



WV Flood Resiliency Framework Toolkit

Wheeling Island



Mt. Zion Cemetery (Ohio County)



Hazard identification using WV Flood Tool

Recent Flood Event (Wheeling Island)

40 VIRGINIA ST,
Wheeling, WV



40 Virginia St, Wheeling

Stream Gauge

Wheeling Island Hotel
Casino Racetrack, WV

I-70

0:00 / 1:03

CC

Drone video of Ohio River flooding in West Virginia

[Drone Link](#)

2024 Flood Crest 41.5 feet (April 5)

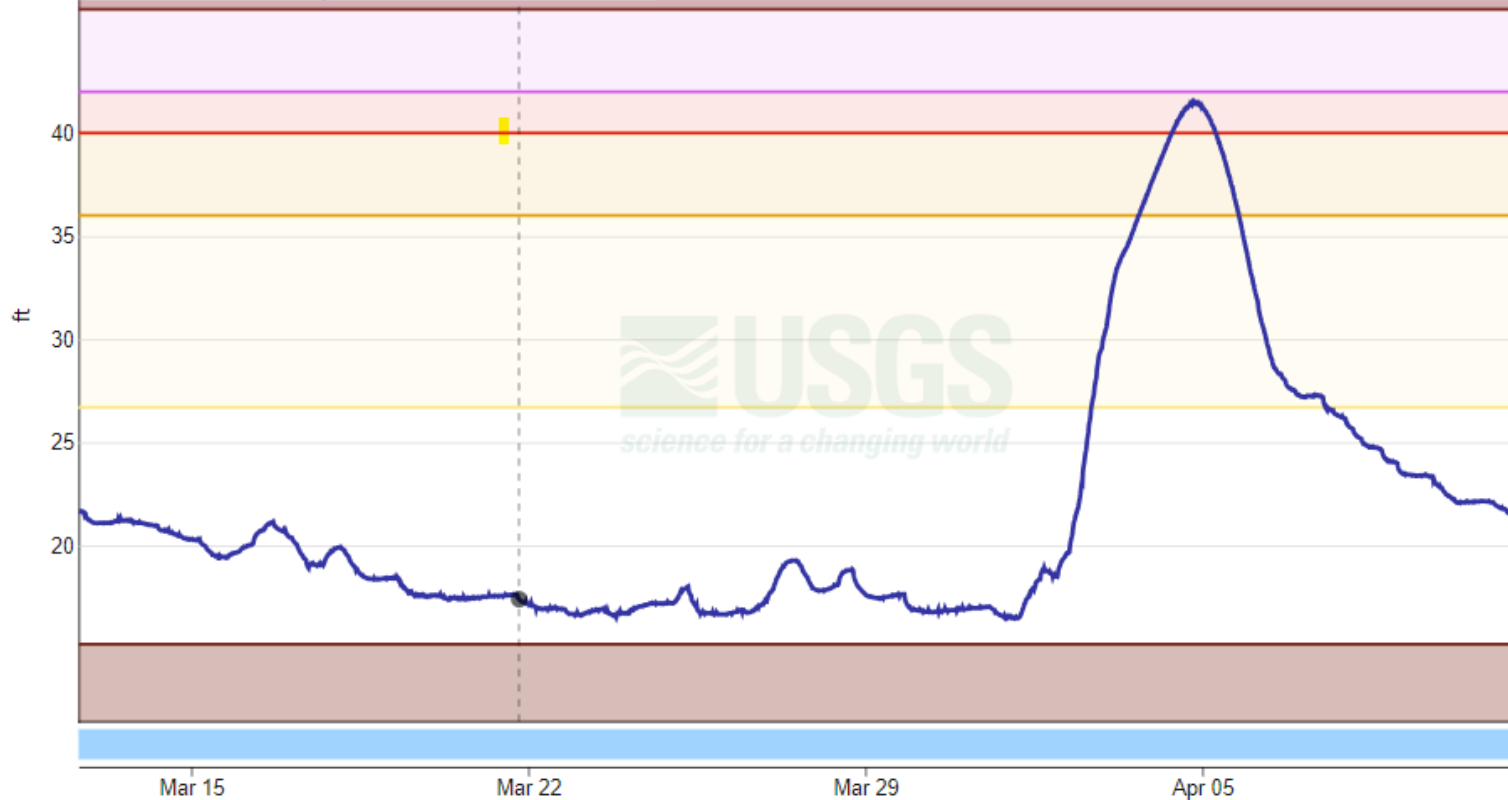
7 days 30 days 1 year

Ohio River at Wheeling, WV - 03112500

March 12, 2024 - April 11, 2024

Gage height, feet

17.39 ft - Mar 21, 2024 07:30:00 PM EDT



Source: [USGS Ohio River Gauge Height](#)

IMPORTANT Data may be [provisional](#)

[Show legend](#) v

Flood Categories (in feet)

Major Flood Stage:	42
Moderate Flood Stage:	40
Flood Stage:	36
Action Stage:	26.7

Historic Crests

- (1) 55.20 ft on 03/19/1936
- (2) 51.50 ft on 12/31/1942
- (3) 51.20 ft on 03/28/1913
- (4) 50.10 ft on 03/15/1907
- (5) 48.70 ft on 01/26/1937
- (6) 47.30 ft on 03/08/1945
- (7) 47.00 ft on 03/12/1964
- (8) 46.60 ft on 06/23/1972
- (9) 46.20 ft on 01/23/1937
- (10) 45.80 ft on 03/27/1937

[Show More Historic Crests](#)

(P): Preliminary values subject to further review.

