West Virginia Flood Tool Reference / Basemap Layers

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Flood Tool Reference Layers

Elevation

Aerial Imagery

E-911 Addresses

Parcels / Assessment Records

Building Footprints

Boundaries

Elevation

Accurate high resolution elevation data sets are required for flood hazard mapping studies, risk assessment and other applications.

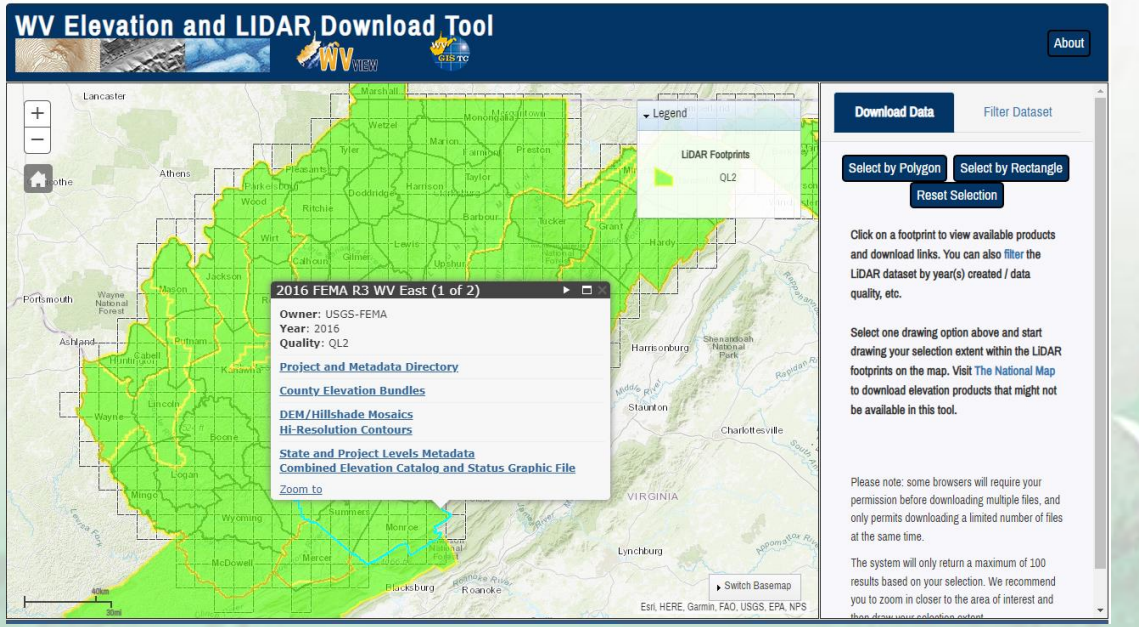
Milestone: Statewide coverage at QL2

- **Statewide Elevation Products on WV Property Viewer and WV Flood Tool**
  - Classified Lidar point cloud files
  - 1-ft Contours cached to 1:282 Map Scale (2-ft. contours for Morgan-Berkeley-Jefferson)
  - 1-meter Digital Elevation Model (created from LiDAR and breaklines)
  - Hillshade (grayscale 3D representation of the surface) and Slope
  - View products on WV Flood Tool and Property Viewer

- **Source Elevation Metadata:** https://www.mapwv.gov/lidar-metadata

- **WV Elevation Download Tool:** https://www.mapwv.gov/elevation
  - County Elevation Bundles (Point Cloud, Contours, DEM, Hillshade, Slope)
  - DEM Hillshade Mosaics
  - Hi-Resolution Contours
  - Compressed LiDAR LAS Files
  - State and Project Levels Metadata

- **USGS Elevation Download:**
  - https://apps.nationalmap.gov/downloader/
  - DEMs and Lidar point cloud files



