

FUTURE DIRECTIONS

- Flood Query Panel (requires updating query programming logic)
 - Advisory AE Flood Zone (e.g, Clear Fork pilot AE Non-Restudy)
 - Base Flood Height (e.g., Upper Mon Watershed Restudy)
 - Composite Depth Grid (all studies)
- Statewide Integration of Effective & Advisory Floodplains
 - Continued Development and Analytics (change in buildings & area)
- Statewide Flood Risk Assessments
 - Buildings Exposed to Multi-Hazards (parcel centroid)
 - Buildings in 1%-annual-chance floodplain
 - Both effective and advisory floodplains
 - Building centroid or maximum flood height of structure
- Statewide Building Footprints Reference Layer
 - Created from multiple sources
 - Useful for identifying structures and 3D community flood visualizations
- Planning Acquisition Maps of Flood Studies (AFH, Restudies, Non-AE Study Re-delineations/Depth Grids) for Risk MAP Flood Risk Products And Regulatory Flood Hazard Products.

Flood Zone: < zone designation >

| Flood Risk Zone Designation | Message | Color Warning Status |
|-----------------------------|---|----------------------|
| AE (Floodway) | Location is WITHIN the FEMA 100-year floodplain. | Red |
| AE | Location is WITHIN the FEMA 100-year floodplain. | Red |
| A | Location is WITHIN the FEMA 100-year floodplain. | Red |
| Advisory AE | Location is WITHIN an advisory floodplain but NOT a regulatory floodplain. <i>More info link.</i> | Orange |
| Advisory A | Location is WITHIN an advisory floodplain but NOT a regulatory floodplain. <i>More info link.</i> | Orange |
| Near Flood Zone | Location is NOT WITHIN identified flood hazard area, but within 75 feet of an identified flood hazard area. | Yellow |
| Out of Flood Zone | Location is NOT WITHIN any identified flood hazard area. Unmapped flood hazard areas may be present. | Green |



GIS Query Layers: Regulatory Floodplains (red), Advisory Floodplains (orange), Advisory/Regulatory Buffer (yellow). Two files: R_SFHA.poly and A_SFHA.poly

Flood Height: < Value >

| Flood Height Designation | Flood Height Determination | Disclaimer |
|--|--|--|
| Base Flood Elevation (Restudy) NEW | < value> feet (Base Flood Elevation) | If you are in doubt of an accurate BFE, then refer to the Flood Profiles or Flood Elevation Tables in the FIS Report. |
| Advisory Flood Height | About < value> ft. (Advisory Flood Height) | CAUTION CAUTION!! The advisory flood height should be used with caution in the proximity of a culvert, bridge, flood control structure or other impoundment since stream crossings were not included in the hydraulic analyses for approximate floodplains. Also, if the site is close to the confluence with a larger stream, compare the advisory flood height at the location of interest to the advisory flood height or Base Flood Elevation on the larger stream to determine whether the site is within the backwater influence of the larger stream. |
| Non-Restudy AE NEW | Refer to FIS report | For an accurate BFE determination refer to the Flood Profiles or Flood Elevation Tables in the FIS Report |

Invisible Composite Query Rasters for flood height values of Water Surface Elevation Level (WSEL) layers: *Effective* WSEL Grid (E_WSEL_01pct.grid) and *Advisory* WSEL Grid (A_WSEL_01pct.grid)

Water Depth: about <<value>>

| Water Depth | Message | Sources |
|--------------|-----------------------|---|
| Water Depth: | About << value >> ft. | Engineering Studies (HEC-RAS) AE Non-Restudy Re-Delineations HAZUS EQL |

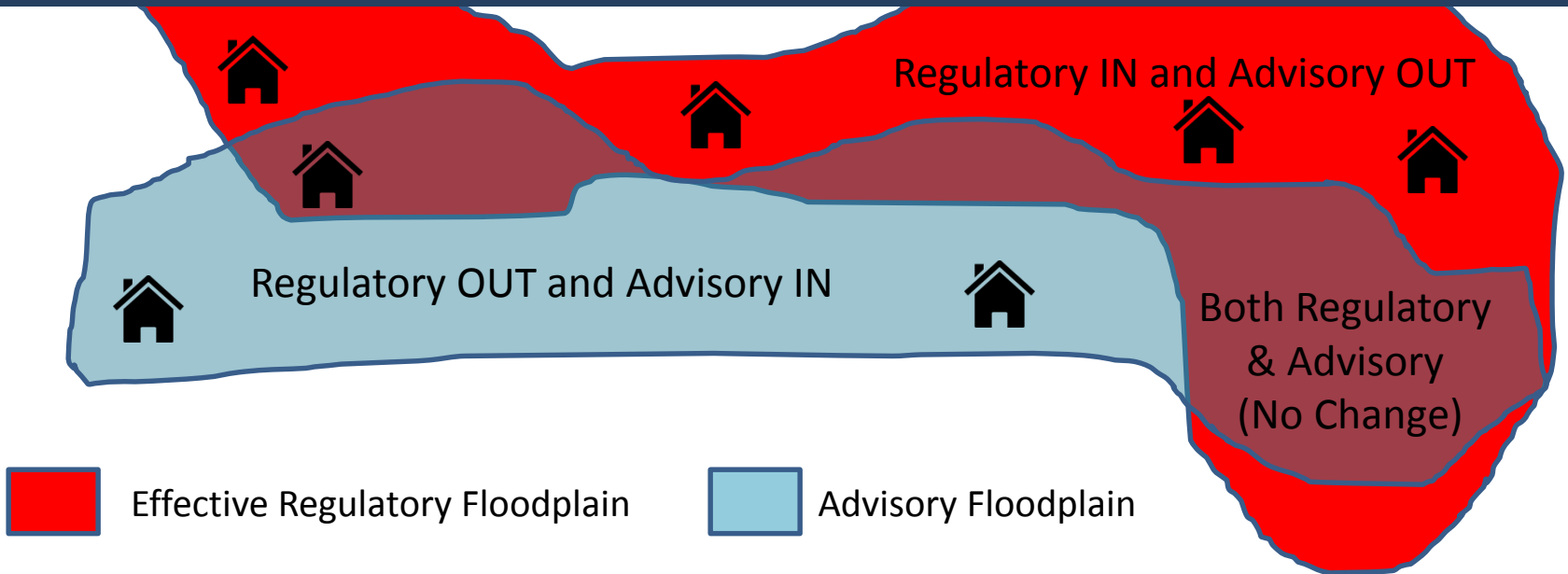
A statewide “Composite” Flood Risk Assessment Depth Grid will be created from *effective* (R_Depth_01pct.grid) and *advisory* (A_Depth_01pct.grid) depth grids.

