Toolkit for Address Validation in Local Communities

Lessons Learned from the

Study of Housing and Population Erosion

Pilot Project

Table of Contents

Table of Contents 2
List of Tables 4
Document Acronyms 5
How to Use This Toolkit 6
About the Study of Housing and Population Erosion (SHAPE) 7
Lessons Learned: Address Validation in Rural Areas 7
About West Virginia University's Health Affairs Institute 9
About LUCA 9
About Robert Wood Johnson Foundation 9
Project Team 10
Project Logo 11
Project Background and Need 11
Project Goals 11
Overview of Toolkit 11
Step 1: Project Management and Monitoring 12
Lessons Learned: Step 1: Project Management and Monitoring 14
Step 2: Connections with Key Stakeholders and Community Outreach 14
Lessons Learned: Step 2: Connections with Key Stakeholders and Community Outreach 16
Step 3: GIS and Mapping Resources 17
Lessons Learned: Step 3: GIS and Mapping Resources 20
Step 4: Address Verification and Field Work 21
Lessons Learned: Step 4 Address Verification and Field Work 22
Step 5: Data Cleaning 25
Lessons Learned: Step 5: Data Cleaning 25
Step 6: Variance Mapping & Analysis 25
Lessons Learned: Step 6: Variance Mapping and Analysis 26
Dissemination and Next Steps 27
Lessons Learned: Dissemination and Next Steps 29

Appendix A: Monthly Report Template 30
Appendix B: Project Task Tracking Template 31
Appendix C: Flyer 7 x 5 32
Appendix D: Logo 33
Appendix E: Overview Presentation (slides) 34
Appendix F: Presentation Email Message – sample 35
Appendix G: Project Overview 37
Appendix H: Stakeholder Identification and Assessment Tool 40
Appendix I: Field Map App Instructions 41
Appendix J: GIS Workflow Documentation 52
Appendix K: Mapping Methodology Summary 53
Appendix L: Job Description for Field Workers 55
Appendix M: Survey Questions Template 57
Appendix N: Data Cleaning Rules and Tasks 59
Appendix O: Project Lessons Learned Template 60

List of Tables

Table 1: Lessons Learned: Address Validation in Rural Areas 7
Table 2: Lessons Learned: Step 1: Project Management and Monitoring 14
Table 3: Lessons Learned: Step 2: Connections with Key Stakeholders and Community Outreach 16
Table 4: Lessons Learned: Step 3: GIS and Mapping Resources 20
Table 5: Lessons Learned: Step 4: Address Verification and Field Work 22
Table 6: Lessons Learned: Step 5: Data Cleaning 25
Table 7: Lessons Learned: Step 6: Variance Mapping and Analysis 26
Table 8: Lessons Learned: Dissemination and Next Steps 29

Document Acronyms

The following acronyms are used throughout this document:

Acronym	Definition
ACS	American Community Survey
E911	Enhanced 911
GIO	Geographic Information Officer
GIS	Geographic Information System
HAI	West Virginia University Health Affairs Institute
LUCA	Local Update of Census Addresses
OCR	Optical Character Recognition
SHAPE	Study of Housing and Population Erosion
Census Bureau	U.S. Census Bureau
RMSE	Root Mean Square Error
WVU	West Virginia University

How to Use This Toolkit

Welcome! This toolkit provides practical guidance, resources, and lessons learned from the Study of Housing and Population Erosion (SHAPE) project. The toolkit is designed to help communities improve address accuracy, document housing, and support population visibility, particularly in rural and underserved areas.

Who should use this toolkit

- County, municipal, and tribal government staff
- Geographic Information System (GIS) and planning professionals
- Community organizations and local leaders
- Field workers and volunteers
- Project managers and coordinators

How to use this toolkit

The toolkit is organized into a series of action-oriented steps that guide users through the following steps: 1) Project Management and Monitoring; 2) Connections with Key Stakeholders and Community Outreach; 3) GIS and Mapping Resources; 4) Address Verification and Field Work; 5) Data Cleaning; and 6) Variance Mapping and Analysis. It is important to note:

- **Follow the steps in order.** Each section builds on the previous one, from project management and monitoring through variance mapping and analysis.
- **Use the resources provided.** Templates, guides, and tools are included to support implementation and can be adapted to local needs.
- **Engage community partners early.** Local knowledge and trusted relationships are critical to project success.
- **Adapt the process to local needs** recognizing that community capacity, geography, and available data may vary.
- **Document lessons learned.** Capture successes, challenges, and recommendations throughout the project.
- **Stay flexible.** Adapt the process to fit your community's capacity, geography, and priorities.