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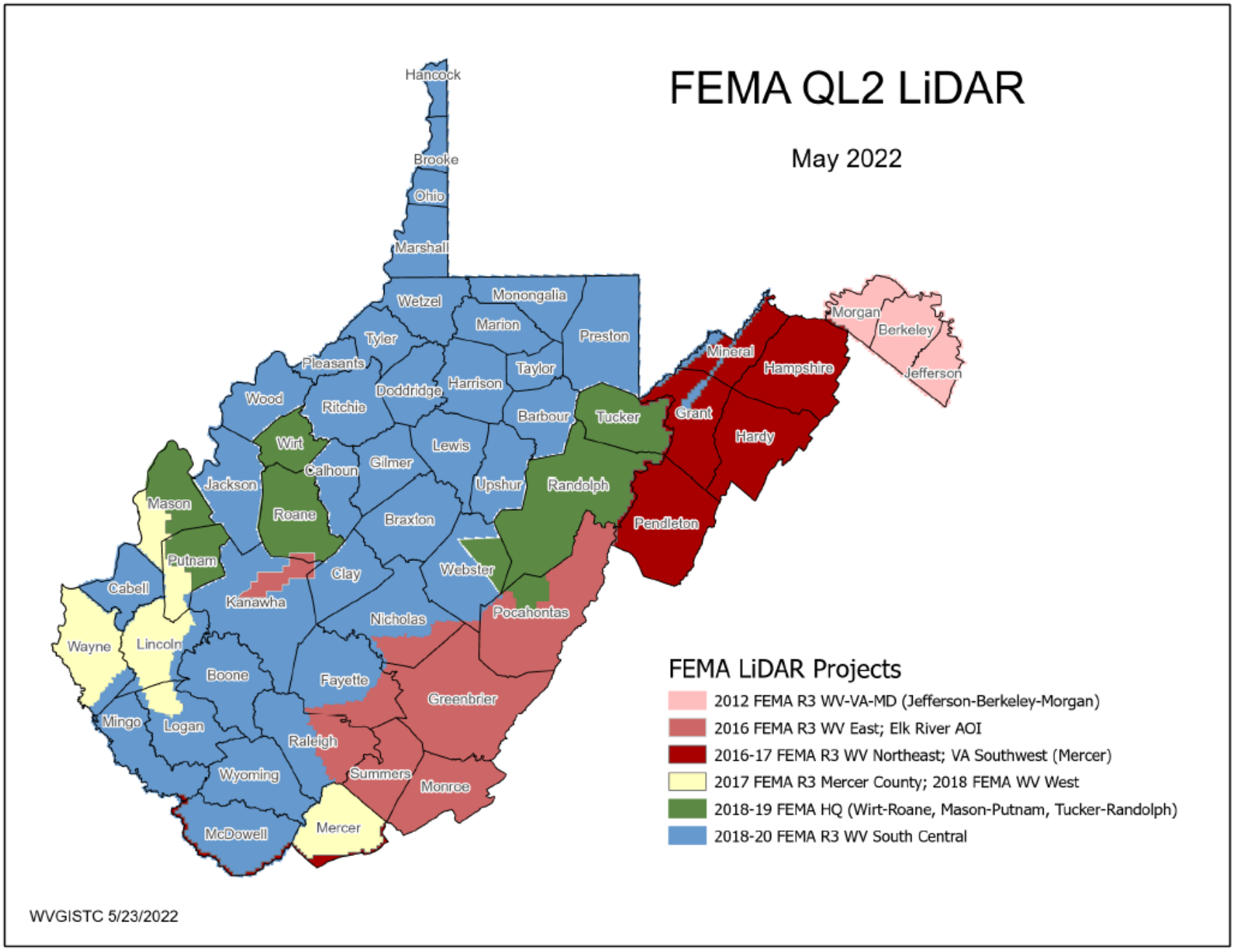

- $10 million over past decade
  - 2012 – 2020
- Six major acquisitions
- QL2 supports 1-foot contours