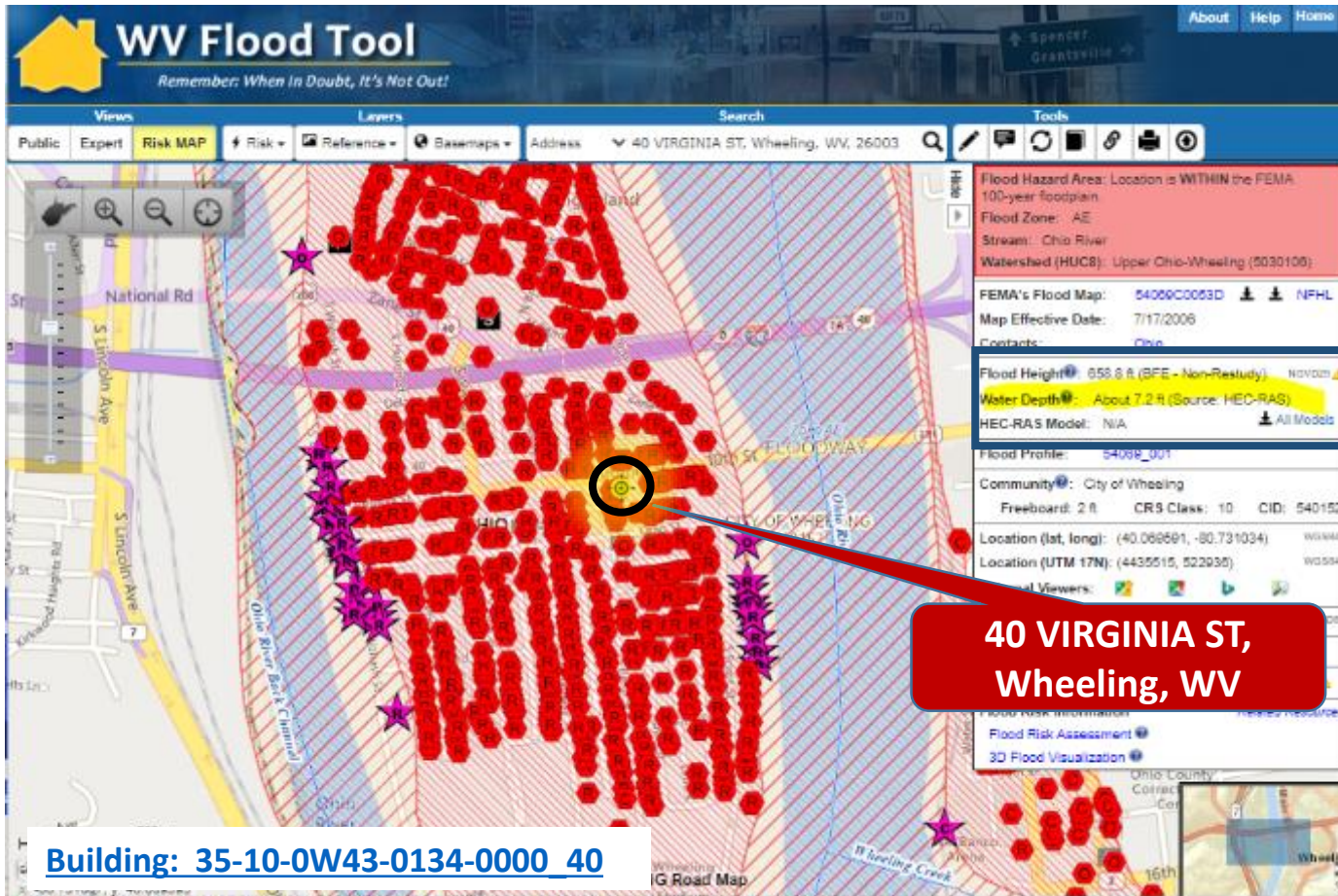
Recent Crests

- (1) 41.49 ft on 04/05/2024 (P)
- (2) 38.34 ft on 09/11/2018
- (3) 38.93 ft on 02/18/2018
- (4) 37.22 ft on 03/12/2011
- (5) 30.50 ft on 03/24/2007
- (6) 33.12 ft on 03/16/2007
- (7) 34.60 ft on 01/13/2005
- (8) 42.17 ft on 01/07/2005
- (9) 45.30 ft on 09/19/2004

Wheeling Flood Probabilities

1% Annual Chance (100-YR) Flood Event for 40 Virginia St., Wheeling, WV

- 7.2 ft. base flood depth above ground (Source: FEMA)
- 49 ft. flood stage gauge height (Source: USGS/NWS)



Flood Depth Probabilities (ft.)

FIRM Effective Date	50 year (2%)	100 year (1%)	500 year (0.2%)
2006	4.1	7.2	10.1



Wheeling (40 VIRGINIA ST, Wheeling, WV, 26003)

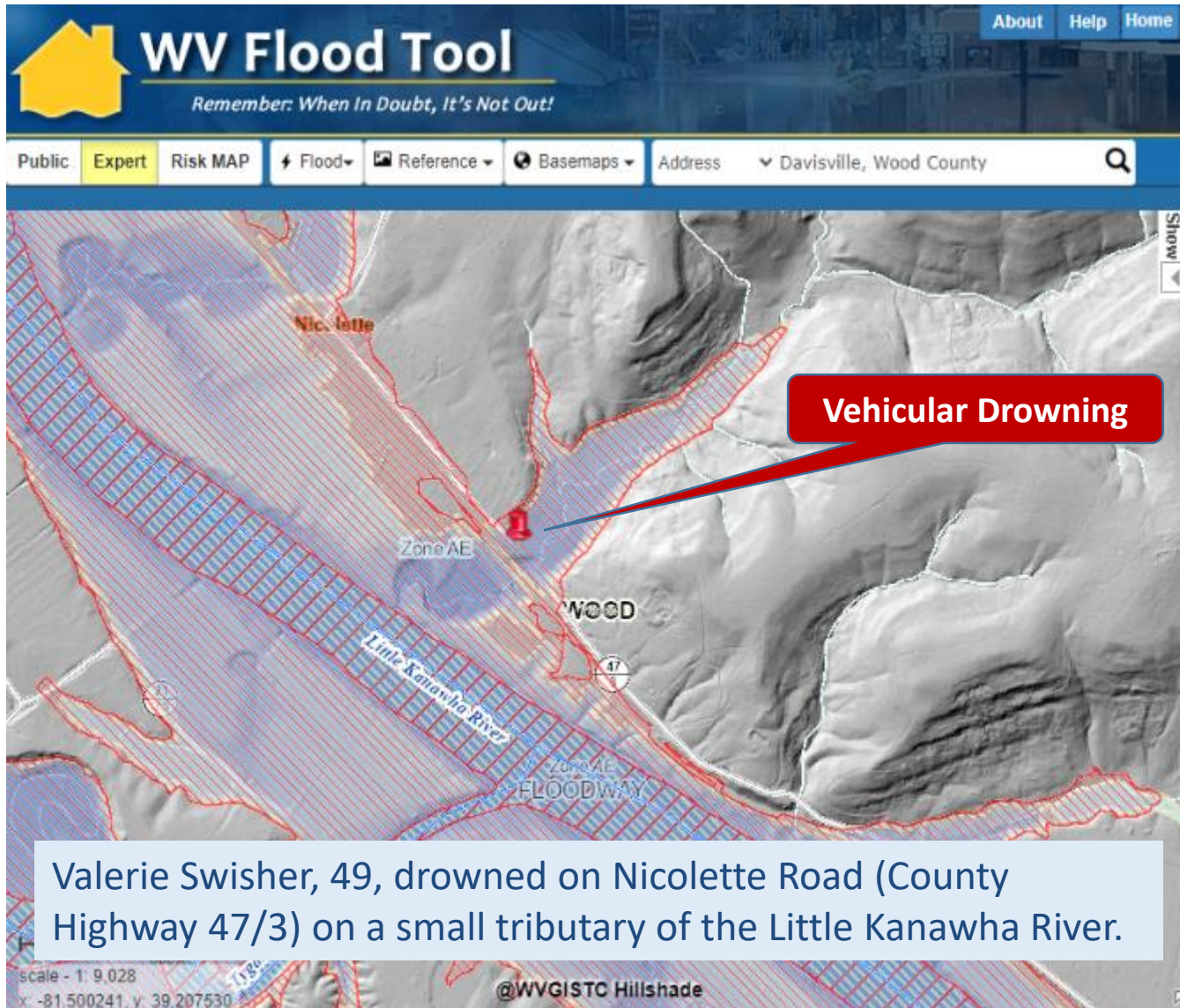


High Water Mark from 1936 Flood (13 ft.)

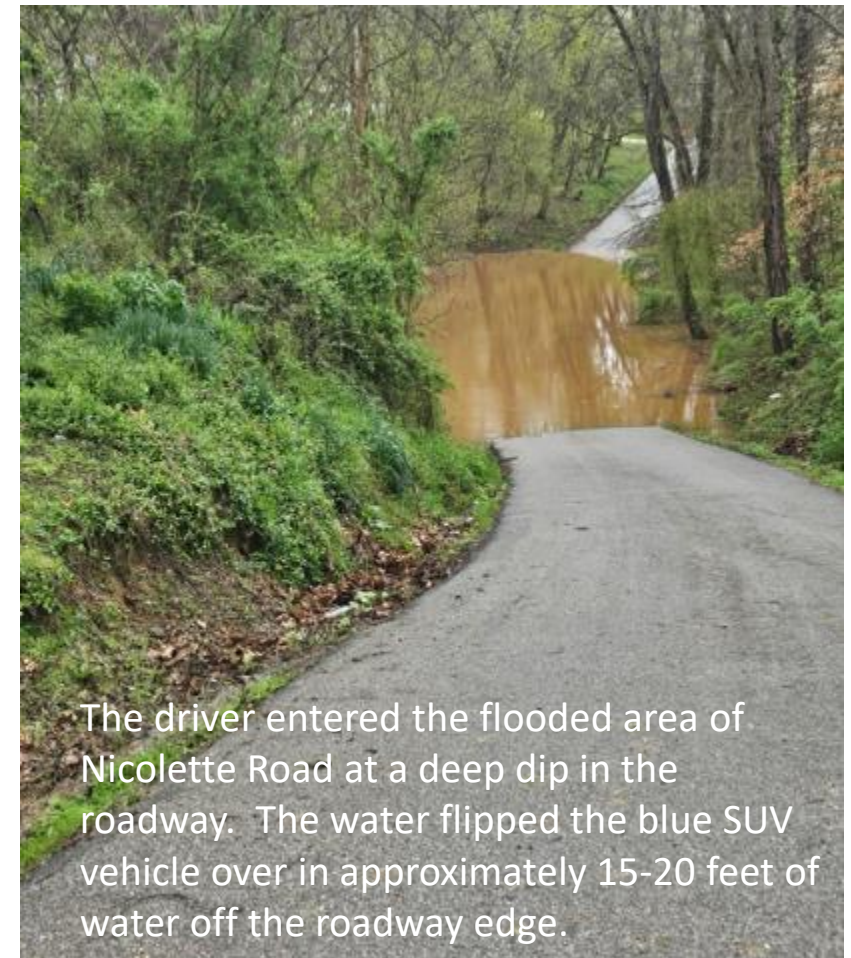
[WV Flood Tool link](#)

- **1936 HWM** = 607.3 ft. ([gauge height](#) = 0) + **55.2 ft.** = 662.5 ft. The **1936 Flood Depth** (662.5 ft. HWM minus LAG 649.5) estimate is **13 feet** flooding above ground level. In structure, estimate **four feet** of water above lowest floor for 1936 flood.
- **2024 HWM** = **41.5 feet crest** on 5 April 2024. 607.3 ft. (gauge height = 0) + 41.5 ft. = 648.8 feet. Flooding should not have impacted this property. House just outside of [drone footage](#).

