RiskMAP
Increasing Resilience Together

Flood Risk Review (FRR) Meeting

Pocahontas County, WV and Incorporated Areas
December 9, 2022

FEMA

Agenda

- Welcome and Introductions
- Where We Are - Draft Maps
- Flood Study Update
- Using Flood Risk Data to Reduce Risk
- Discussion

Welcome and Introductions

FEMA

Risk MAP

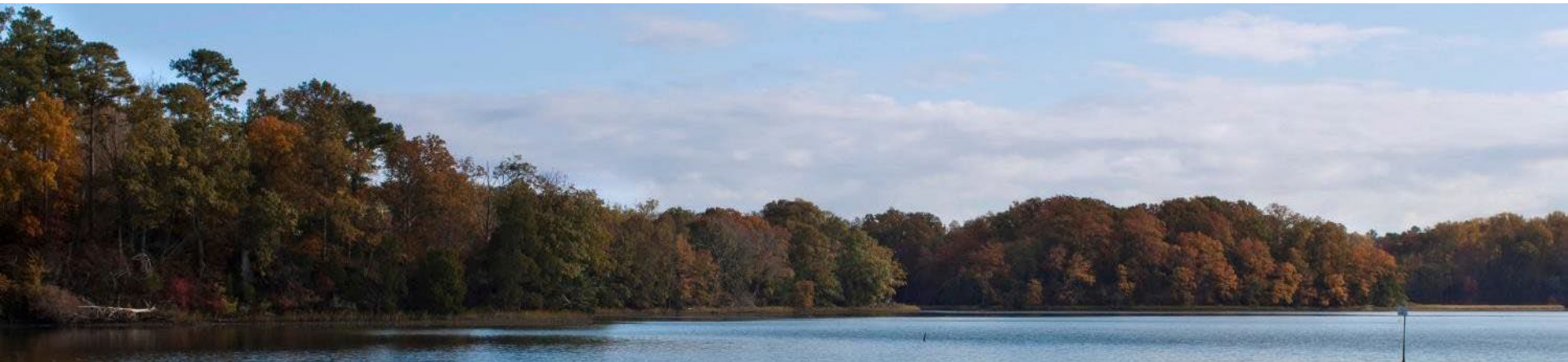
Where We Are - Draft Maps

FEMA

RiskMAP
Increasing Resilience Together

3 Reasons We Are Here Today

- To preview and discuss the updated Flood Insurance Study (FIS) report and Flood Insurance Rate Map (FIRM) for Pocahontas County, WV
- To examine the new study areas, discuss how the analysis and mapping have changed since the previous FIRM, and work collaboratively to ensure that the needs of the community and its partners are met. **BECAUSE THE EARLIER YOU KNOW THE BETTER!**
- To present a timeline of next steps



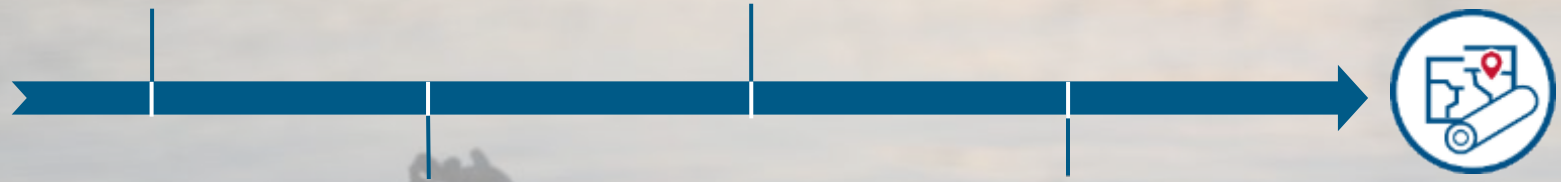
Timeline – Looking Back

Effective FIRM
(Digital Conversion)
November 2010

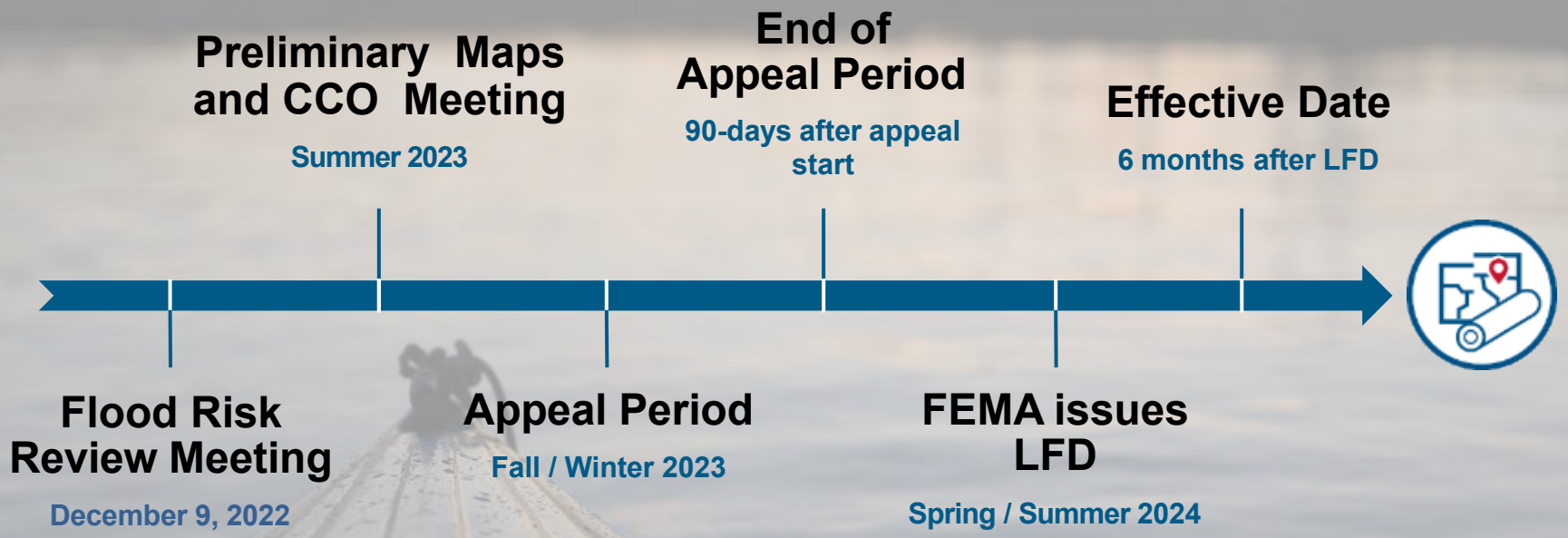
Risk MAP Study Notification
May 2021

Risk MAP Kickoff Meeting
June 2021

Flood Risk Review Meeting
December 9, 2022



Timeline – Looking Ahead



Flood Study Update

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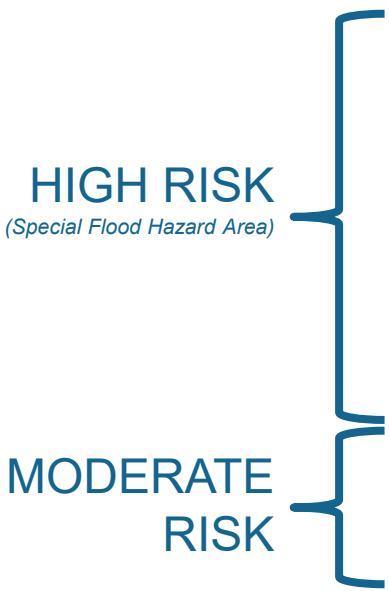
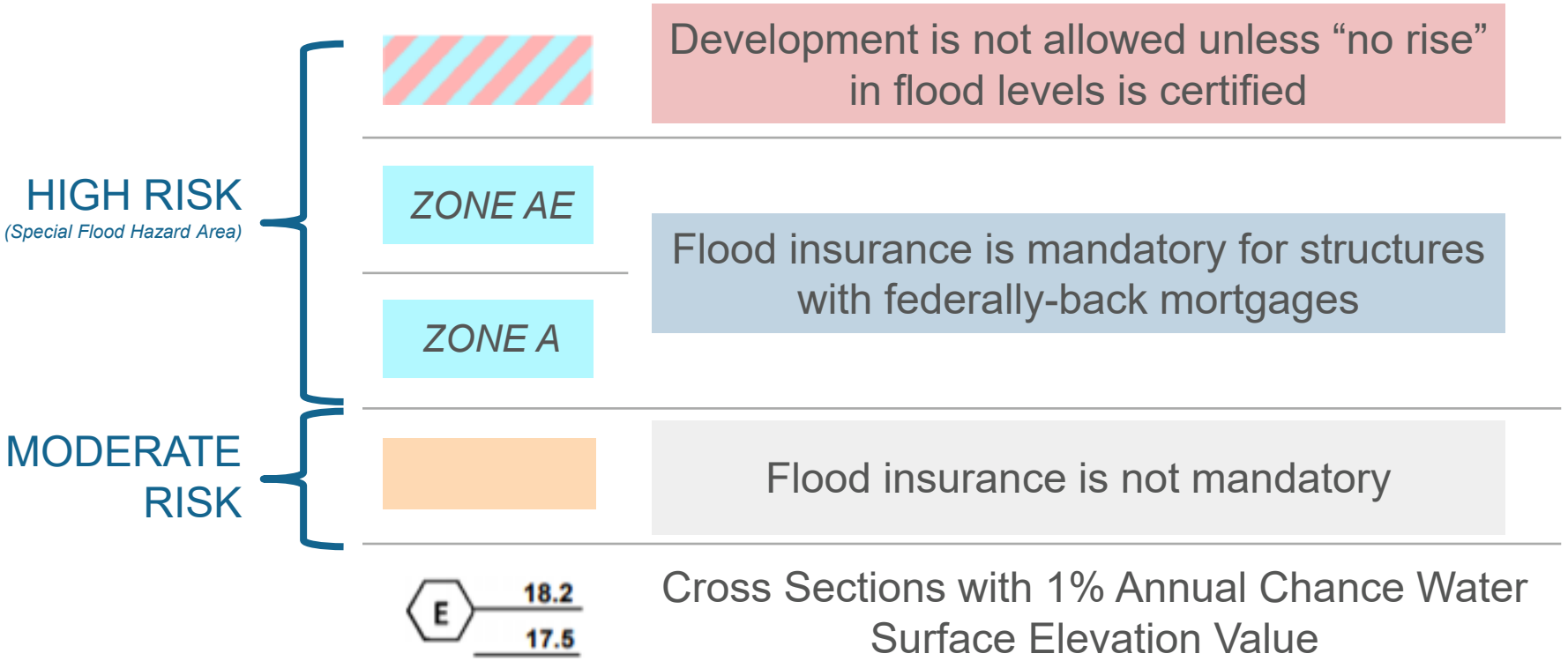
Floodplain Map Overview



	Regulatory Floodway
ZONE AE	1-Percent-Annual-Chance Flood Hazard Area **with published Base Flood Elevations** (BFEs)
ZONE A	1-Percent-Annual-Chance Flood Hazard Area **without published BFEs**
	0.2-Percent-Annual-Chance Flood Hazard Area
E 18.2 17.5	Cross Sections with 1% Annual Chance Water Surface Elevation Value

