

WV Flood Tool Summary Notes

Desktop Version: <https://www.mapwv.gov/flood>

Mobile Version: <https://www.mapwv.gov/flood/mmap>

Property Search and Report: <https://www.mapwv.gov/property>

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History and Purpose: In 2006, during the conversion of all FEMA's modernization of its Digital Flood Insurance Rate Maps, an Internet map application called the WV Flood Tool was developed as a cooperating technical partnership with FEMA and the State National Flood Insurance Program to allow the public to make informed decisions about the degree of flood risk for a specific area or property. During the past decade, the functionality and quality of data layers of the WV Flood Tool have progressed, resulting in an increased use of the application. This is evident by web utilization statistics in that the WV Flood Tool was viewed by more than 126,000 visitors this past calendar year, and now is one of the most popular web map applications hosted by the State. Over time the WV Flood Tool has become more than just a flood determination tool, and today is routinely used by floodplain managers for building permit applications, floodplain regulations enforcement, pre- and post-disaster assessments, and for receiving flood insurance discount credits.

Views: The WV Flood Tool (<https://www.mapwv.gov/flood>) is comprised of three Views: Public, Expert, and RiskMAP. These Views support FEMA's NFIP/CRS and Risk MAP Programs.

Public View: The PUBLIC View allows users to make quick determinations if in or out of a flood zone. It includes 3D Flood Visualizations rendered from the base flood water depth and building type (residential one- or two-story homes, mobile home, commercial/industrial). 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).

Expert View: The EXPERT View allows floodplains managers and experts to enforce compliance of the community's flood damage prevention ordinance and the National Flood Insurance Program (NFIP). It displays the floodway and base flood elevations for regulating new development in the Special Flood Hazard Area (SFHA). The EXPERT View displays published Elevation Certificates and positionally-accurate LOMAs that are beneficial in determining if structures are in the SFHA and built above the BFE.

RiskMAP View: The RiskMAP View supports FEMA's Mapping, Assessment, and Planning (Risk MAP) Program that provides communities with flood information and tools they can use to enhance their mitigation plans and take action to better protect their citizens. The RiskMAP View is the most advanced view and includes all the flood layers of the EXPERT View. This View provides a comprehensive understanding of the flood hazard and the built environment for an estimated 100,000 structures in the SFHA. A Hazus Flood Model Level 2 Analysis produces risk assessments (building exposure, building damage) of all structures inventoried in the effective flood zones as well as the high-risk advisory zones. To support floodplain management activities and identify mitigation measures, the RiskMAP building assessments are displayed graphically in the map view and in tabular format with the RiskMAP popup window tab. The risk assessment layer Future Map Conditions uses model-backed depth values and positionally accurate LOMAs to classify structures as "mapped in" the SFHA or "mapped out" of the SFHA. All essential facilities to the 0.2 percent (500-Year) floodplain are inventoried and displayed in the RiskMAP View. The RiskMAP View also displays structures to include community assets (churches, government buildings), historical structures, dams and levees. Other natural hazards like landslides – the number two hazard after floods in West Virginia – are shown in the RiskMAP View with links to the WV Landslide Inventory Tool. Another feature of the RiskMAP View allows users to access online resources like the U.S. Geological Survey's high-water marks and real-time stream gages. This View also shows undeveloped lands in the floodplain that are

preserved as open space (buyout properties, public/private lands) and thus support mitigation measures of returning the floodplain to its natural state. Eligible communities may receive open space preservation credits via FEMA's Community Rating System (CRS) Program.

Flood Query Results Panel: An important feature of the Flood Tool is the sophisticated user query that provides comprehensive information about the identified flood hazard (flood zone, flood height, flood depth), ground elevation, geographic location (watershed name, stream name, parcel identifier, site address, x-y coordinates), and community information. In addition, the user flood query simultaneously links the area of interest to FEMA issued maps, HEC-RAS models, flood profiles, building-level flood risk assessments, external map viewers, detailed property assessment reports, and a contact list of floodplain managers. For floodplain development permits, floodplain managers may use the Print Function to print out key flood determination information listed in the Flood Query Results Panel. Lastly, the WV Flood Tool application is continuously monitored and optimized to increase user performance. For example, the targeted performance measure is five seconds per query for accessing all the web map services and for populating the Flood Query Results Panel in the WV Flood Tool application.

