated	96.0%
Milton - Incorporated	95.6%
Oceana - Incorporated	95.1%
Keystone - Incorporated	94.7%
Wellsburg - Incorporated	94.2%
Gary - Incorporated	93.8%
Rowlesburg - Incorporated	93.4%
Grantsville - Incorporated	92.9%
Richwood - Incorporated	92.5%
Rainelle - Incorporated	92.1%
Mannington - Incorporated	91.6%
Spencer - Incorporated	91.2%
Welch - Incorporated	90.7%
Buckhannon - Incorporated	90.3%

Unincorporated Areas	Index Score
Kanawha County* - Unincorporated	100.0%
Boone County* - Unincorporated	98.1%
Wayne County* - Unincorporated	96.2%
McDowell County* - Unincorporated	94.4%
Mingo County* - Unincorporated	92.5%
Logan County* - Unincorporated	90.7%

Counties	Index Score
Kanawha	100.0%
Boone	98.1%
McDowell	96.2%
Logan	94.4%
Mingo	92.5%
Wyoming	90.7%

Regions	Index Score
PDC Region 2	100%
PDC Region 3	90%

RANK	Streams (Top 20)	Index Score
1	Coal River	100.0%
2	Ohio River	99.7%
3	Little Coal River	99.5%
4	Greenbrier River	99.3%
5	Davis Creek	99.1%
6	Island Creek	98.9%
7	Kanawha River	98.7%
8	Campbells Creek	98.4%
9	Wheeling Creek	98.2%
10	Pocatalico River	98.0%
11	Cacapon River	97.8%
12	Big Coal River	97.6%
13	Mud River	97.4%
14	Cabin Creek	97.1%
15	Pond Fork	96.9%
16	Elk River	96.7%
17	Twelvepole Creek	96.5%
18	Buckhannon River	96.3%
19	South Branch Potomac River	96.1%
20	Paint Creek	95.8%

Watersheds	Index Score
Lower Kanawha	100%
Coal	96.7%
Upper Kanawha	93.5%
Tug	90.3%

Last update: Aug. 2024
Streams & Watersheds: Jul. 2025

Colors:
Black --> Incorporated places
Black on yellow** --> Split communities
Black on blue: Incorporated communities included in the detailed risk report (Camden-on-Gauley, Clendenin, Marlinton, Rainelle, Richwood, and White Sulphur Springs)
Brown on gray --> Unincorporated areas
Green --> Counties (Total)

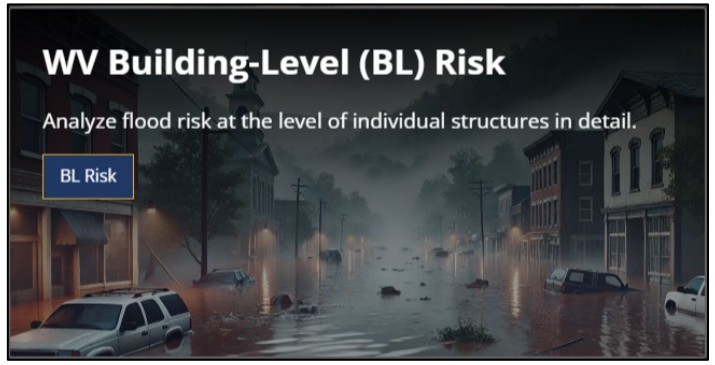
Risk Tools Comparison

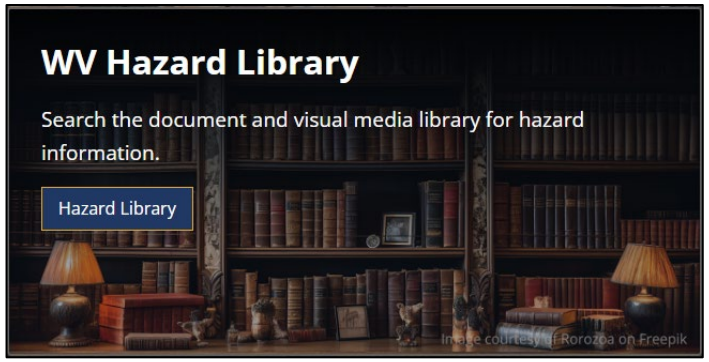
WV Flood Tool	WV Risk Explorer
Determine the degree of flood risk for a *specific area or property* using the Public and Expert Views. View building risk assessments and mitigation measures using the Risk Map View.	View and analyze riverine flood risk at the *aggregate level* for community, county, region, watershed, and stream scales. *Compare risk* among different geographic entities, complete with risk scores and rankings, from the building level to state scales.
Primary Components: • Public View • Expert View (Floodplain Management) • RiskMap View (Risk Reduction) • Reference Layers & Basemaps • Property Search Tools • Links to External Viewers & Resources	**Primary Components:** • Risk Maps Tool • Risk Reports Tool • Risk & Mitigation Dashboard Tools • Building Level Risk Tools • Flood Visualization Tools • Data linkages WV Flood Tool & Hazard Library
Applications: • Flood Risk Determinations at Property Level • Floodplain Management • Mitigation Measures • Damage Assessments • Property Identification • Flood Visualizations & Risk Communications • CRS Map Credits • Other Hazards	**Applications:** • Plans (Resiliency, Emergency Operations, Hazard Mitigation) • Risk Studies (Risk MAP, Risk Reduction, Community Focused) • Mitigation Measures, Tracking & Monitoring • Flood Visualizations & Risk Communications • CRS Programming Variables • Other Hazards

West Virginia Risk Explorer (WVRE)

Risk Assessment Tools: Localized risk assessment tools for analysis

WVRE Landing Page: wvfrf.org/wvre





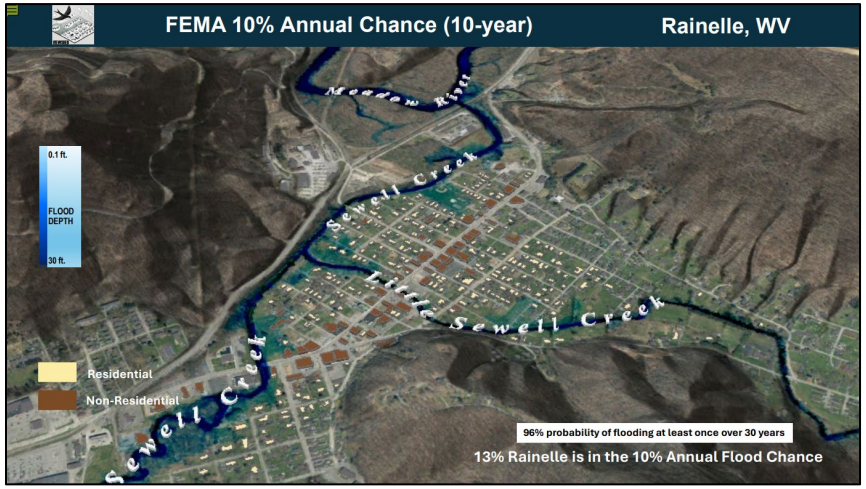
West Virginia Risk Explorer (WVRE)…

Risk Communication Tools:

Facilitating risk comprehension for different groups of stakeholders

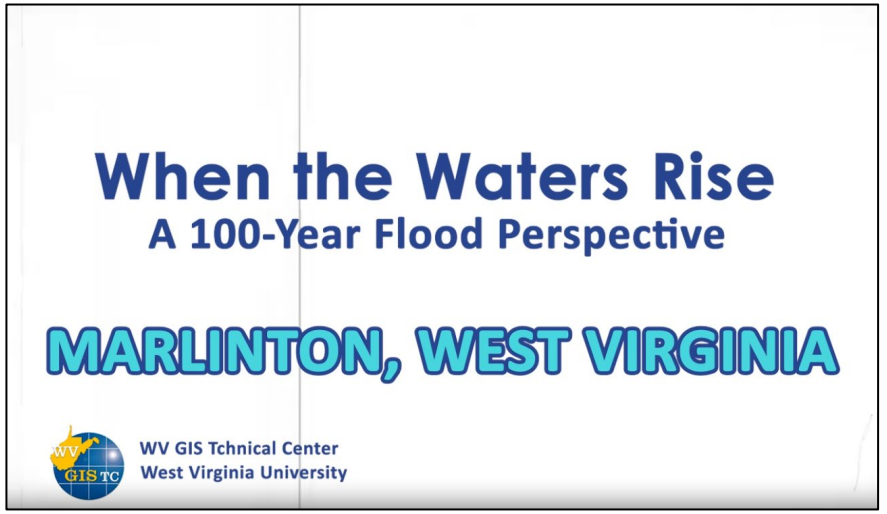
West Virginia Risk Explorer (WVRE)…

Visualization Examples:



[Viewshed for Rainelle]

[Building Profile in Clendenin]

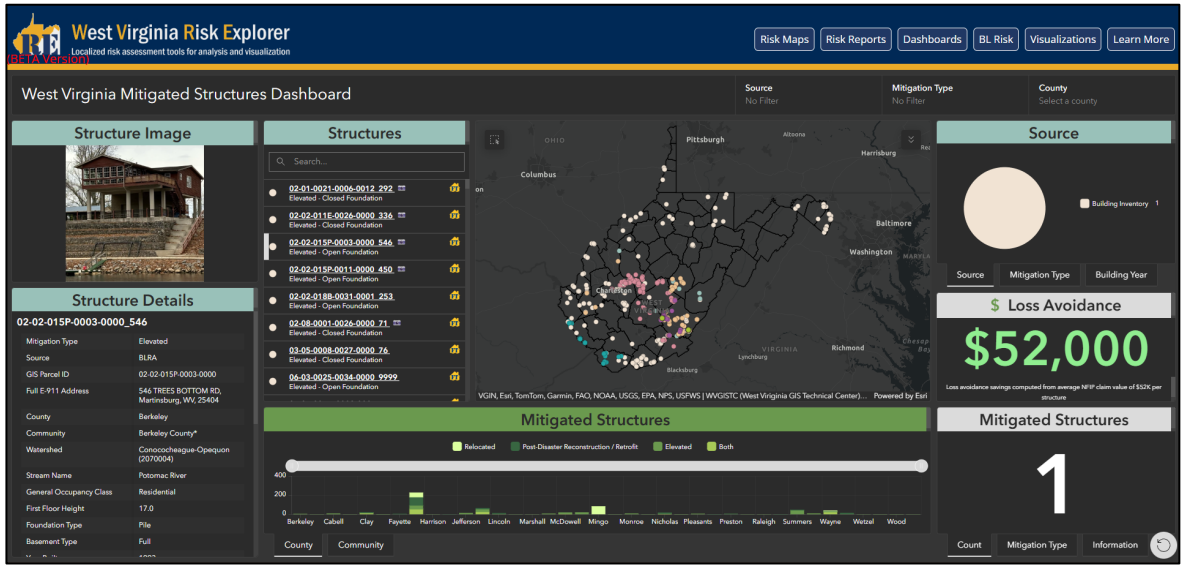


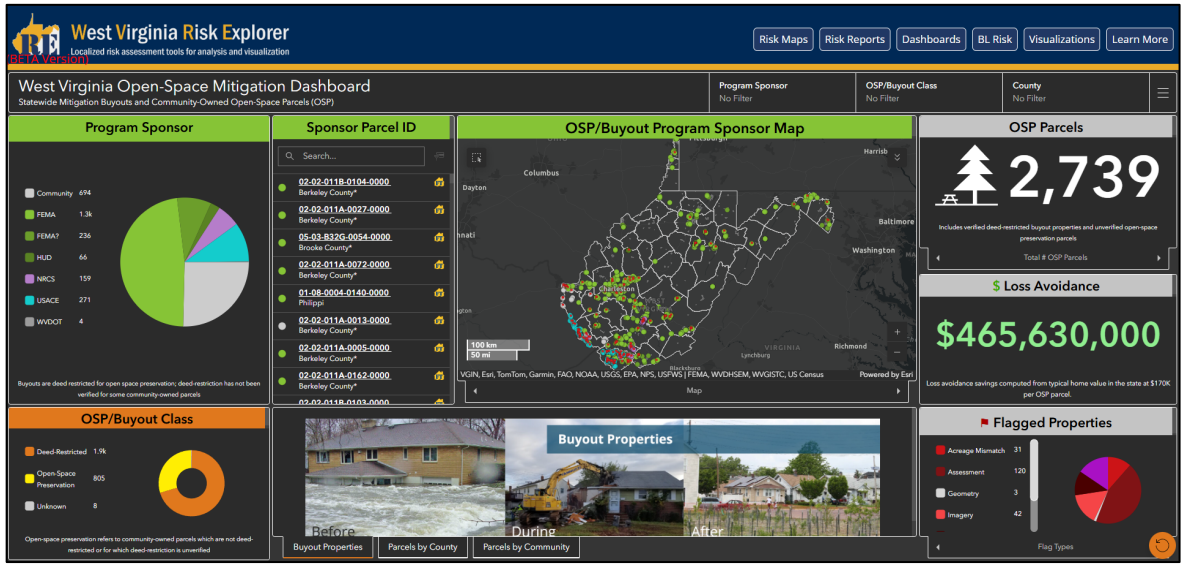
[3D Movie for Marlinton]

West Virginia Risk Explorer (WVRE)…

Mitigation Assessment Tools:

- Mitigated Structures Dashboard
- Open-Space Mitigation Dashboard





Flood Risk Assessment
for
229 Incorporated Places

Cumulative Risk

WVRE → WV Risk Explorer Reports → Select Geographic Scale: Incorporated Place → Risk Comparison Report

West Virginia Risk Explorer
Localized risk assessment tools for analysis and visualization

Risk Maps | Risk Reports | Dashboards | BL Risk | Visualizations | Learn More

Select Geographic Scale: Incorporated Place

Select Geographic Entity: Select an Entity Name ▼

All Risk Indicators Report
Top 20% Risk Indicators Report
Regional/County Report
Risk Comparison Report
Print Report
Download Data

Cumulative Risk

Top 5

Flood Risk Comparison Report

(Incorporated Place Scale)

July 2025

For comparison, this report summarizes the Cumulative Flood Risk Index as well as 25 flood factors in seven major risk categories for the selected Incorporated Places.

Flood Risk Index Comparison

Table 1. Flood Risk Index: Below is a comparison of the Cumulative Flood Risk Index for the selected **Incorporated Places**.