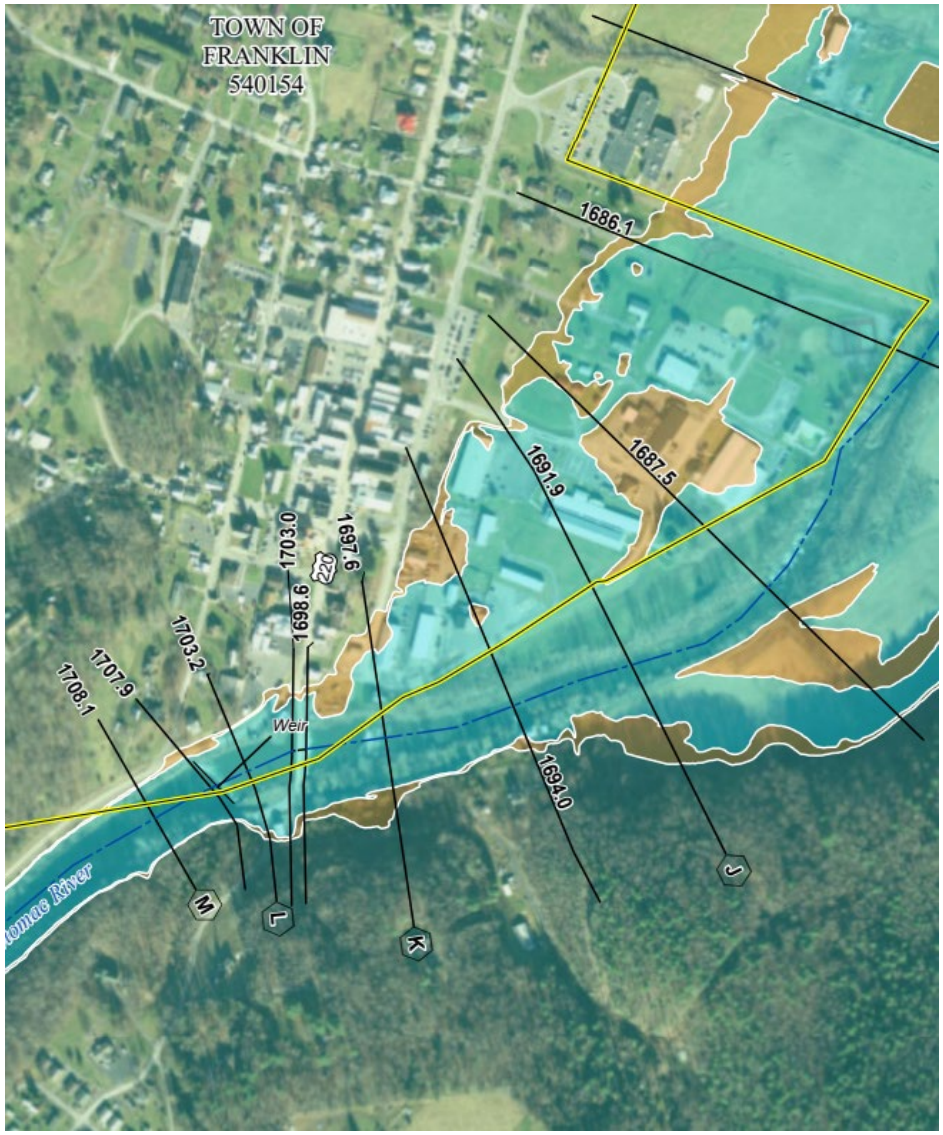
"The 100-Year Flood Zone Explained"

Floodplain Map Overview



"The 100-Year Flood Zone Explained"

Floodplain Map Overview



SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS

- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES

- 20.2 (B) Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- (8) Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

Study Overview

Revised Modeling and Mapping, including:

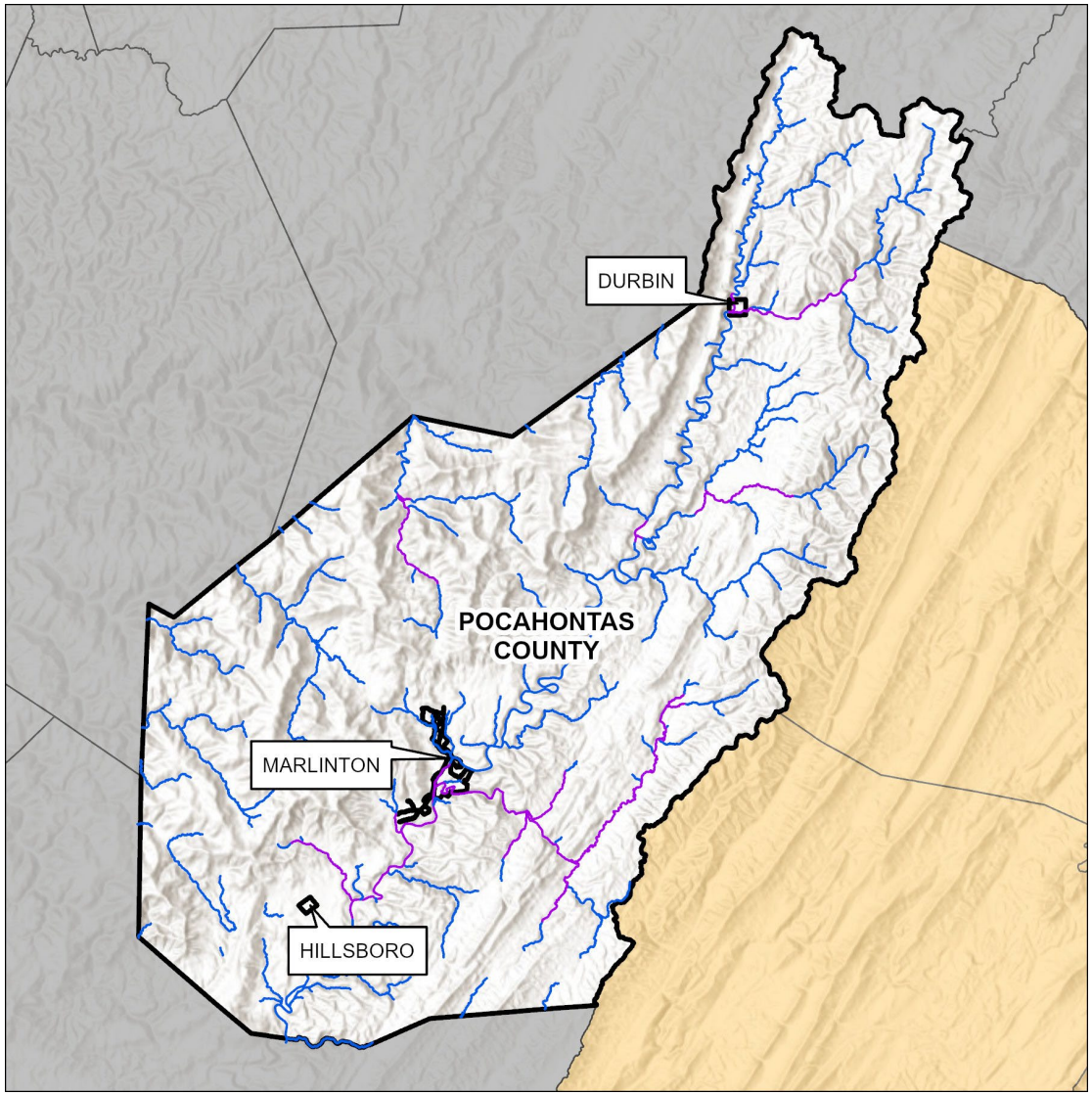
- Updated GIS-based regulatory products, including:
  - Updated maps / database / report formats based on new FEMA guidelines and specifications
- Utilization of high-resolution topographic data (for modeling and mapping)
- ***Detailed 'Zone AE' Studies – 79.8 miles***
- ***Model-backed Approximate 'Zone A' Studies – 442.4 miles***
- Production of associated non-regulatory flood risk datasets

Study Overview MAP

The Project Area

LEGEND

- Zone A Streams
- Zone AE Streams
- Pocahontas County Boundary
- West Virginia County Boundaries
- Virginia County Boundaries



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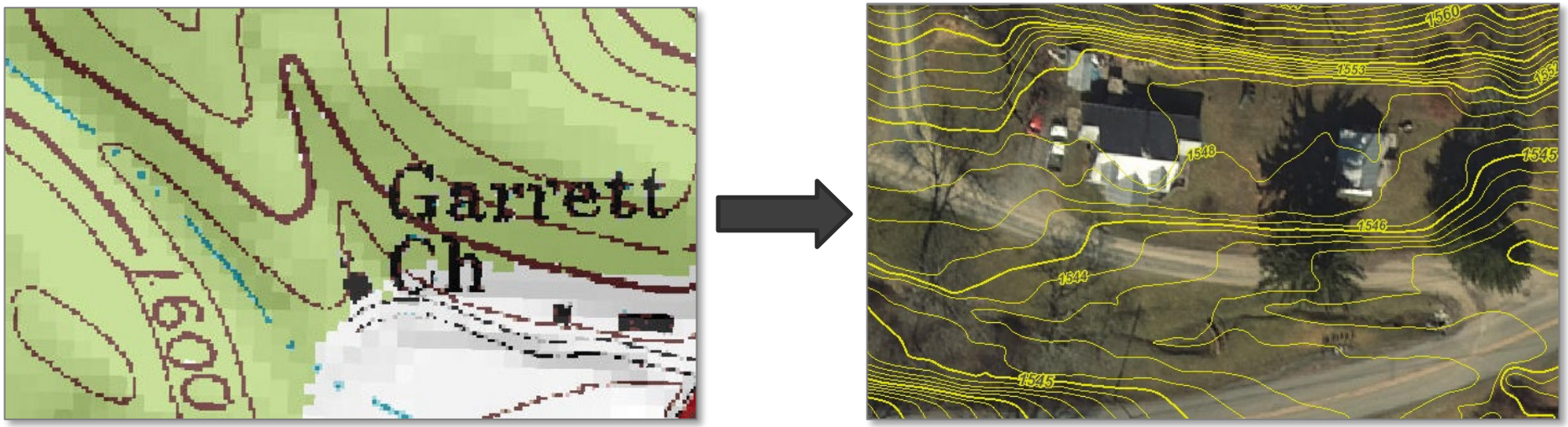
Topographic Data

2016 and 2018/19 LiDAR Based DEM

LiDAR = Light Detection and Ranging

- *Uses light pulses and GPS to survey elevation data*
- *Improves the level of detail for hydraulic modeling and floodplain delineation*



Hydrologic Analyses

Peak discharges for the 10-, 4-, 2-, 1-, and 0.2-percent-annual-chance storm events were computed using Regional Regression Equations (RRE) defined in "***Estimation of Flood-Frequency Discharges for Rural, Unregulated Streams in West Virginia***" – USGS SIR2010-5033 (Wiley and Atkins, 2010)

Hydrologic Study Method	Study Type	Stream Names	Reach Lengths (*Miles*)
Gage Analysis weighted with Regional Regression Equations	AE	Greenbrier River, East Fork Greenbrier River, Knapp Creek, Old Field Fork	52.3
Gage Analysis weighted with Regional Regression Equations	A	Brush Run, Cranberry River, East Fork Greenbrier River, Greenbrier River, Knapp Creek, North Fork Cranberry River, Old Field Fork, Shavers Fork	95.6
Regional Regression Equations	AE	Big Spring Fork, Browns Creek, Cummings Creek, Deer Creek, Douthat Creek, North Fork, Sugar Camp Run, Stamping Creek, Swago Creek, West Fork Greenbrier River	27.5
Regional Regression Equations	A	All remaining approximate studies	346.6

Hydrologic Analyses

Summary information will be published in the forthcoming Flood Insurance Study Report (to a greater degree for detailed Zone AE study reaches)

But a more focused, comprehensive **Hydrology Report** has been already been prepared with full details of the sources and methodology, along with comparative evaluation between effective and draft / proposed restudied discharges.

