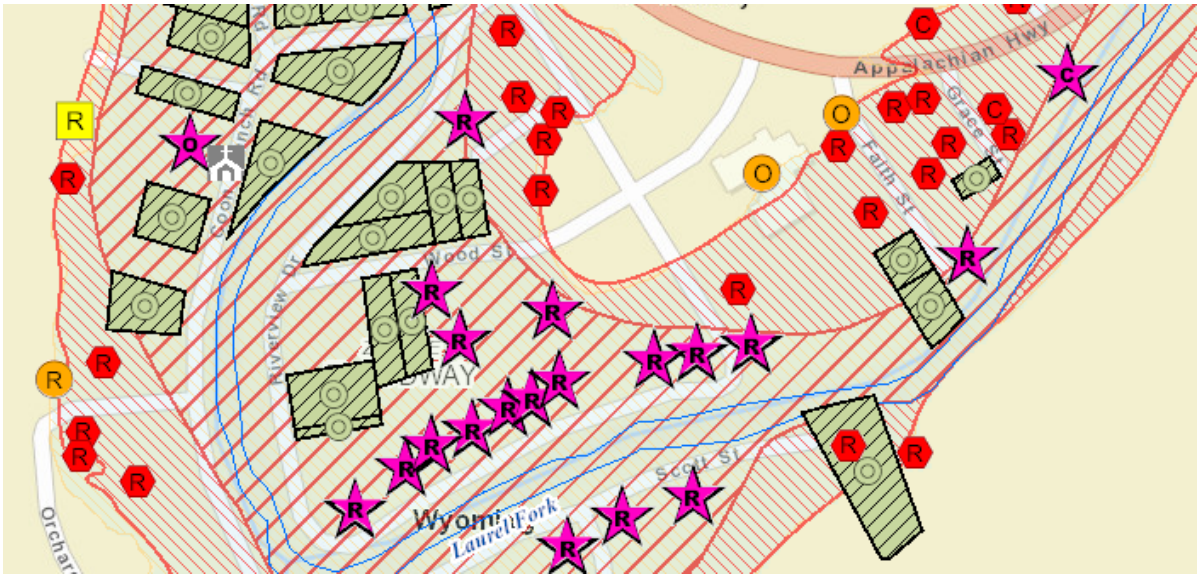
FLOOD RISK ASSESSMENT METHODOLOGY



Support for Hazard Mitigation Plans

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Overview

Funded by a FEMA Hazard Mitigation Grant Program (HMGP) and the State Hazard Mitigation Office, building-level flood risk assessments are being completed statewide for a 1% annual chance flood (100-year) event in support of local and state hazard mitigation plans. The building-level flood risk assessments utilize FEMA's Flood Assessment Structure Tool (FAST), a GIS-based, open source utility designed by FEMA's Hazus Program for estimating potential building losses from flood disasters. FAST was built from the ArcGIS Python script developed by Oregon's Department of Geology and Mineral Industries (DOGAMI). A Hazus Level 2 advanced analysis increases the accuracy and precision of an analysis by incorporating user-supplied data relevant to the hazard. The flood model results support local hazard mitigation plans and other flood reduction efforts.

The Hazus utility employs a standardize methodology in which building and water depth inputs utilize Depth Damage Functions (DDFs) to calculate economic damage loss estimates. The proper Depth Damage Function (DDF) is assigned based on the Occupancy Type, Foundation Type, and Number of Stories of each structure. The First Flood Height for each structure point is subtracted from the Water Depth to calculate the Depth-in-Structure flood depth, in feet above ground level.

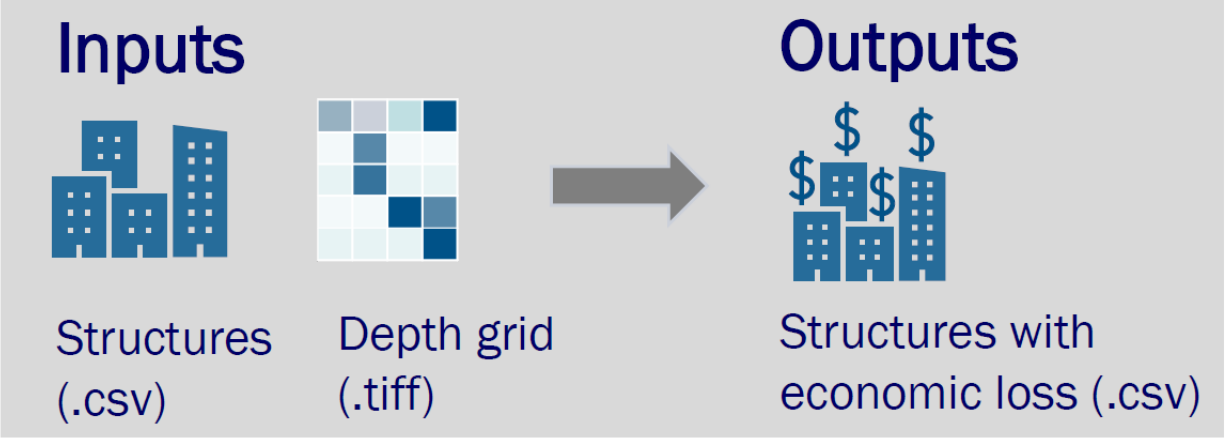


Figure 1. Hazus Building-Level Flood Loss Estimates. Source: FEMA.

The FAST performs a Hazus Flood Model analysis, using the most accurate 100-year depth grid available. It generates damage loss estimates for building, content, and inventory, building debris, and building repair/replacement times. Population displacement estimates are computed from the Residential Occupancy Types and census average household size. All building-level risk assessments are output to tabular reports, geodatabase, and the RiskMAP View of the WV Flood Tool.

The Hazus Program designed FAST to make flood risk assessments quicker, simpler, and more cost effective. FAST provides planners, analysts and policymakers with a free and user-friendly tool to characterize flood risk in their communities using completely open methods and technology.

Building Inventory

Detailed building inventories are developed by pinpointing all primary structures in the high-risk effective and advisory floodplains. Historical and community assets (government buildings, churches) are also inventoried. Essential facilities are inventoried to the 0.2-pecent (500-year) annual chance flood event. Required building characteristics are Occupancy Class, Foundation Type, First Floor Height, Number of Stories, Area, and Replacement Cost. Default values are populated from the most current State Parcel Assessment Database which us updated annually, and then where necessary modified with user-defined values that override the Assessment Database values. User-defined values can be entered for the building address, parcel geometry and assessment identifiers, essential building characteristics, and base flood water depth. Building pictures can be linked to the risk assessment using the unique building identifier.

GIS Specialists use desktop mapping software to pinpoint the building location to the most restrictive flood zone, identify insurable primary structures, match building points to the correct building assessment records, complete missing building attributes, and modify default assessment building values with user-supplied values. The following GIS Reference Layers are used to improve the location accuracy and building attributes: E-911 Addresses, Parcels/Attributes, Aerial Imagery, Building Footprints, Street View Pictures, Elevation Certificates, and other building reference databases. All the building points in the Special Flood Hazard Area and High-Risk Advisory Zones are manually captured, processed, and then quality checked using nine square mile grids. Data error flags are recorded for missing assessment values, parcel misalignments, missing E-911 address numbers, etc. User-supplied values that override the default assessment values are recorded as red text in the building inventory tables. A unique building identifier is formed from concatenating the Parcel ID and Building Address Number.

Water Depth Grids

The Water Depth Grid communicates information about the flood depth for a 1-percent (100-year) annual chance flood. Flood Depth Grids illustrate the flood depth, in feet above the ground surface, to demonstrate the variability of flood depths in flood prone areas. Officials can use depth grids to help individuals visualize the depth of flooding their home might experience; an easier concept than understanding a base flood elevation. The depth grid, combined with an inventory of the built environment, is used by the Hazus Flood Model to determine flood loss potential, by applying the appropriate depth- damage curves. For the Flood Model Analysis, Model-Backed Depth Grids created from engineering software like HEC-RAS are preferred over the less-accurate Hazus Depth Grids. In the WV Flood Tool, the Water Depth is displayed in the (1) Flood Results Query Panel, (2) Flood Risk Layers Menu, and (3) 3D Flood Visualization.

Flood Risk Assessment Products

Flood Risk Products are presented at the building and community levels for each county. Primary products include a Flood Risk Report, Flood Risk Map, Flood Risk Database, Flood Risk Tables, Flood Risk Grids (Water Depth, Water Surface Elevation), Flood Zone Changes resulting from active or future flood map studies, and Building-Level Flood Risk Assessments. Building Exposure information like structure values, occupancy type, owner occupancy, and household population are tabulated per structure. The Hazus Flood Model calculates per structure Building Damage Loss Estimates, Debris Removal, and Restoration Time for a 1% annual chance flood event. The Population Displacement is computed per residential structure from the building inventory and census average household size which provide inputs for Short-Term Shelter Models. Other data layers and products which support floodplain management and risk assessments include dams, levees, landslides, high-water marks, LOMA verified points, elevation certificates, assessment reports, CRS program variables, and 3D flood visualizations. Building Flood Risk Products are viewable in both tabular or graphical formats. Building-level risk assessments are aggregated to the community-level, which in turn can be summarized at the regional and state levels. Risk assessment reports can also be generated at the stream and watershed levels.

Although the Flood Risk Reports and data are organized primarily at the community and building levels, users can access the detailed risk assessments of each structure by viewing the Flood Risk Tables or WV Flood Tool. Mitigation layers (e.g., buyout properties, open space preservation) provide information for communities to identify flood reduction activities. FEMA's Community Engagement Prioritization Tool (CEP-Tool) will be used to rank communities by risk indicators and prioritize for engagement.

Community Exposure and Risk

There are 287 communities (232 municipalities and 55 unincorporated counties), 11 planning regions, and 55 counties.

- Demographic / Social Vulnerability
    - Population Growth
    - Population in SFHA
    - Social Vulnerability (SOVI)
    - Ownership
    - Income
    - Age
- Land Use / Impervious Surfaces
- Historical Flooding
    - Presidential-Declared Disasters
    - Date of Last Disaster
    - High Water Marks
- Insurance Claims
- Insurance Policies

- Flood Zones
    - Stream Miles
    - Regulatory Floodway
    - High-Risk Advisory Zones (Advisory A, Updated AE, Preliminary NFHL)
    - Area in SFHA (aSFHA)
- Structures Summary
    - Buildings in SFHA (counts, values, occupancy class, etc.)
    - Facilities (Essential, Community, Government)
    - Historical
    - Repetitive Loss Structures
    - Dams and Levees
    - Transportation Infrastructure (Roads / Bridges)
- Flood Risk Assessment Summary
    - Building Damage
    - Debris Removal
    - Population Displaced
        - Short-Term Sheltering
        - Companion Pets

Building-Level Exposure

The data variables below identify flood exposure to buildings and communities:

Flood Zones

- Regulatory / Non-Regulatory / Floodway
- High-Risk Advisory Zones / Future Map Conditions
    - Mapped-In SFHA
    - Mapped-Out SFHA
    - No Change SFHA
    - Floodway
- LOMA (Positional Accuracy Verified)
    - Structure Removal
    - Structure Non-Removal
    - Structure Out as Shown
- Flooding Source by Stream Name / Watershed
- Population in SFHA

Water Depth

- Water Depth
- Water Depth-in-Structure
- Water Surface Elevation

Structures

- Building Exposure
- Building Exposure Cost
- Building Occupancy Class (Residential/Commercial/Other)
- Building Owner Occupied / Rental
- Basement / Foundation Type
- First-Floor Height / Lowest Floor
- Building Year / Construction / New Development (Pre-FRIM, Post-FIRM)
- Essential Facilities / Community Assets
- Historical Structure
- Riparian Zone Structure

Building-Level Flood Risk Assessment

Site-specific flood assessments are conducted for a 1% annual chance flood (100-year flood) event. FEMA's OpenHazus Flood Assessment Structure Tool is employed for the Flood Analysis Model.

- Building Damage Percent (Hazus)
- Building Damage Loss U.S. Dollars (Hazus)
- Content and Inventory Loss (Hazus)
- Debris Removal (Hazus)
- Restoration Time (Hazus)
- Population Displacement

Mitigation Opportunities

Factors to identify flood reduction measures and areas of mitigation interest:

- Open Space Preservation / Restore Floodplain to Natural Functions
    - Buyout Properties (Deed-Restricted)
    - Public Lands
    - Private Lands
    - Riparian Zones
- Natural Flood Zone Functions
    - Riparian Zones
    - Wetlands
    - Habitat
    - Permeable Surfaces
- Repetitive Loss Structures
- Community Rating System (CRS) Class
- Adoption of Higher Standards / Building Code Standards
- CAV/CAC Compliance of Last Visit
- Active or Mapping Studies
- Risk Communications

Community Engagement & Field Verification

Field verification and outreach are an important component of the flood risk assessments in support of local hazard mitigation plans. Local officials, planners, emergency managers, or floodplain managers are the primary target audience for community engagement. The Flood Risk Products (Report, Map, Tables, Database) will be provided to each community to verify the risk assessment findings and identify potential mitigation actions. Reports will also be provided to the Regional Planning and Development Councils which are responsible for coordinating local hazard mitigation plans. The Flood Risk Report will provide links to FEMA and State Resource Guides that may include:

- *Reducing Damage from Localized Flooding: A Guide for Communities*
- *Community Rating System Coordinators Manual*
- *WV Floodplain Management Quick Guide*

Communities will be provided with a form or survey to provide feedback on the Flood Risk Report, Maps, and Tables. Important variables for the communities to validate include structure type (e.g., primary, accessory, seasonal, dilapidated) and the foundation type / first floor height of elevated structures. It would be beneficial if communities can provide Finished Construction Elevation Certificates, especially of elevated structures, to verify the first-floor heights, lowest floor elevation, and water depth-in-structure. The Building Inventory follows a cyclic workflow in that new structure-level flood risk assessments can be generated fairly quickly from edits to the building stock or flood depth grids, and then published to the RiskMAP View of the WV Flood Tool. Communities do not need mapping software since the Building-Level Flood-Risk Assessments

can be viewed in a Spreadsheet Table with web links to the WV Flood Tool. Areas of Mitigation Interest should be identified by the communities and submitted to the State via the form or survey. The Areas of Mitigation Interest (AoMI) dataset should capture the mitigation interests of the community and provide targets for future mitigation action.

