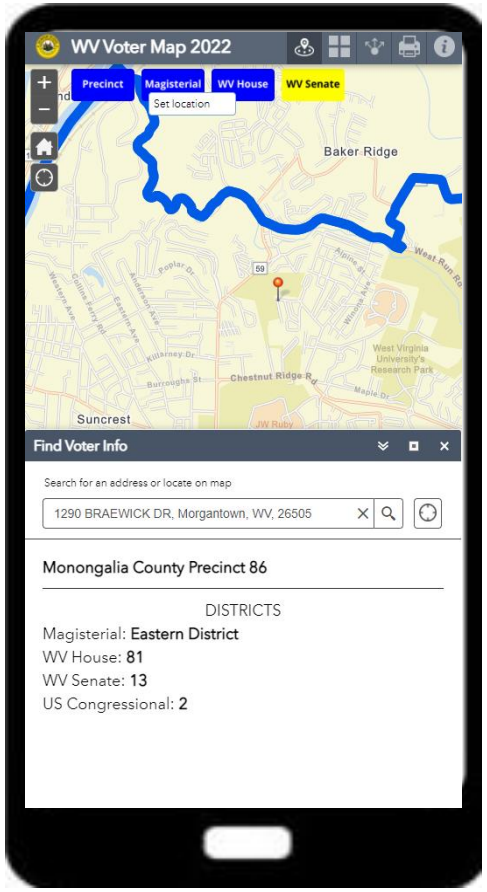
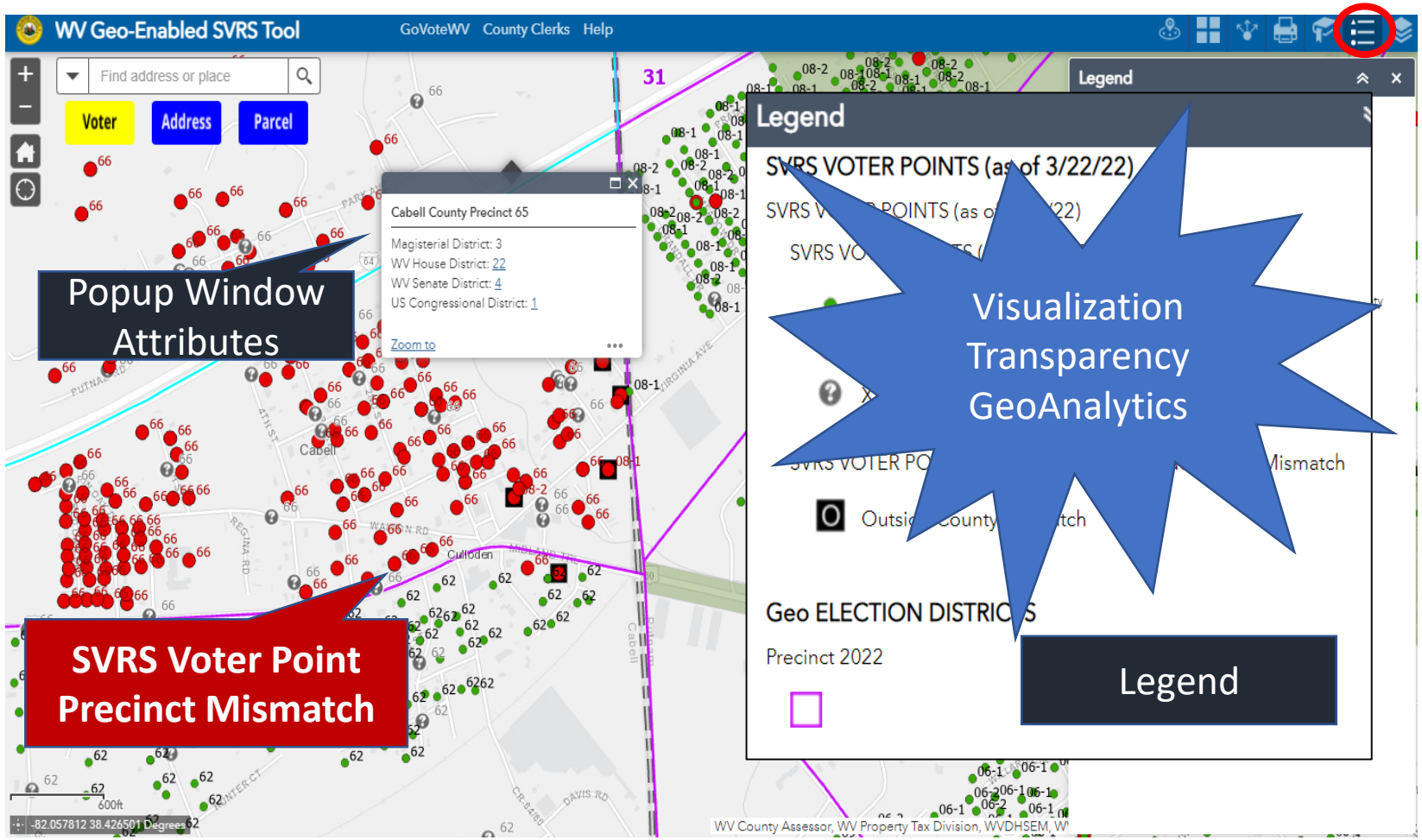
WV Geo-Enabled Elections

9/5/2023

RAISING ELECTION Accuracy and Efficiency with GIS Tools





Kurt Donaldson, Manager, WV GIS Technical Center, West Virginia University, kdonalds@wvu.edu, 304-293-9467

GIS in Elections Pilot Study

PILOT STUDY STATES

Kentucky
Kent Anness, Kim Anness, Jared Dearing

Minnesota
David Maeda, Brad Neuhauser, Dan Ross, Emily Ruetz, Alison Slaats

Nebraska
Michelle Andahl, Wayne Bena, Heather Doxon, Eric Herbert, Nikki Lampe, Angie Nelson, John Watermolen

