Partners – RiskMAP/CRS, ($) HMGP/CTP

WV State Multi-Hazard Risk Assessment Project

FEMA RiskMAP
Increasing Resilience Together

NFIP/CRS

HMGP HAZARD MITIGATION GRANT PROGRAM

CTP COOPERATING TECHNICAL PARTNERS

MAPPING	ASSESSMENT	PLANNING	CRS/NFIP	GIS
Bob Pierson	Will Melville	Matt McCullough	Betsy Ranson	Will Melville
Lee Brancheau	K. Batch, B. Penix	Kelli Batch	Kevin Sneed	Nuvia Villamizar
Kevin Sneed	FEMA Hazus Team	Brian Penix	Christina Groves	USACE Silver Jackets
	WVU Law Clinic, NRCS			

Division of Homeland Security Emergency Management

WV GIS TC West Virginia GIS Technical Center

NIYAM IT

WVU LAW Land Use and Sustainable Development Law Clinic

FPMD FLOODPLAIN MANAGEMENT DIVISION

US Army Corps of Engineers

wood.

USDA NRCS

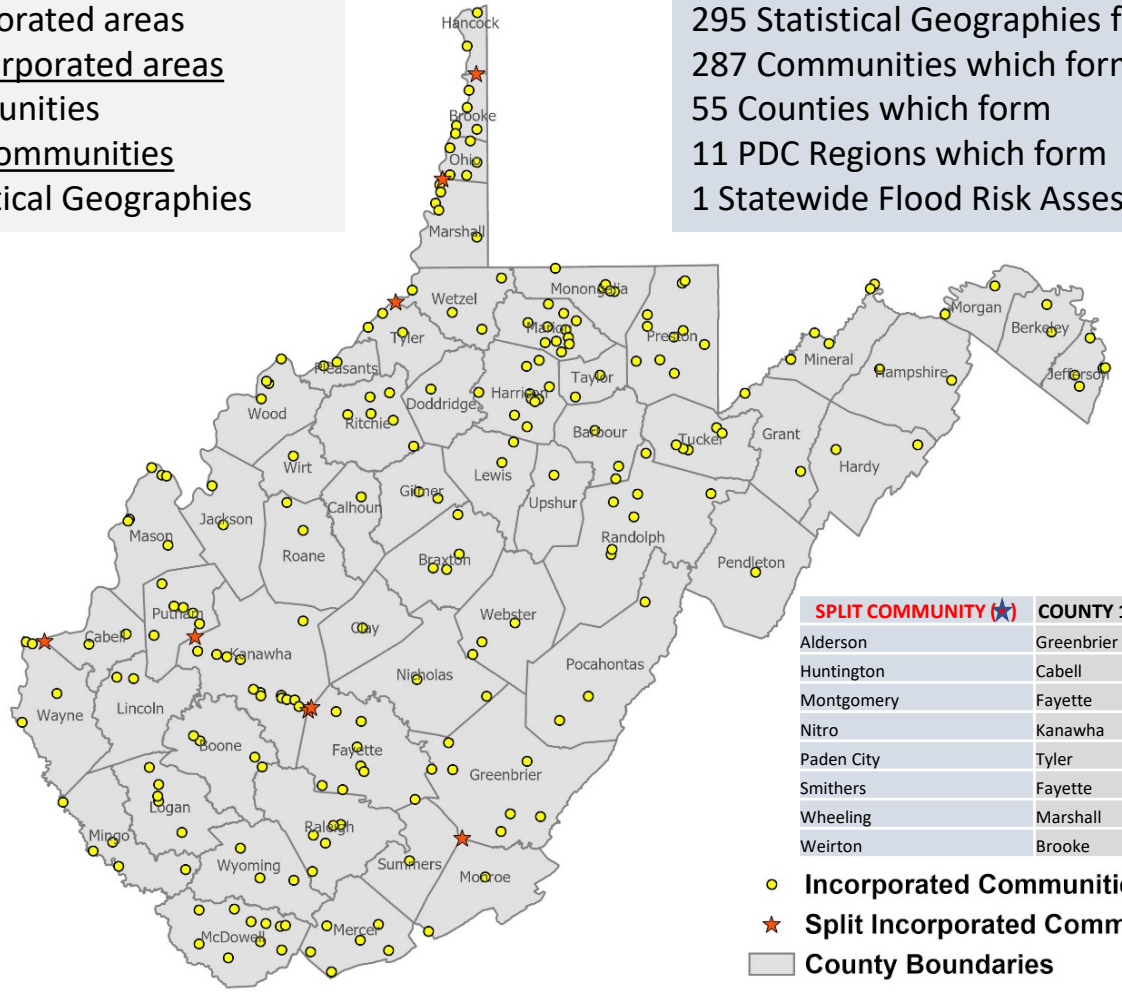
WVGES GEOLOGY UNDERLIES IT ALL

Community Boundaries / Statistical Units

Flood Risk Community Study Map

232 incorporated areas
+55 unincorporated areas
287 Communities
+ 8 split communities
295 Statistical Geographies

295 Statistical Geographies form
287 Communities which form
55 Counties which form
11 PDC Regions which form
1 Statewide Flood Risk Assessment



SPLIT COMMUNITY (★)	COUNTY 1	COUNTY 2
Alderson	Greenbrier	Monroe
Huntington	Cabell	Wayne
Montgomery	Fayette	Kanawha
Nitro	Kanawha	Putnam
Paden City	Tyler	Wetzel
Smithers	Fayette	Kanawha
Wheeling	Marshall	Ohio
Weirton	Brooke	Hancock

Incorporated Communities
Split Incorporated Communities
County Boundaries

95% of WV Municipalities have Special Flood Hazard Areas (SFHA)

Statewide Hazard Assessment

(1) Risk MAPPING

Risk **Mapping**

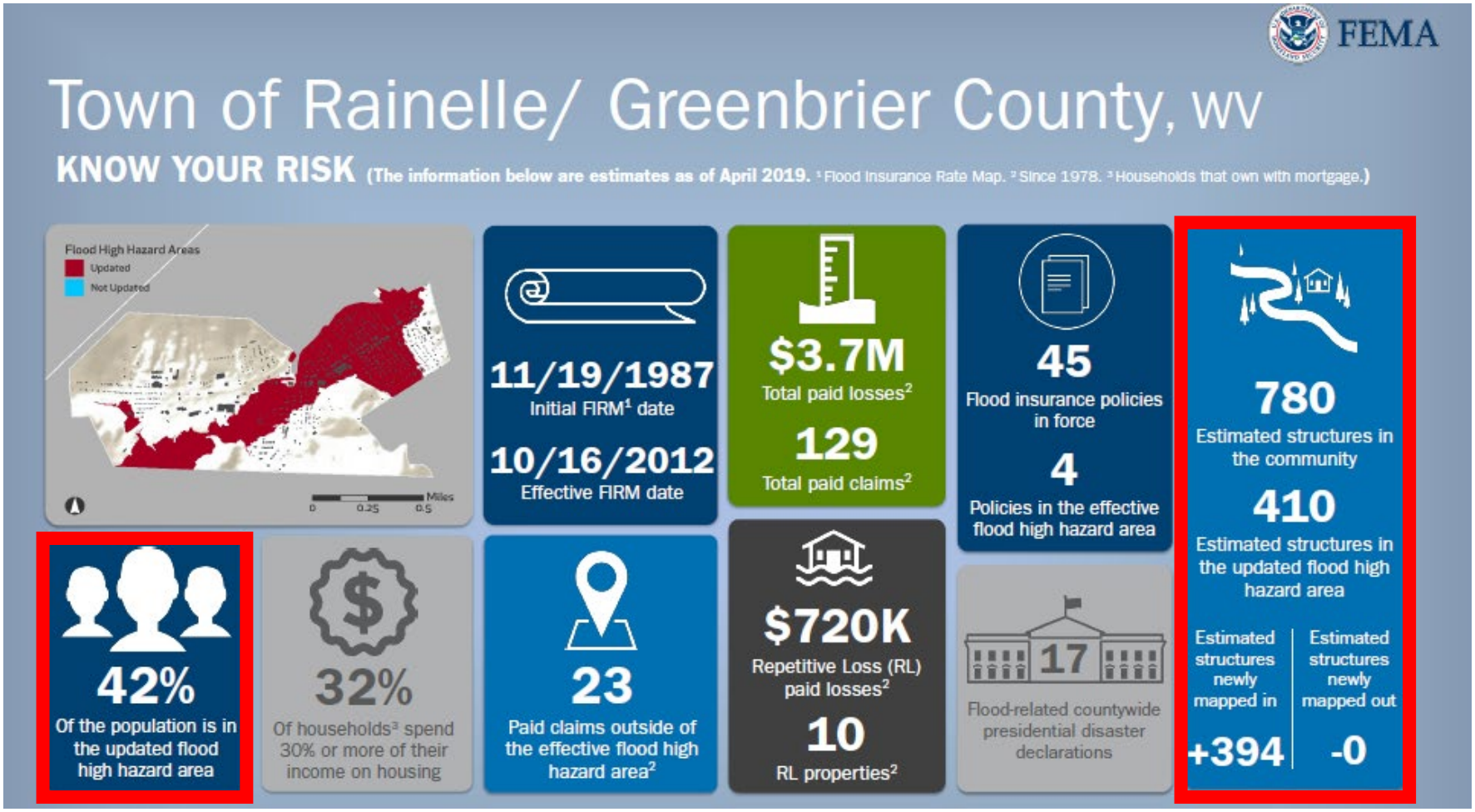
- **Flood Risk Layers Development – Depth Grid and WSEL**
  - Model-Backed Depth Grids needed statewide for more accurate Hazus Loss Estimates and for Mitigation/Insurance Calculators
  - Certain Advisory A Zones with multiple buildings have no depth grids
  - Coordinate data development for RiskMAP Restudy and Updated AE Non-Restudy depth and WSEL grids

- **Alignment with Risk MAP Discovery for Mapping and Data**
  - FEMA RiskMAP Discovery Program https://www.fema.gov/media-library-data/20130726-1809-25045-7902/riskmap_discovery.pdf

- **HEC-RAS Model Library**
  - Incorporate Models from Detailed Studies
  - Add Models from Non-FEMA Sources (e.g., WV DOT)

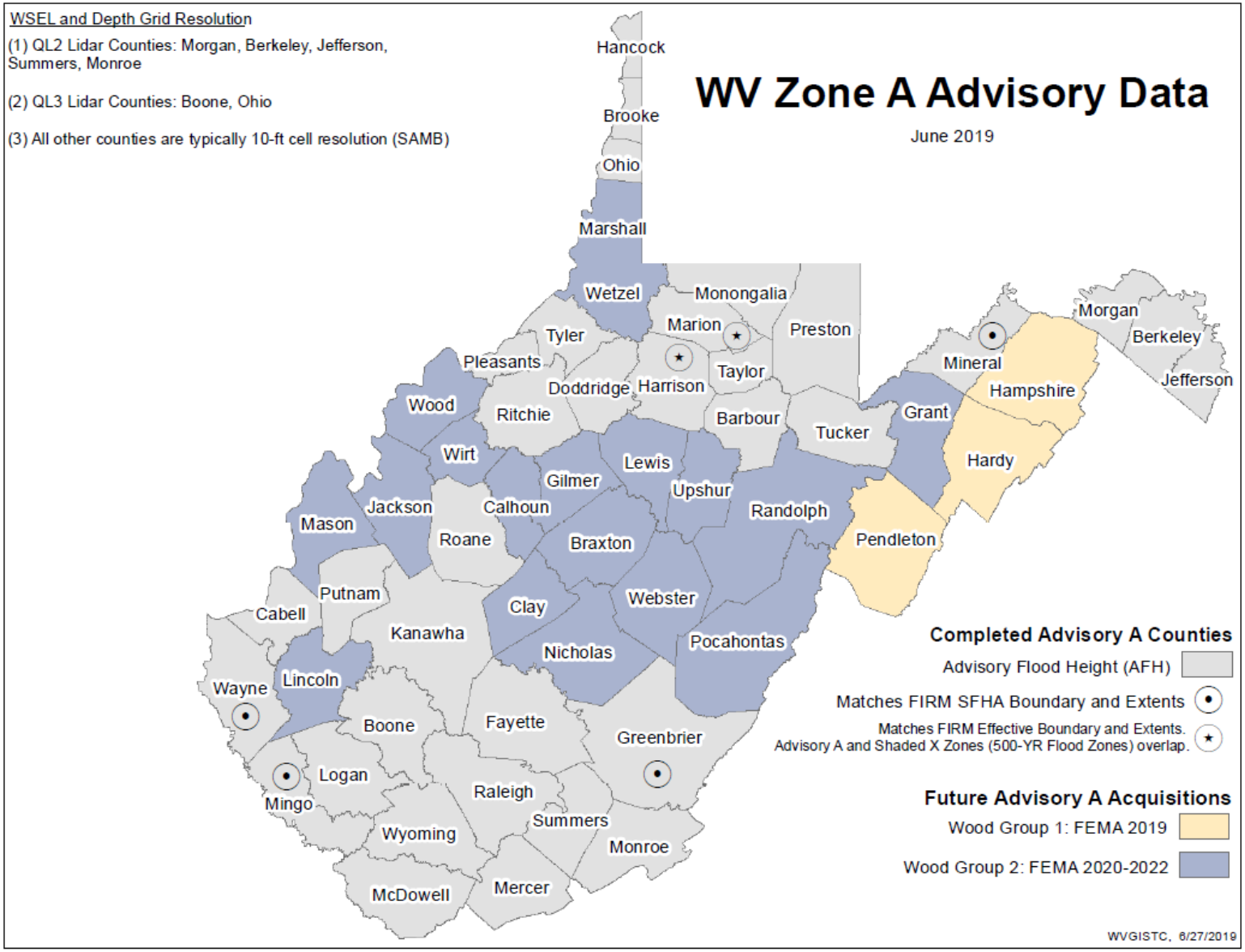
RiskMAP *Discovery*

Cross-Program Linkages: Building and Population Counts from Flood Risk Assessment

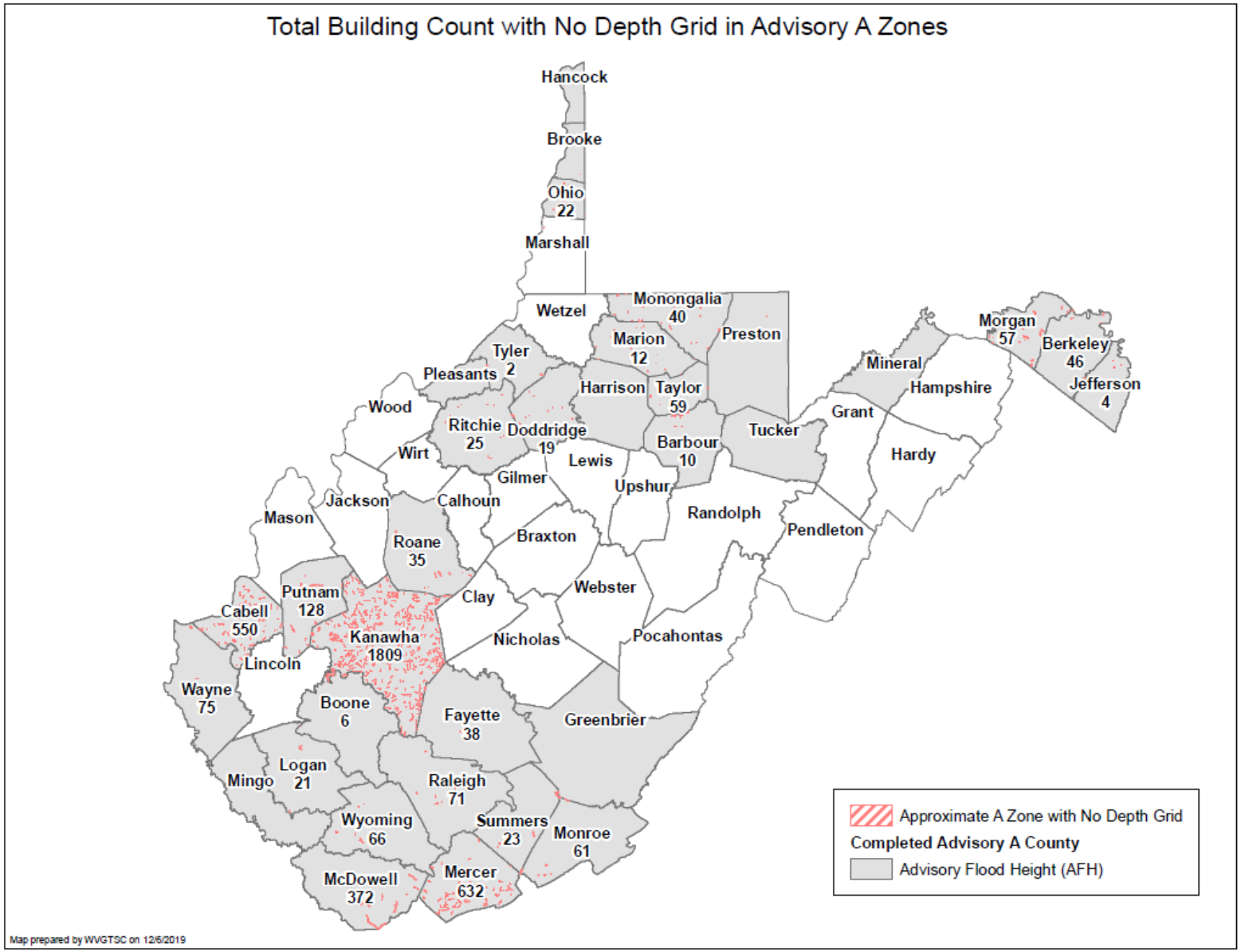


Source: FEMA Flood Risk Review meeting May 2019

Advisory A / Advisory Flood Height



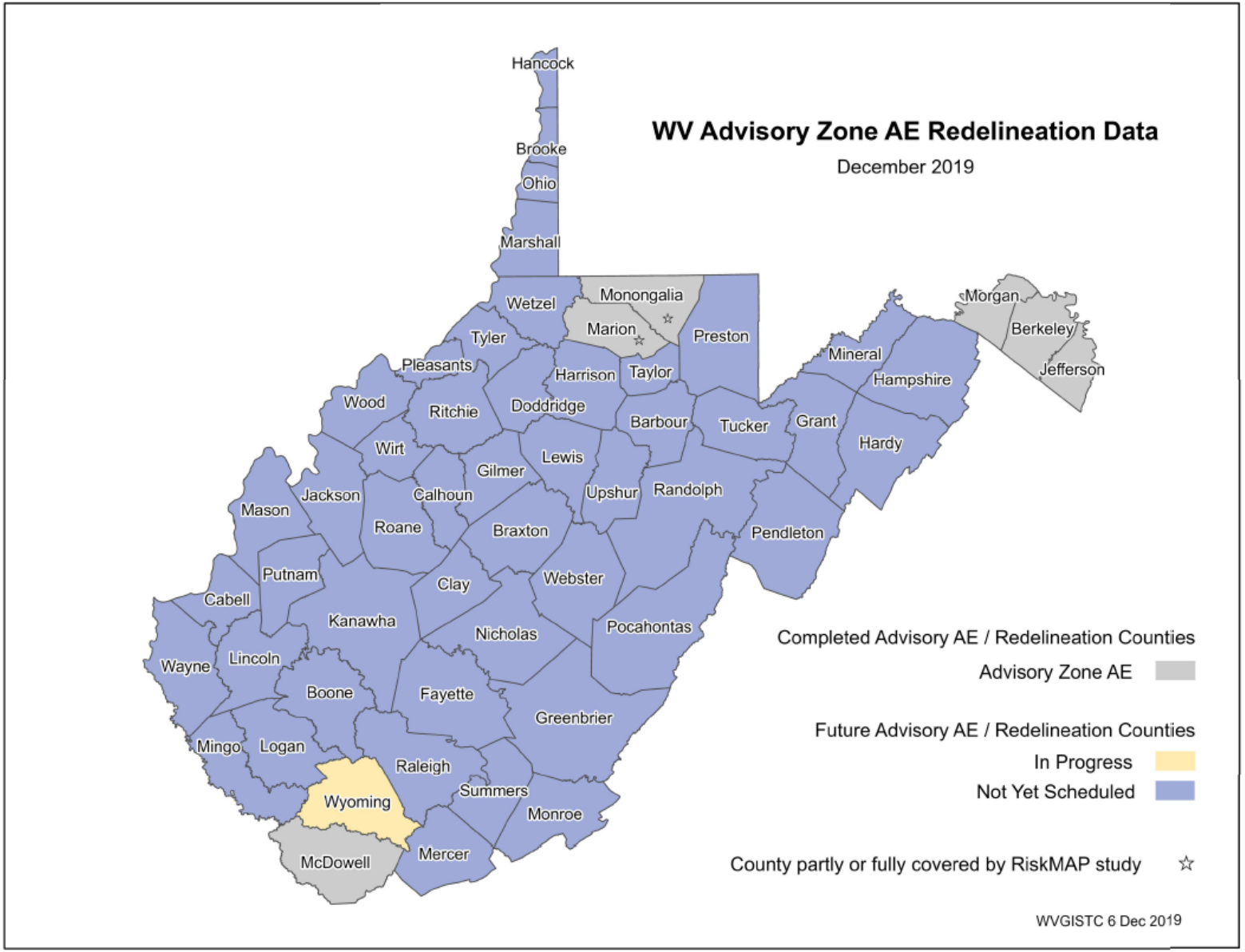
Advisory A Data Gap Analysis



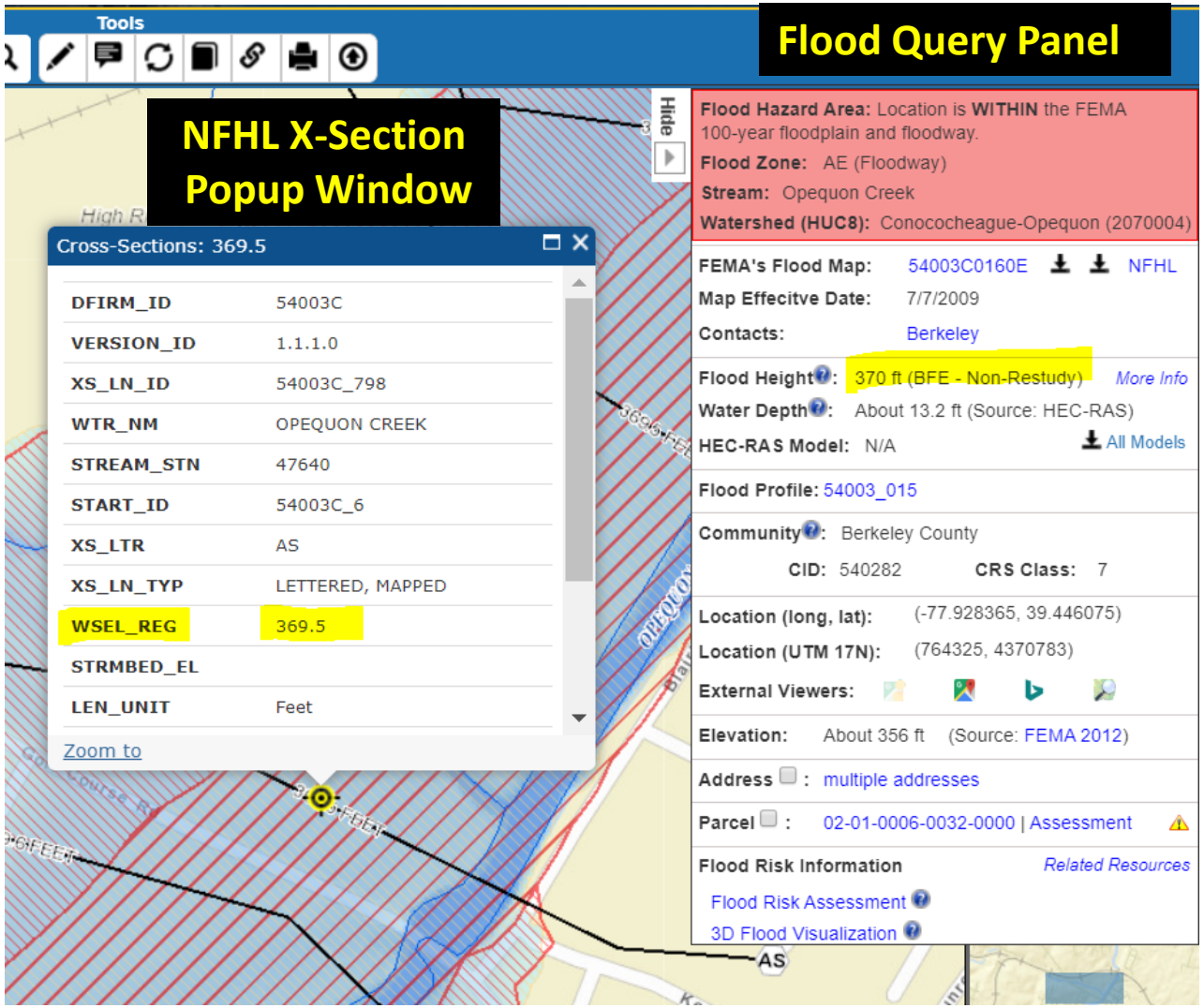
Advisory A Data Gap Analysis

NAME	Total Number of Building Footprint	Example Flood Tool Location	Building Footprint Count at Example Location	Stream Name Example Location	Comments	HAZUS 2010 Depth Grid	LOMA
Kanawha	1809	https://www.mapwv.gov/flood/map/?wkid=102100&x=-9106282&y=4632902&l=8&v=1	124	Two and Three Quater Mile Tributary No.5		No	Yes
Kanawha		https://www.mapwv.gov/flood/map/?wkid=102100&x=-9102778&y=4637444&l=8&v=1	66	Howard Fork	Half of Howard Fork has depth grid; rest of the segment it is absent	No	Yes
Mercer	632	https://www.mapwv.gov/flood/map/?wkid=102100&x=-9045528&y=4484484&l=8&v=1	79	Lorton Lick Creek		No	No
Cabell	550	https://www.mapwv.gov/flood/map/?wkid=102100&x=-9168354&y=4637619&l=8&v=1	54	Russell Creek		Yes	Yes(Few)
Cabell		https://www.mapwv.gov/flood/map/?wkid=102100&x=-9160908&y=4641037&l=10&v=1	63	Merrick Creek	Half of Merrick Creek has depth grid; rest of the segment it is absent	No	No
McDowell	372	https://www.mapwv.gov/flood/map/?wkid=102100&x=-9061791&y=4497573&l=7&v=1	91	North Fork Elkhorn Creek	Half of Merrick Creek has depth grid; rest of the segment it is absent	Yes	No
Putnam	128	https://www.mapwv.gov/flood/map/?wkid=102100&x=-9115366&y=4639313&l=9&v=1	22	Scary Creek	Half of Scary Creek has depth grid; rest of the segment it is absent	No	No
Wayne	75	https://www.mapwv.gov/flood/map/?wkid=102100&x=-9185597&y=4635206&l=9&v=1	68	Krout Creek		No	Yes
Morgan	57	https://www.mapwv.gov/flood/map/?wkid=102100&x=-8707260&y=4810738&l=9&v=1	12	Yellow Spring Run		No	No

Updated AE / Non-Restudy BFE



Flood Height BFE Values **Non-Restudy**



FLOOD HEIGHTS

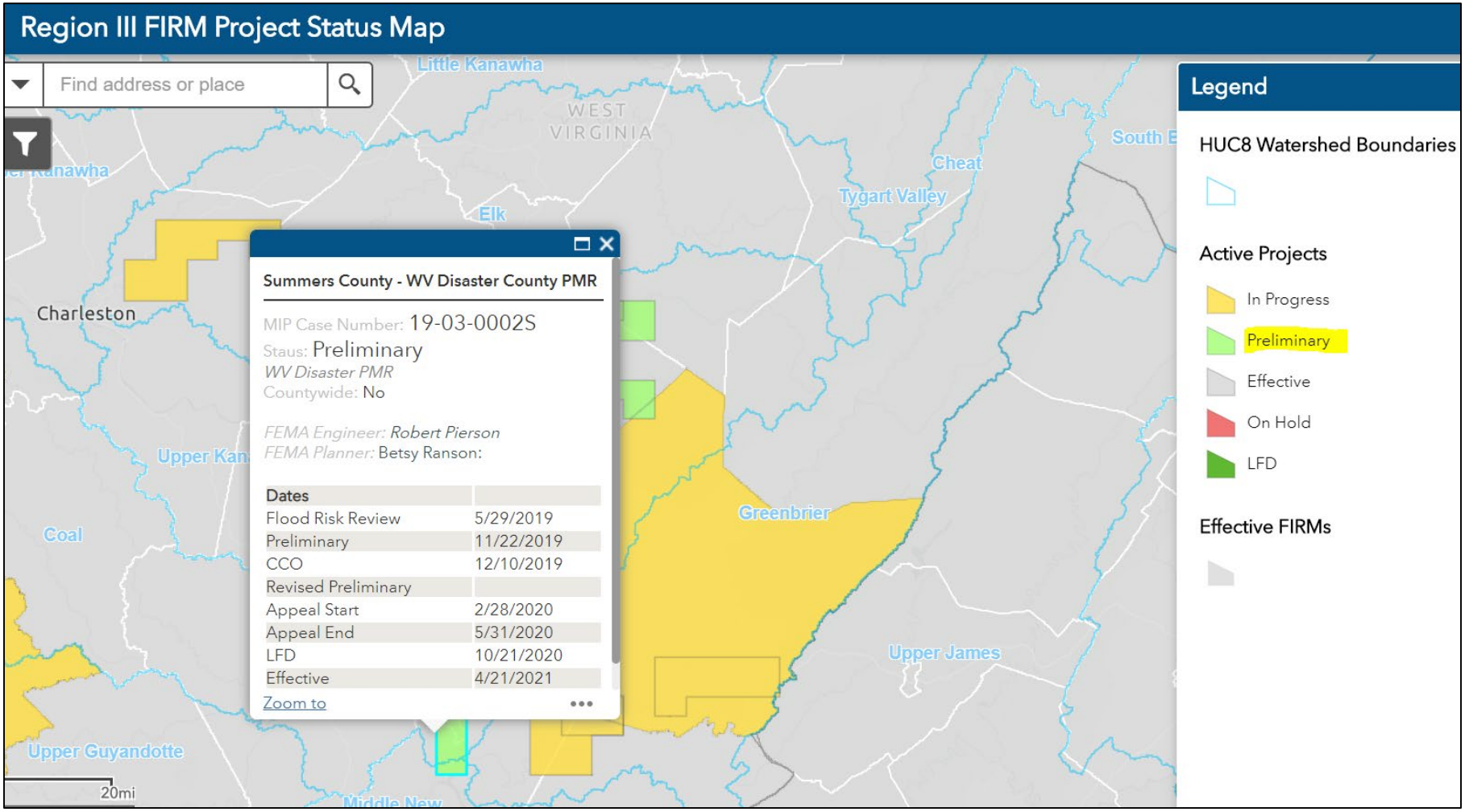
Non-Study Base Flood Elevation Heights displayed in Flood Results Query Panel. Integer values displayed.