PDF Map

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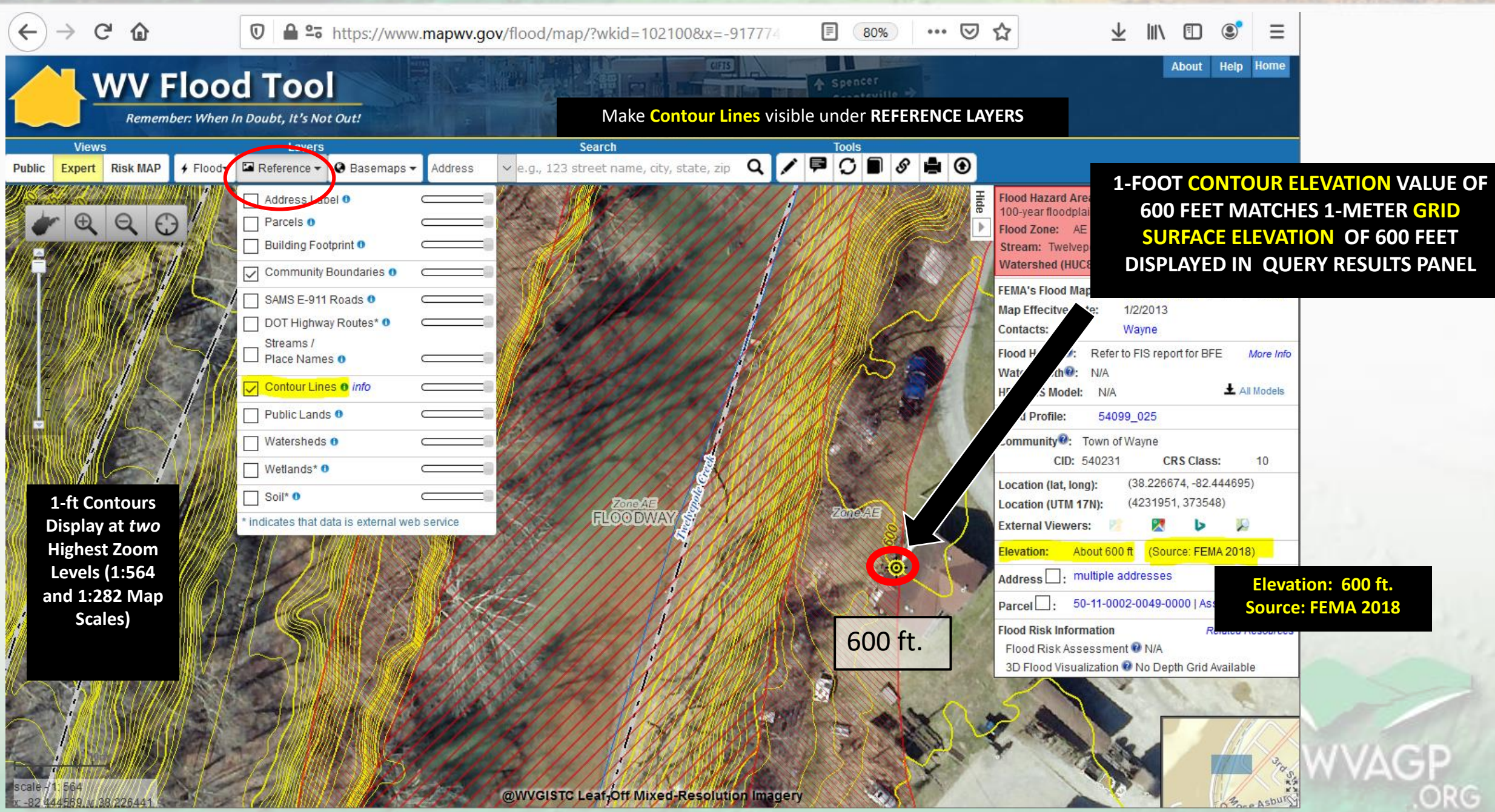


https://www.mapwv.gov/flood/map/?wkid=102100&x=-9177701&y=4611497&l=13&v=1

Lidar Point Cloud Data

Available? Yes, however…

We strongly recommend that you use the vendor-created DEMs to avoid processing challenges.

Point cloud data sets ARE useful for specific purposes

Example: Bridge Deck elevation

Aerial Orthoimagery

Current, high-resolution aerial imagery is a critical component of West Virginia's Spatial Data Infrastructure.