References

Open-File Report O-18-04, **ArcGIS Python script alternative to the Hazus-MH Flood Model for User-Defined Facilities** by John M. Bauer; ArcGIS® Python® script, library, 28 p. user guide, https://www.oregongeology.org/pubs/ofr/p-O-18-04.htm

FEMA's Natural Hazards Risk Assessment Program (NHRAP), **Hazus Flood Model FEMA Standard Operating Procedure for Hazus Flood Level 2 Analysis**, 2018,https://www.fema.gov/media-library-data/1530821743439-e16c13c1f6266bbe374dc00a00ac9910/Hazus_Flood_Model_SOP_level2analysis.pdf

FEMA's Flood Assessment Structure Tool (FAST), https://github.com/nhrap-hazus/FAST, Hazus User Release Notes Fact Sheet, https://www.fema.gov/media-library-data/1579211964765-77a8d16172c28267e657b2ad02eb8656/FAST_Factsheet.pdf

Appendix A: Tables and Figures

Table 1. Flood Risk Products

FLOOD RISK PRODUCT	DESCRIPTION
Flood Risk Report	A narrative or a community's flood risk assessment study to support the floodplain management and flood reduction activities. A Flood Risk Report is published for each county to supplement it Local Hazard Mitigation Plan.
Flood Risk Map	A map that illustrates the overall flood risk for a community. The map can be used as an outreach tool to communicate risk more clearly and to support mitigation planning. The Flood Risk Map is viewable as an interactive map on the WV Flood Tool or as a PDF print-ready static map.
Flood Risk Tables	Excel tables that list per structure the primary building exposure and flood risk assessment attributes for communities to verify. Specific tables for Essential Facilities, Buyout Properties, etc. are also provided to communities for verification. These tables can be used by communities to enhance floodplain management and risk reduction efforts. Share links are included in tables to link records to RiskMAP View of WV Flood Tool.
Flood Risk Database	Provides communities with geospatial information collected during the risk assessment process and offers effective ways to visualize and communicate flood risk. The Flood Risk Assessment GIS (FRAGIS) is the name for West Virginia's flood risk geodatabase.
Flood Risk Community Engagement Form or Survey	Communities are provided with instructions on how to validate and provide feedback on Flood Risk Report, Maps, or Tables. Communities are encouraged to identify Areas of Mitigation Interest (AoMIs) for the State and FEMA to review. The Areas of Mitigation Interest (AoMI) dataset should capture the mitigation interests of the community and provide targets for future mitigation actions.
Flood Depth Grid	Communicates information about the flood depth for a 1-percent (100-year) annual chance flood. Flood Depth Grids illustrate the flood depth, in feet above the ground surface, to demonstrate the variability of flood depths in flood prone areas. Officials can use depth grids to help individuals visualize the depth of flooding their home might experience; an easier concept than understanding a base flood elevation. The depth grid, combined with an inventory of the built environment, is used by the Hazus Flood Model to determine flood loss potential, by applying the appropriate depth-damage curves. Model-backed DEMs are preferred over Hazus-generated depth grids for the Flood Models. In the WV Flood Tool, the Water Depth is displayed in the (1) Flood Results Query Panel, (2) Flood Risk Layers Menu, and (3) 3D Flood Visualization.
Water Surface Elevation Grid (Base Flood Elevation, Flood Height)	Provides the base flood elevations for A Zones. The Water Surface Elevation is an effective tool for evaluating risk when combined with the lowest floor or first-floor elevations for buildings. Base flood heights are important for floodplain management and mitigation activities in determining flood elevations in relation to structure (building, bridges, etc.) elevations. Remember that Flood heights measure elevations above sea level and correspond to a vertical elevation datum,

FLOOD RISK PRODUCT	DESCRIPTION
	whereas depth grids measure flooding above ground level. Where new mapping has occurred with updated topographic data, Advisory Base Flood elevations (or Advisory Flood Heights) are available for select communities The Water Surface Elevation is displayed in the Flood Results Query Panel of the WV Flood Tool.
Future Flood Zone Changes	High-risk advisory flood zones are generated from new model-backed flood studies or from redelineation mapping. Redelineation is the method of updating effective flood hazard boundaries to match updated topographic data based on the computed water surface elevations from effective models. The public should be informed that these non-regulatory zones will most likely become effective when new Flood Insurance Rate Maps (FIRM) are published, and thus any development in these zones should be regulated to the same standards as effective high-risk flood zones. High-risk advisory zones (Preliminary NFHL, Advisory A, Updated AE) are represented as orange-colored flood zones in the WV Flood Tool. In local floodplain ordinances, communities may choose to adopt high-risk advisory zones as "community-identified floodplains" and regulated the same as the Special Flood Hazard Area of the official FIRM.
Building-Level Flood Risk Assessment	Flood Risk Assessment datasets are developed by pinpointing all primary insurable structures in the Special Flood Hazard Area or 100-year floodplain. Historical and community assets (government buildings, churches) are also inventoried. Essential facilities are inventoried to the 0.2-pecent (500-year) annual chance flood event. Required building characteristics are Occupancy Class, Foundation Type, First Floor Height, Number of Stories, Area, and Replacement Cost. Default values are populated from the State Parcel Assessment Database and modified with user-defined values. Building pictures can be linked to the risk assessment using the unique building identifier. (1) Buildings Exposed to Flooding: An inventory of all buildings exposed to flooding. A replacement value is determined for each primary structure. (2) Buildings - Future Map Conditions: Buildings are classified according to LOMA's verified for positional accuracy and non-regulatory flood zones. Categories are Mapped out SFHA (yellow), Mapped in SFHA (orange), No Change (red), and Regulatory Floodway (magenta star). The color symbols have land use category letters for **R**esidential, **C**ommercial, and **O**ther. Buildings "Mapped Out SFHA" should be considered for a LOMA Structure Removed status while Buildings "Mapped out SFHA" should be regulated to the 100-year floodplain standard until new effective maps are published. For buildings in the "Floodway" there should be no development unless a No-Rise Certificate is issued. (3) Buildings - New Development and Basement: The Building Year from Assessment Database is symbolized by FIRM (Pre-FIRM/Post-FIRM/Unknown) and Basement (Basement/No Basement) status. Note: A basement in the assessment database my not be a subgrade basement but a walkout basement. Hence, basement designations from the assessment records should be field verified. An audit of minus rated properties for Pre-FIRM and POST-FIRM structures should be performed and verified with Elevation Certificates or field surveys.

FLOOD RISK PRODUCT	DESCRIPTION
	(4) Building Damage Loss Estimates (Hazus): The Flood Risk Assessment dataset is generated from FEMA's OpenHazus Flood Assessment Structure Tool (FAST) and presents loss estimates in dollar values and damage percent. The depth grid, combined with an inventory of the built environment, is used by the Hazus Flood Model to determine flood loss potential, by applying the appropriate depth-damage curves, for a 100-year flood event. Besides the Building Damage Percent/Dollars Loss, other model outputs of the FAST Utility site-specific risk assessment include the Contents Damage, Inventory Damage, Debris Removal, and Maximum Restoration Time. Population per building is derived from the assessment Occupancy Type Class (e.g., Residential Single Family, Residential Multi Family) and census average residential household size. Owner-occupied homes are determined from assessment fields Tax Class and Occupancy Class.
Other Risk Layers	Other risk layers displayed in the WV Flood Tool include Dams, Levees, Landslides (other natural hazard), and High-Water Marks.
CRS Program Variables	The building-level inventory provides key program variables for FEMA's Community Rating System (CRS) Program: Buildings in the SFHA (bSF) and Area in the SFHA (aSFHA).
LOMA Verified	Verified positional accuracy of LOMAs. Current and historical LOMAs categorized as Structure Non-Removal, Removal, or Out as Shown.
Elevation Certificates	Elevation Certificates are useful for determining lowest floor elevations for BFE regulatory compliance and for determining first-floor heights for building-level risk assessments.
3D Flood Visualizations	3D Flood Visualizations are rendered from the base flood water depth and building type (residential one- or two-story homes, mobile home, commercial/industrial) to effectively communicate flood risk. By describing the depth-in-structure damage according to varying flood depths, visualizations are easier for non-technical users to understand flood risks to their property in feet of water rather than comprehending the base flood elevation (BFE).
Parcel Assessment Report	Detailed Parcel Assessment Reports provide information of all primary and secondary structures on a single parcel. The reports include parcel and E-911 addresses, building values, primary and secondary structure attributes, parcel history, etc. Both the E-911 site addresses, parcels, and assessment records are integrated from local sources into statewide databases that are beneficial for identifying property locations and building parameters (building cost, year, property class, etc.). The parcel geometry and assessment records are updated annually by the WV Property Tax Division and WV GIS Technical Center, while the statewide addressing and geocoding services are typically updated twice a year by the WV Division of Homeland Security and WV GIS Technical Center.

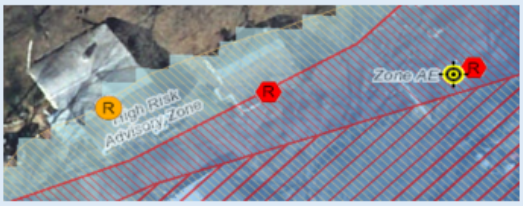
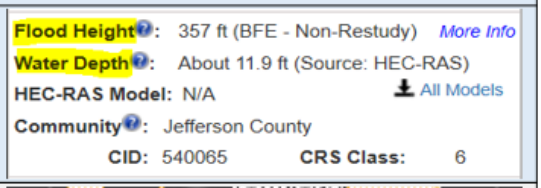
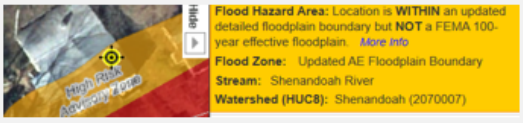
FLOOD RISK PRODUCT	DESCRIPTION
Mitigation Layer: Areas of Mitigation Interest	The Areas of Mitigation Interest (AoMI) dataset assists communities in determining specific actions to increase their resilience from floods. AoMI identifies currently planned mitigation activities as well as areas of potential future action. It encourages collaboration among communities within the project area by providing with them the basis to assess how various mitigation action scenarios can successfully reduce their collective flood risk. AoMIs are identified by communities as part of the State's Flood Risk Assessment.
Mitigation Layer: Open Space Preservation	Open Space Preservation layers restore the floodplain to its natural function and provides opportunities for credits from FEMA's Community Rating System (CRS). Open Space Preservation layers include Deed Restricted Buyout Properties, Private Lands (Nature Preserves, Land Trust) and Public Lands (state and local lands).

Table 2. Flood Risk Layers (Flood Risk Assessment GIS Geodatabase)

RISK LAYER	CATEGORY	SOURCES
1% Chance Flood Event (100-Year)		
• Flood Depth Grid o Model-Backed o Hazus	Flood Risk Grid	FEMA RiskMAP Restudies, Non-Restudies, Hazus
• Water Surface Elevation Grid o Base Flood Elevations o Advisory BFEs	Flood Risk Grid	FEMA Restudies, Non-Restudies
• Preliminary NFHL o Changes Since Last FIRM (CSLF)	Flood Zone Changes	FEMA Preliminary NFHL
• High-Risk Advisory Flood Zones (Non-Regulatory)	Flood Zone Changes	Non-Restudies (Advisory A & Updated AE)
• Future Map Conditions for Buildings o Map In SFHA o Map Out SFHA o No Change o Floodway • LOMA Verified	Building-Level Risk Flood Zone Changes	Enhanced Building Inventory, Non-Regulatory Flood Zones
• Buildings Exposed to Flooding o Building Replacement Cost o Essential Facilities o Community Assets o Historical Structures	Building-Level Risk	Inventories of buildings and facilities
• New Development & Basement o Pre-FIRM / Post-FIRM o Basement (First Floor Height)	Building-Level Risk	WV Building Inventory, WV Assessment Records, Building Pictures
• Building Damage Loss Estimate (Hazus) o Percent Damage o Dollars Loss	Building-Level Risk	Hazus Level 2 Analysis, Enhanced Building Inventory (or UDF), Depth Grids
No Specific Flood Probability Occurrence		
• Levees (FEMA/USACE) • Dams (NID)	Critical Structures	FEMA / USACE
• Landslides	Other Natural Hazards	WV Landslide Inventory, LiDAR-Derived DEMs

Figure 2. Flood Risk Products: Flood Risk Grids, Flood Zone Changes, Risk Per Structure

Flood Risk Products

RISK LAYER	CATEGORY	GRAPHICAL OR TABLE FORMATS
1% Chance Flood Event (100-Year)		
• **Flood Depth Grid** o Model-Backed o Hazus	Flood Risk Grid	
• **Water Surface Elevation Grid** o Base Flood Elevations o Advisory BFEs	Flood Risk Grid	
• **Preliminary NFHL** o Changes Since Last FIRM (CSLF)	Flood Zone Changes	
• **High-Risk Advisory Flood Zones** (Non-Regulatory)	Flood Zone Changes	

Flood Risk Products (Cont.)