Vehicular Fatality (Wood County)



Valerie Swisher, 49, drowned on Nicolette Road (County Highway 47/3) on a small tributary of the Little Kanawha River.



The driver entered the flooded area of Nicolette Road at a deep dip in the roadway. The water flipped the blue SUV vehicle over in approximately 15-20 feet of water off the roadway edge.



Landslides (Ohio County)

[Drone Link](#)

1311 PARK VIEW RD,
Wheeling, WV,

PARKVIEW HOME DESTROYED

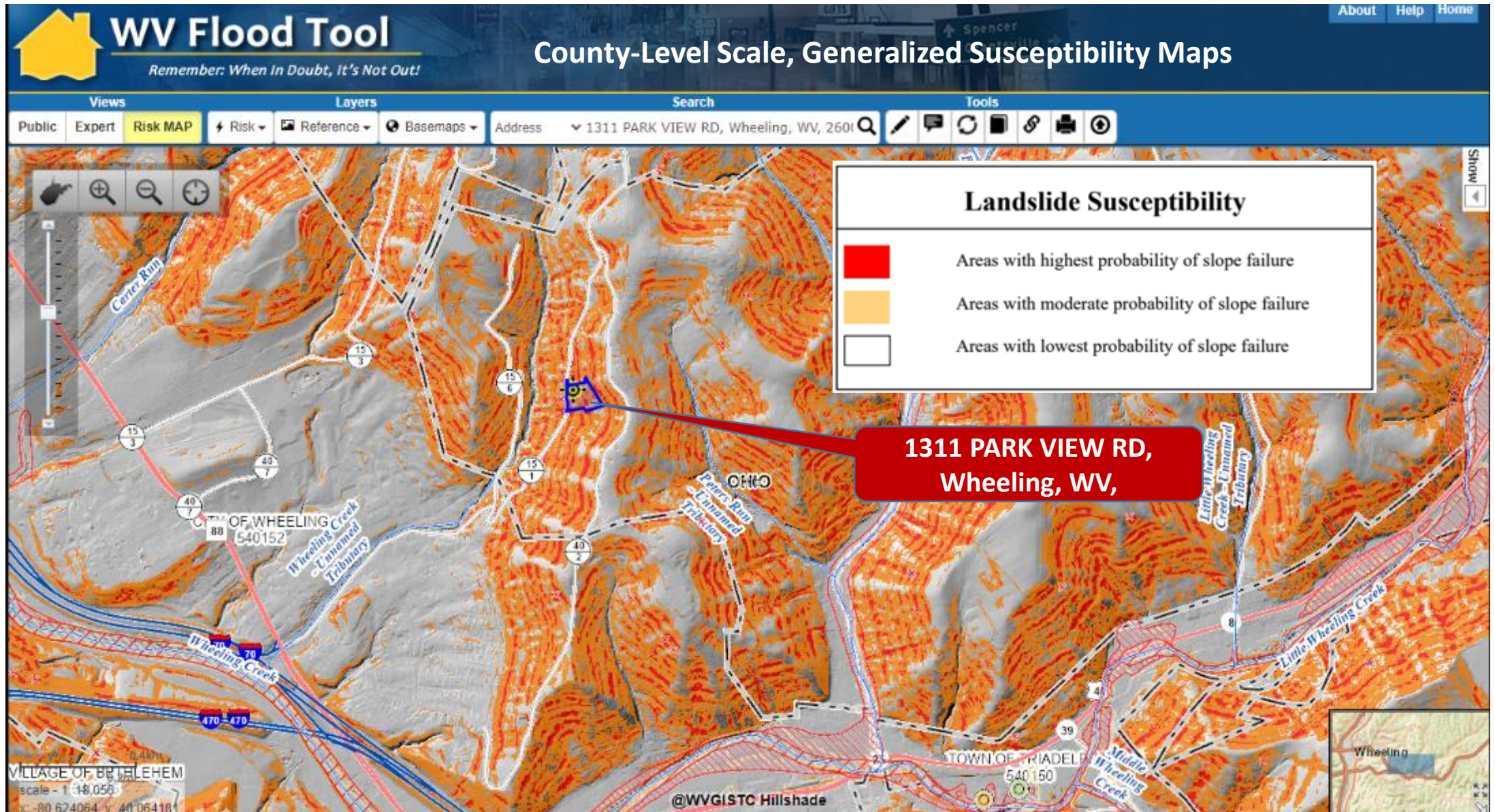
OHIO COUNTY

instant. Betty Mott's home was

WTRF.com

Landslides (Ohio County)

[Drone Link](#)





WV Flood Resiliency Framework Toolkit

Rainelle, WV

Hazard	Ratio of Floodplain to Community Area: 31.1% <small>Incorporated Community Median: 10.2%</small>	Federally Declared Flood Disasters in Greenbrier County since 1989: 9 <small>Statewide County Median: 12</small>
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Exposure	Physical		Human
	Total Buildings in High-Risk Floodplains: 338 (34%) <small>Incorporated Community Median: 59 (9%)</small>		Estimated Population Residing in Floodplains: 582 (43%) <small>Incorporated Community Median: 114 (10%)</small>
	Newly Mapped in Structures: 325 Newly Mapped out Structures: 1	Total Building Value in Floodplains: \$16,889K <small>Incorporated Community Median: \$6,417K</small>	Estimated Population Displaced by Flooding: 487 (36%) <small>Incorporated Community Median: 56 (13%)</small>
	Total At-Risk Residential Structures: 250 <small>Incorporated Community Median: 44</small>	Total Estimated Building Loss: \$994K <small>Incorporated Community Median: \$240K</small>	Estimated Population in Need of Short-Term Shelters: 123 <small>Incorporated Community Median: 12</small>

Vulnerability	Mobile Homes in Floodplains: 14 <small>Incorporated Community Median: 5</small>	Critical Buildings in Floodplains (Essential Facilities and Non-Historical Community Assets): 9 <small>Incorporated Community Median: 3</small>
	Renters Ratio in Floodplains: 55% <small>Incorporated Community Med.: 35%</small>	Social Vulnerability Index (SVI) of Greenbrier County: 0.55 <small>Statewide County Median: 0.48</small>

Marlinton, WV

Vulnerability Indicators		Marlinton	State Ratio/Value	National Ratio/Value
	Poverty Rate	25.7%	17.0%	12.4%
	Unemployment Rate	16.3%	23.7%	14.6%
	Vulnerable Ages Ratio	37.6%	36.7%	34.6%
	Disability Ratio	27.6%	19.3%	12.6%
	No High School Diploma Ratio	16.1%	11.9%	11.1%
	Population Change Ratio	-5.3%	-3.2%	7.4%
	Median Housing Value	\$79,700	\$128,800	\$244,900
	Mobile Homes Ratio	4.9%	14.0%	5.9%
WV Social Vulnerability Index Score (Among incorporated communities)		60.4% (Relatively High)	-	-