Water Depth Grids are a *flood risk assessment* product – *not a flood regulatory* product. Water depths are important for flood loss damages and by flood visualizations of site-specific structures.

See FEMA’s Flood Risk Assessment Guidance (May 2016) for guidance on composite depth grids:

https://www.fema.gov/media-library-data/1469146645661-31ad3f73def7066084e7ac5bfa145949/Flood_Risk_Assessment_Guidance_May_2016.pdf

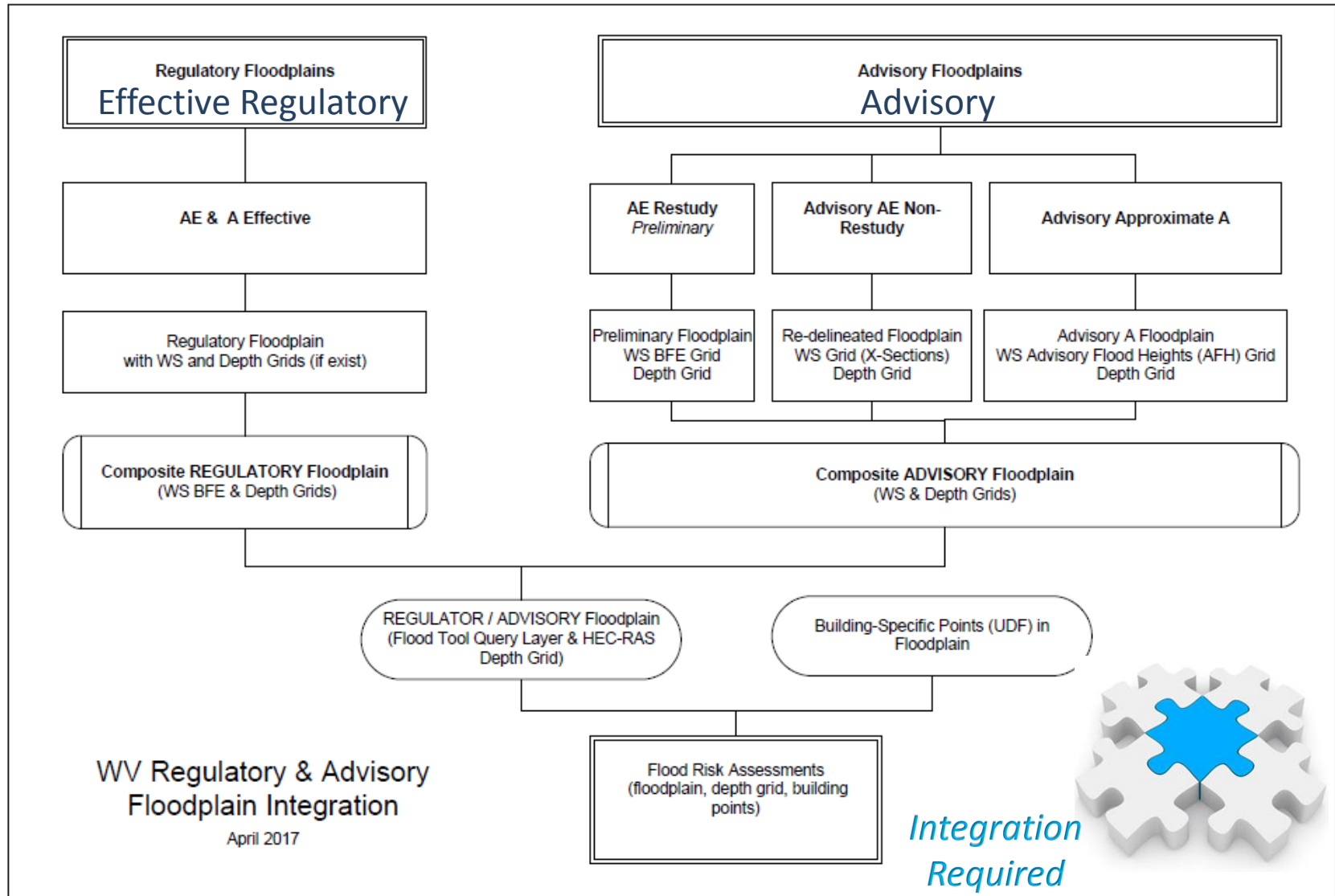
Advisory Changes to Regulatory Floodplain



| Union | Meaning | Building Changes | Area Changes |
|-----------------|---------------------------------|------------------|-------------------|
| No Change | IN both Regulatory and Advisory | 1 | 11 m ² |
| Advisory Only | Regulatory OUT and Advisory IN | 2 | 13 m ² |
| Regulatory Only | Regulatory IN and Advisory OUT | 4 | 21 m ² |