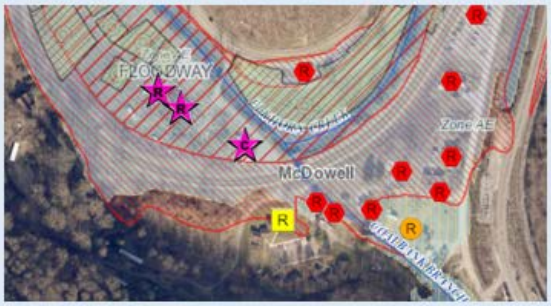
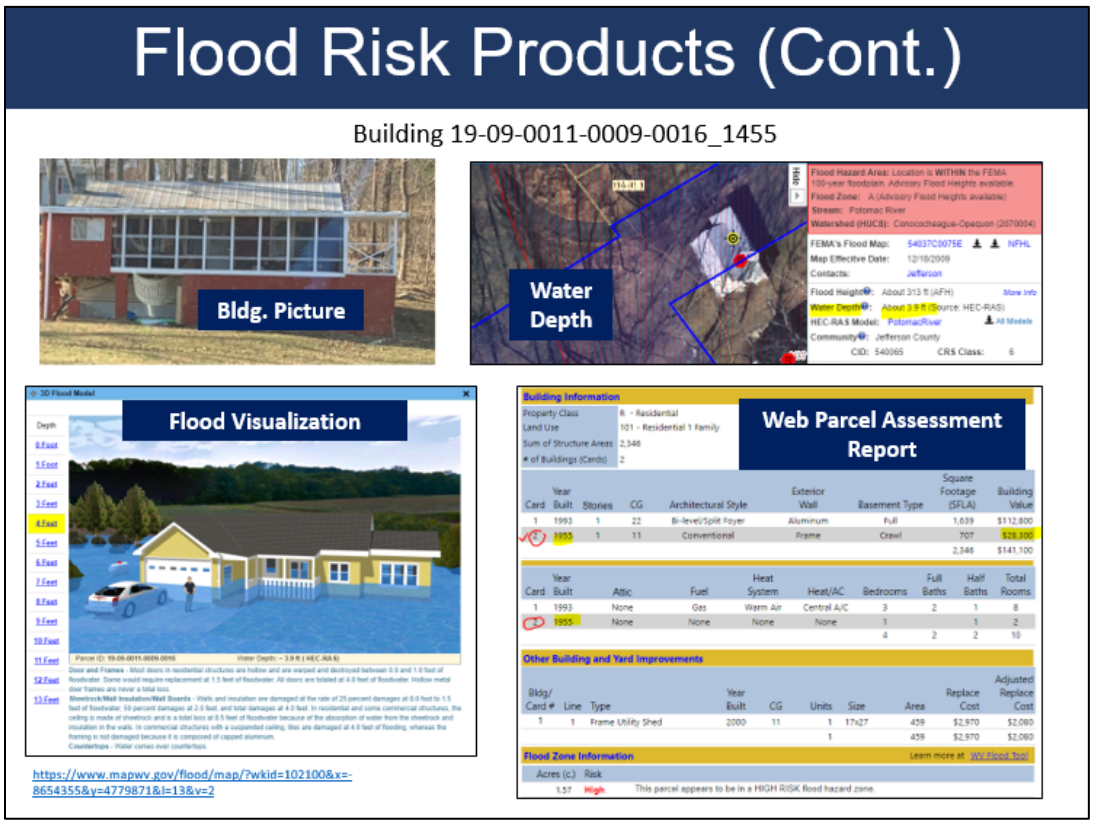
RISK LAYER	CATEGORY	GRAPHICAL OR TABLE FORMATS
1% Chance Flood Event (100-Year)		
• **Buildings: Future Map Conditions** o Map In SFHA (orange) o Map Out SFHA (yellow) o No Change (red) o Floodway (purple)	Building-Level Risk	
• **Buildings: LOMA Verified**	Flood Zone Changes	

Figure 3. Building-Level Flood Risk Products



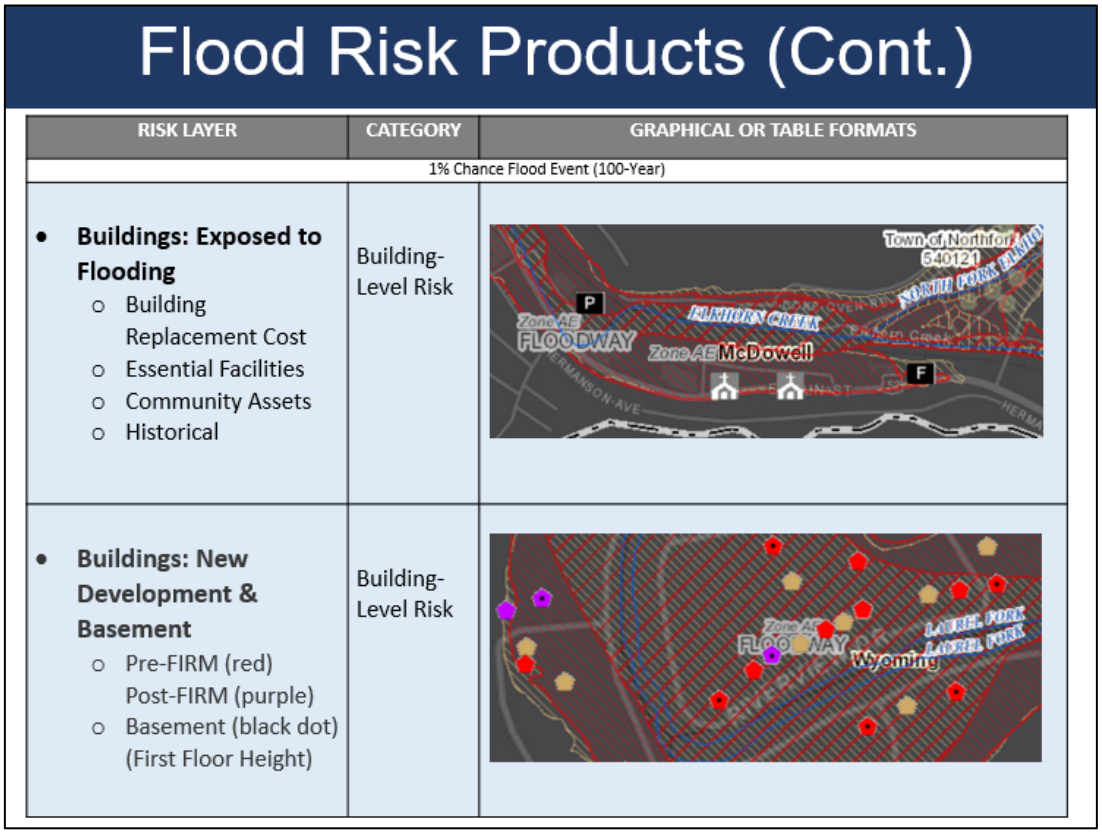
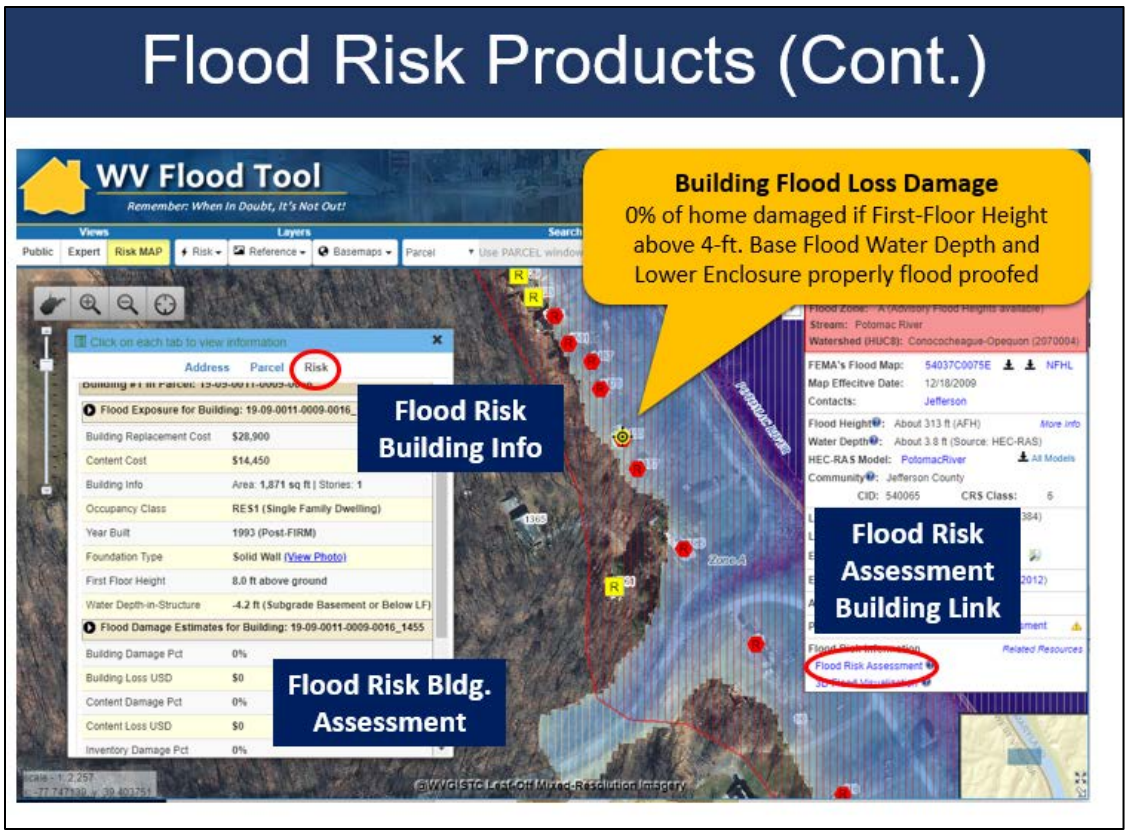


Figure 4. Building-Level Flood Risk Assessments Published to WV Flood Tool



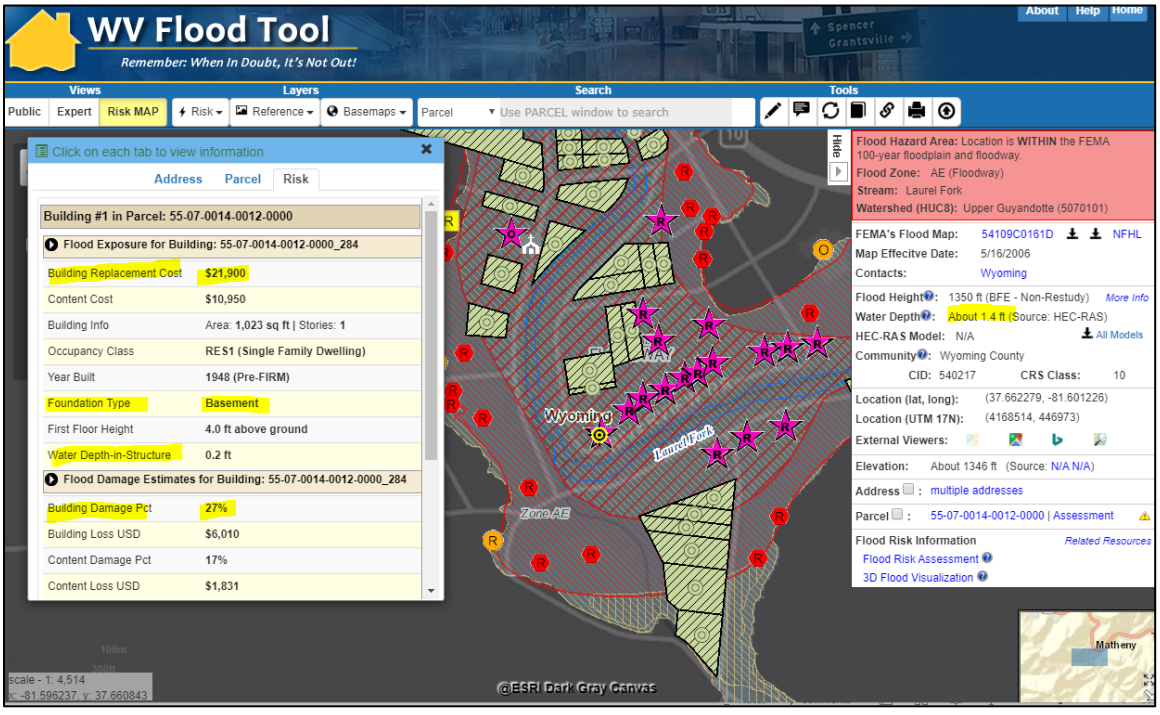
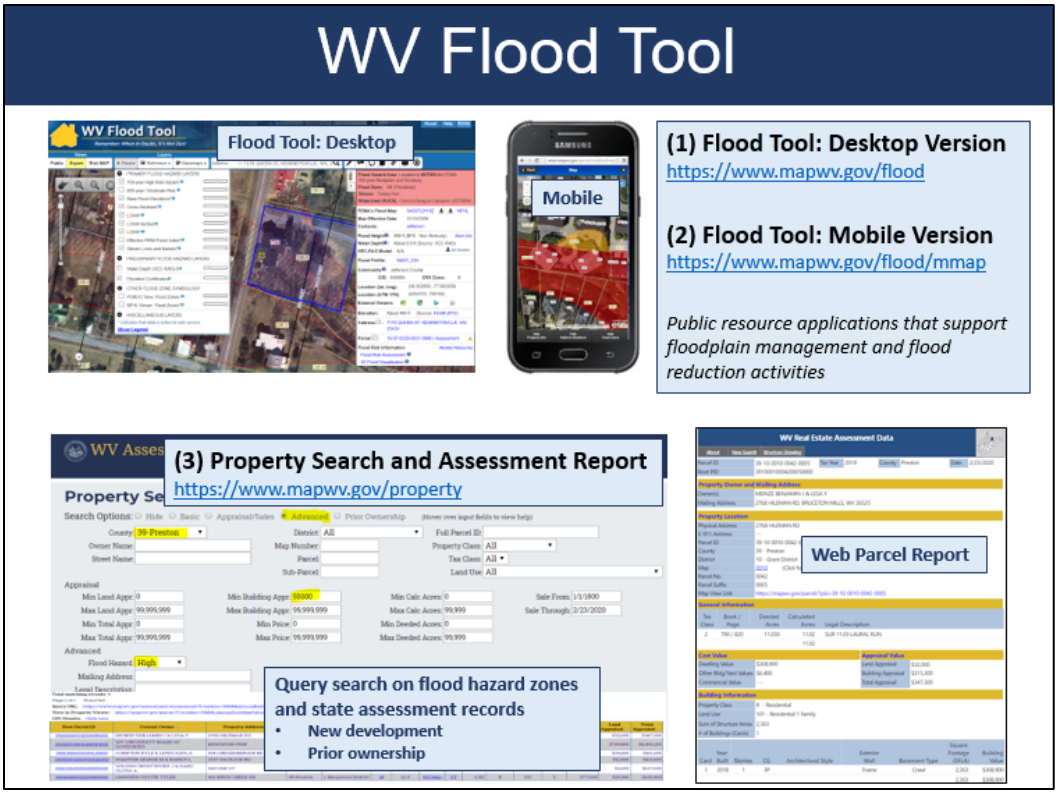


Figure 5. WV Flood Tool, WV Property Viewer, and Web Parcel Assessment Report



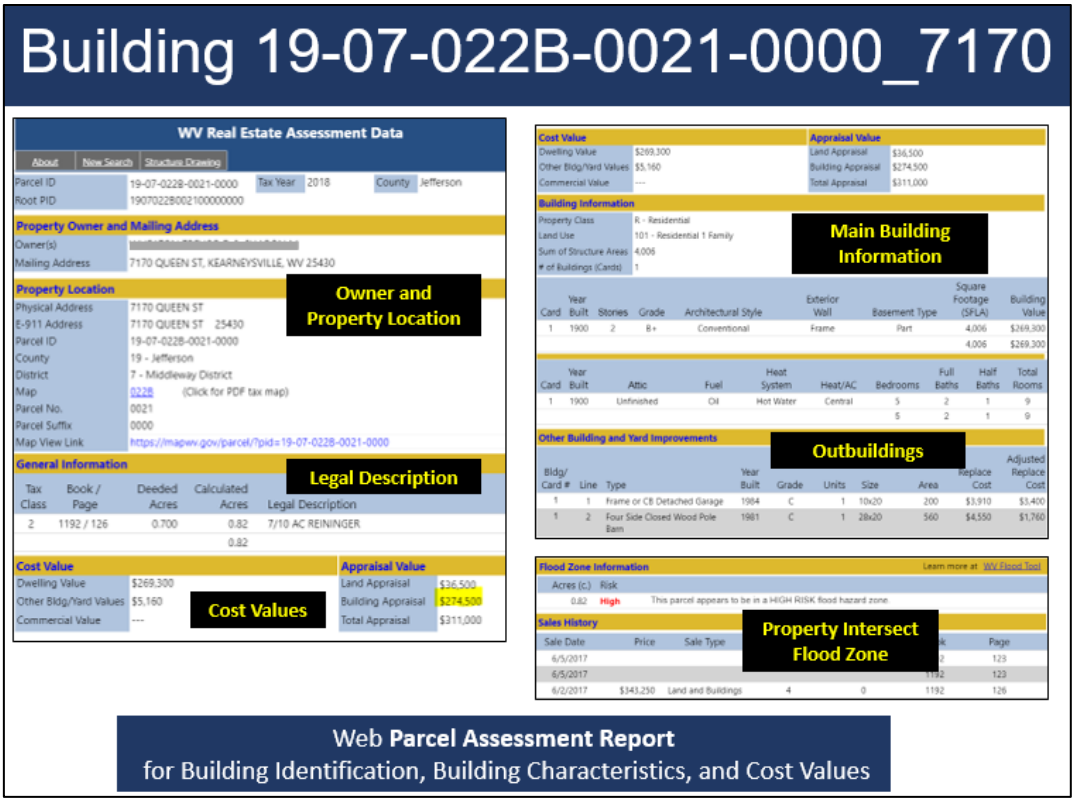


Figure 6. Flood Risk Map. Static Map and WV Flood Tool.