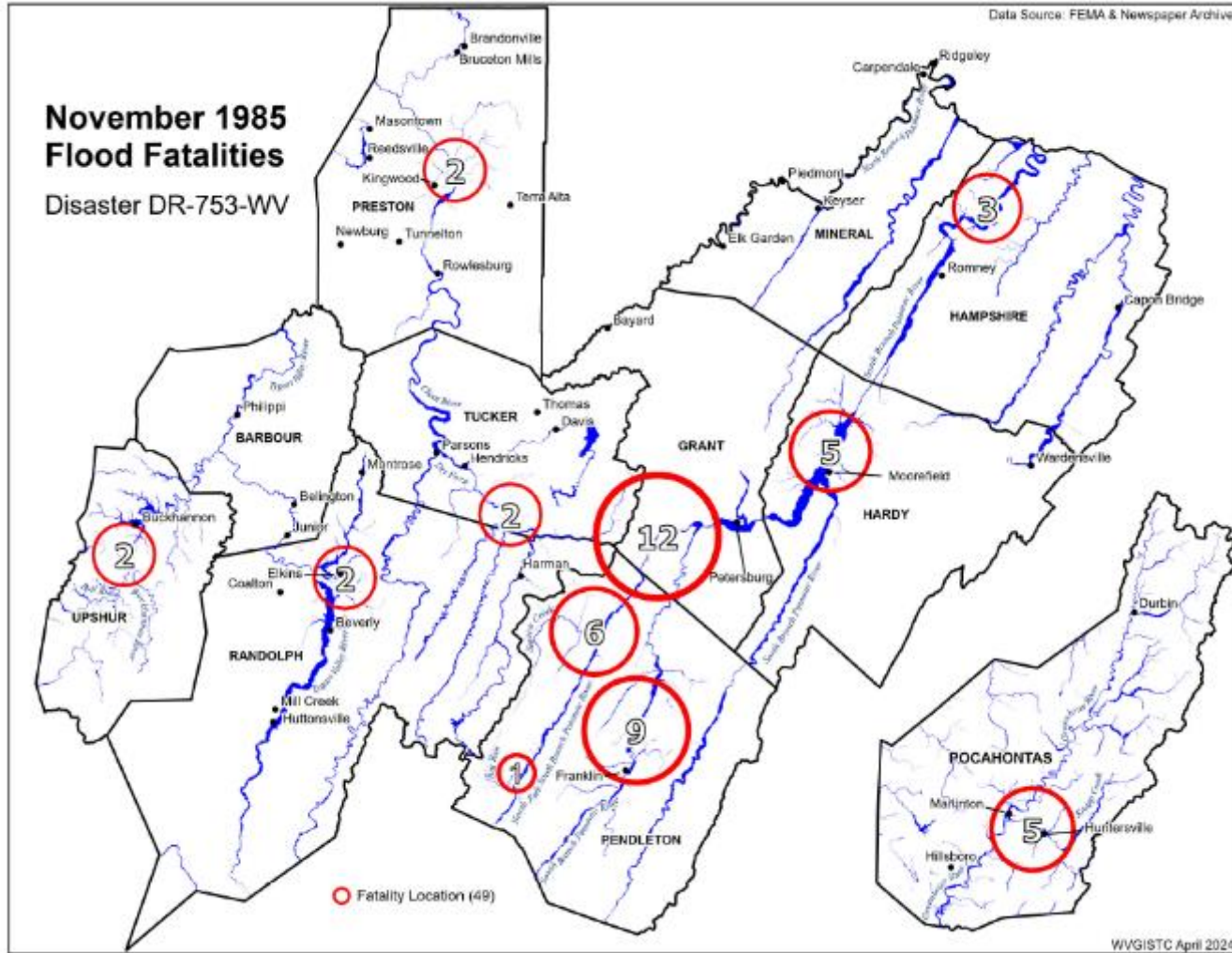
The indicator values in red show more than a 5% difference, toward vulnerability, compared to the state ratios.

The **WV Flood Risk Index Tool** aggregates hazard data to indicate the communities most at risk of riverine flooding. It incorporates flood at community and building levels for communicating risk.

WV Flood Risk Index Tool (future)



Community Impact Study (Marlinton, WV)



Rescuers flock to Marlinton in wake of devastating flood

By John Chastwick

Flood waters receded in Marlinton Tuesday after an estimated 500 people were evacuated from their homes.

Three-week reports of loss being lost. Rescuers reported seeing bodies of those who were trapped in their dwellings when the Greenbrier River rose rapidly in the pre-dawn hours. Four deaths in the county were confirmed late Tuesday.

Sally Timney of the Richmond Fire Department and volunteers from several other fire departments arrived in Marlinton early Tuesday, but they were unable to cross a bridge if the city because of flood waters cresting at about 20 feet.

"The water was so high it was over the bridge, and it wasn't safe to cross it," Timney said. "The whole town was flooded."

Volunteers and firemen aided in rescue efforts on both sides of town after the flood waters had receded. A woman reportedly was found in her attic at Tucker, where she had been trapped all night. She was a diabetic and was at a shock, according to Timney. The woman was taken to a temporary first aid station on higher ground near Barbours and later was transported to a hospital in Lenoir, the fireman said.

Timney also said three Civil Air Patrol rescuers stationed at Richmond were injured in an accident at Mill Point in Pocahontas County en route to Marlinton. The three were identified by a nearby reporter as Hank Huggins, Greenbrier Valley in Lenoir; Gary L. Huggins, North and Lynn were in stable condition Tuesday night, according to the reporter. McGill was treated and released.

Rescue efforts began shortly after daylight for about 50 patients at Pocahontas Memorial Hospital, which is about 200 yards from the river. Those said the hospital staff remained at the facility until after the water went down. Then, many of the patients were transported to their homes outside the city by the Richmond Fire Department ambulance.

Several patients from the Marlinton hospital were transferred to Burnsville Hospital according to the Marlinton supervisor there.

They described the flood-ravaged scene this way:

"Cars were on top of trucks. Cars were everywhere when the water went down. A house was left against a bridge. It was a complete disaster."

Timney said one of Richmond's fire trucks remained on standby at the Marlinton firehouse where all of the city's firefighting equipment was damaged by the flood.

Emergency generators powered Marlinton city hall Tuesday night. The city was without power, telephones and cringing water. Five thousands of people were transported to shelters late Tuesday morning.

Photo-lance photographer Doug Chastwick of Hillsboro reported about 30 National Guard vehicles, carrying water and generators, were headed to Marlinton Tuesday evening. Heavy trucks were sent to the guard to help in clean up efforts which are expected to begin today.

Earlier, the nearby Greenbrier had deposited tons of dirt and debris at the town's business district.

"Water was at the top of the doors in elevators," Chastwick recalled of the flood. "People in boats were pulling people out of buildings."

Chastwick said some of the water was cascaded from buildings a nearby street all their lives.

"One radio station kept its playing music because the staff couldn't get down to Marlinton to report on the flood," Chastwick said.

"This flooding is said to be the worst of the century in the area. One 75-year-old man of Marlinton told rescuer Tom Dragan of Fayette County the flood is the worst he's ever in his life.

"That," Dragan said, "the man told me he's willing to go back and start all over again."

Rescuers from Wild Water Unlimited in Fayette County traveled to Pocahontas County to lead what assistance they could to flood victims. Photo by Doug Chastwick