Source: Flood Heights created from Updated AE Re-delineations using new topography

Coverage: Berkeley, Morgan, Jefferson, Monongalia ((Dunkard Creek), Wyoming (Clear Fork)

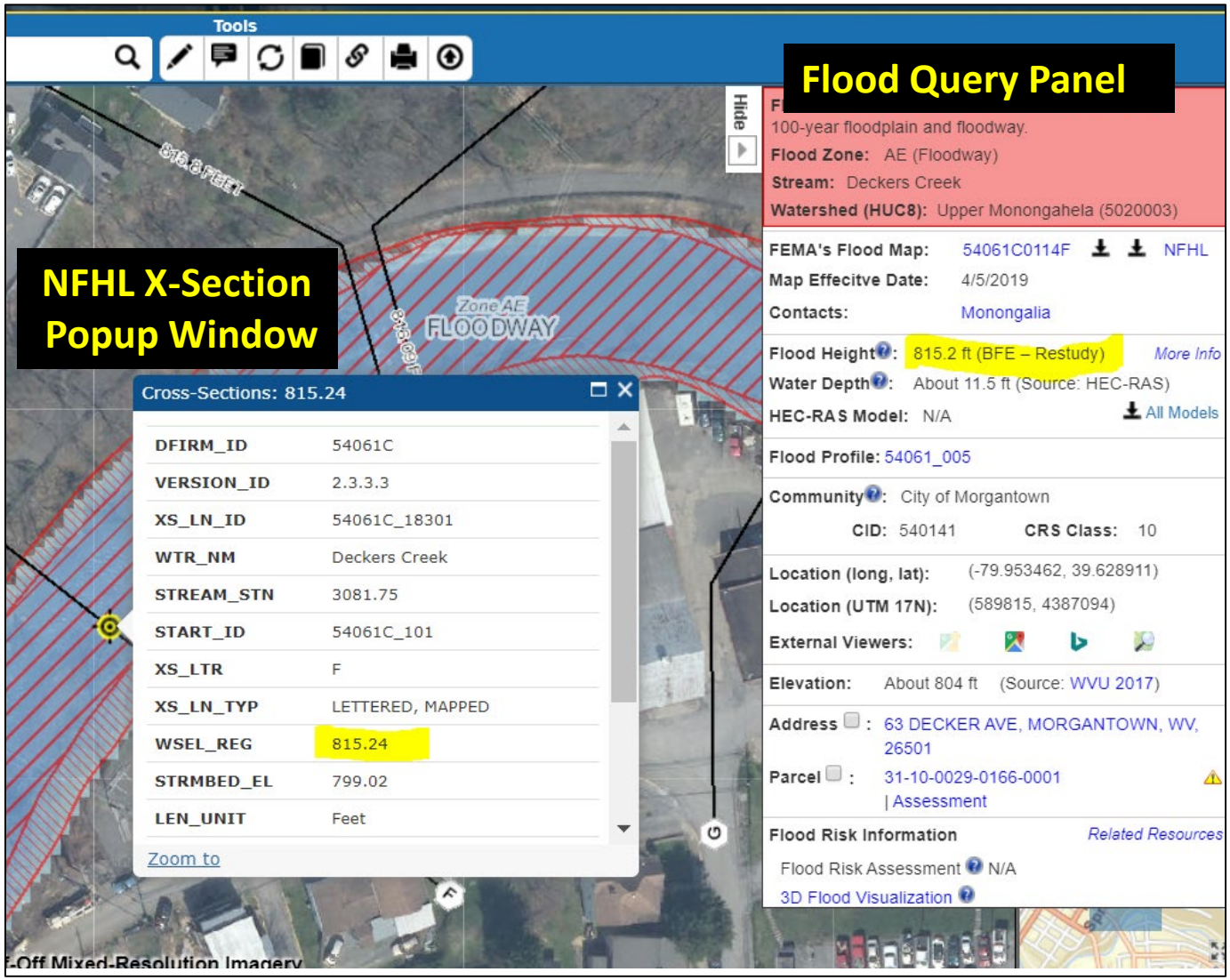
http://www.mapwv.gov/floodtest/?wkid=102100&x=-8674946&y=4785771&l=10&v=1

Risk Mapping



http://fema.maps.arcgis.com/apps/webappviewer/index.html?id=7268cafe7e3f4ceeafe0248720688b2d

Flood Height BFE Values **Restudy**



FLOOD HEIGHTS

Restudy Base Flood Elevation Heights displayed in Flood Results Query Panel. Fractional values displayed to tenth of decimal.

Source: FEMA RiskMAP Restudies

Coverage: Upper Monongahela Watershed (Select Streams)

http://www.mapwv.gov/floodtest/?wkid=102100&x=-8900379&y=4812162&l=12&v=1

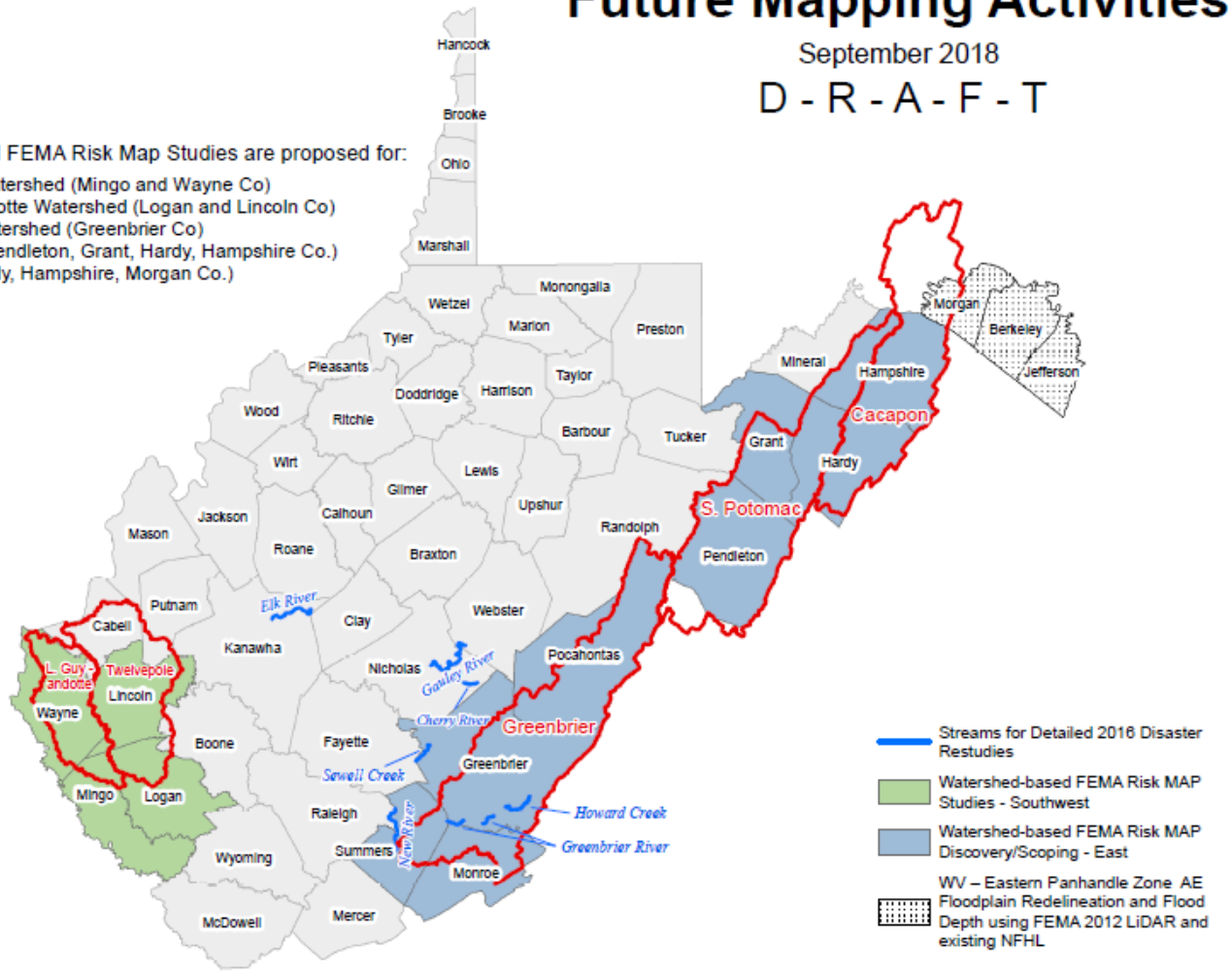
Proposed Flood Studies

Detailed disaster resudies in response to the 2016 event will take place along the following rivers:

- Greenbrier River
- Sewell Creek
- Howard Creek
- Elk River
- Gauley River
- Cherry River
- New River

Watershed-based FEMA Risk Map Studies are proposed for:

- Twelvepole Watershed (Mingo and Wayne Co)
- Lower Guyandotte Watershed (Logan and Lincoln Co)
- Greenbrier Watershed (Greenbrier Co)
- S. Potomac (Pendleton, Grant, Hardy, Hampshire Co.)
- Cacapon (Hardy, Hampshire, Morgan Co.)



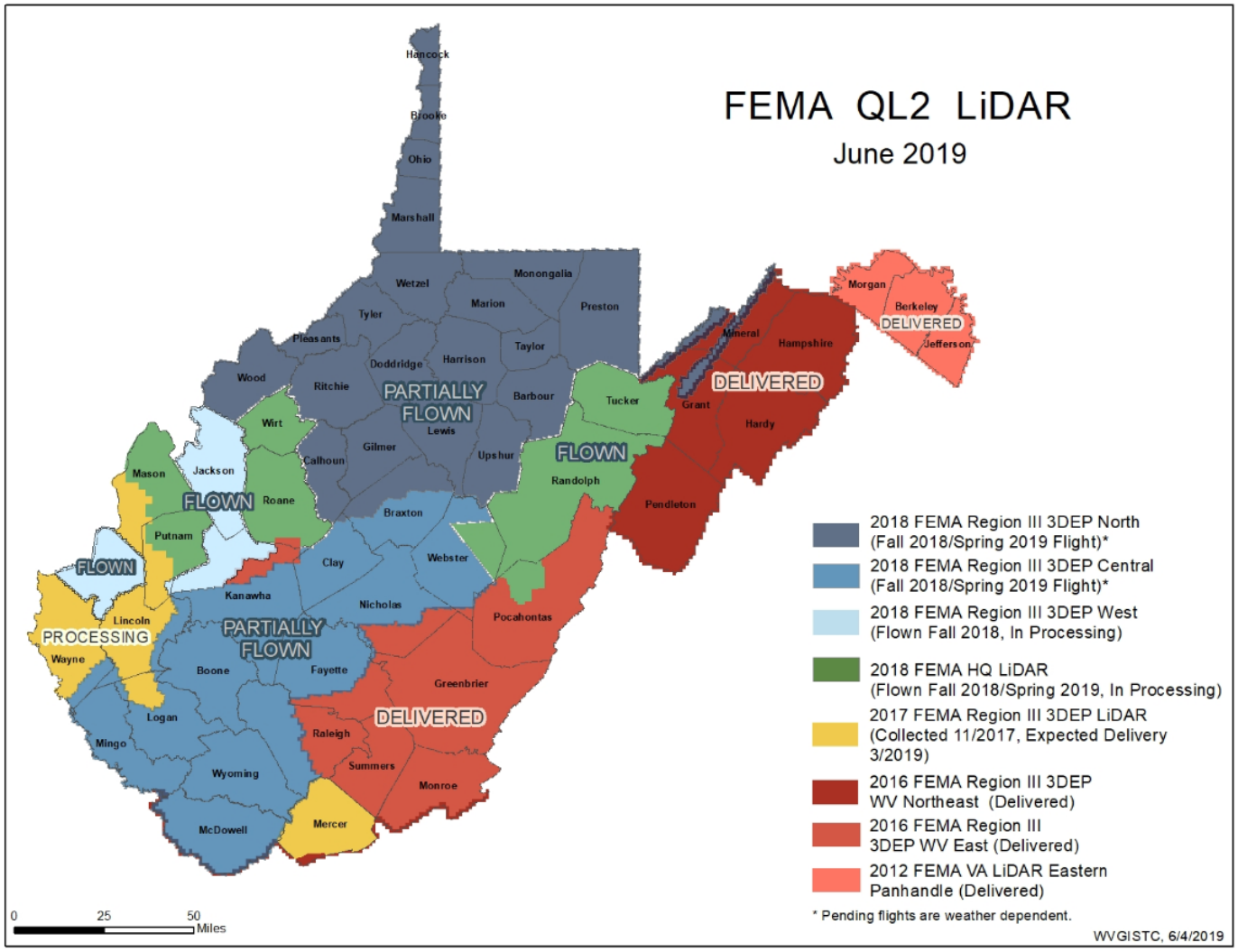
FEMA-Purchased Elevation

Elevation

- New FEMA-Purchased LiDAR-Derived Products published on WV Flood Tool
  - 1-foot contours
  - 1-meter resolution Digital Elevation Model (DEM)
- Source Elevation Metadata https://www.mapwv.gov/floodtest/docs/WV_FloodTool_ElevationSource_Metadata.pdf

Hi-Resolution Elevation Data – 1 Ft Contours

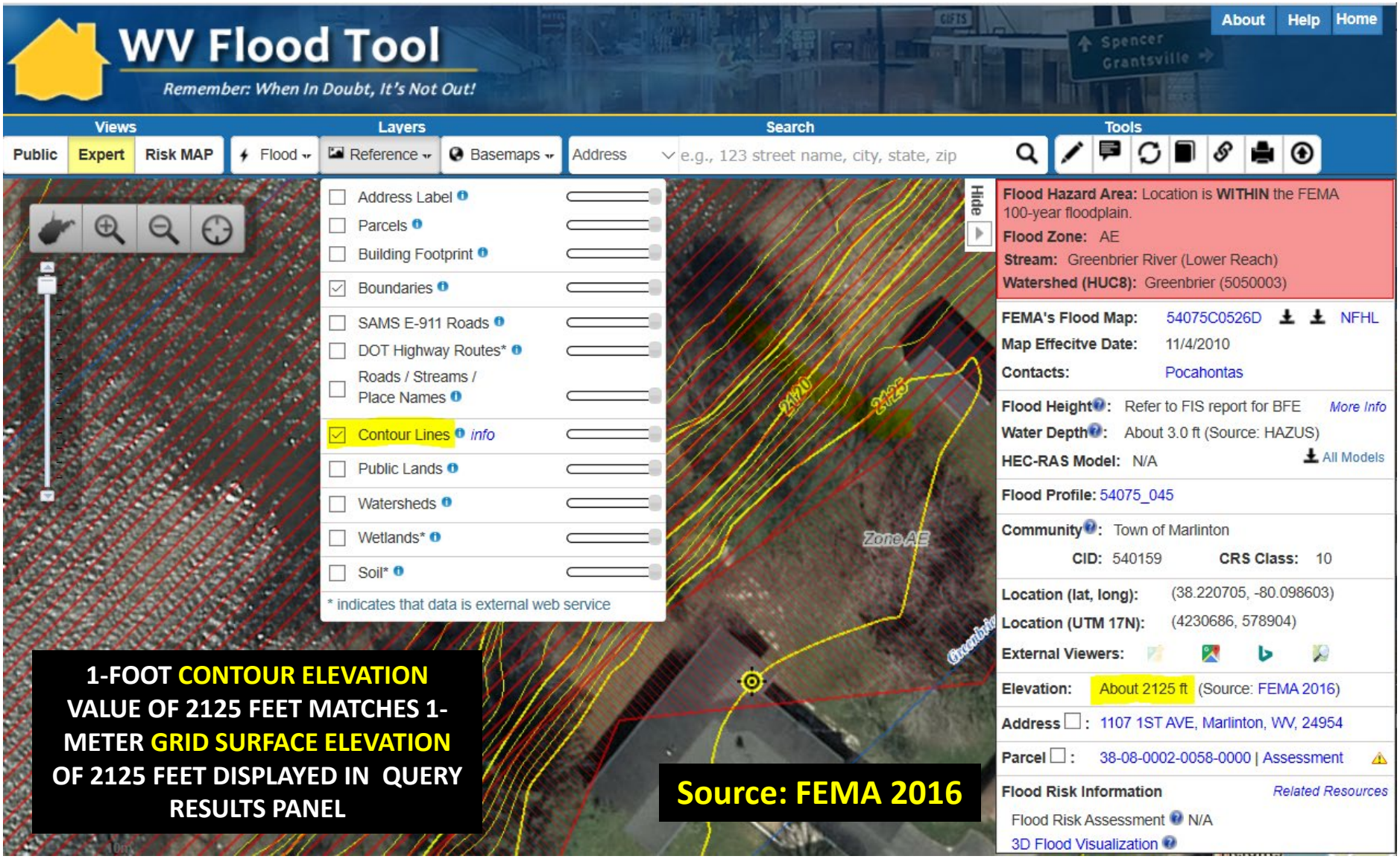
Elevation data can be accessed through State Data Clearinghouse - www.mapwv.gov/lidar



New statewide FEMA elevation data worth an estimated $5 million dollars

Ground Elevation

http://www.mapwv.gov/floodtest/?wkid=102100&x=-8916536&y=4610651&l=13&v=1



FEMA LiDAR-Derived Products: 1-M DEM and 1-Ft. Contour

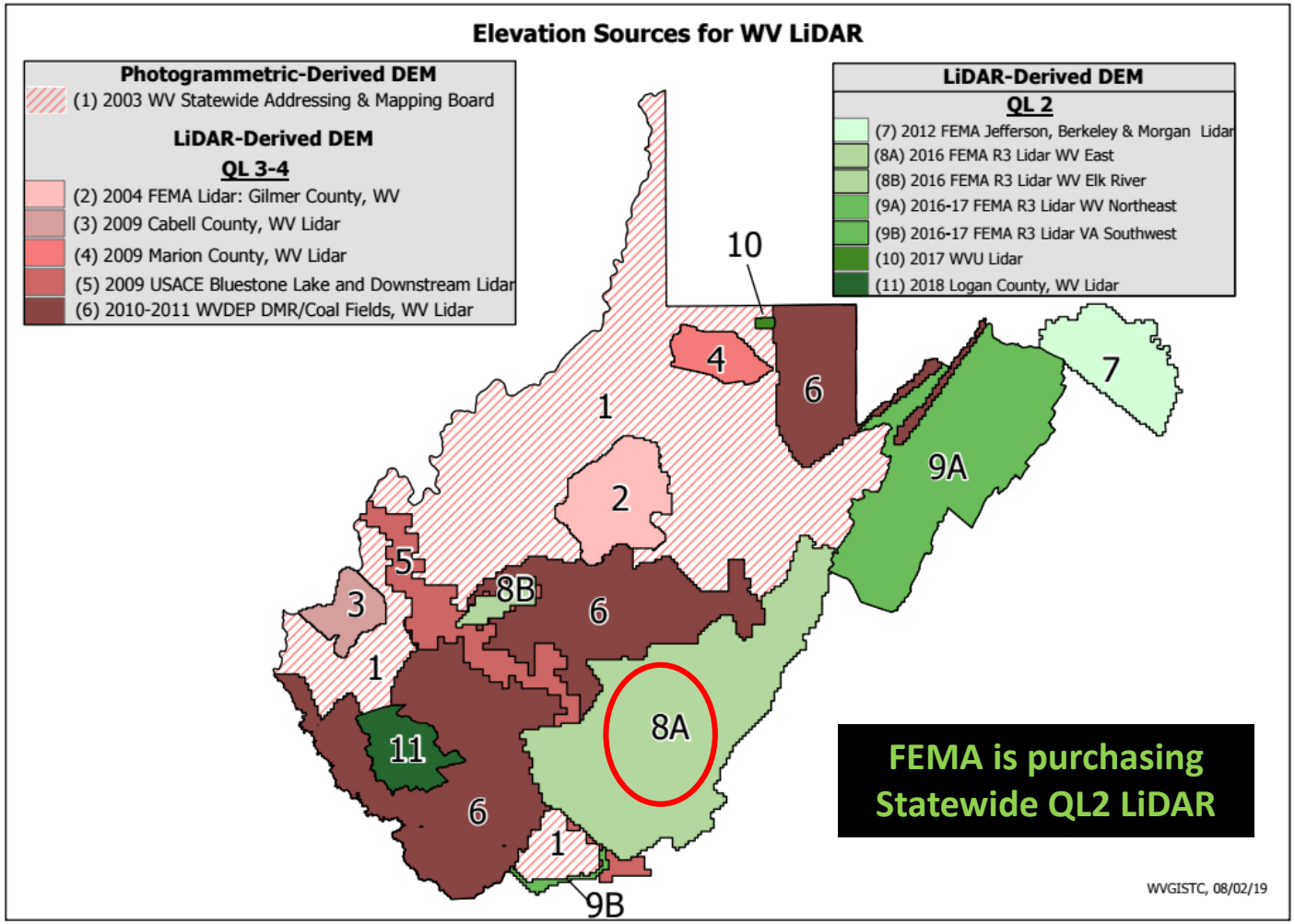
Elevation Source

Source Table

#	8A
WV Project Name	2016 FEMA R3 WV East
Source	FEMA
Year	2016
Quality Level	2
Grid Resolution	1m
Horizontal Accuracy	Not Provided
Vertical Accuracy	6.7 cm
Coordinate Sytem	UTM Zone 17
Horizontal Datum	NAD83
Vertical Datum	NAVD88
Z-Units	Meters

Elevation Metadata

Source Graphic



WV Elevation Source Listing and Graphic: https://www.mapwv.gov/floodtest/docs/WV_FloodTool_ElevationSource_Metadata.pdf

Statewide Hazard Assessment

(2) Risk ASSESSMENT

Risk **Assessment**

- **Building-Level & Community-Level Assessments**

- **Depth-Damage Function Assessments**
  - FEMA's OpenHazus Flood Risk Structure Tool (FAST)
  - Short-Term Shelter Models. *Sheltering statistics from 2016 Flood for Hazus population displacement and sheltering models needed*

- **Flood Risk Products**
  - Flood Risk Assessment Report
  - Building Level Risk Assessment (BLRA) Table and GIS Feature Class
  - Risk Assessment Layers published to WV Flood Tool RiskMAP View

- **Community Verification and Self-Assessments**
  - Verification: Community verification of risk assessments
  - Repetitive Loss Structures: Incorporated into assessment and verification

- **Web Viewing Products**
  - WV Flood Tool, Community-Level Risk Profile, Bldg. Impact Calculator

Building-Level Flood Risk Assessments

Building-Level Flood Risk Assessments support:

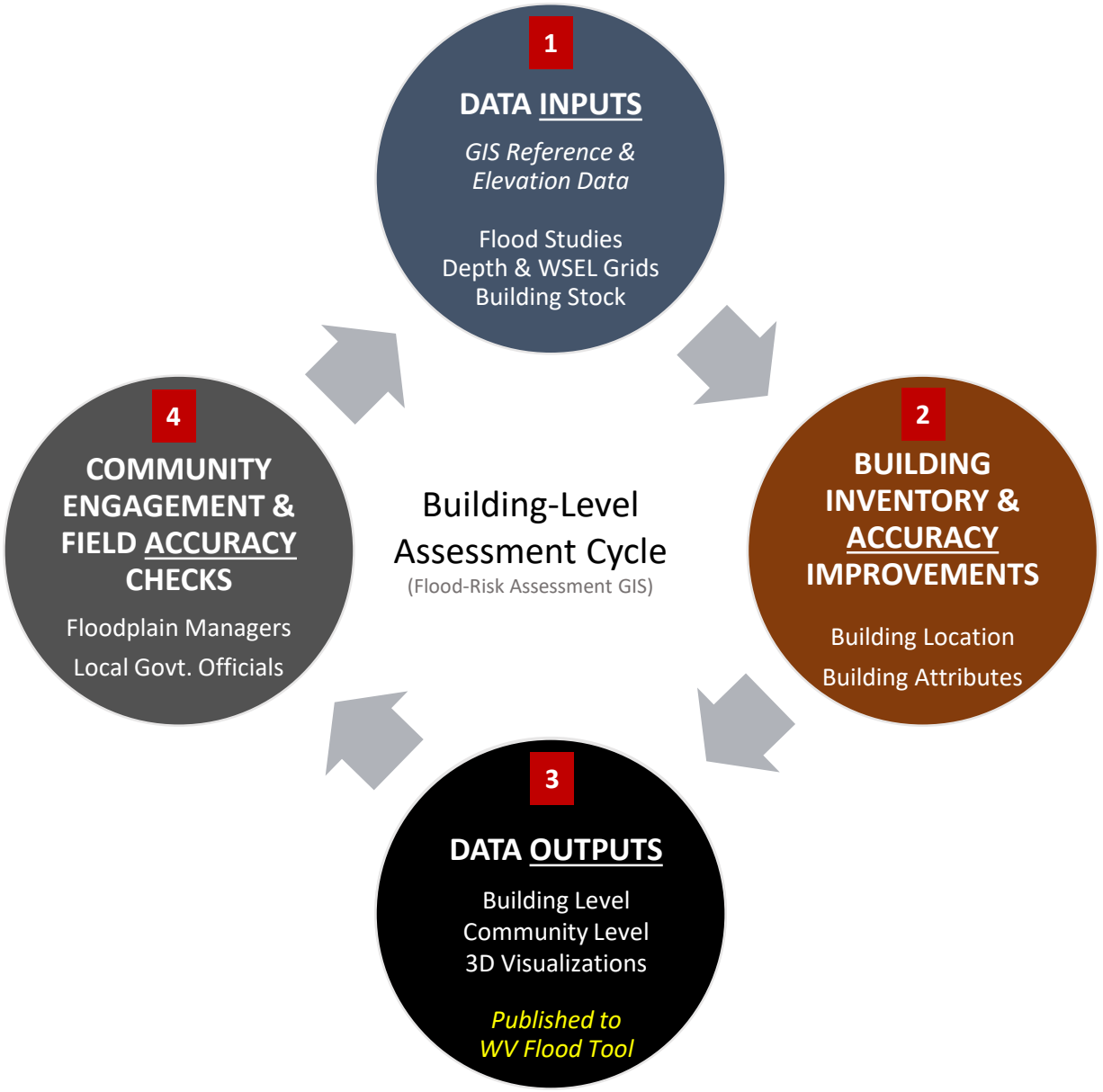
- Hazard Mitigation Plans (SHMO)
- Floodplain Management (NFIP)
- Community Assisted Visits (NFIP)
- Community Rating System (NFIP)