Milestone: 95% of WV counties are now represented by 6" or finer resolution imagery. (Most counties captured at 4")

New Aerial Imagery

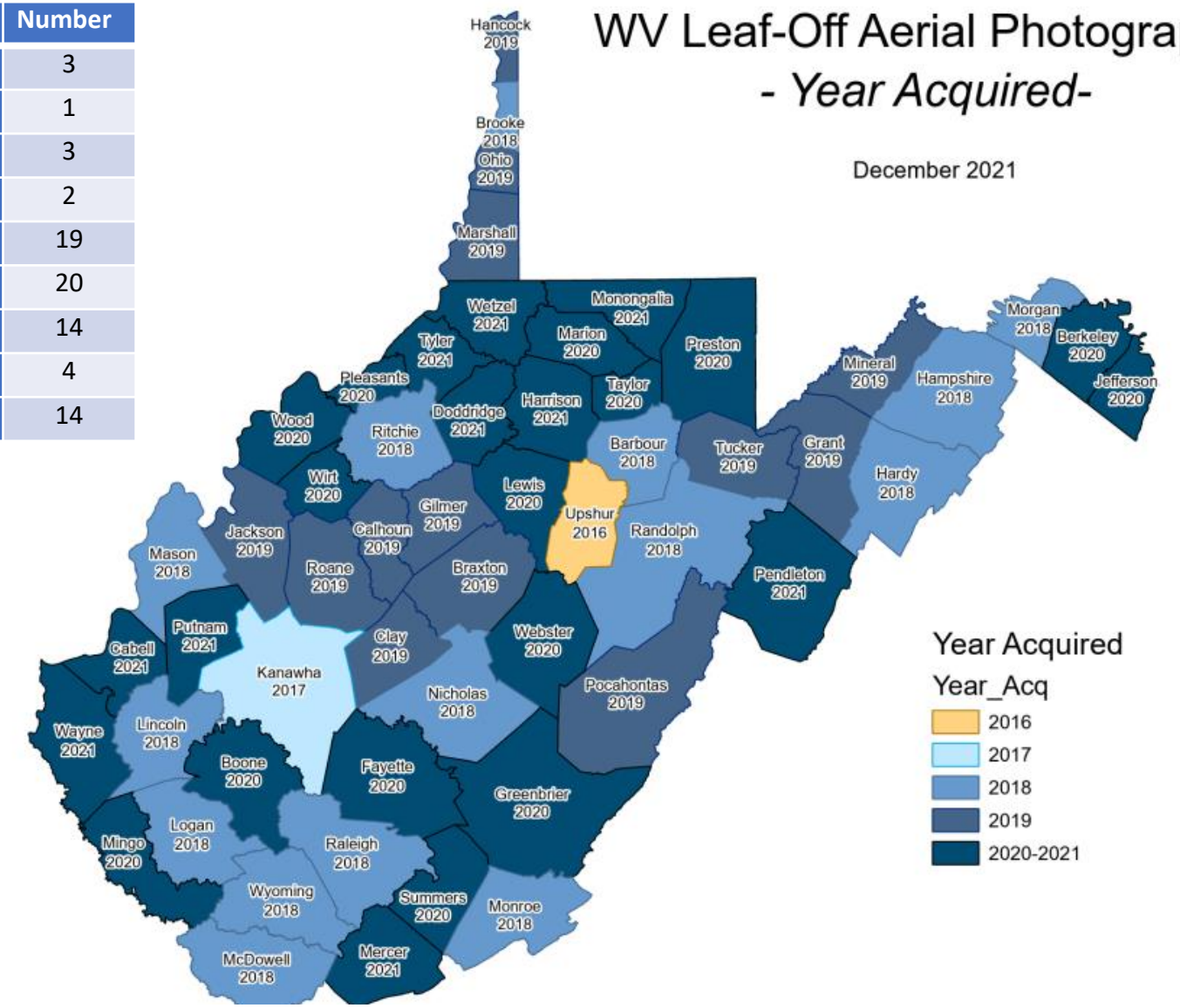
- County Leaf-Off Aerial Imagery
  - 2022: 14 Counties
  - 2021: 4 Counties (COVID-19 impact)
  - 2020: 14 Counties

- USDA National Agricultural Imagery Program (NAIP)
  - 2020: 2-ft pixel resolution, Statewide Coverage
  - 2022: Planned Acquisition; Add to Flood Tool by 2023?

STATEWIDE AERIAL IMAGERY CONTRACT: In February 2019, a 4-year statewide contract (2019-22) through WVU Procurement was executed to provide bulk discounts for government agencies acquiring aerial imagery in West Virginia. Thrasher Group was awarded the contract. The spring flying season is from late February to Mid-April during leaf-out and no snow conditions.