#	*STATE INDEX RANK*	INCORPORATED PLACE	COUNTY	CUMULATIVE FLOOD RISK INDEX	
				INDEX SCORE	INDEX RATING
1	1	Clendenin - Incorporated	Kanawha	100%	VERY HIGH
2	2	New Martinsville - Incorporated	Wetzel	99.5%	VERY HIGH
3	3	Alderson - Incorporated	Greenbrier, Monroe	99.1%	VERY HIGH
4	4	Marlinton - Incorporated	Pocahontas	98.6%	VERY HIGH
5	5	Kimball - Incorporated	McDowell	98.2%	VERY HIGH
6	6	Parsons - Incorporated	Tucker	97.8%	VERY HIGH
7	7	Wheeling - Incorporated	Marshall, Ohio	97.3%	VERY HIGH
8	8	Northfork - Incorporated	McDowell	96.9%	VERY HIGH
9	9	Danville - Incorporated	Boone	96.4%	VERY HIGH

Flood Risk Index
Cumulative Index Map
Floodplain Characteristics
Building Exposure
Building Characteristics
Critical Infrastructure
Community Assets
Building Damage Loss
People / Social Vulnerabilities

Floodplain Characteristics

Floodplain Characteristics Comparison

Table 2. Floodplain Characteristics: Below is a comparison of **4** flood factors under the Floodplain Characteristics category for the selected **Incorporated Places**.

Percentage of total community area that lies within the Special Flood Hazard Area (SFHA)

Floodplain Characteristics

Floodplain Area Ratio

Top 5

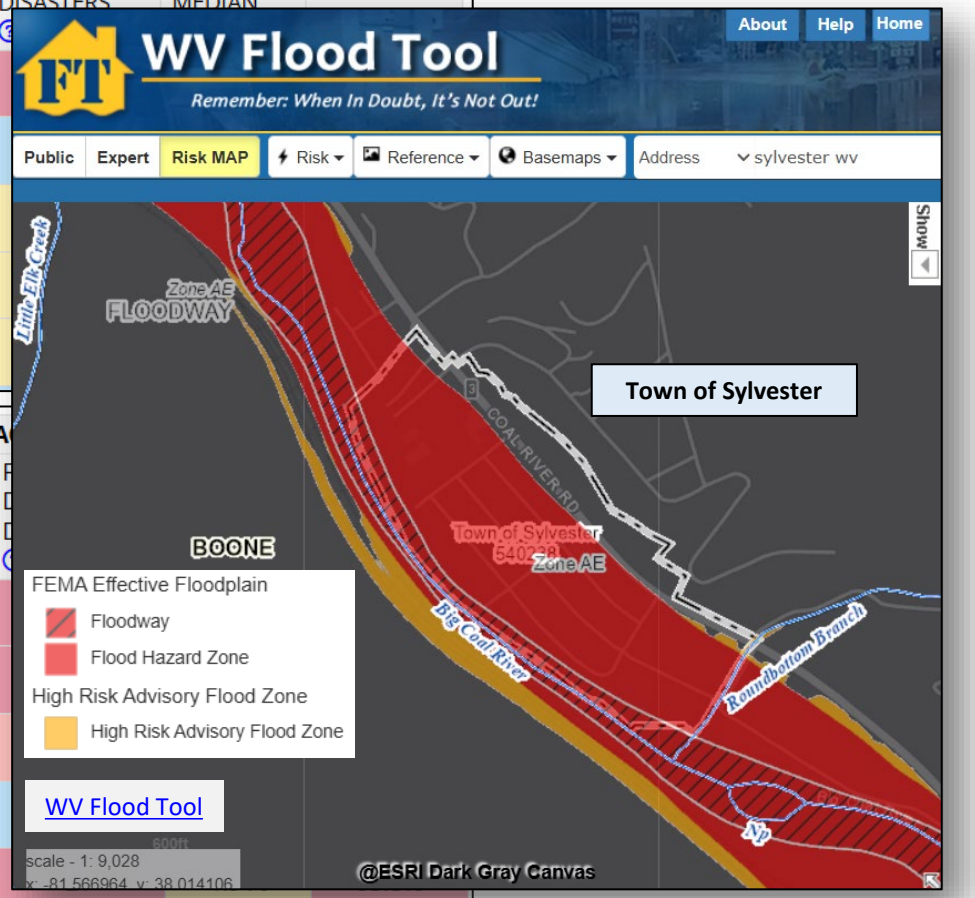
	STATE CATEGORY RANK	INCORPORATED PLACE	FLOODPLAIN CHARACTERISTICS: FLOODPLAIN AREA RATIO	FLOODPLAIN LENGTH RATIO	FLOOD DECLARED DISASTERS	FLOOD DEPTH MEDIAN	CATEGORY SCORE
1	18	Sylvester - Incorporated	79.4%	0.02235 Miles/Acre			
2	10	Friendly - Incorporated	58.5%	0.00815 Miles/Acre			
3	34	Addison - Incorporated	56.4%	0.00891 Miles/Acre			
4	9	Hambleton - Incorporated	50.0%	0.01446 Miles/Acre			
5	33	Reedy - Incorporated	48.0%	0.01312 Miles/Acre			

Floodplain Characteristics

Floodplain Length Ratio

Top 5

	STATE CATEGORY RANK	INCORPORATED PLACE	FLOODPLAIN CHARACTERISTICS: FLOODPLAIN AREA RATIO	FLOODPLAIN LENGTH RATIO
1	18	Sylvester - Incorporated	79.4%	0.02235 Miles/Acre
2	17	Whitesville - Incorporated	35.6%	0.02121 Miles/Acre
3	2	Gary - Incorporated	37.9%	0.01871 Miles/Acre
4	8	Bruceton Mills - Incorporated	47.2%	0.01778 Miles/Acre
5	14	Pineville - Incorporated	19.7%	0.01618 Miles/Acre



Length of floodplain in miles to total community area

Building Exposure

Building Exposure Comparison

Building Exposure

Building Floodplain Count

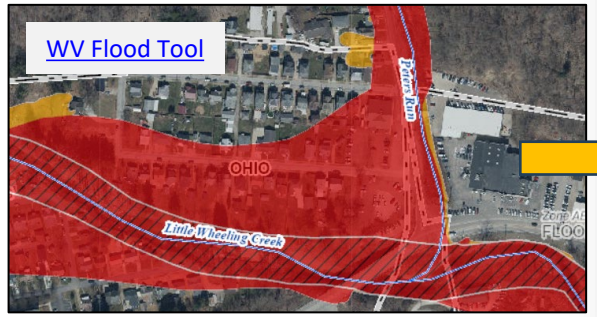
Top 5

Table 3. Building E

Primary insurable structures in the effective 100-year floodplain or Special Flood Hazard Area (SFHA)

#	STATE CATEGORY RANK	INCORPORATED PLACE	BUILDING EXPOSURE: BUILDING FLOODPLAIN COUNT
1	2	Wheeling - Incorporated	2,685
2	32	Charleston - Incorporated	1,512
3	36	Huntington - Incorporated	1,099
4	60	St. Albans - Incorporated	1,043
5	25	Dunbar - Incorporated	903

Recent flood in Wheeling



Building Exposure

Building Floodway Count

Top 5

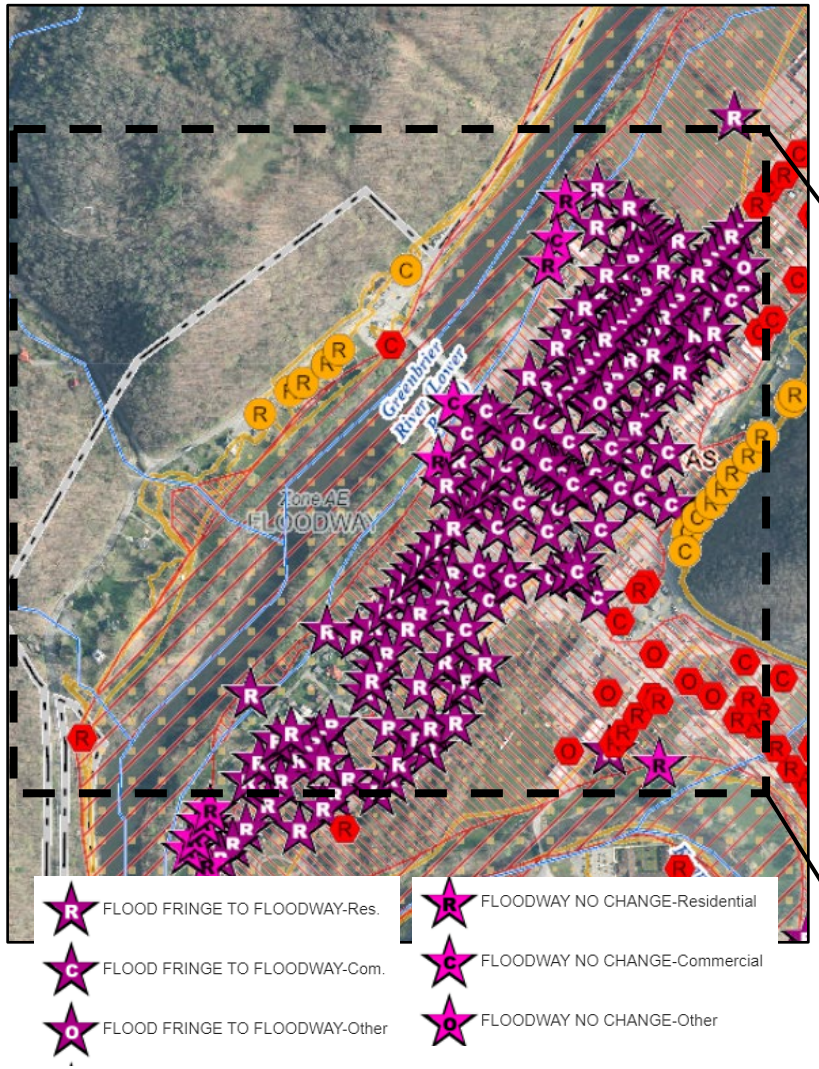
#	STATE CATEGORY RANK	INCORPORATED PLACE	BUILDING EXPOSURE: BUILDING FLOODPLAIN COUNT	BUILDING FLOODWAY COUNT	BUILDING FLOODPLAIN RATIO	BUILDING DENSITY	CATEGORY SCORE
1	7	Marlinton - Incorporated	371	189	55.1%	0.75 /Acre	97.3%
2	2	Wheeling - Incorporated	2,685	176	21.2%	2.01 /Acre	99.5%
3	15	Richwood - Incorporated	286	136	21.3%	1.16 /Acre	93.8%
4	36	Huntington - Incorporated	1,099	112	5.3%	1.03 /Acre	84.6%
5	4	Welch - Incorporated	318	110	21.8%	1.63 /Acre	98.6%

Primary structures located in the Regulatory Floodway (main river channel) of 100-year floodplain

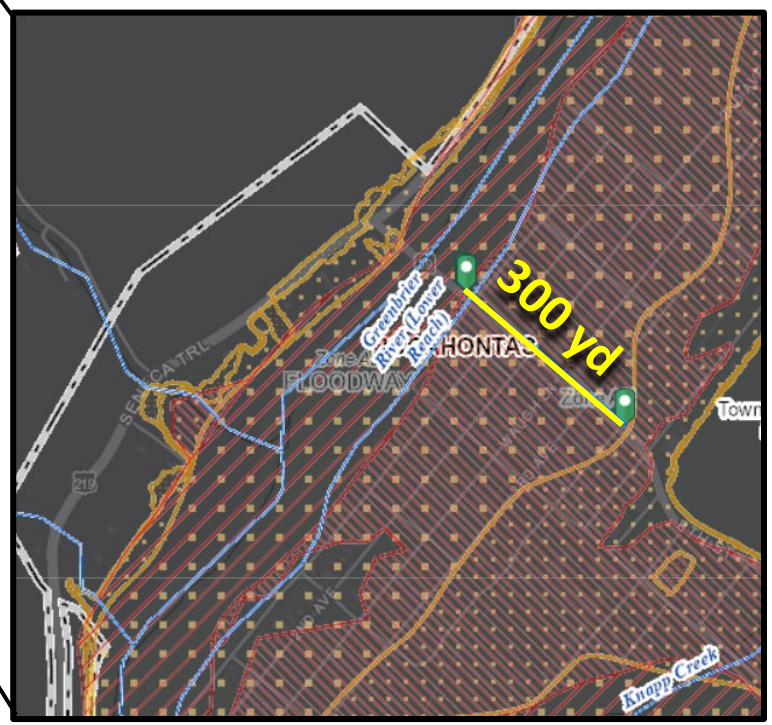
Floodway Increase in Marlinton

Buildings in the floodway channel of a stream or close to the flood source, will be subject to the greatest flood depths, highest velocities, and greatest debris potential.