This toolkit is intended to be flexible, practical, and scalable. Use it as a guide to support your community's efforts to improve address data, strengthen planning and emergency response capabilities, and ensure residents are accurately represented in the data that informs funding, services, and decision-making.

You can view SHAPE's Mapping and Data Collection Process Documentation by visiting healthaffairsinstitute.org/featured-work/shape.

About the Study of Housing and Population Erosion (SHAPE)

SHAPE is a pilot project designed to ensure rural communities are fully seen and counted. Using McDowell County, West Virginia as a starting point, SHAPE addresses a critical challenge: housing units that are missing or inaccurately represented in official address systems due to economic decline, natural disasters, and aging infrastructure.

By combining GIS mapping with on-the-ground verification, SHAPE identifies where people live today, especially in areas that are often overlooked. Improving address accuracy strengthens emergency response, community planning, and future U.S. Census Bureau (Census Bureau) efforts. Just as important, SHAPE is intentionally designed to be shared. The tools, lessons learned, and processes developed through this pilot can be adapted by other rural and disaster-impacted communities to support accurate counting, resource access, and long-term preparedness. SHAPE efforts improved on existing McDowell County Census Bureau estimates by 45%.

The information in the toolkit below will provide tips and adaptable models that can be catered to individual address verification projects. However, the team compiled a series of lessons learned below specific to the experience in McDowell County, a rural, highly forested, and disaster impacted area.

Lessons Learned: Address Validation in Rural Areas

Table 1: Lessons Learned: Address Validation in Rural Areas

Lesson:	Why it Matters:
Connect with local first responders (e.g., local police, emergency service workers) to understand current road conditions.	First responders often know the most current road conditions including roads or bridges that may have been washed out due to natural disasters and can provide advice on alternative routes.
Utilize high-clearance vehicles that are better suited for rugged terrain.	Sport utility vehicles and all-terrain vehicles can access difficult to reach or remote areas better than smaller, compact vehicles.
Hire local field validators.	People local to the area have in-depth knowledge of neighborhoods, roads, and routes, making field validation efficient and effective. Additionally, local field validators help to build trust with the larger community.

Lesson:	Why it Matters:
Consider physical landscape and local conditions (e.g., weather) when scheduling field work.	The condition of the local area will have big implications for your project, including if additional safety equipment is needed (e.g., snow tires) and/or if field worker visibility is low due to leaf or snow cover.

About West Virginia University's Health Affairs Institute

Health Affairs Institute (HAI) at West Virginia University partners with communities, organizations, and government agencies to turn data into action. Our work focuses on helping communities understand challenges, plan effectively, and access the resources they need to thrive.

HAI brings together research, data analysis, project management, and training to support practical, real-world solutions, especially in rural and underserved areas. HAI works alongside local partners to design tools, strengthen systems, and support long-term recovery and growth.

Through projects like SHAPE, the Institute helps ensure communities are visible, counted, and prepared by improving data accuracy, supporting informed decision-making, and sharing models that others can use when facing similar challenges.

Find us: https://healthaffairsinstitute.org/

About LUCA

The Local Update of Census Addresses (LUCA) program, established by the Census Address List Improvement Act of 1994, provides tribal, state, and local governments with the unique opportunity to review and improve the Census Bureau's master address list. This collaborative process ensures accurate geographic coverage, which directly impacts the fair distribution of federal funds and political representation. *Without correct addresses, **communities may miss out** on **funding** and **governmental representation.***

Participation in LUCA is voluntary and occurs several years prior to the census. Ahead of the 2030 Census, governments will receive LUCA invitations and information beginning May 2027, with data submissions due March 2028.