- **County Participation:** 30 unique counties tapped into the contract and multiple counties took advantage of the contract more than once for a total of 41 county aerial imagery contracts (18,987 square miles).
- **Cost Share:** The total cost share by counties was 85% ($713K) while grant share was $124K. The entire aerial imagery cost with no county cost share contributions only had to be paid for two disadvantaged counties (Clay and Pendleton counties).
- **Resolution:** All counties were collected at 4-inch resolution except for Cabell (3”), Pendleton (6’”), and Randolph (6”) counties.
- **Flyover Coverage**: A total of **18,987 square miles** were flown from this state contract.
- **Best Leaf-Off:** Replaced the legacy WV Sheriffs Association (2010-12) as the best available leaf-off imagery
- **Non-Exclusive Contract:** County offices still had the option to contract with other companies for the same services.
- **Unit Costs:** Aerial imagery could be purchased at four different pixel resolutions and over multiple budget cycles. Counties with limited funding qualified for grant cost-share.

Year	Number
2010	3
2014	1
2016	3
2017	2
2018	19
2019	20
2020	14
2021	4
2022	14



Select counties for 2019-22 received funding support through HMGP grant

[PDF Map]

WVGISTC 2021-12-06

New 2021-22 Imagery

- ✓ Berkeley County
- ✓ Cabell County
- ✓ Calhoun County
- ✓ Hampshire County
- ✓ Harrison County
- ✓ Jackson County
- ✓ Jefferson County
- ✓ Lewis County
- ✓ Marshall County
- ✓ Morgan County
- ✓ Pendleton County
- ✓ Pocahontas County
- ✓ Raleigh County
- ✓ Randolph County
- ✓ Roane County
- ✓ Wayne County
- ✓ Wirt County

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

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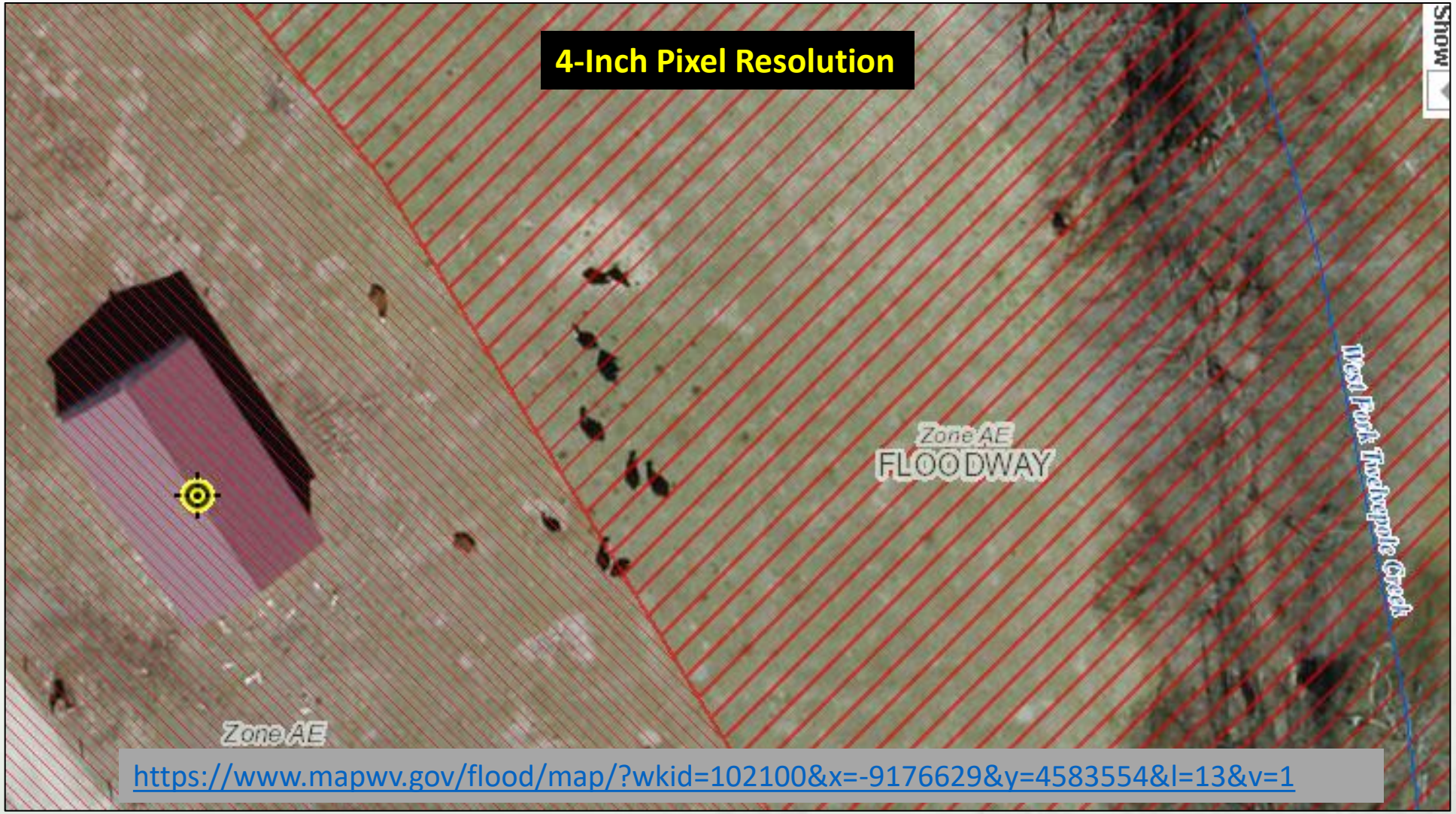
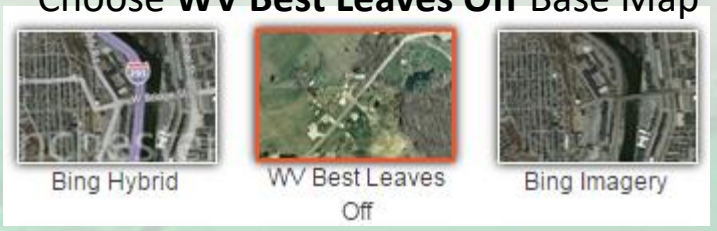