Key Finding

The proposed discharges are generally **lower** than the effective discharges (dating back to the 1980s).

Flows derived from flood frequency analyses at gaged locations are generally higher than both effective flows and regression-based flows, which may be due to the influence of more recent flood events (i.e. not accounted for in the regression analysis).

Regardless, proposed discharges will be used in place of effective discharges to reflect updates over the past half century in hydrologic methods (e.g. regression equations), topography, and land use.

Sample page from the Pocahontas Risk MAP Hydrology Report

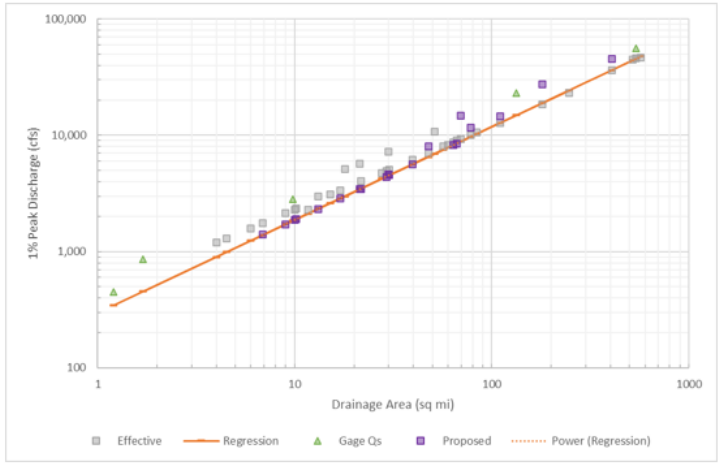


Figure 8: Comparison of 1% Discharges

The table below compares the 1% discharges proposed in this study with the Effective discharges (FEMA, 2010).

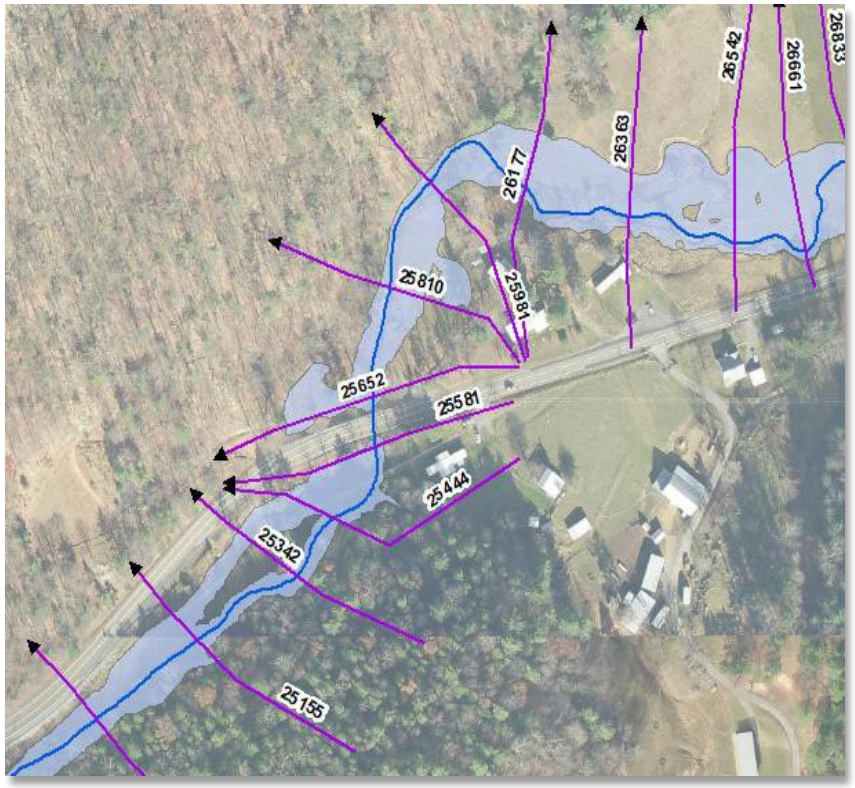
Table 5: Comparison of 1% Discharges

Reach	Description	Approximate DA	Proposed	Effective FIS	Change
BIG SPRING FORK	At Slaty Fork above confluence with Elk River	21	3,440	5,700	-40%
BROWNS CREEK	At Huntersville above confluence with Knapp Creek	10	1,880	2,300	-18%
CUMMINGS CREEK	At Huntersville above confluence with Knapp Creek	9	1,700	2,150	-21%
DEER CREEK	At Cass above confluence of Greenbrier River	67	8,510	9,000	-5%

Hydraulic Analyses

Approximate 'Zone A' Base Level Study
(442.4 stream miles)

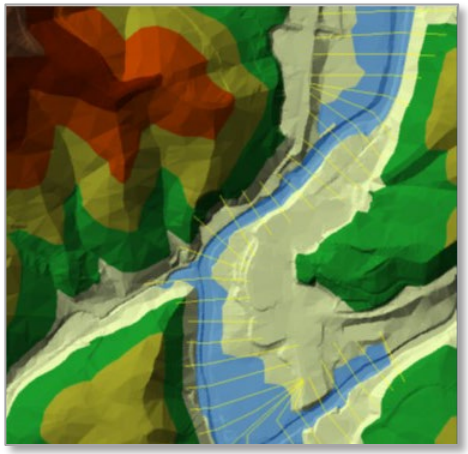
- Generally used in areas with lower development / lower development potential
- Cross-sections generated from LiDAR used for hydraulics:
  - Automated processes
  - Does not include information below normal water surface
  - No structures are modeled
  - No Floodway or BFEs (but modeled XS in FIRM database)
  - Multi-frequency flood values computed but only 1% annual chance on FIRM

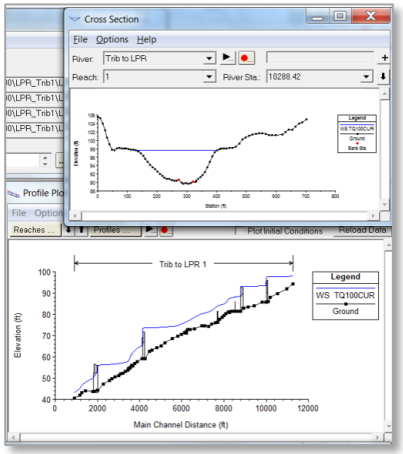


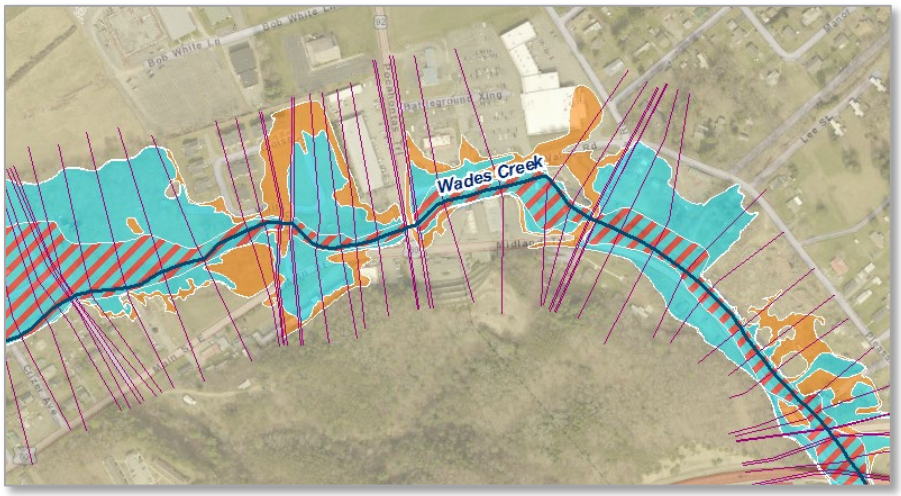
Hydraulic Analyses

Detailed 'Zone AE' Restudy
(79.8 stream miles)

- Used in areas with high development or high development potential
- Encroachments computed and regulatory floodways mapped
- Structures are modeled
- Channel bathymetry is obtained from Field Survey







Study Types

		Approximate	Detailed
Survey	Channel XS	None	Field survey at road crossings
	Hydraulic Structures	None	Field survey
Hydrology	Methodology	Regression Equations / Gage Analysis	Regression Equations / Gage Analysis
Hydraulics	Recurrence Interval	10%, 4%, 2%, 1%, 1%+ and 0.2% annual chance	
	Manning's "n"	Aerial Imagery (Horizontal Variation)	
	Channel Geometry	LiDAR	LiDAR; Supplemented with field survey
Mapping	Boundaries	1% annual chance	1% and 0.2% annual chance
	Flood Zones	Zone A (no published BFEs)	Zone AE (all XS with labeled WSELs, and Floodways) and 'Shaded' Zone X
FIS Report	Tables	Study Summaries	Study Summaries, Summary of Discharge, Floodway Data, Roughness Coefficient
	Profiles	None	10-, 4-, 2-, 1-, 0.2-% annual chance