Pennsylvania
Mary Fulton, Michael Moser

West Virginia
Tony Simental, David Tackett, Brittany Westfall

CASE STUDY STATES

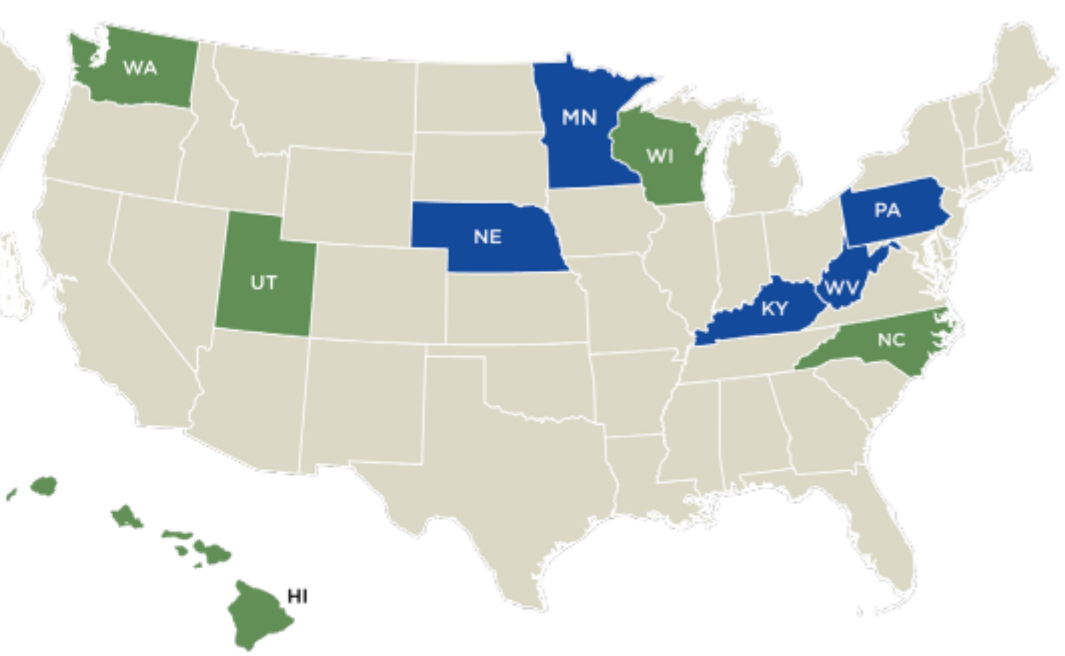
Hawaii
Marc Arakawa

North Carolina
Ballingam Chepuri, Michael Chuang, Veronica Degraffenreid

Utah
Justin Lee

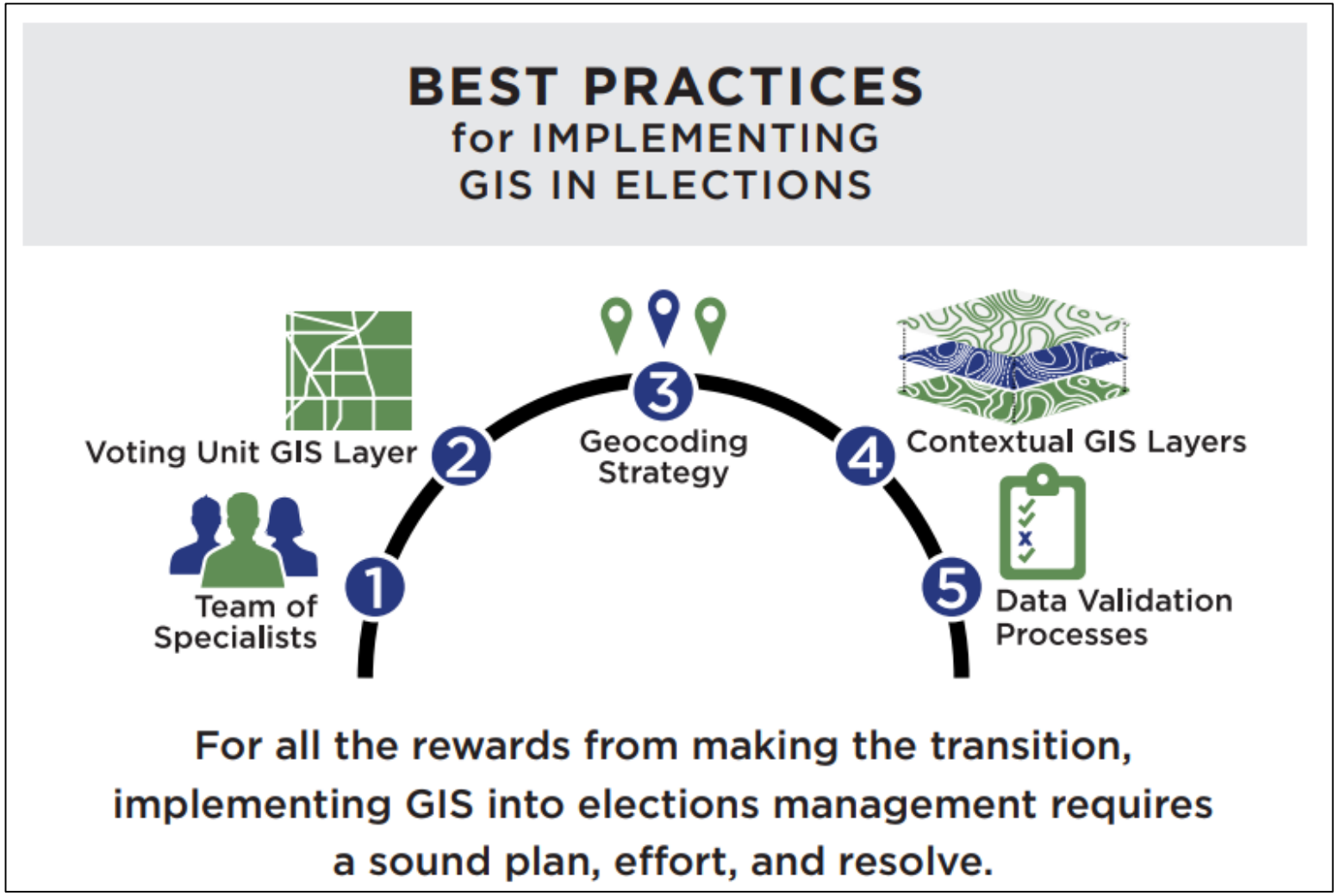
Washington
Lori Augino, Stuart Holmes

Wisconsin
Greg Grube, Sarah Whitt



In March 2019, West Virginia joined five others states in a pilot study sponsored by NSGIC to further the use of GIS in elections and to publish best practices

5 Best Practices for GIS in Elections



In September 2019, NSGIC published five **best practices** for geo-enabled elections.

Integrating GIS with the Statewide Voter Registration System (SVRS) allows for the *visualization*, *geoanalytics*, and *transparency* of voter data.

1. Convene a Team of Specialists

In September 2021, the State GIS Coordinator and Secretary of State's Office contacted the **WV GIS Technical Center** for GIS support in **Redistricting**

The West Virginia GIS Technical Center, located at West Virginia University, provides coordination and technical support in the development and operations of GIS in West Virginia.

- Established by Executive Order 4-93 in 1993
- Six full-time staff
- Funded by service agreements, external grants, and from the state-appropriated Mineral Lands Mapping Program*

* Fund 0253, Activity 207 approved under House Bill 2222 in February 1995

2. Statewide Voting Unit GIS Layer

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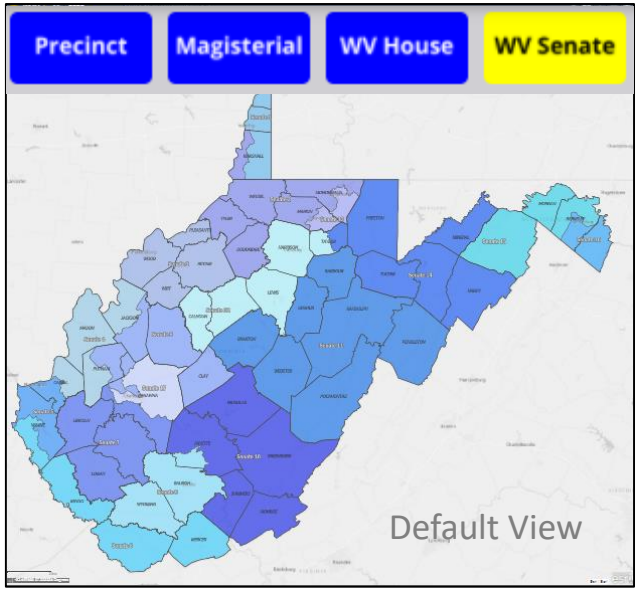
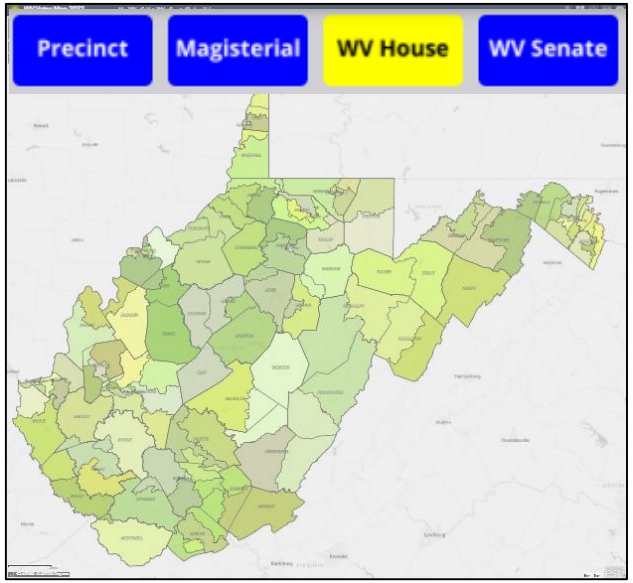
COLLECT & SUSTAIN A STATEWIDE VOTING UNIT GIS LAYER

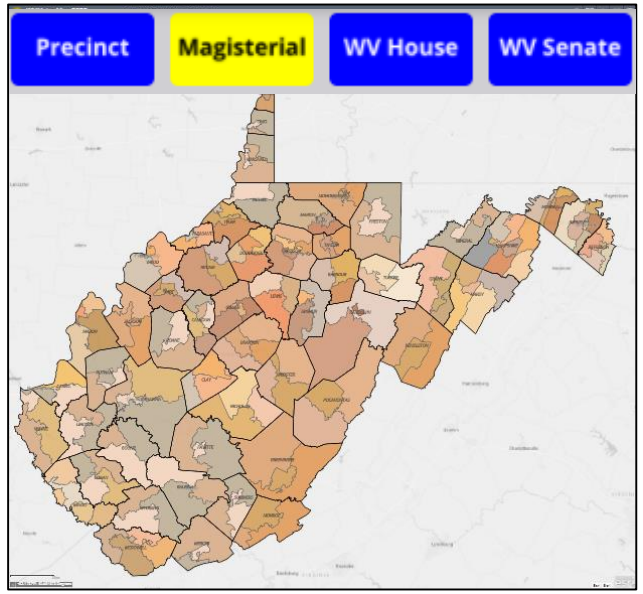
17 **WV Senate Districts**



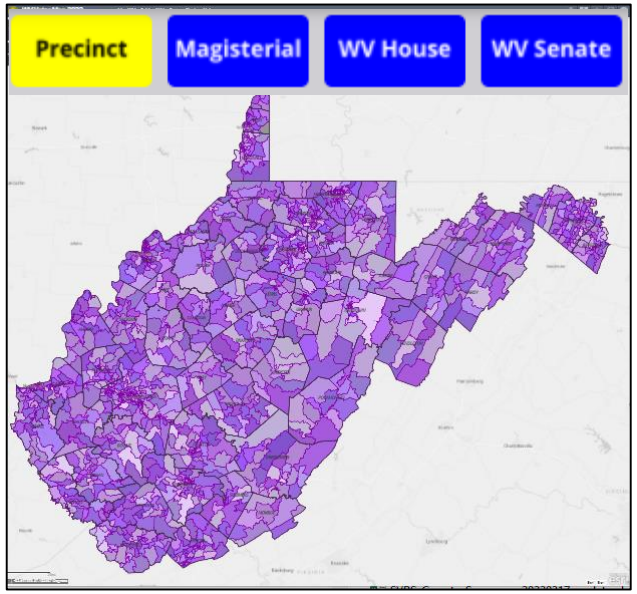
100 **WV House Districts**



195 **Magisterial Districts**

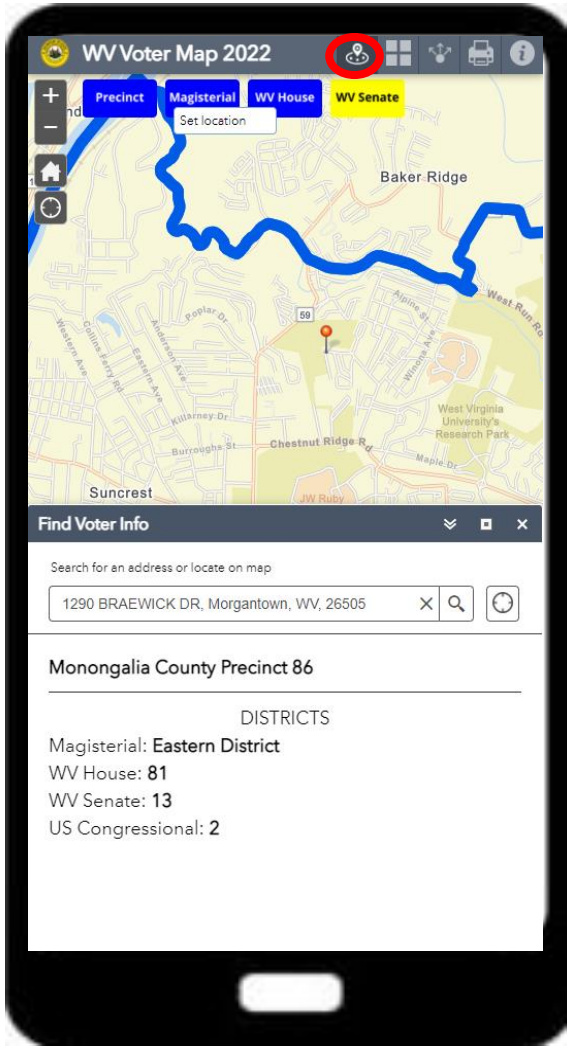


1,677 **Voting Precincts**



Interactive WV Voter Map 2022 (Public)

In March 2022, an interactive map to help voters identify new voting districts and precincts was announced for the May Primary Election



WV Voter Map Version	URL	Election Voting Districts	Links to Elected Officials	Sample Ballot	Poll Site Direct-ions
Find Voter Info	www.mapwv.gov/vote	Yes	Yes		
Election Early Voting	www.mapwv.gov/vote/ev	Yes		Yes	
Election Day	www.mapwv.gov/vote/poll	Yes		Yes	Yes

On the Primary Election Day of May 10 in West Virginia, the state's best-known broadcaster Hoppy Kercheval commented:

"The Secretary of State's Office has a helpful interactive website with lots of voter information. Just go to https://www.mapwv.gov/vote/ enter your address and it will tell you your polling location and have links to sample ballots."

