

**Elevation Sources for WV Flood Tool**

1/21/2021

| #                          | 1  | 2                                  | 3                            | 4                            | 5  | 6  | 7   | 8A   | 8B   | 9A   | 9B   | 10                  | 11                          | 12A  | 12B  | 13A  | 13B  | 13C  |  |
|----------------------------|--|------------------------------------|------------------------------|------------------------------|--|--|---|--|--|--|--|---------------------|-----------------------------|--|--|--|--|--|--|
| <b>WV Project Name</b>     | 2003 WV Statewide Addressing & Mapping Board | 2004 FEMA Lidar: Gilmer County, WV | 2009 Cabell County, WV Lidar | 2009 Marion County, WV Lidar | 2009 USACE Lidar: Bluestone Lake and Downstream, WV    | 2010 - 2011 WVDEP DMR/Coal Fields Lidar Project  | 2012 FEMA R3 WV-VA-MD (Jefferson, Berkeley, Morgan) | 2016 FEMA R3 WV East   | 2016 FEMA R3 WV-East Elk-River-ACI                                 | 2016-17 FEMA R3 WV Northeast                                       | 2016-17 FEMA R3 VA Southwest                                       | 2017 WVU Lidar      | 2018 Logan County, WV Lidar | 2017 FEMA Mercer County  | 2018 FEMA WV West  | 2018-19 FEMA Tucker-Randolph Counties                              | 2018-19 FEMA Wirt-Roane Counties                                   | 2018-19 FEMA Mason-Putnam Counties                                 |  |
| <b>Source</b>              | SAMS   | FEMA                               | Cabell                       | Marion                       | USACE  | WVDEP  | FEMA  | FEMA   | FEMA   | FEMA   | FEMA   | WVU                 | Logan                       | FEMA   | FEMA   | FEMA   | FEMA   | FEMA   |  |
| <b>Year</b>                | 2003   | 2004                               | 2009                         | 2009                         | 2009   | 2010-11  | 2012  | 2016   | 2016   | 2016-17  | 2016-17  | 2017                | 2018                        | 2017   | 2018   | 2018-19  | 2018-19  | 2018-19  |  |
| <b>Quality Level</b>       |  | 4                                  | 3                            | 4                            | 3  | 3 and 4  | 2   | 2  | 2  | 2  | 2  | 2                   | 2                           | 2  | 2  | 2  | 2  | 2  |  |
| <b>Grid Resolution</b>     | 3m   | 2m                                 | 2m                           | 2m                           | 2m   | 2m   | 1m  | 1m   | 1m   | 1m   | 1m   | 1 Ft                | 3 Ft                        | 1m   | 1m   | 1m   | 1m   | 1m   |  |
| <b>Horizontal Accuracy</b> | 3 m  | 0.20 m                             | Not Provided                 | 0.76 m                       | 0.45 m   | 0.76 m   | 1 m   | Not Provided   | Not Provided   | Not Provided   | Not Provided   | Not Provided        | Not Provided                | Not Provided   | Not Provided   | Not Provided   | Not Provided   | Not Provided   |  |
| <b>Vertical Accuracy</b>   | 10 feet                                      | 36 cm RMSE                         | 10.14 cm RMSEz               | 25 cm RMSE                   | 2ft & 4ft contours                                     | 21 cm(DMR)<br>11.8 cm RMSE(Coal Fields)  | 10 cm RMSEz   | 6.7 cm   | 6.7 cm   | 6.22 cm  | 6.22 cm  | Not Provided        | Not Provided                | 12.7 cm  | 12.9 cm  | 10 cm (spec)   | 10 cm (spec)   | 10 cm (spec)   |  |