Benefits

- More detailed and accurate assessments
- Automated scripts generate outputs quickly
- Cost savings through efficiencies
- Helps multiple stakeholders
- Comprehensive Building Risk Database

Methodology

- Consistent methodology statewide
- Semi-automated workflows
- Continuous cycle to improve and update assessments

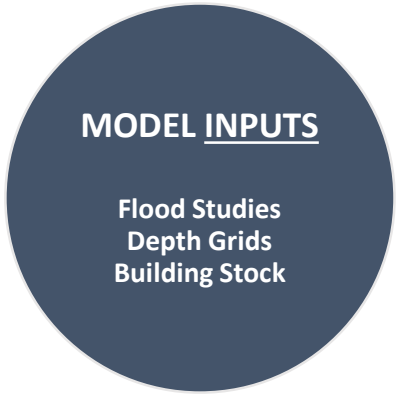


Statewide Flood Risk Assessment

Model Data Inputs

- GIS Reference Data
  - Community Boundaries
  - Parcels/Assessment Attributes (**Building Stock**)
  - E-911 Addresses (**Building Stock**)
  - Leaf-Off Aerial Imagery (**Building Stock**)

- New Elevation Data
  - Driver for **Flood Studies (new flood zone boundaries)**
  - **Depth Grids** and WSEL Grids
  - Ground Elevation: 1-ft contours, 1-m DEM



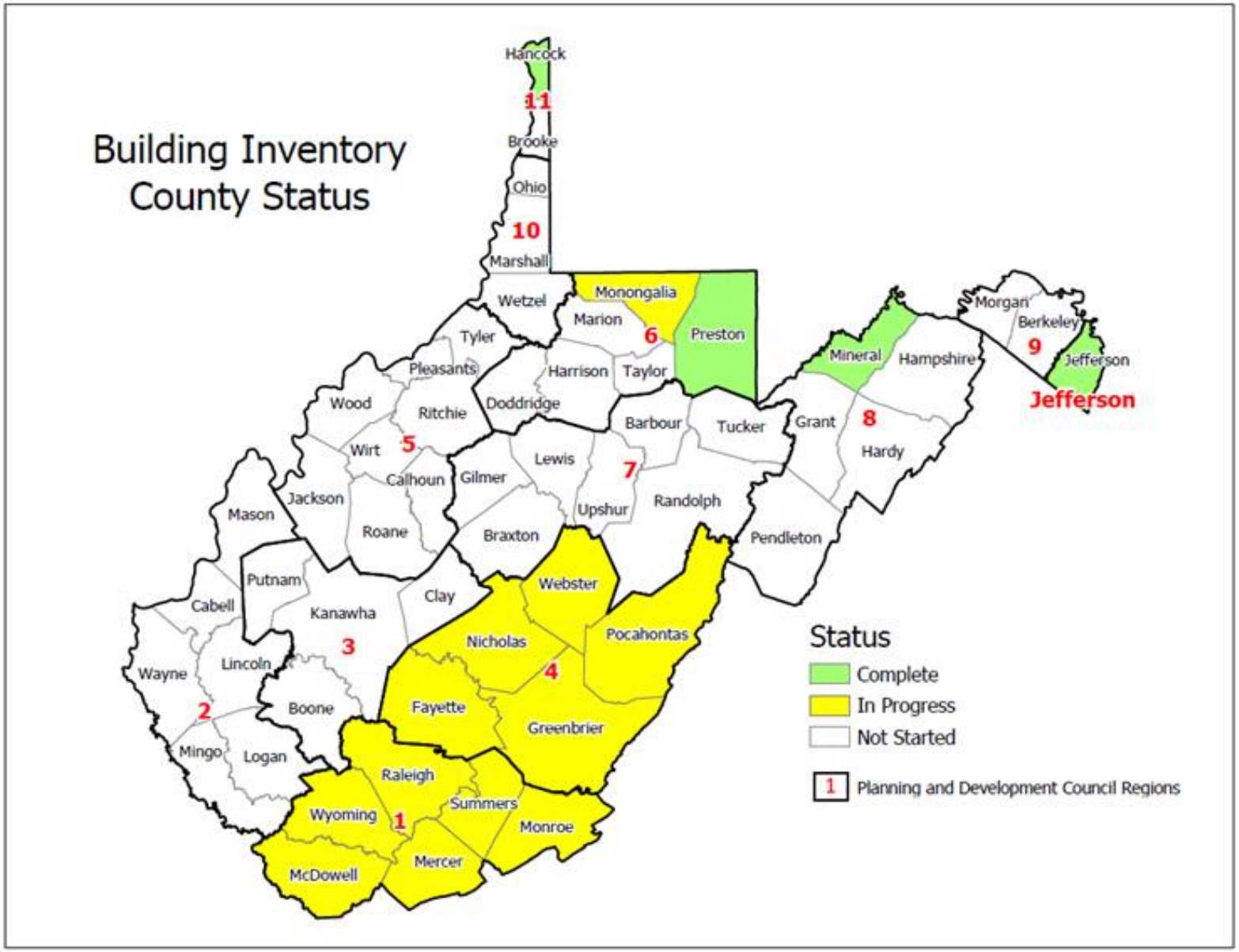
Statewide Flood Risk Assessment

Building Inventory & Accuracy Improvements

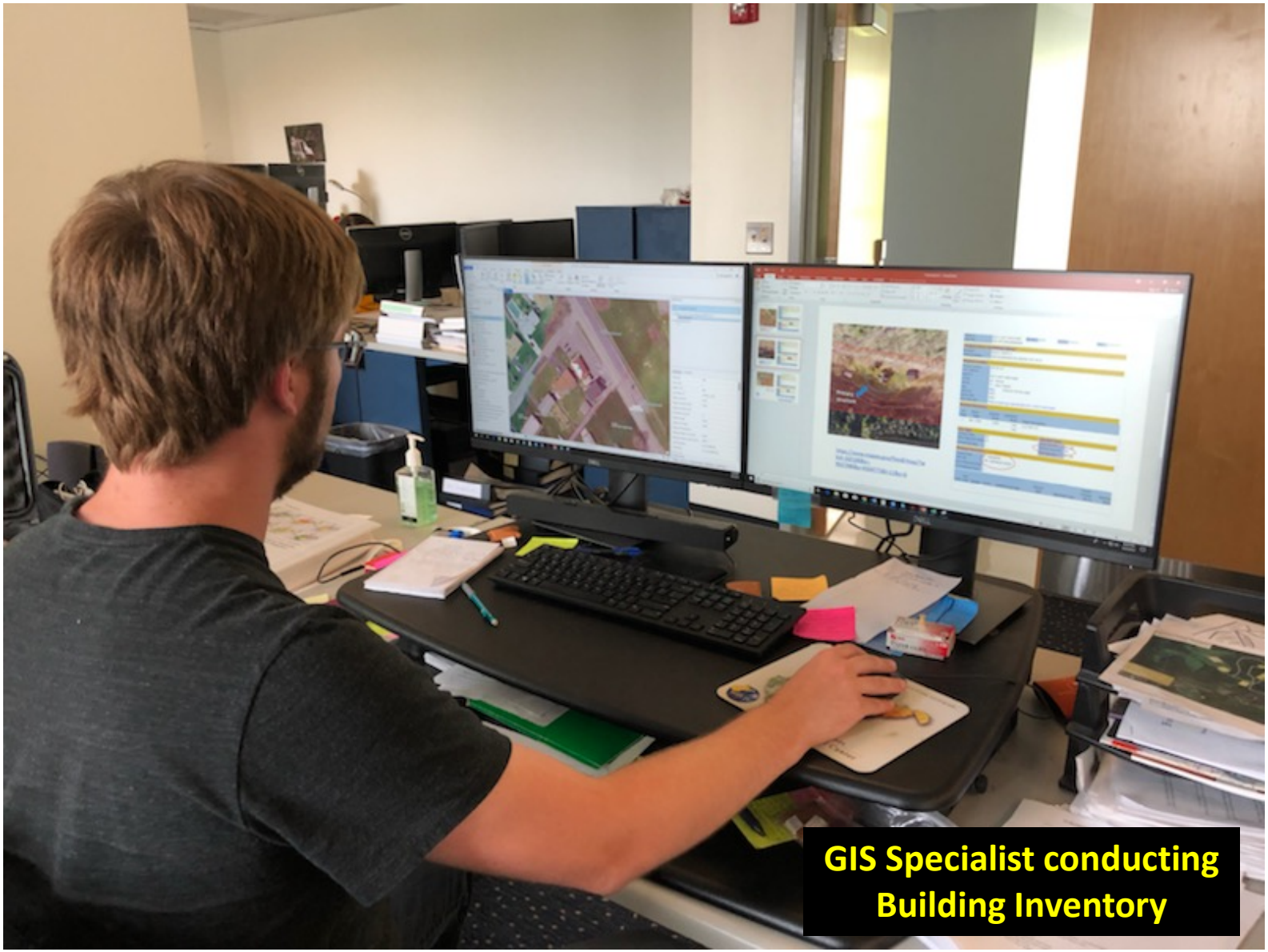
- **Building Inventory Objectives**
  - Identify Primary Structures points
  - Verify Building Identification
    - E-911 Address
    - Parcel geometry and assessment record
    - Aerial and StreetView Images
    - Building Sketches (parcel assessment record)
  - Determine Building Characteristics (Occupancy Class, Cost, Basement, Foundation Type, Stories, Area, etc.)
    - Default Characteristics derived from Assessment Records
    - Overriding Modified Building Characteristics from user-defined values
  - Ensure Building Point in most Restrictive Flood Zone
  - Iterative Process and QC to make more accurate

- **Record Data Issues and Data Gaps**

Building Inventory Status



Building Inventory



GIS Specialist conducting Building Inventory

Building Inventory Workflow

1 Initial Processing

- Building Inventory Setup
- Assessment Error Flags
- Execute Building Inventory Process Script (*BIP Script*)

2 Building Inventory Processing (BIP)

- Building Inventory Processing (BIP) Feature Class
  - Primary Insurable Structure Identification
  - Modified User-Defined Values
    - Location Identifiers (Parcel ID, E-911 Address)
    - Building Characteristics (Occupancy Class, Stories, Basement, Foundation, First Floor Height, Area, Cost)
  - Data Error Flags
  - Quality Control Checks
- Execute Building Inventory Enhanced Script (*BIE Script*)

3 Building Inventory Enhanced (BIE)

- Building Inventory Enhanced (BIE) Table #1 (iterative process to fix errors)
- Building Input FAST (BIF) Table #2 for OpenHazus Flood Loss Utility
- Re-execute Building Inventory Enhanced Script (*BIE Script*) to fix errors

4 Hazus Flood Assessment Structure Tool (FAST)

- Inputs: Building Input FAST (BIF) Table #2, DDF Table, Depth Grids
- Output: Building Output FAST (BOF) Table #3
- Execute OpenHazus Flood Assessment Structure Tool (FAST)

5 Building-Level Outputs & Verification

- Join Building Inventory Enhanced (BIE) Table #1 and Building Output FAST (BOF) Table #3 to Building Inventory GIS Feature Class
- GIS Product: Building-Level Risk Assessment (BLRA) Feature Class
- Table Product: Merged Individual Building Assessment Table(s) (BLRA)

Unit of work at ***county scale***

Blue Text: GIS File
Red Text: Tables

Building Definition

CRS Manual Page 300-4

301.a Definition of "Building"

- 2 or more exterior walls and a roof affixed to a site
- Manufactured (mobile) home
- Travel trailer without wheels

Primary Structure: Not a Building

***CRS Manual* Page 300-5**

"Not a Building"

- ✓Open pavilions, carports, underground pump stations, trailers, etc. are not buildings
- ✓Accessory structures are not counted

*All **primary structures** in high-risk flood zones are inventoried.*
***Critical infrastructure** in moderate-risk flood zones also inventoried.*

Building ID Format - Elevation Certificates

Collect multiple spatial identifiers to verify location

Parcel	01-08-0011-0069-0000
	01 (County) - 08 (District) - 0011 (Map) - 0069 (Parcel) - 0000 (Suffix)
Address	604 S Main St, Philippi, West Virginia, 26416

★ **Building Identifier**	01-08-0011-0069-0000_604
★ **X,Y Coordinate**	39.144752, -80.033529
★ **Google Plus Code (11-digit)**	86FX4XV8+VHF
★ **Share MAP URL Link**	https://www.mapwv.gov/flood/map/?wkid=102100&x=-8909292&y=4742427&l=12&v=1
Share Parcel Assessment URL Link	http://www.mapwv.gov/Assessment/Detail/?PID=01080011006900000000

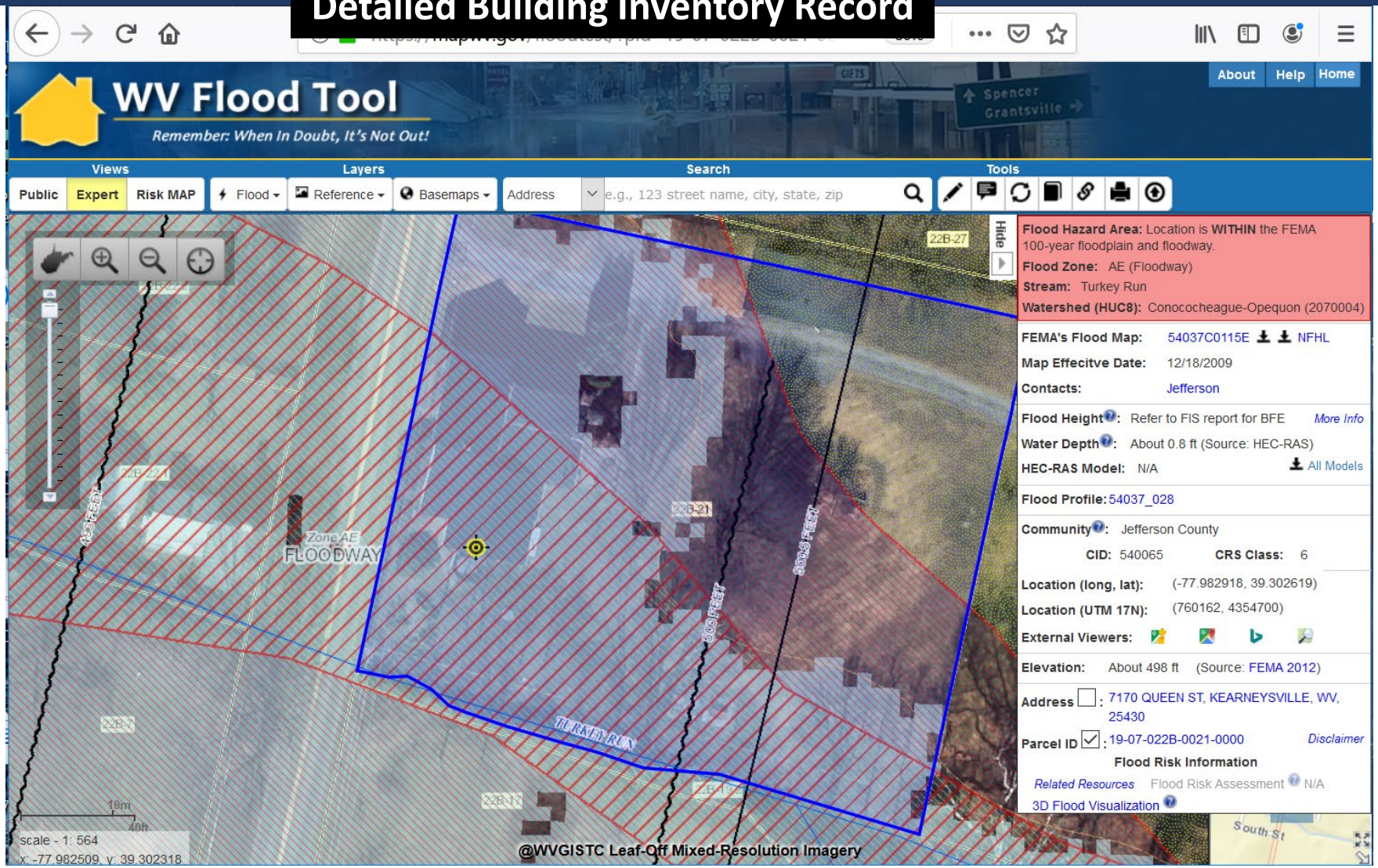
★ = **Unique Identifiers**

Notes: Owner Name from assessment records and Building Pictures (elevation certificates) can be helpful for property identification purposes

Proper Building and Property Identifiers are important for exchanging building-level data efficiently among local, state, and federal partners (including UDFs, LOMAs, Mitigated Buyout Properties, Elevation Certificates, Repetitive Loss Structures, etc.)

Building 19-07-022B-0021-0000_7170

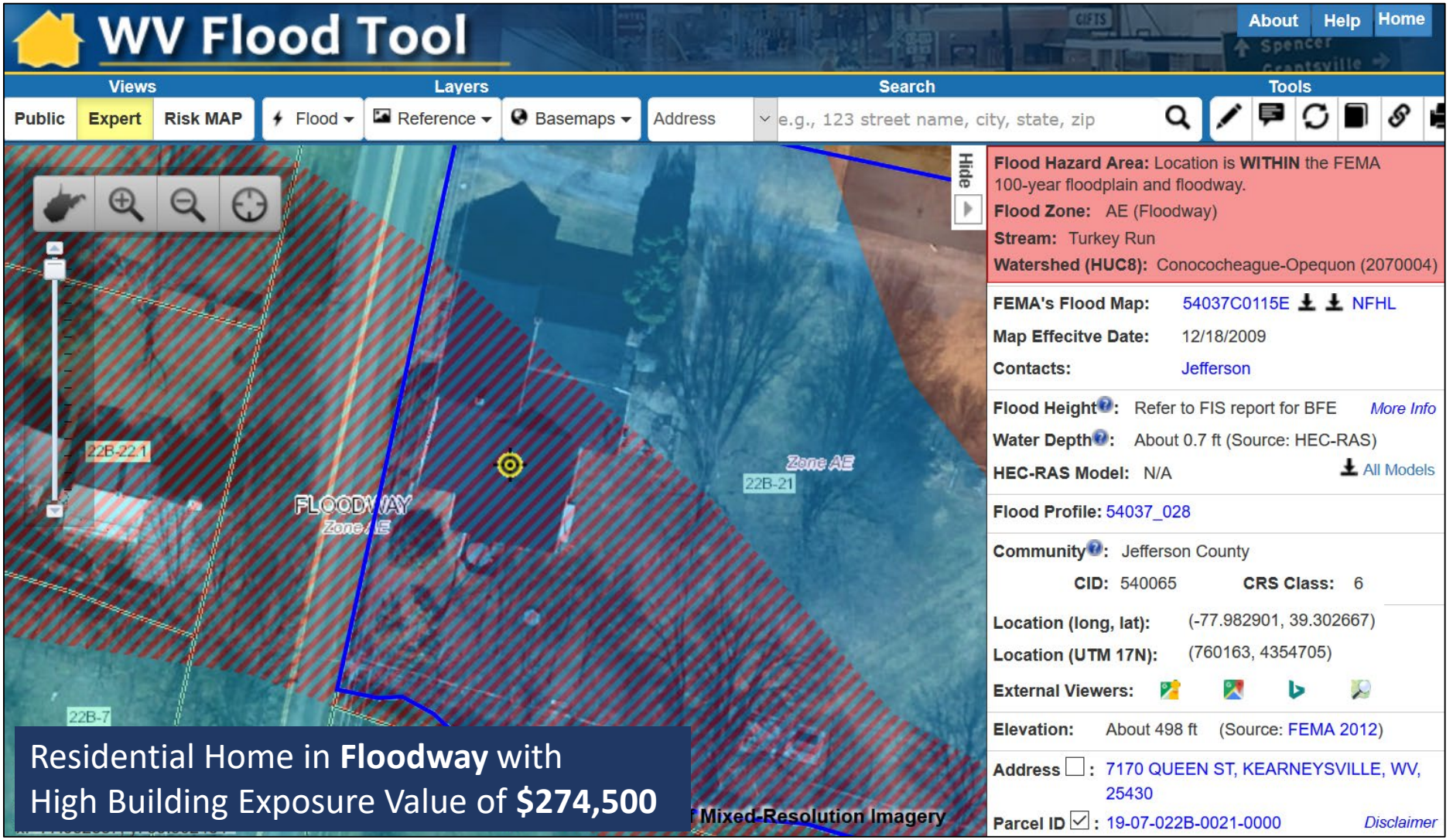
Detailed Building Inventory Record



1% Annual Chance **Flood Depth** Exists for this Building

Building 19-07-022B-0021-0000_7170

Detailed Building Inventory Record



Residential Home in **Floodway** with High Building Exposure Value of **$274,500**

Building 19-07-022B-0021-0000_7170

Flood Tool External Link to Google **Street View**

Building 19-07-022B-0021-0000_7170

WV Real Estate Assessment Data

About | New Search | Structure Drawing

Parcel ID	19-07-022B-0021-0000	Tax Year	2018	County	Jefferson
Root PID	1907022B002100000000				

Property Owner and Mailing Address

Owner(s)	WHEATON TREVOR D & SHARON M
Mailing Address	7170 QUEEN ST, KEARNEYSVILLE, WV 25430

Owner and Property Location

Property Location

Physical Address	7170 QUEEN ST
E-911 Address	7170 QUEEN ST 25430
Parcel ID	19-07-022B-0021-0000
County	19 - Jefferson
District	7 - Middleway District
Map	022B (Click for PDF tax map)
Parcel No.	0021
Parcel Suffix	0000
Map View Link	https://mapwv.gov/parcel/?pid=19-07-022B-0021-0000

Legal Description

General Information

Tax Class	Book / Page	Deeded Acres	Calculated Acres	Legal Description
2	1192 / 126	0.700	0.82	7/10 AC REININGER
			0.82	

Cost Values

Cost Value

Dwelling Value	$269,300
Other Bldg/Yard Values	$5,160
Commercial Value	---

Appraisal Value

Land Appraisal	$36,500
Building Appraisal	$274,500
Total Appraisal	$311,000

Cost Value

Dwelling Value	$269,300
Other Bldg/Yard Values	$5,160
Commercial Value	---

Appraisal Value

Land Appraisal	$36,500
Building Appraisal	$274,500
Total Appraisal	$311,000

Building Information

Property Class	R - Residential
Land Use	101 - Residential 1 Family
Sum of Structure Areas	4,006
# of Buildings (Cards)	1

Main Building Information

Card	Year Built	Stories	Grade	Architectural Style	Exterior Wall	Basement Type	Square Footage (SFLA)	Building Value
1	1900	2	B+	Conventional	Frame	Part	4,006	$269,300
							4,006	$269,300

Card	Year Built	Attic	Fuel	Heat System	Heat/AC	Bedrooms	Full Baths	Half Baths	Total Rooms
1	1900	Unfinished	Oil	Hot Water	Central	5	2	1	9
						5	2	1	9

Other Building and Yard Improvements

Outbuildings

Bldg/ Card #	Line	Type	Year Built	Grade	Units	Size	Area	Replace Cost	Adjusted Replace Cost
1	1	Frame or CB Detached Garage	1984	C	1	10x20	200	$3,910	$3,400
1	2	Four Side Closed Wood Pole Barn	1981	C	1	28x20	560	$4,550	$1,760

Flood Zone Information

Learn more at WV Flood Tool

Acres (c.)	Risk	
0.82	High	This parcel appears to be in a HIGH RISK flood hazard zone.

Property Intersect Flood Zone

Sales History

Sale Date	Price	Sale Type			Book	Page
6/5/2017					2	123
6/5/2017					1192	123
6/2/2017	$343,250	Land and Buildings	4	0	1192	126

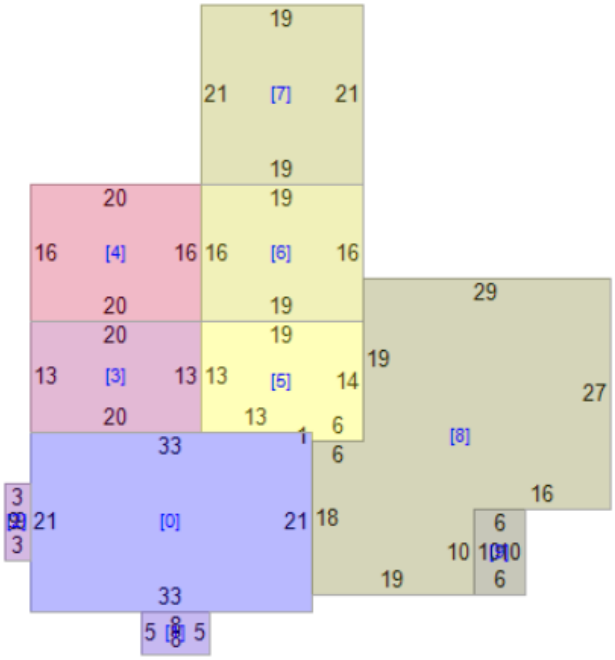
Web **Parcel Assessment Report**
for Building Identification, Building Characteristics, and Cost Values

Building 19-07-022B-0021-0000_7170

West Virginia
Real Estate Assessment - Building Sketch

Building Sketch Diagram (main area and additions)

Jefferson County, District 7, Map 22B, Parcel 21



Parcel ID: 1907022B002100000000
Building: 1 ▼ of 1

Additions

#	Lower	First	Second	Third	Area	Value
0	Refer to Base Area Description				693	$0
1	---	Masonry terrace	---	---	40	$530
2	---	Frame bay window	---	---	27	$1,040
3	---	One story frame	One half story frame	---	260	$14,460
4	Basement unfinished	One story brick	One half story frame	---	320	$21,260
5	---	One story frame	---	---	253	$9,730
6	---	One story frame	---	---	304	$11,690
7	---	Patio (concrete)	---	---	399	$1,140
8	---	One story frame	---	---	1,021	$39,250
9	---	Open frame porch	---	---	60	$1,230

☑ Show dimensions ☑ Show addition numbers

Building Sketches from parcel assessment records are available for all **Residential** and **Farm** properties. Very useful for Building Identification.