3. Geocoding Strategy

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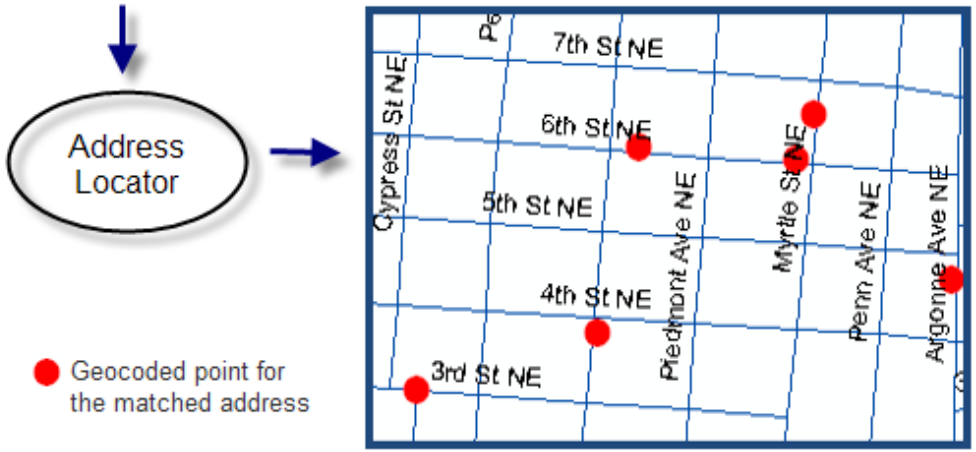
IMPLEMENT A STATEWIDE GEOCODING STRATEGY

customers

NAME	ADDRESS	CITY	S
Ace Market	1171 PIEDMONT AVE NE	ATLANTA	G
Andrew's Gasoline	1670 W PEACHTREE ST NE	ATLANTA	
AP Supermarket	4505 BEVERLY RD NE		G
Atlanta Market	241 16TH ST NW	ATLANTA	G



Geocoding, or address matching, is the computational process by which a physical address is converted into geographic coordinates.

Address Accuracy and Standardization Issues

Valid city-style addresses based on E-911 authoritative data need to be entered in the **Statewide Voter Registration System** (SVRS) to be successfully geocoded

INVALID ADDRESSES

Rural Route addresses like RT 14 BEN CREEK STAT RD BEN CK STAT RD, GILBERT, WV 25621

PO Box addresses like BOX 206-A, BAISDEN, WV 25608

General Delivery addresses like GENERAL DELIVERY, DINGESS, WV 25671

Highway Contract addresses like HC 70 BOX 520, LENORE, WV 25676

No House Numbers like CHATTAROY HOLLOW LILLY ADDITION LOT 58, CHATTAROY, WV 25667

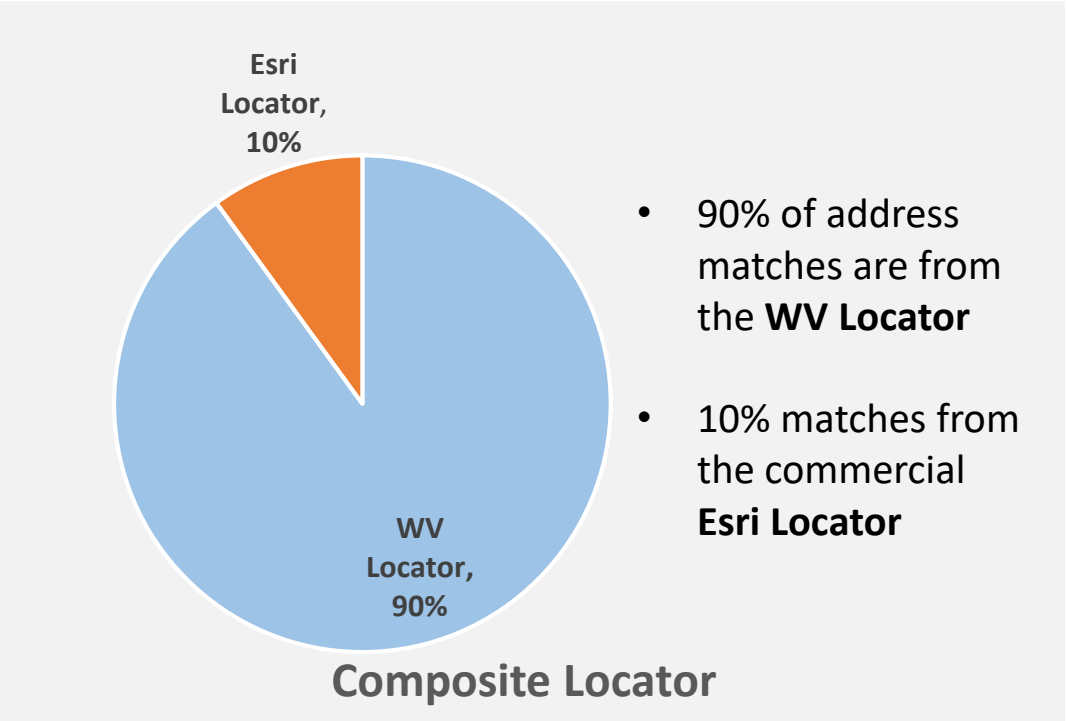
Descriptive addresses like BELOW FOOTBALL FIELD, GILBERT, WV 25621 or ABOVE POST OFFICE, RAGLAND, WV

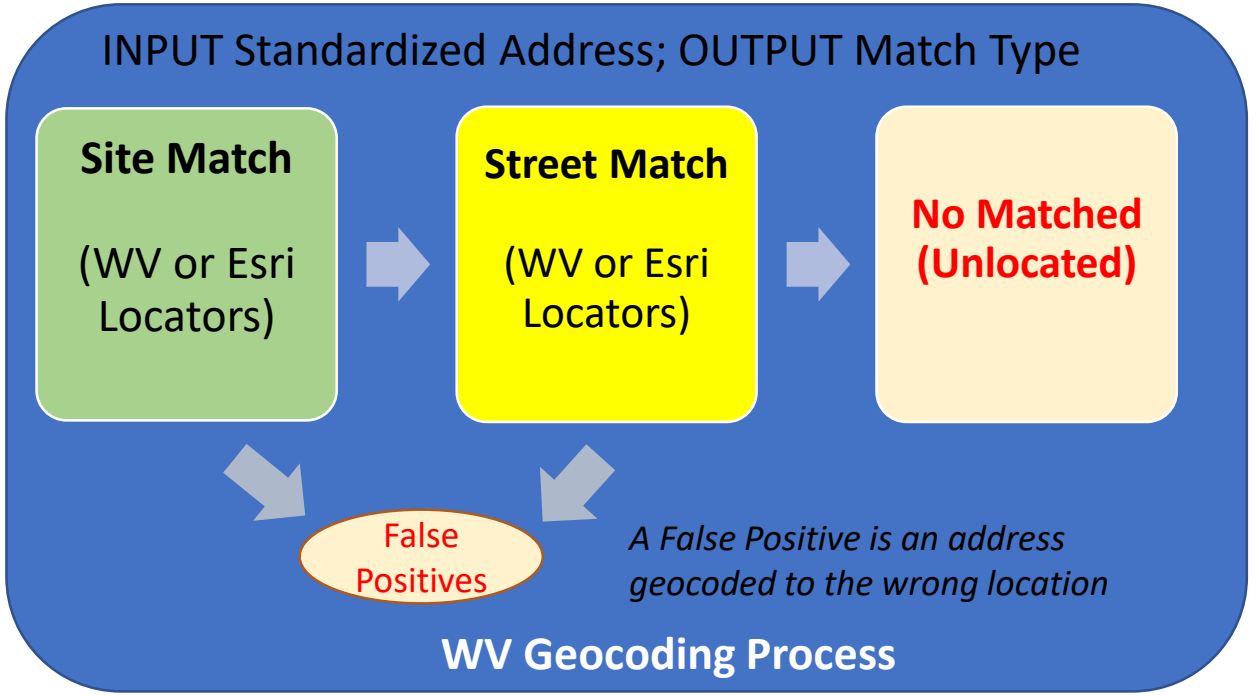
Incomplete addresses like KERMIT KERMIT, KERMIT, WV 25674 or PIGEON CR PIGEON CREEK

Non-Standardized addresses like MATE CREEK and MATE CRK, or MUNCY HOLLOW and MUNCY HOLLW