| <b>Coordinate System</b>   | UTM Zone 17                                  | UTM Zone 17                        | UTM Zone 17                  | UTM Zone 17                  | UTM Zone 17  | UTM Zone 17  | UTM Zone 17 & 18                                    | UTM Zone 17  | UTM Zone 17  | UTM Zone 17  | UTM Zone 17  | SPCS North          | SPCS South                  | UTM Zone 17  | UTM Zone 17  | UTM Zone 17  | UTM Zone 17  | UTM Zone 17  |  |
| <b>Horizontal Datum</b>    | NAD83  | NAD83                              | NAD83                        | NAD83                        | NAD83  | NAD83  | NAD83   | NAD83  | NAD83  | NAD83  | NAD83  | NAD83               | NAD83                       | NAD83  | NAD83  | NAD83  | NAD83  | NAD83  |  |
| <b>Vertical Datum</b>      | NAVD88                                       | NAVD88                             | NAVD88                       | NAVD88                       | NAVD88   | NAVD88   | NAVD88  | NAVD88   | NAVD88   | NAVD88   | NAVD88   | NAVD88              | NAVD88                      | NAVD88   | NAVD88   | NAVD88   | NAVD88   | NAVD88   |  |
| <b>Z-Units</b>             | Meters                                       | Meters                             | Meters                       | Meters                       | Meters   | Meters   | Meters  | Meters   | Meters   | Meters   | Meters   | Feet                | Feet                        | Meters   | Meters   | Meters   | Meters   | Meters   |  |
| <b>Source Data Type</b>    | Photogrammetry                               | Lidar-Topo                         | Lidar-Topo                   | Lidar-Topo                   | Lidar-Topo   | Lidar-Topo   | Lidar-Topo  | Lidar-Topo   | Lidar-Topo   | Lidar-Topo   | Lidar-Topo   | Lidar-Topo          | Lidar-Topo                  | Lidar-Topo   | Lidar-Topo   | Lidar-Topo   | Lidar-Topo   | Lidar-Topo   |  |
| <b>Restrictions</b>        | Public                                       | Public                             | Public                       | Other                        | Public   | Public   | Public  | Public   | Public   | Public   | Public   | Public              | Not Public                  | Public   | Public   | Public   | Public   | Public   |  |
| <b>Products Available</b>  | Points, breaklines, DEM, 10-ft contours      | Bare earth points, DEMs (1m)       | Points                       | Not Provided                 | Points, DTMs, DEMs, breaklines, 2 ft and 4 ft contours | Points, DEMs, breaklines. In-house produced derived data products include an intensity image, breaklines, digital elevation model (DEM), elevation grid, hillshade, contours (100, 20 and 2 foot), slope and aspect datasets | Points, bare earth, breaklines, DEM                 | DEM, point cloud, contours, breaklines                             | DEM, point cloud, contours, breaklines                             | DEMs, point cloud, contours, breaklines                            | DEMs, point cloud, contours, breaklines                            | DEMs, point cloud   | Point Cloud DEM             | Point Cloud, DEM   | Bare Earth DEMs, point cloud, contours, breaklines                 | Bare Earth DEMs, point cloud, contours, breaklines                 | Bare Earth DEMs, point cloud, contours, breaklines                 | Bare Earth DEMs, point cloud, contours, breaklines                 | Bare Earth DEMs, point cloud, contours, breaklines |