Building 19-07-022B-0021-0000_7170

Building ID	**7170:19-07-022B-0021-0000**
Full E-911 Address	7170 QUEEN ST, KEARNEYSVILLE, WV 25430
Full Owner Address	7170 QUEEN ST, KEARNEYSVILLE, WV 25430
GIS Parcel ID	19-07-022B-0021-0000
WV Flood Tool Link	https://mapwv.gov/assessment/detail/?pid=1907022B002100000000
WV Parcel Assessment Link	https://mapwv.gov/flood/map/?pid=19-07-022B-0021-0000
CID	540065
Community Name	JEFFERSON COUNTY *
County	JEFFERSON COUNTY
Incorporated/Unincorporated	Unincorporated
Flood Zone Designation	Effective 100 yr Zone AE - Floodway
Floodway	**Yes**
Regulatory Status	Regulatory
FIRM Status	Pre-FIRM
Flood Depth Value	0.5
Flood Depth Source	HEC-RAS
Ground Elevation	151.9
Ground Elevation Source	2012 FEMA Jefferson, Berkeley & Morgan Lidar
Year Built	1900
Grade	B+
Property Class Code	R
Property Class Description	Residential
Land Use Code	101 - Residential 1 Family
Land Use Description	101
Hazard Occupancy Code	RES1
Stories	2
Exterial Wall Type	Frame
Architectural Style	None
Structure Area	4006
Basement Type	Part
Dwelling Value	269300
OBY Value	5160
Building Appraisal	**$274,500**

Detailed Building Inventory Record

Foundation Type

Basement Types from Assessment Records are used to compute Foundation Type and First Floor Height

Table 1: Basement to FdtnCode to FirstFloorHeight

	Foundation Type				First Floor Height		
WV Assessment Record Values for BASEMENT	**FdtnType**	**FdtnCode**	Modified-FdtnCode	Description	**FirstFloorHt (PRE-FIRM) ft.**	**FirstFloorHt (POST-FIRM) ft.**	Modified-FFH
3645 River Rd, Shepherdstown, WV 25443	Pile	**1**	1	Exposed supports built off-site as single units.	7.0	8.0	<value>
	Pier	2	2	Exposed supports built on-site using masonry blocks.	5.0	6.0	<value>
	Solid Wall	3	3	Load-bearing perimeter walls taller than 4 ft.	7.0	8.0	<value>
FULL or **PART** (Residential); **FIRST BASEMENT**, **SUB BASEMENT** (Commercial)	Basement	**4**	4	Structure that has any floor beneath grade.	4.0	4.0	<value>
CRAWL (Residential); **CRAWL SPACE** (Commercial)	Crawlspace	**5**	5	Short load bearing masonry or concrete wall. Default for Trailers RES2.	3.0	4.0	<value>
	Fill	6	6	Soil built up above the ground elevation.	2.0	2.0	<value>
NONE or blank	Slab-on-Grade	**7**	7	Concrete slab resting on the ground. Default if no basement value except for RES2.	1.0	1.0	<value>

Statewide Flood Risk Assessment

Flood Model Outputs

- **Flood Models**
  - FEMA Open Hazus **Flood Assessment Structure Tool** (FAST)
    - Building Direct Economic Loss Estimates
    - Incorporate **Population Displacement** and **Short-Term Shelter Needs** in FEMA's Open Hazus script *(in development)*

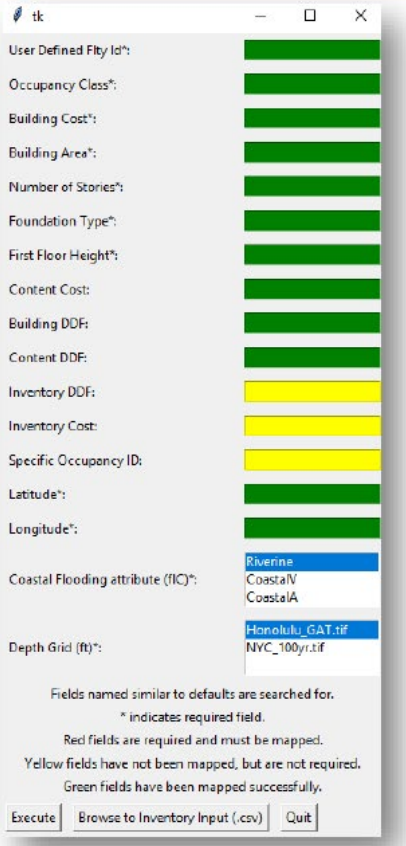
- **Model Data Outputs**
  - Community-Level
  - Building-Level
  - 3D Visualizations

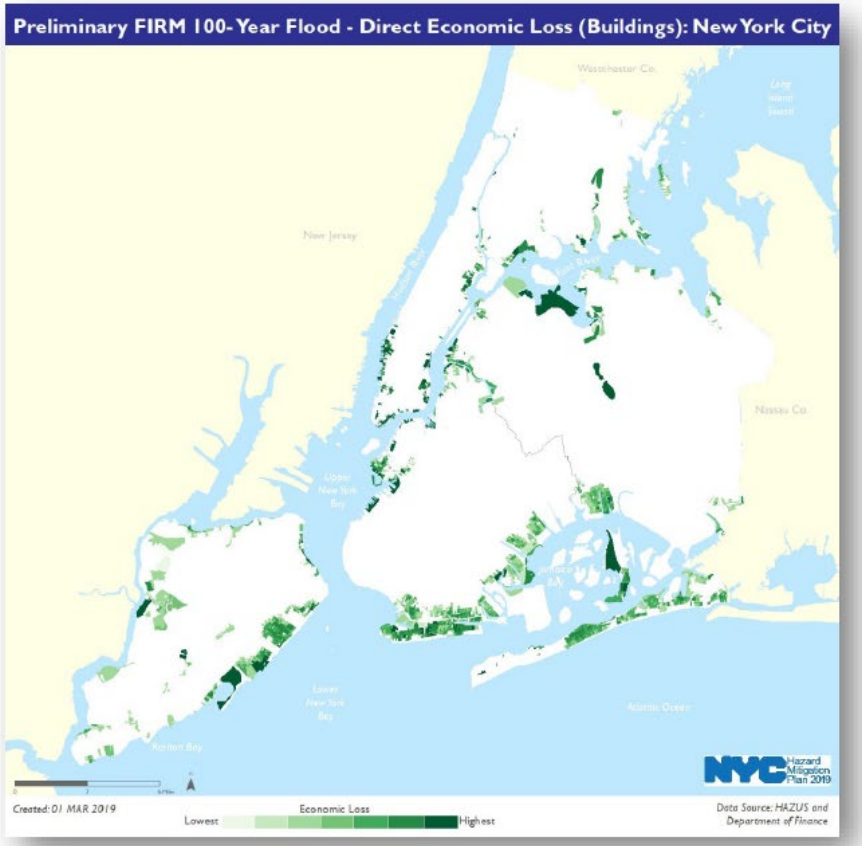
- **Risk Layers Published to RiskMAP View of WV Flood Tool** (www.mapwv.gov/Flood)

- **Community Flood Risk Assessments**
  - Submit flood risk assessments and data to communities, state, and federal partners
  - Identify potential mitigation actions and resources for stakeholders that correlate with risk assessment outputs/analytics

Hazus Flood Loss Estimation Program

Flood Loss Utility





FEMA's new OpenHazus Flood Loss Utility.

It works!

Very beneficial for project!

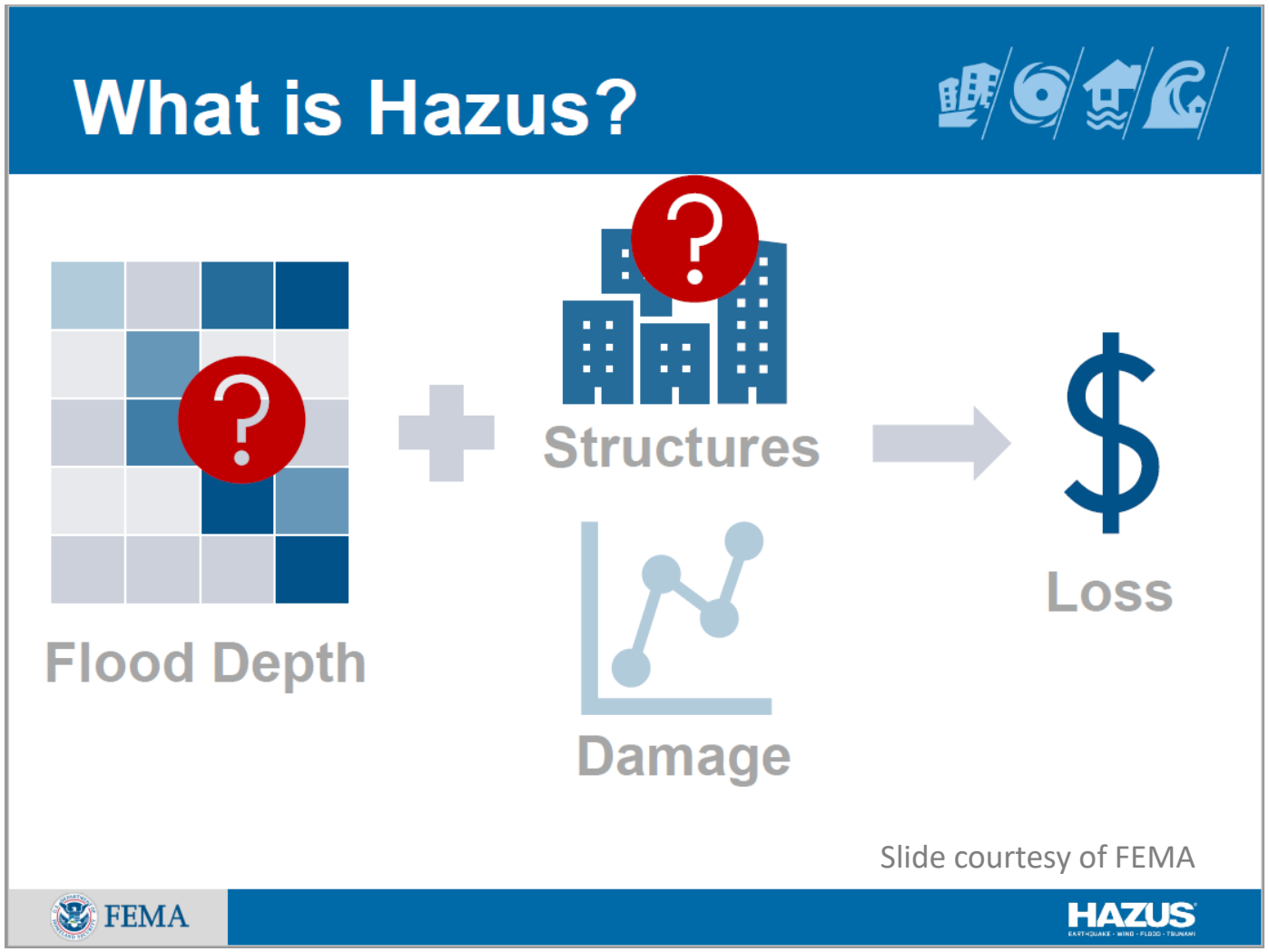
Slide courtesy of FEMA

FEMA

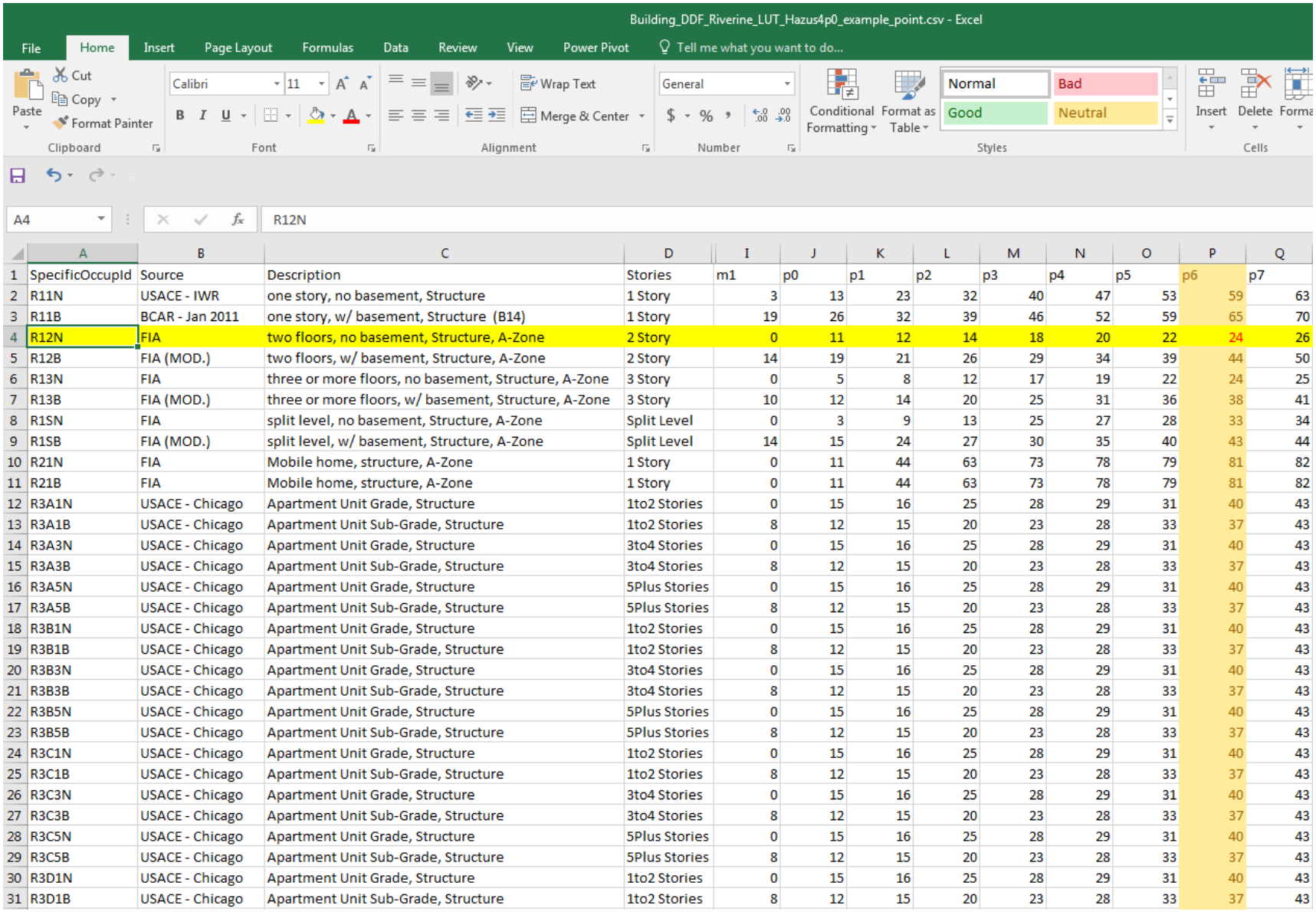
HAZUS
EARTHQUAKE · WIND · FLOOD · TSUNAMI

Hazus Flood Loss Estimation Program

A GIS-based natural hazard analysis tool developed and freely distributed by FEMA

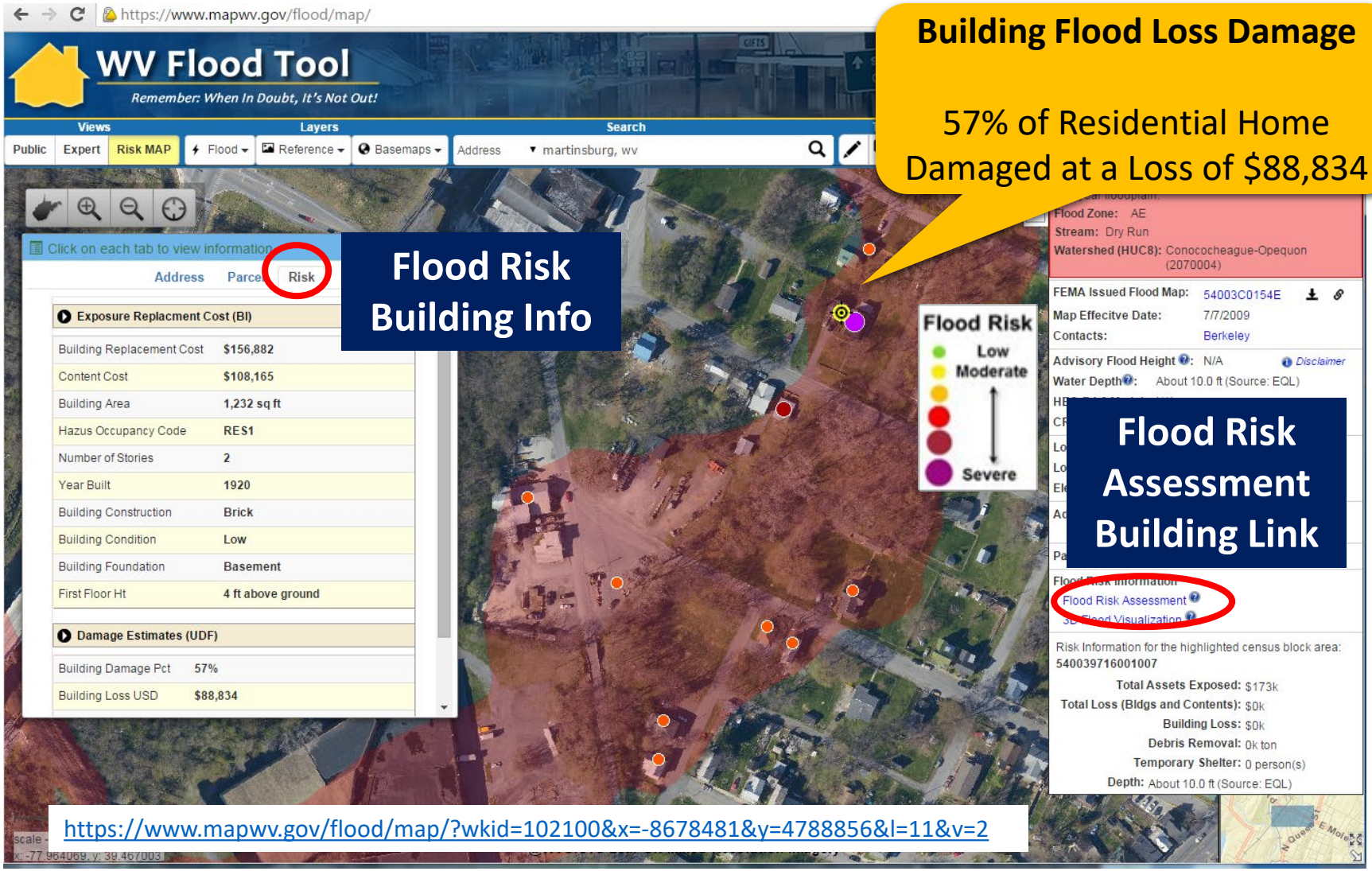


Depth-Damage Function (DDF) Values



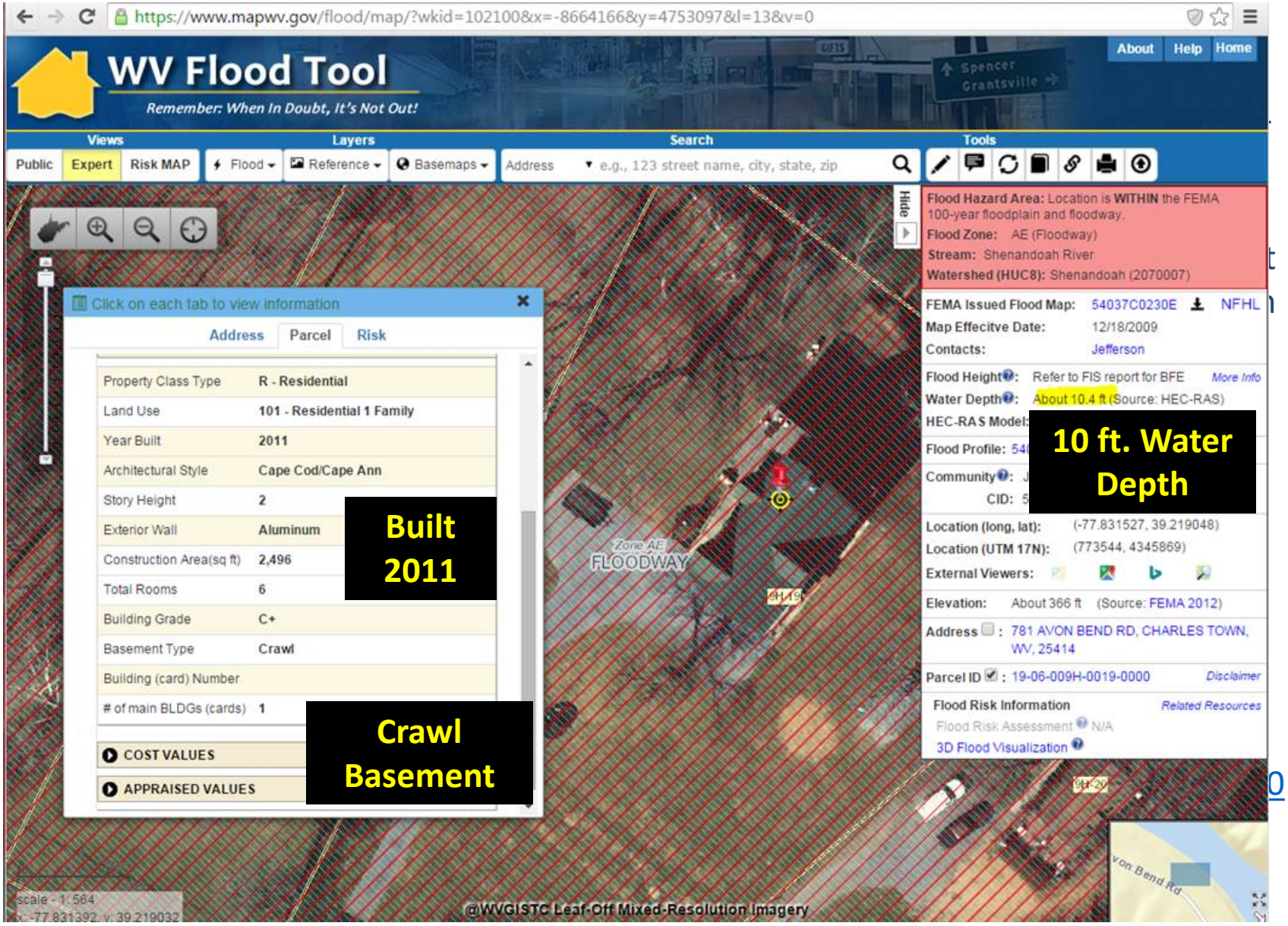
	A	B	C	D	I	J	K	L	M	N	O	P	Q
1	SpecificOccupId	Source	Description	Stories	m1	p0	p1	p2	p3	p4	p5	p6	p7
2	R11N	USACE - IWR	one story, no basement, Structure	1 Story	3	13	23	32	40	47	53	59	63
3	R11B	BCAR - Jan 2011	one story, w/ basement, Structure (B14)	1 Story	19	26	32	39	46	52	59	65	70
4	R12N	FIA	two floors, no basement, Structure, A-Zone	2 Story	0	11	12	14	18	20	22	24	26
5	R12B	FIA (MOD.)	two floors, w/ basement, Structure, A-Zone	2 Story	14	19	21	26	29	34	39	44	50
6	R13N	FIA	three or more floors, no basement, Structure, A-Zone	3 Story	0	5	8	12	17	19	22	24	25
7	R13B	FIA (MOD.)	three or more floors, w/ basement, Structure, A-Zone	3 Story	10	12	14	20	25	31	36	38	41
8	R1SN	FIA	split level, no basement, Structure, A-Zone	Split Level	0	3	9	13	25	27	28	33	34
9	R1SB	FIA (MOD.)	split level, w/ basement, Structure, A-Zone	Split Level	14	15	24	27	30	35	40	43	44
10	R21N	FIA	Mobile home, structure, A-Zone	1 Story	0	11	44	63	73	78	79	81	82
11	R21B	FIA	Mobile home, structure, A-Zone	1 Story	0	11	44	63	73	78	79	81	82
12	R3A1N	USACE - Chicago	Apartment Unit Grade, Structure	1to2 Stories	0	15	16	25	28	29	31	40	43
13	R3A1B	USACE - Chicago	Apartment Unit Sub-Grade, Structure	1to2 Stories	8	12	15	20	23	28	33	37	43
14	R3A3N	USACE - Chicago	Apartment Unit Grade, Structure	3to4 Stories	0	15	16	25	28	29	31	40	43
15	R3A3B	USACE - Chicago	Apartment Unit Sub-Grade, Structure	3to4 Stories	8	12	15	20	23	28	33	37	43
16	R3A5N	USACE - Chicago	Apartment Unit Grade, Structure	5Plus Stories	0	15	16	25	28	29	31	40	43
17	R3A5B	USACE - Chicago	Apartment Unit Sub-Grade, Structure	5Plus Stories	8	12	15	20	23	28	33	37	43
18	R3B1N	USACE - Chicago	Apartment Unit Grade, Structure	1to2 Stories	0	15	16	25	28	29	31	40	43
19	R3B1B	USACE - Chicago	Apartment Unit Sub-Grade, Structure	1to2 Stories	8	12	15	20	23	28	33	37	43
20	R3B3N	USACE - Chicago	Apartment Unit Grade, Structure	3to4 Stories	0	15	16	25	28	29	31	40	43
21	R3B3B	USACE - Chicago	Apartment Unit Sub-Grade, Structure	3to4 Stories	8	12	15	20	23	28	33	37	43
22	R3B5N	USACE - Chicago	Apartment Unit Grade, Structure	5Plus Stories	0	15	16	25	28	29	31	40	43
23	R3B5B	USACE - Chicago	Apartment Unit Sub-Grade, Structure	5Plus Stories	8	12	15	20	23	28	33	37	43
24	R3C1N	USACE - Chicago	Apartment Unit Grade, Structure	1to2 Stories	0	15	16	25	28	29	31	40	43
25	R3C1B	USACE - Chicago	Apartment Unit Sub-Grade, Structure	1to2 Stories	8	12	15	20	23	28	33	37	43
26	R3C3N	USACE - Chicago	Apartment Unit Grade, Structure	3to4 Stories	0	15	16	25	28	29	31	40	43
27	R3C3B	USACE - Chicago	Apartment Unit Sub-Grade, Structure	3to4 Stories	8	12	15	20	23	28	33	37	43
28	R3C5N	USACE - Chicago	Apartment Unit Grade, Structure	5Plus Stories	0	15	16	25	28	29	31	40	43
29	R3C5B	USACE - Chicago	Apartment Unit Sub-Grade, Structure	5Plus Stories	8	12	15	20	23	28	33	37	43
30	R3D1N	USACE - Chicago	Apartment Unit Grade, Structure	1to2 Stories	0	15	16	25	28	29	31	40	43
31	R3D1B	USACE - Chicago	Apartment Unit Sub-Grade, Structure	1to2 Stories	8	12	15	20	23	28	33	37	43

Flood Risk Structures of Martinsburg



The Risk MAP View allows for viewing flood loss estimates at the building or structure level for a 1%-annual-chance flood event.

Field Verification – Post-FIRM Structure



Post-FIRM Structure in Floodway?

Building ID	**781:19-06-009H-0019-0000**
Full E-911 Address	781 AVON BEND RD, CHARLES TOWN, WV, 25414
Full Owner Address	9299 ALL SAINTS RD, LAUREL, MD 20723
GIS Parcel ID	19-06-009H-0019-0000
Lat	39.218996
Long	-77.83151391
Plus Code	87F46599+H9X
WV Flood Tool Link	https://mapwv.gov/flood/map/?wkid=102100&x=-8664164.49652&y=4753089.59353&l=13&v=0
WV Parcel Assessment Link	https://mapwv.gov/Assessment/Detail/?PID=1906009H001900000000
CID	540065
Community Name	JEFFERSON COUNTY *
Stream Name	**Shenandoah River**
Watershed (HUC8)	Shenandoah (2070007)
Flood Zone Designation	Effective 100 yr Zone AE - Floodway
Floodway	**Yes**
Year Built	**2011**
FIRM Status	**Post-FIRM**
Hazard Occupancy Code	RES1
Stories	2
Basement Type	**Crawl**
First Floor Height	4.0
Building Appraisal	**$170,200**
Structure Area	2496
Flood Depth Value	**9.8**
Flood Depth Source	HEC-RAS
WSEL Value	376.0
WSEL Source	UAE
Ground Elevation	366.2
Ground Elevation Source	2012 FEMA Jefferson, Berkeley & Morgan Lidar
Grade	C+
Tax Class	2
Land Use Description	Residential 1 Family
Exterial Wall Type	Aluminum

Building Inventory

Building ID	**781:19-06-009H-0019-0000**
Full E-911 Address	781 AVON BEND RD, CHARLES TOWN, WV, 25414
GIS Parcel ID	19-06-009H-0019-0000
Plus Code	87F46599+H9X
WV Flood Tool Link	https://mapwv.gov/flood/map/?wkid=102100&x=-8664164.49652&y=4753089.59353&l=13&v=0
WV Parcel Assessment Link	https://mapwv.gov/Assessment/Detail/?PID=1906009H001900000000
Full Owner Address	9299 ALL SAINTS RD, LAUREL, MD 20723
Occ	RES1
Cost	170200
NumStories	2
FoundationType	5
FirstFloorHt	4
Area	2496
UserDefinedFltyId	453
Latitude	39.218996
Longitude	-77.83151391
Depth_Grid	**9.825653**
Depth_in_Struc	5.825653076
flExp	1
SOID	R12N
BDDF_ID	107
BldgDmgPct	**23.7**
BldgLossUSD	**$40,254**
ContentCostUSD	$85,100.00
CDDF_ID	23.00
ContDmgPct	37.95
ContentLossUSD	$32,299
DebrisID	RES1NBFT4
Debris_Tot	16.9728
Restor_Days_Min	270
Restor_Days_Max	450
GridName	AFH_wm.tif

FAST Utility Output

FEMA Resource Documents

Flood Risk Products

USING FLOOD RISK PRODUCTS IN HAZARD MITIGATION PLANS

FEMA

RiskMAP
Increasing Resilience Together

Hazard mitigation is the effort to reduce loss of life and property by reducing the impact of disasters. Disasters can cause injury and death, damage buildings and infrastructure, and have devastating consequences for a community's economic, social, and environmental well-being. Hazard mitigation plans are key to breaking the cycle of disaster damage, reconstruction, and repeated damage, and they allow communities to remain eligible to receive certain types of state, tribal, and federal assistance.