Cows in the Floodway
West Fork Twelvepole Creek, Wayne County

Choose **WV Best Leaves Off** Base Map



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Bald Eagle in Pendleton County

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3-Inch Pixel Resolution

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E-911 Addresses

The importance of accurate statewide digital addresses to multiple efforts in GIS and other areas cannot be overemphasized.

Milestone: Maturation of the Statewide Addressing and Mapping System (SAMS)

E-911 Addresses

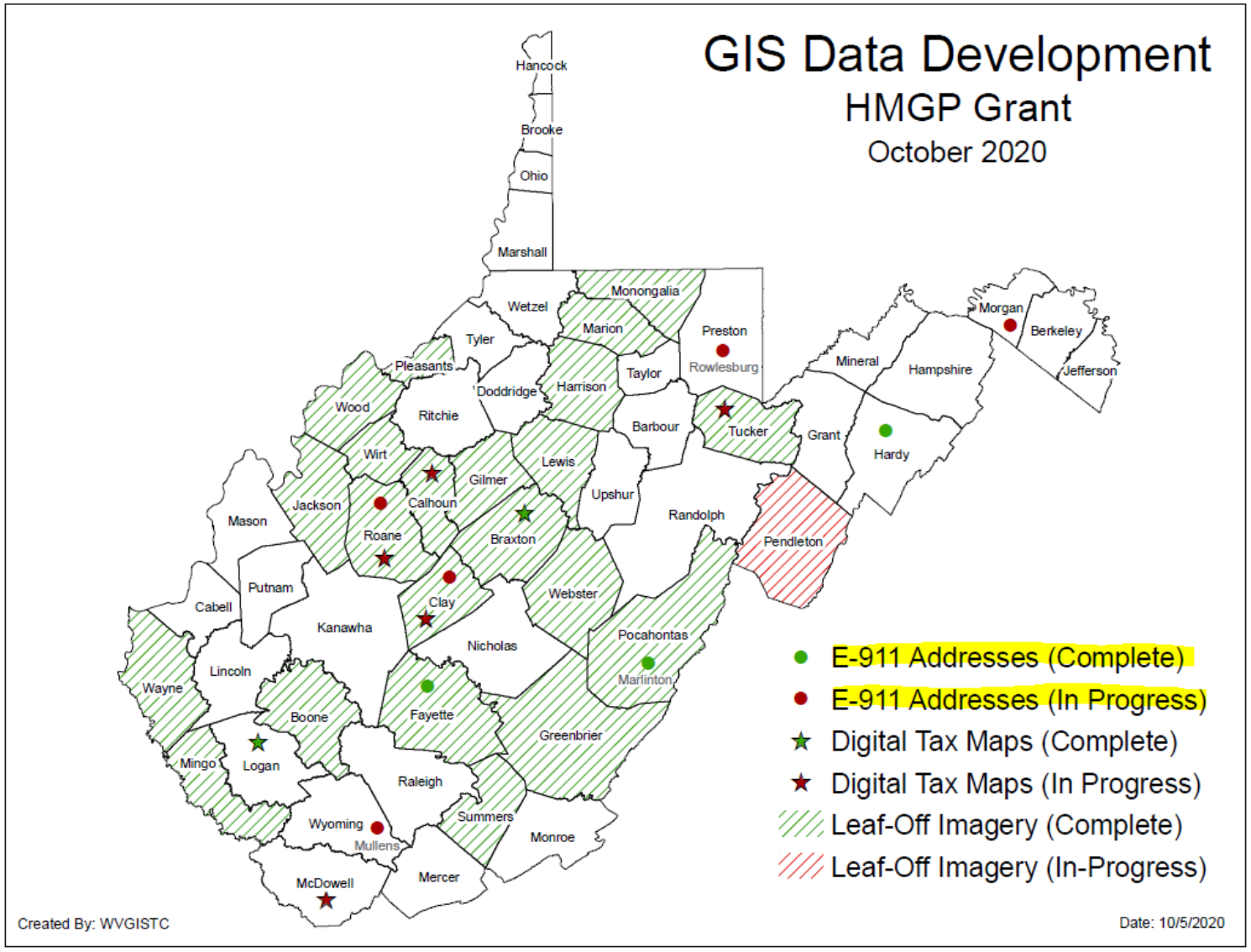
- **Addressable:** Currently the WV Flood Tool accesses **1 million** addressable structures in the Statewide Addressing and Mapping System (SAMS). It is estimated that **100,000** addressable structures are in a high-risk flood zone.

- **Address Matching Geocoding Services:** Updated geocoding services of WV Flood Tool from new Statewide Addressing and Mapping Files

- **Community Addressing Projects:** Incorporated new addresses from Hazard Mitigation Grant Addressing Projects

- **Building Identifier:** The E-911 Address Number, combined with the Parcel Identifier, forms the Building Identifier for identifying structures for flood risk assessments, building pictures, LOMAs, Elevation Certificates, etc.

Improved Addresses Uploaded to WV Flood Tool



Marlinton, WV

HMGP Addressing Improvement Projects

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Address Issues Remain:

Missing Address Site Numbers

Fairmont, WV

Wrong Addresses

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

Elkins, WV

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Parcels / Assessment Records

An accurate statewide digital parcel GIS layer is a high priority for Hazard Mitigation Plans and other purposes.

Milestone: Completion of statewide digital parcels

Parcels / Assessment Records

- **Tax Year 2020 Parcels and Assessment Records:** Updated Flood Tool with 1.4 million tax parcel and assessment records for Tax Year 2020.

- **Parcel Assessment Reports:** Updated Parcel Web Reports including building sketch diagrams.

- **Building Identifier:** The Parcel Identifier, combined with the E-911 Address Number, forms the Building Identifier for identifying structures for flood risk assessments, building pictures, LOMAs, Elevation Certificates, etc.

Web Assessment Reports

- Ownership
- Building Identification
- Building Characteristics
- Building Sketch Diagrams
- Outbuildings
- Cost Values
- Land Use
- Tax Class (Owner Occupied)
- Parcel History (15 years)

Boundaries

Accurate representation of county, municipal and other boundaries is foundational to multiple areas of GIS and other efforts throughout the state.