| <b>Point Spacing</b>       |  | 1 m                                | 1 m                          | 1 m                          | 1 m  | 2 m or less  | 0.5 m   | 0.64 m   | 0.64 m   | 0.7 m (spec)   | 0.7 m (spec)   |                     |                             | .71m   | .71m   | 0.7 m (spec)   | 0.7 m (spec)   | 0.7 m (spec)   |  |
| <b>Vertical RMSE</b>       |  | 36                                 | 10.14                        | 25                           | 18.2   | 21(DMR)<br>11.8(Coal Fields)   | 10  | 6.7  | 6.7  | 10   | 10   |                     |                             | 12.7   | 12.9   | 10   | 10   | 10   |  |
| <b>InvID</b>               |  | 2034                               | 2450                         | 2533                         | 2150   | 5048(DMR)<br>2376(Coal Fields)   | 4114  | 8265   | 8265   | 9282   | 9282   |                     |                             | 9161   | 9161   | 9282   | 9282   | 9282   |  |
| <b>Meets 3DEP</b>          | No   | No                                 | No                           | No                           | No   | No   | No  | Yes  | Yes  | Yes  | Yes  | No                  | No                          | Yes  | Yes  | Yes  | Yes  | Yes  |  |
| <b>Reasons 3DEP</b>        | QL3 or lower quality lidar                   | QL3 or lower quality lidar         | QL3 or lower quality lidar   | Data not in public domain    | QL3 or lower quality lidar                             | QL3 or lower quality lidar   | Missing USGS Base Spec products                     | QL2 or better quality lidar data with USGS Base Spec v1.2 products | QL2 or better quality lidar data with USGS Base Spec v1.2 products | QL2 or better quality lidar data with USGS Base Spec v1.2 products | QL2 or better quality lidar data with USGS Base Spec v1.2 products | Not a 3DEP project. | Not a 3DEP project.         | QL2 or better quality lidar data with USGS Base Spec v1.2 products | QL2 or better quality lidar data with USGS Base Spec v1.2 products | QL2 or better quality lidar data with USGS Base Spec v1.2 products | QL2 or better quality lidar data with USGS Base Spec v1.2 products | QL2 or better quality lidar data with USGS Base Spec v1.2 products |  |
| <b>Prime Contractor</b>    | Statewide Addressing & Mapping Board         | Canaan Valley Inst.                | Woolpert                     |                              | Woolpert   | WVU  | Dewberry  | Quantum Spatial  | Quantum Spatial  | Dewberry   | Dewberry   | Thrasher            | Kucera                      | Dewberry   | Dewberry   | Dewberry   | Dewberry   | Dewberry   |  |
| <b>FEMA Project Name</b>   |  |                                    |                              |                              |  |  | VA-WV-MD_FEMA-LIDAR-R3 Lot4_2012                    | 2016 FEMA R3 WV East   | 2016 FEMA R3 WV East   | 2016 VA FEMA R3 Southwest Lidar                                    | 2016 VA FEMA R3 Southwest Lidar                                    |                     |                             | 2017_NRCS_FEMA_South_Central_VA_WV_Lidar                           | 2017_NRCS_FEMA_South_Central_VA_WV_Lidar                           | 2018 FEMA HQ WV LIDAR  | 2018 FEMA HQ WV LIDAR  | 2018 FEMA HQ WV LIDAR  |  |