Community	Buildings in Preliminary Floodway	Buildings in Effective Floodway	Net Change in Floodway
Marlinton	189	14	+ 175



Floodway width expanded significantly up to 300 yards (900 ft)

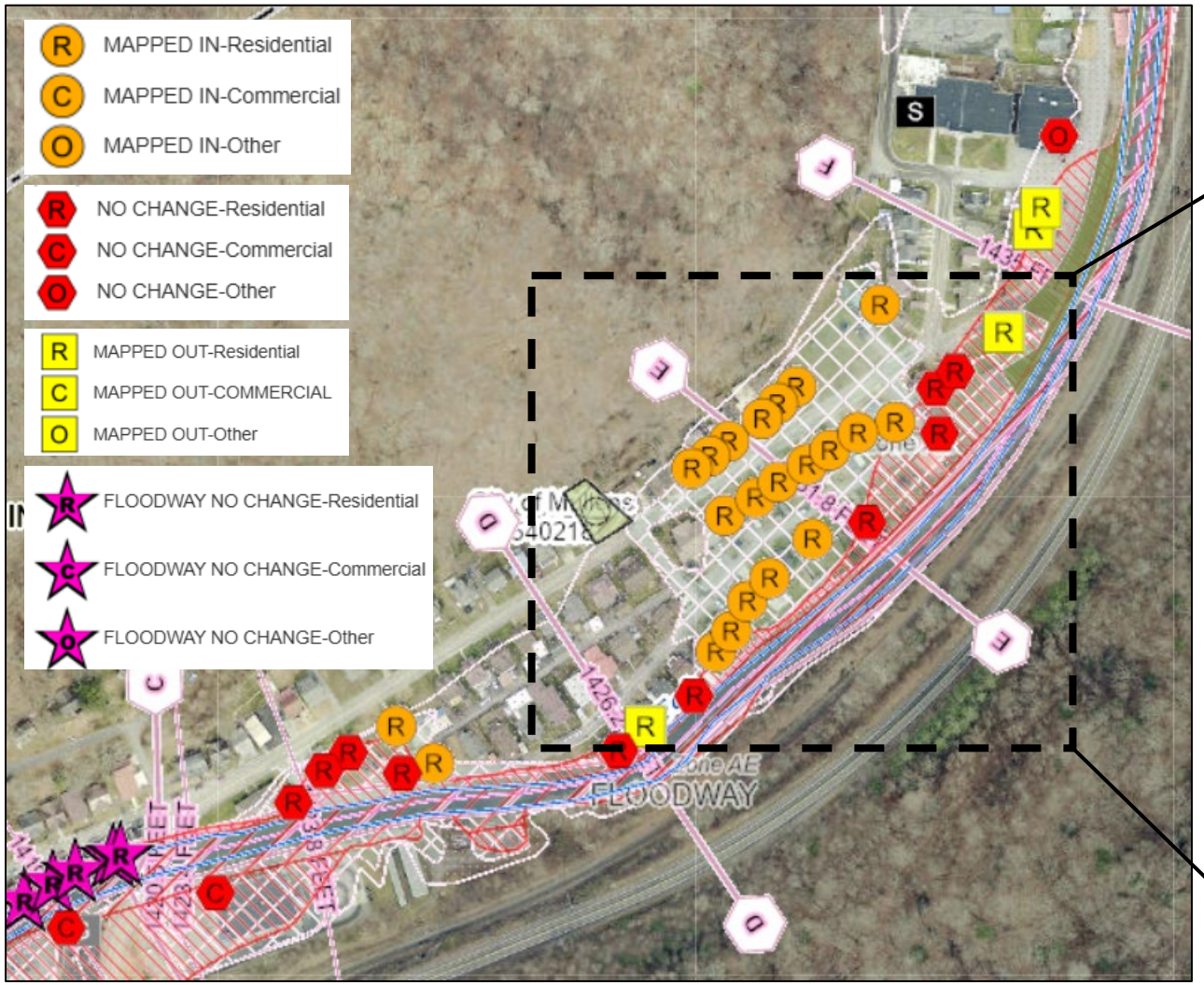


Base Flood Elevation increased to about 2 feet

[WV Flood Tool]

Base Flood Depth Increase in Mullens

The floodwater depth of a structure is a critical element to be considered in planning and designing floodproofing measures



**According to the draft 100-year flood map,
Base Flood Elevation increased to about 3 feet**

[WV Flood Tool]

Building Exposure…

Building Exposure

Building Floodplain Ratio

Top 5

#	STATE CATEGORY RANK	INCORPORATED PLACE	BUILDING EXPOSURE				
			BUILDING FLOODPLAIN COUNT	BUILDING FLOODWAY COUNT	BUILDING FLOODPLAIN RATIO	BUILDING DENSITY	CATEGORY SCORE
1	71	Sylvester - Incorporated	53	0	**63.1%**	**1.96 /Acre**	69.2%
2	73	Friendly - Incorporated	58	0	**58.0%**	1.53 /Acre	68.4%
3	7	Marlinton - Incorporated	**371**	**189**	**55.1%**	0.75 /Acre	**97.3%**
4	26	Hartford - Incorporated	204	24	**54.8%**	0.71 /Acre	89.0%
5	61	Bancroft - Incorporated	99	0	**52.7%**	**3.41 /Acre**	73.6%

Building in Floodplain Count
/
Total Primary Building Count in Incorporated Place

Building Exposure

Building Density

Top 5

#	STATE CATEGORY RANK	INCORPORATED PLACE	BUILDING EXPOSURE				
			BUILDING FLOODPLAIN COUNT	BUILDING FLOODWAY COUNT	BUILDING FLOODPLAIN RATIO	BUILDING DENSITY	CATEGORY SCORE
1	60	St. Albans - Incorporated	**1,043**	0	18.1%	**4.53 /Acre**	74.1%
2	167	Bolivar - Incorporated	4	0	0.0%	**4.00 /Acre**	27.1%
3	90	Shepherdstown - Incorporated	76	0	10.3%	**3.45 /Acre**	60.9%
4	61	Bancroft - Incorporated	99	0	**52.7%**	**3.41 /Acre**	73.6%
5	67	Salem - Incorporated	148	0	21.3%	**3.22 /Acre**	71.0%

Building in Floodplain Count
/
Floodplain Area in Incorporated Place (Acres)

Building Characteristics

Building Characteristics

Building Median Value

Top 5

Building Characteristics Comparison

Table 4. Building Characteristics: Below is a comparison of **6** flood factors under the Building Characteristics category for the selected **Incorporated Places**.

Median of appraised building values in 100-year floodplain

#	STATE CATEGORY RANK	INCORPORATED PLACE	BUILDING CHARACTERISTICS						
			BUILDING MEDIAN VALUE	BLDG. MOBILE HOMES RATIO	BLDG. SUBGRADE BASEMENTS RATIO	BUILDING 1-STORY RATIO	BLDG. YEAR PRE-FIRM RATIO	BLDG. YEAR MINUS RATED POST-FIRM RATIO	CATEGORY SCORE
1	116	Shepherdstown - Incorporated	**$213,800**	0.0%	45.5%	16.7%	92.4%	1.3%	49.5%
2	136	Harpers Ferry - Incorporated	**$188,000**	0.0%	**90.3%**	3.2%	**100.0%**	0.0%	40.7%
3	177	Winfield - Incorporated	**$179,350**	0.0%	7.1%	44.5%	43.4%	2.7%	22.8%
4	176	Hurricane - Incorporated	**$176,400**	14.7%	7.3%	46.3%	26.8%	0.0%	23.2%
5	114	Franklin - Incorporated	**$164,000**	0.0%	20.0%	86.7%	66.6%	**13.3%**	50.4%

Building Characteristics

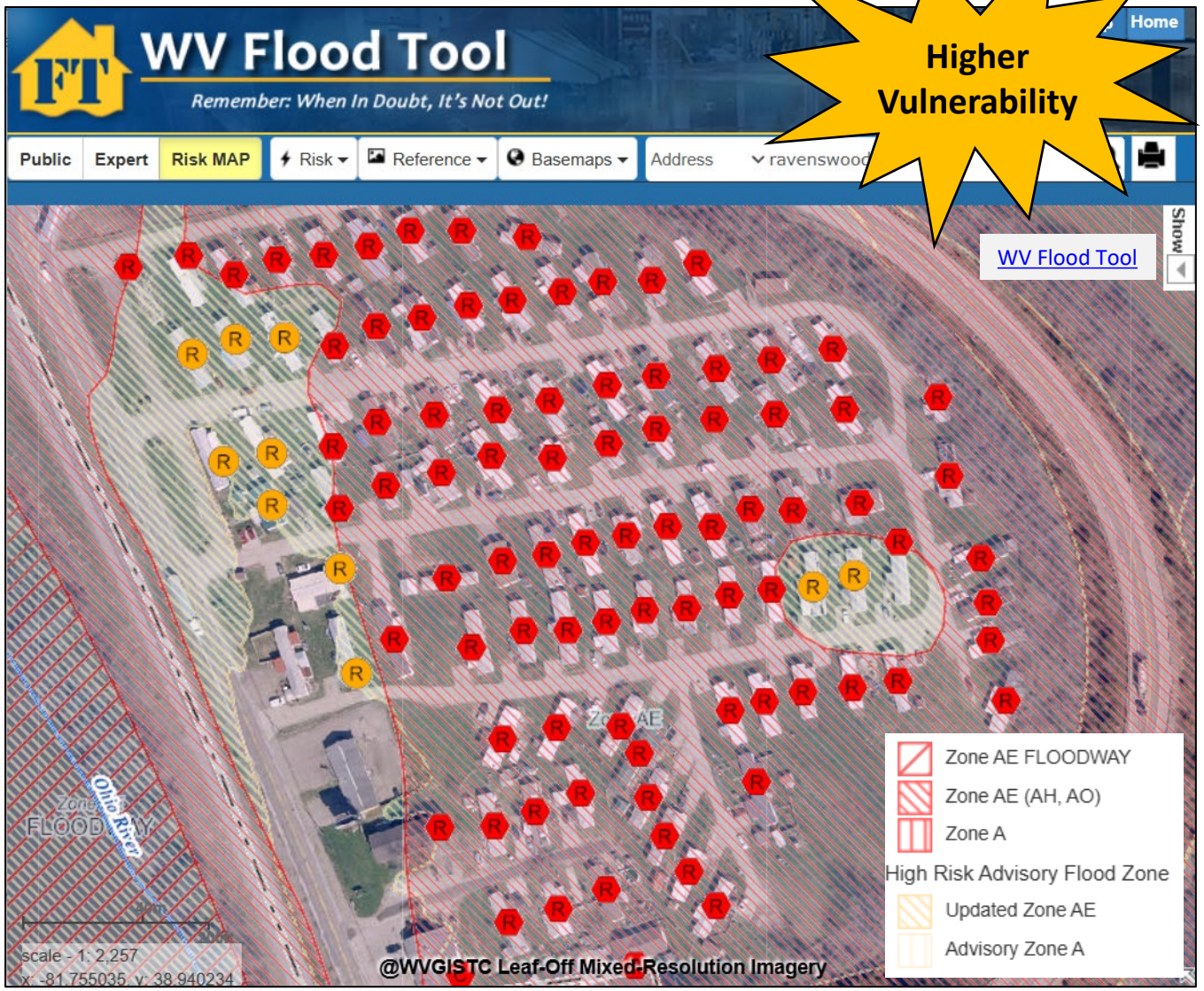
Mobile Homes Ratio

Top 5

Percentage of manufactured buildings among all single-family structures in 100-year floodplain

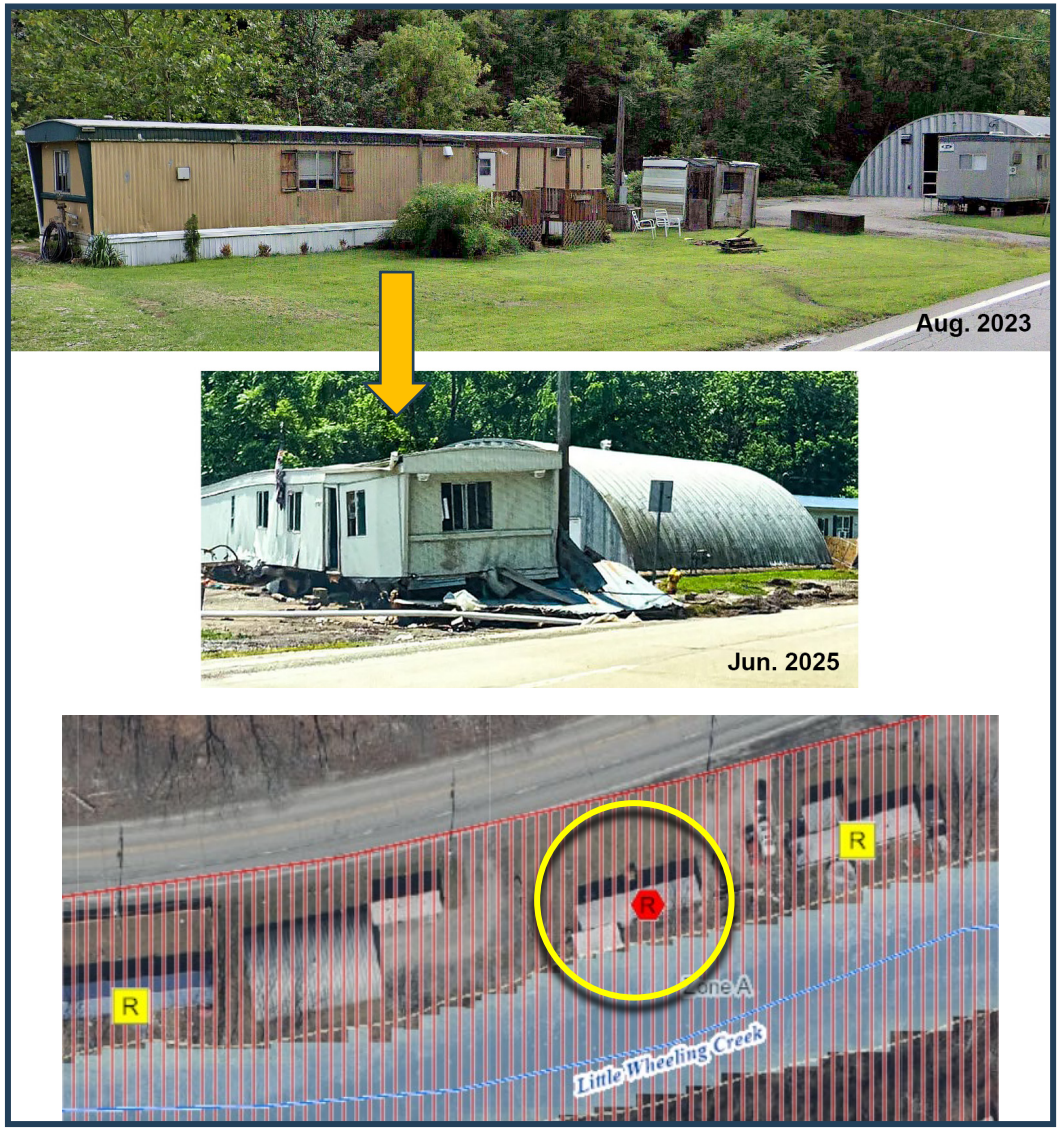
#	STATE CATEGORY RANK	INCORPORATED PLACE	BUILDING MEDIAN VALUE	BLDG. MOBILE HOMES RATIO	BLDG. SUBGRADE BASEMENTS RATIO	BUILDING 1-STORY RATIO	BLDG. YEAR PRE-FIRM RATIO	BLDG. YEAR MINUS RATED POST-FIRM RATIO	CATEGORY SCORE
1	54	Ripley - Incorporated	$29,000	**100.0%**	0.0%	**94.1%**	88.2%	6.3%	76.7%
2	91	Ravenswood - Incorporated	$29,000	**69.9%**	11.9%	82.8%	25.2%	**39.9%**	60.5%
3	55	Moundsville - Incorporated	$20,935	**60.9%**	21.0%	89.5%	68.4%	**12.1%**	76.3%
4	49	Albright - Incorporated	$28,670	**59.0%**	24.5%	85.7%	55.1%	**16.7%**	78.9%
5	77	Blacksville - Incorporated	$41,700	**58.3%**	20.0%	80.0%	**100.0%**	0.0%	66.6%