Flood Hazard Layers: The WV Flood Tool displays the primary National Flood Hazard Layers (NFHL) made from effective flood maps. Besides the effective flood hazard layers, non-regulatory flood zones – Preliminary NFHL and High-Risk Advisory Zones – are also displayed on the WV Flood Tool. For select map layers, the WV Flood Tool consumes external web map services from FEMA's National Flood Hazard Layer geodatabase. To ensure the Flood Tool continuously operates at a high level of availability, failover protocols have been programmed in the Flood Tool for when external flood hazard web map services cannot be consumed within a predefined performance time.

Multiple Flood Zone Symbology: Three different cartographic representations of flood zones are published to the WV Flood Tool to enhance zonal features: (1) the PUBLIC View flood zone symbology differentiates between high-risk regulatory (red) and non-regulatory (orange) flood zones; (2) the EXPERT View flood symbology (hachure patterns) allows for the depth grid to underlie flood zones or risk map layers; and (3) FEMA's NFHL View symbology emphasizes the regulatory floodway or main channel where the discharge of the base flood occurs. The mobile application for the WV Flood Tool only displays the flood zone symbology of the PUBLIC View.

Flood Zone Programming Logic and Warning Status Colors: The Flood zone determination sequence applies a programming logic to the stacked floodplain layers to display the correct flood zone designation in the Flood Query Results Panel. Flood zone designations are categorized by three degrees of risk (High, Moderate, Low) and four warning status colors (Red, Orange, Yellow, Green). The programming order sequence is as follows: (1) HIGH RISK 100-YR Effective A Zones (RED Warning Color); (2) HIGH RISK Advisory Non-Regulatory Zones (ORANGE Warning Color) for Preliminary NFHL, Advisory A, Updated AE; (3) MODERATE RISK 500-YR Shaded X Zones, Levee-Protected X Zones, and Areas in Close Proximity to Flood Zones (YELLOW Warning Color); and LOW RISK for no identified flood risks (GREEN Color).

Flood Height Grids: Gridded base flood heights are important for floodplain management and flood risk assessment activities. Presently, in the Flood Query Results Panel, model-backed flood height values are displayed for Approximate A Zones and AE Zones for 35 and 10 counties, respectively. FEMA now accepts the Advisory Flood Heights (or Advisory BFE) displayed on the WV Flood Tool for LOMA determinations and for Elevation Certificates. Gridded base flood elevations for AE Zones (Restudies/Non-Restudies) should be confirmed with the Flood Profile in the Flood Insurance Study. Composite Water Surface Elevation Grids are organized and published separately by source methodology: Risk MAP Restudy, Non-Restudy (AE Zone Redelineation), and Advisory Flood Height (Approximate A Zone) studies.

Water Depth Grids: The base flood water depths are important for communicating flood risk. Water depths are published in the Flood Query Results Panel and used for computing the Water Depth-in-Structure for the building-level flood risk assessments. The Water Depth is the principal input for the 3D flood visualizations. The statewide Hazus depth grid created in 2010 is not very accurate, and thus a priority is to attain model-backed depth grids for full statewide coverage. Two statewide, composite Depth Grids are organized and published separately by the source software utilized: HEC-RAS engineering software and Hazus software.

Reference and Base Map Layers: Key reference layers for correctly identifying properties and pinpointing at-risk structures are parcels/assessment records, E-911 site addresses, and aerial imagery. The reference layers are derived from integrating local data sources into statewide map services. County offices and local officials have realized the value of the Flood Tool for its citizens and thus are inclined to provide these key reference data layers for state-level integration into the Tool. Unlike other states, court case decisions and legislation in West Virginia have deemed that property record information and maps are not private information. This includes the collection, storage, retrieval or aggregation of information about an individual that is publicly available from legal information found in deeds, property records, and property maps. The complete integration of key reference layers – property parcels, assessment records, site addresses, and leaf-off imagery – has significantly increased the utility of the web application for both the floodplain management community and the general public.

Aerial Imagery: A library of more than ten aerial imagery products ranging from 1999 to present is useful for tracking new development or buyout/relocated structures. The best available, leaf-off aerial imagery service published by the WV GIS Technical Center is comprised of 12-inch resolution or better aerial imagery acquired from county sources. A statewide goal is to have all 55 counties acquire high resolution, leaf-off imagery within the past five years and integrated into the statewide imagery service.

Parcels and Site Addresses: Parcels and site addresses are combined to form a unique building identifier for flood risk assessments, building photos, verified LOMA's, elevation certificates, etc. The 20-character parcel identifier (19-02-019A-0022-0000) combined with a building address number (257 Main Street) forms the unique building identifier (19-02-019A-0022-0000_257) of various flood hazard data products. 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, building 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.