| #                       | 1  | 2                                  | 3   | 4   | 5   | 6  | 7   | 8A                   | 8B                                 | 9A                           | 9B                           | 10                  | 11                          | 12A                     | 12B               | 13A                                   | 13B                              | 13C                                |
|-------------------------|--|------------------------------------|---|---|---|--|---|----------------------|------------------------------------|------------------------------|------------------------------|---------------------|-----------------------------|-------------------------|-------------------|---------------------------------------|----------------------------------|------------------------------------|
| <b>WV Project Name</b>  | 2003 WV Statewide Addressing & Mapping Board | 2004 FEMA Lidar: Gilmer County, WV | 2009 Cabell County, WV Lidar  | 2009 Marion County, WV Lidar  | 2009 USACE Lidar: Bluestone Lake and Downstream, WV | 2010 - 2011 WVDEP DMR/Coal Fields Lidar Project  | 2012 FEMA R3 WV-VA-MD (Jefferson, Berkeley, Morgan)   | 2016 FEMA R3 WV East | 2016 FEMA R3 WV-East Elk-River-AOI | 2016-17 FEMA R3 WV Northeast | 2016-17 FEMA R3 VA Southwest | 2017 WVU Lidar      | 2018 Logan County, WV Lidar | 2017 FEMA Mercer County | 2018 FEMA WV West | FEMA 2018-19 Tucker-Randolph Counties | FEMA 2018-19 Wirt-Roane Counties | FEMA 2018-19 Mason-Putnam Counties |
| <b>Source</b>           | SAMS   | FEMA                               | Cabell  | Marion  | USACE   | WVDEP  | FEMA  | FEMA                 | FEMA                               | FEMA                         | FEMA                         | WVU                 | Logan                       | FEMA                    | FEMA              | FEMA                                  | FEMA                             | FEMA                               |
| <b>Year</b>             | 2003   | 2004                               | 2009  | 2009  | 2009  | 2010-11  | 2012  | 2016                 | 2016                               | 2016-17                      | 2016-17                      | 2017                | 2018                        | 2017                    | 2018              | 2018-19                               | 2018-19                          | 2018-19                            |
| <b>Start Date</b>       | 2003   | 03/25/04                           | 03/18/09  | 02/13/09  | 04/2009   | 4/9/2010   | 01/29/12  | 11/22/16             | 11/22/16                           | 11/04/16                     | 11/04/16                     | 2017                | 2018                        | 12/4/2017               | 04/11/2018        | 11/8/2018                             | 11/8/2018                        | 11/8/2018                          |
| <b>End Date</b>         |  | 04/07/04                           | Mar 22, 2009  |   |   | 12/13/2011   | 04/26/12  | 12/28/16             | 12/28/16                           | 04/27/17                     | 04/27/17                     | 2017                | 2018                        | 12/6/2017               | 05/24/2018        | 5/5/2019                              | 5/5/2019                         | 5/5/2019                           |
| <b>Tile Extent</b>      |  |                                    | 2,500m x 2,500m   |   |   | 1,500m x 1,500m  | 1,500m x 1,500m   | 1,500m x 1,500m      | 1,500m x 1,500m                    | 1,500m x 1,500m              | 1,500m x 1,500m              | 2,500 ft x 2,500 ft | 2,962 ft x 2,962 ft         | 1,500m x 1,500m         | 1,500m x 1,500m   | 1,000m x 1,000m                       | 1,000m x 1,000m                  | 1,000m x 1,000m                    |
| <b># Tiles</b>          |  | 4,346                              | 1,741 (63.1 GB)   |   | 433   |  | 1,023 (29.8GB)  | 4133 (300GB)         | 187 (13GB)                         | 3,242 (579GB)                | 74 (8.70GB)                  | 102 (1.36GB)        | 1,577 (51.6GB)              | 538 (4.69GB)            | 1,535 (13.4GB)    | 5,115 (24.8GB)                        | 2,270 (11GB)                     | 1,760 (8.48GB)                     |
| <b>DEM/LAS Download</b> | WVGISTC                                      | WVGISTC                            | TNM   | None  | WVGISTC   | WVDEP  | TNM   | TNM                  | TNM                                | TNM                          | TNM                          | WVGISTC             | WVGISTC                     | WVGISTC                 | WVGISTC           | WVGISTC                               | WVGISTC                          | WVGISTC                            |
| <b>Notes</b>            | Statewide coverage                           |                                    | Part of 2008 NGA Urban Area, USGS Partnership. Project name in The National Map: WV_CABELLCO_2009 | Originally delivered to Marion County by CVI in 2009; recreated with permission for WVDEP in 2011 | USACE-Huntington District; ARRA project             | Data was flown and .LAS files produced by West Virginia University's Natural Resources Analysis Center for the West Virginia Department of Environmental Protection's Division of Mining and Reclamation. Clean .LAS files were provided to WVView ( <a href="http://www.wvview.org/">http://www.wvview.org/</a> ) | Covered by multiple projects in The National Map: VA-WV- MD_FEMA_REGION 3_UTM18_2012, VA-WV- MD_FEMA_REGION 3_UTM17_2012, and VA_LOUDOUNCO_2012 | FEMA R3 GPSC         | FEMA R3 GPSC                       | USGS GPSC                    | USGS GPSC                    | No metadata         | No metadata                 | USGS GPSC               | USGS GPSC         | USGS GPSC                             | USGS GPSC                        | USGS GPSC                          |