Mobile Home Park at Risk, Ravenswood



Destroyed Mobile Homes, June 2025

5550 National Rd, Triadelphia, WV
Ohio County
Building ID: 35-07-0TW7-0012-0000_5550



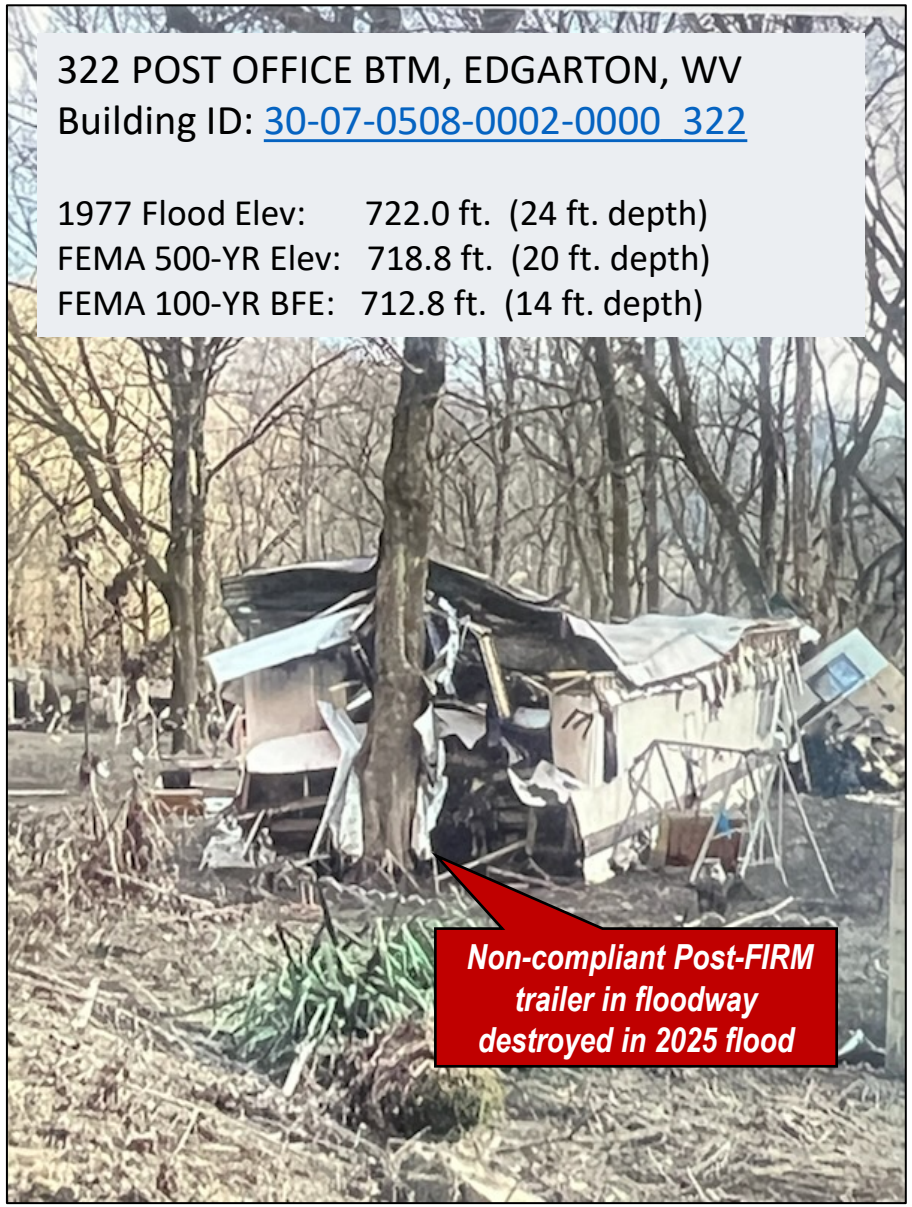
5736 National Rd, Triadelphia, WV
Ohio County
Building ID: 35-07-0TW7-0012-0000_5736

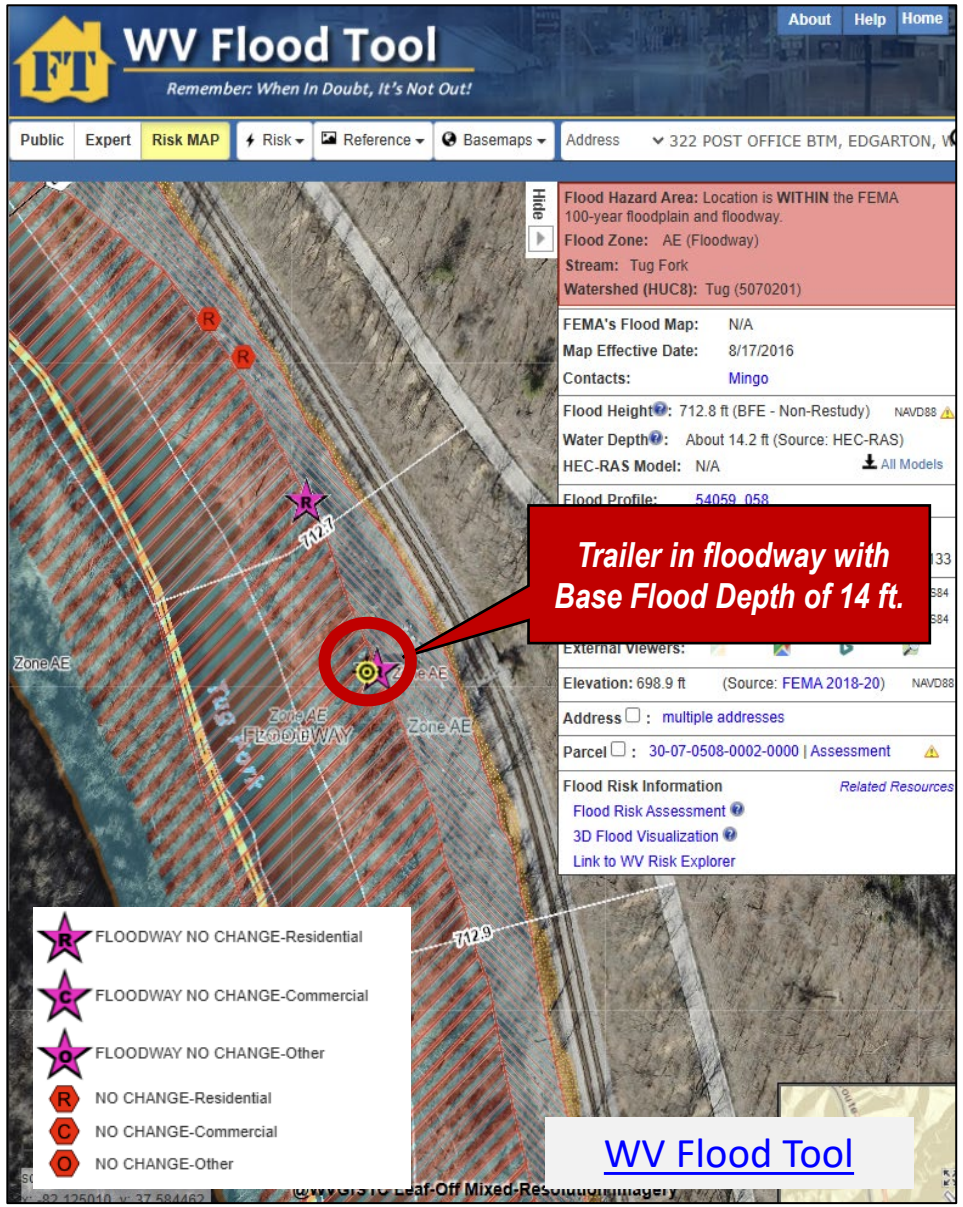
5048 National Rd, Triadelphia, WV
Triadelphia, WV
Not in Floodplain

Mobile Home in Floodway Destroyed (Edgarton, Mingo), Feb. 2025

322 POST OFFICE BTM, EDGARTON, WV
Building ID: 30-07-0508-0002-0000_322

1977 Flood Elev: 722.0 ft. (24 ft. depth)
FEMA 500-YR Elev: 718.8 ft. (20 ft. depth)
FEMA 100-YR BFE: 712.8 ft. (14 ft. depth)





Building Characteristics...

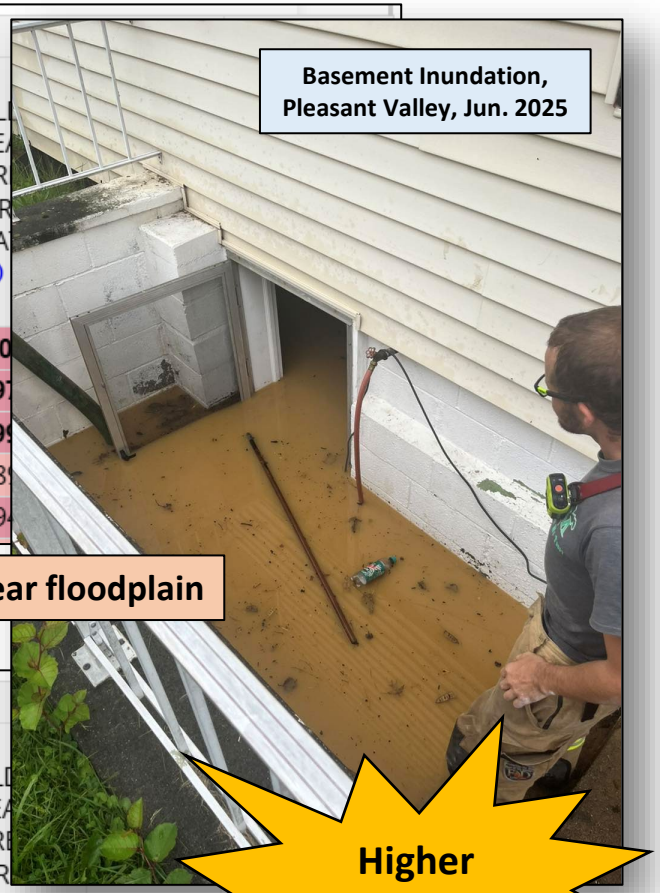
Building Characteristics

Buildings Subgrade Basements Ratio

Top 5

#	STATE CATEGORY RANK	INCORPORATED PLACE	BUILDING CHARACTERISTICS: BUILDING MEDIAN VALUE	BLDG. MOBILE HOMES RATIO	BLDG. SUBGRADE BASEMENTS RATIO	BUILDING 1-STORY RATIO	BL... YE... PR... FIR... RA...
1	136	Harpers Ferry - Incorporated	**$188,000**	0.0%	**90.3%**	3.2%	**10**
2	133	Mcmechen - Incorporated	$46,400	0.8%	**80.4%**	54.5%	**9**
3	71	Wheeling - Incorporated	$40,300	1.5%	**76.6%**	30.0%	**9**
4	84	Benwood - Incorporated	$37,800	0.8%	**74.7%**	24.7%	**8**
5	113	Wellsburg - Incorporated	$51,500	0.0%	**71.8%**	36.6%	**9**

Percentage of primary structures with subgrade basements in 100-year floodplain



Basement Inundation, Pleasant Valley, Jun. 2025

Building Characteristics

One-Story Buildings Ratio

Top 5

#	STATE CATEGORY RANK	INCORPORATED PLACE	BUILDING CHARACTERISTICS: BUILDING MEDIAN VALUE	BLDG. MOBILE HOMES RATIO	BLDG. SUBGRADE BASEMENTS RATIO	BUILDING 1-STORY RATIO	BL... YE... PR... FIR... RATIO	FIRM RATIO	
1	65	Sand Fork - Incorporated	$22,600	31.3%	14.3%	**100.0%**	81.0%	5.3%	71.9%
2	140	Lester - Incorporated	$24,435	**56.7%**	5.3%	**97.4%**	84.2%	0.0%	39.0%
3	17	Summersville - Incorporated	**$73,350**	13.6%	16.7%	**97.2%**	61.2%	8.6%	**92.9%**
4	141	Oak Hill - Incorporated	$27,000	4.1%	25.5%	**96.4%**	90.9%	0.0%	38.5%
5	41	Rupert - Incorporated	$41,190	18.4%	10.7%	**96.4%**	87.5%	3.6%	82.4%

Percentage of one-story structures in 100-year floodplain

Higher Vulnerability

Building Characteristics...

Building Characteristics

Bldg. Year Pre-FIRM Ratio

A pre-FIRM building is a (1) building constructed before December 31, 1974, or a (2) building constructed before the effective date of an initial Flood Insurance Rate Map (FIRM), or a (3) newly identified Post-FIRM structure mapped into an expanded Special Flood Hazard Area from a restudy.