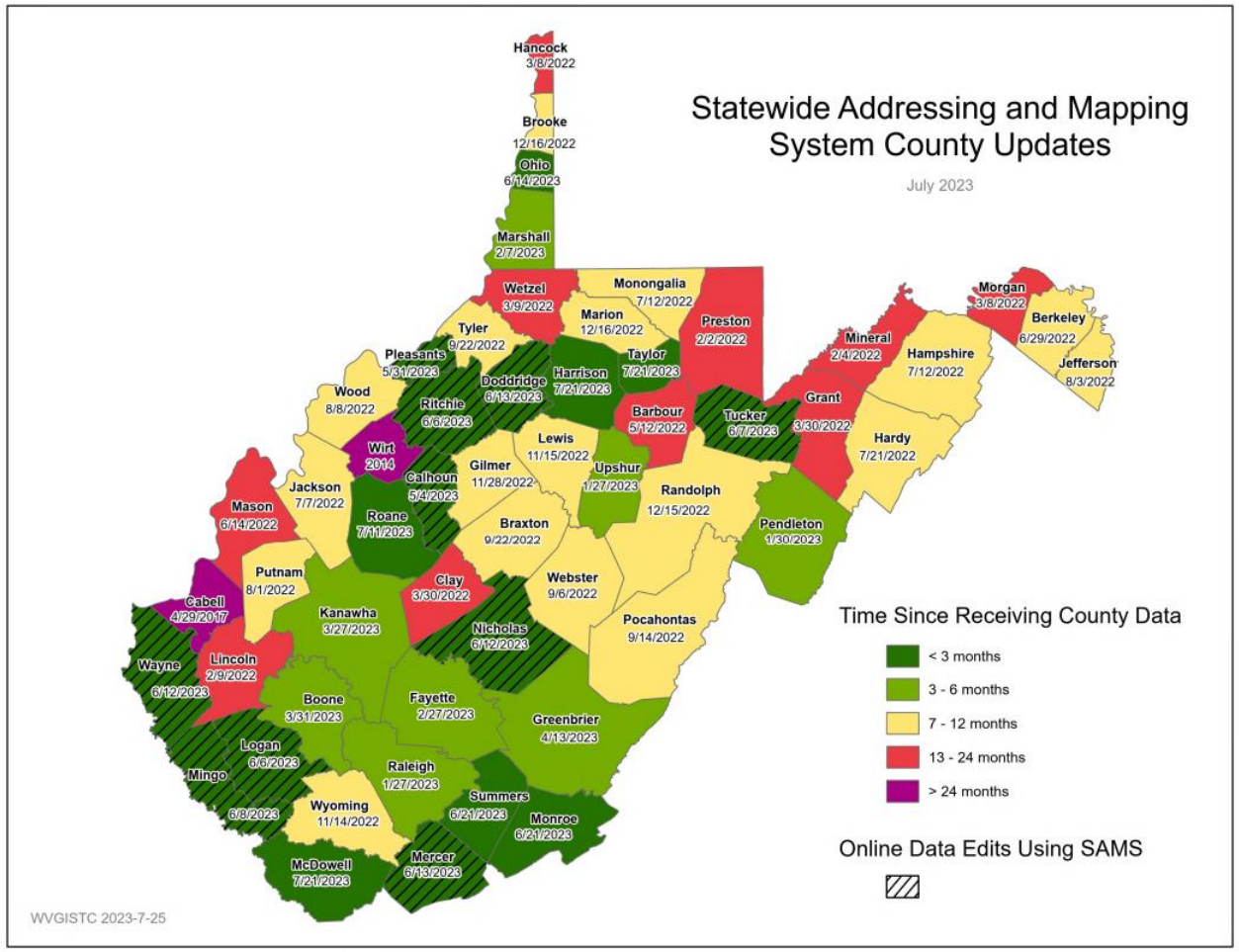
WV Composite Locator

There are approximately 1.0 million addressable structures in West Virginia. A **Composite Locator** is created from public and commercial address layers to geocode 1.1 million voter registration addresses. It is need for both single and bulk geocoding of voter address points.

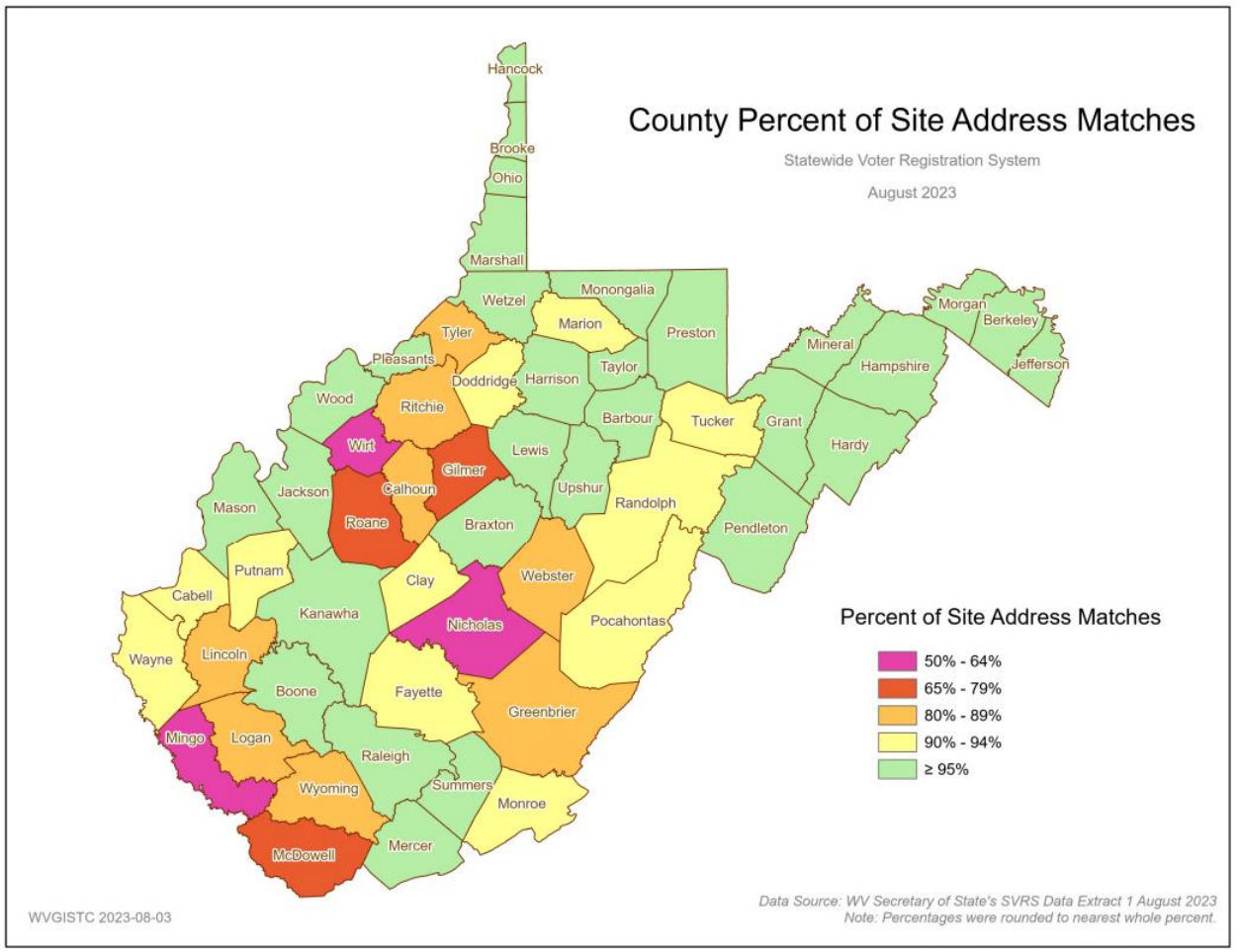




Status Graphics for Addresses



E-911 Office Updates to SAMS



County Site Address Match Rate

4. Contextual GIS Layers

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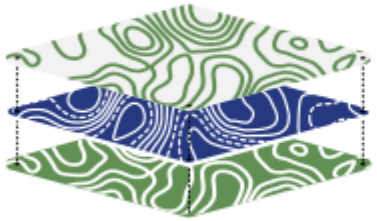
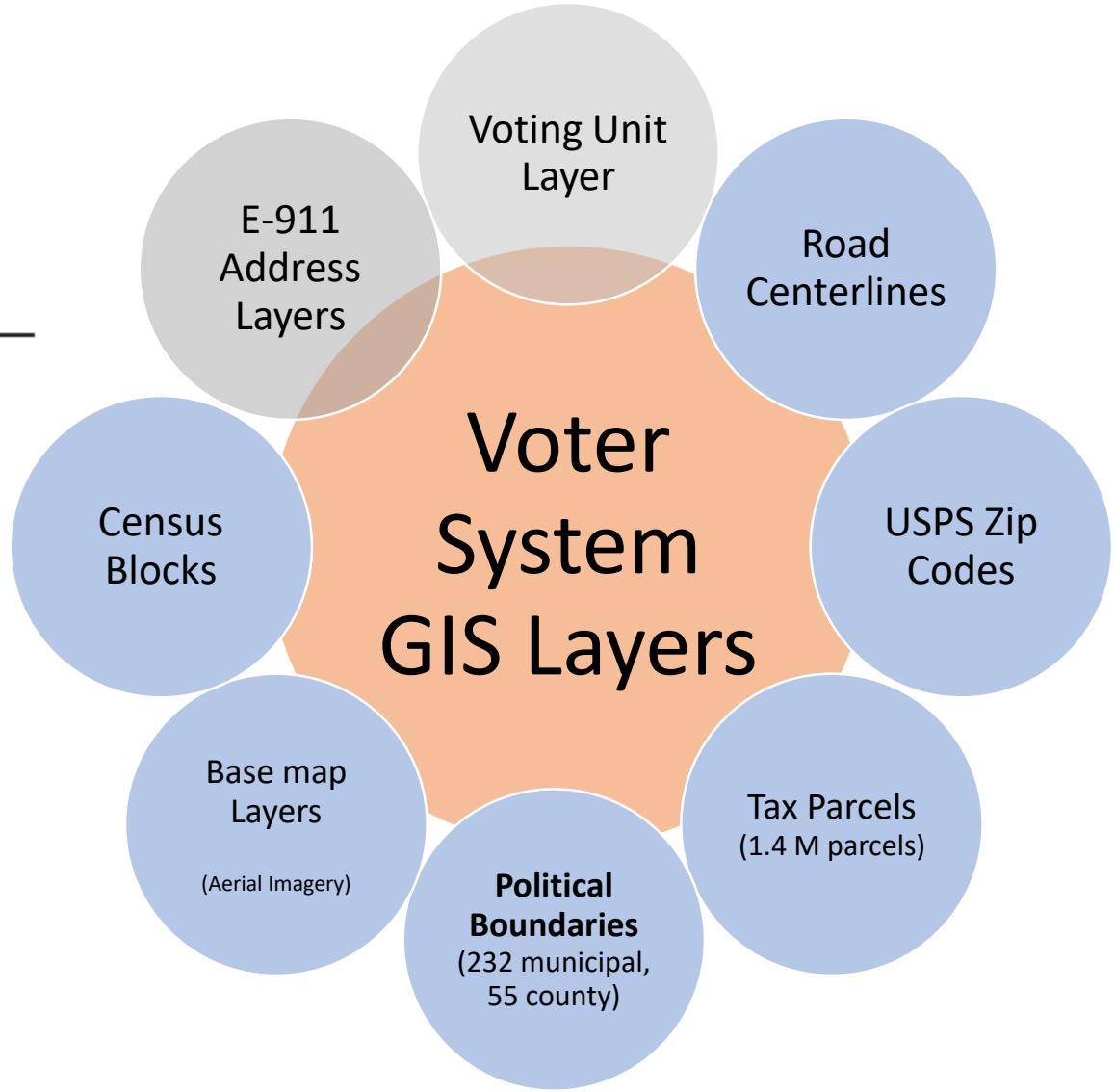