Please access the website for more information and dates: https://www.census.gov/programs-surveys/decennial-census/about/luca.html

About Robert Wood Johnson Foundation

RWJF is a leading national philanthropy paving the way, together toward a further where health is no longer a privilege, but a right. What started as a modest mission to support vulnerable population in local communities has transformed into a commitment to address structural racism, a root cause of health inequities in the United States. Our understanding and our commitment have deepened, and we continue to push ourselves to be more transparent and accountable as we work to create a more equitable society, centered in health and well-being.

Learn more at: Robert Wood Johnson Foundation | RWJF

Project Team

Our team brings together expertise in data analytics, research, project management, technology, and learning design, all working toward a shared goal: supporting communities through accurate data, thoughtful planning, and practical solutions. Each team member contributes unique skills and perspectives, allowing us to approach complex challenges collaboratively and with care.



Dr. Bryce Weaver

Associate Director of Survey Analytics



Brandon Marsh

Director of IT, Data Integrity, and Compliance



Emily Robinson

Senior Program Manager



Tonya Taylor

Senior Program Coordinator



Anina Rossouw

Senior Health Data Analyst



Dylan Griffith

Senior Health Data Analyst



Carrie A. Clippinger

Senior Health Data Analyst



Benjamin Balding

Research Specialist



Dr. Gabriela Barbosa

Senior Instructional Designer

Project Logo

The SHAPE logo represents both housing and people at the center of the project's mission.

The outline of a house symbolizes homes, stability, and community infrastructure. The group of people inside represents the population. Together, these elements reflect SHAPE's focus on understanding where people live and highlighting the connection between housing data, population counts, and access to resources.



Project Background and Need

- A high number of residential structures are missing from or incorrectly listed in commercially available and Census Bureau databases.
- Many homes lack formal street addresses or house numbers, making them invisible to mail carriers, emergency responders, census canvassers, and data-driven funding efforts.
- These gaps contribute to population undercounts and reduced access to services and funding, reinforcing long-standing inequities in rural communities.

Project Goals

- To support McDowell County in updating and submitting updated addresses to the Census Bureau.
- To identify the practical challenges and test scalable solutions for updating local addresses in advance of the 2030 Census.
- To develop training materials and documentation of lessons learned, and a toolkit with tips and adaptable models for similar efforts elsewhere.

Overview of Toolkit

The following section provides key findings, insights, and recommendations to stakeholders who are interested in conducting their own local address update project. The SHAPE team has broken the project into seven steps that document field-tested guidance, adaptable templates, data collection protocols, and partnership models. These steps outline a practical, scalable process for address verification, housing documentation, community engagement, and lessons learned. Each step builds on the previous one and can be adapted based on local context, capacity, and available resources.

Step 1: Project Management and Monitoring

Standardized but flexible project management practices and tools empower the project team to engage in all aspects of the project life cycle, from planning, to execution, to monitoring, and completion. An actively engaged team will identify roadblocks sooner, create practical solutions faster, and ensure the project meets all requirements and expectations.

Assemble your team with the following experience and skills:

- Project management and monitoring: Team members will build simple project infrastructure to monitor project progress, identify/mitigate risk, and ensure effective internal/external project communication.
- Connections with key stakeholders and community outreach. Team members will work to build awareness and support of the local community, focused on identifying, connecting, and ongoing relationship-building with residents, leaders, and trusted voices to cultivate trust and support for the project. *Note: a state, local, or tribal government must be involved in official LUCA submissions*.
- Geographic Information System (GIS) and mapping resources. Team members will gather and validate all available data (e.g., Census Bureau, local emergency dispatch unit, other commercially available data, etc.) to develop initial housing maps and to configure a mobile data collection and route planning application for field work.
- Address Verification and Field Work. Team members will be a boots-on-the ground team to physically verify *via mobile application* the existence of inhabitable housing indicated on the map and log discrepancies.
- Data cleaning. Team members will review field validated data to ensure that collected data complies with data collection rules.
- Variance Mapping & Analysis. Team members will analyze data to measure differences between initial maps and field data and then translate results to a variety of audiences to facilitate support of local, regional, and state audiences.