Top 5

			BUILDING CHARACTERISTICS						
				BLDG. MOBILE HOMES RATIO	BLDG. SUBGRADE BASEMENTS RATIO	BUILDING 1-STORY RATIO	BLDG. YEAR PRE-FIRM RATIO	BLDG. YEAR MINUS RATED POST-FIRM RATIO	CATEGORY SCORE
1	136	Harpers Ferry - Incorporated	**$188,000**	0.0%	**90.3%**	3.2%	**100.0%**	0.0%	40.7%
2	77	Blacksville - Incorporated	$41,700	**58.3%**	20.0%	80.0%	**100.0%**	0.0%	66.6%
3	139	Grant - Incorporated	$24,400	9.4%	13.9%	91.7%	**100.0%**	0.0%	39.4%
4	117	Mill Creek - Incorporated	$27,330	**57.5%**	9.8%	87.8%	**100.0%**	0.0%	49.1%
5	71	Wheeling - Incorporated	$40,300	1.5%	**76.6%**	30.0%	**99.5%**	2.3%	69.2%

Percentage of Pre-FIRM buildings in 100-year floodplain

Building Characteristics

Bldg. Year Minus Rated Post-FIRM Ratio

Percentage of buildings in floodplain constructed or substantially improved after December 31, 1974, or after the effective date of an initial Flood Insurance Rate Map (FIRM), in which the first floor is more than one foot below the base flood elevation (BFE)

Top 5

			BUILDING CHARACTERISTICS						
				BLDG. MOBILE HOMES RATIO	BLDG. SUBGRADE BASEMENTS RATIO	BUILDING 1-STORY RATIO	BLDG. YEAR PRE-FIRM RATIO	BLDG. YEAR MINUS RATED POST-FIRM RATIO	CATEGORY SCORE
1	91	Ravenswood - Incorporated	$29,000	**69.9%**	11.9%	82.8%	25.2%	**39.9%**	60.5%
2	12	Point Pleasant - Incorporated	$31,700	29.6%	45.6%	87.3%	65.9%	**32.9%**	**95.1%**
3	129	Hendricks - Incorporated	$69,700	0.0%	**52.9%**	41.2%	58.8%	**31.3%**	43.8%
4	69	Williamstown - Incorporated	$43,950	30.2%	25.0%	67.0%	64.0%	**29.2%**	69.7%
5	28	Hartford - Incorporated	$29,900	36.9%	21.2%	**91.8%**	54.3%	**24.0%**	88.1%

Critical Infrastructure: Essential Facilities

Police Station


Fire Station


E-911 Dispatch


School


Hospital


Nursing Home

- **Essential Facilities provide emergency services during a flood.**
- **Hospitals and nursing homes with immobile patients are particularly susceptible to flooding. Schools often serve as refuges during floods.**
- **Communities need to establish emergency protocols to maintain critical services amidst a flood.**

Critical Infrastructure

Essential Facilities

Top 5

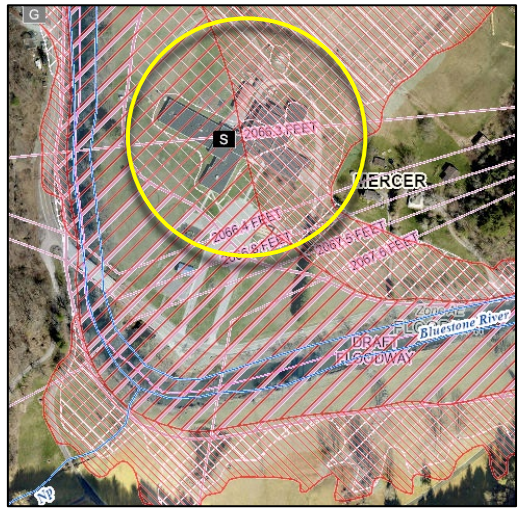
Critical Infrastructure Comparison

Table 5. Critical Infrastructure: Below is a comparison of **2** flood factors under the Critical Infrastructure category for the selected **Incorporated Places**.

#	*STATE CATEGORY RANK*	INCORPORATED PLACE	CRITICAL INFRASTRUCTURE		*CATEGORY SCORE*
			ESSENTIAL FACILITIES	ROADS INUNDATED RATIO	
1	62	Charleston - Incorporated	**20**	5.6%	73.2%
2	54	Huntington - Incorporated	**16**	6.9%	76.7%
3	7	Wheeling - Incorporated	**8**	19.6%	**97.3%**
4	71	South Charleston - Incorporated	**8**	4.4%	69.2%
5	1	Wellsburg - Incorporated	**7**	**42.7%**	**100.0%**

Number of essential facilities in the in the high, moderate, and reduced risk flood zones.

Flooded Essential Facilities



Spanishburg Elementary School
Mercer County
Inundated, Feb. 2025
Building ID: 28-11-0026-0075-0000_8544

Nursing Home in Richwood
Inundated, June 2016

Fire station in Marlinton
Inundated, Nov. 1985

Saint Francis Hospital, Charleston

Critical Infrastructure: Road Inundation

Critical Infrastructure

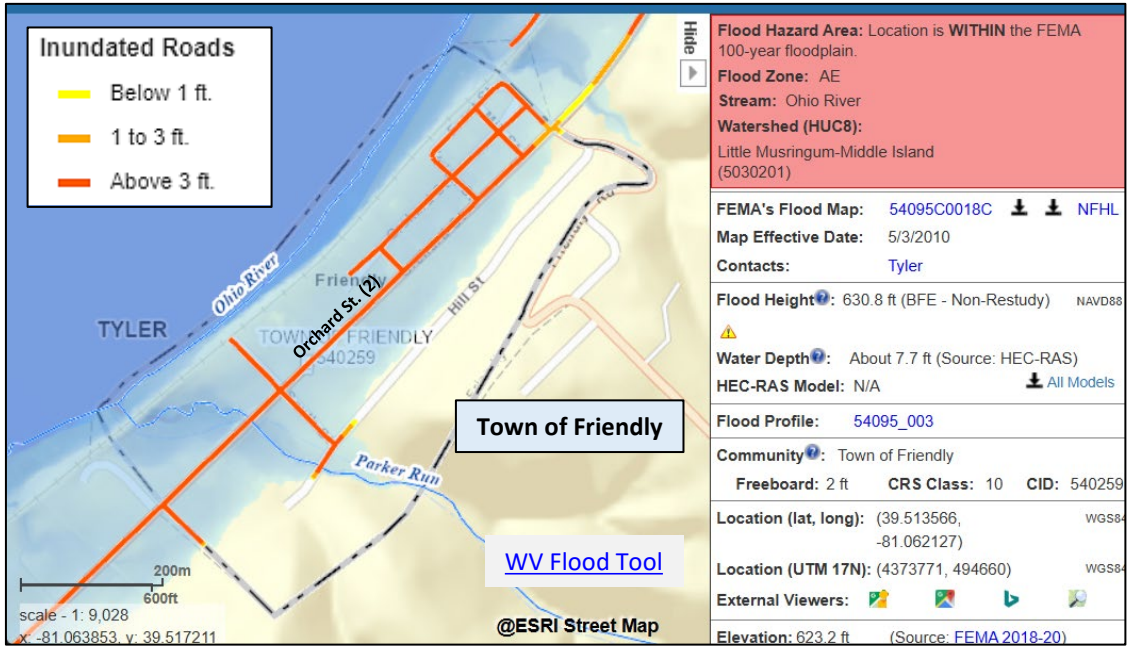
Roads Inundated ratio

Top 5

#	STATE CATEGORY RANK	INCORPORATED PLACE	CRITICAL INFRASTRUCTURE		CATEGORY SCORE
			ESSENTIAL FACILITIES	ROADS INUNDATED RATIO	
1	102	Friendly - Incorporated	0	**66.7%**	55.7%
2	41	Hartford - Incorporated	1	**60.1%**	82.4%
3	104	Worthington - Incorporated	0	**52.3%**	54.8%
4	13	Clendenin - Incorporated	2	**51.8%**	**94.7%**
5	43	Sylvester - Incorporated	1	**50.0%**	81.5%

Percentage of roads inundated by flood waters of 1 foot or more by a major 1% annual chance (100-yr) flood event

~1 Foot	~3 Feet	~6 Feet	~9 Feet
Response focused on those who need additional assistance	Near the limit to use High Profile Vehicles to perform high water rescues	Boats and helicopters now required to perform high water rescues	1st Floors completely inundated




Welch, McDowell County, Feb. 2025


Fairmont, Marion County, Jul. 2025


Williamson, Mingo County, Feb. 2025


Pleasant Valley, Marion County, Jul. 2025

Community Assets: Historical & Non-Historical


Religious Organization


Educational Building


Emergency Medical Services


Government Building


Utility


National Register Historical Structure


In Historic District Older than 1930


Other Assets

Non-Historical buildings such as churches often serve as emergency shelters during floods. Flooding can disrupt critical community lifelines including safety, water, shelter, health, and energy.
Historical assets often have significant cultural value. Besides, It may affect insurance premiums for these assets and eligibility for government funding for flood mitigation.

Community Assets

Historical & Non-Historical

Top 5

Community Assets Comparison

Table 6. Community Assets: Below is a comparison of **2** flood factors under the Community Assets category for the selected **Incorporated Places**.

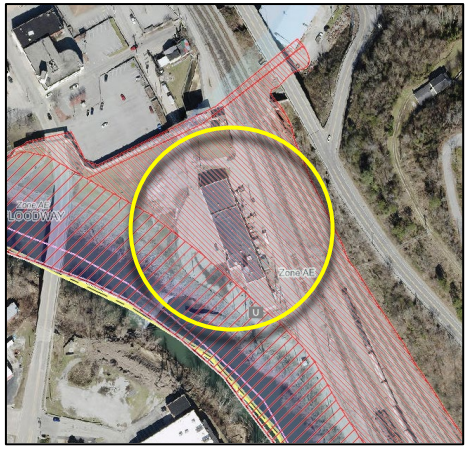
#	STATE CATEGORY RANK	INCORPORATED PLACE	COMMUNITY ASSETS		CATEGORY SCORE
			COMMUNITY ASSETS HISTORICAL	COMMUNITY ASSETS NON-HISTORICAL	
1	1	Wheeling - Incorporated	1,259	24	100.0%
2	2	Charleston - Incorporated	154	55	99.5%
3	3	Wellsburg - Incorporated	507	15	99.1%
4	4	Clendenin - Incorporated	54	15	98.6%
5	5	New Martinsville - Incorporated	38	18	98.2%

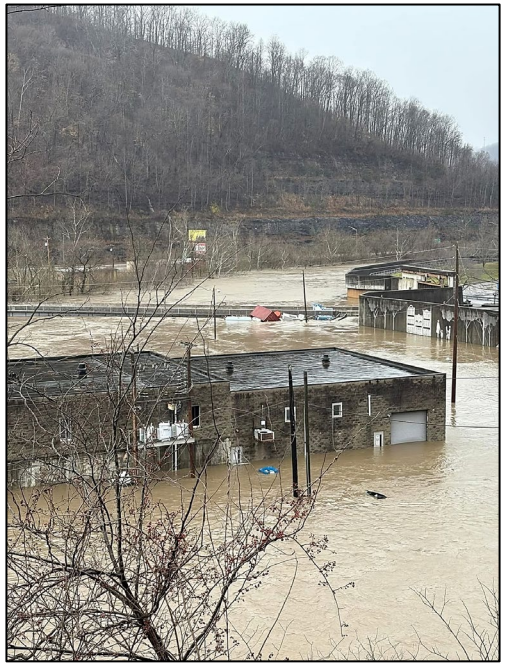
Number of historical community assets in 100-year floodplain listed on the National Register of Historic Places, the official list of the Nation's historic places worthy of and includes buildings identified within National preservation, Register Areas constructed before 1930.

Number of non-historical community assets in 100-year floodplain including utilities, post-secondary educational facilities, emergency medical services (EMS), government buildings providing public services, and facilities hosting religious services

Flooded Community Assets

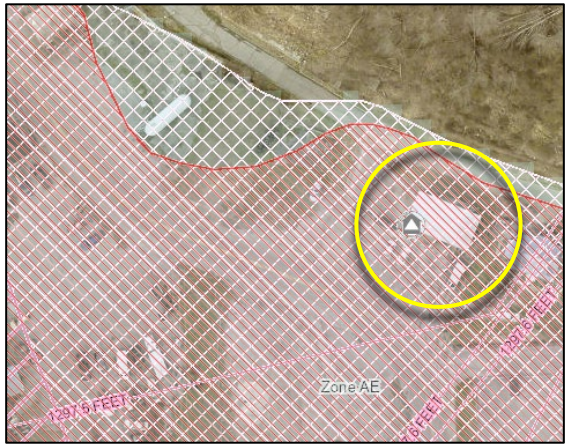
Valley Grove Assembly of God
Valley Grove, Ohio County
Inundated, Jun. 2025
Building ID: 35-08-0VG9-0083-0000_8580



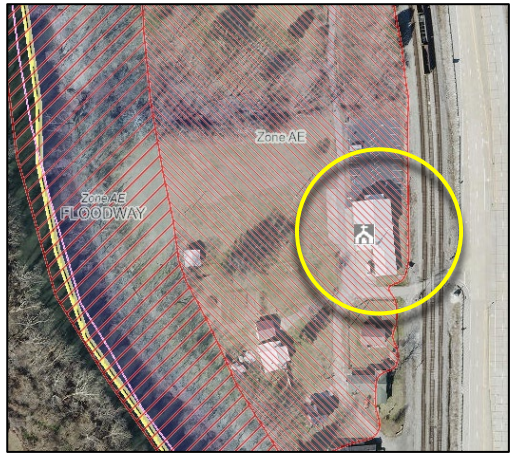


Williamson Water Plant (Veolia Water)
Williamson, Mingo County
Inundated, Feb. 2025
Building ID: 30-11-0007-0233-0000_317

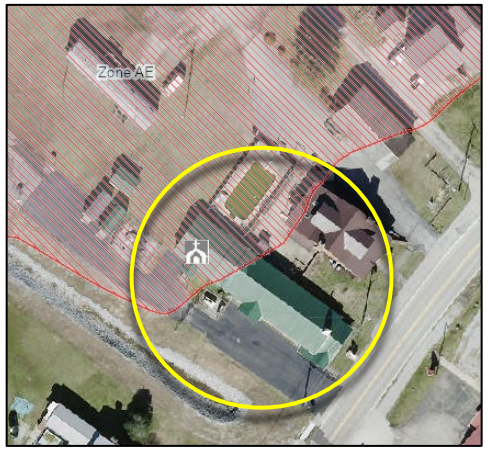
Jan-Care of Guardian Angel (EMS)
Welch, McDowell County
Inundated, Feb. 2025
Building ID: 27-15-0002-0247-0000_58



Flooded Community Assets…

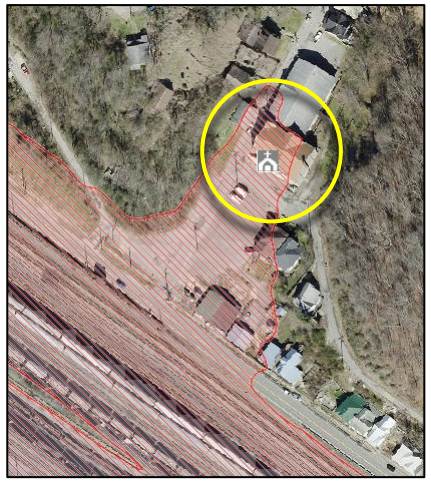


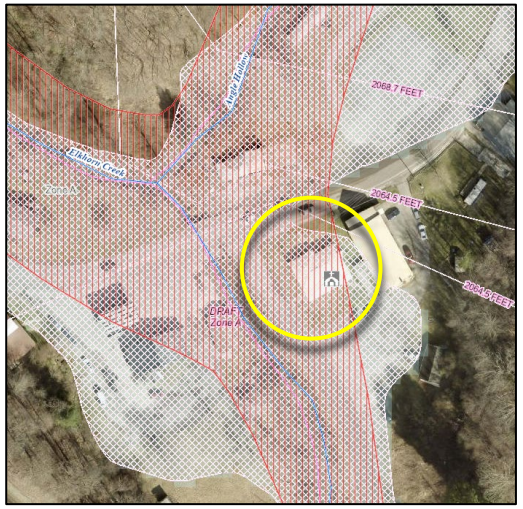
Borderland Baptist Church
Mingo County
Inundated, Feb. 2025
Building ID: 30-10-362K-0010-0000_46



Cornerstone Church
Matewan, Mingo County
Inundated, Feb. 2025
Building ID: 30-08-0009-0071-0000_1028

East Williamson Baptist Church
Williamson, Mingo County
Inundated, Feb. 2025
Building ID: 30-11-0010-0098-0000_9999





Church Of God Ennis & Maybeury
McDowell County
6 inches of water in basement, Feb. 2025
Building ID: 27-06-0011-0019-0000_40150

Building Damage Loss: Estimates

Building Damage Loss

Substantial Damage Count

Top 5

Building Damage Loss Comparison

Table 7. Building Damage Loss: Below is a comparison of **4** flood factors under the Building Damage Loss category for the selected **Incorporated Places**.