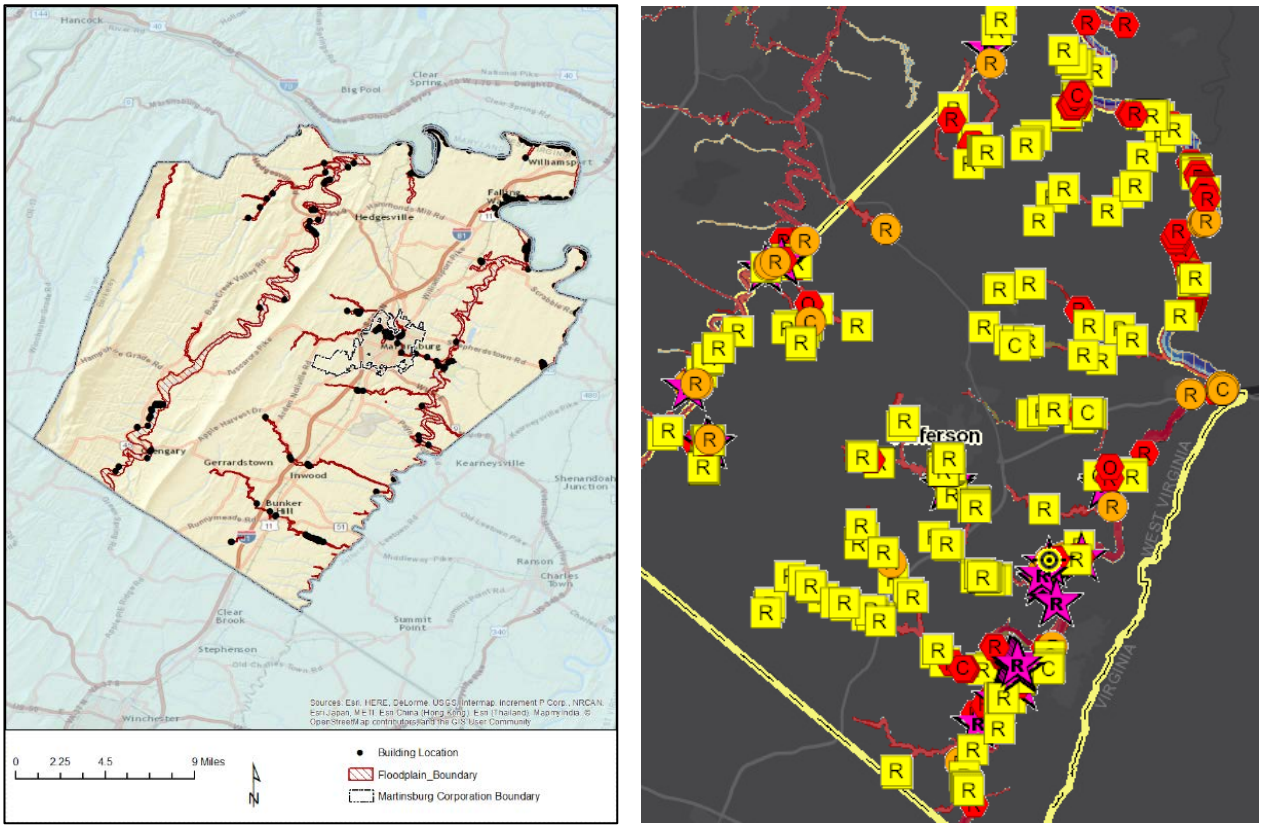


Figure 7. Flood Risk Database. Also known as Flood Risk Assessment GIS (FRAGIS).