Study Impacts

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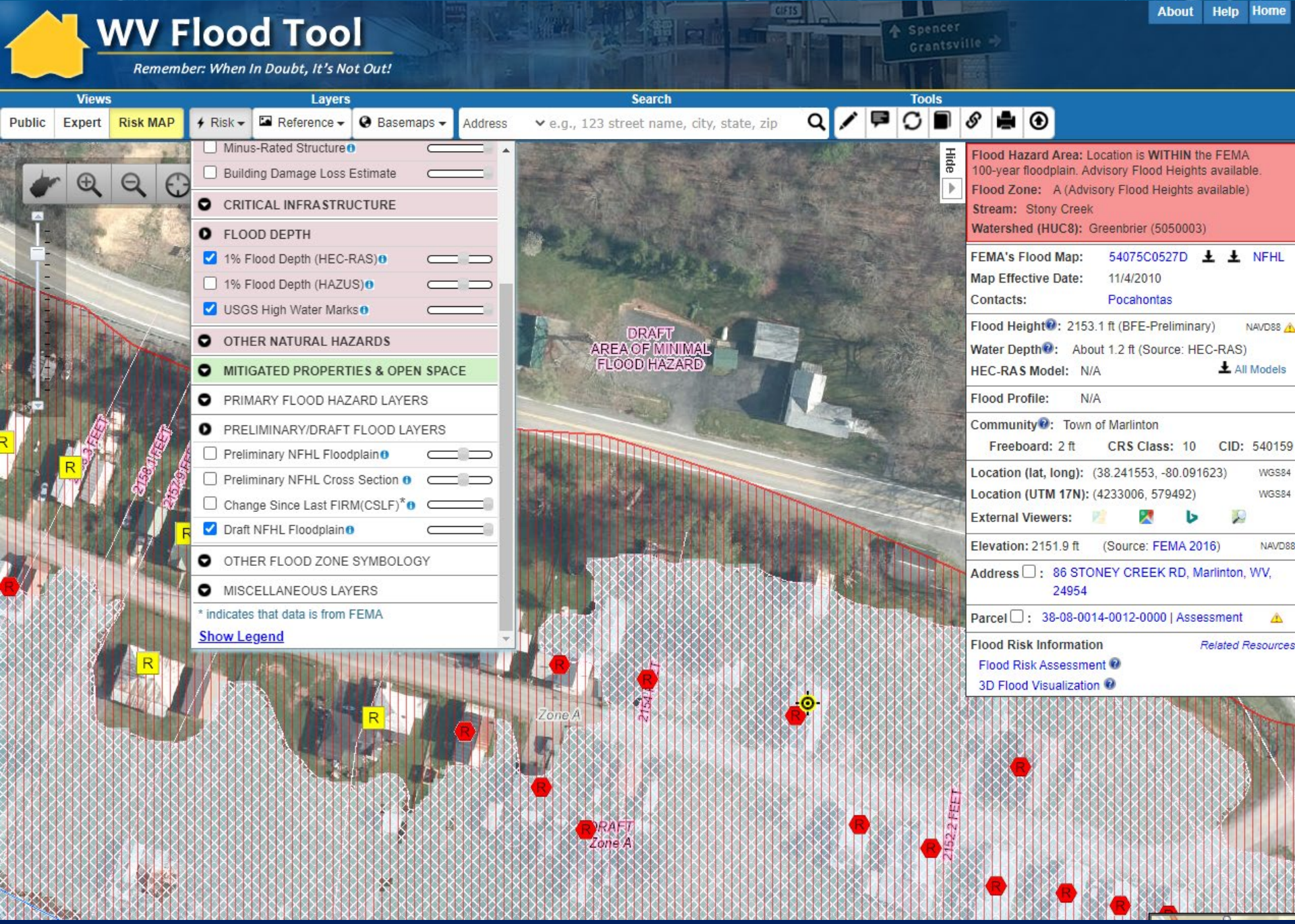
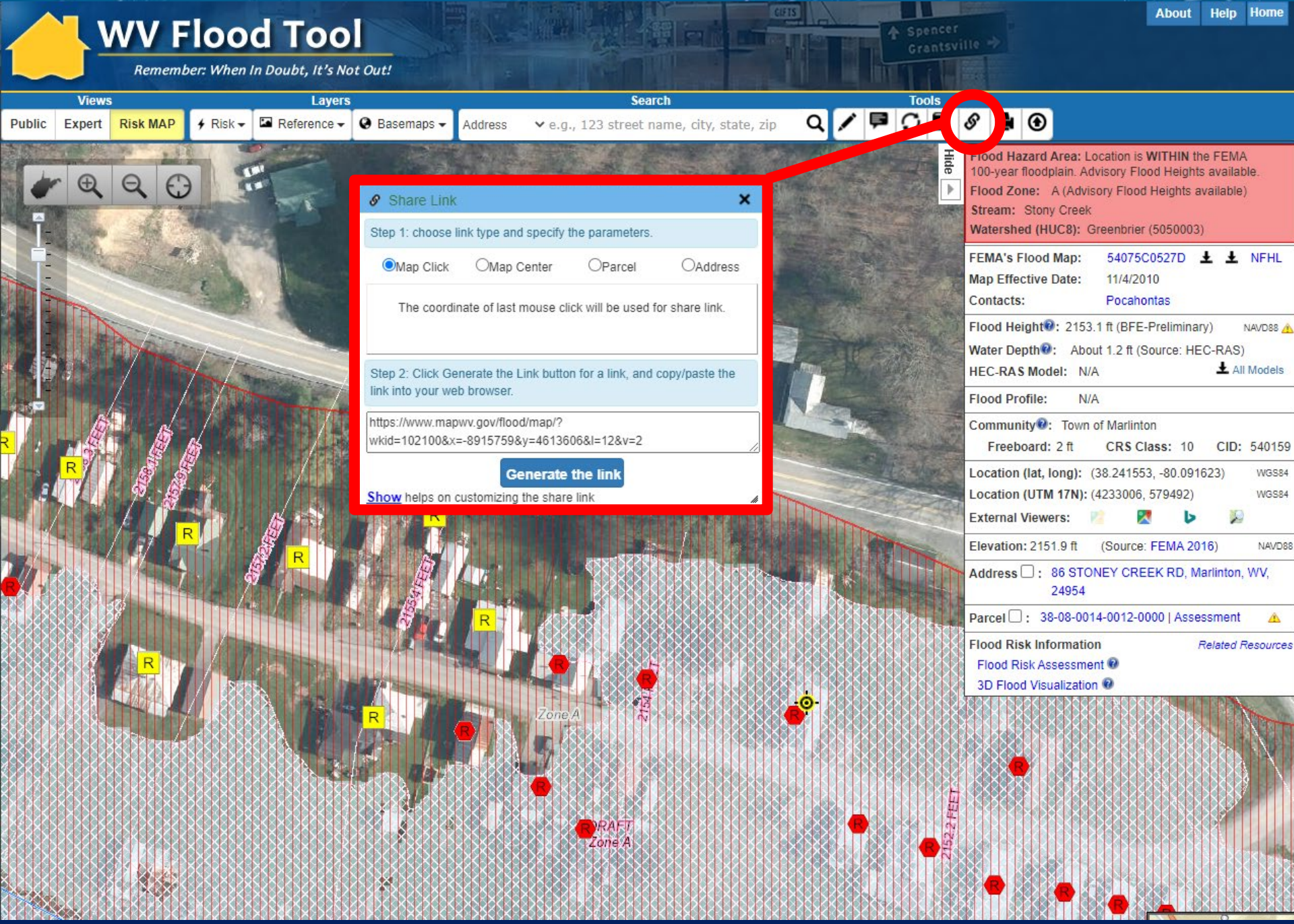


http://www.mapwv.gov/flood/



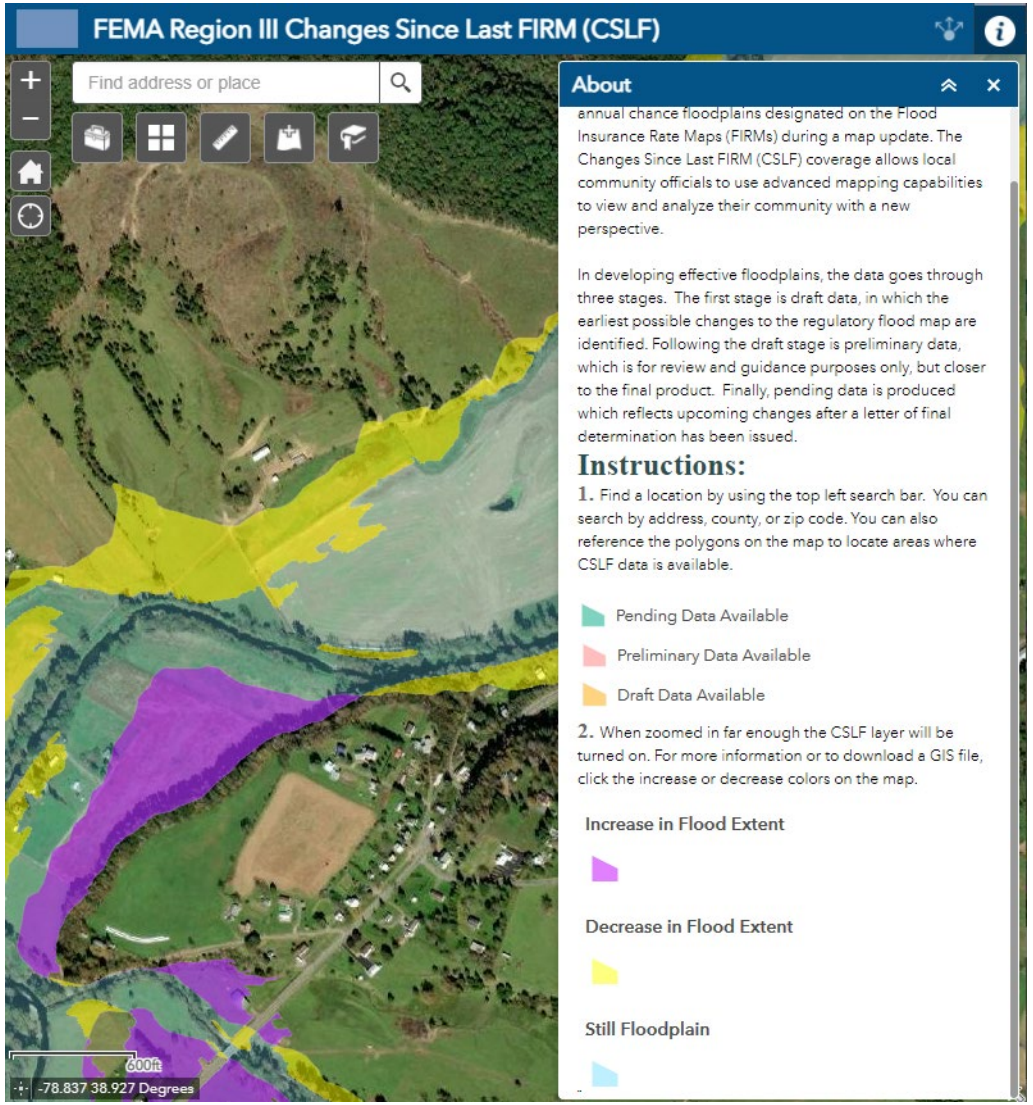
http://www.mapwv.gov/flood/

How Did the Floodplain Maps Change?

FEMA Region 3 Changes Since Last FIRM (CSLF) Viewer: https://arcg.is/1Pr5nL0

Change in Floodplain Extents:

- Purple – Increase
- Blue – Still Floodplain
- Yellow – Decrease



FEMA

National Flood Hazard Layer

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

Accessing the National Flood Hazard Layer

Map Service Center

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

FEMA's Map Service Center

NFHL ArcGIS Viewer

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

NFHL Viewer

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

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

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

Draft National Flood Hazard Layer

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

Preliminary Flood Hazard Data

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

Pending Flood Hazard Data

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

Significant Impacts Overview

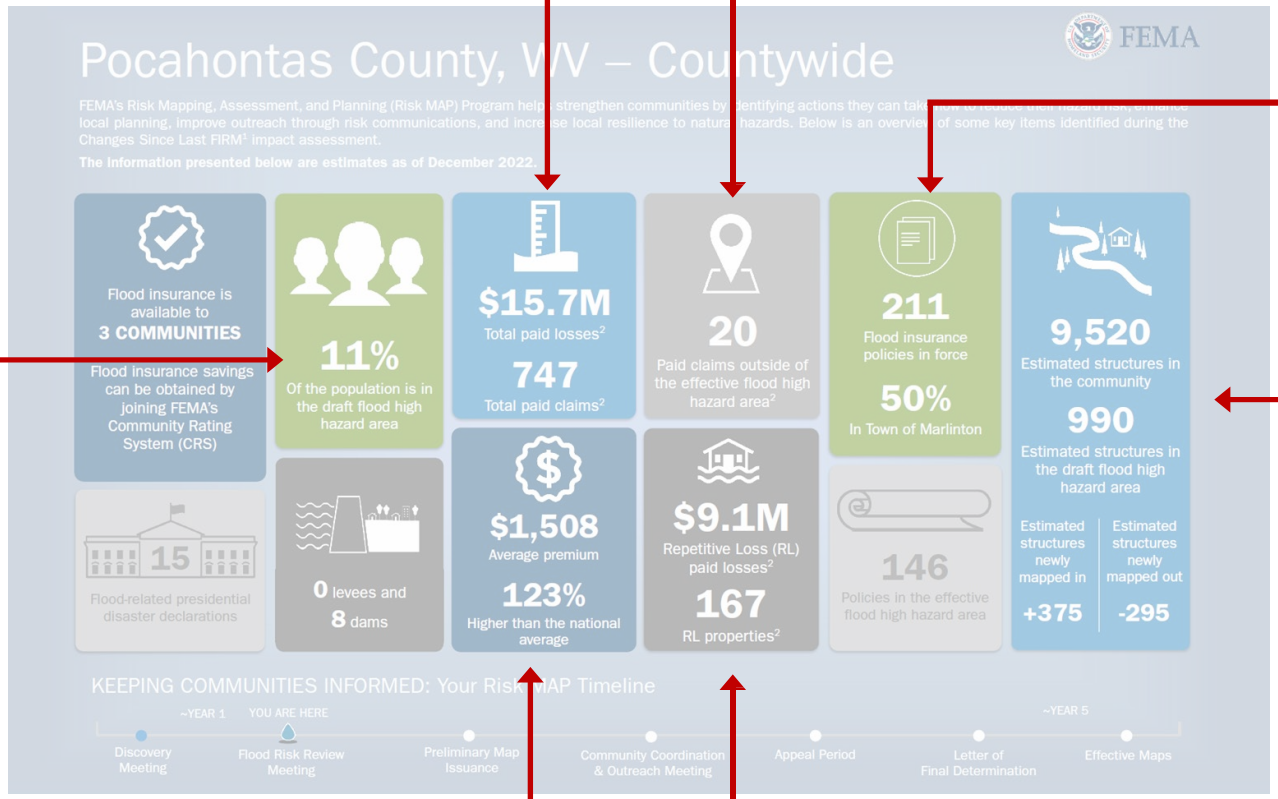
- The study resulted in **moderate changes to SFHA extents** with both narrowing and widening compared to effective SFHAs.

- **Extended Zone A study reaches** (with drainage areas of 2 square mile and greater, and not on current effective FIRM) result in new properties within the SFHA. Where effective Zone A SFHAs are present (particularly in headwaters), the draft Zone A SFHAs are narrower.

WV Flood Tool – SFHA Future Map Conditions

	Floodway	No Change SFHA	Mapped In SFHA	Mapped Out SFHA	Community Total
Durbin	1	4	9	2	16
Marlinton	14	317	43	30	404
Pocahontas County (Unincorporated Areas)	54	194	153	170	571
	69	**515**	**205**	**202**	**991**

Flood Risk Dashboard



NFIP FLOOD CLAIM PAYOUTS

CLAIMS OUTSIDE OF SFHA

NFIP FLOOD POLICIES

AFFECTED RESIDENTS

HIGH-RISK STRUCTURES

AVERAGE PREMIUM

REPETITIVE LOSSES

FEMA

Flood Risk Dashboard

Pocahontas County, WV – Countywide

FEMA

FEMA's Risk Mapping, Assessment, and Planning (Risk MAP) Program helps strengthen communities by identifying actions they can take now to reduce their hazard risk, enhance local planning, improve outreach through risk communications, and increase local resilience to natural hazards. Below is an overview of some key items identified during the Changes Since Last FIRM[1] impact assessment.

The information presented below are estimates as of December 2022.

Flood insurance is available to **3 COMMUNITIES**

Flood insurance savings can be obtained by joining FEMA's Community Rating System (CRS)

11%
Of the population is in the draft flood high hazard area

$15.7M
Total paid losses[2]

747
Total paid claims[2]

20
Paid claims outside of the effective flood high hazard area[2]

211
Flood insurance policies in force

50%
In Town of Marlinton

9,520
Estimated structures in the community

990
Estimated structures in the draft flood high hazard area

Estimated structures newly mapped in	Estimated structures newly mapped out
+375	-295

15
Flood-related presidential disaster declarations

0 levees and **8** dams

$1,508
Average premium

123%
Higher than the national average

$9.1M
Repetitive Loss (RL) paid losses[2]

167
RL properties[2]

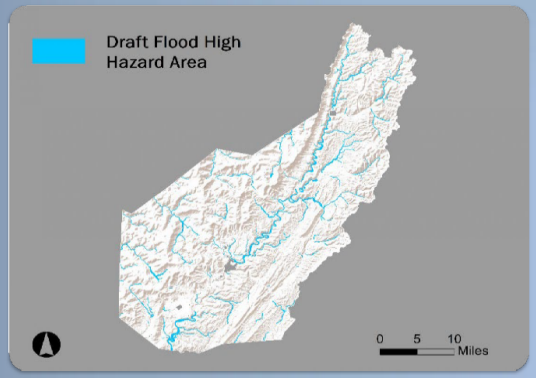
146
Policies in the effective flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

Flood Risk Dashboard

Unincorporated Areas/Pocahontas County, WV

KNOW YOUR RISK (The information presented below are estimates as of December 2022. [1] Flood Insurance Rate Map. [2] Since 1978.)



10/17/1989
Initial FIRM[1] date

11/4/2010
Effective FIRM date

$2.2M
Total paid losses[2]

155
Total paid claims[2]

104
Flood insurance policies in force

60
Policies in the effective flood high hazard area

8,450
Estimated structures in the community

560
Estimated structures in the preliminary flood high hazard area

Estimated structures newly mapped in	Estimated structures newly mapped out
+310	-250

5%
Of the population is in the preliminary flood high hazard area

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

9
Paid claims outside of the effective flood high hazard area[2]

$500K
Repetitive Loss (RL) paid losses[2]

13
RL properties[2]

15
Flood-related countywide presidential disaster declarations

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

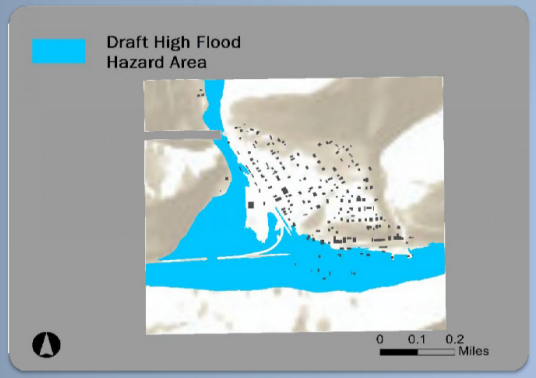
~YEAR 1 — YOU ARE HERE — ~YEAR 5

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

Flood Risk Dashboard

Town of Durbin/ Pocahontas County, WV

KNOW YOUR RISK **(The information presented below are estimates as of December 2022.** [1] Flood Insurance Rate Map. [2] Since 1978.**)**



8/24/1984
Initial FIRM[1] date

11/4/2010
Effective FIRM date

$39K
Total paid losses[2]

5
Total paid claims[2]

1
Flood insurance policies in force

1
Policies in the effective flood high hazard area

190
Estimated structures in the community

20
Estimated structures in the preliminary flood high hazard area

Estimated structures newly mapped in	Estimated structures newly mapped out
+15	-0

3.4%
Of the population is in the preliminary flood high hazard area

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

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

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

0
RL properties[2]

15
Flood-related countywide presidential disaster declarations

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

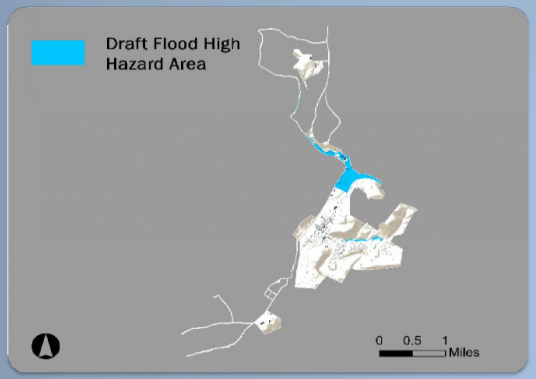
~YEAR 1 — YOU ARE HERE — ~YEAR 5

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

Flood Risk Dashboard

Town of Marlinton/Pocahontas County, WV

KNOW YOUR RISK (The information presented below are estimates as of December 2022. [1] Flood Insurance Rate Map. [2] Since 1978.)



10/17/1989
Initial FIRM[1] date

11/4/2010
Effective FIRM date

$13M
Total paid losses[2]

585
Total paid claims[2]

106
Flood insurance policies in force

85
Policies in the effective flood high hazard area

700
Estimated structures in the community

410
Estimated structures in the preliminary flood high hazard area

Estimated structures newly mapped in	Estimated structures newly mapped out
+50	-45

56%
Of the population is in the preliminary flood high hazard area

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

11
Paid claims outside of the effective flood high hazard area[2]

$8.6M
Repetitive Loss (RL) paid losses[2]

154
RL properties[2]

15
Flood-related countywide presidential disaster declarations

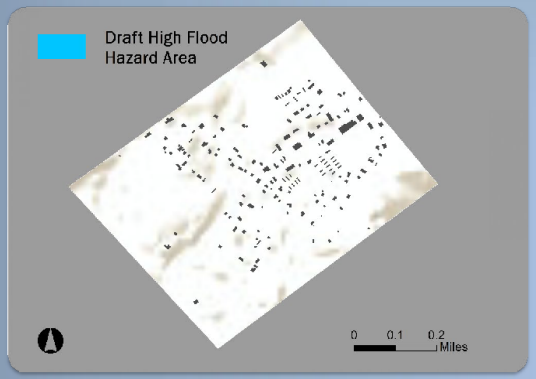
KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

~YEAR 1	YOU ARE HERE					~YEAR 5
Discovery Meeting	Flood Risk Review Meeting	Preliminary Map Issuance	Community Coordination and Outreach Meeting	Appeal Period	Letter of Final Determination	Effective Maps

Flood Risk Dashboard

Town of Hillsboro/Pocahontas County, WV

KNOW YOUR RISK **(The information presented below are estimates as of December 2022.** [1] Flood Insurance Rate Map. [2] Since 1978.**)**



10/17/1989
Initial FIRM[1] date

10/17/1989
Effective FIRM date

**Not participating in NFIP*

$0
Total paid losses[2]

0
Total paid claims[2]

0
Flood insurance policies in force

0
Policies in the effective flood high hazard area

180
Estimated structures in the community

0
Estimated structures in the preliminary flood high hazard area

Estimated structures newly mapped in **+0**

Estimated structures newly mapped out **-0**

0%
Of the population is in the preliminary flood high hazard area

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

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

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

0
RL properties[2]

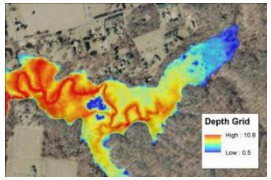
15
Flood-related countywide presidential disaster declarations

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline

~YEAR 1	YOU ARE HERE					~YEAR 5
Discovery Meeting	Flood Risk Review Meeting	Preliminary Map Issuance	Community Coordination and Outreach Meeting	Appeal Period	Letter of Final Determination	Effective Maps

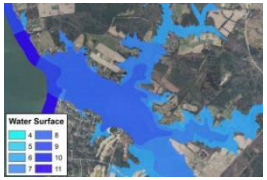
Using Flood Risk Data to Identify and Reduce Risk