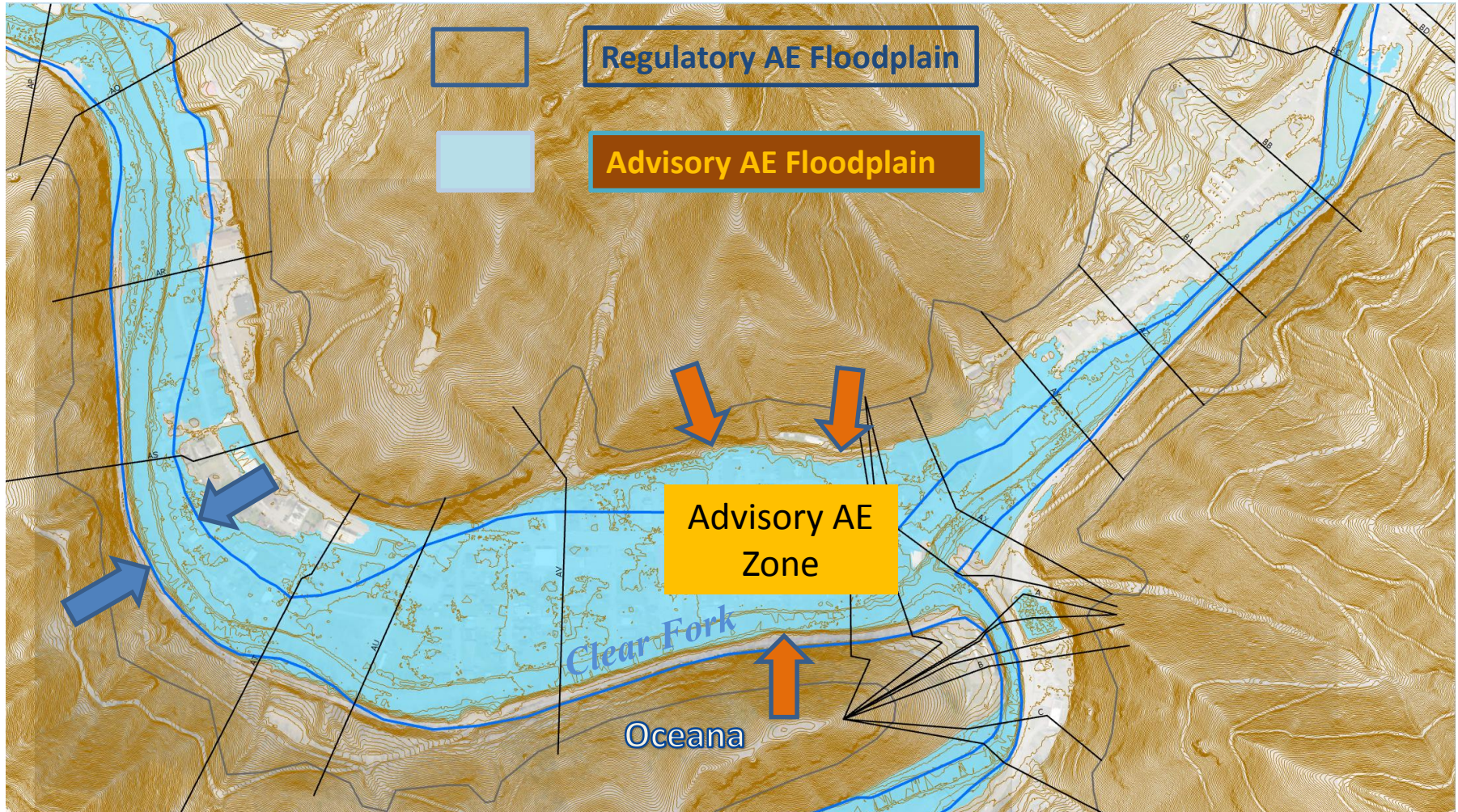
The geographic union of Regulatory and Advisory Floodplains generates a change polygon for flood risk analysis by area. Subsequently the union polygon can be intersected with site-specific structures to analyze the impact of the Advisory Floodplain changes to the Regulatory Floodplain.