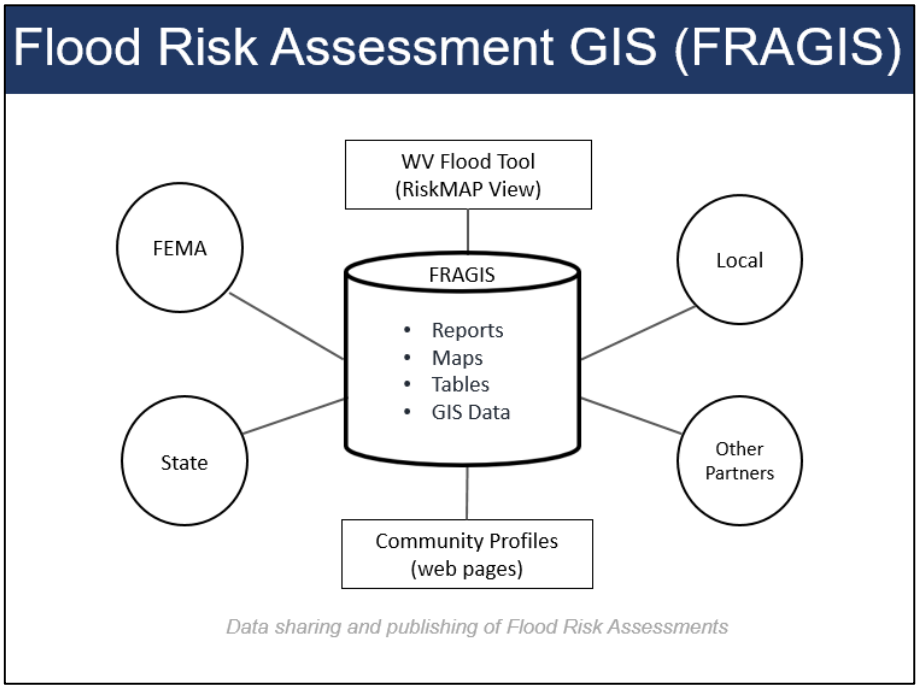


Figure 8. Building-Level Flood Risk Assessment Cycle

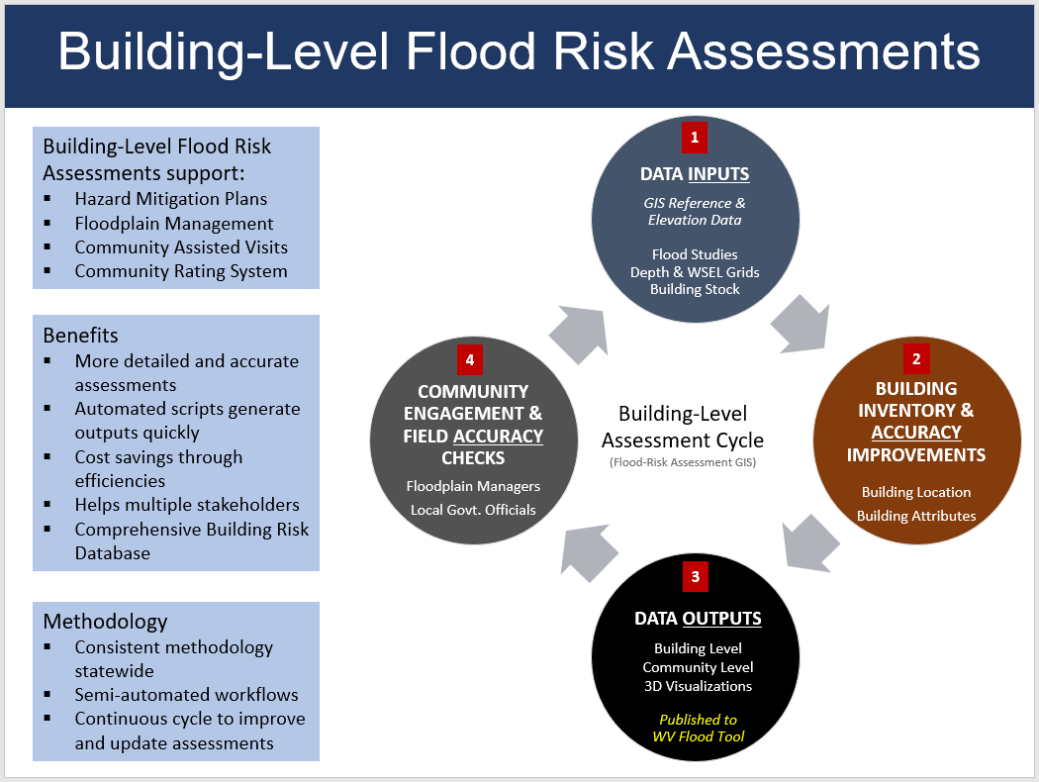


Figure 9. Building Inventory Workflow

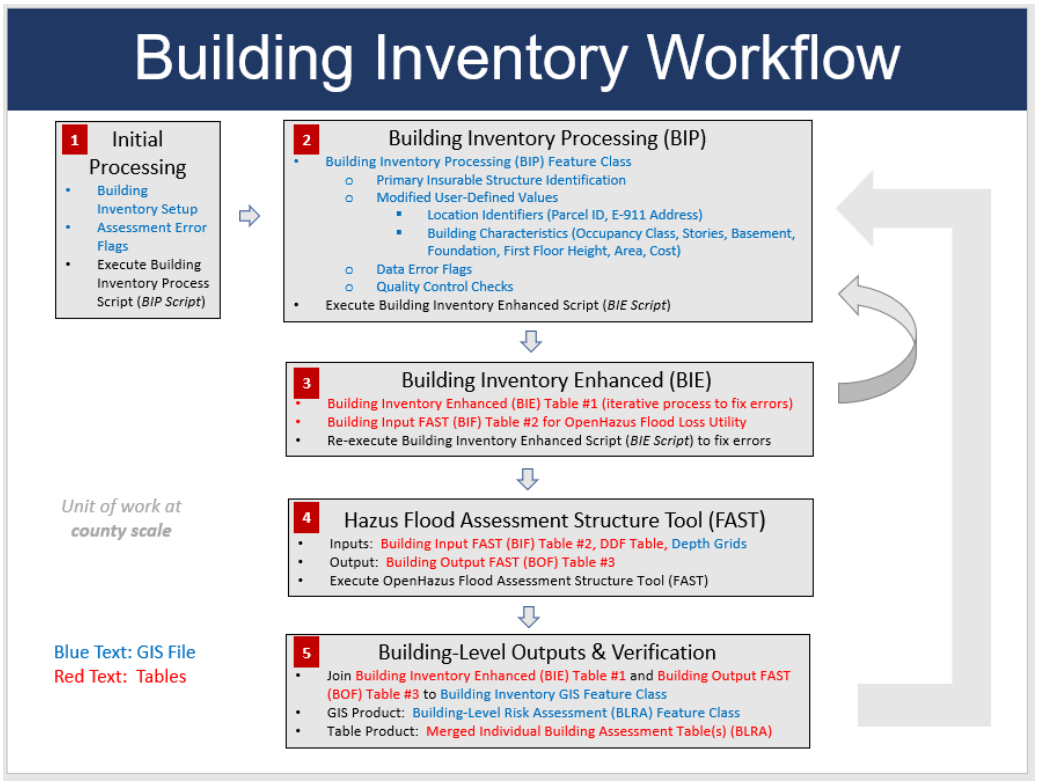


Figure 10. Hazus Flood Loss Flowchart

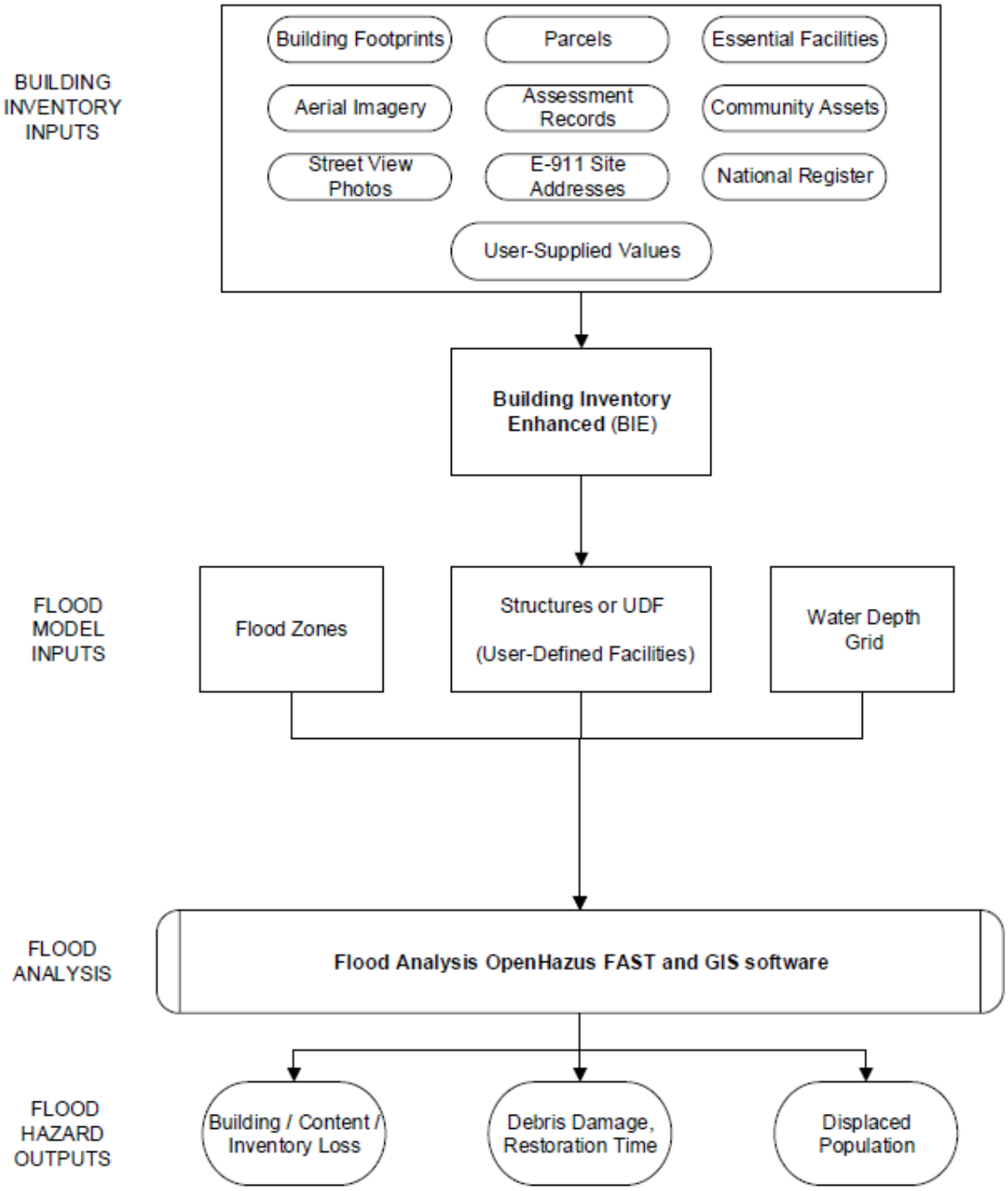


Table 3. Spatial Identifiers. The standardized Building Identifier is a combination of the 20-character parcel identifier and building address number.

Building Spatial Identifiers

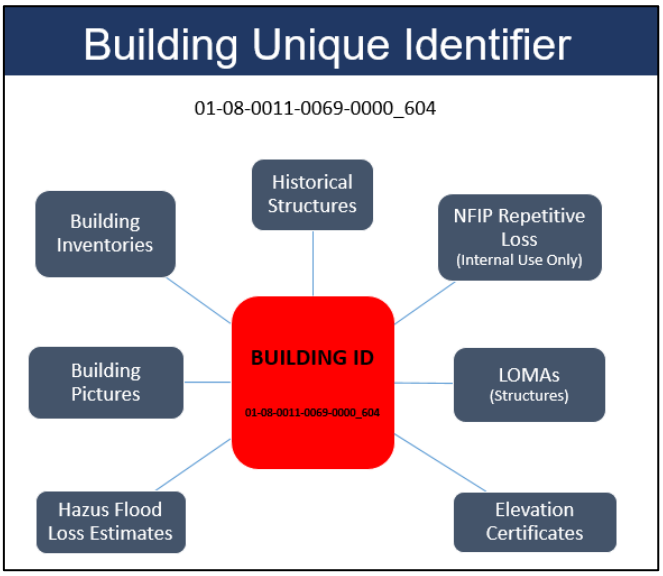
Collect multiple spatial identifiers to verify location

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.)



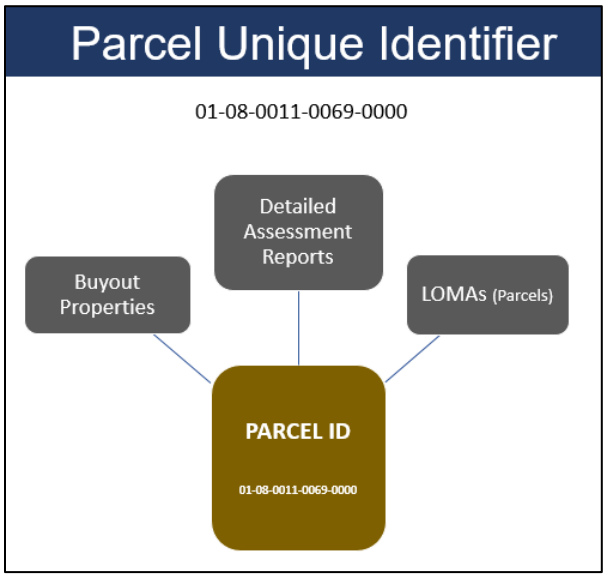


Table 4. Hazus Mode Inputs: Building Characteristics**.** User-defined modified values in red text.

Primary Assessment Source	Hazus Codes	Modified Values (User Defined)	Secondary Sources	Hazus Input	Notes
Basement & Building Year	Foundation LUT (Pre-FIRM, Post-FIRM)	M-Foundation	Elevation Certificates, Building Pictures	**Foundation Type**	See Foundation Code LUT for descriptions
		M-FFH		**First Floor Height**	
Land Use	Occupancy Class LUT	M-OccupClass	Building Pictures, Business Directories	**Occupancy Class**	See Occupancy Class LUT for descriptions
Number of Stories			Building Pictures	**Number of Stories**	Unknown Stories value = 1 Story
Building Cost		M-Cost	Neighboring Parcels, RS Means, Insurance Databases	**Cost**	Unknown value for RES2 trailers: Single wide = $23K, Doublewide = $46K
Area		M-Area	Sketch Diagrams, Measure Tools	**Area**	Singlewide Area = 1,000 sq. ft.; Doublewide Area = 2,000 sq. ft.

Table 5. Hazus Mode Inputs: Flood Water Depth

Depth Grid Source	Modified Values	Secondary Sources	Hazus Input
HEC-RAS model-backed & Hazus	M-Depth	FIRM BFE, Elevation Certificate	**Water Depth**

Table 6. Hazus Mode Inputs: Building Point

Mapping Structure Point	Data Sources	Hazus Input Location
Pinpoint primary building in most restrictive flood zone	Building Footprint, Parcel, Site Address, Aerial Imagery, Assessment Records, Verified LOMA, Essential Facility Databases, Business Directories	**Building Point** (Longitude, Latitude). Also known as Hazus User-Defined Facility (UDF)

Table 7. RESIDENTIAL Basement Information from Assessment Records

WV CAMA Assessment Code	Residential Basement Type	Residential Assessment Description	Hazus Foundation Code	Hazus Foundation Description
1	None	NONE to indicate slab construction or no basement	7	Slab-on-Grade
2	Crawl	CRAWL to indicate crawl space to 1/4 basement area	5	Crawlspace
3	Part	PART to indicate 1/4 to 3/4 basement area	4	Basement
4	Full	FULL to indicate 3/4 to full basement area	4	Basement

Table 8. COMMERCIAL Basement Information from Assessment Records

WV CAMA Assessment Floor Level	Commercial Basement Type	Commercial Basement Description	Hazus Foundation Code	Hazus Foundation Description
	None	No "B" or "C" Level values indicate no basement.	7	Slab-on-Grade
C1	Crawl	Crawl Space	5	Crawlspace
B1	Basement	First Basement	4	Slab-on-Grade
B2-B5	Sub-Basement	Second Basement. Up to 5 sub basements	4	Basement

Table 9. Foundation Type, Foundation Code, First Floor Height for Hazus Flood Model

	Foundation Type				First Floor Height		
WV Assessment Record Values for BASEMENT	**Foundation Type**	**Foundation Code**	**Modified-FdtnCode**	**Description**	**FirstFloorHt (PRE-FIRM) ft.**	**FirstFloorHt (POST-FIRM) ft.**	**Modified-FFH**
	Pile	**1**	1	Piles support an elevated structure and consist of multiple columns driven into the ground and embedded several feet below grade.	7.0	8.0	<value>
	Pier	**2**	2	This system is often used on manufactured housing and consists of multiple small piers or post that support the structure and are shallowly embedded into the ground.	5.0	6.0	<value>
	Solid Wall	**3**	3	Load-bearing perimeter walls greater than 4 ft. in height, usually supported by shallow footings.	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 Occupancy Class. If there is no Building Year then an average 3.5 feet is used for the First Floor Height.	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 Trailers (RES2 Occupancy Class).	1.0	1.0	<value>

Note: Basement values of assessment records for residential and commercial properties are used to generate Foundation Codes 4 (Basement),5 (Crawlspace), and 7 (No Basement).

Table 10. Hazus Occupancy Class Descriptions

Hazus Label	Occupancy Class	Standard Industrial Codes (SIC)	Description / Notes
Residential			
RES1	Single Family Dwelling		
RES2	Mobile Home		A titled owner of a mobile home, house trailer, or manufactured home has the option to convert their home to real property and obtain a deed in place of a certificate of title if it has been permanently affixed to real property. Owner-occupied property is designated as Tax Class = 2. The following default values are used for missing attributes. Foundation Type = Crawlspace; Single Wide Trailer: Avg. Value = $23,000 and Area = 1,000 sq. ft.; Double Wide Trailer: Value = $46,000 and Area = 2,000 sq. ft.
RES3A	Multi Family Dwelling – Duplex		
RES3B	Multi Family Dwelling – 3-4 Units		
RES3C	Multi Family Dwelling – 5-9 Units		
RES3D	Multi Family Dwelling – 10-19 Units		
RES3E	Multi Family Dwelling – 20-49 Units		
RES3F	Multi Family Dwelling – 50+ Units		
RES4	Temporary Lodging	70	Hotels, motels, boarding houses, sports and recreation camps, recreational vehicle parks and campsites, lodging houses, and hotels open to the public operated by membership organizations for the benefit of constituents
RES5	Institutional Dormitory		
RES6	Nursing Home	8051, 8052, 8059	Skilled or intermediate nursing care facilities providing continuous or non-continuous nursing and rehabilitative services to patients, personal care facilities providing inpatient nursing and rehabilitative services to people with special mental or physical condition
Commercial			
COM1	Retail Trade	52, 53, 54, 55, 56, 57, 59	Establishments selling lumber and a general line of building materials, basic hardware lines, garden supplies, plants and mobile homes, department stores, supermarkets, grocery stores, food stores, fruit and vegetable markets, confectionary stores, dairy product stores, bakeries, motor vehicle and boat dealers, gasoline service stations, clothing, accessory and shoe stores, furniture and household appliance stores, electronics and computer software stores, drug stores, liquor stores, tobacco stores and stands, sporting goods and bicycle stores, book and stationary stores, jewelry stores, camera and photographic supply stores, toy and game shops, gift shops, luggage and leather goods stores, florists, etc.

Hazus Label	Occupancy Class	Standard Industrial Codes (SIC)	Description / Notes
COM2	Wholesale Trade	42, 50, 51	Trucking with or without storage, courier services except by air, general, farm product and refrigerated warehousing and storage, terminal facilities for motor freight transportation, wholesale and distribution of motor vehicles and parts, furniture, electrical appliances, hardware, lumber and wood products, construction materials, office equipment, medical equipment and drugs, metals, coal, minerals, petroleum products, agricultural, industrial and construction machinery, livestock, groceries, food and beverages, paper, clothing, footwear and accessories, plastics, chemicals, etc.
COM3	Personal and Repair Services	72, 75, 76, 83, 88	Laundry and dry-cleaning, photography, beauty and hair styling services, funeral services, tax return preparation services, rental vehicles, automobile parking services, automotive repair and paint shops, car washes, appliance and furniture repair shops, social services, job training and vocational rehabilitation services, child daycare services, and private households
COM4	Business/Professional/Technical Services	40, 41, 44, 45, 46, 47, 49, 61, 62, 63, 64, 65, 67, 73, 78 (except 7832), 81, 87, 89	Railroads establishments, local and suburban transit, school buses, transportation terminals and service facilities, water transportation, air transportation, travel agencies, packing and crating, petroleum pipelines, electric services, water supply, sewerage systems, refuse systems, steam and air conditioning supply, irrigation systems, credit institutions and agencies, mortgage bankers and loan correspondents, dealers and flotation companies, security and commodity exchanges, investment advice, all types of insurance, building operators, real estate agents and managers, land or cemetery sub-dividers and developers, holding and investor companies, advertising agencies, building cleaning and maintenance services, heavy construction equipment rental, medical equipment rental, employment agencies, computer programming services, motion picture production, legal services, engineering and architectural services, research organizations, and management services
COM5	Depository Institutions	60	Federal reserve banks, central reserve depository institutions, commercial banks, saving institutions, credit unions, branches of foreign banks, and non-deposit trust facilities
COM6	Hospital	8062, 8063, 8069	General medical and surgical hospitals, psychiatric hospitals, and specialty hospitals
COM7	Medical Office/Clinic	80 (except 8051, 8052, 8059, 8062, 8063, 8069)	Offices and clinics of doctors of medicine, dentists, osteopathy, chiropractors, optometrists, podiatrists, health practitioners, medical and dental laboratories, home health care services, and kidney dialysis centers
COM8	Entertainment & Recreation	48, 58, 79 (except 7911), 84	Radiotelephone, telephone, telegraph and other message communications, radio or television broadcasting stations, cable and other pay television services, eating and drinking places, theatrical producers, bands, orchestras, actors, and other entertainers, bowling centers, professional sports clubs and promoters, racing including track operations, physical fitness facilities, public golf courses, amusement parks and devices, and membership sports and recreation clubs
COM9	Theaters	7832, 7911	Motion picture theaters except drive-in and dance studios, schools and halls