Building Inventories: A building inventory of all primary structures located in the SFHA is created from building footprints, parcels, assessment records, site addresses, aerial imagery, and building photos. The building inventory is completed, validated, and field checked through an iterative process and then published to the RiskMAP View of the WV Flood Tool. The enhanced building inventory is beneficial for risk assessments, floodplain management record keeping, and for credits with FEMA's Community Rating System (CRS) program. The site-specific building stock (or user defined facilities) is an important model input for the Hazus Flood Level 2 Analysis results displayed in the RiskMAP View.

Topography: LiDAR-derived elevation sources are essential for new flood studies, flood risk products, and evaluating building's grade. Users currently query elevation values and source metadata from a statewide 1-meter elevation grid, a composite of the best available elevation data sources ranging from 1 to 3 meters. In addition, at the highest zoom level, the WV Flood Tool displays 2- or 1-foot contours as a reference layer. In the future, when all the FEMA-purchased QL2 LiDAR is processed and delivered, there will be statewide coverage of

1-meter digital elevation models (DEMs) and high-resolution contours. A statewide hillshade map layer is created from the statewide DEM layer for visualizing the terrain and identifying landslides.

Search Tools and Property Identification: Various map tools allow users to search or zoom to the property of interest. The WV Assessment Search Tool allows users to access 1.4 million property assessment records and link to the WV Flood Tool.

Map Tool Searches: Users can search on a city-style address, parcel identifier, owner name, or x-y coordinates. If a building identifier (e.g., 19-02-019A-0022-0000_257) is known, then users can quickly zoom to the property by entering the full parcel identifier (e.g., 19-02-019A-0022-0000) and then identifying the building address.

WV Property Assessment Search Tool: The WV Property Search Tool (<https://www.mapwv.gov/property>) is a companion application of the WV Flood Tool that allows users to perform advanced search and filter queries on all property assessment records. The “Prior Ownership” search option allows users to search the parcel history back to the year 2005. This option is useful for verifying the positional accuracies of LOMAs and Mitigated Buyout Properties when prior owner and deed book information is recorded. The “Advanced” search option allows users to search for new structures in the floodplain; for example, the following filter parameters (County of Interest, Flood Hazard = High, Minimum Building Appraisal = \$50,000, Building Year Minimum = 2018) will result in a record listing of all parcels that intersect high risk flood zones for 2018-19 Tax Years and building values exceed \$50,000.

Property Assessment Reports: Detailed Web Assessment Reports are available for each property in West Virginia. The assessment reports provide information for every structure (main buildings and outbuildings) on a single parcel to include: Owner Name, Mailing Address, Property Location, Tax Class (Owner Occupied), Deed Book/Page Number, Deed and Calculated Acreage, Legal Description, Land Use, Building and Land Values, Building Characteristics, Building Year, Secondary Structures, Sales History, Parcel History, Building Sketch Diagrams, and Flood Zone Hazard Risk. Building sketches with dimensions and additions are displayed for residential and farm properties. These sketch diagrams are beneficial in distinguishing among multiple structures located in a single parcel.

Future Directions: The digital development and improved access to quality flood and reference GIS data layers, along with programming sophisticated queries for users to easily access the information, has expanded immensely the capabilities and usage of the WV Flood Tool. Future directions for the Flood Tool will enhance the RiskMAP View to include detailed building flood loss estimates for more than 100,000 flood structures in the Special Flood Hazard Area of West Virginia. Community flood risk profiles and educational resources will be created for 287 incorporated / unincorporated jurisdictions and linked to the Flood Tool through an online dashboard. A continued focus of the Flood Tool will be to identify state-based credits via the Flood Tool to make communities more resilient and lower their flood insurance rates through FEMA’s Community Rating System. As for updating flood maps in West Virginia, the FEMA-purchased LiDAR elevation data will be the driver for completing gridded base flood heights and water depths for all 100-year flood zones. Other future directions are to continuously update the statewide ground elevation products as the new LiDAR-derived products are delivered. Since higher resolution map layers (e.g., 4-inch resolution imagery, 1-ft. contours) are now being published, another goal is to increase the highest zoom level of the Flood Tool from 1:564 to 1:282 map scale to show more detail. Lastly, the WV Flood Tool will identify and coordinate with other partners like the U.S. Army Corps of Engineers to improve the capabilities of the WV Flood Tool for disseminating flood risk information.

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