Convene the team:

- Schedule project kick-off meeting. Conducted virtually or in person, the meeting is critical to the success of the project because it is an opportunity for team members to define the shared vision and reach mutual understanding of project goals and their function within the team.
    - Welcome and Introductions. Provide the team with an opportunity to get to know each other and their functions on the team.
    - Project Overview. Provide background/contextual information, share the need for the project, and discuss goals, objectives, and timeline.
    - Project Activities and Milestones. Discuss activities designed to achieve project goals and what milestones that team will utilize to measure progress.

- Team Structure and Communication. Clarify roles, responsibilities, and communication pathways (e.g., via weekly check-in meetings, asynchronous updates using email or other work communication systems, etc.)
- Discuss initial risks and align with the next steps. Assess capacity, tools, and training needs early to avoid delays later in the project (e.g., ArcGIS software license, outreach materials, etc.)

Utilize simple project management tools to monitor project health, coordinate work, and proactively identify opportunities and risks.

- Virtual or Physical Whiteboard. Utilize whiteboards to map out project needs, including goals, objectives, and timelines and share with the team often to ensure alignment. Whiteboards can also be used for effective team brainstorming and assessment activities. It is important that all project team members have access and can add information freely to the boards.
- Excel sheets and/or project management work systems. Utilize Excel/Google sheets to document workflows, tasks, ownerships, and target date/range for completion. Work systems streamline communication and facilitate ongoing alignment of project work, team function/expectations, and appropriate resource allocation.
- Virtual collaborative space. Utilize online spaces for document and data repository to support asynchronous collaboration. Virtual tools like Microsoft SharePoint or Google Drive can support team collaboration while balancing several competing priorities and limited live/real-time collaboration time.

Lessons Learned: Step 1: Project Management and Monitoring

Table 2: Lessons Learned: Step 1: Project Management and Monitoring

Lesson:	Why it Matters:
Identify/convene team with the necessary skills to successfully complete the project.	Strategically building a team with the right skills and experience reduces delays and overall project risk, supports efficiency and productivity, and increases probability of project success.
Hold a project kick-off meeting to establish a team, build rapport, define the shared vision, the team members' individual function within the team, and align on next steps.	Conducting a thorough project kick-off meeting establishes alignment, clarity, and momentum from the beginning.
Create simple project management tools to empower the team to engage in all aspects of the project including tasks, timelines, identification opportunity/risks, and potential roadblocks to achieve goals/objectives.	Establishing simple project management tools and processes is essential to keep the project organized, facilitate transparent communication, and support effective and efficient teamwork.

Resources

- Monthly Report Template
- Project Task Tracking Template

Step 2: Connections with Key Stakeholders and Community Outreach

Strong stakeholder relationships are the foundation of a successful local address update project. Local partners provide critical insight into community context, known data gaps, and hard-to-reach areas. Additionally, stakeholders could be willing to share materials, host events, and recruit field workers. Early engagement builds trust and improves data quality.

Identify key stakeholders, including:

- State, local, or tribal leadership and members. These stakeholders are often in elected positions that address local community needs, such as tax and spending issues, infrastructure projects, public safety, etc. Local leaders are a critical resource for creating awareness within communities, making introductions to key county stakeholders, and providing local contextual knowledge. Impromptu conversations with community members provide critical information that deepened the team's understanding of the

area and accelerated the work. *Note: a* ***state, local, or tribal government must be*** *involved in* ***official LUCA submissions***.

- **Planning and GIS departments.** These stakeholders can provide expert knowledge, advice, and resources, including providing access to existing datasets. Examples of stakeholders include the local emergency services agency, the state Geographic Information Officer (GIO), and county or regional planning and development councils.
- **Local university and colleges.** Local institutions of higher education can provide expertise and support the project by encouraging students to engage and experience real-world applications of their course work.
- **Community-based and faith-based organizations.** Oftentimes, these stakeholders have a good rapport with the surrounding neighborhoods and can communicate directly with their communities. Organizations can explain the benefits of the project and encourage trust and participation. When partners understand the "why," they become effective advocates and messengers.

Develop shareable community awareness materials (e.g., flyers, talking points):

- **Project purpose.** Build awareness and understanding of why accurate address data matters, how organizations can support outreach and field efforts.
- **Provide clear guidance on how communities can support the project.** Communicate what support for the project looks like, how to get involved, and the potential benefits to the community.
- **Communication best practices.** Use plain language, focus on community benefits, explain why the project matters locally, be transparent about activities, address concerns promptly, avoid technical GIS terminology when speaking to the public.
- **Anticipate questions from the community.** Be prepared for questions about the data being collected. Assure the community that no personal information will be collected, only housing locations and street addresses, and that participation is voluntary.