Hazus Label	Occupancy Class	Standard Industrial Codes (SIC)	Description / Notes
COM10	Parking		
		Industrial	
IND1	Heavy	22, 24, 26, 32, 34, 35 (except 3571, 3572), 37	Fabric, textile, carpets and rugs, logging, structural wood members, mobile homes, prefabricated wood or metal buildings and components, paper and cardboard products, sanitary food containers, plastics, foil and paper bags, glass products, cement, brick and structural clay tile, ceramic tiles, china bathroom accessories, kitchen articles, electrical supplies, wire products, cut stone and products, concrete products, lime, gypsum, mineral wool, metal products, turbines, agricultural, construction, mining and petroleum machinery, industrial patterns and machinery, power-driven hand tools, office machines, building equipment such as elevators, air conditioning and heating machinery, motor vehicles, aircrafts, ships and boats, and railroad equipment
IND2	Light	23, 25, 27, 30, 31, 36 (except 3671, 3672, 3674), 38, 39	Clothing, footwear and accessories, household furniture, office and store furniture and fixtures, public building furniture, household appliances, printing and publishing, tires and other rubber products, plastics products, power generators and transformers, carbon and graphite products, lighting fixtures and equipment, audio and video equipment, electronic components, batteries, laboratory instruments, measuring and controlling devices, surgical and medical instruments, musical instruments, toys and games, sporting and athletic goods
IND3	Food/Drugs/Chemicals	20, 21, 28, 29	Meat products, dairy and creamery, vegetables, canned, dried and frozen food, bakery products, confectionary products, table oils, beverages, pet food, tobacco products, manufactured ice, industrial chemicals, medicinal chemicals, detergents, perfumes and cosmetics, fertilizers, pesticides and other agricultural chemicals, adhesives, explosives, petroleum refining, asphalt, and lubricating oils
IND4	Metals/Minerals Processing	10, 12, 13, 14, 33	Iron, copper, lead, zinc, gold, silver, ferroalloy, uranium, radium and vanadium mining services, steel, aluminum and copper works, surface and underground coal mining and services, petroleum and natural gas exploration and field services, stones, sand and gravel, clay, ceramic, refractory mineral and other nonmetallic mineral services
IND5	High Technology	3571, 3572, 3671, 3672, 3674	Electronic computers, computer storage devices, electron tubes, printed circuit boards, semiconductors and related services
IND6	Construction	15, 16, 17	General contractors of residential and non-residential buildings, operative builders, highway, street, bridge and tunnel construction, water and sewer pipelines, communications and power line construction, demolition and excavation work, masonry and stone work, concrete work, structural steel erection, plumbing, heating and air-conditioning, electrical work, carpentry work, glazing work, painting and paper hanging, water well drilling, and installation of building equipment

Hazus Label	Occupancy Class	Standard Industrial Codes (SIC)	Description / Notes
Agriculture			
AGR1	Agriculture	01, 02, 07, 08, 09	Production of cereals, cotton, tobacco, sugarcane and sugar beets, vegetables, fruits, ornamental nursery products, cattle, hogs, sheep and goats, poultry, horses, dairy farms, soil preparation services, crop planting, protection and harvesting, crop preparation for market, veterinary services, farm labor contractors and management services, landscape counseling and planning, timber and forestry services, fishing and hunting
Religion/Non-Profit			
REL1	Church/Membership Organizations	86	Professional and business membership organizations, labor unions, civic, social and fraternal associations, political organizations, and religious organizations
Government			
GOV1	General Services	43, 91, 92 (except 9221, 9224), 93, 94, 95, 96, 97	United States postal service, executive offices, legislative bodies, courts, legal counsel and prosecution, correctional institutions, public order and safety, public finance, taxation and monetary policy, administration of educational, health, social and general economic programs, administration of veterans' affairs, management of air, water and solid waste, conservation of land, minerals, wildlife and forests, administration of housing programs, urban planning and rural development, regulation and administration of transportation, communications and utilities, regulation of agricultural marketing, space research and technology, national security, and international affairs
GOV2	Emergency Response	9221, 9224	Police and fire protection
Education			
EDU1	Schools/Libraries	82 (except 8221, 8222)	Elementary and secondary schools, libraries, data processing schools, business and secretarial schools, and educational services
EDU2	Colleges/Universities	8221, 8222	Colleges, universities, professional schools, junior colleges, and technical institutes

Table 11. WV Assessment Land Use Codes. 186 LUCs Classified to 33 Hazus Occupancy Class Types

			Flood Loss Estimation Models (Based on Structure Use)				(Structure Construction Type)
ID	**CAMA/ Assessment Land Use Code**	**Description**	**Hazus Occupancy Class Type Code**	**Hazus General Occupancy Class**	**Abbreviated General Occupancy Class**	**Hazus Population Displacement Models - People Occupied (Residence)**	**SDE Residential/ Non-Residential Structure Definition**
1	100	Residential Vacant	UNK	Unknown	UNK	No	
2	101	Residential 1 Family	**RES1**	Residential	RES	Yes	**Residential**
3	102	Residential 2 Family	**RES3A**	Residential	RES	Yes	**Residential**
4	103	Residential 3 Family	**RES3B**	Residential	RES	Yes	Non-Residential
5	104	Residential 4 Family	**RES3B**	Residential	RES	Yes	Non-Residential
6	105	Mixed Residential/Commercial	**RES1**	Residential	RES	Yes	TBD
7	106	Condominium (common element)	**RES3A**	Residential	RES	Yes	**Residential**
8	107	Condominium (fee simple)	**RES3A**	Residential	RES	Yes	**Residential**
9	108	Mobile Home	**RES2**	Residential	RES	Yes	**Residential**
10	109	Auxiliary Improvement	UNK	Unknown	UNK	UNK	
11	110	Salvage Value Building	**RES1**	Residential	RES	Yes	Non-Residential
12	112	Active Farm	**AGR1**	Agricultural	AGR	Yes	**Residential**
13	113	Inactive Farm	**AGR1**	Agricultural	AGR	Yes	**Residential**
14	114	Conservation easement perpetual	UNK	Unknown	UNK	UNK	
15	115	Unsound Residential Structure	**RES1**	Residential	RES	No	**Residential**
16	123	Large Vac Tract - Unknown Potential	UNK	Unknown	UNK	No	
17	200	Vacant Apartment Land	UNK	Unknown	UNK	Yes	
18	201	Residen. Structure on Apartment land	**RES1**	Residential	RES	Yes	**Residential**
19	211	Apartment-Garden (1-3 stories)	**RES3B**	Residential	RES	Yes	Non-Residential
20	212	Apartment-High Rise	**RES3F**	Residential	RES	Yes	Non-Residential
21	213	Mobile Home Park	**RES2**	Residential	RES	Yes	Residential
22	300	Vacant Commercial Land	UNK	Unknown	UNK	No	
23	301	Resid. Structure on Commercial Land	**COM1**	Commercial	COM	No	Non-Residential
24	310	Unsound Commercial Structure	**COM1**	Commercial	COM	No	Non-Residential
25	314	Hotel/Motel-High Rise	**RES4**	Residential	RES	Yes	Non-Residential
26	315	Hotel/Motel-Low Rise	**RES4**	Residential	RES	Yes	Non-Residential
27	316	Nursing Home	**RES6**	Residential	RES	Yes	Non-Residential
28	318	Boarding and Rooming Houses	**RES4 or RES5**	Residential	RES	Yes	Non-Residential

			Flood Loss Estimation Models (Based on Structure Use)				(Structure Construction Type)
ID	**CAMA/ Assessment Land Use Code**	**Description**	**Hazus Occupancy Class Type Code**	**Hazus General Occupancy Class**	**Abbreviated General Occupancy Class**	**Hazus Population Displacement Models - People Occupied (Residence)**	**SDE Residential/ Non-Residential Structure Definition**
29	319	Mixed Commercial/Residential	**COM1**	Commercial	COM	UNK	
30	321	Restaurant	**COM8**	Commercial	COM	No	Non-Residential
31	323	Food Stand	**COM8**	Commercial	COM	No	Non-Residential
32	325	Franchise Food	**COM8**	Commercial	COM	No	Non-Residential
33	326	Ice House	**COM8**	Commercial	COM	No	Non-Residential
34	327	Bar/Lounge	**COM8**	Commercial	COM	No	Non-Residential
35	328	Night Club/Dinner Theater	**COM9**	Commercial	COM	No	Non-Residential
36	330	Kwik Lube	**COM3**	Commercial	COM	No	Non-Residential
37	331	Auto Dealer-Full Service	**COM1**	Commercial	COM	No	Non-Residential
38	332	Auto Service Garage	**COM3**	Commercial	COM	No	Non-Residential
39	333	Service Station with Bays	**COM3**	Commercial	COM	No	Non-Residential
40	334	Service Station without Bays	**COM3**	Commercial	COM	No	Non-Residential
41	335	Truck Stop	**COM4**	Commercial	COM	No	Non-Residential
42	336	Car Wash-Manual	**COM3**	Commercial	COM	No	Non-Residential
43	337	Car Wash-Automatic	**COM3**	Commercial	COM	No	Non-Residential
44	338	Parking Garage/Deck	**COM10**	Commercial	COM	No	Non-Residential
45	339	Parking Miscellaneous	**COM10**	Commercial	COM	No	Non-Residential
46	340	Super Regional Shopping Mall	**COM1**	Commercial	COM	No	Non-Residential
47	341	Regional Shopping Mall	**COM1**	Commercial	COM	No	Non-Residential
48	342	Community Shopping Center	**COM1**	Commercial	COM	No	Non-Residential
49	343	Neighborhood Shopping Center	**COM1**	Commercial	COM	No	Non-Residential
50	344	Strip Shopping Center	**COM1**	Commercial	COM	No	Non-Residential
51	345	Discount Department Store	**COM1**	Commercial	COM	No	Non-Residential
52	346	Department Store/Anchor Store	**COM1**	Commercial	COM	No	Non-Residential
53	347	Supermarket	**COM1**	Commercial	COM	No	Non-Residential
54	348	Convenience Food Market	**COM1**	Commercial	COM	No	Non-Residential
55	349	Medical Office	**COM7**	Commercial	COM	No	Non-Residential
56	351	Bank	**COM5**	Commercial	COM	No	Non-Residential
57	352	Savings Institution	**COM5**	Commercial	COM	No	Non-Residential
58	353	Office Building-Low Rise (1-4 stories)	**COM4**	Commercial	COM	No	Non-Residential

			Flood Loss Estimation Models (Based on Structure Use)				(Structure Construction Type)
ID	**CAMA/ Assessment Land Use Code**	**Description**	**Hazus Occupancy Class Type Code**	**Hazus General Occupancy Class**	**Abbreviated General Occupancy Class**	**Hazus Population Displacement Models - People Occupied (Residence)**	**SDE Residential/ Non-Residential Structure Definition**
59	354	Office Building-High Rise (>4 stories)	**COM4**	Commercial	COM	No	Non-Residential
60	355	Office Condominium	**COM4**	Commercial	COM	No	Non-Residential
61	356	Retail Condominium	**COM1**	Commercial	COM	No	Non-Residential
62	361	Funeral Home	**COM4**	Commercial	COM	No	Non-Residential
63	362	Veterinary Clinic	**AGR1**	Agricultural	AGR	No	Non-Residential
64	363	Legitimate Theater	**COM9**	Commercial	COM	No	Non-Residential
65	364	Motion Picture Theater	**COM9**	Commercial	COM	No	Non-Residential
66	365	Cinema/Theater	**COM9**	Commercial	COM	No	Non-Residential
67	366	Radio/TV/Motion Picture Studio	**COM8**	Commercial	COM	No	Non-Residential
68	367	Social/Fraternal Hall	**REL1**	Religious	REL	No	Non-Residential
69	368	Hangar	**COM4**	Commercial	COM	No	Non-Residential
70	369	Day Care Center	**COM3**	Commercial	COM	No	Non-Residential
71	370	Greenhouse/Florist	**COM1**	Commercial	COM	No	Non-Residential
72	371	Downtown Row Type	**COM4**	Commercial	COM	No	Non-Residential
73	373	Retail-Single Occupancy	**COM1**	Commercial	COM	No	Non-Residential
74	374	Retail-Multiple Occupancy	**COM1**	Commercial	COM	No	Non-Residential
75	375	Retail-Drive Up	**COM1**	Commercial	COM	No	Non-Residential
76	381	Bowling Alley	**COM8**	Commercial	COM	No	Non-Residential
77	382	Skating Rink	**COM8**	Commercial	COM	No	Non-Residential
78	383	Health Spa	**COM8**	Commercial	COM	No	Non-Residential
79	384	Swimming Pool-Indoor	**COM8**	Commercial	COM	No	Non-Residential
80	385	Tennis Club-Indoor	**COM8**	Commercial	COM	No	Non-Residential
81	386	Racquet Club-Indoor	**COM8**	Commercial	COM	No	Non-Residential
82	387	Country Club without Golf Course	**COM8**	Commercial	COM	No	Non-Residential
83	388	Club House	**COM8**	Commercial	COM	No	Non-Residential
84	389	Country Club with Golf Course	**COM8**	Commercial	COM	No	Non-Residential
85	390	Amusement Park	**COM8**	Commercial	COM	No	Non-Residential
86	391	Cold Storage Facility	**COM2**	Commercial	COM	No	Non-Residential
87	392	Lumber Storage Facility	**COM2**	Commercial	COM	No	Non-Residential
88	393	Comm Auxiliary Improvement	**COM1**	Commercial	COM	No	Non-Residential
89	395	Truck Terminal	**COM4**	Commercial	COM	No	Non-Residential