The Federal Emergency Management Agency (FEMA) provides policy, guidance, products, tools, training, and technical assistance to state, local, and tribal jurisdictions to help them develop and update mitigation plans. More information on available resources can be found on FEMA's Hazard Mitigation Planning website, www.fema.gov/hazard-mitigation-planning. In addition, FEMA's Risk Mapping, Assessment, and Planning (Risk MAP) program has developed Flood Risk Products (FRPs), which are tools created to assist in mitigating flood risk. Under the Risk MAP program, FEMA partners with local, state, and tribal governments to identify flood hazards, assess flood risks, develop plans and mitigation strategies, and implement mitigation actions using a wide range of public and private resources. Data produced from Risk MAP projects can be incorporated into a mitigation plan and help inform mitigation strategies and prioritize mitigation activities.

https://www.fema.gov/media-library-data/1533059807625-e1a0d07e4326e2ec4f027ce41befe922/Using_FRPs_in_HMPs_Guide_508_07-31-18.pdf

Statewide Flood Risk Assessment

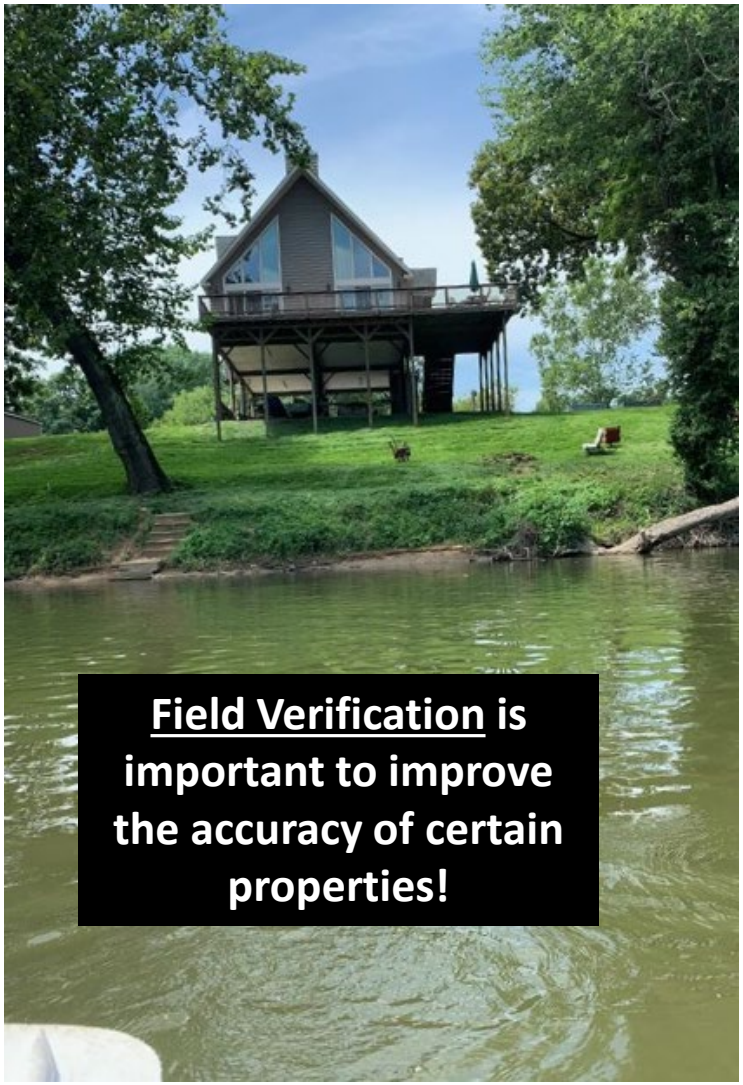
Community Engagement & Field Verification

- **Community Flood Risk Assessments**
  - Submit flood risk assessments and data to communities, state, and federal partners.
  - Review potential mitigation actions and resources with stakeholders that correlate with risk assessment outputs/analytics. Link to available FEMA and State Resource Guides:
    - *Reducing Damage from Localized Flooding: A Guide for Communities*
    - *Community Rating System Coordinators Manual*
    - *WV Floodplain Management Quick Guide*

- **Field Accuracy Checks**
  - Make necessary edits to Flood Risk Assessment GIS
  - Revisions serve as new Model Inputs for Building Inventory Cycle

- **Communities do not need mapping software since…**
  - Building-Level Flood-Risk Assessments can be viewed in a Spreadsheet Table with web links to WV Flood Tool

Field Verification



Field Verified from Shenandoah River

Field Verification of the structure located at 781 Avon Bend Road in Charles Town along the Shenandoah River in the **Regulatory Floodway** reveals that this **Post-FIRM** (2011) structure is built on a **piles foundation**. The Foundation Type/First Floor Height will be changed in the Building Inventory and the FAST Loss Estimate Utility executed again for this structure.

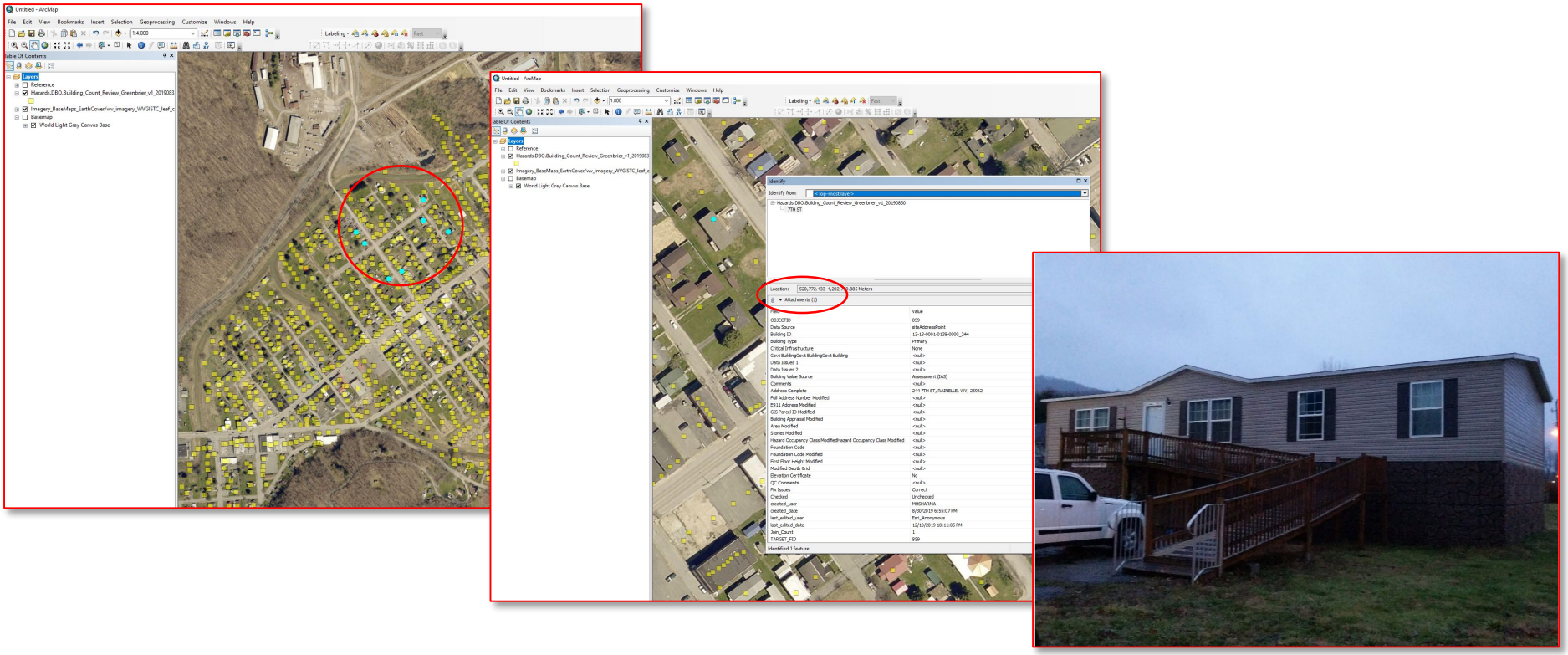
The estimated Base Flood Water Depth for this structure is 10 feet and with 2 feet of freeboard 12 feet.

781 Avon Bend Road, Charles Town, WV 25414
Building ID 781:19-06-009H-0019-0000

WV Flood Tool Link:
https://mapwv.gov/flood/map/?wkid=102100&x=-8664165&y=4753090&l=13&v=1

Community Data Collection and Validation

- Rainelle, WV synced data showing modified first floor height



Statewide Hazard Assessment

(3) Risk PLANNING

Risk **Planning**

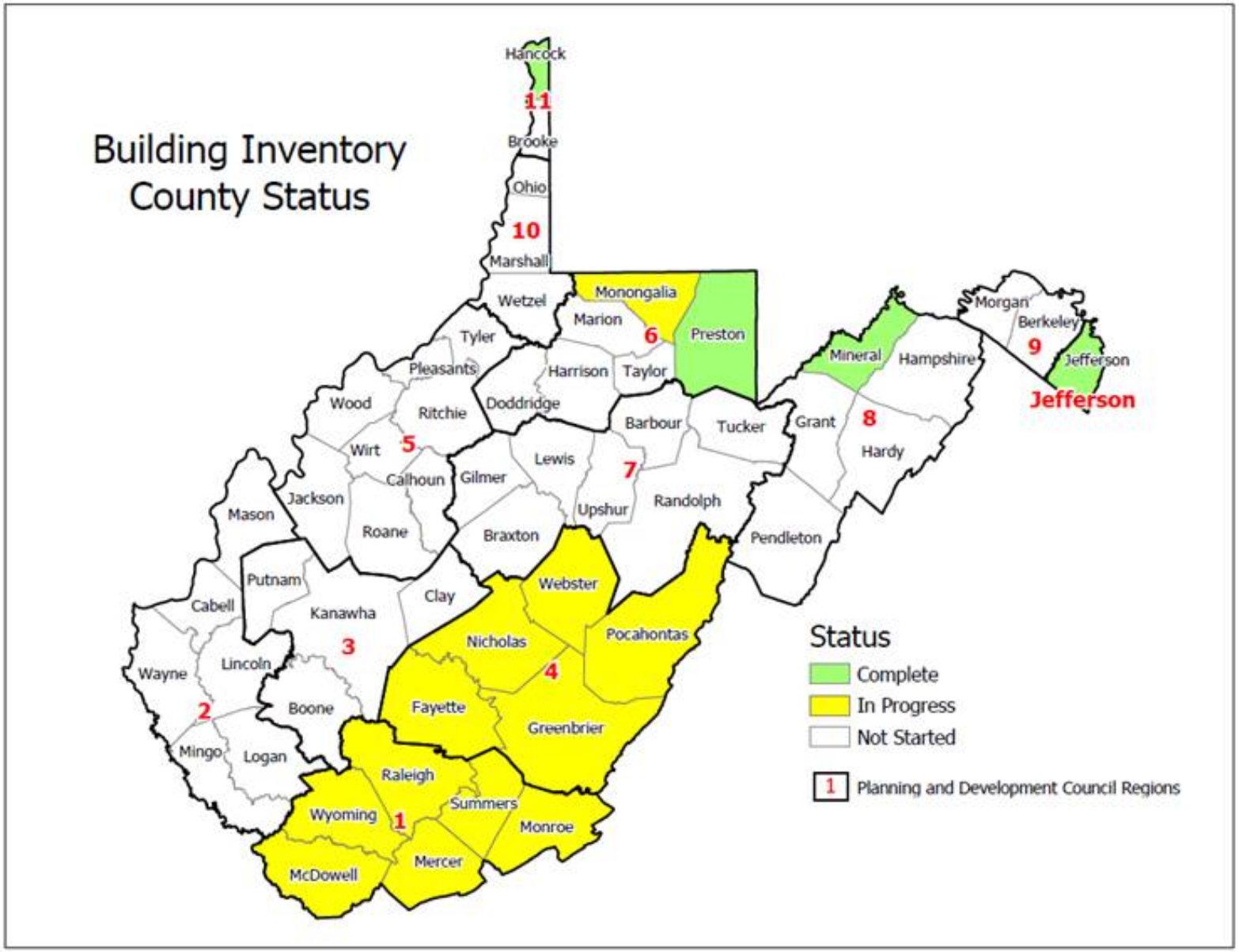
- **Hazard Mitigation Application & Schedule**
  - Risk Assessment performs Hazard Risk Identification and Risk Assessment (HIRA) requirement for Flood and Landslide Hazards.

- **Hazard Mitigation Plan Process**
  - Non-CRS Community: Local Hazard Mitigation Plan
  - CRS Community: Combined Local HMP and CRS Floodplain Mgmt. Plan. Single, coordinated process.

- **Planning Tools and Engagement**
  - Community Self-Assessment
    - Online Community Tracking Survey (SurveyMonkey.com)
    - Community Contact Lists (FPM ListServ, CRS User Group, PDC/GIS Contacts)
    - Target Audience: Floodplain Manager, Community Planner, Emergency Planner, Community Leader
    - Administrative Oversight: Regional Planning & Development Council/Vendor --> County Unincorporated --> Municipality Incorporated
  - CRS Planning Tools: Planning Steps, CRS Point Sheets, etc.
  - FEMA's Community Engagement Prioritization Tools (CEP-T)
  - Web Planning Tools and Resources: WV Flood Tool, Mitigation calculator, FloodSmart.gov, etc.

- **Proposed Areas of Mitigation and Actions**
  - WV Flood Tool can be used for mapping areas of mitigation

Alignment with Local HMP



Floodplain Managers and the Mitigation Strategy

- Responsible development and meaningful flood mitigation are crucial for a safe, resilient community
- Floodplain Managers are key stakeholders in this effort
- Floodplain Manager outreach and inclusion are extremely important and beneficial

Floodplain Managers and the Mitigation Strategy

- Floodplain Managers can bring a wealth of knowledge to mitigation strategy development during the hazard mitigation planning process
- Ultimately leading to a targeted and effective flood mitigation plan

Floodplain Managers and the Mitigation Strategy

Hazard Mitigation Plans in which Floodplain Managers have participated in the planning process tend to:

Include more specific and targeted flood mitigation projects

Consider long-term flood risk reduction strategies such as changes to local policies and ordinances

Document realistic and attainable mitigation funding sources making projects more feasible and implementable

Risk **Planning**

Example Community Engagement Document

STEP 1: Review and understand the risks in your floodplain. Evaluate your community's existing management, planning, and public outreach activities for multi-hazards.

Insurable Buildings have been inventoried for the high-risk flood zones in your community. Verify if Recreational Vehicles (RV) or trailers located in the SFHA are permanent structures. Report first floor heights of mitigated structures that have been elevated. Verify building and provide corrections for building replacement cost, foundation type, occupancy class, Pre-FIRM/Post-FRIM status, etc.

Critical Facilities are those buildings and facilities that are essential for the delivery of vital services or protection of a community. Please verify the essential facilities and community assets that have been mapped in the flood zones. List any critical facilities that are not listed in the report.

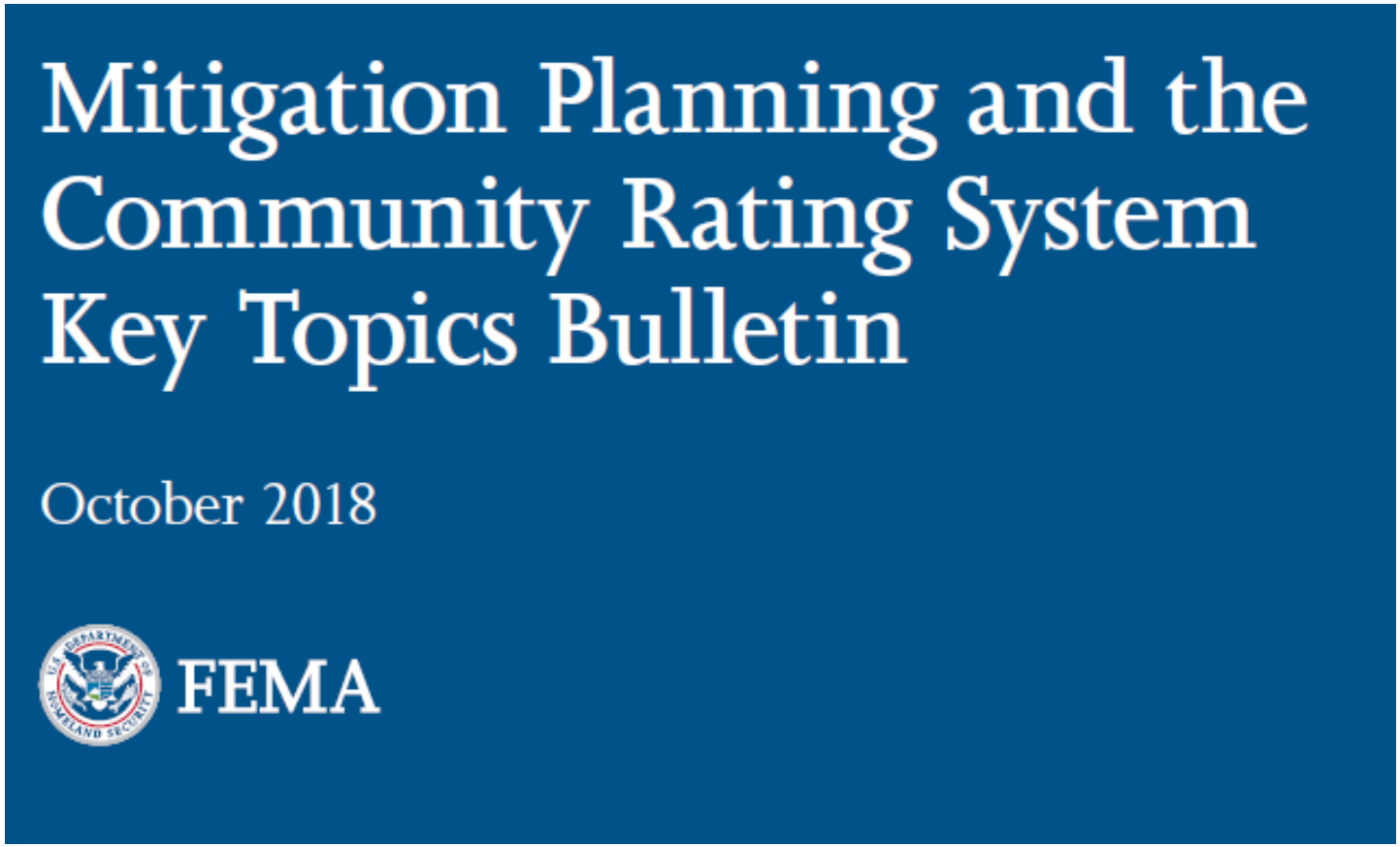
Most Vulnerable Building Lists are provided to identify and assess flood risk for your community. Please review and verity the following building lists:

- *High Value Building Exposure*: Most expensive residential and non-residential buildings located in the high-risk flood zones.
- *Floodway Exposure*: High-value buildings located in the regulatory floodway, the main channel of the river or stream where floodwaters are likely the deepest and with highest velocities.
- *Building Impact Models*: High physical building damage estimates for a 1-percent-annual-chance flood event.
- *New Development*: Review permits of Post-FIRM buildings that are below the BFE or have basements. Review non-conforming buildings that are subject to substantial damage for a 1-percent-annual chance flood.

Repetitive Loss Buildings and Areas. Review and updated the list of repetitive loss properties in your community using the WV Flood Tool. Verify the buildings still exists by viewing online assessment records. A community with 50 or more repetitive loss properties should perform a Repetitive Loss Area Analysis as part of updating its floodplain management plan.

FEMA Resource Documents

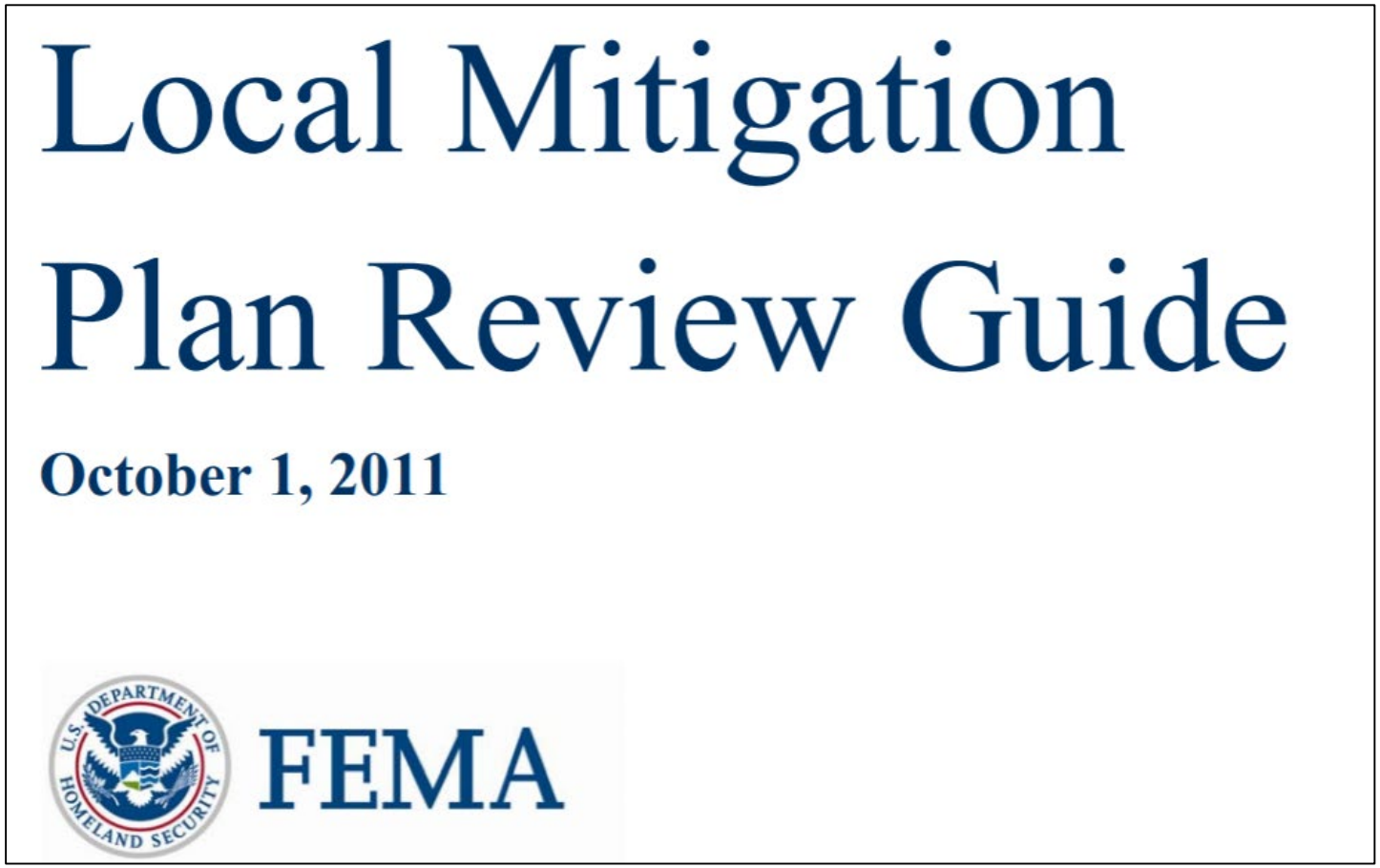
Mitigation Planning and the Community Rating System Key Topics Bulletin



https://www.fema.gov/media-library/assets/documents/171290

FEMA Resource Documents

LOCAL MITIGATION PLAN REVIEW GUIDE



https://www.fema.gov/media-library-data/20130726-1809-25045-7498/plan_review_guide_final_9_30_11.pdf

HIRA

ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT

The hazard identification and risk assessment tasks are very similar for mitigation and CRS planning. Both require attention to repetitive loss properties.

ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT	CRS COUNTERPART
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	**Step 4. Assess the Hazard**
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	

Up to 35 points are provided for describing the hazards facing the community, based on available studies. CRS Step 4(a) is the **flood hazard assessment** (REQUIRED, up to 15 points). It must include:

- The Special Flood Hazard Area shown on the Flood Insurance Rate Map (FIRM);
- **All repetitive loss areas**. CRS communities should have already prepared repetitive loss area maps because they are prerequisite to joining the program. See also the guidance on using flood insurance data on page 18;
- Areas not mapped on the FIRM that have flooded in the past (flood insurance claims can help with this); and
- Other surface flooding identified in other studies.

Most multi-hazard mitigation plans sufficiently cover this minimum requirement for CRS Step 4. To obtain more than 15 points, the assessment needs to provide **more details**, address hazards that are not usually shown on the FIRM, such as levee or dam failure flooding, review future development and flooding conditions, and cover other natural hazards.

Sub-element B2 is also addressed in the creditable parts of CRS Step 4, specifically in 4(a)(3), a discussion of past floods (REQUIRED) and 4(c), identifying areas likely to be flooded and flood problems that are likely to get worse in the future.

ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT	CRS COUNTERPART
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	**Step 5. Assess the Problem**
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii)))	

While CRS Step 4 focuses on the hazards, CRS Step 5 reviews the impact of the hazards on people and property.

a. Under CRS Step 5, the plan is REQUIRED to include "an **overall summary** of the jurisdiction's vulnerability to each hazard identified in the hazard assessment (CRS Step 4) and the impact on the community" (2 points). These criteria are essentially the same as those for sub-element B3.