Establish relationships with key stakeholders:

- **Connect with your regional and/or state Census Bureau representative.** Most states and/or municipalities have a designated GIO who is also the designated liaison to the Census Bureau. Establish a relationship with this person as he/she/they may have direct access to Census Bureau staff and resources for technical assistance.
- **Customize communication strategy to stakeholders.** Communication preferences can range from text messages to phone calls, to emails, to virtual/in-person meetings. It is important to learn the preference of each stakeholder and use the preferred methods whenever possible.
- **Share materials, resources, and language.** After the relationship is established, regularly send easy-to-share project materials (e.g., flyers, talking points) to support low-effort amplification of the purpose of the project.

- **Maintain relationships.** Share project progress, updated information, and major milestones or roadblocks with stakeholders as appropriate. Always express and communicate gratitude for their support of the project.

Lessons Learned: Step 2: Connections with Key Stakeholders and Community Outreach

Table 3: Lessons Learned: Step 2: Connections with Key Stakeholders and Community Outreach

Lesson:	Why it Matters:
Identify and engage with key community stakeholders early.	Establishing trust and rapport with key community stakeholders will increase the likelihood of the success of your project.
Draft clear communication materials that outline the "why" of the project, as well as how it benefits the broader community.	Clear and concise materials streamline communications into digestible messaging and minimize the need for additional follow-up or clarification.
Establish and maintain relationships with key stakeholders by using their preferred communication methods and providing regular information throughout the duration of the project.	Receiving regular, concise, and actionable updates will support ongoing engagement of stakeholders, proactive risk identification, and quick issue resolution.

Resources

- Flyer 7x5
- Logo
- Overview Presentation (slides)
- Presentation Email Message – sample
- Project Overview
- Stakeholder Identification and Assessment Tool
- Web Page
    - https://healthaffairsinstitute.org/featured-work/shape-ensuring-rural-communities-are-seen-counted-and-prepared/

Note: Customize materials to reflect local culture, population, and priorities.

Step 3: GIS and Mapping Resources

GIS provides a technical foundation for identifying and tracking housing units. Standardized workflows support consistency and data sharing across agencies, which is critical for the success of LUCA. Local GIS knowledge should be relied upon to guide and assist while developing a data collection plan. Local knowledge is a very valuable resource. Do not be scared to ask questions and ask for assistance.

Gather data:

- Census Bureau. Understanding Census data, expectations, and data preferences is critical for LUCA success. Make this a priority.
- Local and state GIS offices. Connecting with local mapping organizations like emergency response agencies who use Enhanced 911 (E911) datasets, public service commissions and development councils may collect their own address data, as well as transportation departments, who will be able provide detailed road networks. Consider sharing collected data with these agencies afterwards as a professional courtesy and a way to further integrate LUCA work with the community. Take time to understand the goals of these agencies' data, and incorporate what is important to them where possible.
- Commercially available datasets. The team may have access to other datasets to help with mapping, for example, the United States Postal Service.

Validate and clean the shared data sources:

- Request data dictionaries from stakeholders, if available. Shared data may not be immediately understandable. Know what column headings, legends, and abbreviations really mean. Consider using these pre-defined items in new data collection if appropriate. Similarly, maintain an internal data dictionary, and include it whenever sharing data.
- Ensure a detailed understanding of the attributes in the geographic datasets. The team should rely on the expertise of someone trained in this area both prior to and during the project. Their input is key. Ask partners questions anytime there is confusion.
- Ensure you have a detailed understanding of the purpose of each of the datasets you intend to utilize in the project. This will allow correct interpretation and the development of datasets that best meet community needs.
- Ensure geographic accuracy. Use geocoding for address lists or test accuracy of the datasets if pre-existing geographic files (i.e., Shapefiles) were shared with the team.

Develop maps and field data collection tools:

- Review all available LUCA or Census Bureau documentation prior to developing maps or a field data collection tool.
- Collaborate with project team and local GIS professionals. Agree on geographic layers to be included in the maps. Ensure the data collection instrument functions with all layers included, if appropriate.