Types of Flood Risk Products



Flood Depth & Analysis Grids

Changes Since Last FIRM



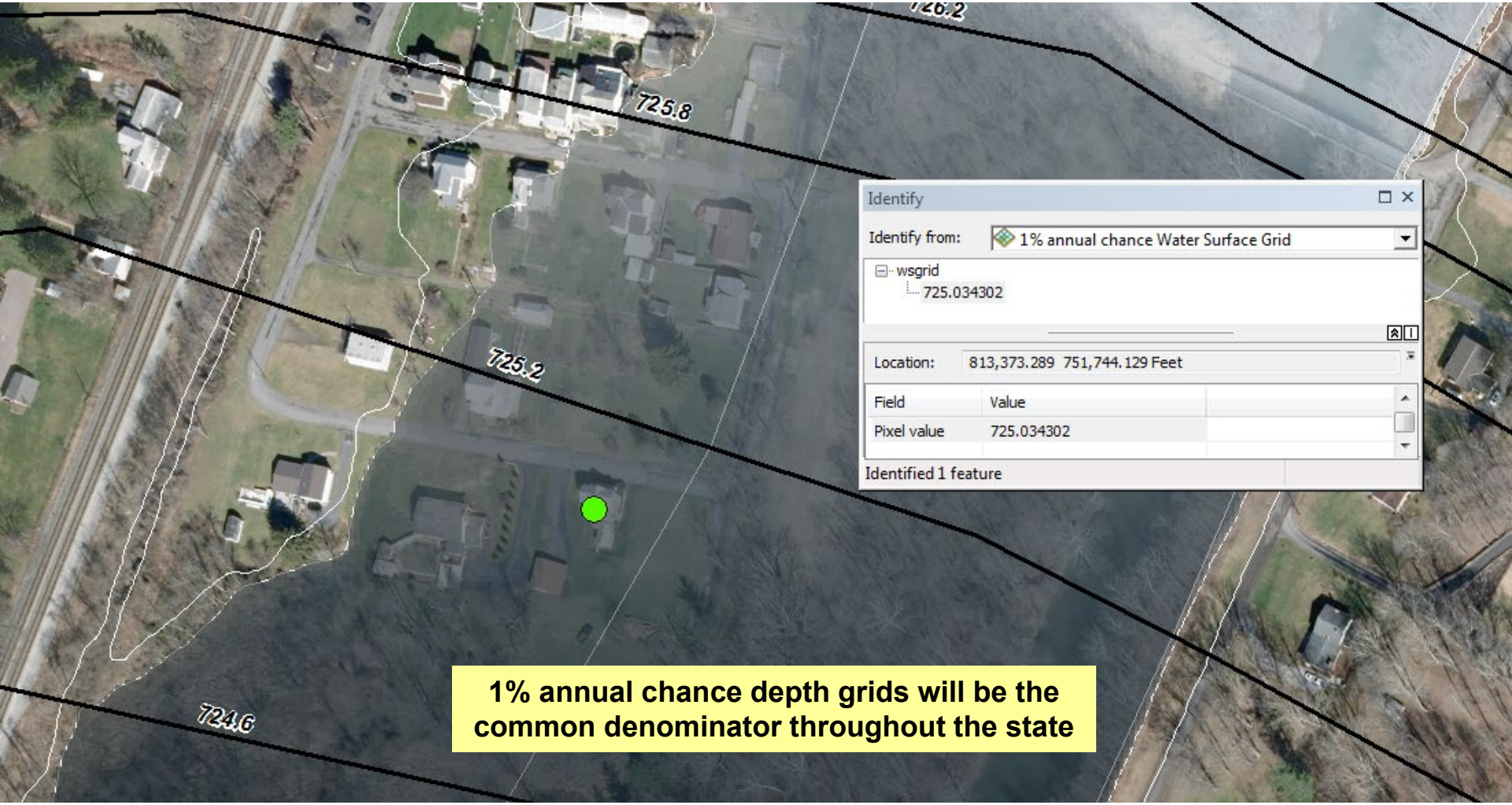
Water Surface Elevation Grids

Flood Risk Assessment / Economic Loss Calculations

Areas of Mitigation Interest

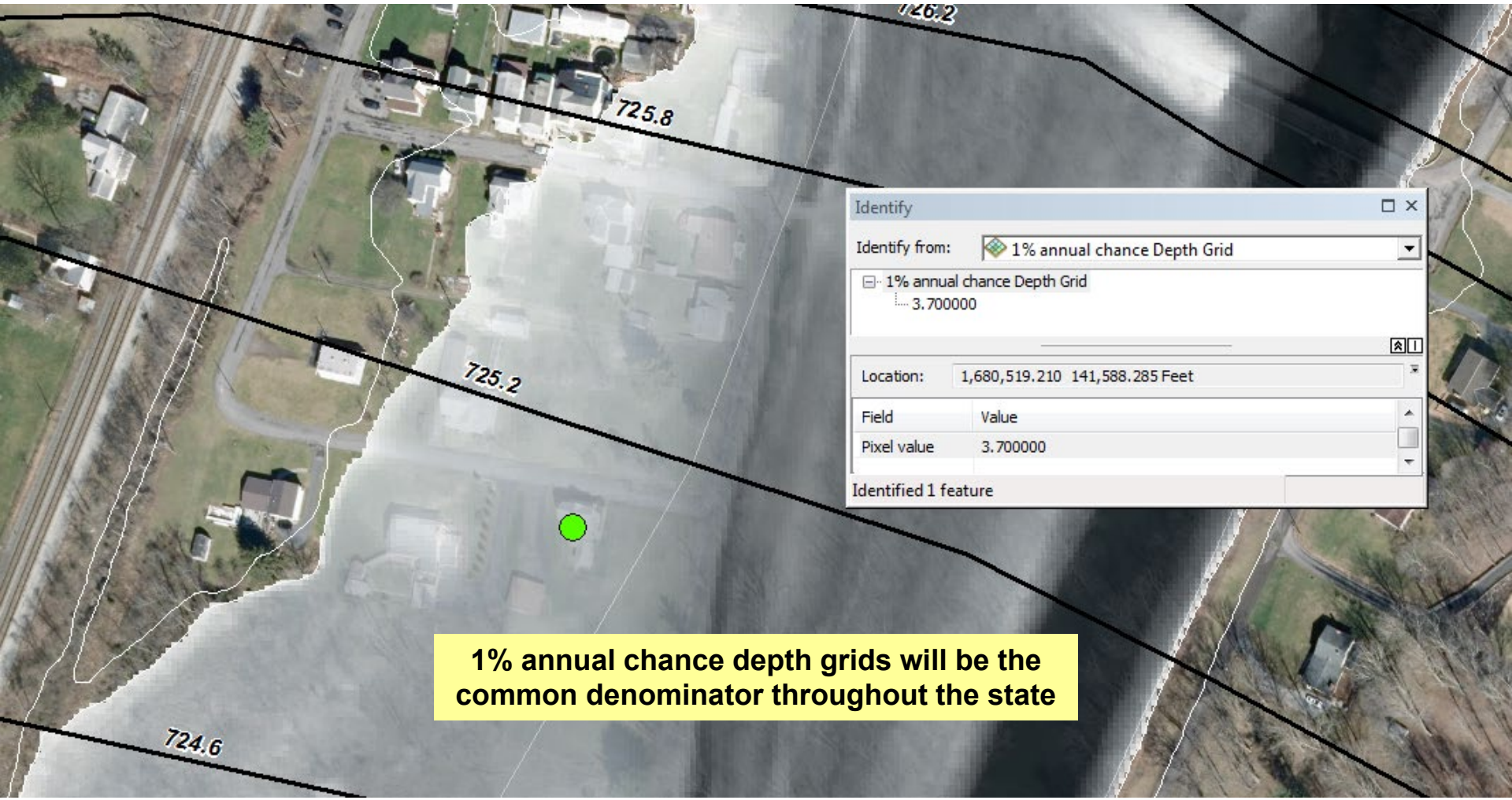
Water Surface Elevation Grids

Represent the continuous water surface elevations as determined at modeled cross-sections and interpolated values between cross sections

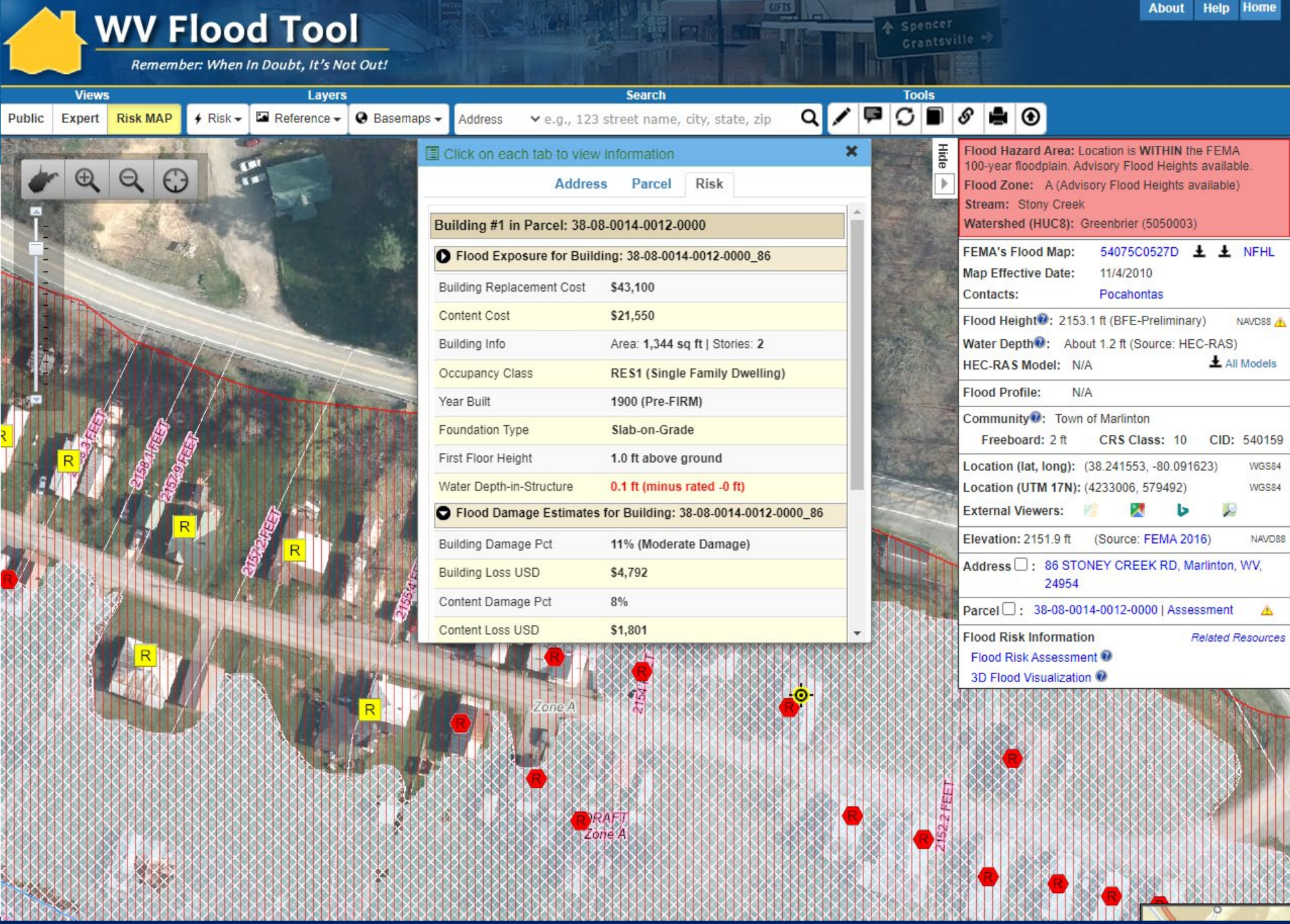


Depth Grids

Represent the difference between the ground surface and the water surface elevations