Up to 50 more points are provided for providing more details:

b. A description of the **impact of flooding** on various community attributes, such as critical facilities and the local economy (25 points)

Risk **Planning**

Table 3. Comparison of the Planning Processes			
Mitigation Planning Elements*	**CRS Planning Steps****	**Max Points**	**Average**
A. Planning Process	1. Organize to prepare the plan	15	10
	2. Involve the public	120	34
	3. Coordinate	35	10
	10. Implement, evaluate, revise	26	5
B. Hazard Identification and Risk Assessment	4. Assess the hazard	35	25
	5. Assess the problem	52	29
C. Mitigation Strategy	6. Set goals	2	2
	7. Review possible activities	35	20
	8. Draft an action plan	60	42
D. Plan Update	10. Implement, evaluate, revise 5-year update	*See Element A*	
E. Plan Adoption	9. Adopt the plan	2	2
		382	171

* The planning elements are per Local Mitigation Plan Review Guide and its Plan Review Tool

** The 10 steps are detailed in Activity 510, Section 512.a, Floodplain Management Planning (FMP) in the CRS Coordinator's Manual

The CEP-Tool indicators align to a community's strategic attributes

Risk

- Average Residential Growth Over Previous Decade
- Claims Outside the SFHA (Zones BCX)
- Compliance at Last Visit
- Estimated Population Growth Rate
- Percent of SFHA Structures Without Flood Insurance
- Number of LOMCs
- Dollar Amounts of Previous Claims
- Number of Declared Disasters with Flooding Since 1989
- Number of pre-FIRM Policies
- Number of Policies
- Number of Repetitive Loss Structures
- Population in SFHA
- Social Vulnerability (SOVI)

Opportunity

- Date of Last Disaster
- Number of Mitigated Properties
- Number of Pre-FIRM Policies
- Number of Repetitive Loss Structures
- Estimated Population Growth in the SFHA

Interest/Need

- Active of Planned Mapping Study in the Fiscal Year
- Current CRS Class
- Current CRS Enrollment Application?
- Current CRS Status
- Date of Last CAV/CAC
- Date of Last Floodplain Management Training/Workshop
- Higher Standards Adopted?
- Number of GTA Contacts in the Last Year
- Number of Mitigated Properties

FPMD
FLOODPLAIN MANAGEMENT DIVISION

FEMA

Online Hazard & Mitigation Tools

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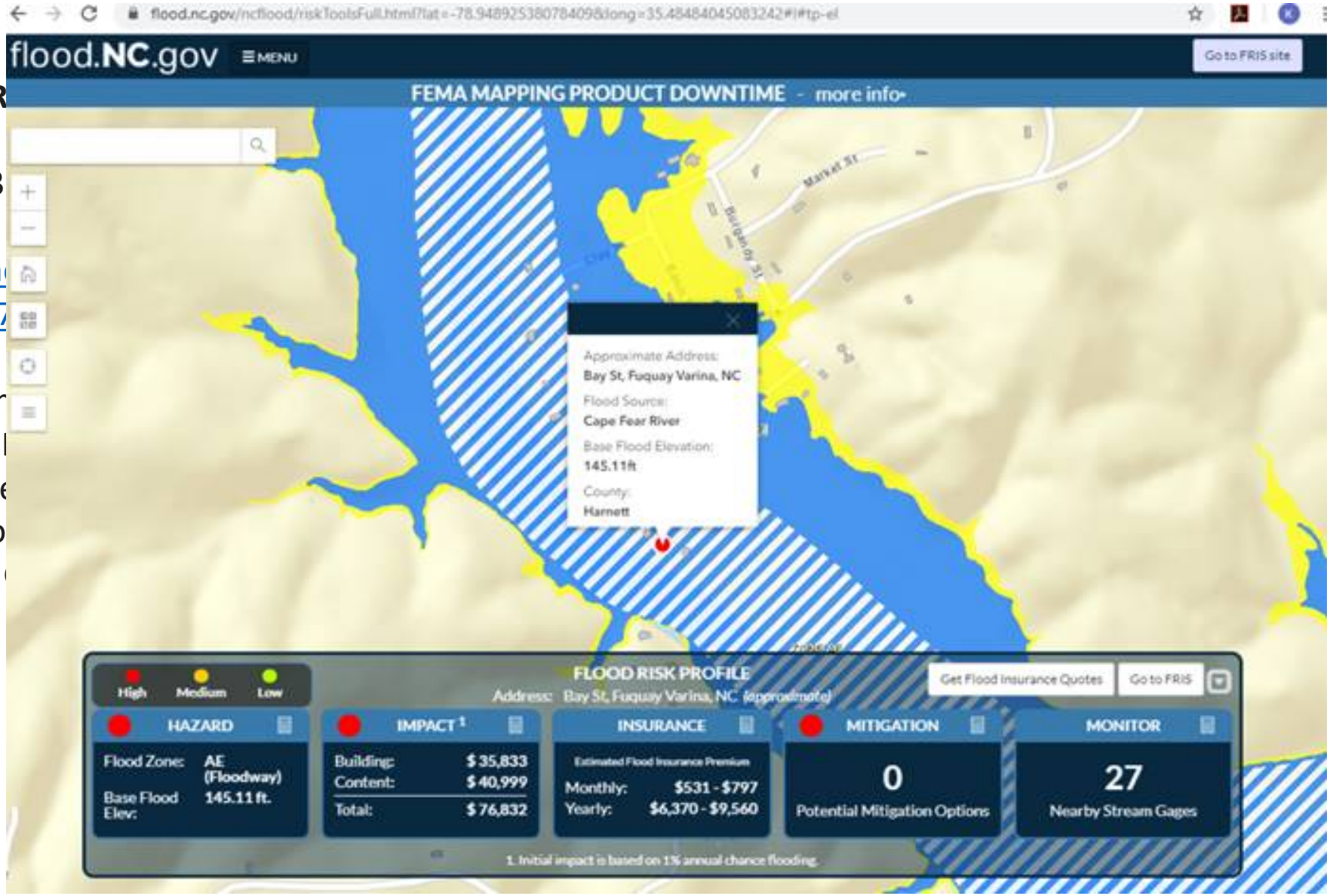
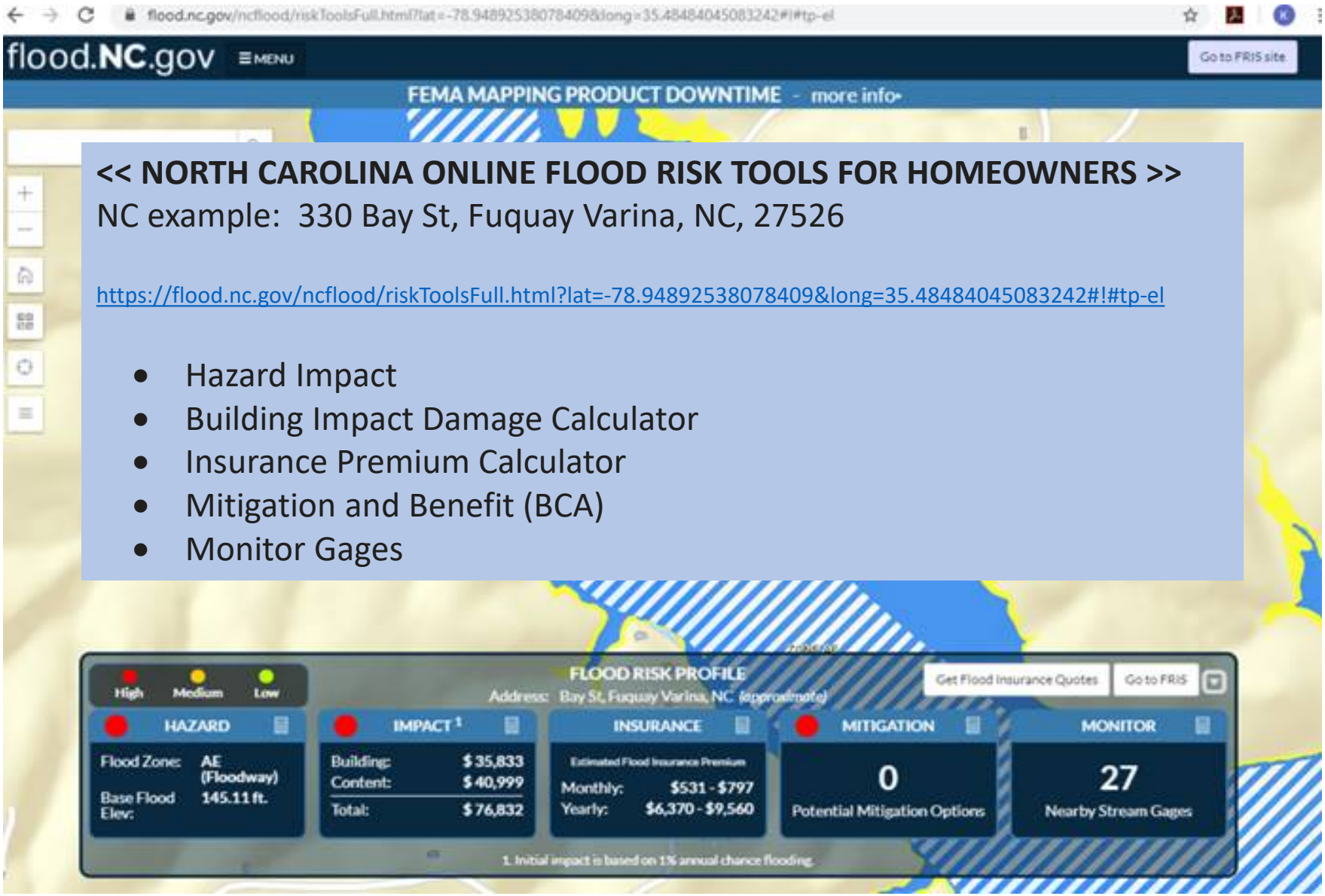


Online Hazard & Mitigation Tools



Statewide Hazard Assessment

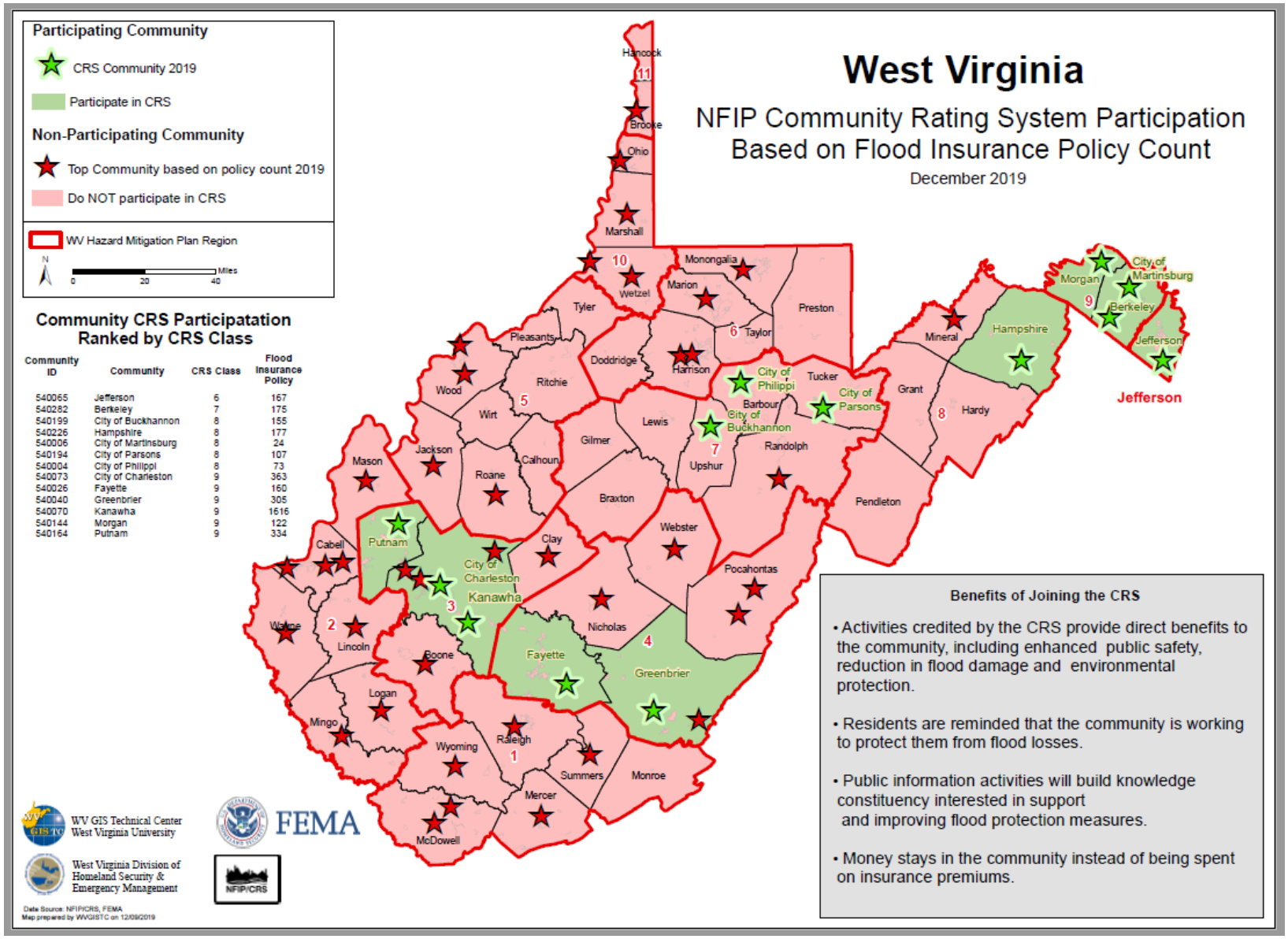
(4) CRS / NFIP

CRS / NFIP

- **State-Based CRS Credits**
  - CRS Assessments: Evaluate CRS Credit Breakdowns by Community. Assist CRS Communities to move to Higher Class. *Need updated report of CRS credits. Identify full or partial*
  - Identify Full or Partial State-Based CRS credits for Communities
  - Potential Credits from Local Flood Risk Assessments
    - CRS 300 **Public Outreach Activities**
      - 350 Flood Protection Information (WEB) – Community Web Pages: Community-Level Risk Profile, Risk/Insurance/Mitigation Calculators, web links (FloodSmart.gov, etc.)
    - CRS 400 Mapping and Regulations
      - 410 Flood Hazard Mapping New Study (NS) – Model Ordinance: BFE's in Advisory A Zones and Community Identified Floodplains (Non-SFHA Advisory A or Updated AE)
      - 420 Open Space Preservation (OSP). *Freeboard information needed.*
    - CRS 500 Flood Damage Reduction Activities
      - 510 Floodplain Mgmt. Planning (FMP) and Repetitive Loss Area Analyses (RLAA)
      - 520 Acquisition and Relocation (AR)

- **Alignment of Local HMP with CRS Floodplain Mgmt. Planning**
  - CRS Assessments: Evaluate CRS Credit Breakdowns by Community. Assist CRS Communities to move to Higher Class. *Need updated report of CRS credits.*

FEMA's Community Rating System



CRS Point System

Table 110-2. Credit points awarded for CRS activities.*				
Activity	Maximum Possible Points	Maximum Points Earned	Average Points Earned	Percentage of Communities Credited
300 Public Information Activities				
310 Elevation Certificates	116	116	38	96%
320 Map Information Service	90	90	73	85%
330 Outreach Projects	350	350	87	93%
340 Hazard Disclosure	80	62	14	84%
350 Flood Protection Information	125	125	38	87%
360 Flood Protection Assistance	110	100	55	41%
370 Flood Insurance Promotion [5]	110	110	39	4%
400 Mapping and Regulations				
410 Flood Hazard Mapping	802	576	60	55%
420 Open Space Preservation	2,020	1,603	509	89%
430 Higher Regulatory Standards	2,042	1,335	270	100%
440 Flood Data Maintenance	222	249	115	95%
450 Stormwater Management	755	605	132	87%
500 Flood Damage Reduction Activities				
510 Floodplain Mgmt. Planning	622	514	175	64%
520 Acquisition and Relocation	2,250	1,999	195	28%
530 Flood Protection	1,600	541	73	13%
540 Drainage System Maintenance	570	454	218	43%
600 Warning and Response				
610 Flood Warning and Response	395	365	254	20%
620 Levees	235	207	157	0.5%
630 Dams	160	99	35	35%

* Figures are based on communities that have received verified credit under the 2013 *CRS Coordinator's Manual* (about 43% of CRS communities), as of October 2016. The maximum possible points are based on the 2013 *Coordinator's Manual*. Growth adjustments are not included.

Public Outreach – Story Maps

Floods

Flood Risk in West Virginia: What We Learned from the June 2016 Flood

https://wvu.maps.arcgis.com/apps/Cascade/index.html?appid=32292859b21b44e99c0be706f6da8aa3

2016 Flood: WV Flooded Towns, June 2016. The Historic Flooding of Southern West Virginia on June 23, 2016

https://wvu.maps.arcgis.com/apps/Cascade/index.html?appid=7b98379452094cd6827dc8f09c8293bd

1985 Flood: The Historic WV Flooding of November 4-5 1985

https://wvu.maps.arcgis.com/apps/Cascade/index.html?appid=8c8fd107215443b98dbd61252a9c6c40

Landslides

Causes of Landslides in Mountain State, West Virginia

https://arcg.is/1SW0Sn

West Virginia Landslides and Slide Prone Areas, WVGES 1976. An online Story Map of the landslide risk assessment published in 1976 by the WV Geological and Economic Survey that was funded by the Appalachian Regional Commission. https://arcg.is/1KDnvq

Community Profile Dashboards

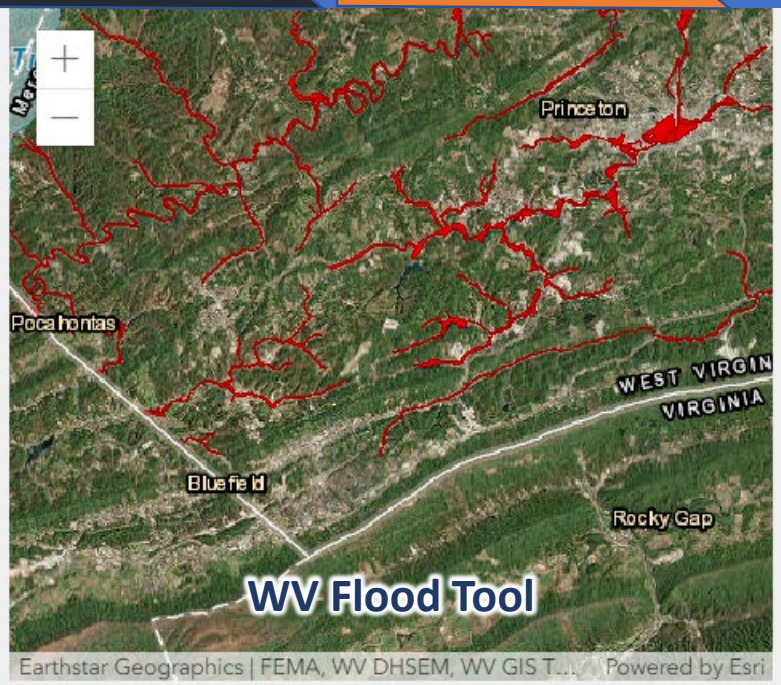
Flood Risk | CRS Credits | Landslide Risk

City of Bluefield

Bluefield City Hall
200 Rogers Street
Bluefield West Virginia, 24701
Community ID: 540285

Area Flood Policy Summary

Flood Insurance Policies in Force	$378,000
Written Premiums In Force	572
Policies In Force	2



WV Flood Tool Quick View of Bluefield

National Flood Insurance Program Status

Initial FIRM Date	3/2/2005
Effective FIRM Date	3/2/2005

Community Rating System

CRS Status	Not Participating
Current CRS Class	10
Discount for SFHA Status	0%
Discount for Non-SFHA Status	0%

Story Maps of Flood Risk and Mitigation

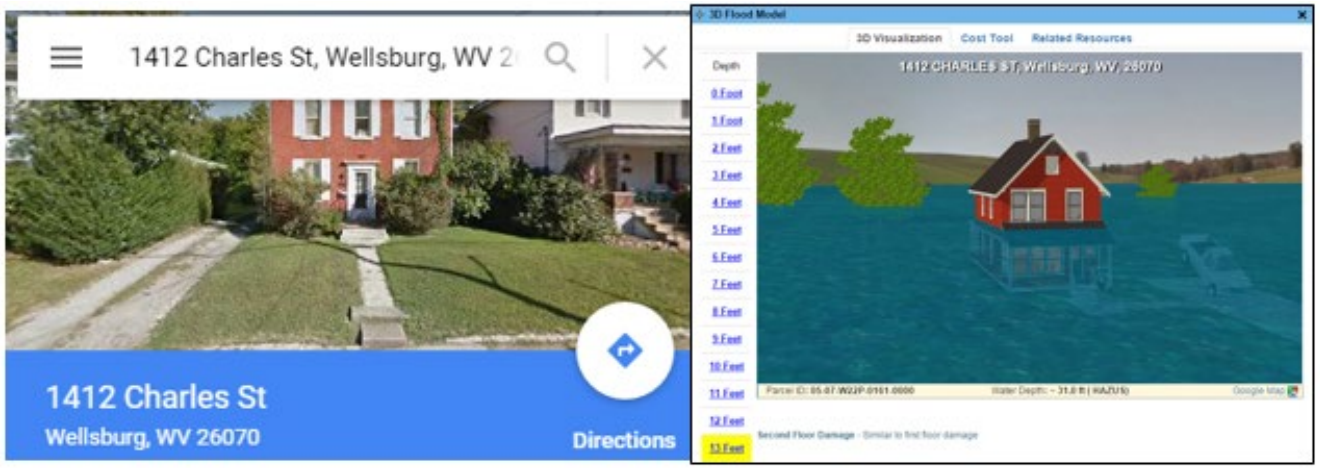
http://mapwv.gov/flood/communities/?id=540285

3D Flood Visualizations

Brooke County

https://www.mapwv.gov/flood/map/?v=1&pid=05-07-W22P-0161-0000

1412 Charles St, Wellsburg, WV, 26070, Parcel ID: 05-07-W22P-0161-0000



"This is the coolest thing ever….thank you!!!"

Source: 3D Flood Visualization Comment from Terri Jo Bennett, CFM, Upshur County Building Permit, Floodplain and Addressing and Mapping Coordinator

Upshur County

https://www.mapwv.gov/flood/map/?v=0&pid=49-05-0003-0031-0000

673 Vicksburg RD, Buckhannon, WV, 26201, Parcel ID: 49-05-0003-0031-0000

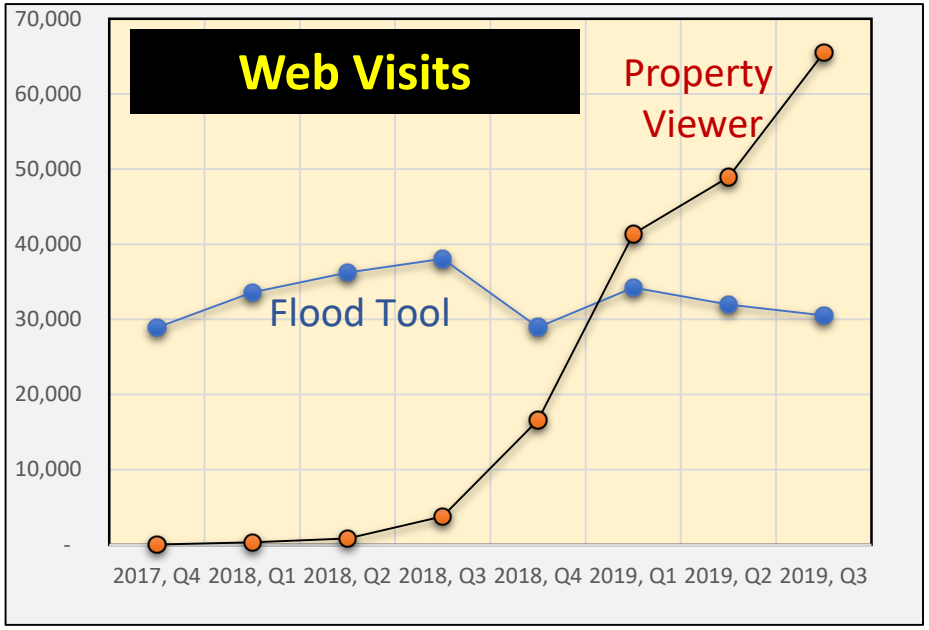
WV Flood Tool Outreach

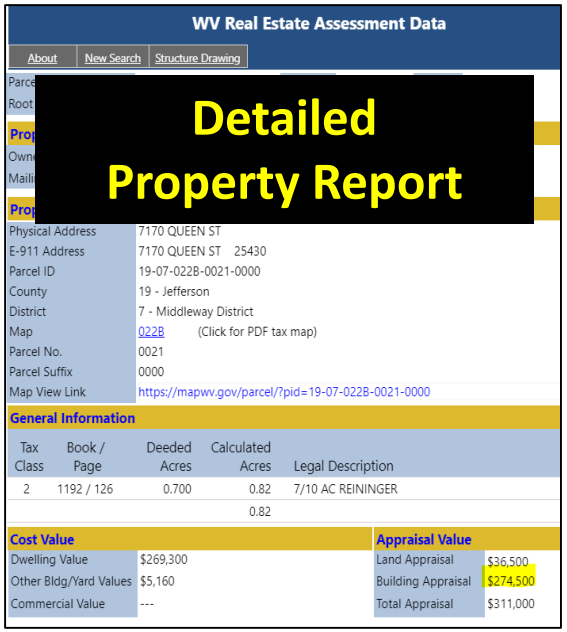
Charleston WV Billboard Marketing (April 2017)

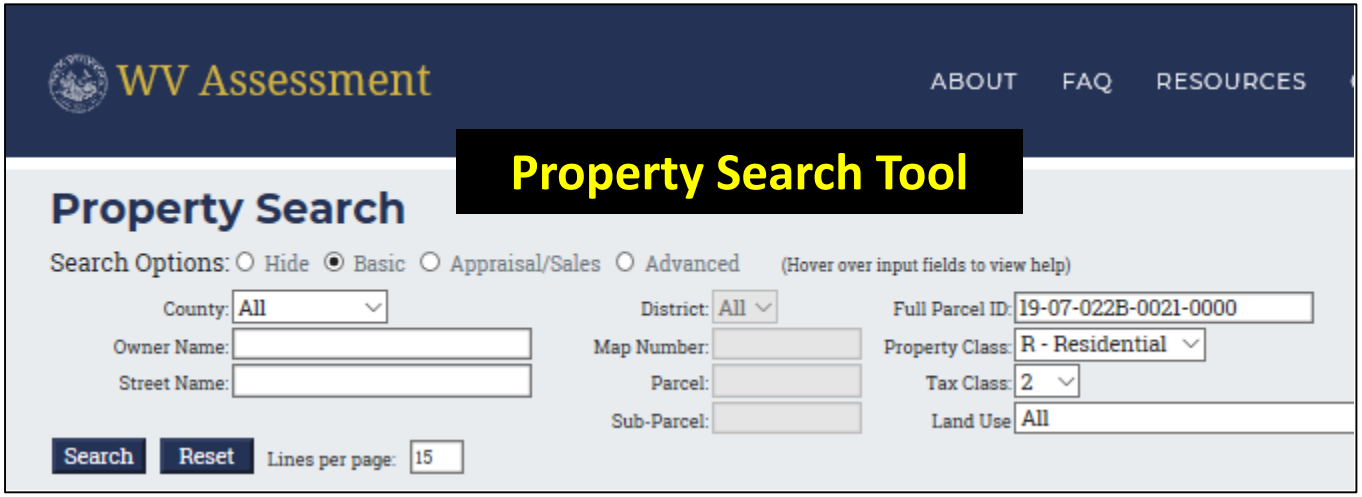
WV Property Viewer
www.mapwv.gov/property

Which instrument is better for the public discovering the WV Flood Tool – a Billboard Campaign or a Real Estate Property Viewer?