Regulatory vs. Advisory Floodplains



Advisory AE Floodplain

Redelineated Floodplain Using New Topo

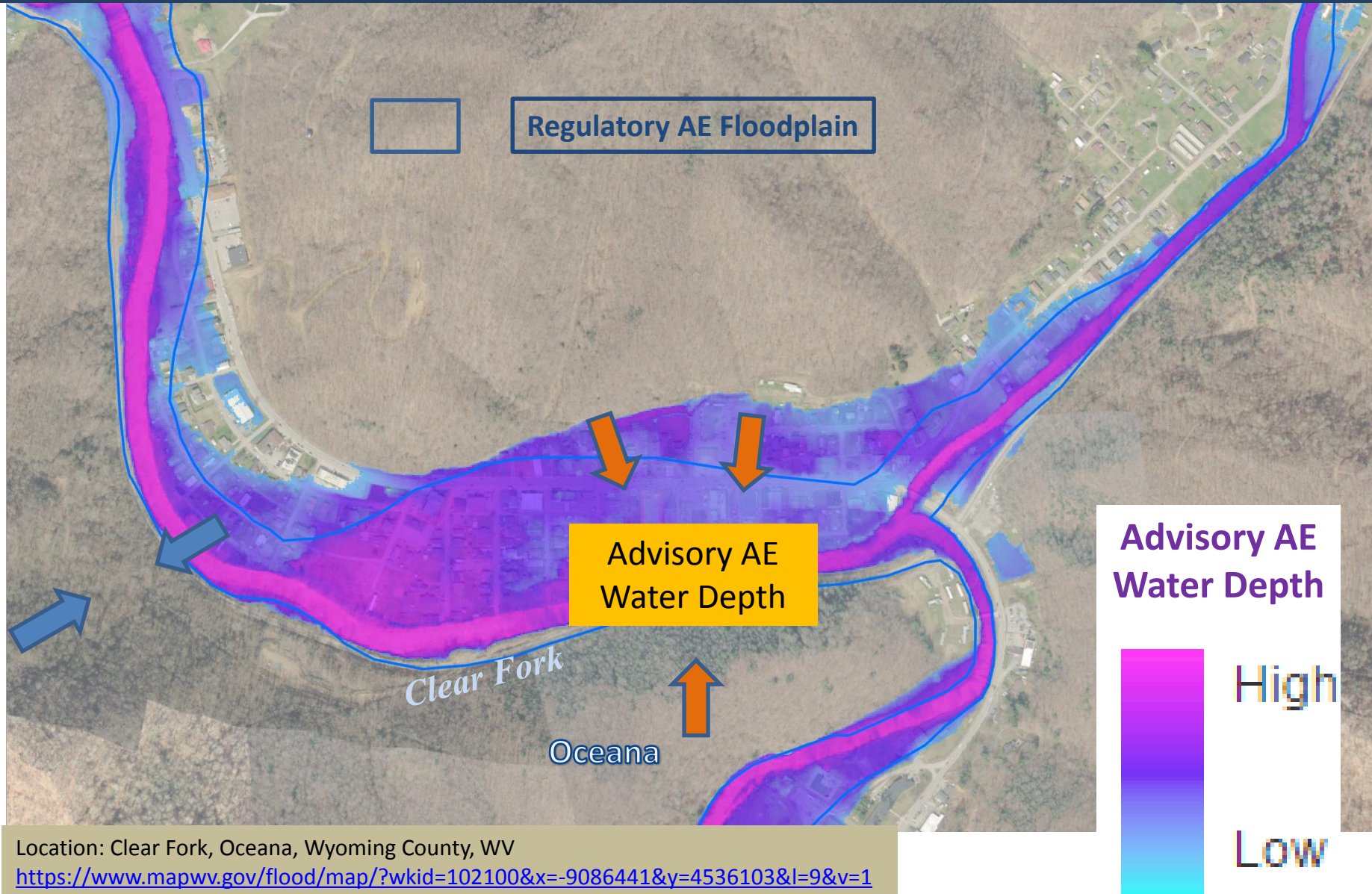


Location: Clear Fork, Oceana, Wyoming County, WV

Objective: Zone AE Floodplain Redelineation and Flood Risk Products using existing LiDAR-derived elevation data