Notes:

- (1) All the datums for the ground elevation data are NAVD 88 (vertical) and NAD83 (horizontal)
- (2) The WVDEP fused the different elevation sources into a 3-meter resolution elevation grid for Coal Fields project.
- (3) Elevation source information compiled from the NOAA U.S. Interagency Elevation Inventory (<https://coast.noaa.gov/inventory/>) and project metadata.
- (4) Lidar files and derived products can be downloaded from USGS' The National Map (<https://viewer.nationalmap.gov/basic/>) and the WV LIDAR LAS File Download Tool (<http://data.wvgis.wvu.edu/elevation/>).

# Elevation Sources for WV LiDAR

## Photogrammetric-Derived DEM

- (1) 2003 WV Statewide Addressing & Mapping Board

## LiDAR-Derived DEM

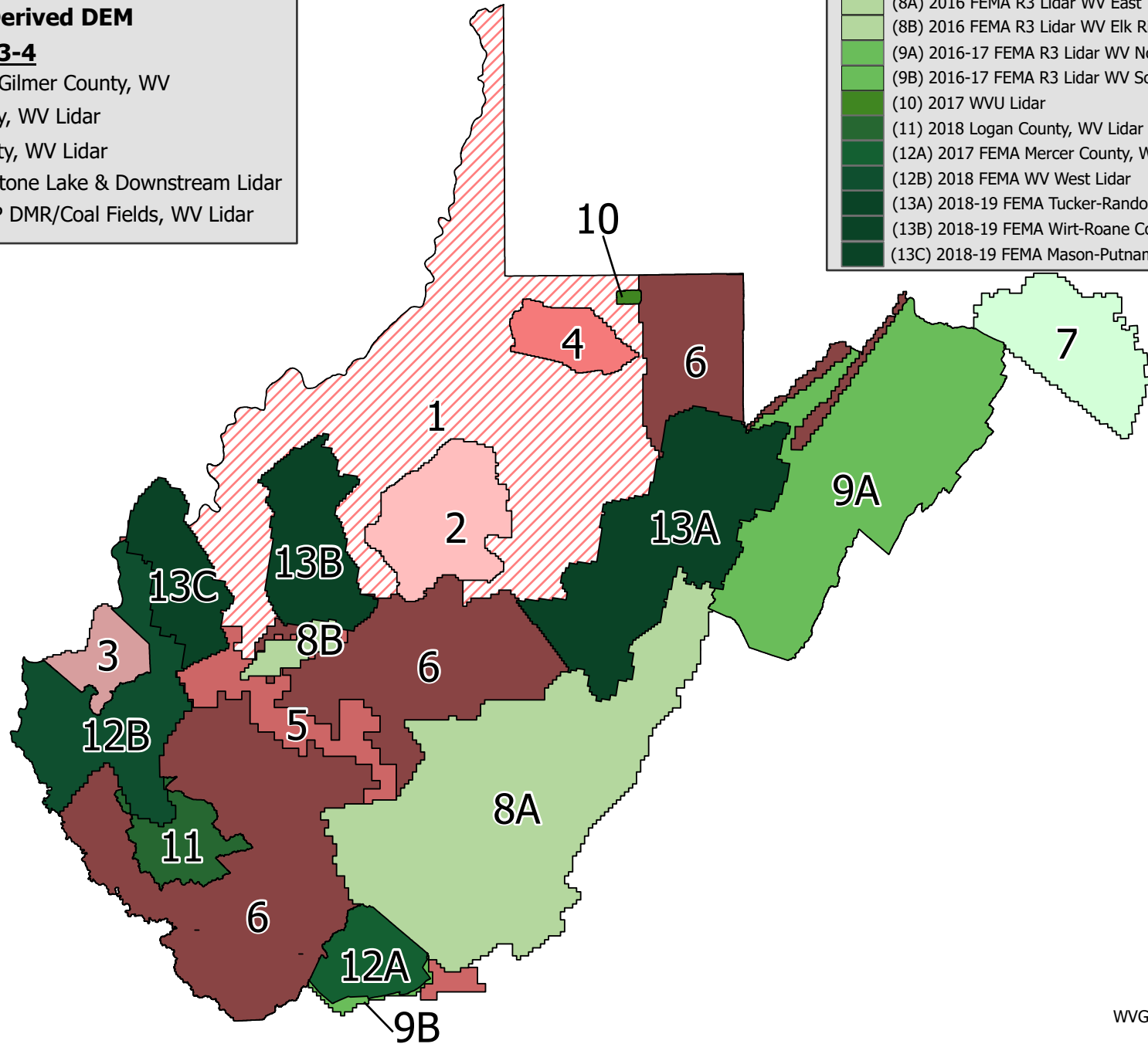
### QL 3-4

- (2) 2004 FEMA Lidar: Gilmer County, WV
- (3) 2009 Cabell County, WV Lidar
- (4) 2009 Marion County, WV Lidar
- (5) 2009 USACE Bluestone Lake & Downstream Lidar
- (6) 2010-2011 WVDEP DMR/Coal Fields, WV Lidar