WV Property Application







WV Property Viewer
www.mapwv.gov/parcel

WV Property Search
www.mapwv.gov/assessment

WV Flood Tool Website Visits

West Virginia Flood Tool
Website Visits

2010	2015	2019
9,800	65,000	126,000

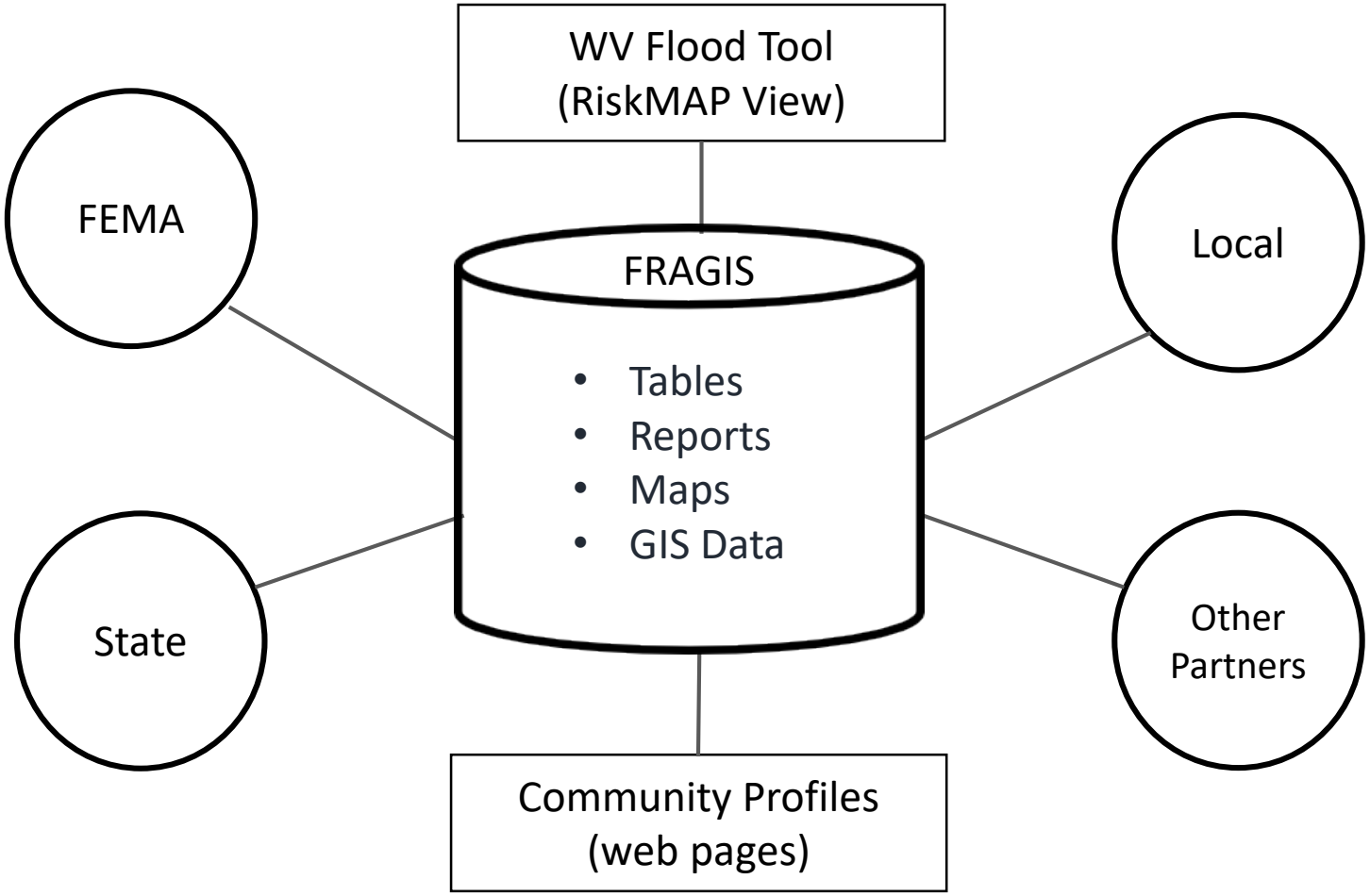
Statewide Hazard Assessment

(5) GIS

GIS

- **Flood Risk Assessment GIS**
  - Flood Risk Assessment Layers
  - Mitigated Buyout Properties
  - Repetitive Loss Structures
  - LOMAs
- **Dam and Levee Inundation Zones**
  - Communities downstream of Significant Hazard Level Dams
- **Reference GIS Layer Development**
  - Parcels
  - Addresses / Assessment Records
  - Aerial Imagery
- **Other GIS Data Layers and Information**
  - State Owned or Leased Buildings
  - Red Cross Sheltering Data for 2016 Flood

Flood Risk Assessment GIS (FRAGIS)



Data sharing and publishing of Flood Risk Assessments

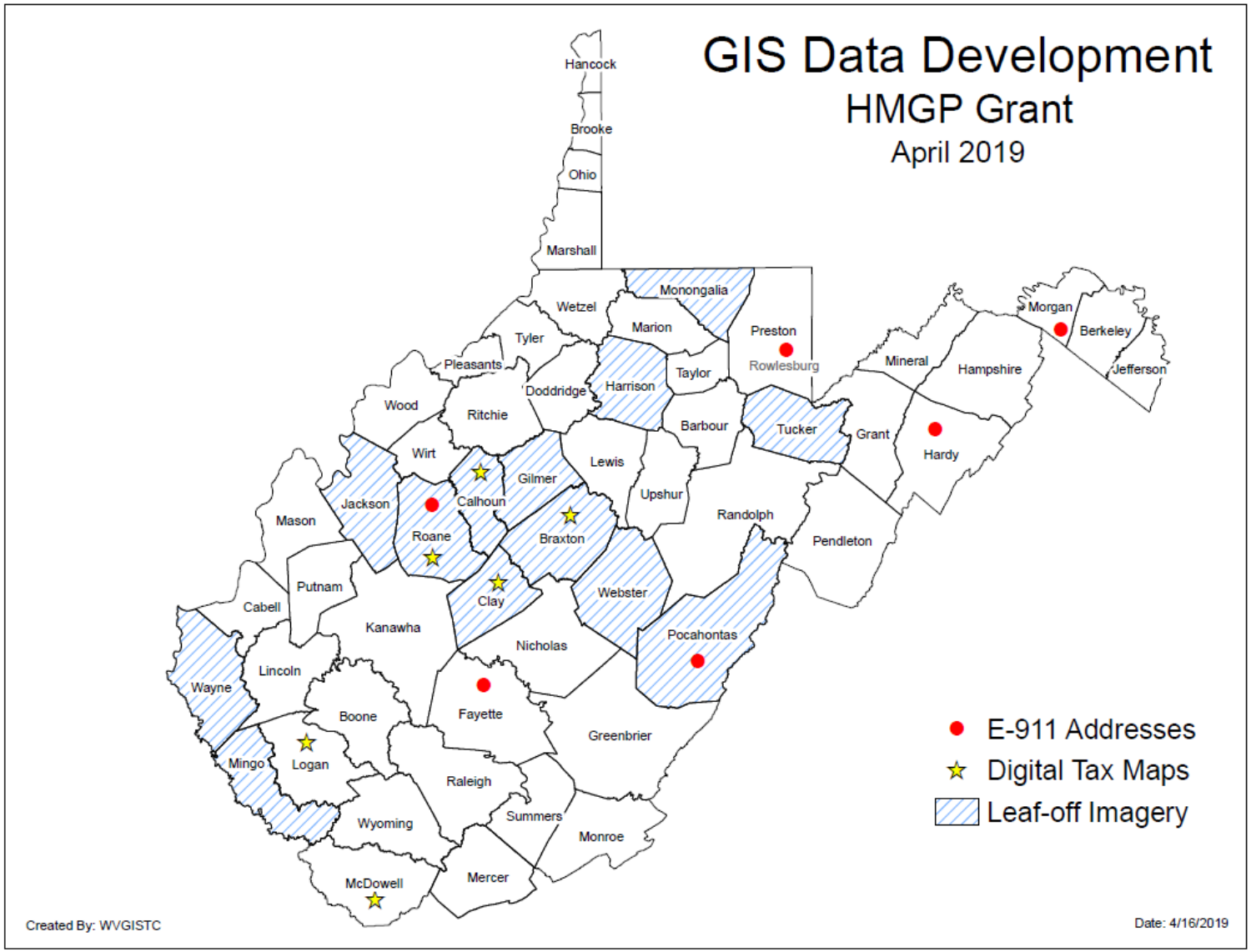
WV Flood Tool Updates

New Aerial Imagery

- 2018 USDA National Agriculture Imagery Program (NAIP) (2-ft pixel resolution)
- 2019 County Leaf-Of Aerial Imagery (4-inch pixel resolution)

Imagery can vary greatly in resolution. Pixel resolution refers to the actual distance on the ground that each pixel represents in the orthophotography. For example, four-inch pixel resolution means that each pixel in the image covers four inches on the ground.

Counties benefiting from HMGP



Statewide E-911 Addresses

Address Issues

Missing Address Site Numbers

Fairmont, WV

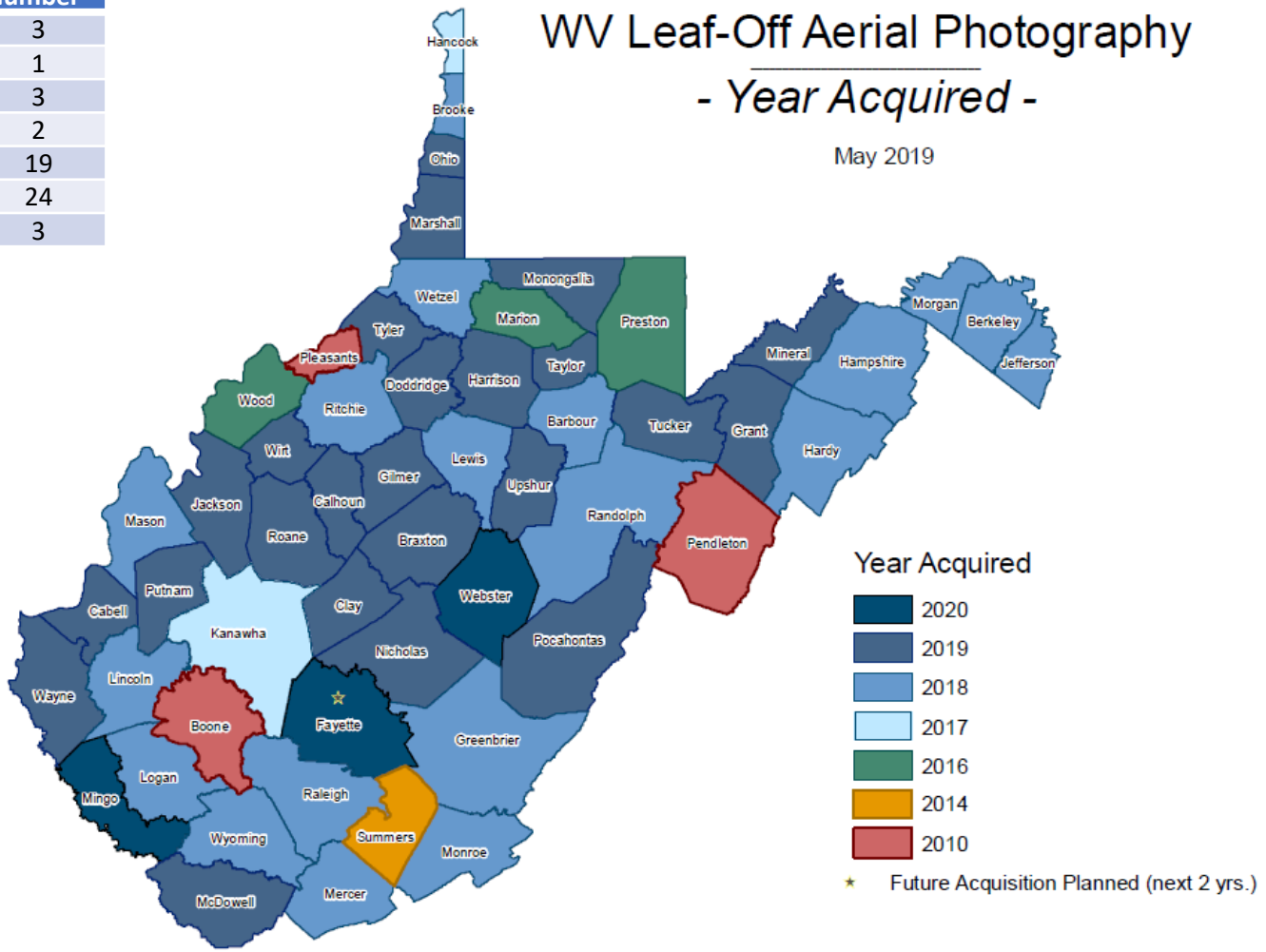
Wrong Addresses

(98 Graham St. should be 315 Graham St.)

Elkins, WV

County Aerial Imagery (2019)

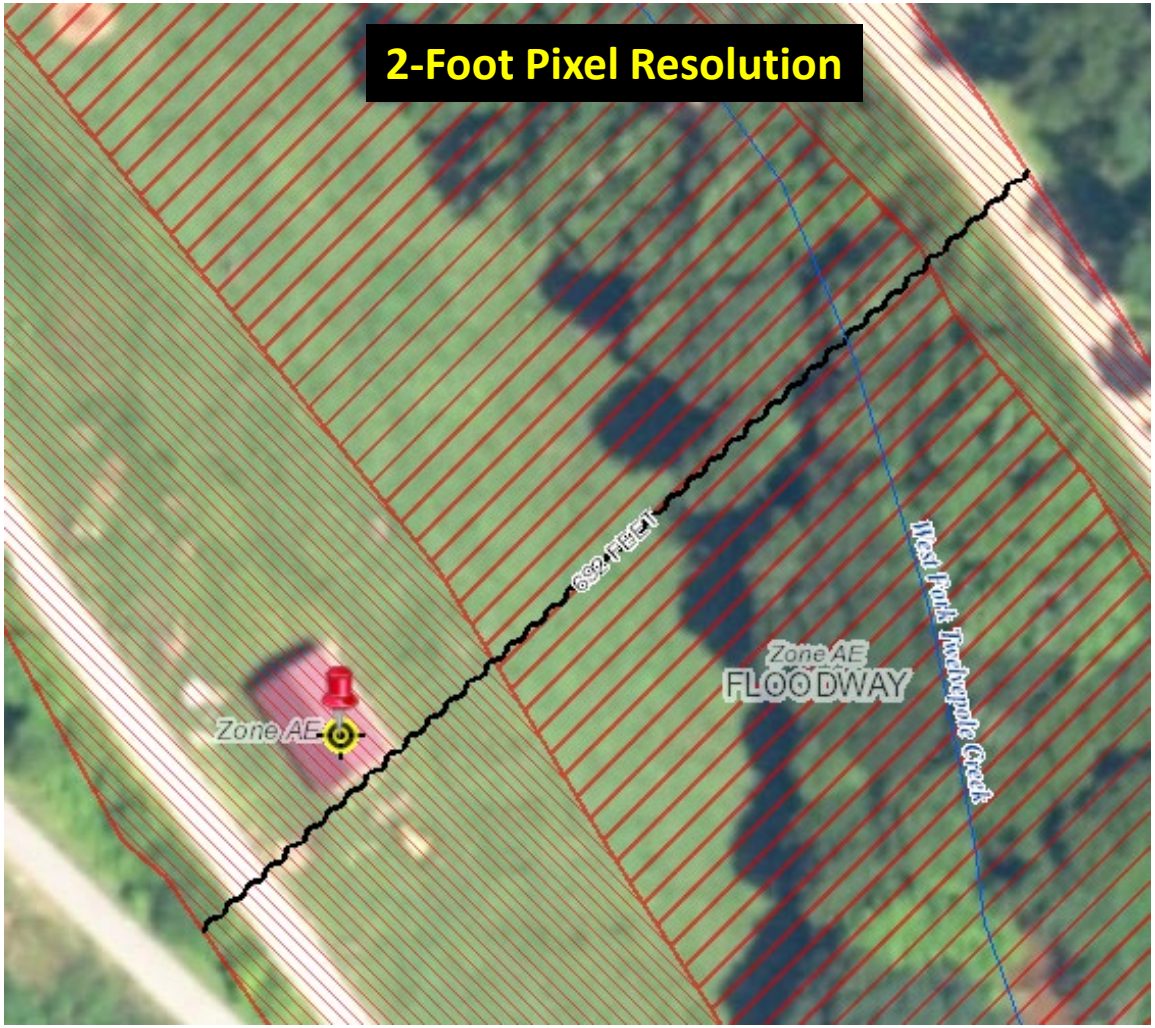
Year	Number
2010	3
2014	1
2016	3
2017	2
2018	19
2019	24
2020	3



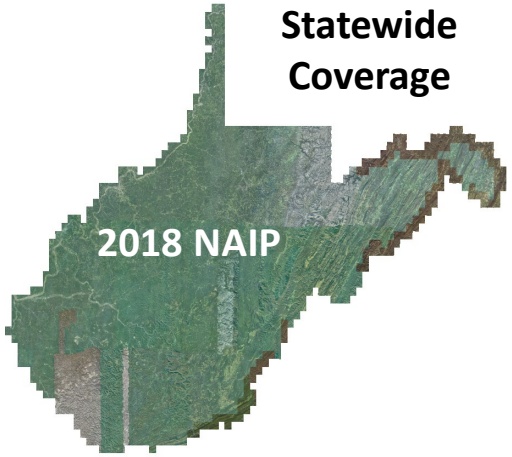
Ideally, leaf-off imagery should not be older than 5 years. Imagery is important for identifying at-risk structures and accurate disaster mapping.

New 2018 NAIP Aerial Imagery

http://www.mapwv.gov/floodtest/?wkid=102100&x=-9176629&y=4583554&l=13&v=1

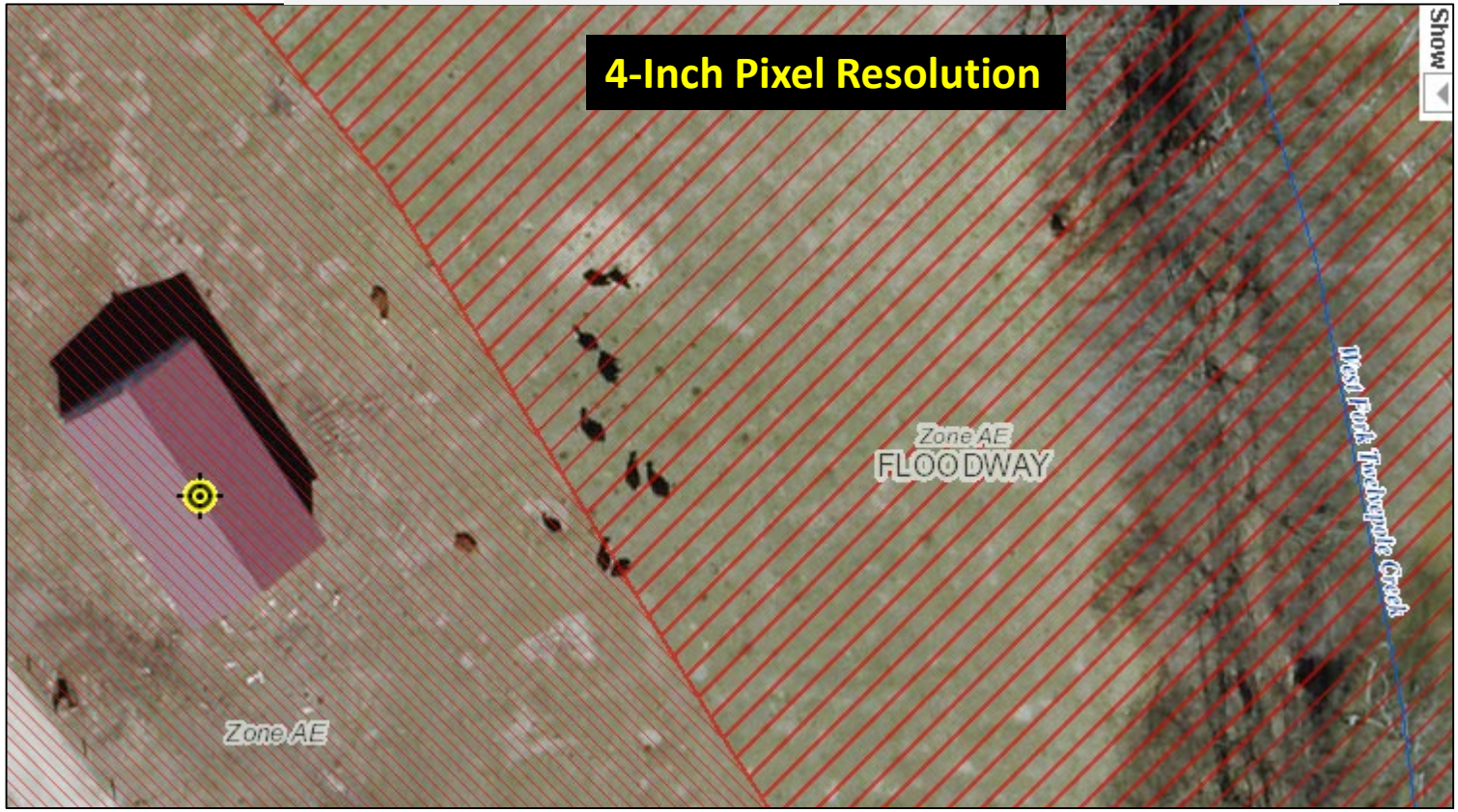


Choose **WV NAIP (2018)** from Base Map Layers Pulldown Menu



New 2019 Leaf-Off Aerial Imagery

http://www.mapwv.gov/floodtest/?wkid=102100&x=-9176629&y=4583554&l=13&v=1



4-inch Resolution Leaf-Off Aerial Imagery

- Braxton
- Calhoun
- Clay
- Gilmer
- Harrison
- Jackson
- Monongalia
- Pocahontas
- Roane
- Monongalia
- Wayne

More 2019 county aerial imagery to be added

Choose **WV Best Leaves Off** Base Map


Bing Hybrid


WV Best Leaves Off


Bing Imagery

Cows in the Floodway
West Fork Twelvepole Creek, Wayne County

Communities benefiting from HMGP

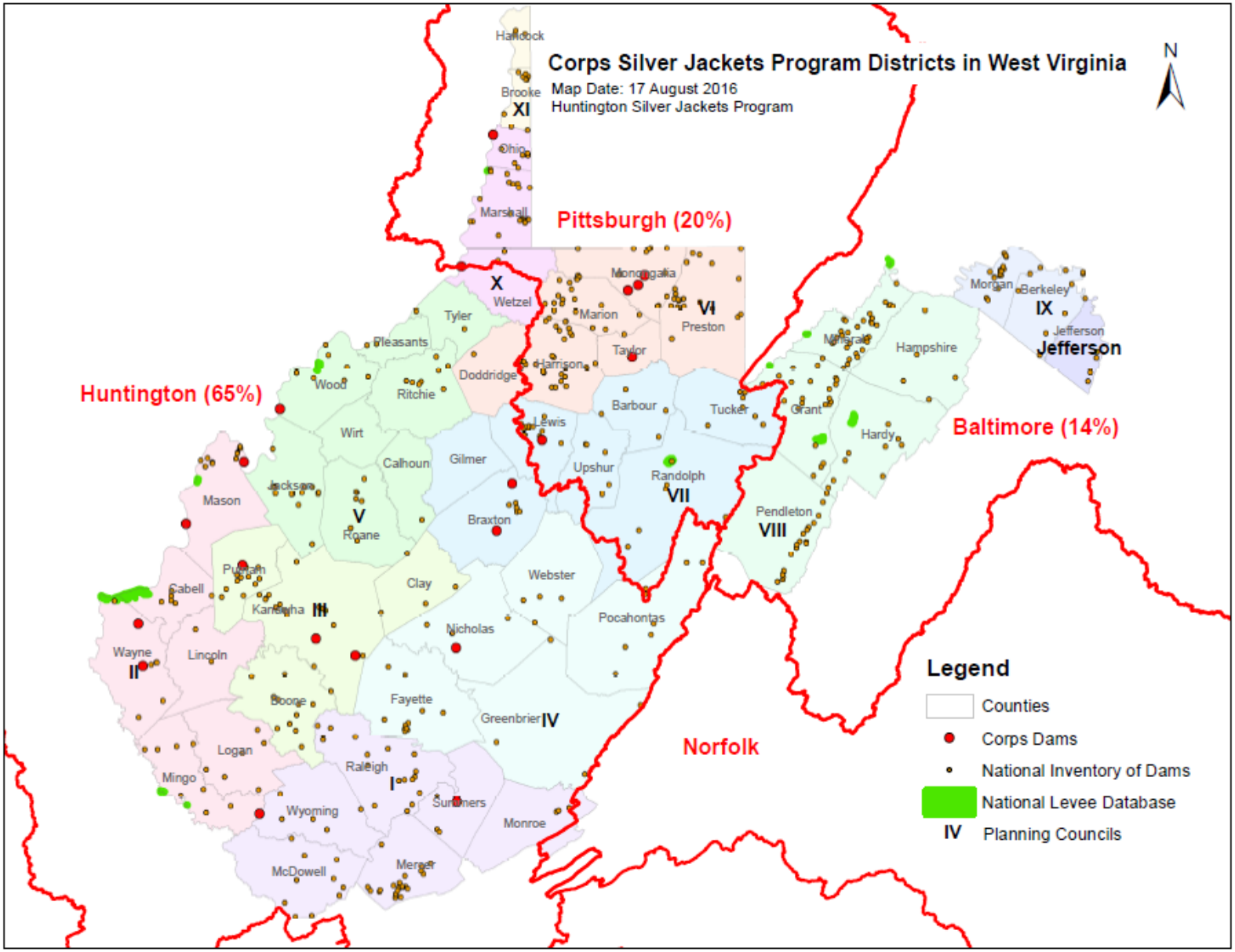
GIS Data Development Costs associated with Statewide Multi-Hazards Project

GIS Data Development Contracts	# Local Govt. Projects	# Signed MOUs	Vendor	Local Govt. Cost Share	Cost Share Type	FEMA Grant Dollars Obligated	TOTAL COST
E-911 Addresses	7	7	Atlas Geographic Data	$81,629	In-Kind (field validation)	$75,520	$156,149
Digital Tax Maps/Parcels	6	6	Atlas Geographic Data	$27,474	In-Kind (imagery)	$235,533	$263,007
Leaf-Off Imagery	13	13	Blue Mountain / Thrasher	$205,536	Dollars ($)	$56,958	$262,494
TOTAL	**26**	**26**		$314,639 (40%)		**$437,991**	$752,630