#	*STATE CATEGORY RANK*	INCORPORATED PLACE	BUILDING DAMAGE LOSS				*CATEGORY SCORE*
			BLDG. SUBSTANTIAL DAMAGE COUNT	BLDG. SUBSTANTIAL DAMAGE RATIO	BLDG. PREVIOUS DAMAGE CLAIMS	BLDG. REPETITIVE LOSS STRUCTURES	
1	3	Wheeling - Incorporated	**125**	4.7%	**2,873**	**1,574**	**99.1%**
2	5	Moundsville - Incorporated	**87**	**27.1%**	86	31	**98.2%**
3	2	New Martinsville - Incorporated	**82**	10.8%	**276**	**97**	**99.5%**
4	4	Madison - Incorporated	**65**	**24.9%**	87	36	**98.6%**
5	9	Clendenin - Incorporated	**46**	15.2%	122	24	**96.4%**

Estimated number of primary structures substantially damaged (to ≥ 50% of the appraised value) from a major 1% annual chance (100-yr) flood

White Sulphur Springs, Greenbrier County, Jun. 2016

Building Damage Loss: Previous Claims

Building Damage Loss

Previous Damage Claims

Top 5

#	STATE CATEGORY RANK	INCORPORATED PLACE	BUILDING DAMAGE LOSS				CATEGORY SCORE
			BLDG. SUBSTANTIAL DAMAGE COUNT	BLDG. SUBSTANTIAL DAMAGE RATIO	BLDG. PREVIOUS DAMAGE CLAIMS	BLDG. REPETITIVE LOSS STRUCTURES	
1	3	Wheeling - Incorporated	125	4.7%	2,873	1,574	99.1%
2	8	Marlinton - Incorporated	16	4.3%	585	252	96.9%
3	28	Williamson - Incorporated	1	4.5%	532	44	88.1%
4	1	Clarksburg - Incorporated	38	9.6%	374	155	100.0%
5	19	Wellsburg - Incorporated	8	1.1%	373	136	92.1%

Number of previous flood-related insurance claims for a geographic unit since 1978

Building Damage Loss

Repetitive Loss Structures

Top 5

#	STATE CATEGORY RANK	INCORPORATED PLACE	BUILDING DAMAGE LOSS				CATEGORY SCORE
			BLDG. SUBSTANTIAL DAMAGE COUNT	BLDG. SUBSTANTIAL DAMAGE RATIO	BLDG. PREVIOUS DAMAGE CLAIMS	BLDG. REPETITIVE LOSS STRUCTURES	
1	3	Wheeling - Incorporated	125	4.7%	2,873	1,574	99.1%
2	8	Marlinton - Incorporated	16	4.3%	585	252	96.9%
3	1	Clarksburg - Incorporated	38	9.6%	374	155	100.0%
4	19	Wellsburg - Incorporated	8	1.1%	373	136	92.1%
5	17	Glenville - Incorporated	5	4.0%	280	132	92.9%

Number of NFIP-insured structures that have had at least 2 paid flood losses of more than $1,000 each in any 10-year period since 1978

People / Social Vulnerabilities

People / Social Vulnerabilities

WV Social Vulnerability Index

Top 5

People / Social Vulnerabilities Comparison

Table 8. People / Social Vulnerabilities: Below is a comparison of **3** flood factors under the People / Social Vulnerabilities category for the selected **Incorporated Places**.

#	*STATE CATEGORY RANK*	INCORPORATED PLACE	PEOPLE / SOCIAL VULNERABILITIES			
			POPULATION IN FLOODPLAIN RATIO	POPULATION DISPLACED RATIO	WV SOCIAL VULNERABILITY INDEX	*CATEGORY SCORE*
1	2	Anawalt - Incorporated	**75.9%**	**64.6%**	**100.0%**	**99.5%**
2	12	War - Incorporated	49.0%	28.6%	**99.6%**	**95.1%**
3	5	Smithfield - Incorporated	53.0%	**47.0%**	**99.1%**	**98.2%**
4	11	Auburn - Incorporated	51.6%	35.5%	**98.7%**	**95.6%**
5	59	Lester - Incorporated	10.5%	6.9%	**98.2%**	74.5%

Social vulnerability index developed for West Virginia based on eight socioeconomic and demographic indicators

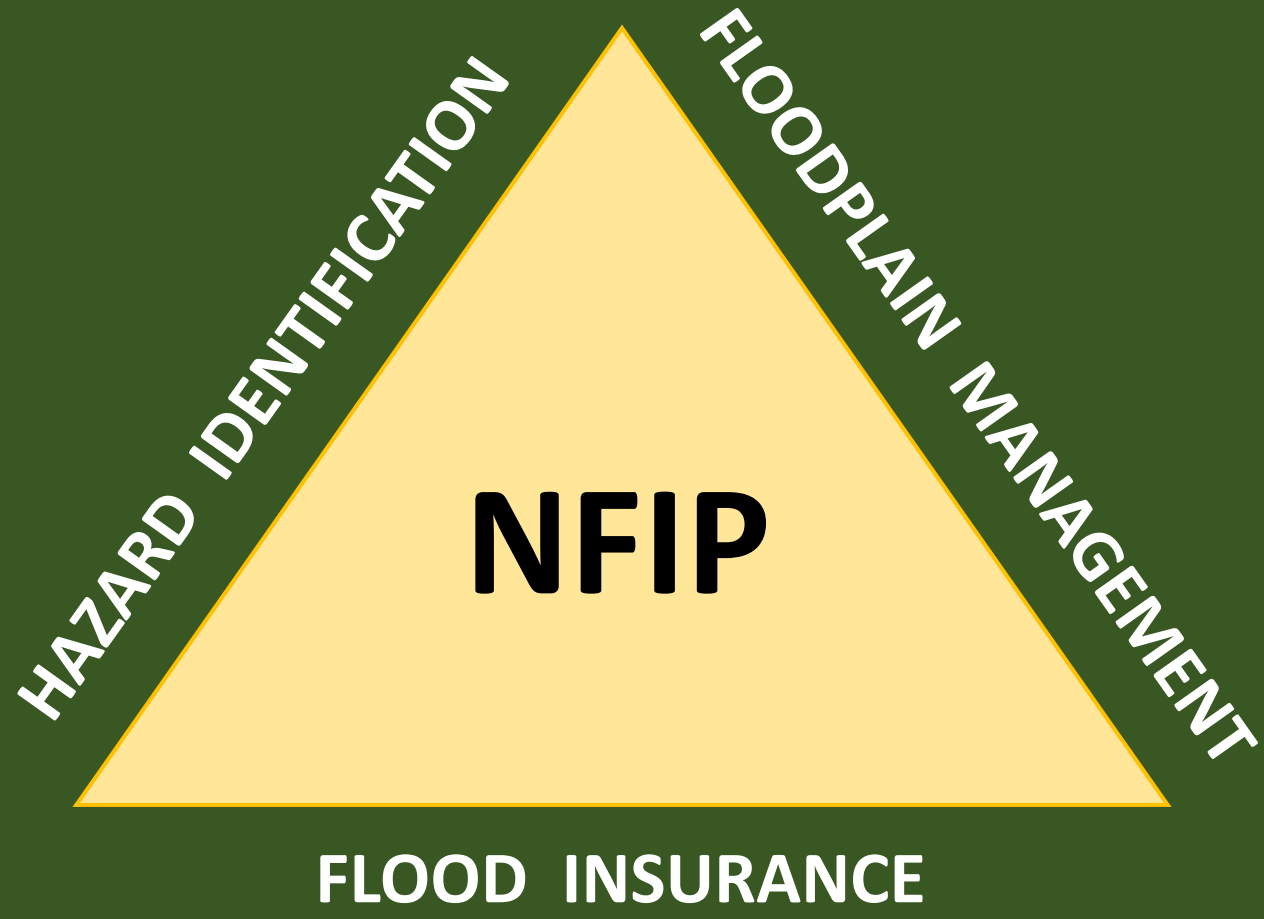
Nov. 1985

Social Vulnerability Index (WV SVI) (0% to 100%)

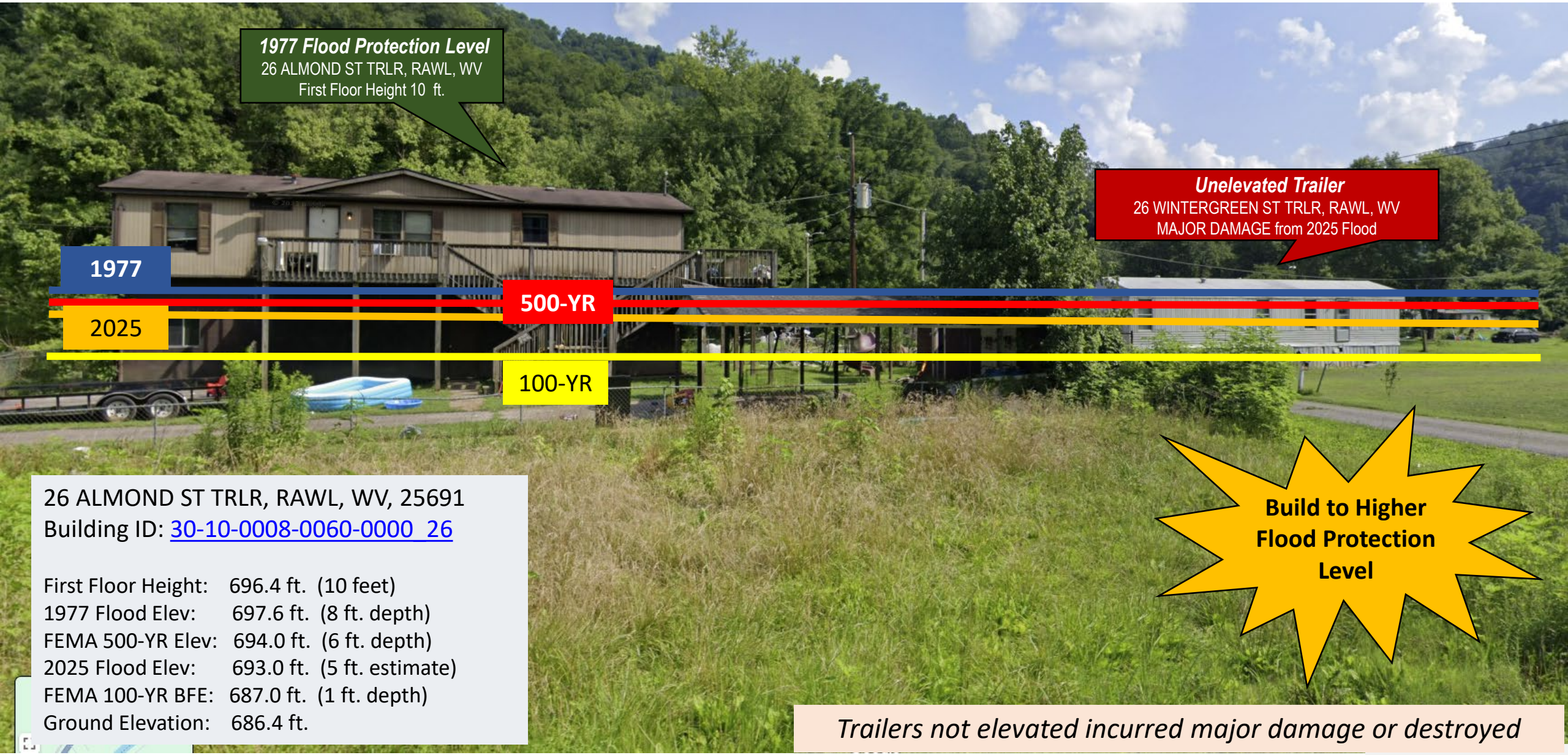
Indicators:

- **Poverty Rate**
- **Unemployment Rate**
- **Vulnerable Ages Rate**
- **Disability Rate**
- **Population without a High School Diploma**
- **Population Change**
- **Median Housing Unit Value**
- **Percentage of Mobile Homes in Housing Units**