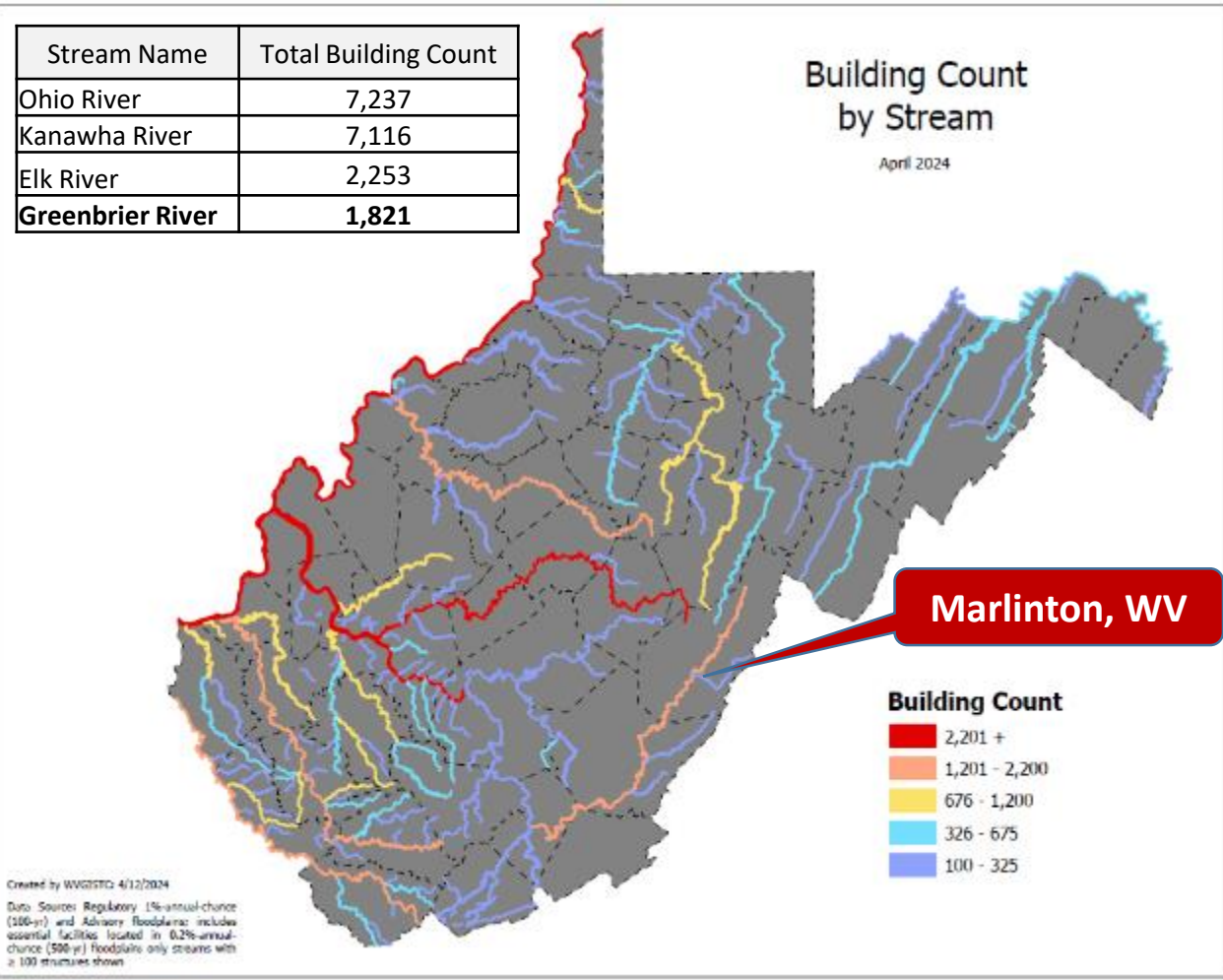
Marlinton resident William Mochant made his escape from the second story of his home via ladder early Tuesday morning (photo left). Later in the day, unidentified rescuers helped save Marlinton residents on Eighth Street. Photos by Doug Chastwick

This Chevrolet Monte Carlo was one of the flood victims on Tuesday night in Lewis County. Traffic on both lanes of Interstate 79 just south of Jane Low was Clarksville was rerouted for about of the day. In the north central part of the state, 200 residents of Grantsville, near Morgantown, were evacuated as a result of days-long rains. Staff photo by John C. Deane

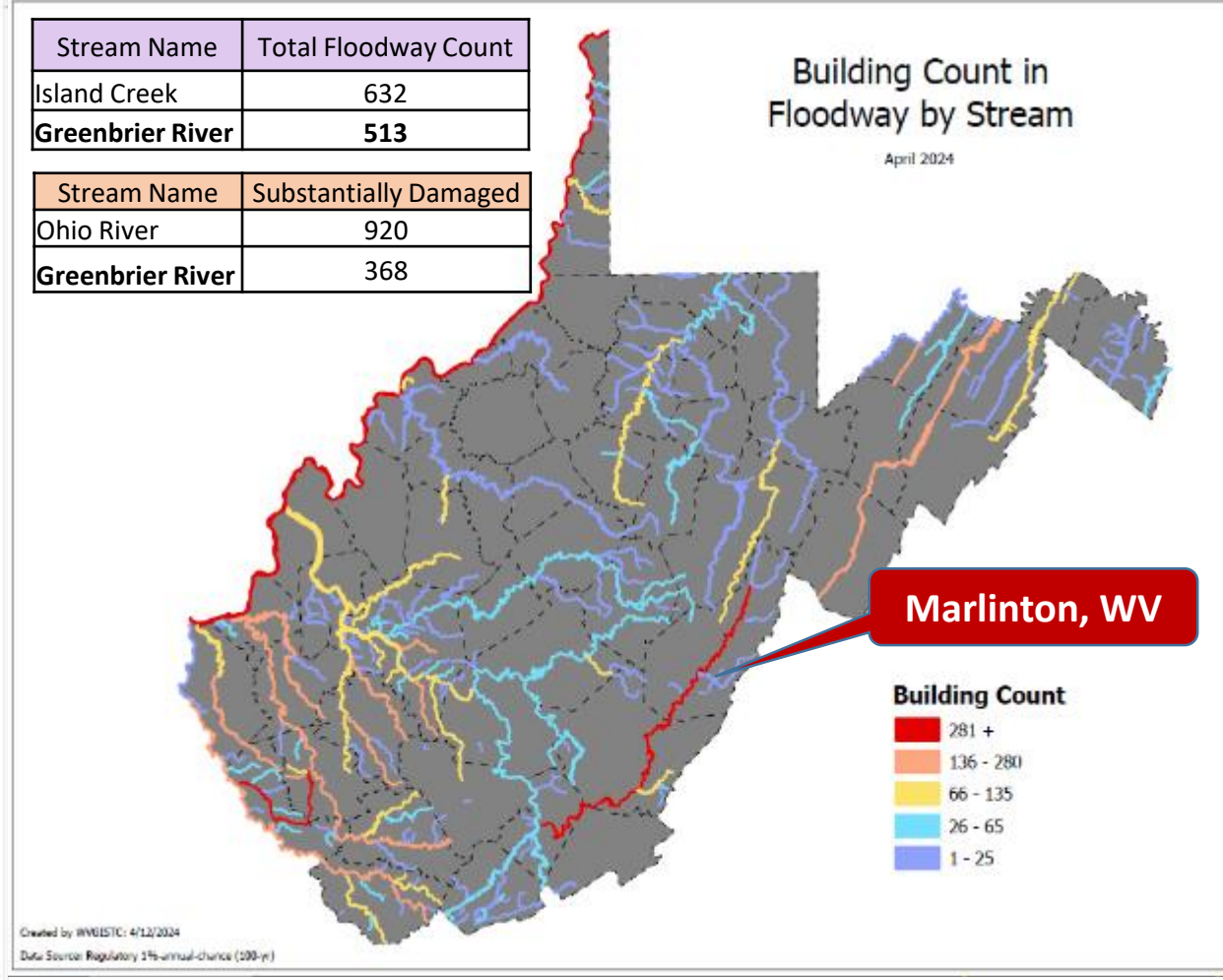
November 1985 Flood (47 fatalities)



Community Impact Study (Marlinton, WV)



Buildings in SFHA



Flood Risk Indicators

Buildings in Floodway

Statewide Stream Scale



Community Impact Study (Marlinton, WV)