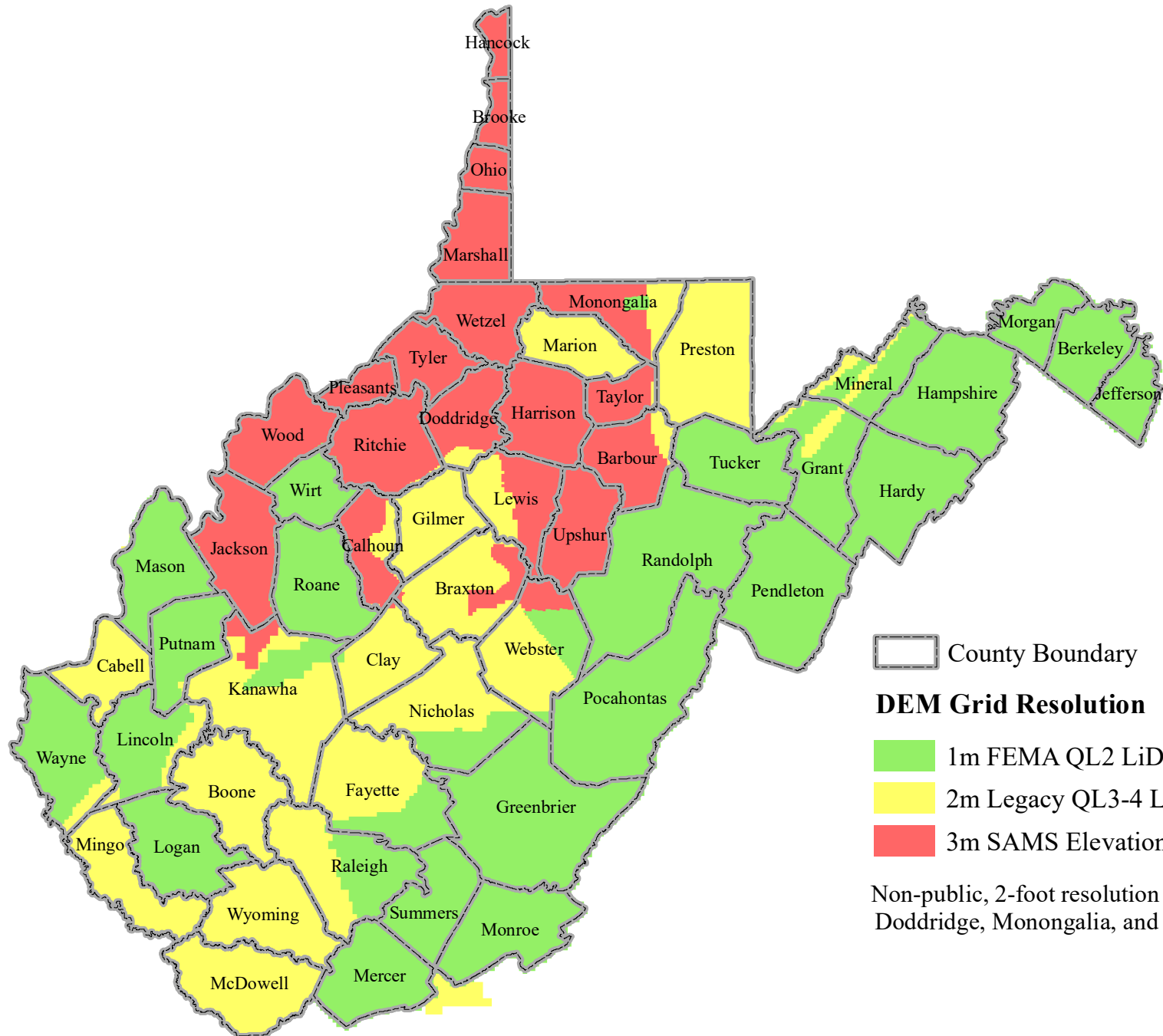
## LiDAR-Derived DEM


### QL 2

- (7) 2012 FEMA Jefferson, Berkeley & Morgan Lidar
- (8A) 2016 FEMA R3 Lidar WV East
- (8B) 2016 FEMA R3 Lidar WV Elk River
- (9A) 2016-17 FEMA R3 Lidar WV Northeast
- (9B) 2016-17 FEMA R3 Lidar WV Southwest
- (10) 2017 WVU Lidar
- (11) 2018 Logan County, WV Lidar
- (12A) 2017 FEMA Mercer County, WV Lidar
- (12B) 2018 FEMA WV West Lidar
- (13A) 2018-19 FEMA Tucker-Randolph Counties
- (13B) 2018-19 FEMA Wirt-Roane Counties
- (13C) 2018-19 FEMA Mason-Putnam Counties