1% annual chance depth grids will be the common denominator throughout the state



http://www.mapwv.gov/flood/

Flood Hazard Mitigation Planning

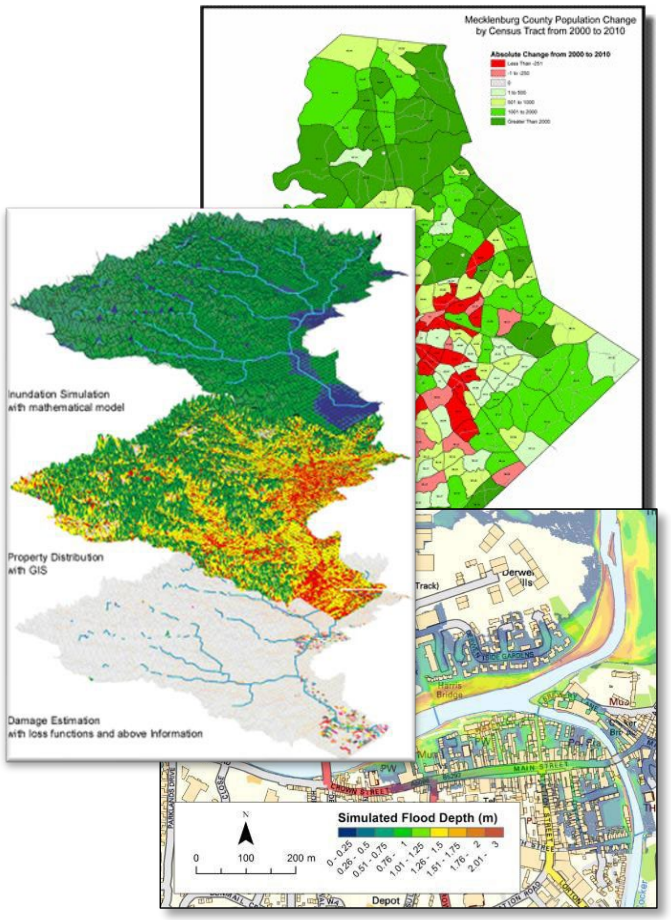
We are here

It's time to start assessing the impacts of the new floodplain boundaries

RiskMAP
Increasing Resilience Together

Using FRPs to Manage Development

- Structure-based depth of flooding analyses
- Prioritization of mitigation action
- Residential/commercial density in the floodplain
- Location/inundation area of historic events
- Properties with insurance policies and as a percentage of the population
- Areas of population growth
- Areas requiring protection



Floodplain Management

FEMA

RiskMAP
Increasing Resilience Together

Flood Risk Doesn't Stop at a Line

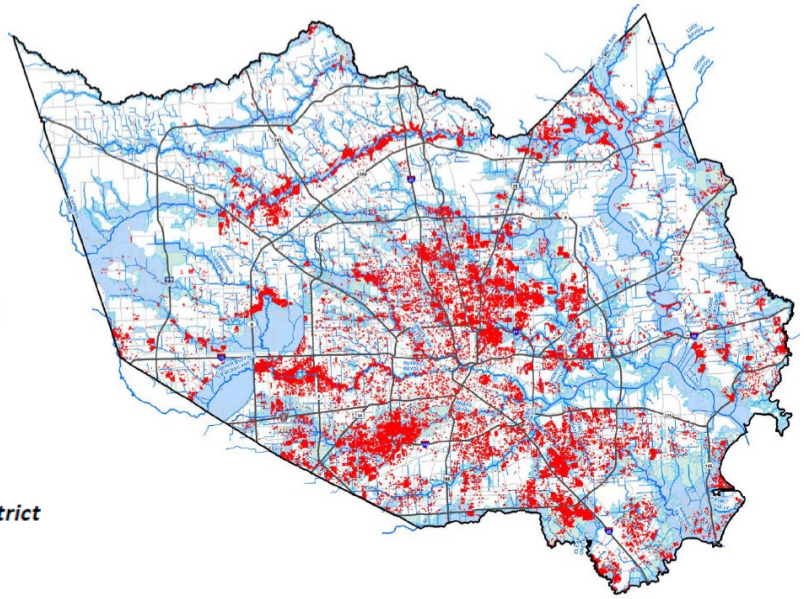
- 25% of all flood insurance claims come from outside high-risk areas.
- Your community can regulate to standards higher than the NFIP minimum standards. Consider strengthening regulations using:
  - 0.2% annual chance flood
  - "Freeboard"
  - Buffer around Special Flood Hazard Area (SFHA)
  - Flood depth grids

HURRICANE HARVEY
GREATER HOUSTON

154,170 Homes Flooded

32% < 100-yr
23% > 100 yr, < 500 yr
46% > 500 yr

SOURCE: Harris County Flood Control District



FEMA

Floodplain Management

- **Permits are Required for ALL Development in the floodplain!**
- Development means any **manmade change** to improved or unimproved real estate
- Build it **right** and insurance premiums will be more affordable
- Build it **wrong** and premiums will be very expensive

Taken from outside WVDOT office on Rt. 219 north of Marlinton, West Virginia (Pocahontas County)

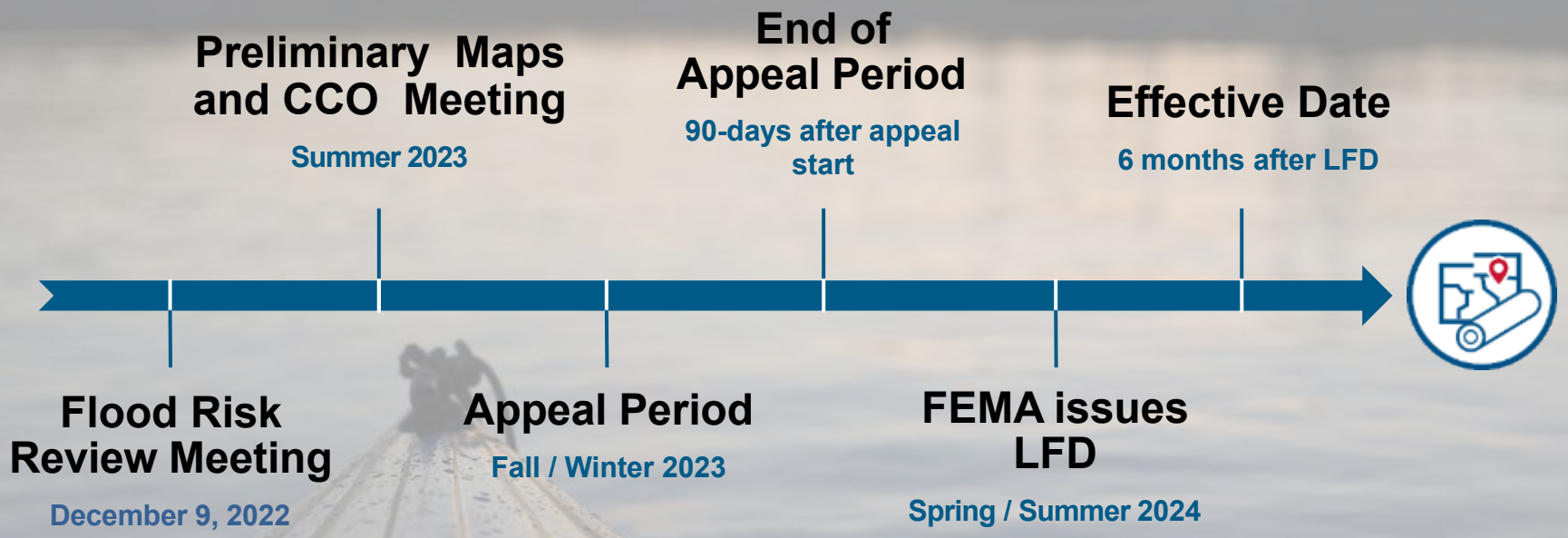
Floodplain Management

- Communities must regulate based on FIRMs
- Development should be reasonably safe from flooding
- Permits are required for all development
- State/federal permits are required
- Elevate and/or construct with flood-resistant materials
- Locate and design mechanicals to minimize or eliminate flood damage
- Locate and design public utilities and facilities to minimize or eliminate flood damage

A Zones: top of lowest floor (residential) elevated to or above the base flood level