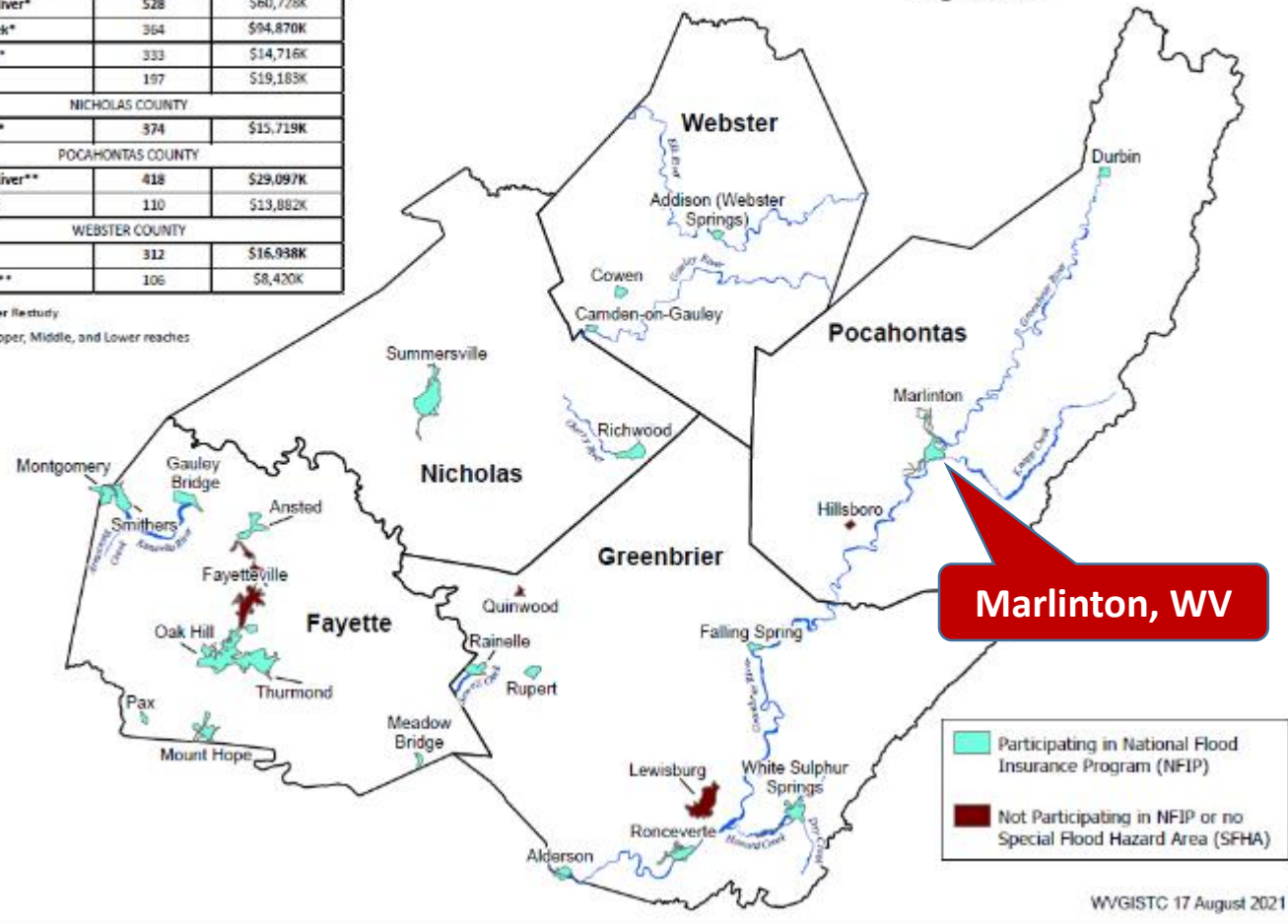
Building Counts & Building Values

Flood Source	Building Count	Dollar Exposure (\$)
FAYETTE COUNTY		
Armstrong Creek	275	\$11,334K
Kanawha River	242	\$46,459K
GREENBRIER COUNTY		
Greenbrier River*	528	\$60,728K
Howard Creek*	364	\$94,870K
Sewell Creek*	333	\$14,716K
Dry Creek	197	\$19,183K
NICHOLAS COUNTY		
Cherry River*	374	\$15,719K
POCAHONTAS COUNTY		
Greenbrier River**	418	\$29,097K
Knapp Creek	110	\$13,882K
WEBSTER COUNTY		
Eik River	312	\$16,998K
Gauley River**	106	\$8,420K

* 2016 Disaster Reentry
 ** includes Upper, Middle, and Lower reaches

Region 4 Communities

August 2021



WVGISTC 17 August 2021

Flood Risk Indicators

Regional Scale



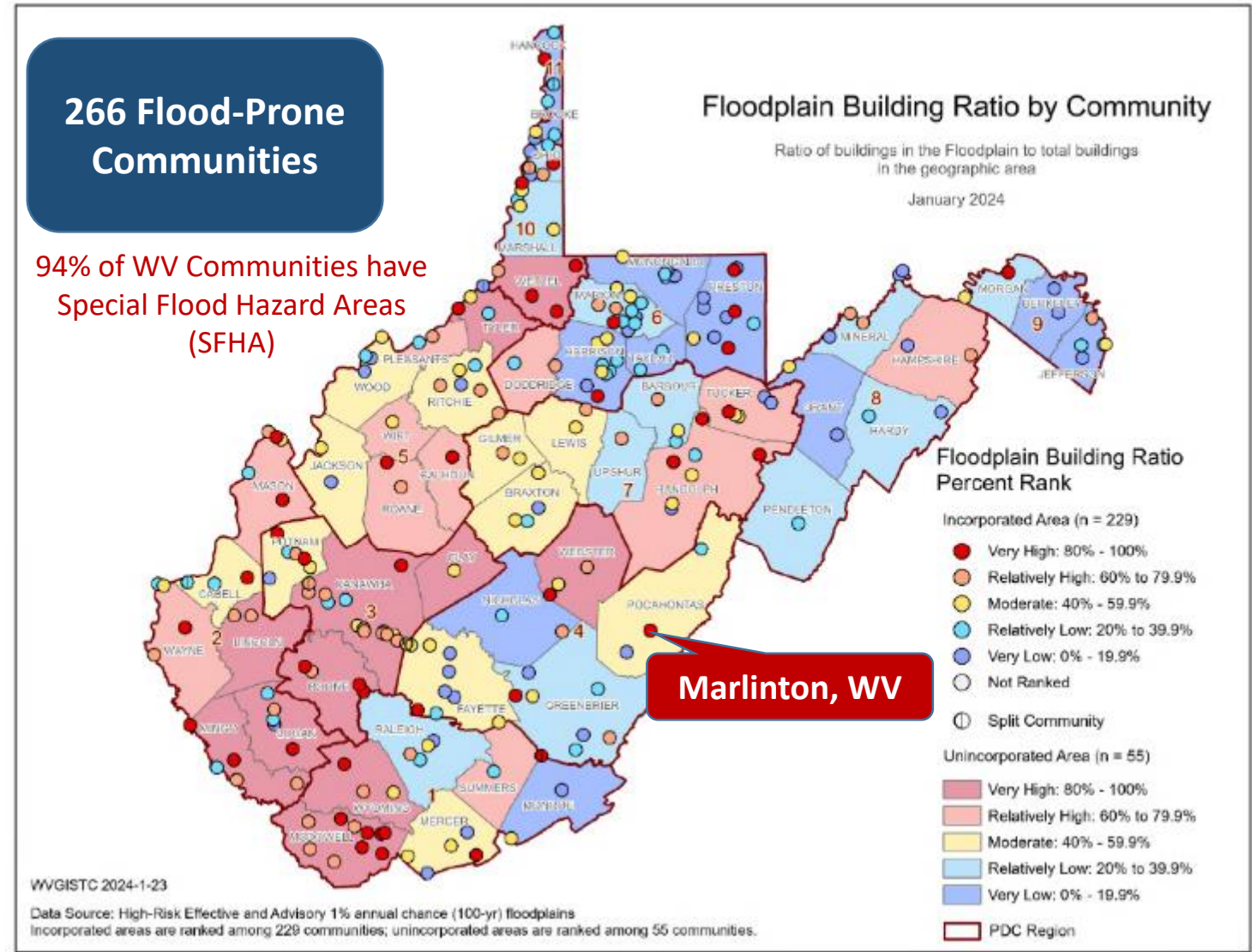
Community Impact Study (Marlinton, WV)

Floodplain Building Ratio

266 Flood-Prone Communities

94% of WV Communities have Special Flood Hazard Areas (SFHA)