<https://www.mapwv.gov/flood/map/?wkid=102100&x=-9086441&y=4536103&l=9&v=1>

Advisory AE Depth Grid



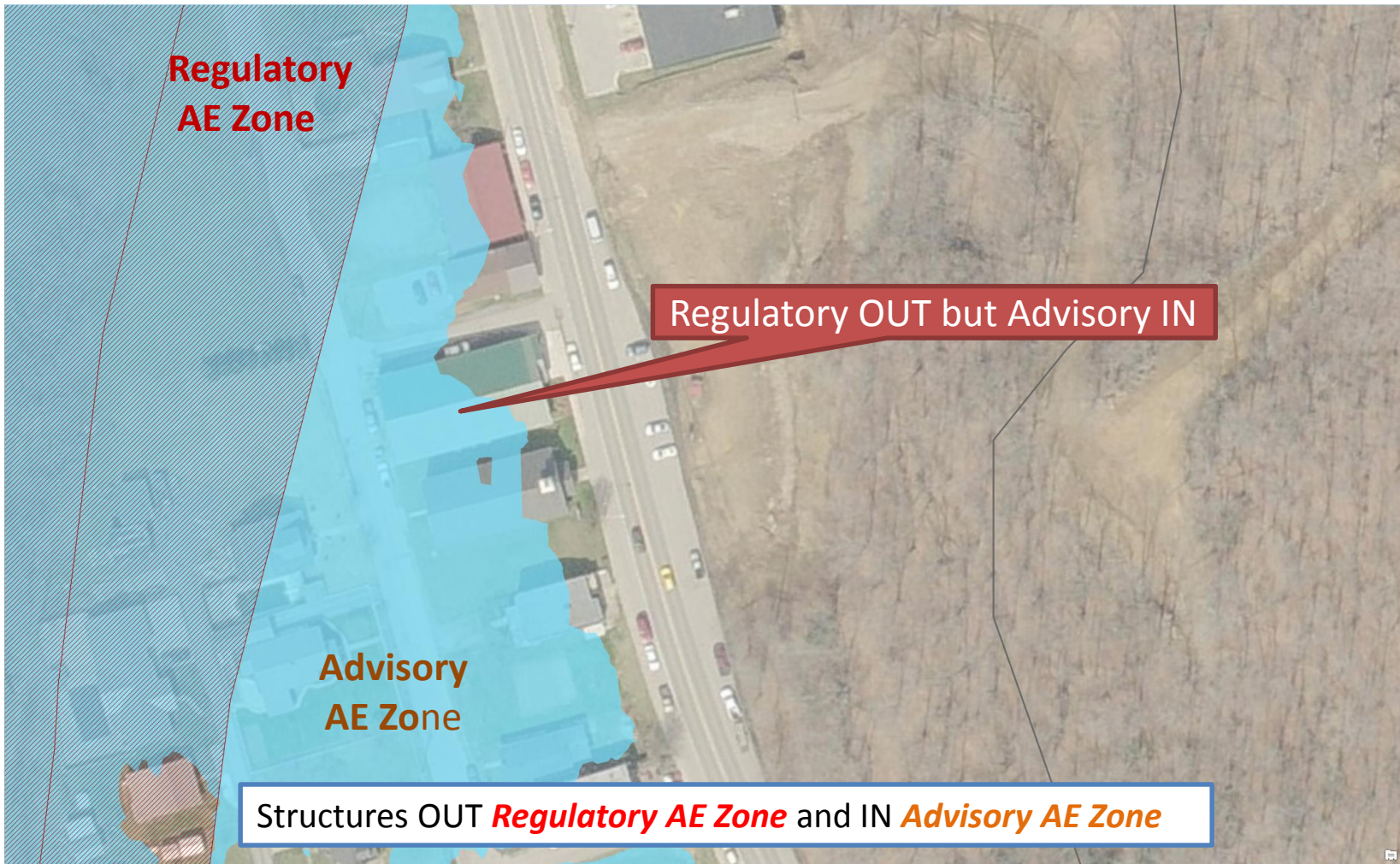
Advisory AE Determinations



Structures IN **Regulatory AE Zone** and OUT **Advisory AE Zone**

What do you tell the public? Acquire an elevation certificate and use the advisory flood elevation to request a LOMA to amend the effective NFIP map.

Advisory AE Determinations



What do you tell the public? Advisory information indicates a flood hazard area and will likely be incorporated into future effective NFIP maps. New development should not occur in Advisory Floodplains without a detailed study to show development reasonably safe from flooding. Recommend purchasing flood insurance for existing structures.

Flood Risk Assessments

- **Source Data**

- Quality digital source data is essential for correctly identifying and producing site-specific structures with accurate replacement values: assessment building records, property parcels, site addresses, leaf-off imagery, and building footprints
- Engage local floodplain managers to quality check building inventories and critical facilities

- **Building Inventory Tool**

- The Building Inventory Tool streamlines the process for creating an inventory of buildings assets exposed to multi-hazards and for executing Hazus flood loss models at the building or structure level. The Tool requires further refinements like updating the building construction tables for commercial/industrial properties and including building information from non-assessment sources. The tool also has to be robust in that building updates can be performed quickly when newer data sources become available.