			Flood Loss Estimation Models (Based on Structure Use)				(Structure Construction Type)
ID	**CAMA/ Assessment Land Use Code**	**Description**	**Hazus Occupancy Class Type Code**	**Hazus General Occupancy Class**	**Abbreviated General Occupancy Class**	**Hazus Population Displacement Models - People Occupied (Residence)**	**SDE Residential/ Non-Residential Structure Definition**
90	396	Mini Warehouse	**COM2**	Commercial	COM	No	Non-Residential
91	397	Office/Warehouse	**COM2**	Commercial	COM	No	Non-Residential
92	398	Warehouse	**COM2**	Commercial	COM	No	Non-Residential
93	399	Warehouse-Prefabricated	**COM2**	Commercial	COM	No	Non-Residential
94	400	Vacant Industrial Land	UNK	Unknown	UNK	No	
95	401	Manufacturing	**IND2**	Industrial	IND	No	Non-Residential
96	405	Research & Development	**COM4**	Commercial	COM	No	Non-Residential
97	411	Aircraft Engine Plant	**IND1**	Industrial	IND	No	Non-Residential
98	412	Aluminum & Foil Mfg	**IND4**	Industrial	IND	No	Non-Residential
99	413	Asphalt Plant	**IND3**	Industrial	IND	No	Non-Residential
100	414	Automobile Parts Mfg	**IND1**	Industrial	IND	No	Non-Residential
101	415	Bakery	**IND3**	Industrial	IND	No	Non-Residential
102	416	Bottling Plant	**IND1**	Industrial	IND	No	Non-Residential
103	417	Broom Mfg	**IND2**	Industrial	IND	No	Non-Residential
104	418	Candy Mfg	**IND3**	Industrial	IND	No	Non-Residential
105	419	Cement Mfg	**IND1**	Industrial	IND	No	Non-Residential
106	420	Concrete Mfg	**IND1**	Industrial	IND	No	Non-Residential
107	421	Chemical Mfg	**IND3**	Industrial	IND	No	Non-Residential
108	422	Clay Mfg	**IND1**	Industrial	IND	No	Non-Residential
109	423	Clothing Mfg (exc Leather/Rubber)	**IND2**	Industrial	IND	No	Non-Residential
110	424	Coal Processing	**IND4**	Industrial	IND	No	Non-Residential
111	425	Compressor Station (not Pub.Util)	**IND4**	Industrial	IND	No	Non-Residential
112	426	Dairy	**IND3**	Industrial	IND	No	Non-Residential
113	428	Dental and Medical Lab	**IND3**	Industrial	IND	No	Non-Residential
114	429	Electronic Components Prods. Mfg	**IND5**	Industrial	IND	No	Non-Residential
115	430	Electronic Equipment Mfg	**IND5**	Industrial	IND	No	Non-Residential
116	431	Feed & Flower Mfg	**IND3**	Industrial	IND	No	Non-Residential
117	432	Foundry Products	**IND2**	Industrial	IND	No	Non-Residential
118	433	Food Processing	**IND3**	Industrial	IND	No	Non-Residential
119	434	Glass Mfg	**IND1**	Industrial	IND	No	Non-Residential
120	435	Glass Mfg-Special Tools	**IND1**	Industrial	IND	No	Non-Residential

			Flood Loss Estimation Models (Based on Structure Use)				(Structure Construction Type)
ID	**CAMA/ Assessment Land Use Code**	**Description**	**Hazus Occupancy Class Type Code**	**Hazus General Occupancy Class**	**Abbreviated General Occupancy Class**	**Hazus Population Displacement Models - People Occupied (Residence)**	**SDE Residential/ Non-Residential Structure Definition**
121	436	Grain & Milling Products Mfg	**IND3**	Industrial	IND	No	Non-Residential
122	437	Ice Plant	**IND3**	Industrial	IND	No	Non-Residential
123	438	Leather Products Mfg	**IND2**	Industrial	IND	No	Non-Residential
124	439	Liquefied Natural Gas Plant	**IND4**	Industrial	IND	No	Non-Residential
125	440	Logging, Cutting of Timber	**IND1**	Industrial	IND	No	Non-Residential
126	441	Machinery & Equipment Mfg	**IND1**	Industrial	IND	No	Non-Residential
127	442	Meat Packing & Slaughterhouse	**IND3**	Industrial	IND	No	Non-Residential
128	443	Metal Working	**IND6**	Industrial	IND	No	Non-Residential
129	444	Mining, Deep	**IND4**	Industrial	IND	No	Non-Residential
130	445	Mining, Strip	**IND4**	Industrial	IND	No	Non-Residential
131	446	Natural Gas Extracting Facility	**IND4**	Industrial	IND	No	Non-Residential
132	447	Nickel Mfg	**IND4**	Industrial	IND	No	Non-Residential
133	448	Newspaper Plant	**IND2**	Industrial	IND	No	Non-Residential
134	449	Oil & Gas Pipeline (not Public Utility)	**COM4**	Commercial	COM	No	Non-Residential
135	450	Optical Mfg	**IND2**	Industrial	IND	No	Non-Residential
136	451	Paint Mfg	**IND3**	Industrial	IND	No	Non-Residential
137	452	Paper Finishing & Converting	**IND2**	Industrial	IND	No	Non-Residential
138	453	Petroleum Refinery	**IND3**	Industrial	IND	No	Non-Residential
139	454	Pipeline Mfg	**IND1**	Industrial	IND	No	Non-Residential
140	455	Plastics Products Mfg	**IND1**	Industrial	IND	No	Non-Residential
141	456	Plastics Products Mfg - Special Tools	**IND1**	Industrial	IND	No	Non-Residential
142	457	Print Shop	**IND2**	Industrial	IND	No	Non-Residential
143	458	Pulp & Paper	**IND1**	Industrial	IND	No	Non-Residential
144	459	Quarries Incl st&gr, ls, ss,sh,cl	**IND4**	Industrial	IND	No	Non-Residential
145	460	Railroad Car Mfg	**IND1**	Industrial	IND	No	Non-Residential
146	461	Rubber Mfg-Tire Recapping	**IND2**	Industrial	IND	No	Non-Residential
147	462	Shoe Mfg	**IND2**	Industrial	IND	No	Non-Residential
148	463	Steel Mill	**IND1**	Industrial	IND	No	Non-Residential
149	464	Steam Generating Plant	**IND1**	Industrial	IND	No	Non-Residential

			Flood Loss Estimation Models (Based on Structure Use)				(Structure Construction Type)
ID	**CAMA/ Assessment Land Use Code**	**Description**	**Hazus Occupancy Class Type Code**	**Hazus General Occupancy Class**	**Abbreviated General Occupancy Class**	**Hazus Population Displacement Models - People Occupied (Residence)**	**SDE Residential/ Non-Residential Structure Definition**
150	465	Saw Mills-Permanent	**IND1**	Industrial	IND	No	Non-Residential
151	466	Saw Mills-Temporary	**IND1**	Industrial	IND	No	Non-Residential
152	467	Textile Mfg	**IND1**	Industrial	IND	No	Non-Residential
153	468	Tobacco Products Mfg	**IND3**	Industrial	IND	No	Non-Residential
154	469	Woodworking Shop	**IND1**	Industrial	IND	No	Non-Residential
155	470	Wire Products Mfg	**IND1**	Industrial	IND	No	Non-Residential
156	471	Jewelry/Musical Instruments	**IND2**	Industrial	IND	No	Non-Residential
157	600	Vacant Exempt Land	**UNK**	Unknown	UNK	No	Non-Residential
158	601	Cemetery	**UNK**	Unknown	UNK	No	Non-Residential
159	602	Post Office	**GOV1**	Governmental	GOV	No	Non-Residential
160	603	Federal/State Building	**GOV1**	Governmental	GOV	No	Non-Residential
161	604	Other Miscellaneous Exempt	UNK	Unknown	UNK	No	Non-Residential
162	610	Recreational/Health	**COM8**	Commercial	COM	No	Non-Residential
163	611	Library	**EDU1**	Educational	EDU	No	Non-Residential
164	612	School	**EDU1**	Educational	EDU	No	Non-Residential
165	613	College & University	**EDU2**	Educational	EDU	No	Non-Residential
166	620	Religious	**REL1**	Religious	REL	No	Non-Residential
167	630	Auditorium	**COM8**	Commercial	COM	No	Non-Residential
168	640	Hospital	**COM6**	Commercial	COM	No	Non-Residential
169	660	Police or Fire Station	**GOV2**	Governmental	GOV	No	Non-Residential
170	670	Correctional	**GOV1**	Governmental	GOV	No	Non-Residential
171	680	Cultural	**COM8**	Commercial	COM	No	Non-Residential
172	690	Rail/Bus/Air Terminal	**COM4**	Commercial	COM	No	Non-Residential
173	700	Utility Vacant Land	UNK	Unknown	UNK	No	Non-Residential
174	701	Water System	**COM4**	Commercial	COM	No	Non-Residential
175	702	Gas Distribution System	**COM4**	Commercial	COM	No	Non-Residential
176	703	Electric Company	**COM4**	Commercial	COM	No	Non-Residential
177	704	Telephone Company	**COM4**	Commercial	COM	No	Non-Residential
178	705	Railroad	**COM4**	Commercial	COM	No	Non-Residential
179	706	Pipeline	**COM4**	Commercial	COM	No	Non-Residential
180	707	Sewage Treatment	**COM4**	Commercial	COM	No	Non-Residential
181	710	Telephone Equipment Building	**COM8**	Commercial	COM	No	Non-Residential

			Flood Loss Estimation Models (Based on Structure Use)				(Structure Construction Type)
ID	**CAMA/ Assessment Land Use Code**	**Description**	**Hazus Occupancy Class Type Code**	**Hazus General Occupancy Class**	**Abbreviated General Occupancy Class**	**Hazus Population Displacement Models - People Occupied (Residence)**	**SDE Residential/ Non-Residential Structure Definition**
182	715	Telephone Service Garage	**COM8**	Commercial	COM	No	Non-Residential
183	720	Radio/TV Transmitter Building	**COM8**	Commercial	COM	No	Non-Residential
184	721	Wireless Serv Facility on leased land	**COM8**	Commercial	COM	No	Non-Residential
185	722	Wireless Serv Facility with land	**COM8**	Commercial	COM	No	Non-Residential
186	723	Land leased to Wireless Service	**COM8**	Commercial	COM	No	Non-Residential

Table 12. Average Mobile Home Appraisal Values by County. Computed from TY 2019 Assessment Records.

County	Count	Average Bldg. Appraisal	Min Bldg. Appraisal	Max Bldg. Appraisal	Single Wide	Double Wide
Barbour	702	$15,587	$400	$130,100	$16,000	$32,000
Berkeley	3,393	$18,707	$100	$180,400	$19,000	$38,000
Boone	1,871	$33,459	$300	$193,700	$33,000	$66,000
Braxton	1,203	$28,129	$100	$178,400	$28,000	$56,000
Brooke	330	$21,420	$200	$102,200	$21,000	$42,000
Cabell	1,899	$28,674	$200	$144,100	$29,000	$58,000
Calhoun	143	$21,811	$100	$157,300	$22,000	$44,000
Clay	510	$13,860	$200	$142,300	$14,000	$28,000
Doddridge	225	$16,716	$300	$185,500	$17,000	$34,000
Fayette	1,390	$16,466	$100	$152,300	$16,000	$32,000
Gilmer	270	$20,539	$100	$171,900	$21,000	$42,000
Grant	835	$24,609	$100	$178,400	$25,000	$50,000
Greenbrier	1,686	$24,441	$100	$149,500	$24,000	$48,000
Hampshire	1,922	$25,989	$200	$147,700	$26,000	$52,000
Hancock	311	$12,246	$200	$183,900	$12,000	$24,000
Hardy	887	$21,125	$100	$788,000	$21,000	$42,000
Harrison	2,139	$41,536	$100	$258,100	$42,000	$84,000
Jackson	1,824	$33,915	$100	$208,600	$34,000	$68,000
Jefferson	905	$32,361	$500	$307,900	$32,000	$64,000
Kanawha	5,903	$32,195	$100	$235,400	$32,000	$64,000
Lewis	649	$13,273	$100	$60,600	$13,000	$26,000
Lincoln	1,839	$23,160	$100	$222,000	$23,000	$46,000
Logan	2,421	$20,570	$100	$105,100	$21,000	$42,000
Marion	1,420	$24,879	$100	$163,600	$25,000	$50,000
Marshall	514	$17,663	$100	$271,200	$18,000	$36,000
Mason	1,092	$17,682	$100	$185,300	$18,000	$36,000
McDowell	1,050	$14,360	$100	$74,000	$14,000	$28,000
Mercer	3,591	$31,237	$100	$153,600	$31,000	$62,000
Mineral	999	$20,437	$100	$140,600	$20,000	$40,000
Mingo	2,285	$17,743	$200	$126,100	$18,000	$36,000
Monongalia	1,549	$26,246	$100	$219,900	$26,000	$52,000
Monroe	929	$23,875	$100	$197,800	$24,000	$48,000
Morgan	920	$28,480	$100	$160,600	$28,000	$56,000
Nicholas	1,380	$19,957	$100	$243,000	$20,000	$40,000
Ohio	292	$19,748	$200	$98,700	$20,000	$40,000
Pendleton	467	$19,737	$100	$304,000	$20,000	$40,000
Pleasants	205	$16,768	$100	$92,700	$17,000	$34,000

County	Count	Average Bldg. Appraisal	Min Bldg. Appraisal	Max Bldg. Appraisal	Single Wide	Double Wide
Pocahontas	679	$10,797	$200	$181,800	$11,000	$22,000
Preston	1,193	$15,295	$200	$164,600	$15,000	$30,000
Putnam	1,359	$15,197	$400	$305,000	$15,000	$30,000
Raleigh	3,955	$31,491	$100	$205,300	$31,000	$62,000
Randolph	1,017	$21,853	$100	$190,300	$22,000	$44,000
Ritchie	574	$32,052	$200	$178,100	$32,000	$64,000
Roane	582	$13,725	$300	$86,300	$14,000	$28,000
Summers	774	$18,845	$200	$156,800	$19,000	$38,000
Taylor	702	$46,681	$100	$238,500	$47,000	$94,000
Tucker	284	$23,705	$200	$206,300	$24,000	$48,000
Tyler	423	$26,439	$100	$170,900	$26,000	$52,000
Upshur	1,120	$27,775	$100	$233,800	$28,000	$56,000
Wayne	2,158	$18,928	$100	$181,500	$19,000	$38,000
Webster	880	$19,763	$100	$102,600	$20,000	$40,000
Wetzel	403	$17,675	$100	$144,300	$18,000	$36,000
Wirt	524	$8,962	$100	$81,600	$9,000	$18,000
Wood	2,103	$37,984	$200	$229,000	$38,000	$76,000
Wyoming	2,244	$20,094	$300	$194,900	$20,000	$40,000
Average		$22,670	$156	$186,656	$23,000	$46,000

Table 13. Data Issues and Quality Control Measures

Data Category	Data Issue	Validation Check
Building Identifier	Building Identifier not unique	BIE Table
Building Identifier	Building elements missing, incomplete, duplicate	BIE Table
Building Identifier	Parcel ID/Address No. don't correspond correctly to Building-ID	BIE Table
Parcel Geometry	Parcel Geometry misalignment	GIS Map Check
Parcel Geometry	No GIS Parcel Geometry	GIS Map Check
E-911 Address	Site Address wrong	BIE Table, GIS
E-911 Address	Site Address for structure located outside of parcel	GIS Map Check
E-911 Address	No Site Address	BIE Table
E-911 Address	Missing any elements of Full Address (Address Number, Street Name, City, Zip)	BIE Table
E-911 Address	Duplicate Addresses	BIE Table
Imagery	Imagery - No building visible in imagery	GIS Map Check
Assessment Record	Neighboring parcel assessment record matches to parcel with structure. Ensure correct BIE foundation type, occupancy class, etc. from neighboring parcel are copied to parcel with structure.	BIE Table, GIS
Assessment Record	Missing key building attributes: Building Value, Occupancy Class, Foundation Code, Stories, Area	BIE Table
Assessment Record	Sort on highest building values - verify	BIE Table
Assessment Record	Verify with other Essential Facility and Community Asset geodatabases	BIE Table, GIS
Stream Name	Stream Name missing. Update Stream Query Layer.	BIE Table
Water Depth	Sort on highest water depth values - verify	BIE Table
Flood Zone	Building located in most restrictive flood zone	GIS Map Check
Flood Zone	Verify future map conditions of Non-Regulatory High-Risk Advisory Zones	GIS Map Check

Note: All user-supplied values should be red color in Building Inventory Enhanced File. Make sure corresponding Data Issue description codes are selected.