Flood Mitigation



Mingo County – Trailers at Rawl, WV



26 ALMOND ST TRLR, RAWL, WV, 25691
Building ID: 30-10-0008-0060-0000 26

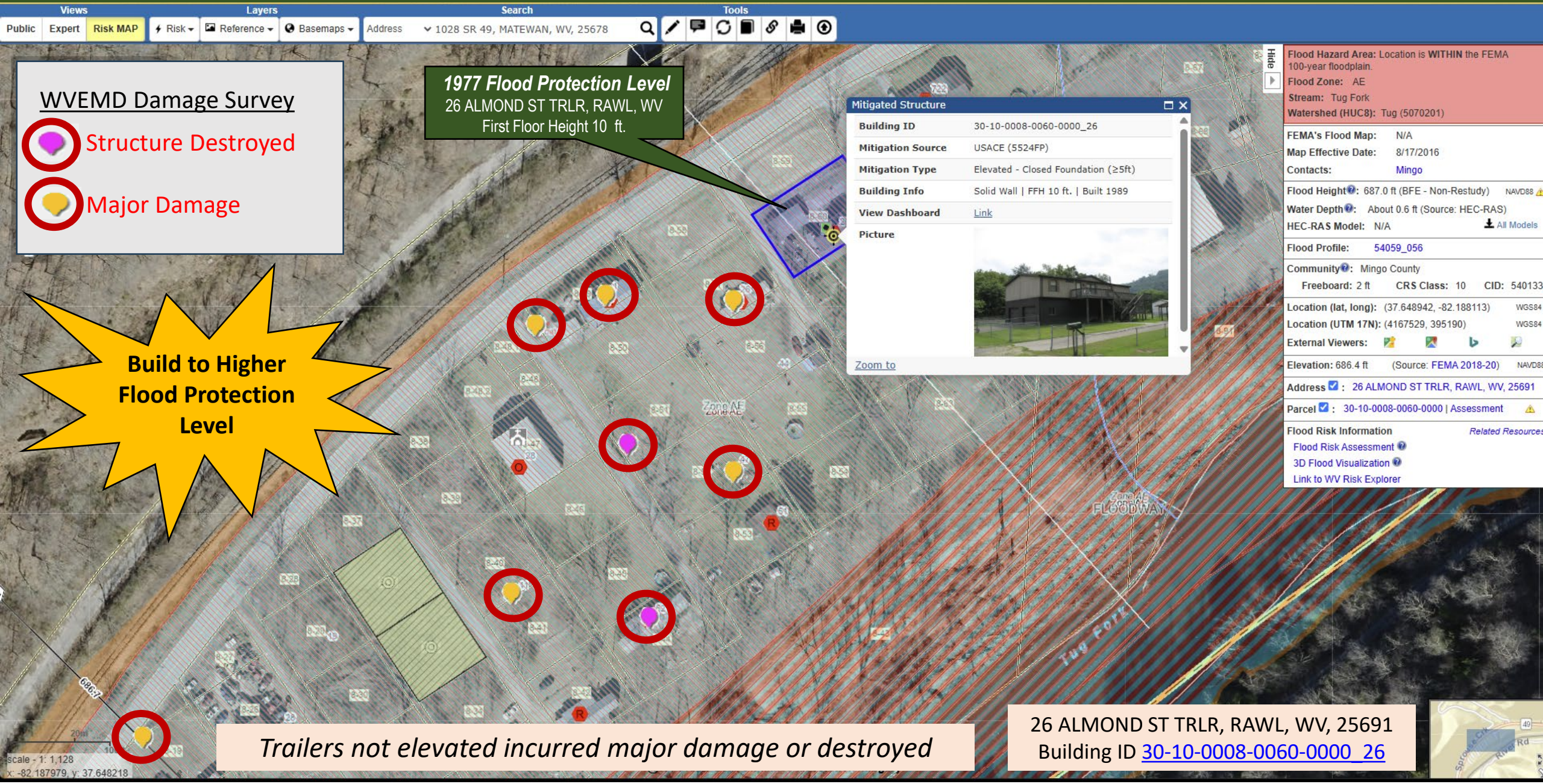
First Floor Height: 696.4 ft. (10 feet)
1977 Flood Elev: 697.6 ft. (8 ft. depth)
FEMA 500-YR Elev: 694.0 ft. (6 ft. depth)
2025 Flood Elev: 693.0 ft. (5 ft. estimate)
FEMA 100-YR BFE: 687.0 ft. (1 ft. depth)
Ground Elevation: 686.4 ft.

Trailers not elevated incurred major damage or destroyed

WV Flood Tool

Mingo County – Trailers at Rawl, WV

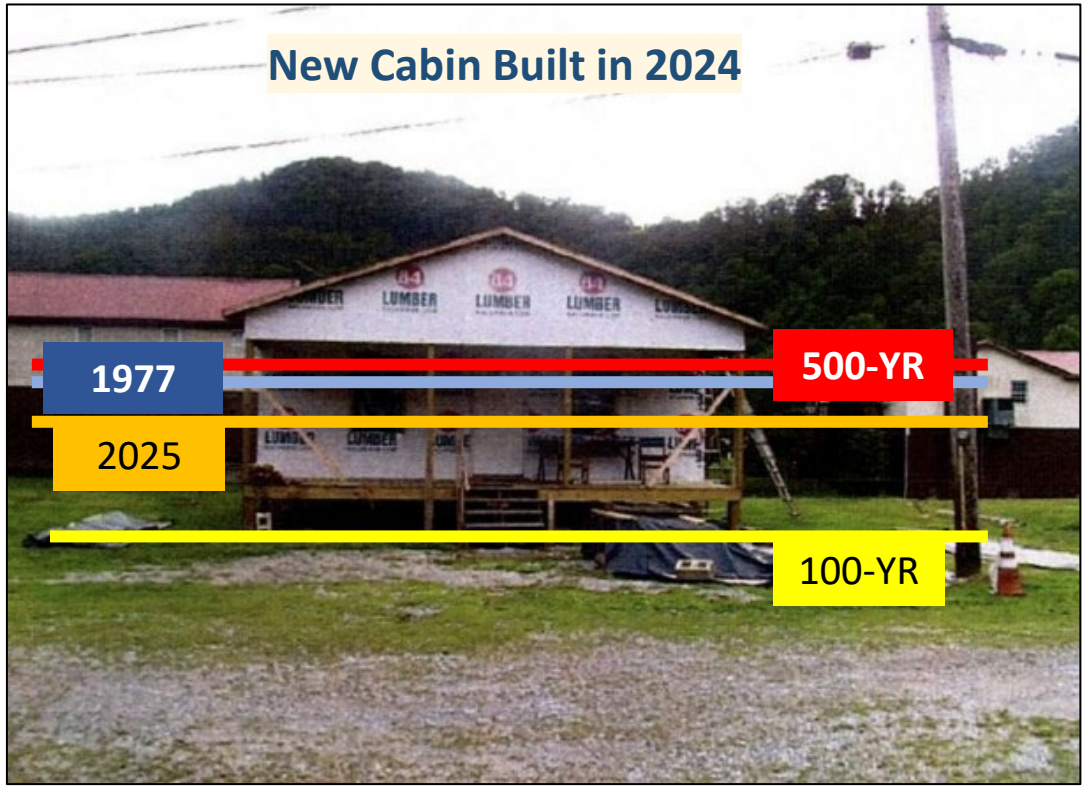
WV Flood Tool



Trailers not elevated incurred major damage or destroyed

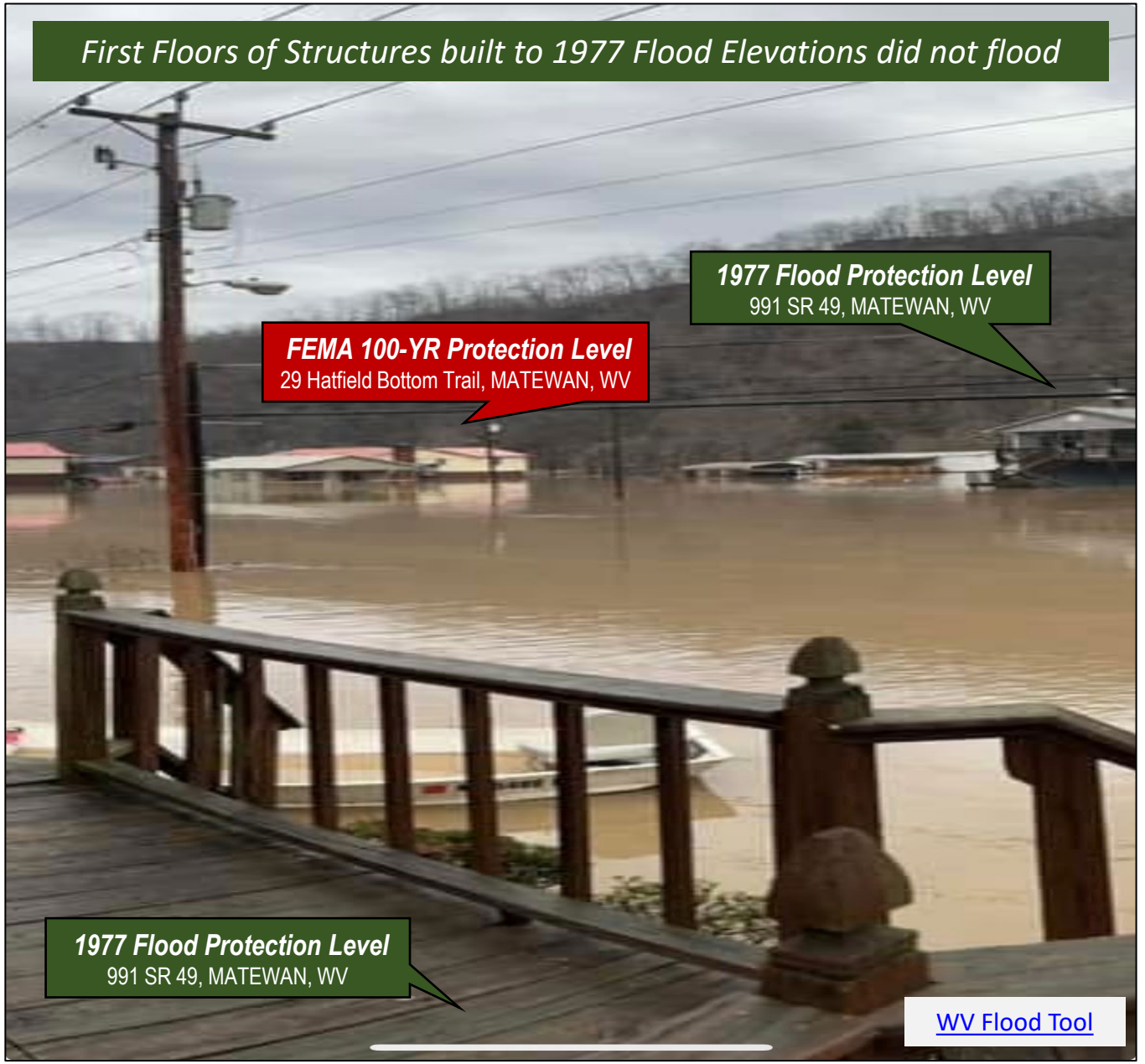
26 ALMOND ST TRLR, RAWL, WV, 25691
Building ID 30-10-0008-0060-0000_26

Mingo County – New 2024 Cabin (Matewan, WV)



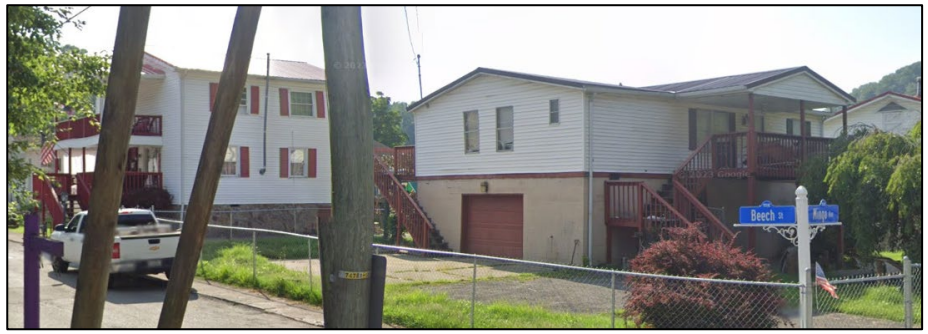
29 Hatfield Bottom Trail (Built in July 2024)
Building ID: 30-08-0008-0016-0000_29

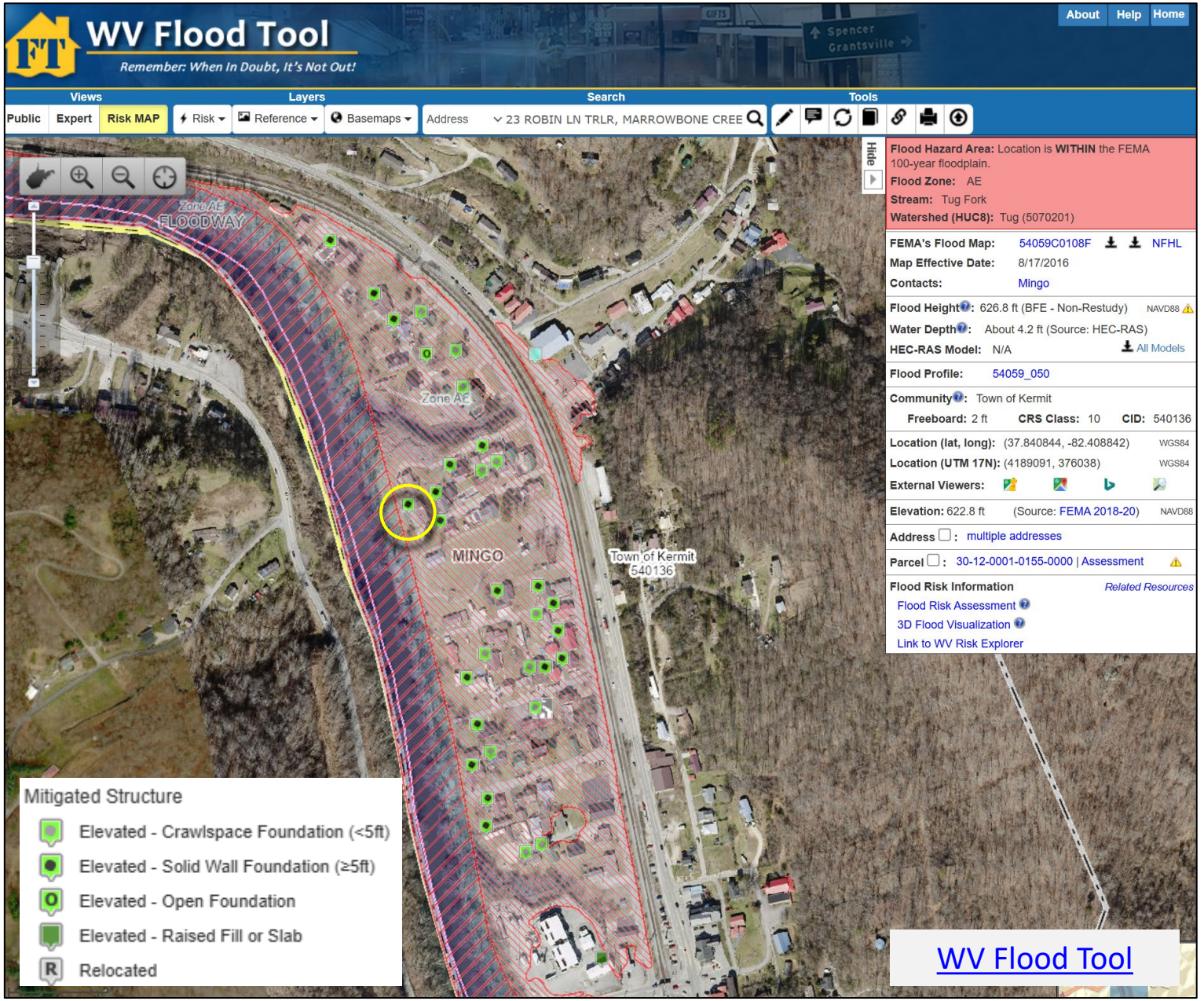
FEMA 500-YR Elev: 699.0 ft. (6.6 ft. depth)
1977 Flood Elev: 698.3 ft. (5.9 ft. depth)
2025 Flood Elev: 697.7 ft. (5.4 ft.; 2 feet reported in cabin)
First Floor Height: 695.7 ft. (3.4 feet above ground)
FEMA 100-YR BFE: 693.0 ft. (0.8 ft. depth)
LAG from EC: 692.4 ft. (Finished Grade)