- Determine technical details. There are a wide range of products to be considered for teams of all experience levels, and this may influence your approach. Consider prior to developing a field data collection application: map coordinate systems, type and cost of field data collection applications or software, and field data collection devices (e.g., tablets, phones).
- Seek technical assistance. If possible, contact the Census Bureau and let them guide your team regarding areas that need to be surveyed, methods and mapping resources, etc. Their support is crucial to the success of LUCA. You may find that priority areas overlap.
- Create maps. Maps will include:
    - Locally validated or commonly used road networks. Challenges with private roads, industrial sites, and unpaved/lesser-maintained roads should be considered, where possible. Building a way to describe significant road access issues is recommended (i.e., "bridge is out", "private gate across road", "logging road").
    - Known residential address points. These basic data points will be a key interest and reference point.
    - Other geographic boundaries such as counties or Census tracts. This will help organize the data and plan fieldwork routes.
- Develop field validation routes using any route planning software. The route planning software divides the field data collection activities into manageable portions that can be completed by a driver and a navigator, or on foot if applicable. Consider:
    - Terrain and accessibility. Is the area mountainous? Will leaf cover obscure housing units? Are water levels high in streams?
    - Road types and conditions. Data collection may be easier when there hasn't been significant rain or snow on dirt roads.
    - Safety considerations. Is the area dangerous? Do local residents know and trust your organization? If you are without cell service, are you safe in an emergency?
    - Time spent at each stop on the route. Take into consideration if the team will spend several minutes at each location, and how they can do that safely with road berms or lack thereof, speed limits, etc.
    - Workload on the field validators. Can the validation be completed within the project timeframe?
- Use the field validation routes layer to develop the field data collection application. Working with key stakeholders:
    - Decide which geographic data and/or attributes to validate or collect in-the-field validation application. Consider completing one test area first, then using lessons learned to tweak plans for the remaining areas.
    - Design and configure the field validation application to be easily accessed on a standard mobile device (if applicable), with offline capabilities for use in areas with limited communications availability.

    - Determine if other, more accurate field validation devices such as GPS units can also be used, if available.
- Test the field data collection application. Verify that the field data collection application works in the project's target areas prior to fieldwork (consider cell service, Wi-Fi capability, operating system, map layers, offline downloads, etc.). Make certain of the availability of GIS support personnel during field collection activities and reconfigure the field data collection application as needed to ensure trouble-free data collection while in the field.

Lessons Learned: Step 3: GIS and Mapping Resources

Table 4: Lessons Learned: Step 3: GIS and Mapping Resources

Lesson:	Why it Matters:
Scan the environment for all current and available data that could be leveraged for the success of your project.	Identifying and utilizing all available data improves overall output quality and an opportunity to collaborate with multiple-level stakeholders to build awareness and trust for the project.
Perform an in-depth review of all shared datasets and supplemental resources (i.e., data dictionary), ask questions to build a full understanding, and test accuracy.	Thorough preparation ensures data quality and trustworthiness of results and/or findings.
Develop maps and field data collection tools customized to the needs of your project while leveraging available local and national experts to inform your project.	Developing maps and field data collection tools that account for the practical challenges of field validation work (e.g., changing infrastructure, lack of connectivity) while also ensuring your project meets the needs of the LUCA.
Allow adequate time for field data collection testing and ensure availability of GIS support personnel during field validation.	Be mindful of the number of layers you add to the map; too many will decrease functional capability of the application.

Resources

- Field Maps App Instructions
- GIS Workflow Documentation
- Mapping Methodology Summary
- Example applications:
  - ArcGIS Field Maps for mobile data collection: https://www.esri.com/en-us/arcgis/products/arcgis-field-maps/overview
  - Google Maps or Waze for navigation on routes, to view live traffic, and travel efficiently
  - Shared drives and dashboards for collaboration

Step 4: Address Verification and Field Work

Accurate address verification ensures communities are properly represented in Census data, emergency response systems, and funding formulas. Clear guidance helps field staff make consistent, Census-aligned decisions.