Flood Risk Indicator



Community Scale

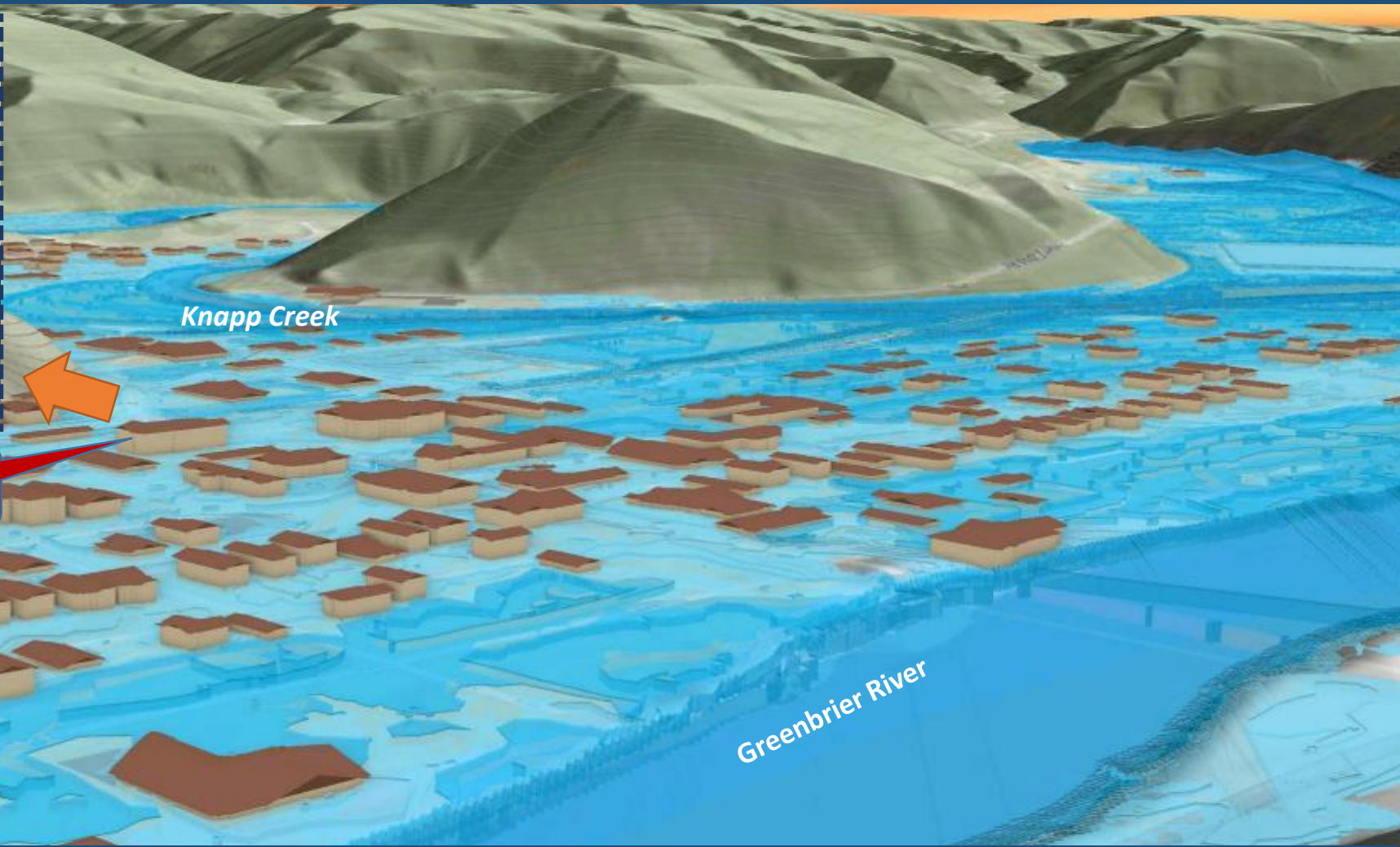


Flood Visualization (Marlinton, WV)

Water Depth Height in feet	
0 - 5	Lightest blue
6 - 10	Light blue
11 - 20	Medium blue
21 - 30	Dark blue
31 - 50	Very dark blue



**309 8th St,
Marlinton, WV**



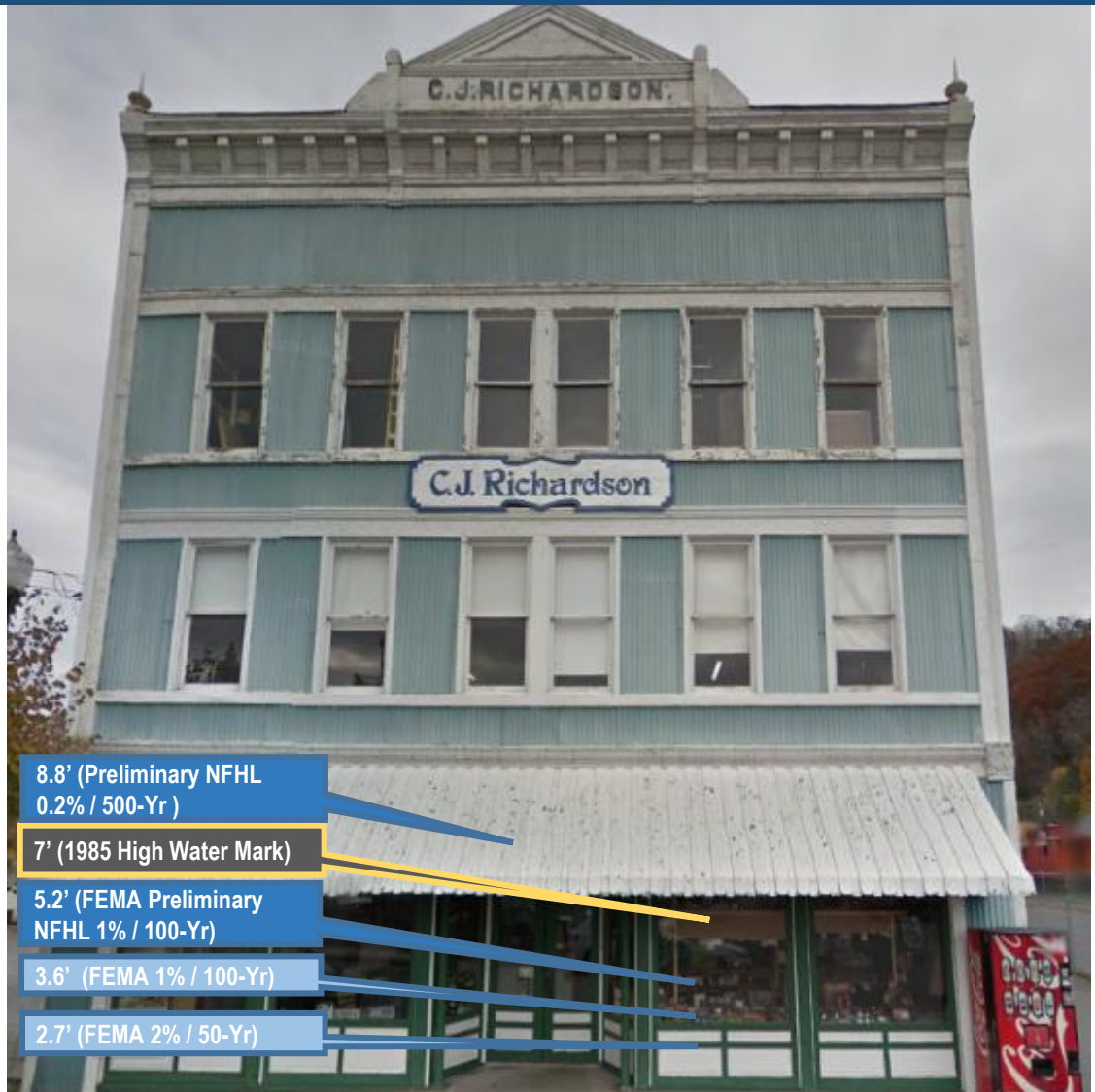
FEMA 1% Annual Chance (100-year)

26% probability of flooding at least once over 30 years

Community Scale



Flood Visualization (Marlinton, WV)



- 8.8' (Preliminary NFHL 0.2% / 500-Yr)
- 7' (1985 High Water Mark)
- 5.2' (FEMA Preliminary NFHL 1% / 100-Yr)
- 3.6' (FEMA 1% / 100-Yr)
- 2.7' (FEMA 2% / 50-Yr)



1985 Flood High Water Mark

309 8th St, Marlinton, WV, 24954
 Building: [38-08-0003-0023-0000](#)
 Commercial Structure built in 1900

Building Scale

Flood Risk Assessment (Marlinton)