ASSEMBLE BEST AVAILABLE CONTEXTUAL GIS LAYERS

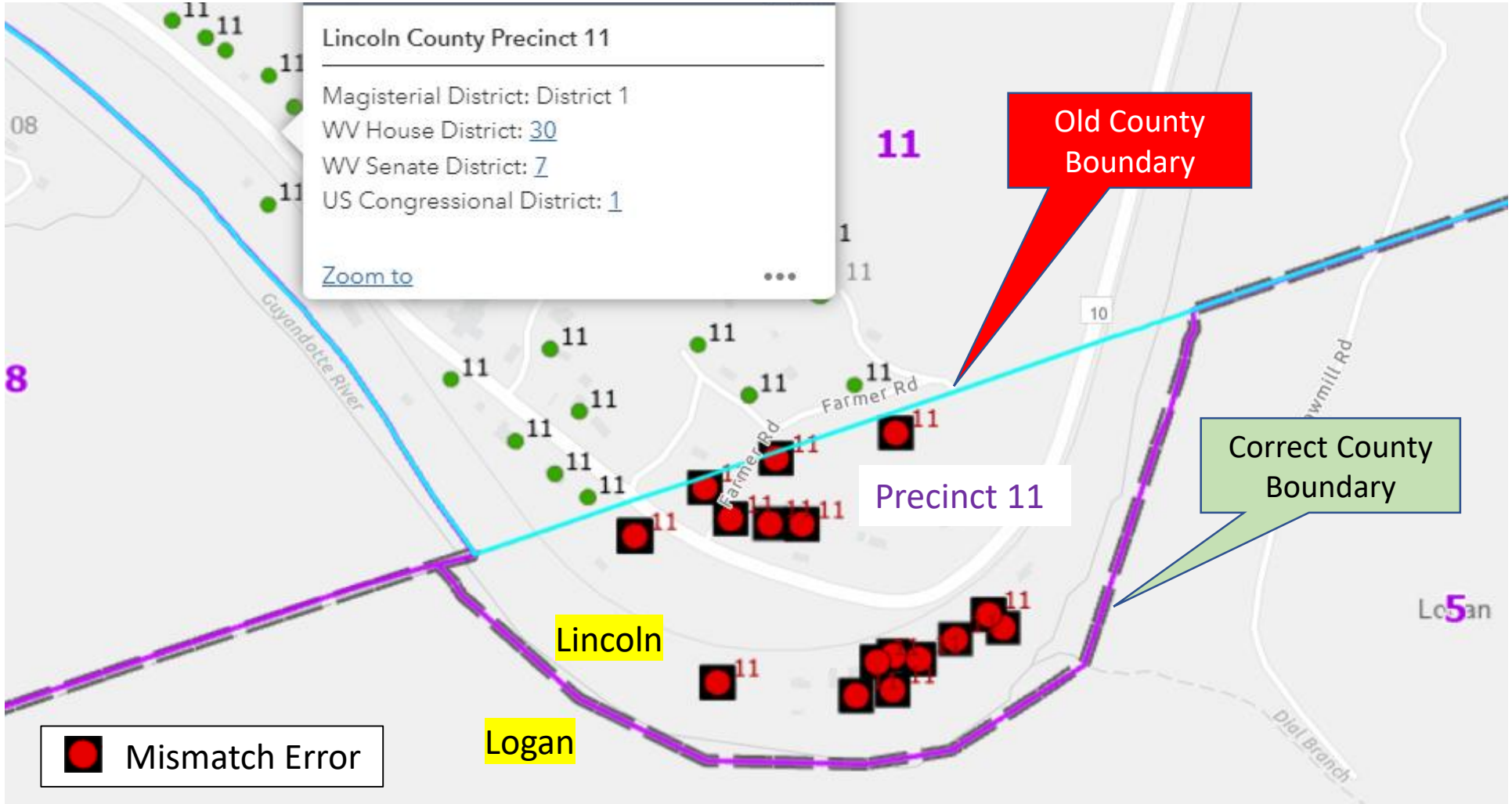
- Reference or **contextual GIS layers** that support Geo-Enabled elections include municipal and county boundaries, tax parcels, and aerial imagery.
- These GIS layers provide *context* for mapping election district boundaries and address locations.
- Support the State's Spatial Data Infrastructure



Political Boundaries (County)

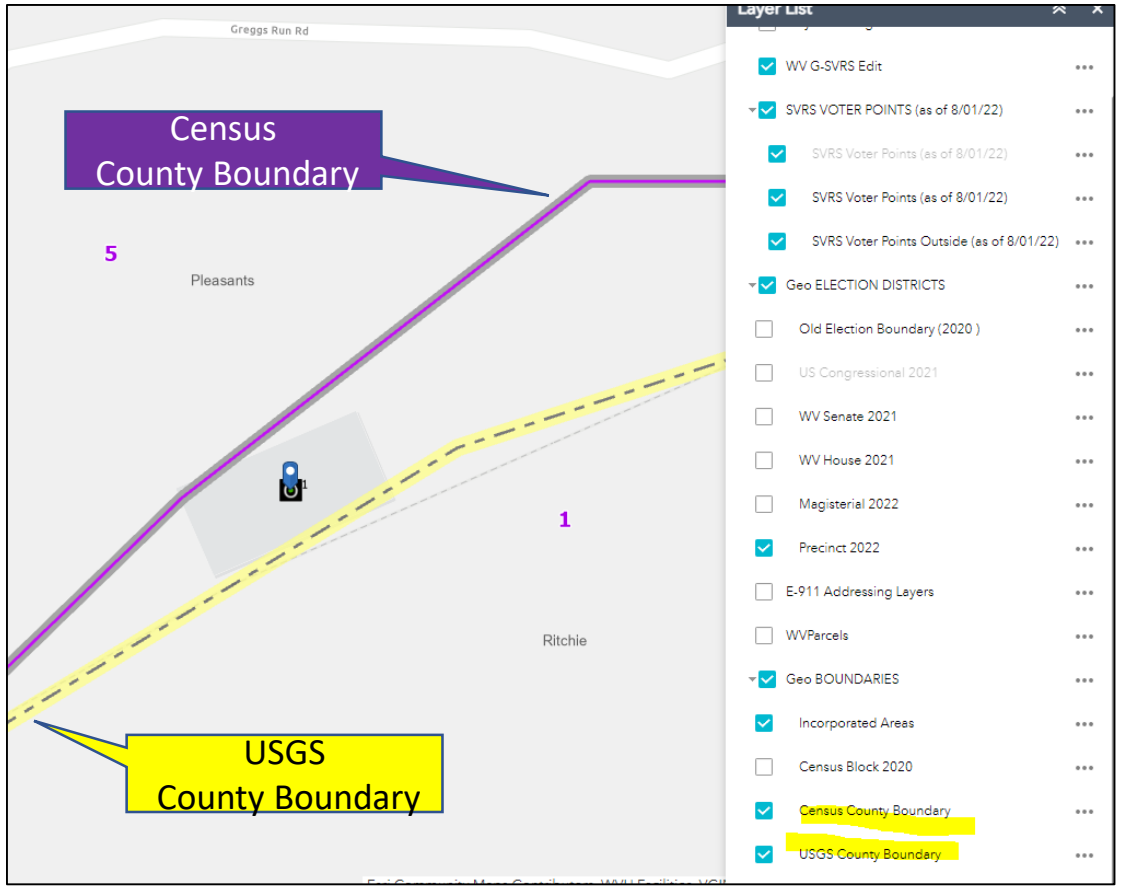
Precinct Mismatch Errors will result if County or Incorporated Place boundaries are incorrect