Table 14. Building Inventory Enhanced (BIE) Attributes

Field Name	Description	Category	Sample Data Value
Lat	Latitude	Identification	39.463181
Long	Longitude	Identification	-77.83959
Plus_Code	Google Plus Code (11-Digits)	Identification	87F4F576+75F
Building_ID	Unique Building Identifier	Identification	02-08-0013-0013-0000_801
Building_Type	Primary Building (P Code)	Identification	P
Full_E-911_Address	Complete E-911 Address	Identification	801 TURNER RD, SHEPHERDSTOWN, WV, 25443
GIS_Parcel_ID	GIS Parcel Identifier	Identification	02-08-0013-0013-0000
IAS_ID	Assessment Record Override ID	Identification	
WV_Flood_Tool_Link	WV Flood Tool Link (RiskMAP View)	Identification	https://mapwv.gov/flood/map/?wkid=102100&x=-8665063.574442726&y=4788237.0562021565&l=13&v=2
WV_Parcel_Assessment_Link	WV Detailed Assessment Report	Identification	https://mapwv.gov/Assessment/Detail/?PID=02080013001300000000
CID	FEMA Community Identifier	Community	540065
Community_Name	Community Name	Community	Jefferson County
County	County Name	Community	JEFFERSON COUNTY
Incorporated_Unincorporated	Incorporated or Unincorporated	Community	Unincorporated
Stream_Name	Stream Name	Stream Info	Rockymarsh Run
Watershed_HUC8	Watershed Name (HUC-8)	Stream Info	Conococheague-Opequon (2070004)
Flood_Zone_Designation	Flood Zone Designation (MAP-IN, MAP-OUT)	Flood Zone	Effective 100 yr Zone A (N/A)
Floodway	Floodway (Y/N)	Flood Zone	No
FloodPlainType_RiskLayer	Floodplain Risk Layer Symbol	Flood Zone	Effective A (N/A)
Non_Regulatory	Non-Regulatory High Risk Advisory Zones	Flood Zone	Regulatory
FIRM_Status	Pre-FIRM or Post-FIRM	Flood Zone	Pre-FIRM
Flood_Depth_Value	Flood Depth Value	Flood Zone	N/A
Flood_Depth_Source	Flood Depth Source	Flood Zone	N/A
WSEL_Value	Water Surface Elevation	Flood Zone	N/A
WSEL_Source	Water Surface Elevation Source	Flood Zone	N/A
Ground_Elevation	Ground Elevation	Flood Zone	405.5
Ground_Elevation_Source	Ground Elevation Source	Flood Zone	2012 FEMA Jefferson, Berkeley & Morgan Lidar
Full_Owner_Address	Assessment: Owner Address	Building Info	801 TURNER RD, SHEPHERDSTOWN, WV 25443
Owner_Name_s	Assessment: Owner Name	Building Info	MILLER LEIGHTON B BETTY V
Year_Built	Assessment: Building Year	Building Info	1885
Grade	Assessment: Building Grade	Building Info	C
Property_Class_Code	Assessment: Property Class (R,F,C,I,A,U,X)	Building Info	F
Property_Class_Description	Assessment: Property Class Description	Building Info	Farm
Tax_Class	Assessment: Tax Class (Owner-Occupied = 2)	Building Info	2
Land_Use_Code	Assessment: Land Use Code	Building Info	112
Land_Use_Description	Assessment: Land Use Description	Building Info	Active Farm

Field Name	Description	Category	Sample Data Value
Hazard_Occupancy_Code	Assessment: Hazus Occupancy Class Code	Building Info	AGR1
General_Occupancy_Code	Assessment: Hazus General Occupancy Class	Building Info	Agriculture
Stories	Assessment: Number of Stories	Building Info	2
Exterial_Wall_Type	Assessment: Exterior Wall (Residential or Commercial)	Building Info	Aluminum
Architectural_Style	Assessment: Architectural Style (Residential)	Building Info	Conventional
Structure_Area	Assessment: Structure Area (R or C)	Building Info	1864
Basement_Type	Assessment: Basement Type (R or C)	Building Info	Part
Foundation_Type	Assessment: Foundation Type - Hazus LUT	Building Info	Basement
First_Floor_Height	Assessment: First Floor Height	Building Info	4.0
Dwelling_Value	Assessment: Dwelling Value	Building Info	97400
Commercial_Value	Assessment: Commercial Value	Building Info	0
OBY_Value	Assessment: Out Buildings Value	Building Info	8590
Building_Appraisal	Assessment: Building Appraisal Value	Building Info	106000
Building_Value_Source	Assessment: Building Value Source	Building Info	Assessment (IAS)
Total_Structures	Assessment: Total Structures on Parcel	Building Info	1
Accessory_Structures_Count	Assessment: Owner Name	Building Info	6
Units	Assessment: Number of Untis	Building Info	1
Critical_Infrastructure	Essential Facilities	Other	
Governmental_Building	Governmental Building (F, S, L)	Other	
Historical_Structure	Historical Structure (Yes or No)	Other	
Federal_Land	Federal Land (FED)	Other	
Comments	General Comments	Other	Moved point to flood zone and updated parcel ID / building appraisal
Data_Issue_1	Data Issue Flag 1	Other	
Data_Issue_2	Data Issue Flag 2	Other	
Timestamp	Time Stamps	Other	02/03/2020
Average_Household_Size	Census Average Household Size	Population Displacement	2.6
Residential_Units_FLD	Number of Residential Units	Population Displacement	0
Displaced_Population_FLD_BLD	Population Displaced Per Building	Population Displacement	0

Table 15. Hazus FAST Inputs. Building Input FAST (BIF) Attributes

Input Attribute	Data Type	Range or Length	Notes
UserDefinedFltyId	Text		Unique FAST identifier
OccupancyClass	Text	5	One of 33 Hazus-defined types, e.g., {RES1, RES2, COM3, IND4, AGR1, GOV2, REL1}. Script will skip row if not specified, or if an unrecognized value is provided.
Cost	Long	> 0	Replacement Cost of Structure, in U.S. dollars. Records D51with '0' cost: the script will accept a zero value, but any estimated dollar damage to the structure will be 0. Consider correcting the UDF record or deleting it.
NumStories	Short	≥ 1	Number of Stories. Must be an integer.
FoundationType	Text	{1,2,3,4,5,6,7}	Foundation Type of the building. Text type, per Hazus-MH Flood Model convention. Must be an integer from 1 to 7, inclusively.
FirstFloorHt	Float	≥ 0.0	First Floor Height, in feet. Height can be specified in fractional feet.
Area	Long	> 0	Total Area for the structure, in square feet. Used for Inventory Loss calculation when Inventory Cost is not supplied. Used for debris estimates. Must be greater than 0.
Latitude	Float		Latitude decimal degrees
Longitude	Float		Longitude decimal degrees
Input Attribute	Data Type	Range or Length	Notes
UserDefinedFltyId	Text		Unique FAST identifier
OccupancyClass	Text	5	One of 33 Hazus-defined types, e.g., {RES1, RES2, COM3, IND4, AGR1, GOV2, REL1}. Script will skip row if not specified, or if an unrecognized value is provided.
Cost	Long	> 0	Replacement Cost of Structure, in U.S. dollars. Records D51with '0' cost: the script will accept a zero value, but any estimated dollar damage to the structure will be 0. Consider correcting the UDF record or deleting it.
NumStories	Short	≥ 1	Number of Stories. Must be an integer.
FoundationType	Text	{1,2,3,4,5,6,7}	Foundation Type of the building. Text type, per Hazus-MH Flood Model convention. Must be an integer from 1 to 7, inclusively.
FirstFloorHt	Float	≥ 0.0	First Floor Height, in feet. Height can be specified in fractional feet.
Area	Long	> 0	Total Area for the structure, in square feet. Used for Inventory Loss calculation when Inventory Cost is not supplied. Used for debris estimates. Must be greater than 0.
Latitude	Float		Latitude decimal degrees
Longitude	Float		Longitude decimal degrees

Table 16. Hazus FAST Outputs. Building FAST Outputs (BOF)

Output Attribute	Data Type	Range or Length	Notes
Depth_Grid	Float	≥ 0.0	Flood Depth Grid, in feet.
Depth_in_Struc	Float		Depth-in-Structure Adjusted flood depth grid at the UDF point, in feet. Simple calculation: If the Depth_Grid is a NoData or -9999 value, value is -9999. Else value is Depth_Grid − FirstFloorHt
flExp	Short	{0,1}	UDF is exposed to a flood. Simply 0 or 1. If the UDF is in a flood depth grid, then the value is 1, regardless of depth-in-structure.
SOID	Text	5	Specific Occupancy ID. The Hazus-MH Flood shorthand that compresses OccupancyClass, NumStories, and FoundationType into a concise 4- to 5-character code, e.g. R11N for a RES1, no basement, single story. Used to access the look-up tables where the user does not specify a DDF. XXXX for buildings not in the flood zone.
BDDF_ID	Text	3	Building Depth Damage Function (DDF): If not provided by the user, defaults will be assigned based on Hazus methodology by computing Specific Occupancy ID based on Occupancy Type, Foundation Type, num stories and flood type. If populated by user, the script will check to ensure that only valid DDFs are used.
BldgDmgPct	Float	0 – 100	Building Damage Percentage. Interpolated from the lookup tables, depending on flood depth. Value ranges between 0 and 100. For UDFs outside the flood zone, the value is set to 0.0.
BldgLossUSD	Long	≥ 0	Loss, in US dollars, to the building. Formula: Cost × BldgDmgPct
ContentCostUSD	Long	≥ 0	Content Cost: Building Content Cost, in US dollars. If user supplied a ContentCost attribute, and the record's value is non-null, the value is ContentCost. Otherwise, depending on OccupancyClass, it is calculated at 0.5, 1.0, or 1.5 times the user-supplied building Cost. See Hazus-MH Flood Technical Manual (FEMA, 2011).
CDDF_ID	Text	3	Content Depth Damage Function ID. If not provided by the user, defaults will be assigned based on Hazus methodology by computing Specific Occupancy ID based on Occupancy Type, Foundation Type, num stories and flood type. If populated by user, the script will check to ensure that only valid DDFs are used.
ContDmgPct	Float	0 – 100	Building Content Damage Percentage. Interpolated from the lookup tables, depending on flood depth. Value ranges between 0 and 100. For UDFs outside the flood zone, the value is set to 0.0.
ContentLossUSD	Long	≥ 0	Loss, in US dollars, to the Building Content. Formula: ContDmgPct × ContentCostUSD
InventoryCostUSD	Long	≥ 0	Hazus estimates are provided based on Occupancy Class and Area unless provided by the user. Must be greater than or equal to 0.
IDDF_ID	Text	3	Inventory Depth Damage Function ID. If not provided by the user, defaults will be assigned based on Hazus methodology by computing Specific Occupancy ID based on Occupancy Type, Foundation Type, num stories and flood type. If populated by user, the script will check to ensure that only valid DDFs are used.
InvDmgPct	Float	0 – 100	Building Inventory Damage Percentage. Interpolated from the lookup tables, depending on flood depth. Value ranges between 0 and 100. For UDFs outside the flood zone, the value is set to 0.0. Note that only certain types of OccupancyClass have a standard Inventory Loss function defined.
InventoryLossUSD	Long	≥ 0	Loss, in US dollars, to the Inventory Content. If user supplied an inventory cost attribute, the value is InvDmgPct × InventoryCostUSD. (Note the significant discrepancy between the computed values and Hazus 4.0 loss estimates. Hazus 4.0 does not correctly implement the Inventory Loss calculation at the UDF level.)
Debris_Tot	Long	≥ 0	Total debris, in tons. Combines Finish, Structure, and Foundation debris estimates. Based on Occupancy Class, Square Footage, Foundation Type, and Depth-in-Structure.
Restor_Days_Min	Short	≥ 0	Restoration time, in days — Minimum bound. Note there is no direct Hazus equivalent. The name is identical to what is in the Hazus lookup table. Note that the

Output Attribute	Data Type	Range or Length	Notes
			restoration times assume, like the debris, that a 'substantially damaged' structure (one which experiences > 50% loss) is torn down and replaced.
Restor_Days_Max	Short	≥ 0	Restoration time, in days — Maximum bound. Note there is no direct Hazus equivalent. The name is identical to what is in the Hazus lookup table. Note that the restoration times assume, like the debris, that a 'substantially damaged' structure (one which experiences > 50% loss) is torn down and replaced.
GridName	Text	50	Name of flood depth grid. This may seem redundant, given the output file naming convention, but

Appendix B: Glossary

1% Annual Chance Flood: A one percent annual chance flood event (a.k.a. 100-year flood) has a one percent (1 in 100) chance of being equaled or exceeded during any given year. The one percent annual chance flood was selected in the early 1970s when the National Flood Insurance Program was tasked with mapping all floodplains in the U.S. It was considered a reasonable balance of protection and cost between the 0.5% (1 in 200) to 0.2% (1 in 500) variable reference used at the time by the U.S. Army Corps of Engineers for floodwater control structure design. The term 100 year (or 5 year or 500 year) refers to the expected frequency of return of a given flood event. The area of inundation associated with a given flood event is called the **floodplain** (e.g. 1% floodplain, etc.).

Source: The 100 Year Flood Myth*, Federal Emergency Management Agency, Region 10, handout.*

CAMA/IAS: Computer Assisted Mass Appraisal (CAMA) is the process of using a computer to assist in property tax appraisal and equity evaluation. Administered by the Tax Commissioner, the CAMA system for West Virginia is a centralized Oracle database also known as the Integrated Assessment System (IAS). A number of years ago the State Tax Department purchased real estate mass appraisal software called IAS. This software is installed on the network server in Charleston and is accessed through computers in each County Assessor's Office.