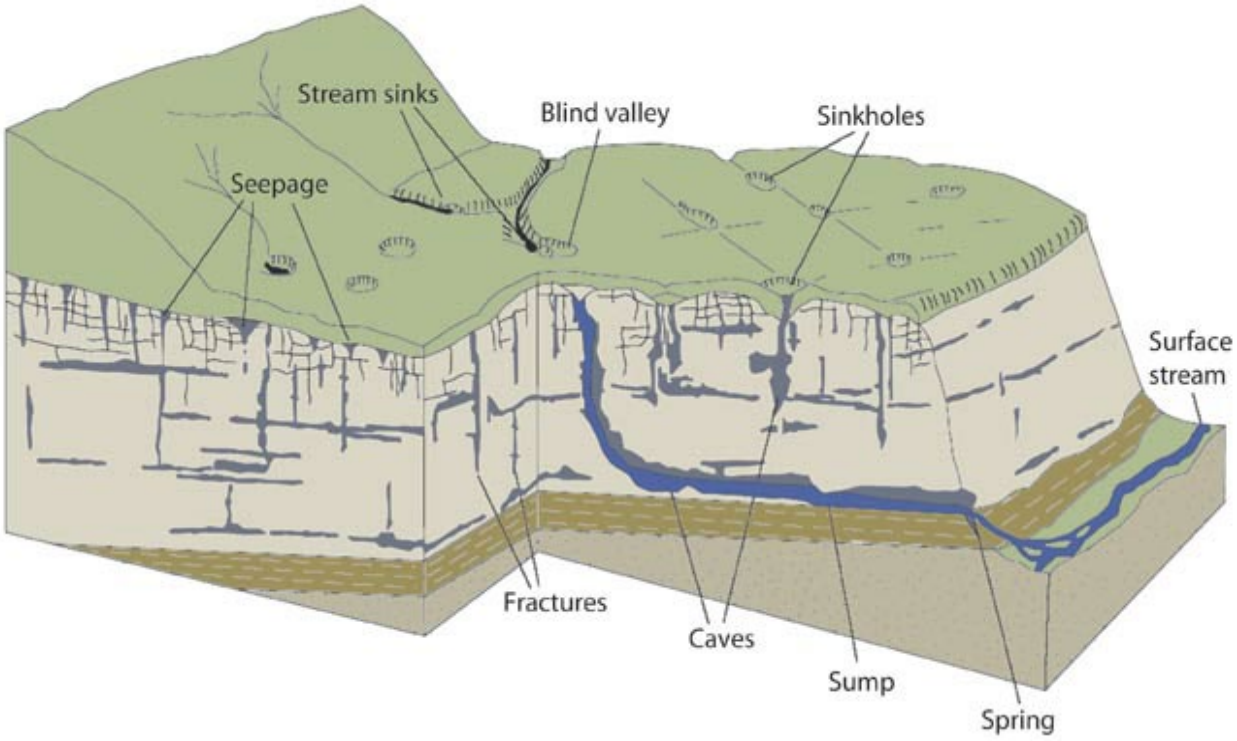

Discussion
FEMA
RiskMAP
Increasing Resilience Together

Timeline – Looking Ahead

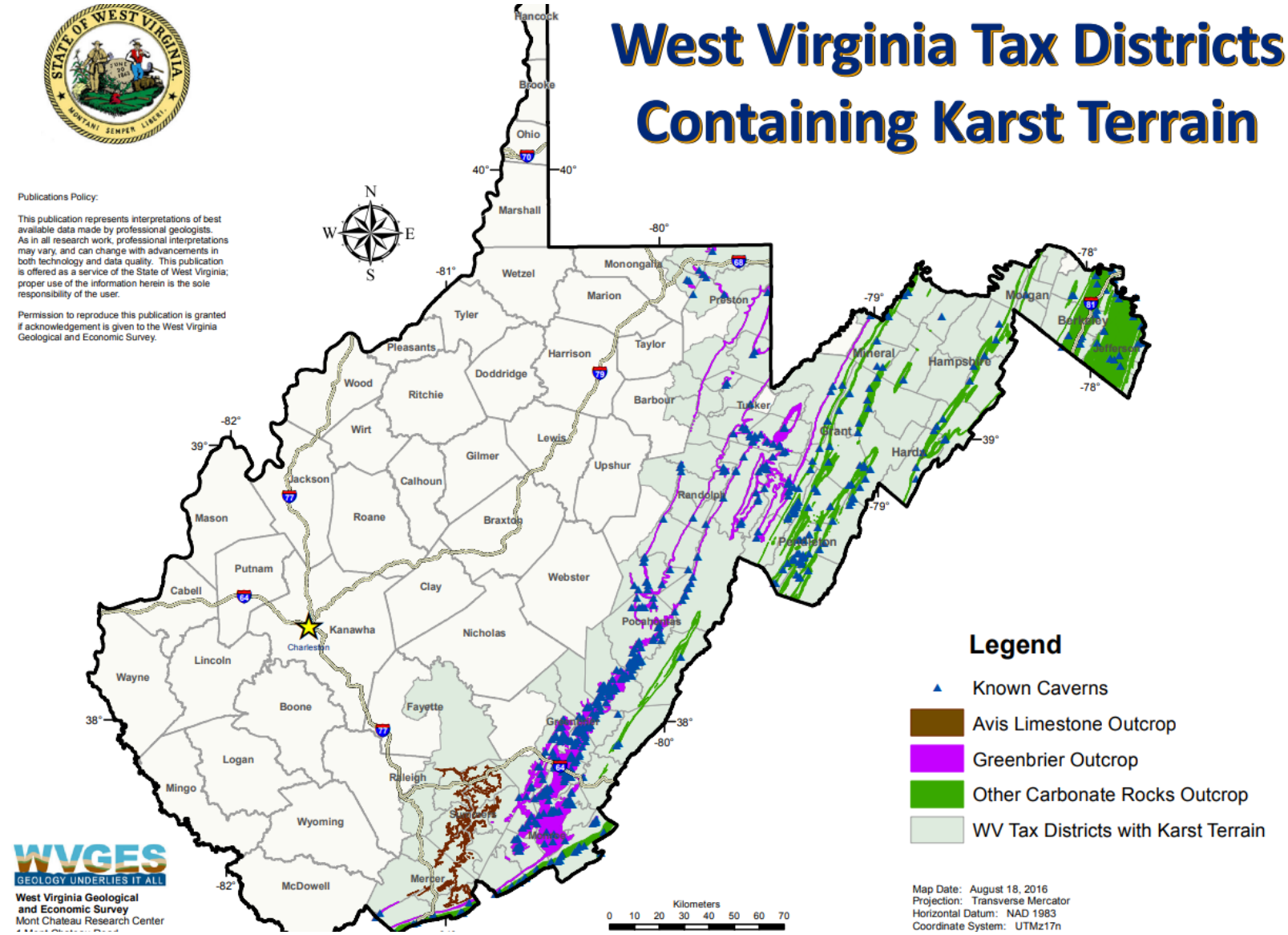


Karst in Pocahontas County

Karst topography is formed from the dissolution of soluble rocks such as limestone, dolomite, and gypsum. It is characterized by underground drainage systems with sinkholes and caves.

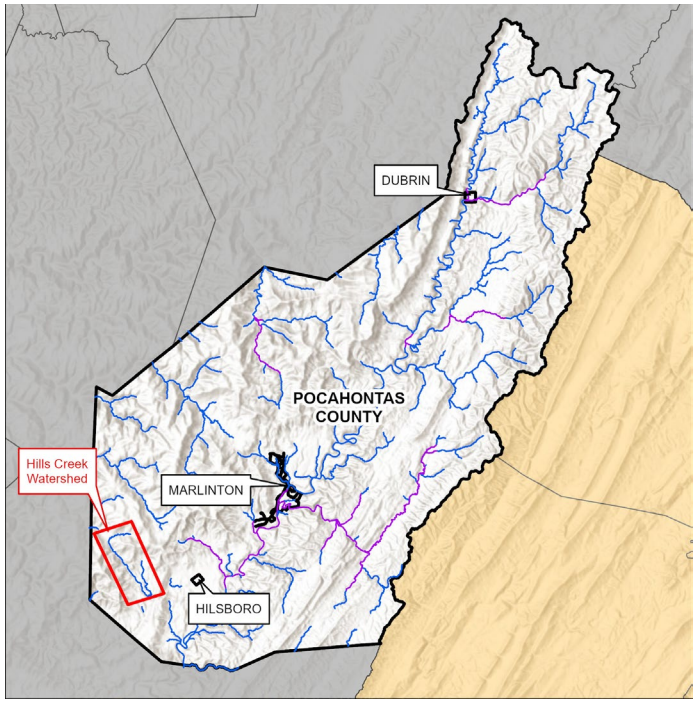


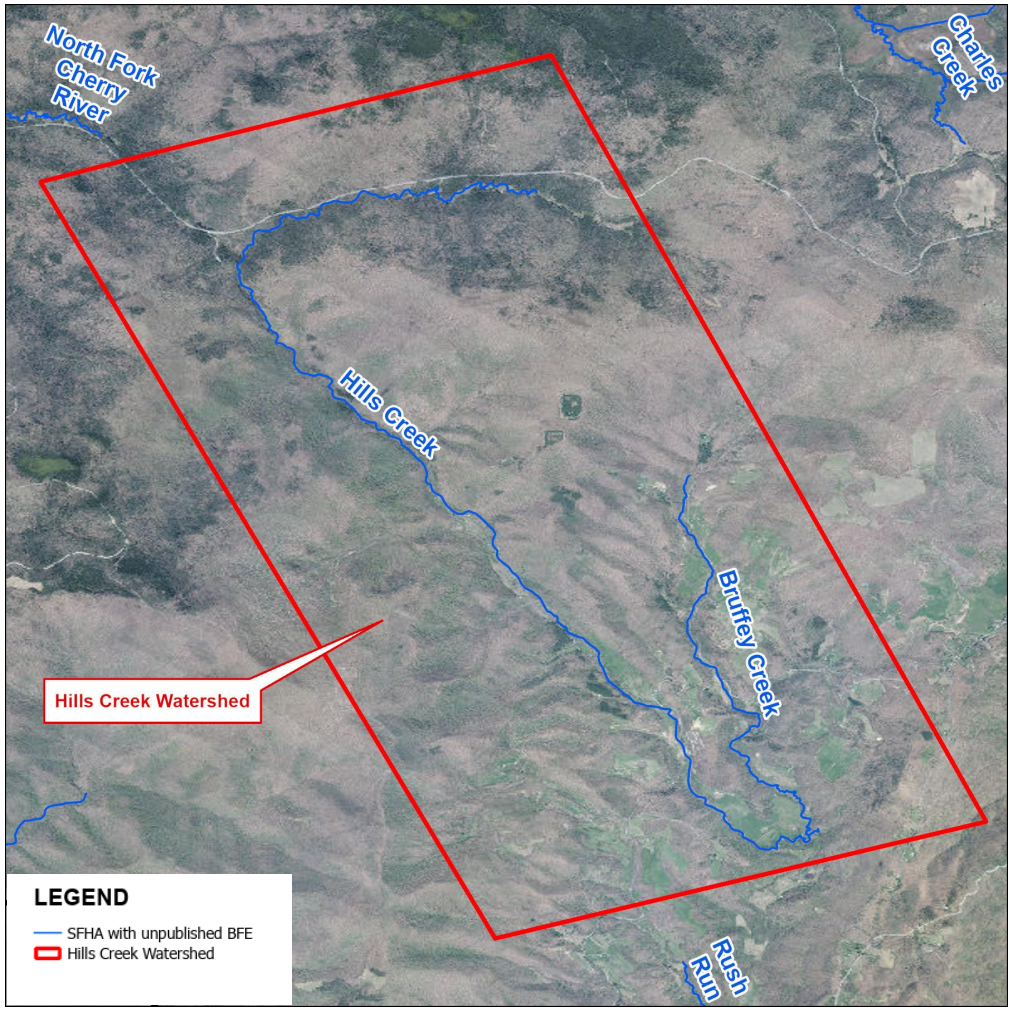
Karst in Pocahontas County



Karst in Pocahontas County

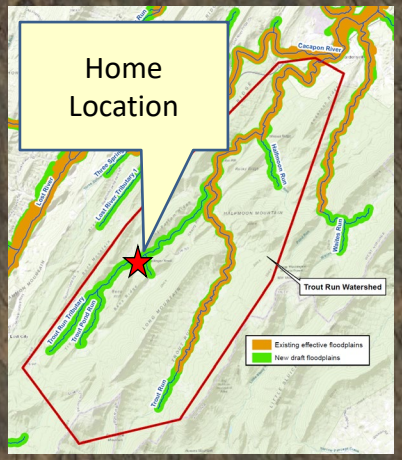
The scope for this project expands beyond the current effective floodplain extents





RiskMAP
Increasing Resilience Together

Karst Example from Hardy County



Home in floodplain

Trout Run Tributary

Trout Run Tributary A

- Streams in this area are not well-defined in the LiDAR and may partially run underground
- Surface flow is not visible on aerial imagery
- Flooding may still occur during large rainfall events

Karst in Pocahontas County

Options for floodplain management in karst areas:

- **Map floodplains as Zone A**
  - Flood insurance is mandatory for properties with federally-back mortgages
- **Map floodplains as Shaded Zone X**
  - Flood insurance is optional

We want to hear from you!

- 30-day review and comment period
- WV Flood Tool: https://www.mapwv.gov/flood
- Review the materials we will be sending you
- We are available to answer questions
- Talk about mitigation actions in your community
- ***Thank you for your participation!***

Project Contacts

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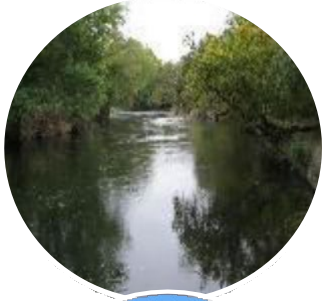

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