# DEM Grid Resolution



 County Boundary

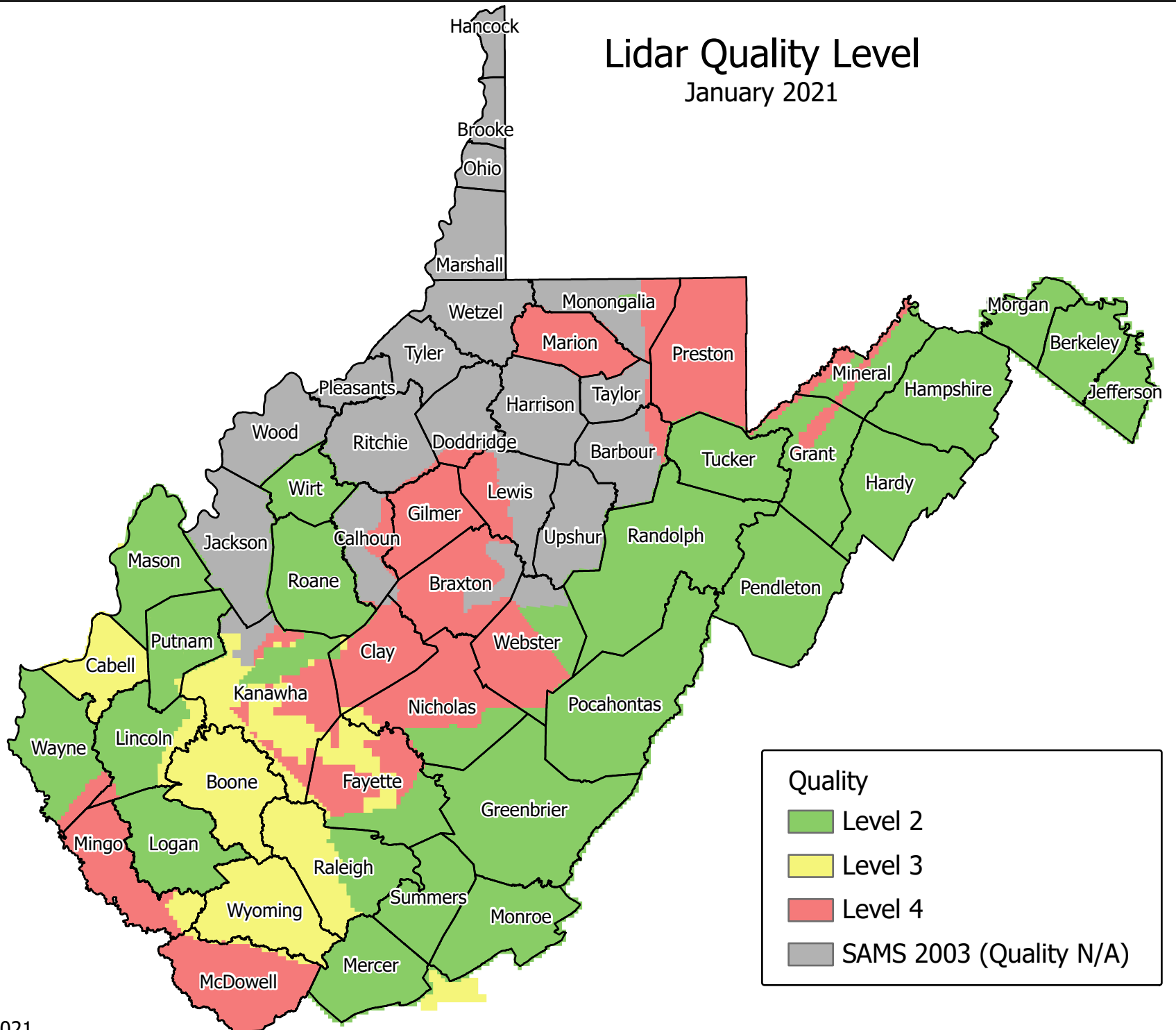
### DEM Grid Resolution

-  1m FEMA QL2 LiDAR
-  2m Legacy QL3-4 LiDAR
-  3m SAMS Elevation (2003)

Non-public, 2-foot resolution DEMs exist for Doddridge, Monongalia, and Ohio Counties.

# Lidar Quality Level

January 2021



**Quality**

- Level 2
- Level 3
- Level 4
- SAMS 2003 (Quality N/A)