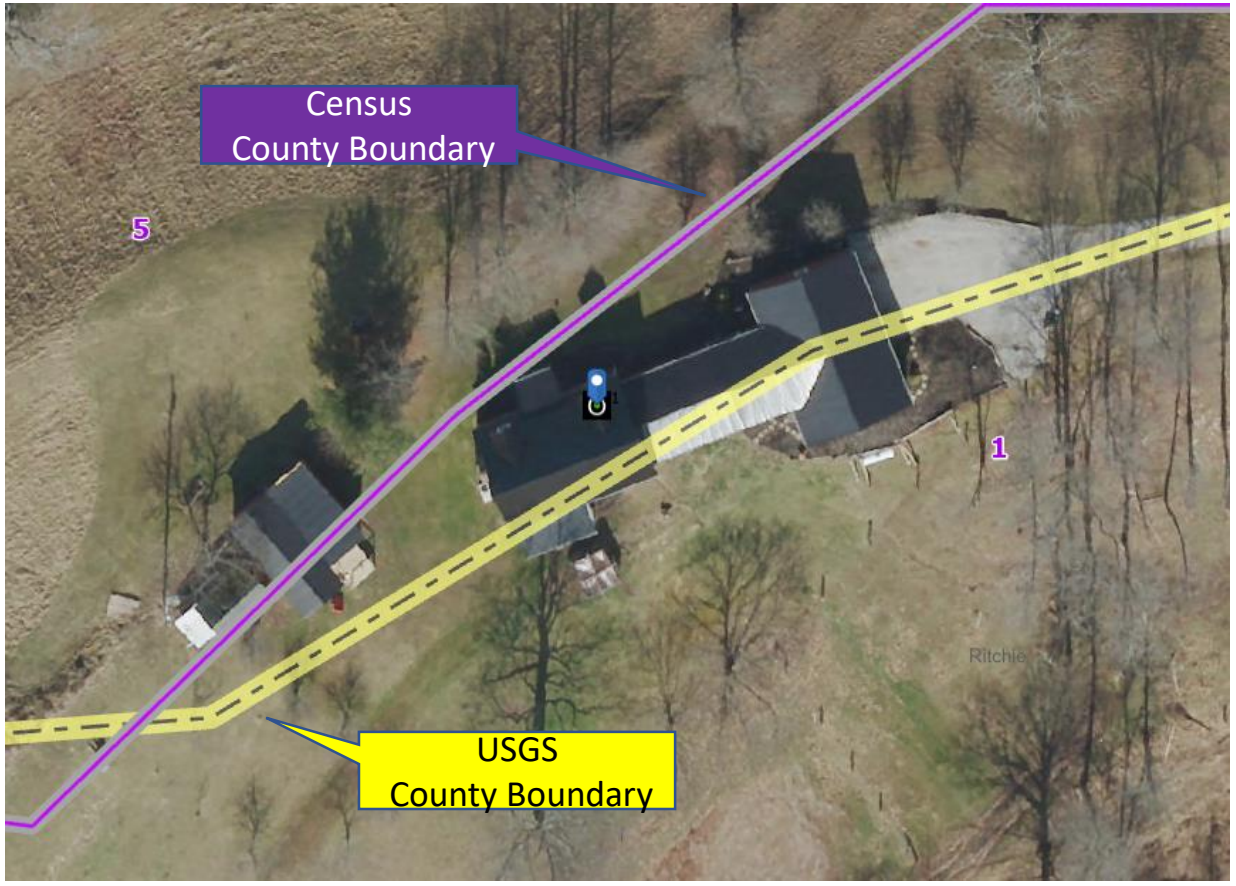
The Lincoln-Logan county boundary changed by the 2020 BAS was not correct for the 3/22/2022 spatial audit, resulting in mismatch and outside county precinct errors for voter points in Lincoln County Precinct 11. The GIS boundary has been updated in the G-SVRS Tool, so the precinct mismatch errors should be corrected when the next spatial audit is performed.



County Boundary Accuracy Improvement

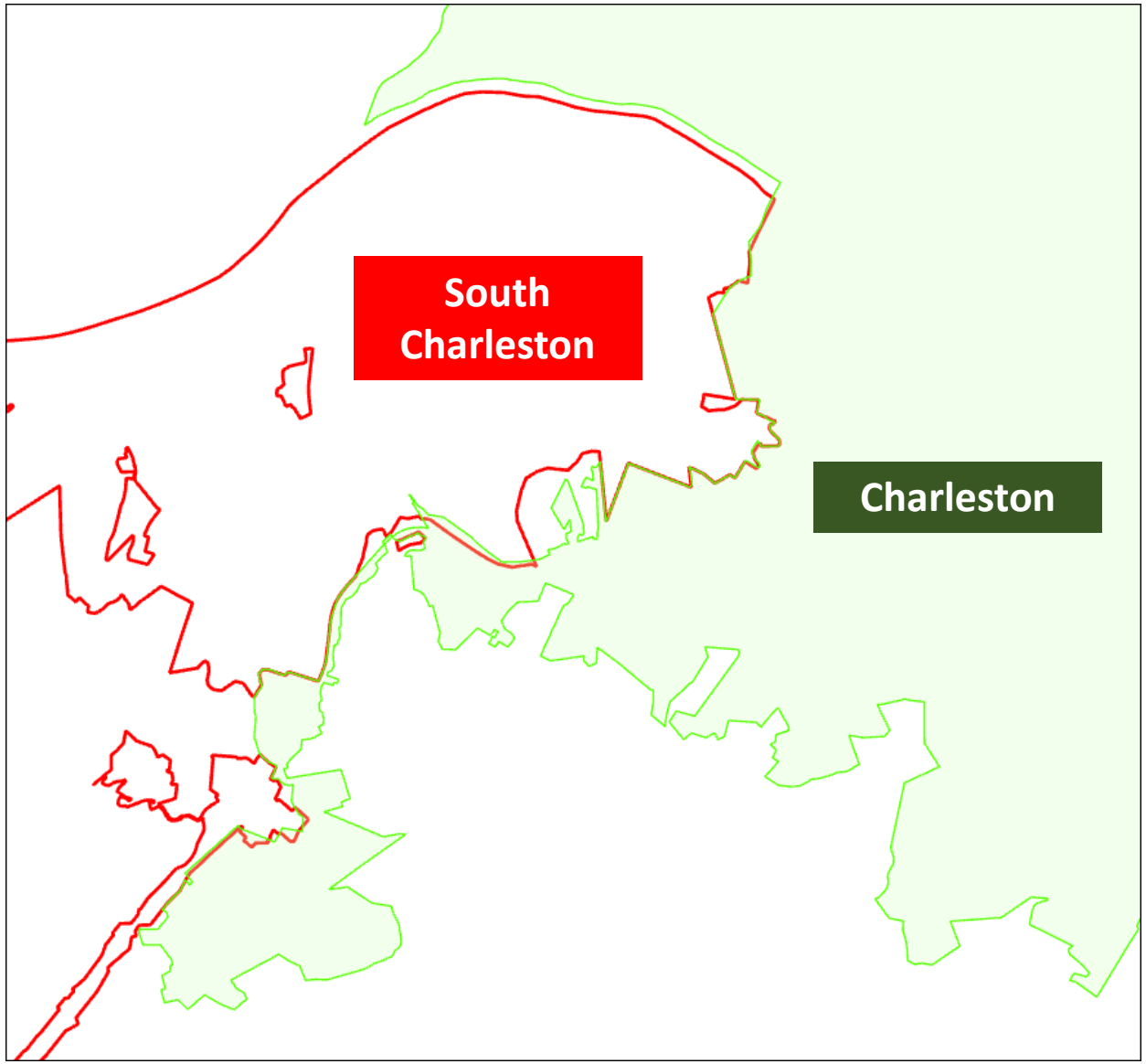
The official county boundaries for West Virginia are the USGS topographic map boundaries plus recent court order updates. West Virginia is coordinating with Census BAS to improve the spatial resolution of county boundaries in West Virginia before the 2030 Census.





Non-coincidental USGS topo and Census boundaries
https://mapwv.gov/svrs/?marker=-81.075303,39.327192&level=20

Political Boundaries (Municipal)

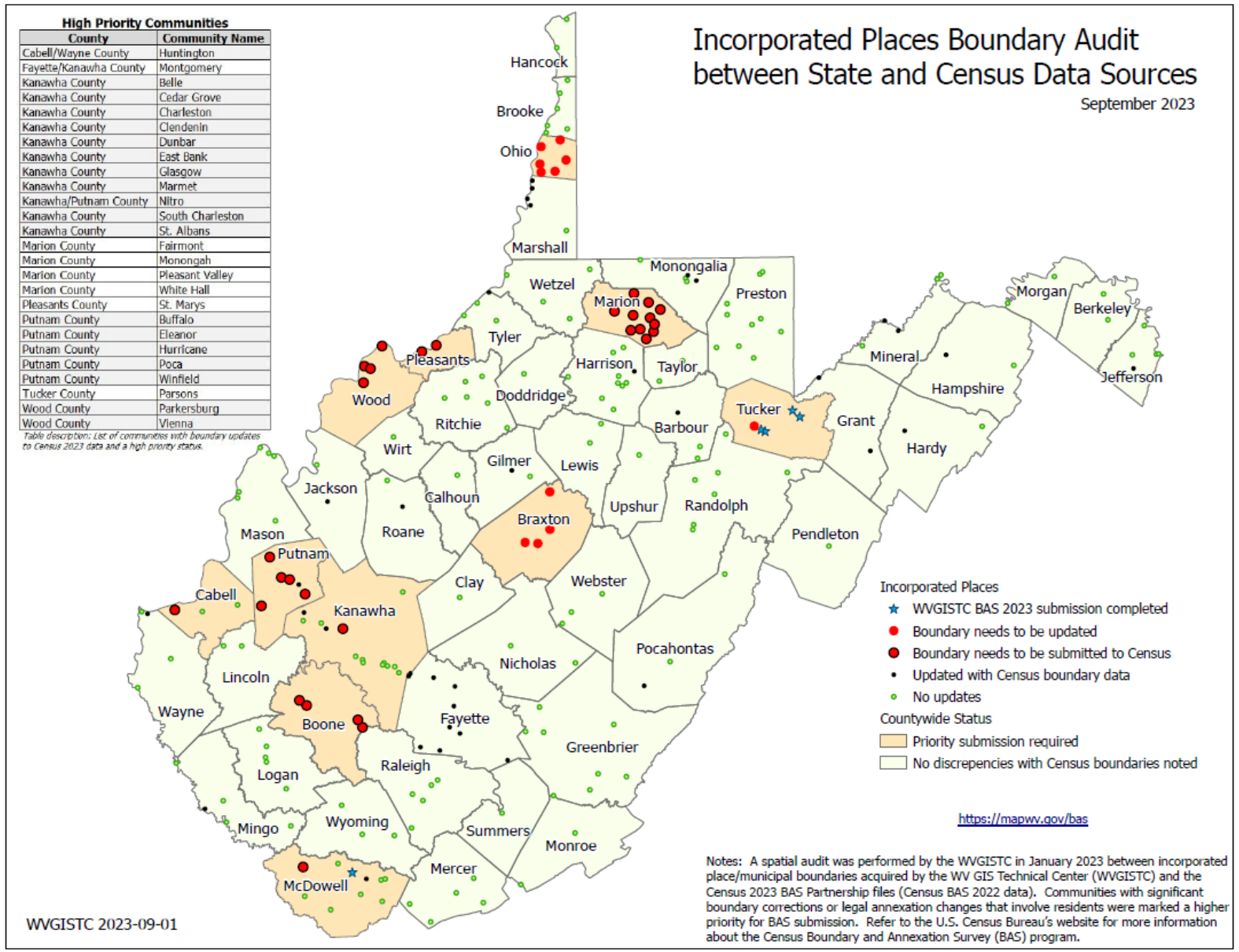


Municipal or Incorporated Place Boundaries

- Incorporated Place boundaries are important for defining **municipal precincts**
- Municipal boundary corrections need to be submitted to the federal geospatial database via **Census BAS** for Charleston and South Charleston which have a shared boundary.
- A tracking log should monitoring progress of pending community BAS submissions

WV BAS Interactive Viewer of Municipal Boundaries from Census and Local Data Source

Municipal Boundary Audit / BAS Tracking



Municipal Boundary audit between Census and local data sources. Boundary changes submitted via Census BAS program.