Goal: Adoption of an “official” West Virginia County Boundary data set

Efforts under way to review county boundaries and resolve discrepancies

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CHAPTER 7. COUNTY COMMISSIONS AND OFFICERS.

ARTICLE 2. COUNTY AND DISTRICT BOUNDARIES; CHANGE OF COUNTY SEAT AND NAMES OF UNINCORPORATED TOWNS AND OF DISTRICTS.

§7-2-6. Establishment of county boundary lines; filing of maps; changes.

The boundary lines between the several counties of the state shall be established in the following manner: Topographic quadrangle maps prepared by the United States geological survey and the West Virginia geological and economic survey in conformance with prior acts of the general assembly of Virginia, acts of the Legislature of West Virginia and other applicable provisions of law, shall be filed by the state geologist with the Secretary of State of West Virginia and shall thereafter constitute the official boundary lines between the said counties: Provided, however, That said boundary lines shall be located, plotted and delineated upon said maps together with any other pertinent information with reference thereto and each of said maps shall be certified as correct by the director and state geologist of the West Virginia geological and economic survey prior to such filing. Certified copies of all such maps shall be filed with the Legislative Auditor for use in the legislative library and a certified copy of each county map shall be filed in the office of the clerk of the county court of that county and recorded in an appropriate deed book or plat book.

All county boundary lines which are or may be established by metes and bounds (by bearings and distances between monuments) by the Legislature or pursuant to section one of this article shall constitute an official change in such boundary line or lines and the director and state geologist of the West Virginia geological and economic survey shall promptly locate, plat and delineate such change upon the applicable map or maps and certify and file such change as aforesaid.

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IN THE CIRCUIT COURT OF LINCOLN COUNTY, WEST VIRGINIA

CERTIFIED TO BE A TRUE C
Dick G. Baker
CLERK LINCOLN COUNTY COMM

THE COUNTY COMMISSION OF
LINCOLN COUNTY, WEST VIRGINIA,

Petitioner,

v.

CIVIL ACTION NO. 16-C-32

THE COUNTY COMMISSION OF LOGAN
COUNTY, WEST VIRGINIA,

Respondents.

AGREED ORDER GRANTING PETITION TO CHANGE COUNTY BOUNDARY BETWEEN LINCOLN AND LOGAN COUNTIES

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Lincoln / Logan County
Guyandotte River, Near Harts, WV

Multiple Sources:
WV DEP 24K
Census TIGER/Line 2021
NRCS (Census)

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Building Footprints

Accurate, updated building footprints are essential for in-depth Risk Assessment Analysis

Milestone: Reviewed and updated existing statewide building footprint layers for buildings in the 1% annual chance floodplain (0.2% chance floodplain for critical infrastructure)

Statewide building footprint reference layer created from best available sources

Layer	Source	Coverage
2003 SAMB	2003 2-ft. resolution leaf-off imagery, Statewide Addressing & Mapping Board (large buildings only)	Statewide partial (12,671)
Counties 2010-2018	6” or better leaf-off imagery	Select Counties
2018 Microsoft Building Footprints	Statewide dataset contains 1,020,048 building footprints generated by Microsoft in 2018.	Statewide (1 million)
2022 WVGISTC	ESRI’s Deep Learning Package	Ongoing. 13 counties completed

2018 Microsoft Building Footprints

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

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Building footprints created from Best Leaf Off by WVU

A comparison of building footprints on Wheeling Island in Ohio County. The WVGISTC building footprints were created from 4” resolution, 2019 imagery using ESRI’s Deep Learning Package for U.S. structures.

As of May 2022, the WVGISTC has completed Building Footprint extractions for 13 West Virginia Counties. An assessment for overlap of building footprints with existing Primary Structure centroids has averaged 90% overlap for WVGISTC Footprints. This is in comparison to 75% and 66% overlap for Microsoft and Oak Ridge (US Structures) footprints, respectively.

On top of these percentages, the quality of the WVGISTC Footprints in orientation, positioning, and boundary matching is also improved.

WVGISTC – 2019 imagery

Microsoft

Oak Ridge

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