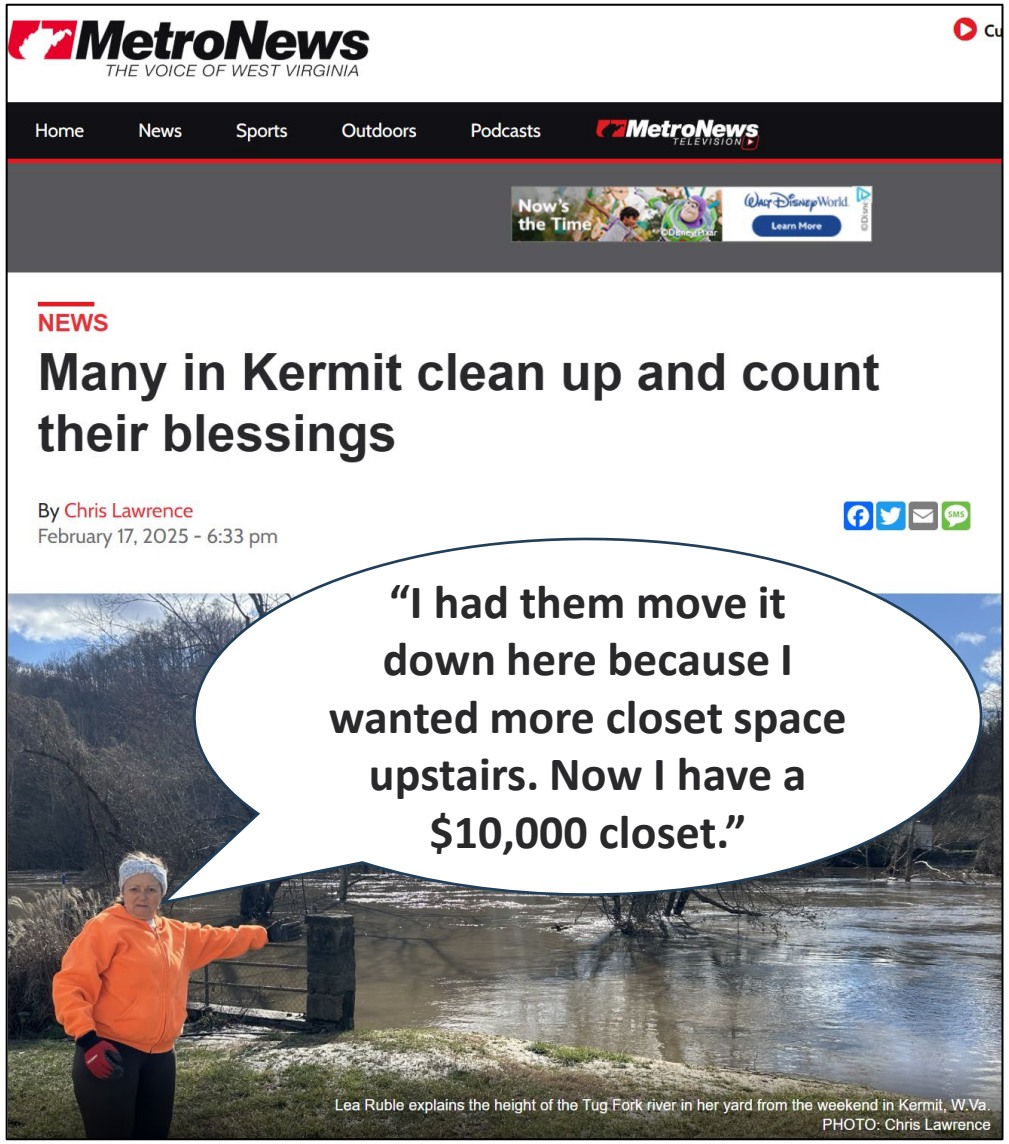
Mitigated Structures in Kermit, Mingo County

The town of Kermit has one of the highest percentages in the state of mitigated structures in high-risk flood areas





Kermit, Mingo County



No living spaces below the mitigation level

No utility equipment below the mitigation level

85 BLANKENSHIP ST, KERMIT, WV
Building ID: 30-12-0001-0261-0000_85

Verify Building Risk Assessments

Verify Primary Structures for High Depths

Verify Lowest Floor Elevations

Verify Foundation & Basement Types

Use **Building-Level (BL) Tools & Tables** to identify **Most Vulnerable Structures**

- Statewide Building-Level Tool for Primary Structures
- Statewide Building-Level Tool for Significant Structures
- Statewide BLRA (Table & GIS)
- BLRA County Tables organized by region
- BLRA Data Extract Tables: High Building Value, High Damage Loss, **High Minus Ratings**
- BLRA Statewide Top Lists: Building Value, Flood Depth, Damage Loss $, Damage Loss %, Minus Rated, Mitigated Structures
- Risk Reports: Exposure and Damage Loss Reports of Risk Indicators at Aggregated Geographic Levels

Verify Mitigation Status of Post-FIRM Structures

Publish Elevation Certificates to WV Flood Tool

Plan for Inundated Road Impacts

Why Water Depth Matters

~1 Foot

Response focused on those who need additional assistance

~3 Feet

Near the limit to use High Profile Vehicles to perform high water rescues

~6 Feet

Boats and helicopters now required to perform high water rescues

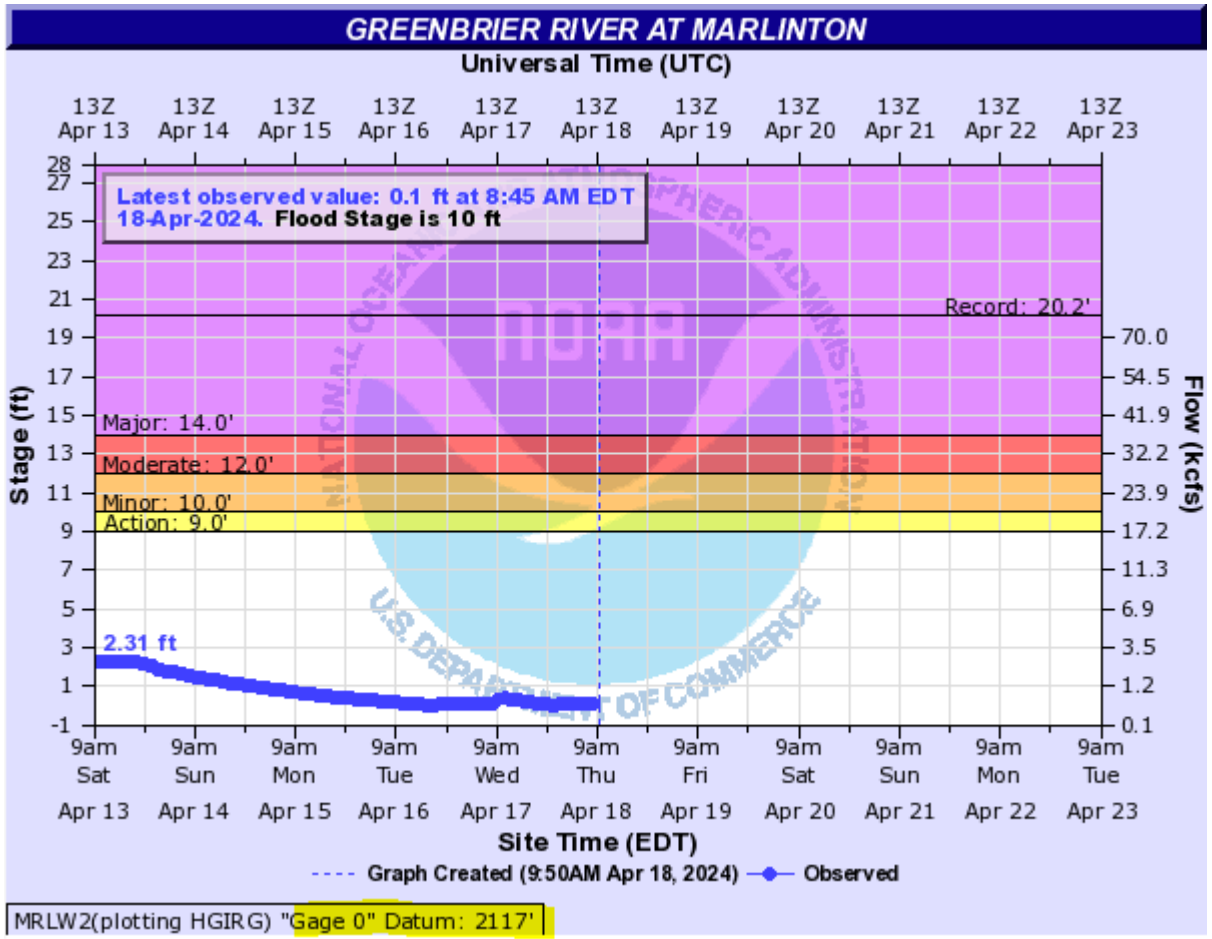
~9 Feet

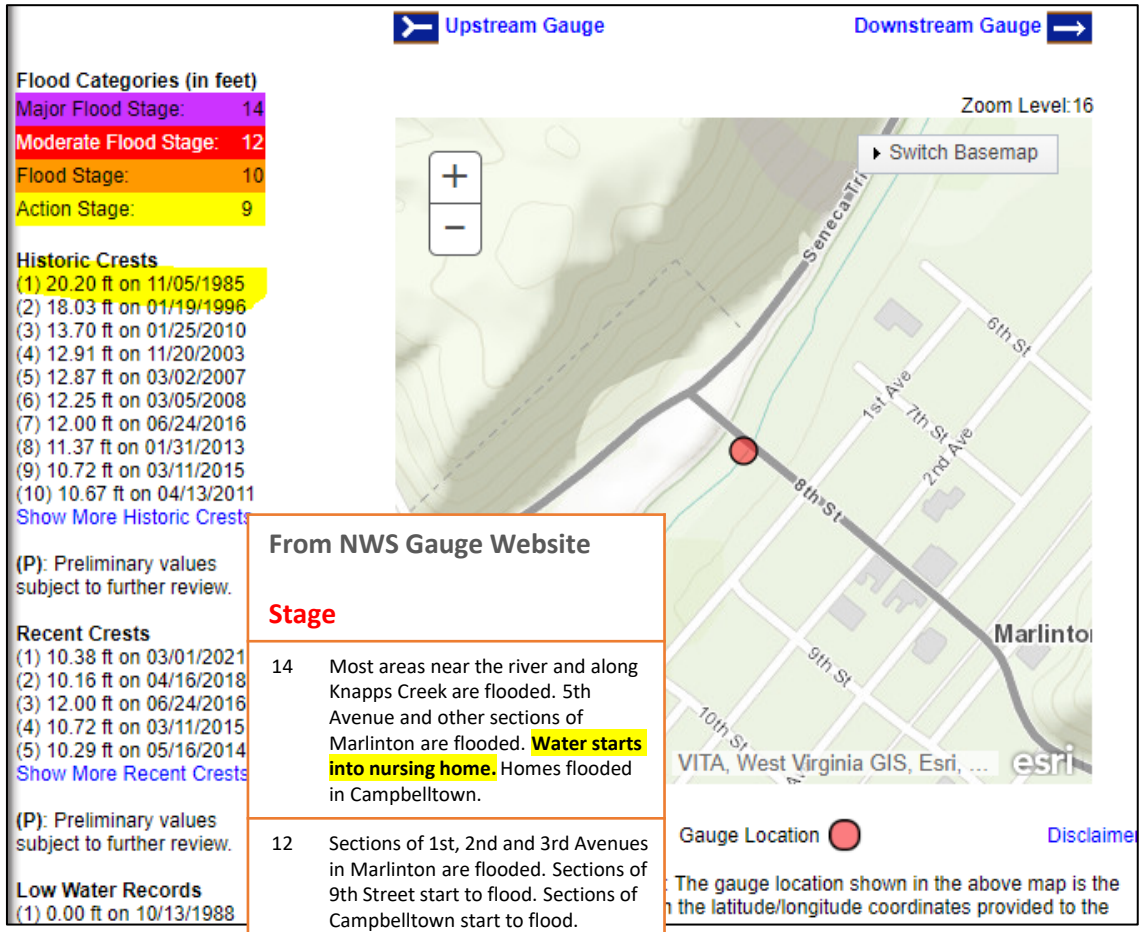
1st Floors completely inundated

"How many helicopters, boats, and high profile vehicles and where to send them"
– Texas State Operations Center

National Weather Service's West Gulf River Forecast Center in Fort Worth Texas

Plan with Stream Gauges and Flood Tool





From NWS Gauge Website

Stage	
14	Most areas near the river and along Knapps Creek are flooded. 5th Avenue and other sections of Marlinton are flooded. **Water starts into nursing home.** Homes flooded in Campbelltown.
12	Sections of 1st, 2nd and 3rd Avenues in Marlinton are flooded. Sections of 9th Street start to flood. Sections of Campbelltown start to flood.
10	Low areas along the river are flooded. 1st & 2nd Avenues start to flood.

https://water.weather.gov/ahps2/hydrograph.php?wfo=rlx&gage=mrlw2

Plan with Stream Gauges and Flood Tool

[WV Flood Tool](#) (use 1-ft. ground elevation contours or displayed elevation value in query results panel)

Property-Level Mitigation by Owners

Purchase flood Insurance;
Elevate buildings;
Provide flood openings;
Seal foundations;
Elevate and anchor utilities;
Protect valuable possessions

https://www.floodsmart.gov
"What to do before a flood"

Thank you!

Questions?

Framework website: www.wvfrf.org
WV Risk Explorer web tools: www.wvfrf.org/wvre
Email:
kurt.donaldson@mail.wvu.edu
behrang.bidadian@mail.wvu.edu