Topic	Census Resources	State Resources
Review Boundary Data	TIGERweb[1] viewer and guide BAS Partnership Shapefiles[2] PDF BAS maps[3]	WV Incorporated Places Viewer State Municipality GIS File WV BAS Status Graphic WV BAS Audit Table

5. Data Validation Processes

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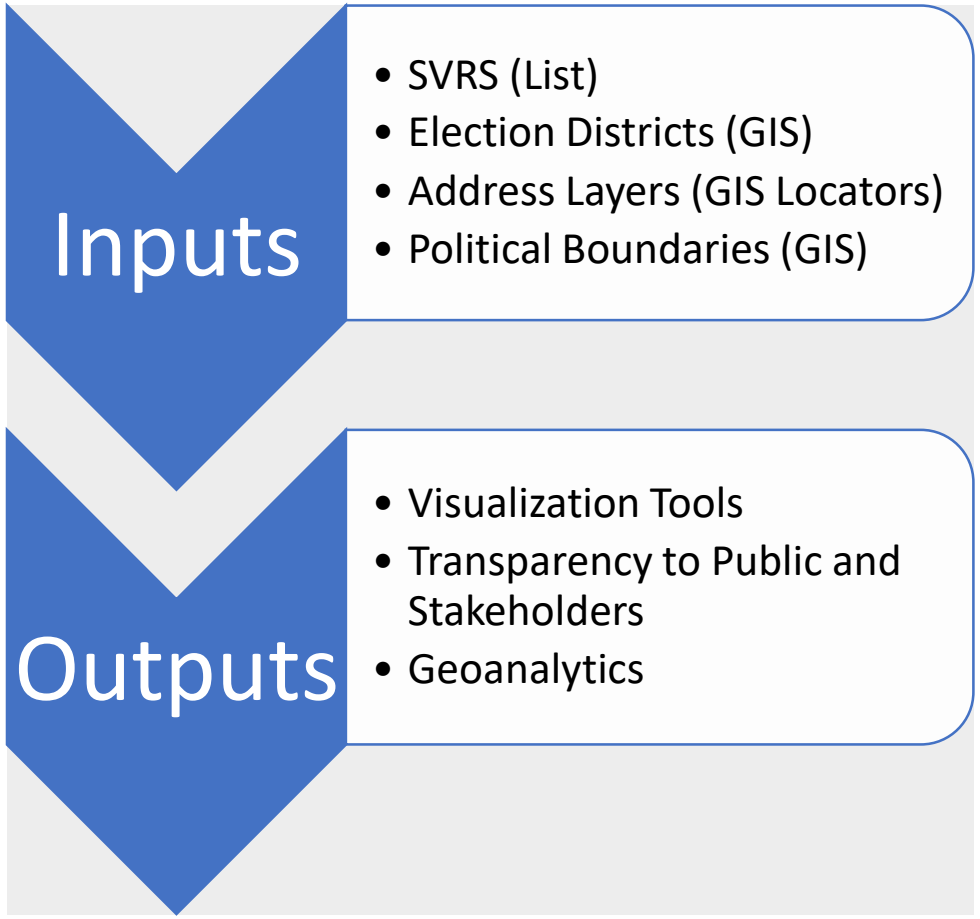
DEFINE & IMPLEMENT DATA VALIDATION PROCESSES

Validating the elections data using geoanalytics provides greater confidence in the elections system to administrators and the public. Monthly systematic audits include:

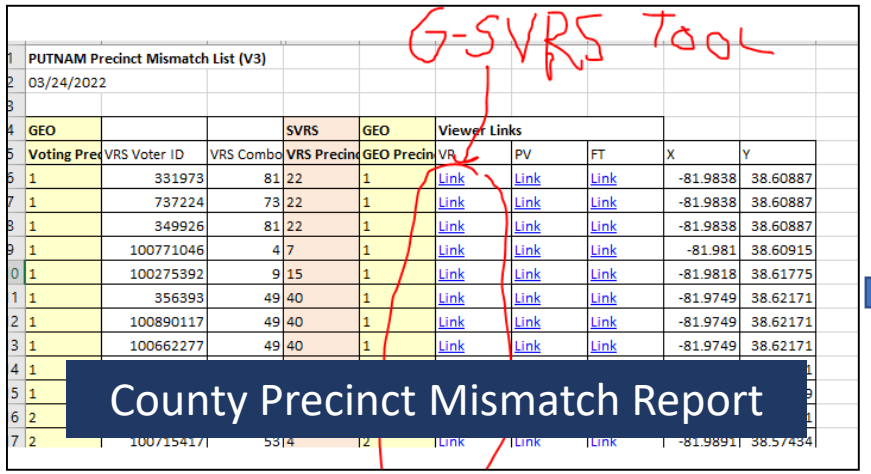
- Verifying mapped voters fall within the correct district
- Address geocoding match rates

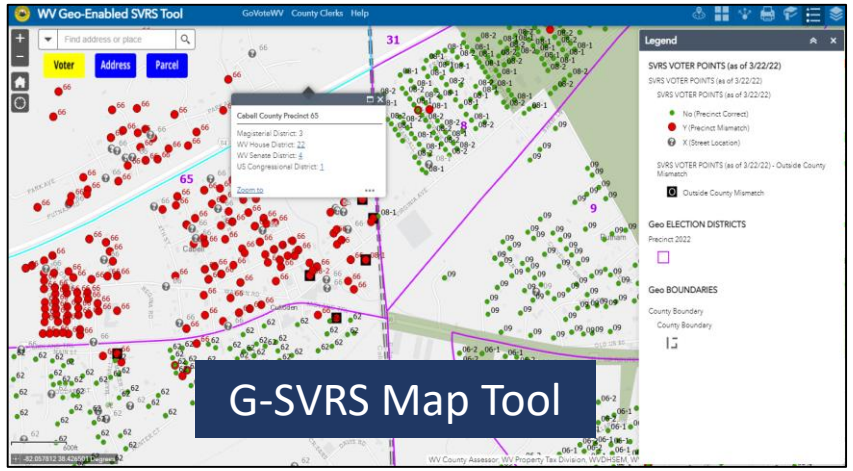


WV GIS Products

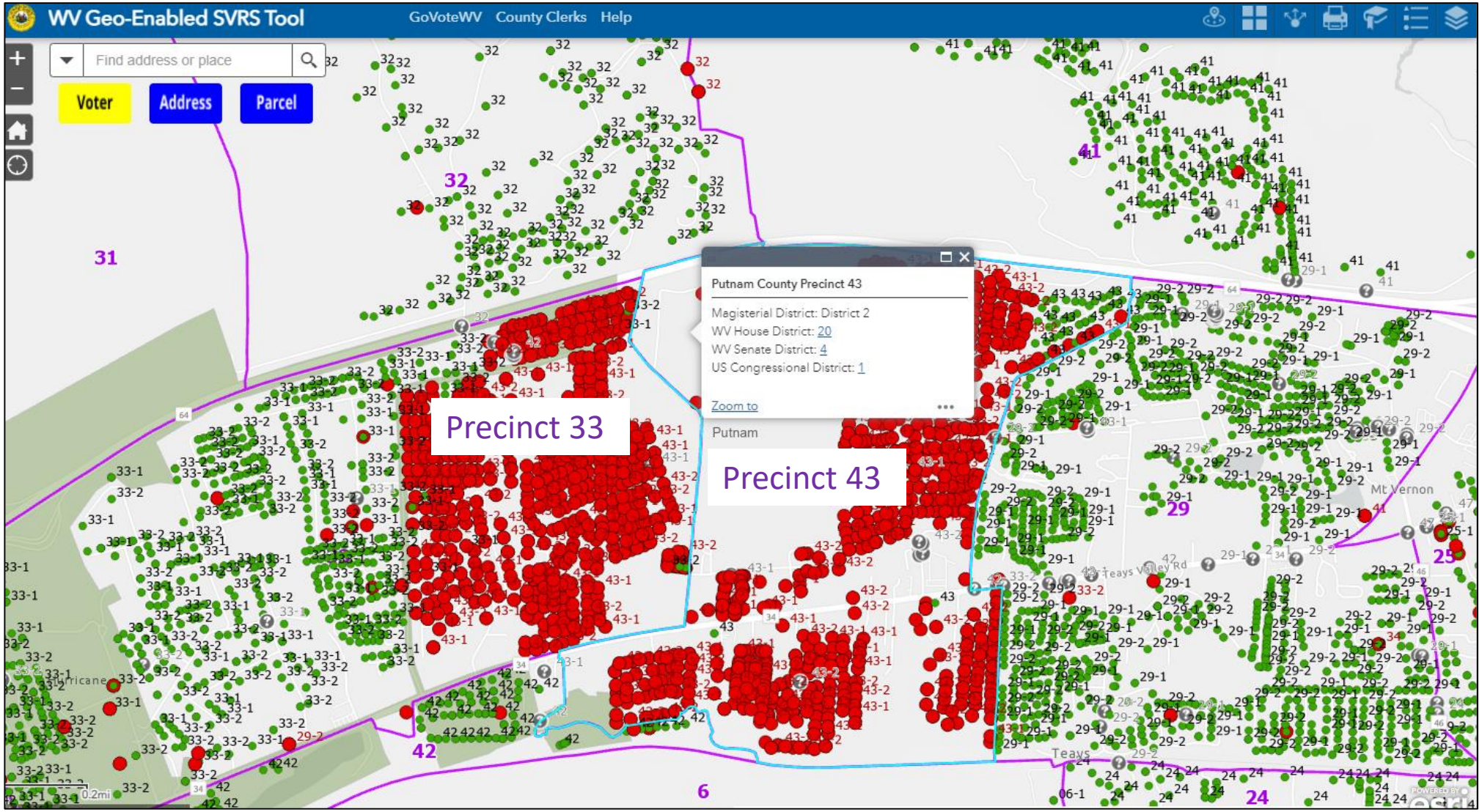
PRODUCT	DESCRIPTION	WEB LINKS
County Report Lists (Excel Spreadsheet)	Precinct Mismatch List	Download County Mismatch File
	Voter List (all SVRS records)	Download County Voter List File
	E-911 Site and Street Ranges	Download Select Counties
Map Viewers (Online Web)	WV Voter Map 2022 (Public)	www.mapwv.gov/vote
	WV Geo-Enables SVRS Tool (Non-Public) *formerly the redistricting web map*	www.mapwv.gov/svrs
Progress Tracking (Excel Spreadsheet)	County SVRS-GEO and Address Geocoding Statuses	Table | Graphic | Geocode Status
	Precinct SVRS-GEO Status	Table | Graphic
Online Resources	County Clerk Redistricting Resources	www.mapwv.gov/redistricting
	Background info about Reports and Map Viewers	GEO-SVRS Reports and Map Viewers