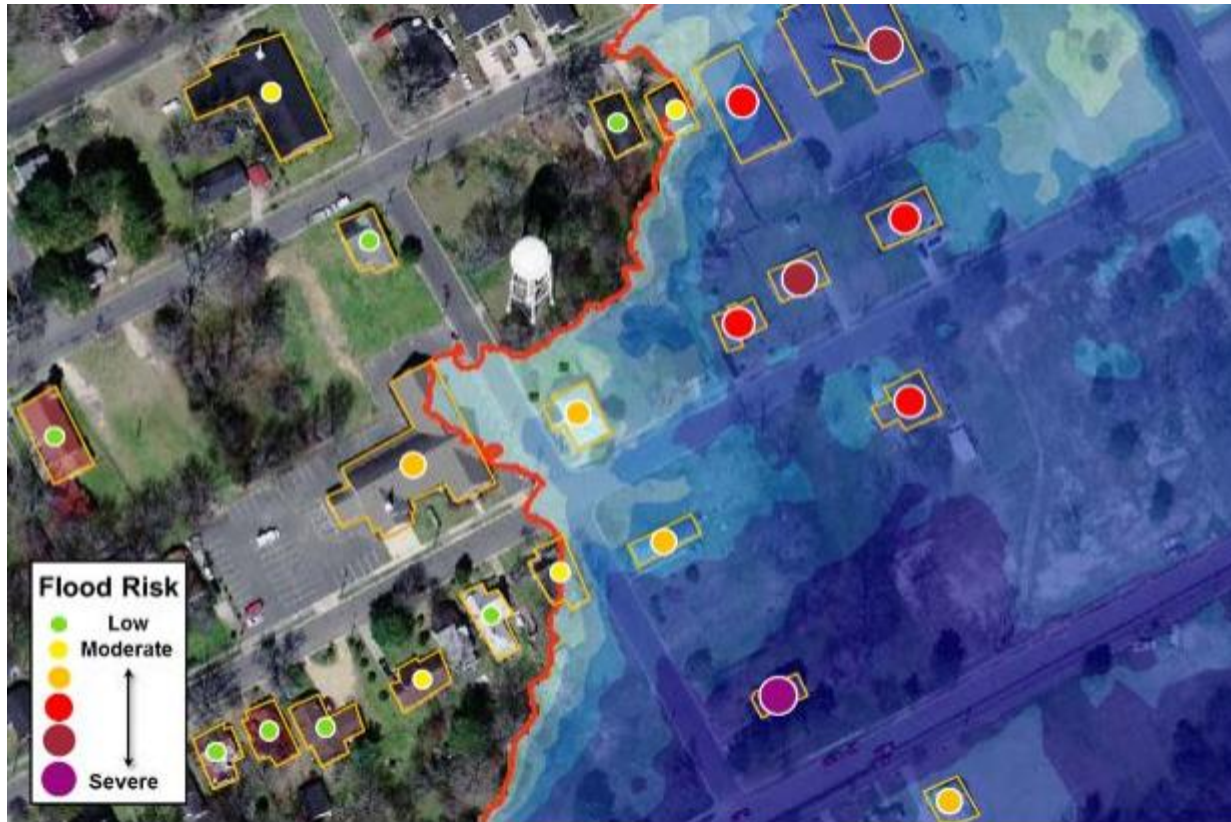
- **Building Values**

- Structures with significant variance between building **replacement values** and **appraised values** should be flagged and reviewed. Certain structures may require substituting the replacement value (cost to replace or rebuild the structure) with the appraised value (resell value).
- Building values for tax-exempt properties like governmental, educational, or religious properties must be derived from other sources such as school and insurance databases. The WV Board of Risk and Insurance Management (BRIM) database is one such source.

- **Depth Grids**

- Accurate and comprehensive flood depth grids are essential for credible building loss damage estimates. Many of the flood risk structures are located in AE Zones where no depth grids exist. A composite depth grid is created from the best available depth grids.

Statewide Flood Risk Structure File



Various **Flood Risk Reports** by community, stream name, flood zones, etc. can be generated from the Flood Risk Data (FRD).

Structure-specific (called “User-Defined Facilities”, or UDFs, in Hazus) flood risk assessments produce loss estimates at the building or structure level, and can often help facilitate flood risk discussions with individual home- or business-owners in a community. These types of risk assessments can provide valuable information to communities to help pre-screen properties and projects before going through a more in-depth Benefit-Cost Analysis (BCA). Personally-identifiable information (PII) such as property address, name of owner, etc. will not be included in FEMA's Flood Risk Assessment dataset (S_UDF_Pt and L_RA_UDF_Results). Source: Flood Risk Assessment Guidance - https://www.fema.gov/media-library-data/1469146645661-31ad3f73def7066084e7ac5bfa145949/Flood_Risk_Assessment_Guidance_May_2016.pdf

Flood Risk Structures of Martinsburg

WV Flood Tool
Remember: When In Doubt, It's Not Out!

Views: Public Expert **Risk MAP** Layers: Flood Reference Basemaps Search: martinsburg, wv

Flood Risk Building Info

| Exposure Replacement Cost (BI) | |
|--------------------------------|-------------------|
| Building Replacement Cost | \$156,882 |
| Content Cost | \$108,165 |
| Building Area | 1,232 sq ft |
| Hazus Occupancy Code | RES1 |
| Number of Stories | 2 |
| Year Built | 1920 |
| Building Construction | Brick |
| Building Condition | Low |
| Building Foundation | Basement |
| First Floor Ht | 4 ft above ground |

| Damage Estimates (UDF) | |
|------------------------|----------|
| Building Damage Pct | 57% |
| Building Loss USD | \$88,834 |

Flood Risk Assessment Building Link

Flood Risk

- Low
- Moderate
- Severe

Building Flood Loss Damage

57% of Residential Home Damaged at a Loss of \$88,834

Flood Risk Information

Flood Risk Assessment

Risk Information for the highlighted census block area: 540039716001007

- Total Assets Exposed: \$173k
- Total Loss (Bldgs and Contents): \$0k
- Building Loss: \$0k
- Debris Removal: 0k ton
- Temporary Shelter: 0 person(s)
- Depth: About 10.0 ft (Source: EQL)

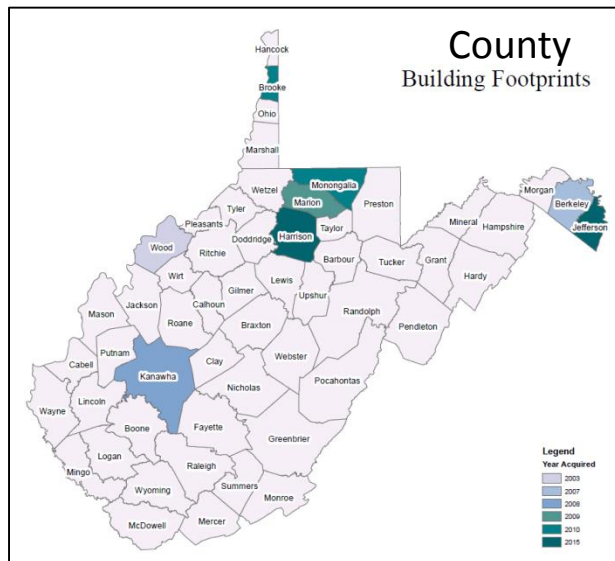
<https://www.mapwv.gov/flood/map/?wkid=102100&x=-8678481&y=4788856&l=11&v=2>