Top 10% rankings among 229 incorporated places

Floodplain Characteristics

High percentage of community in in flood zone

Building Counts

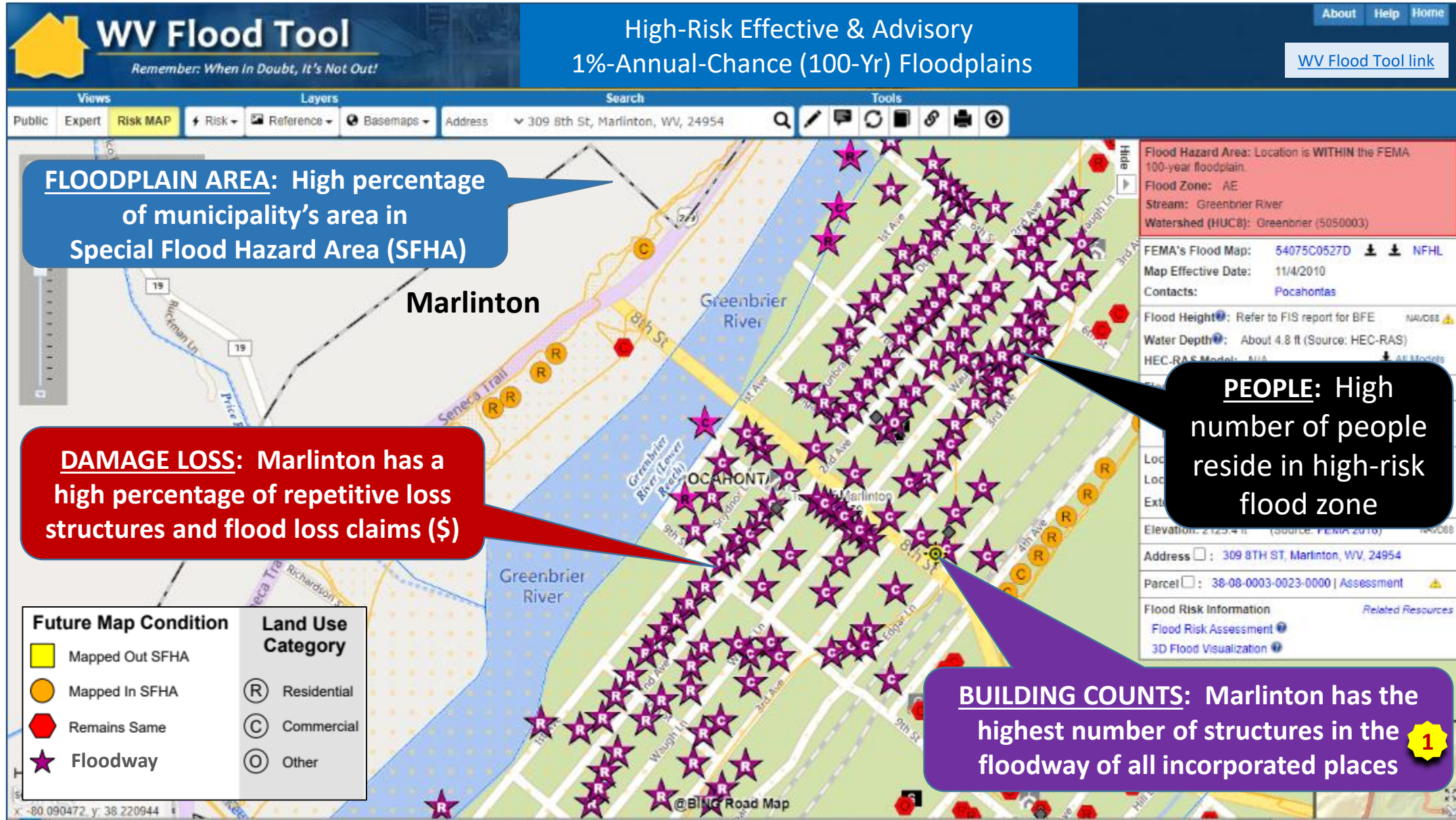
High building counts in SFHA and floodway

Damage Loss \$

High percentage of previous losses

People

Many residents displaced from major flood event



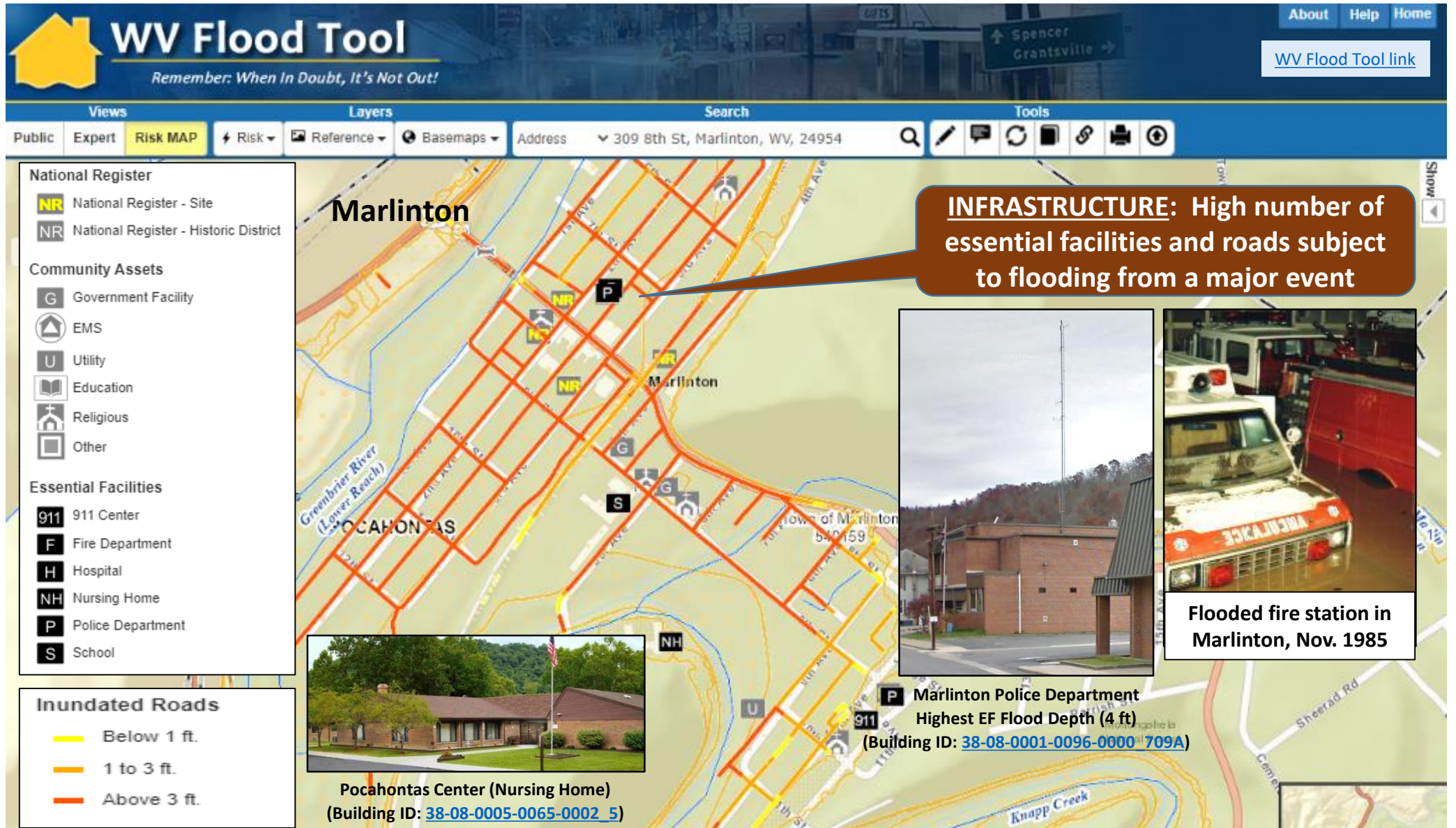
Critical Infrastructure (Marlinton)

TOP 10%

Top 10% rankings among 229 incorporated places

Critical Infrastructure

High number of essential facilities & flooded roads



Community Assets (Marlinton)

TOP 10%

Top 10% rankings among 229 incorporated places

Community Assets

High number of non-historical community assets



Partnerships and Interagency Coordination



No single agency has all the answers but leveraging multiple programs and perspectives can provide a cohesive solution



FEMA



WVU LAW
Land Use and Sustainable Development Law Clinic



FPMD
FLOODPLAIN MANAGEMENT DIVISION

RiskMAP
Increasing Resilience Together



ESF



Resilience Action Partners
A JOINT VENTURE OF GOODY'S & MICHAEL BAKER INTERNATIONAL



US Army Corps of Engineers®



SRO



WVEMD



NRCS



CEP-Tool



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