Statewide Voter Registration System (SVRS) Reports link tabular data to Map Viewer



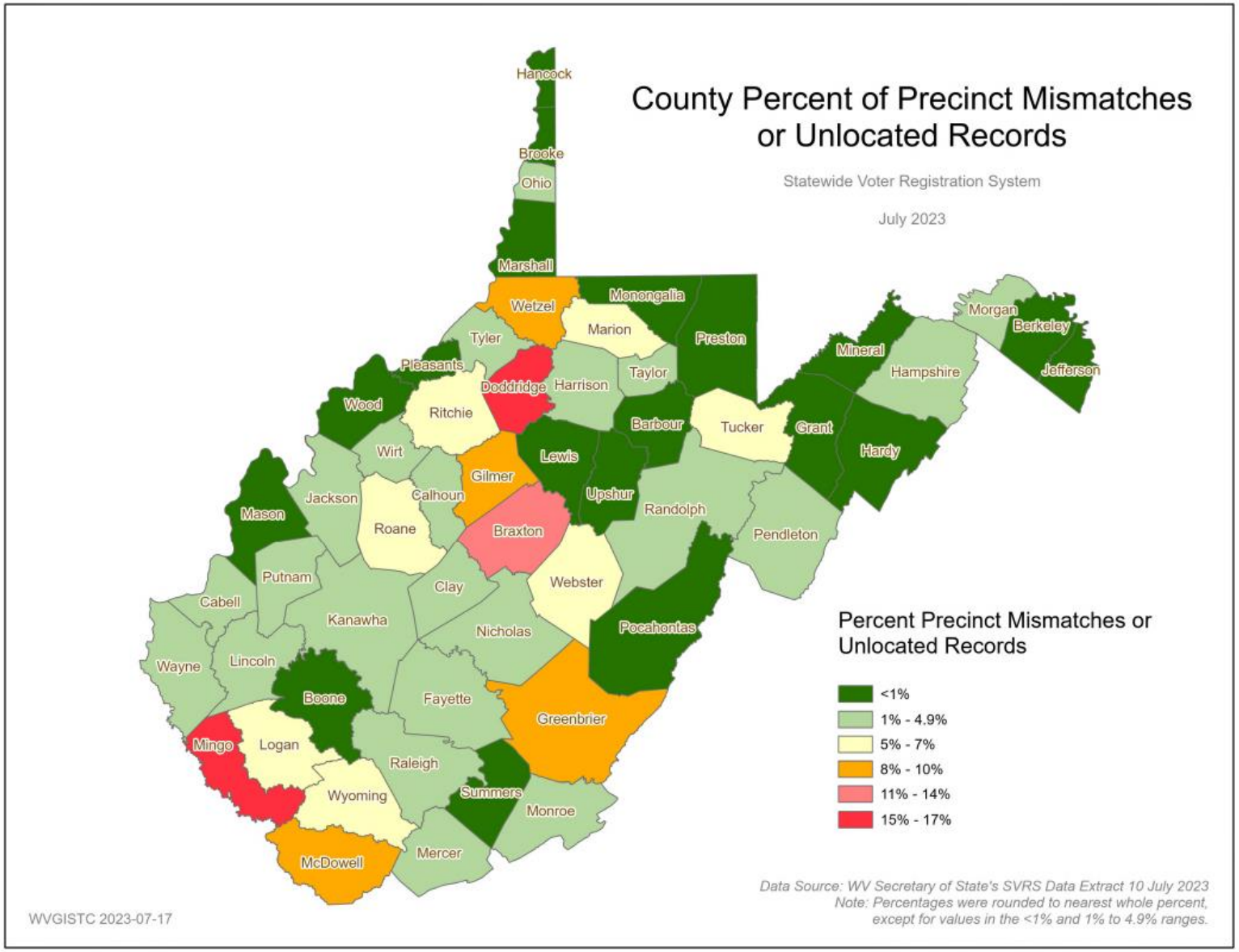


Precinct Level SVRS-Geo Audit



View specific precincts on [G-SVRS Tool]

Countywide % SVRS-Geo Mismatch



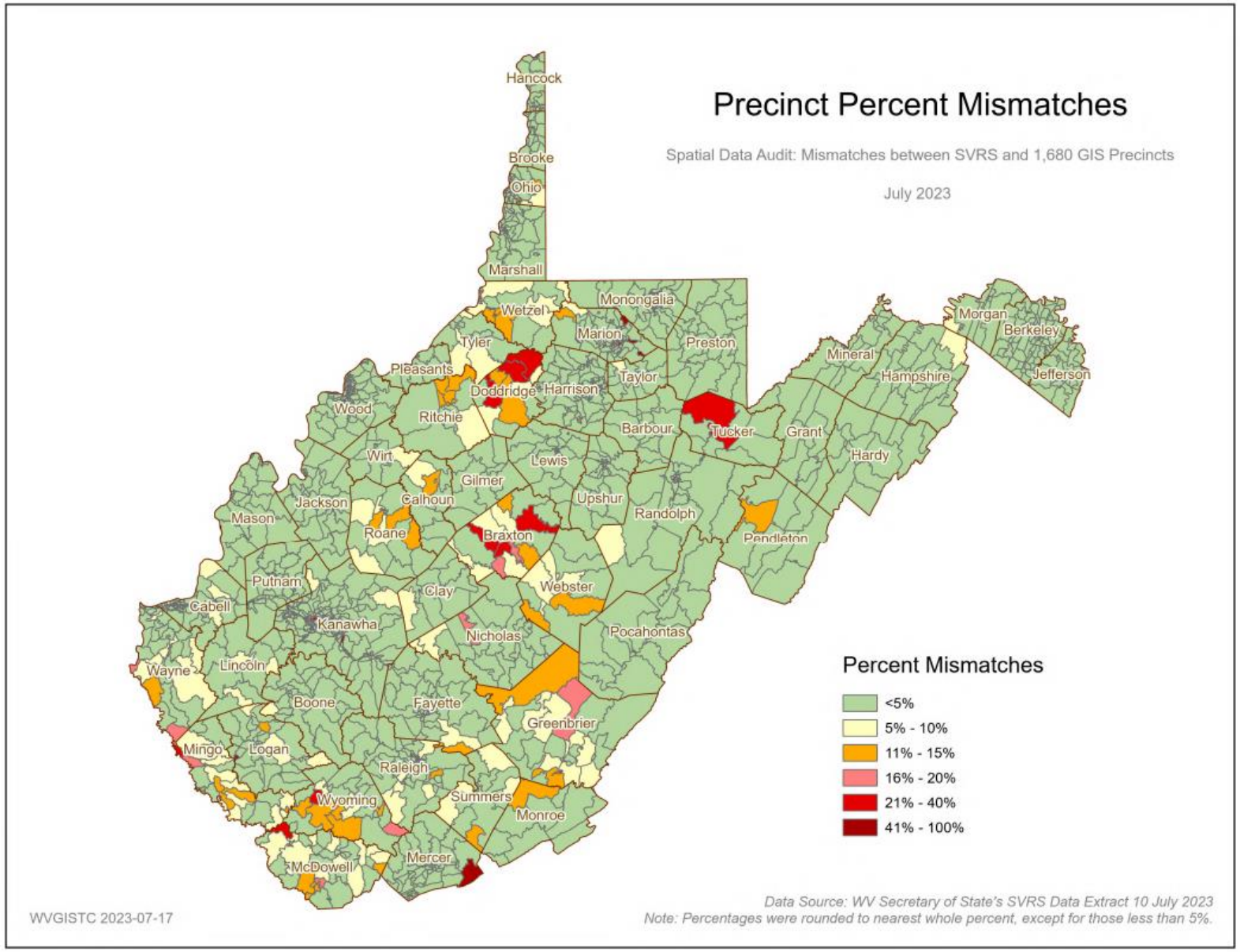
State Level

- SVRS-GEO mismatch 2.3%
- Ideally < 1%

County Level

- SVRS-GEO mismatch < 5%
- Ideally < 1%

Precinct % SVRS-Geo Mismatch



Precinct Level

- SVRS-GEO mismatch < 5%
- Ideally < 1%

GeoAnalytics: Performance Measures

Voting Districts	Deficiency: SVRS-GEO Mismatches
County Level	❑ > 5% SVRS-GEO countywide precinct mismatch; > 10% more severe ❑ > 1000 SVRS-GEO precinct mismatches ❑ > 20 outside county precinct mismatches ❑ < 90% SVRS-GEO matches (all districts: Congressional, WV State, WV House, Magisterial, Precinct)
Precinct Level	❑ # precincts > 100 voters

Addresses	Deficiency
% Site Address Matches	❑ < 95% countywide
Updates to SAMS	❑ > 1 year addresses not updated to Statewide Addressing and Mapping System (SAMS)
Address Exceptions	❑ > 1%

Boundaries	Deficiency
Municipal	❑ 1 or more BAS submissions pending