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

Statewide Building Web Service

Statewide building footprint reference layer created from best available sources

| Layer | Source | Coverage |
|----------|---|-----------------|
| SAMB | 2003 2-ft. resolution leaf-off imagery, Statewide Addressing & Mapping Board (large buildings only) | Statewide |
| Counties | 6" or better leaf-off imagery | Select Counties |
| ORNL | 2016 1-meter Leaf-On, FEMA Region III contract to Oak Ridge National Lab | Statewide |

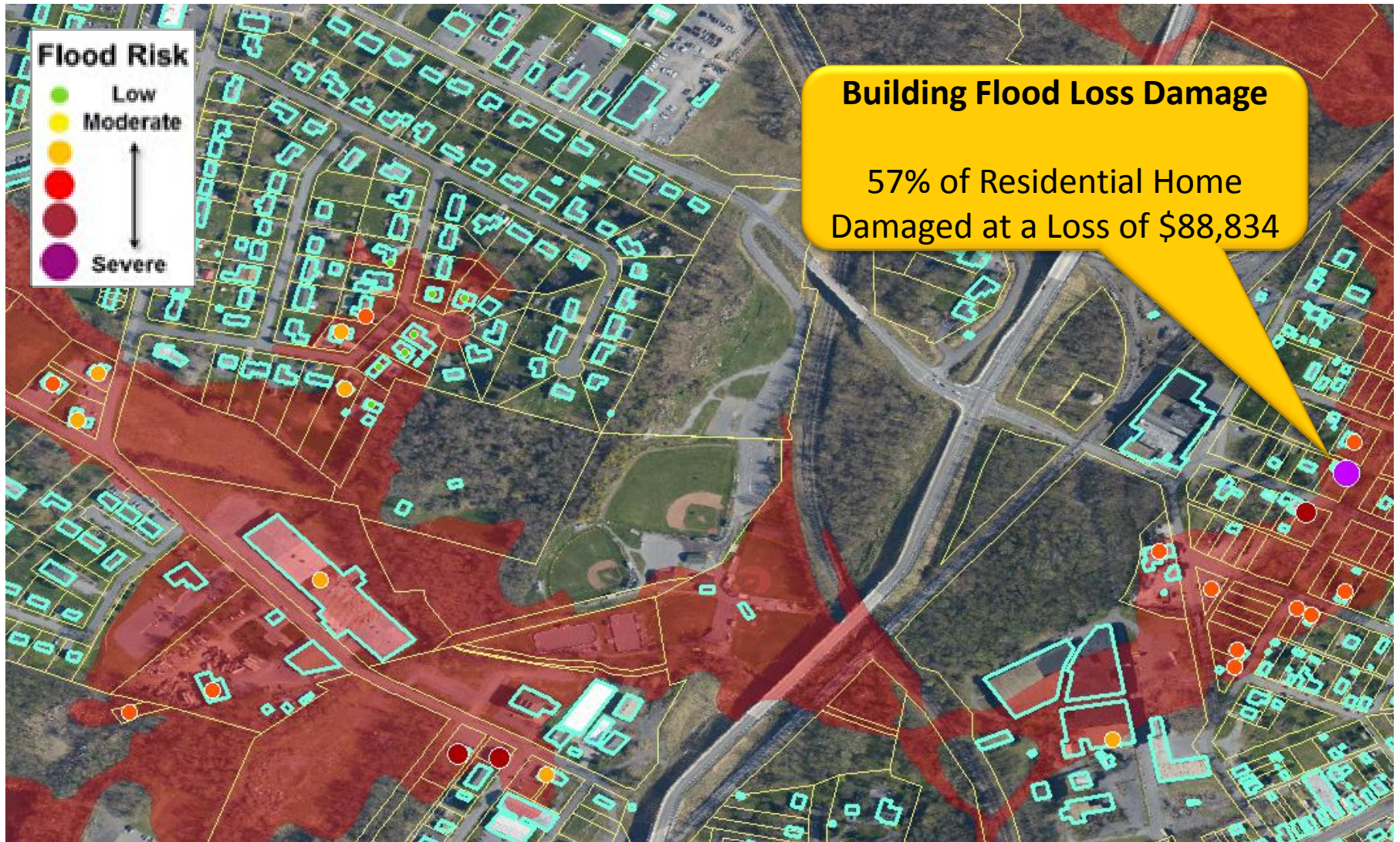


How are BUILDING FOOTPRINTS beneficial?

- Improves the locational pin-pointing of structures for multi-hazard assessments
- Enhances visual representation of structures on 2D flood risk maps
- Necessary for 3D flood visualization models
 - Building footprints extruded to known heights
 - Beneficial to communicating flood risk to communities