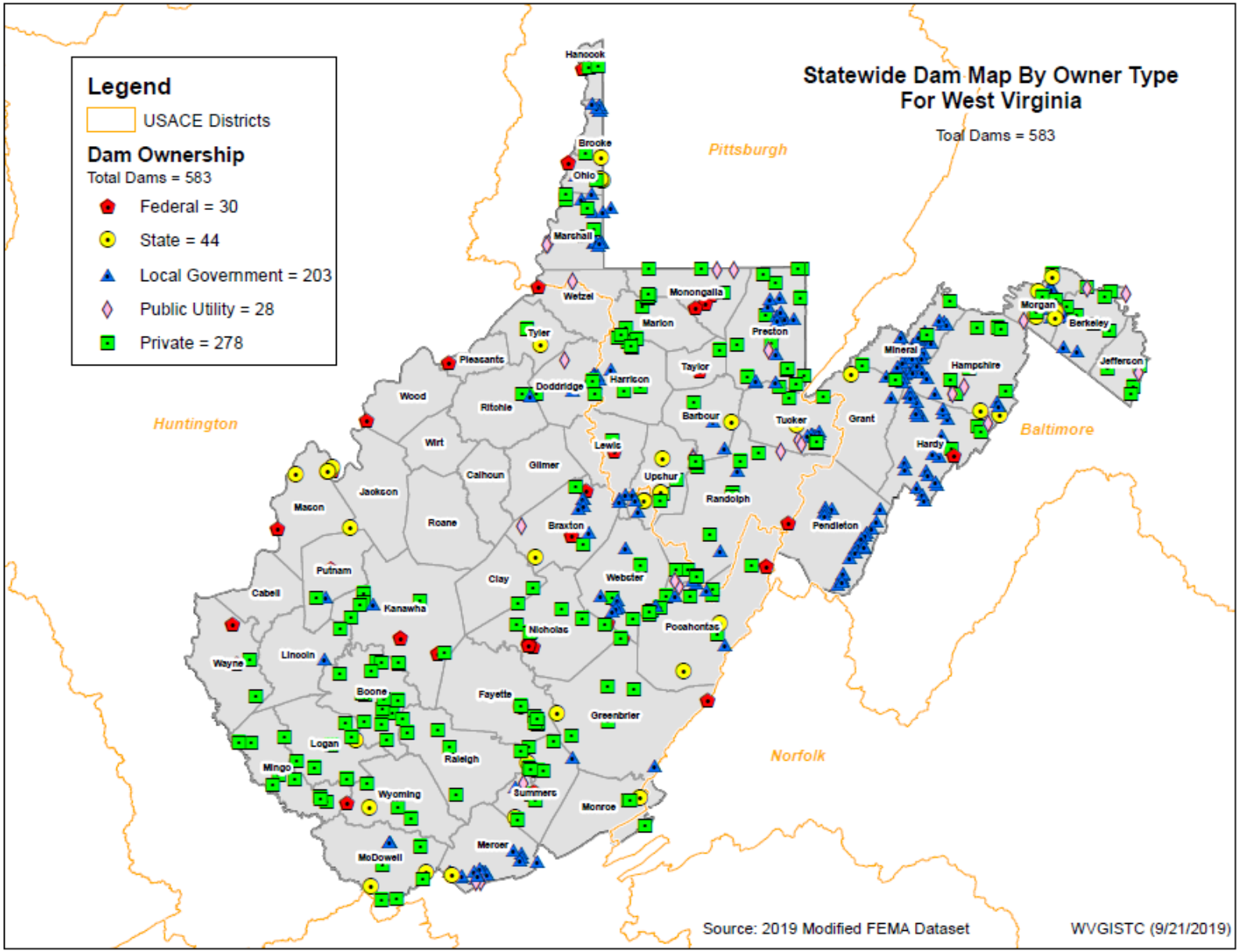
Statewide Flood Risk Assessment

Dams and Levees

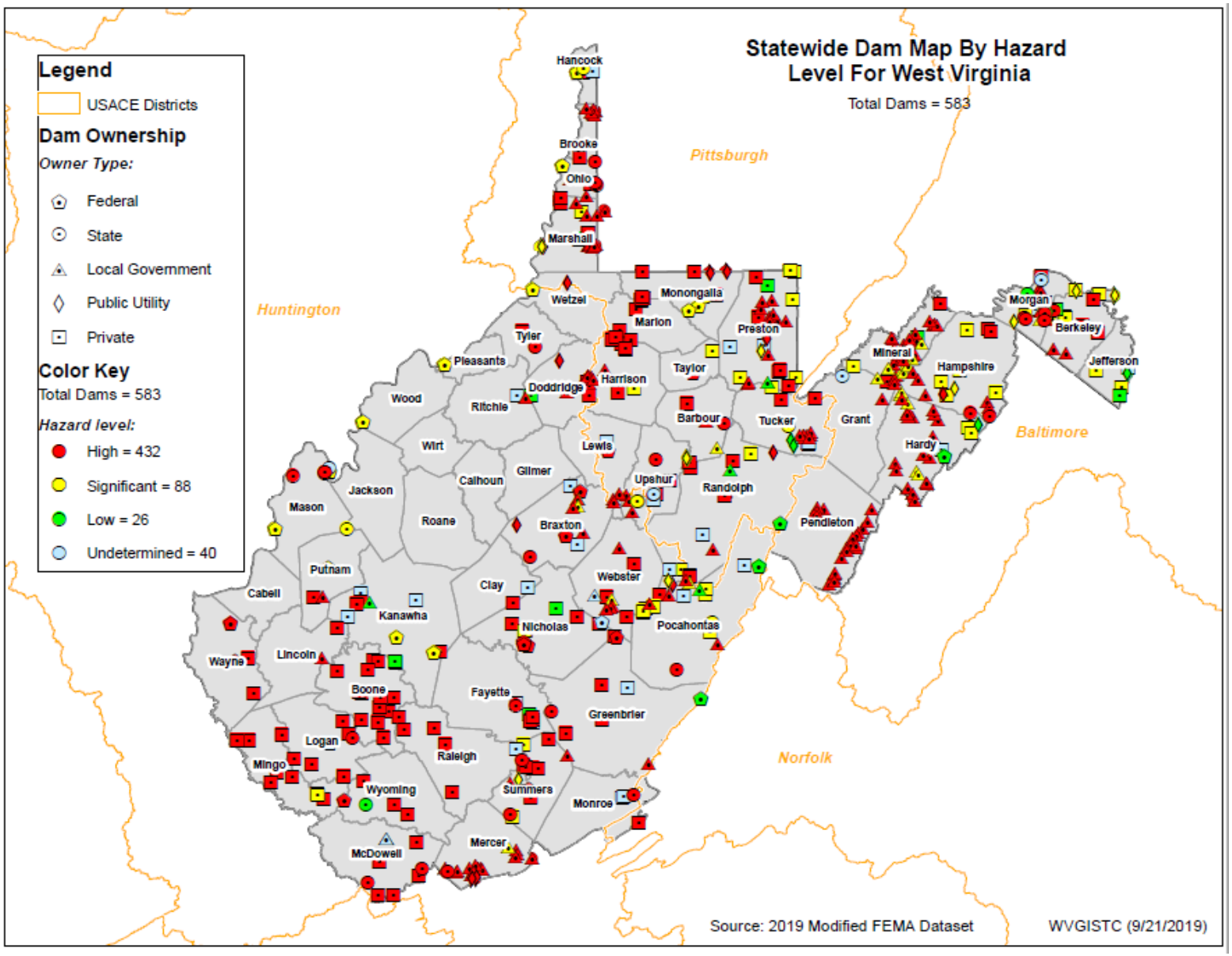
Dams and Levees



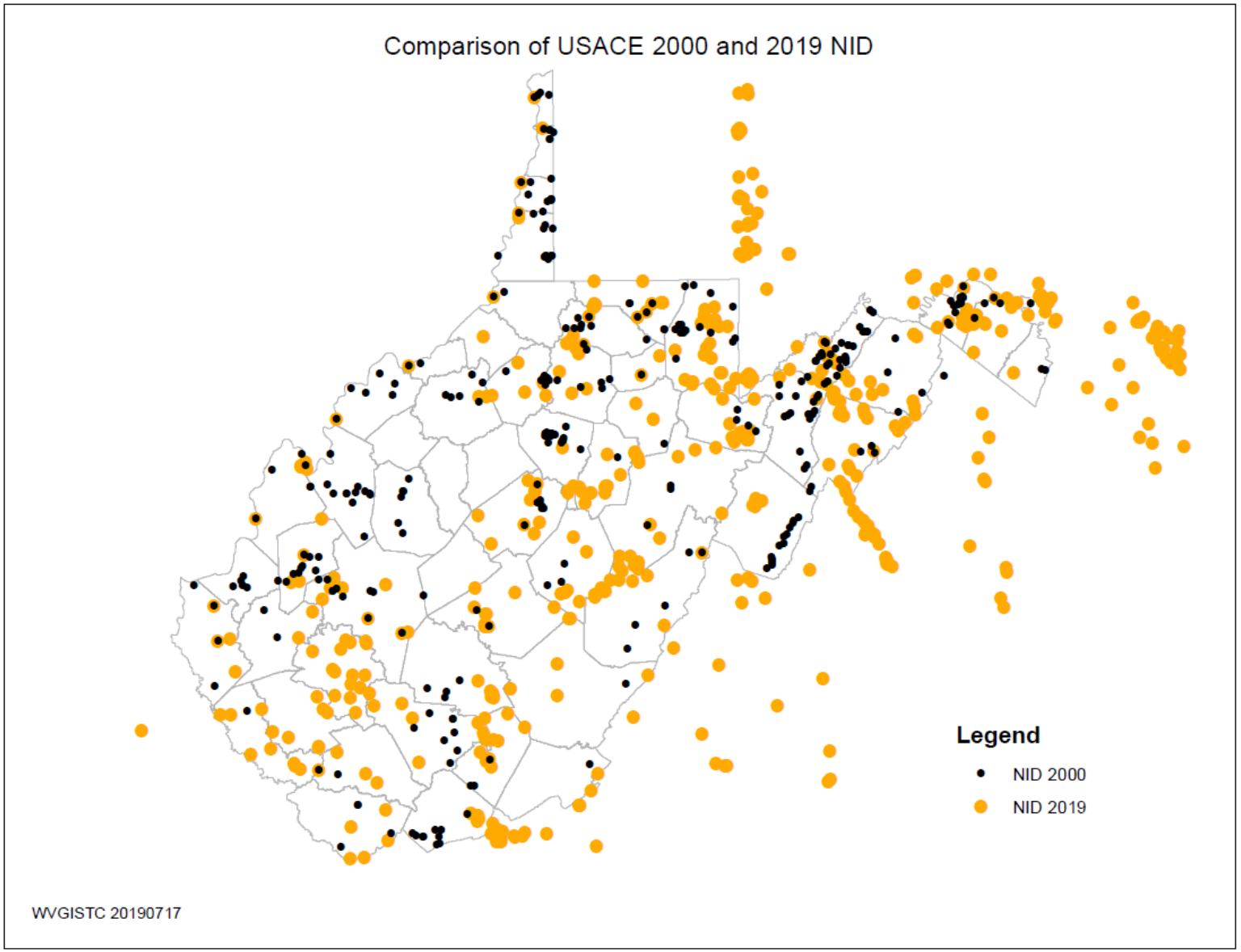
Dams by Owner Type



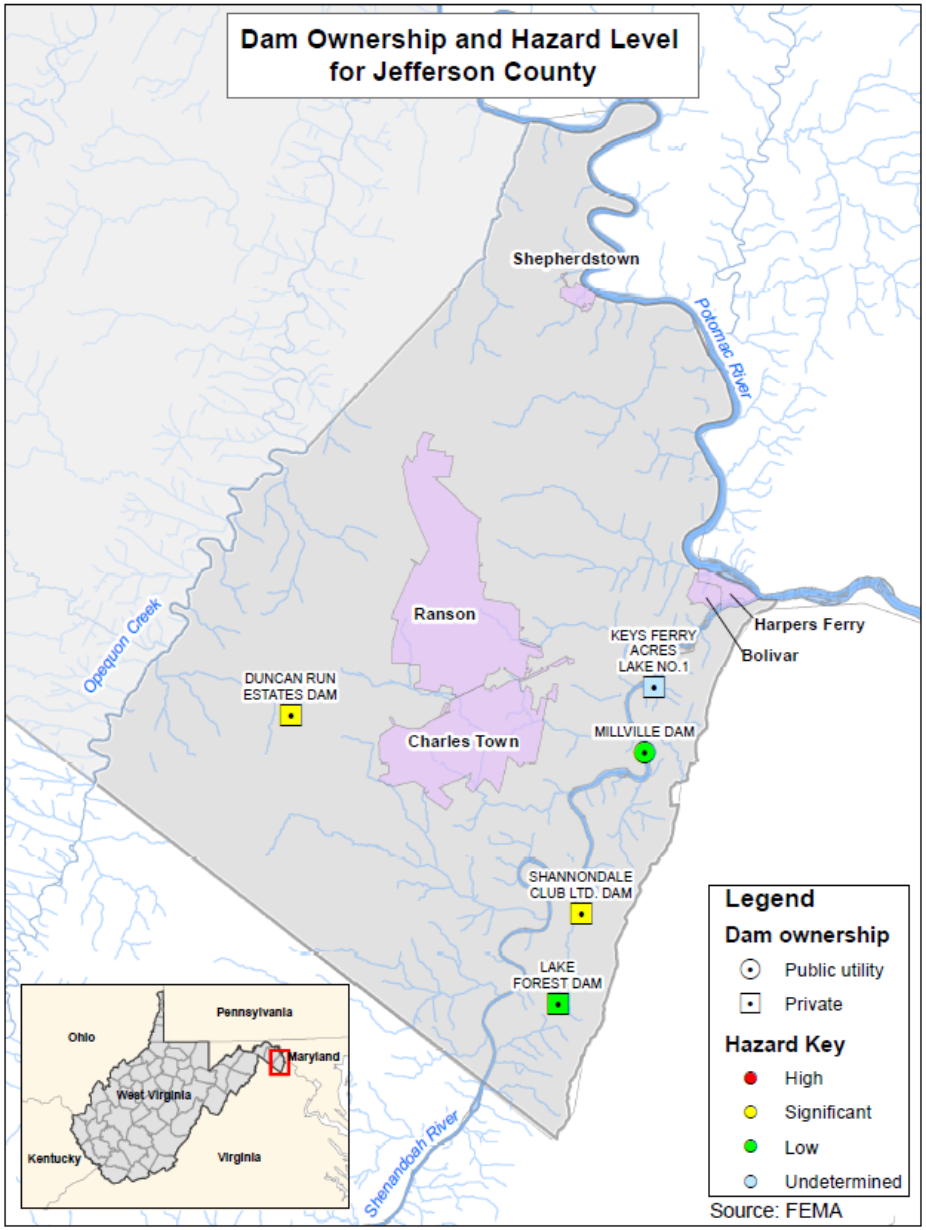
Dams by Hazard Type



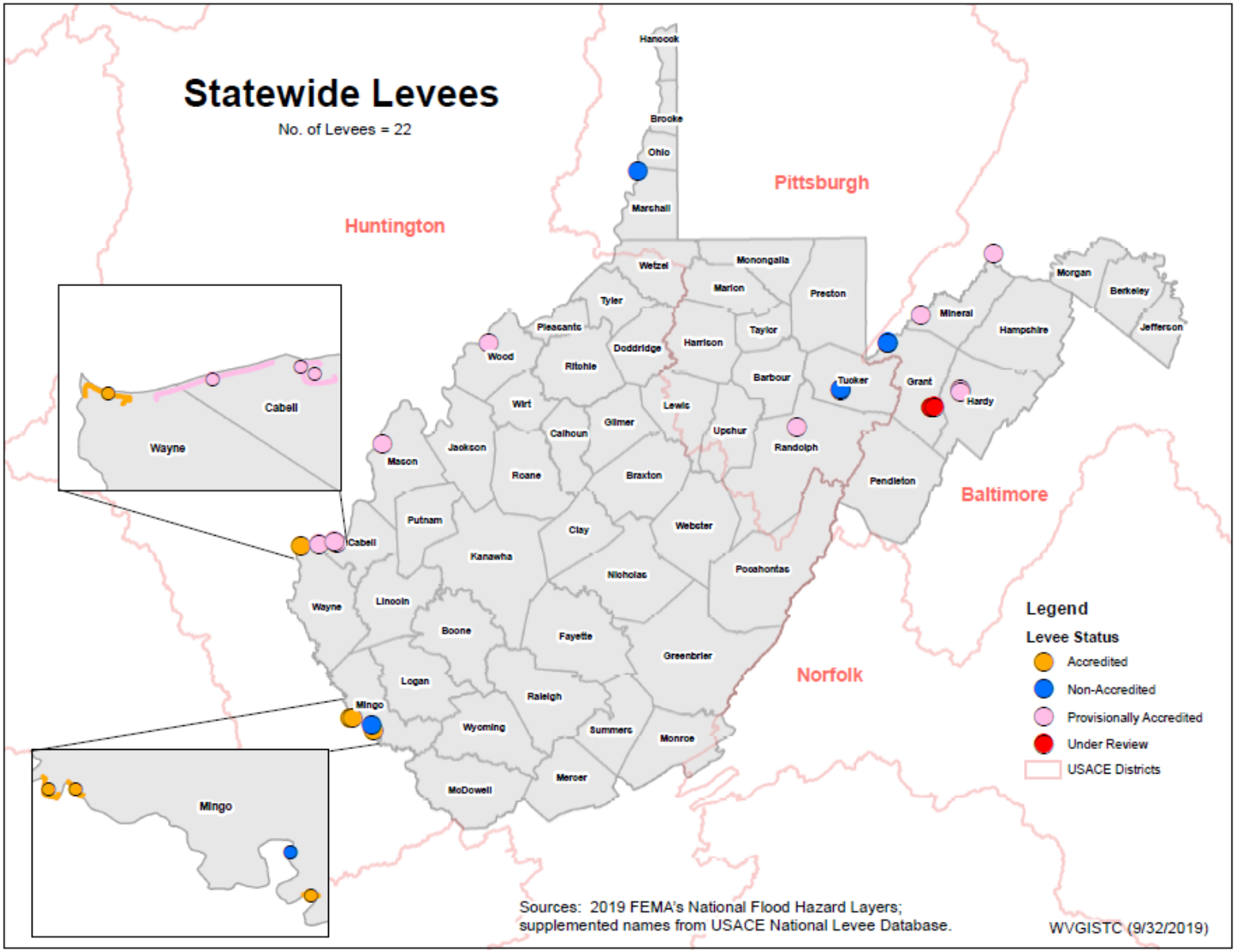
NID Non-Federal Dam Issues



Dams of Jefferson County



Levees


Statewide Levees
No. of Levees = 22
Huntington
Pittsburgh
Baltimore
Norfolk
Hancock
Brooke
Ohio
Marshall
Wetzel
Monongalia
Marion
Preston
Morgan
Berkeley
Jefferson
Tyler
Mineral
Hampshire
Pleasants
Taylor
Wood
Doddridge
Harrison
Ritchie
Barbour
Tucker
Grant
Hardy
Wirt
Lewis
Gilmer
Calhoun
Upshur
Randolph
Jackson
Mason
Roane
Braxton
Pendleton
Putnam
Clay
Webster
Cabell
Kanawha
Nicholas
Pocahontas
Wayne
Lincoln
Boone
Fayette
Greenbrier
Logan
Raleigh
Mingo
Wyoming
Summers
Monroe
McDowell
Mercer
Cabell
Wayne
Mingo
Legend
Levee Status
Accredited
Non-Accredited
Provisionally Accredited
Under Review
USACE Districts
Sources: 2019 FEMA's National Flood Hazard Layers;
supplemented names from USACE National Levee Database.
WVGISTC (9/32/2019)

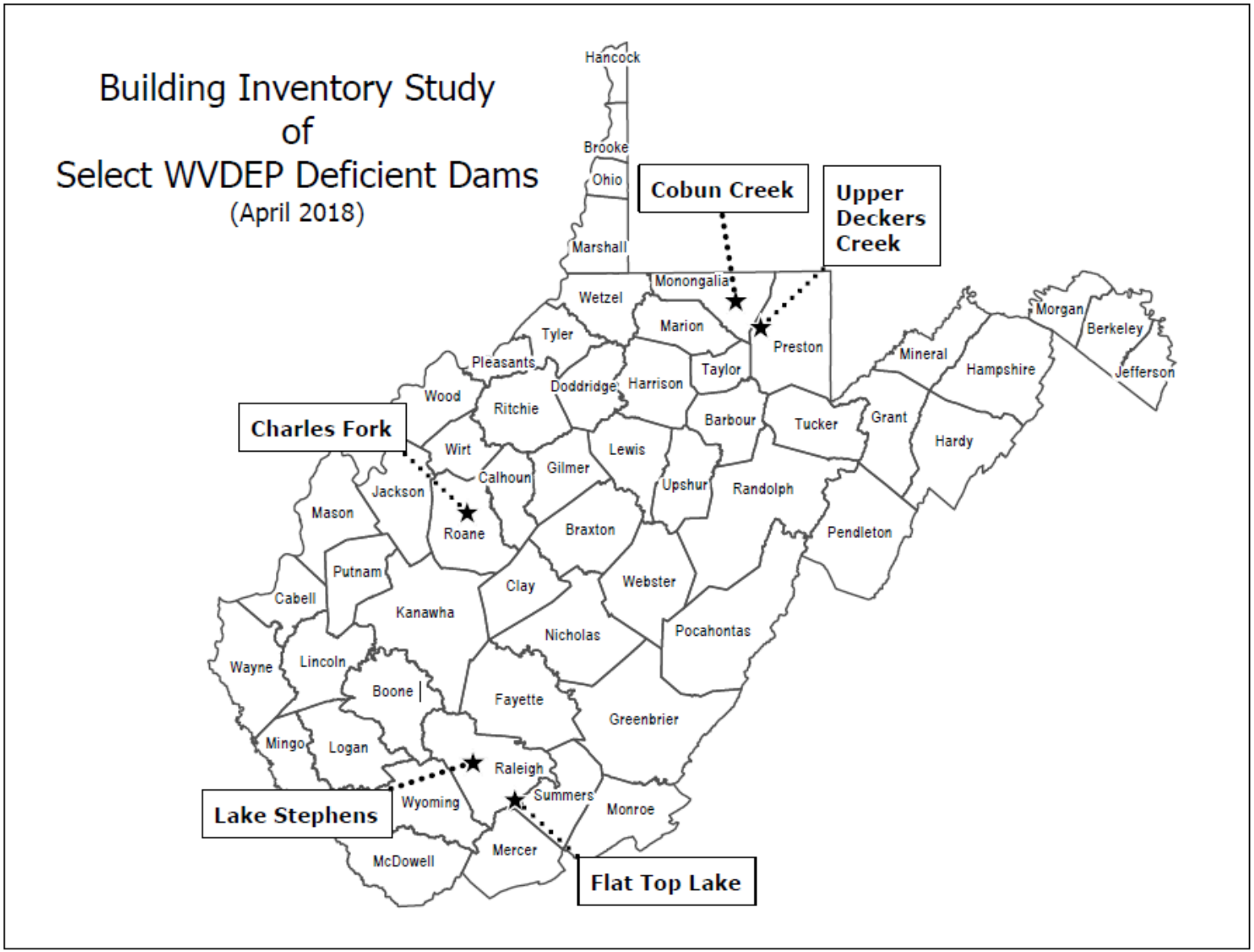
FEMA Levee Accreditation

LEVEE ACCREDITATION STATUS
WEST VIRGINIA - REGION 3
AS OF 5/20/2019

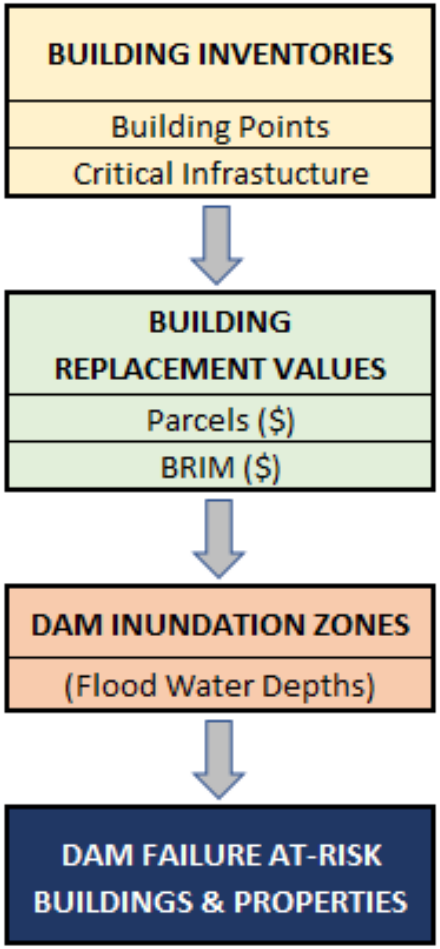
*ALL EXPIRED PALS (12 TOTAL) ARE SHOWN AS UNDER REVIEW
SOURCES: FAST, NLD
WV ORTHOIMAGERY NAIP 2016

FEMA
REGION 3

Building Inventories – Deficient Dams

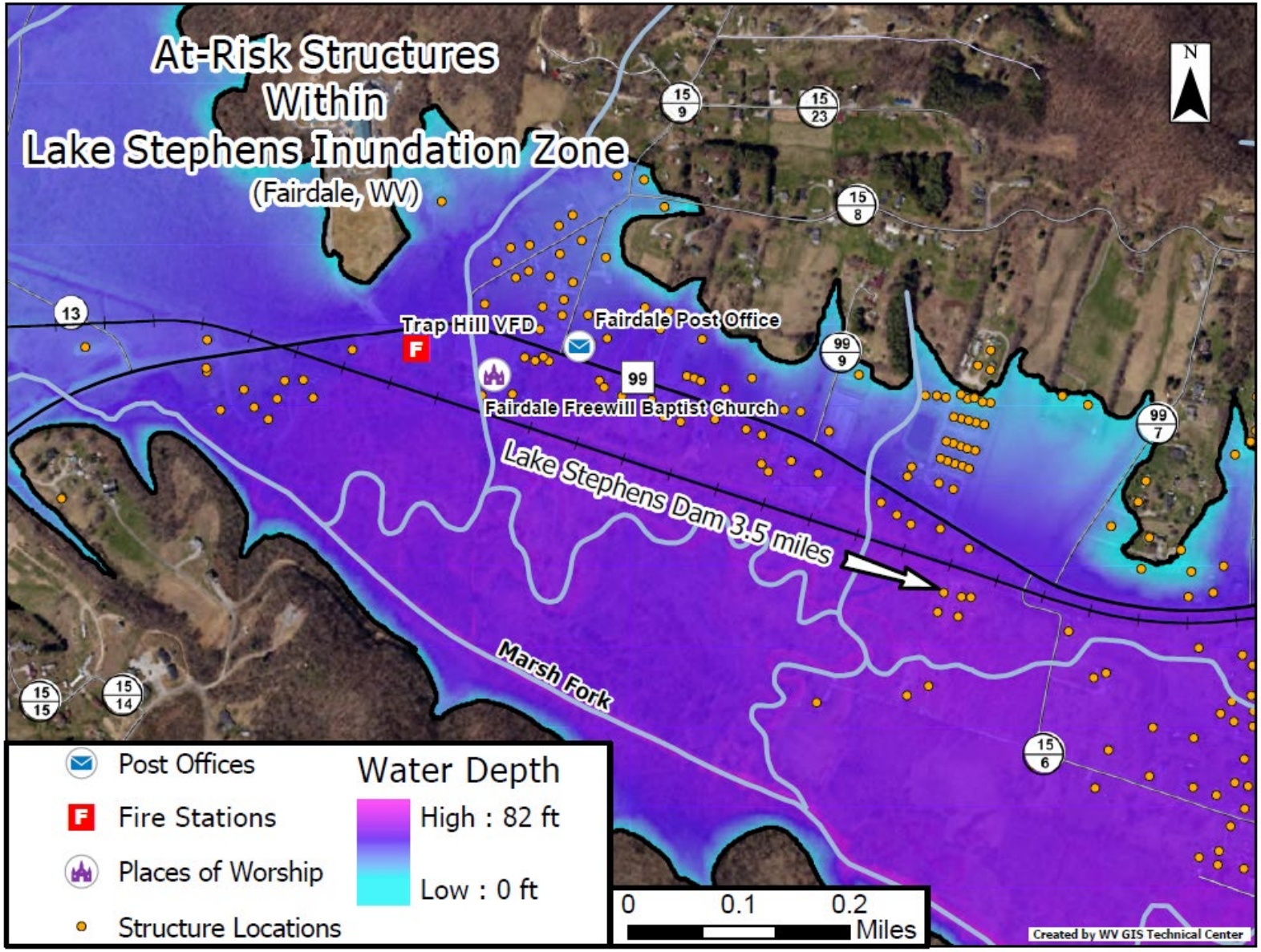


Building Inventories – Deficient Dams



Category	Charles Fork #17 Dam	Cobun Creek Dam	Flat Top Lake Dam	Lake Stephens Dam	Upper Deckers #1 Dam
Hazard Potential Classification	**High Risk**	**Significant Risk**	**High Risk**	**High Risk**	**Significant Risk**
WV DEP Deficient Dams / Rank	T1 / 5		T1 / 14	T1 / 7	
Flood Inundation Area (sq. mi.)	3.06	0.04	3.38	4.91	1.55
Flood Inundation Area (acres)	1955	23	2164	3141	995
River or Stream	Charles Fork	Cobun Creek	Beaverpond Branch	Stephens Branch	Decker's Creek
Watershed	Little Kanawha	Upper Monongahela	Lower New	Coal	Upper Monongahela
County	Roane	Monongalia	Raleigh	Raleigh	Preston
Community and distance (mi)	Spencer (2 miles)	Morgantown (1 mile)	Cool Ridge (1 mile)	Surveyor (1 mile)	Arthurdale (1 mile)
Owner	City of Spencer	Morgantown Utility Board	Flat Top Lake Assoc.	Raleigh County Rec. Authority	Monongahela SCD
# Structures	**983**	**7**	**252**	**1,071**	**188**
Building Type - % Residential	58%	29%	85%	80%	75%
Building Type - % Farm	16%	0%	9%	5%	12%
Building Type - % Commercial / Industrial	13%	57%	1%	12%	9%
Building Type - % Other	13%	14%	5%	3%	4%
At-Risk Building Exposure Value ($)	**$33,821,000**	**$83,900**	**$11,244,500**	**$27,286,500**	**$7,465,600**
# Critical Facilities	**7**	**0**	**1**	**5**	**0**
Critical Facilities Exposure Value ($)	**$2,025,500**		**$203,300**	**$1,175,800**	
# Parcels Intersecting Inundation Zone	**1,253**	**25**	**478**	**2,063**	**277**
Land Use Type - % Vacant / Open Space	24%	68%	23%	44%	28%
Land Use Type - % Residential	40%	0%	45%	34%	50%
Land Use Type - % Agriculture	14%	0%	20%	8%	10%
Land Use Type - % Commercial / Industrial	9%	28%	5%	2%	8%
Land Use Type - % Other	13%	4%	7%	11%	5%

Building Inventories – Deficient Dams



Contact Information

WVU GIS Technical Center, West Virginia University

Kurt Donaldson, GIS Manager
kurt.donaldson@mail.wvu.edu, phone: (304) 293-9467

Eric Hopkins, GIS Analyst
Eric.Hopkins@mail.wvu.edu, phone: (304) 293-9463

Maneesh Sharma, GIS Analyst
Maneesh.Sharma@mail.wvu.edu, phone (304) 293-9466

Behrang Bidadian , Graduate Research Assistant
behrang.bidadian@mail.wvu.edu