Building Footprints

Building footprints can enhance flood risk assessment maps



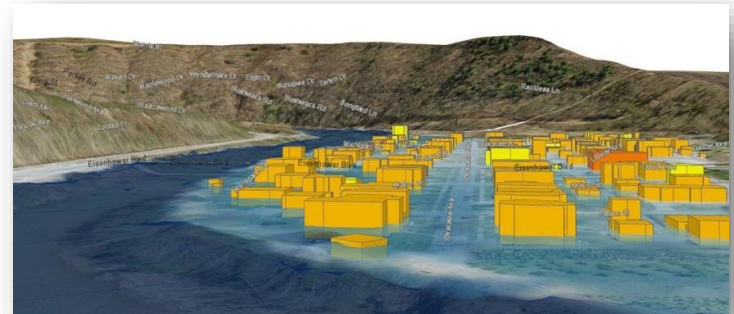
3D Flood Visualization - Community

Basic Steps for Creating 3D Flood Visualizations

- Start with High-Resolution Digital Terrain Model
- Overlay High-Resolution Aerial Image
- Then add Streets
- Then add Building Footprints
- Extrude Building Footprints to Known Heights (“sugar-cube” 3D buildings)
- Generate Detailed 3D Building Models
- Photo-Texture the 3D Building Models
- Add Trees and other Landscape/Streetscape Features
- Add Flood Overlay (Riverine 1% Annual Chance Flood)

Source: NEMAC

The objective is to make the 3D visualizations as realistic as possible in a minimal amount of processing time



3D Flood Visualization - Community

WV Flood Tool
Remember: When In Doubt, It's Not Out!

Public Expert **Risk MAP** Flood Reference Basemaps

Search: Address 197 Rodeo Dr, WV 25403

Tools: [Icons for various map functions]

Baltimore Street, Martinsburg, WV

3D

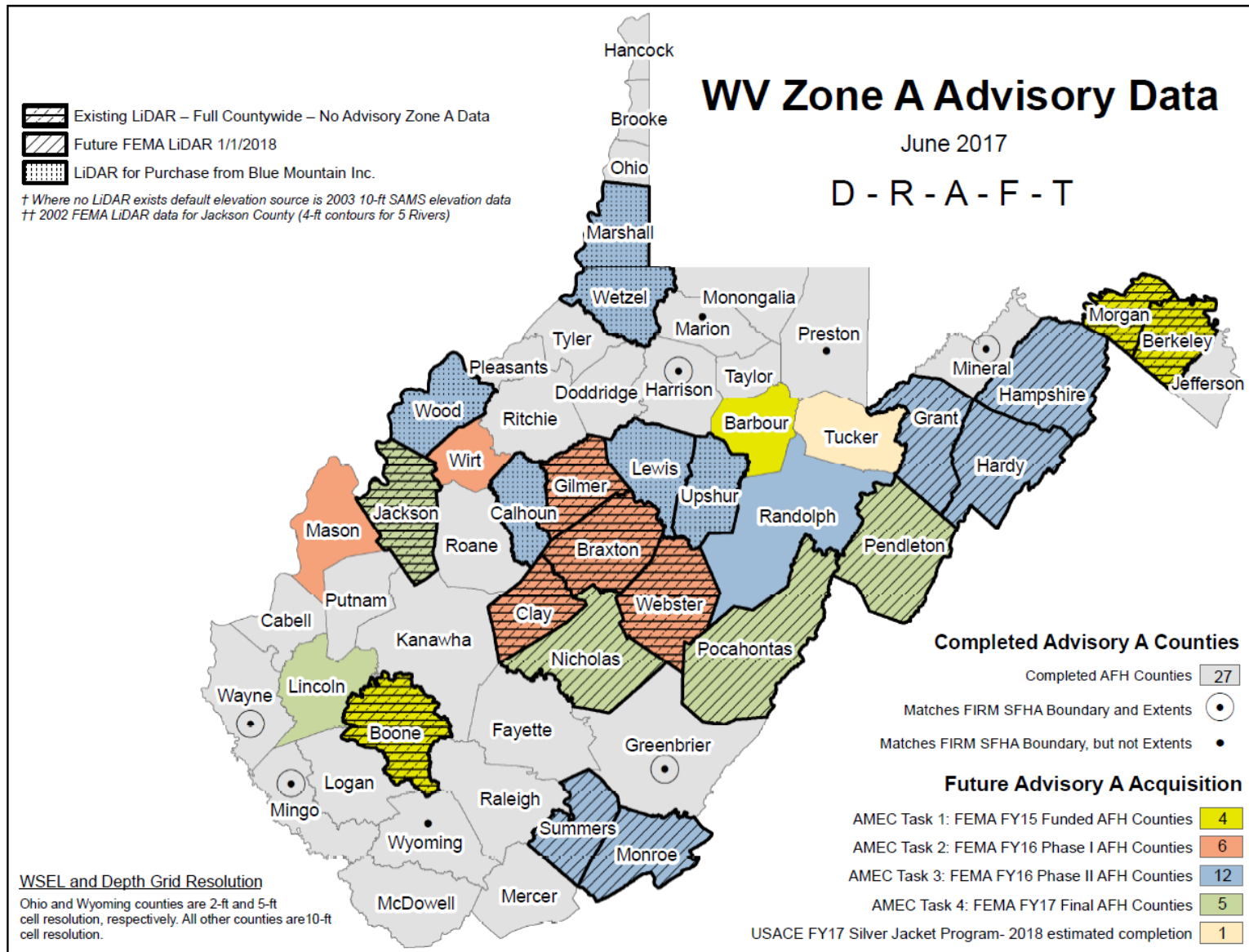
3D Northwest View

WV Flood Tool Conceptual Slide

Scale: 1:4,314
x: -77.967507, y: 39.464872

Map labels: Spencer Grantsville, Tavern Rd, W King St, Martinsburg

AFH Proposed Schedule



Proposed Flood Studies

Proposed Studies

June 2017

D - R - A - F - T