Plan field work:

- Determine the best time of year. Consider areas that may become less accessible due to weather conditions (e.g., rainy seasons) and plan around those to ensure the field workers will have ample time to complete the routes.
- Build in long timelines. Field workers may discover important attributes of the physical location that were previously unknown (e.g. a road is impassable), which will require alternative routes and add time to the overall field work.
- Begin hiring conversations early. If working within a larger organization to hire field workers, begin conversations with human resources and/or administration departments early to ensure alignment on program needs and hiring processes.
- Recruit local field workers (when possible). As part of communication with key stakeholders and outreach, request support in connecting the team with local individuals who would be a good fit for the project goals and needs.
- Determine application questions. Consider what data collection questions are vital to the success of your project. Too many questions can unnecessarily prolong data entry, and too few may not collect crucial information.

Create accessible materials and processes:

- Create an accessible manual for the field data collection application. Develop step-by-step instructions on the use of the application using clear and concise language, visuals to support readability, and include technical support instructions.
- Onboard field workers. Provide a supportive onboarding process for field workers that includes discussions of the purpose and goal of the project, safety concerns, and agreed-upon back-up plans and safety protocols before training on data collection application.
- Train field workers on field data collection application. Demonstrate use of the field data collection application. Provide each worker with a printed manual that describes how to identify missing or incorrect addresses; recognize hidden, informal, or unnumbered housing units; and document housing units that no longer exist or are uninhabitable. Assist with technical issues (e.g., downloads, logins and accessing the field data collection form) and share technical support contact information. Allow time prior to field data collection for field workers to familiarize themselves with the mobile application. Allow field workers to decide on the time spent at each collection point, how to manage time and input of field data, and how many stops to complete in a day or shift.

Complete field work

- Reminders for field data collection day. Ensure at a minimum that there is a driver and navigator/field data collector. However, three-person teams are optimal, with one driver and two navigators/field data collectors. The driver should not use a mobile device while driving. Agree on areas or routes that will be surveyed by each field data collector team. Have a safety briefing and ensure everyone understands and agrees with safety protocols. Check all equipment and vehicles field workers will use, i.e., full gas tanks, flat tire changing kits, fire extinguishers, battery chargers or back-ups for mobile devices, cables and mounts, binoculars, pen and paper, water and snacks, basic first aid, etc. Make sure the application is functioning on each device. Test out Android and iPhone devices separately. Download offline navigation maps before setting out and have a paper map backup. Consider having one device to navigate, and a second to enter data. Respect local customs and culture and learn from the area and people you encounter. Share why you are there and what you are doing with a smile. *Respect privacy if the situation calls for it.*
- Anticipate the unplanned. Field workers will encounter unexpected events (e.g., house numbers or roads do not match the current record). Document those situations in the notes section of application, which will also record the coordinates so discrepancies can be resolved during data cleaning. Additionally, field workers may be uncertain if a house is inhabitable; a helpful indicator to determine the status of the structure is to look for lights or locate the electric meter and determine if power is flowing. Additional indicators may be garbage collection, package delivery, pets, seasonal weather modifications, or drivable vehicles nearby.

Lessons Learned: Step 4 Address Verification and Field Work

Table 5: Lessons Learned: Step 4: Address Verification and Field Work

Lesson:	Why it Matters:
Build in long timelines for field work validation because time estimates are dependent on many unknown factors (e.g., passable roadways, favorable weather conditions).	Field workers may discover parts of the area's physical infrastructure are no longer there (e.g., washed out bridges) and will have to determine an alternative path, which could take more time than originally anticipated, potentially causing delays to the entire project.
If you are not directly hiring field workers, connect early with the designated human resources and/or administration department in charge of hiring to ensure mutual understanding of project timing and hiring process.	Delays in hiring local field workers can shorten time for data cleaning, analysis, and variance map development.

Lesson:	Why it Matters:
Work with local key stakeholders to help the team connect with people who would be a good fit to complete the field work. Begin conversations early with prospective field workers and support their progress through the hiring process.	Local field workers have specialized and comprehensive understanding of the community. Engaging with potential field workers early will streamline the hiring and onboarding process.
Keep application questions limited, focused, and streamlined.	Data entry can be time-consuming and clumsy in the field. Lingering in front of homes, hard-to-assess homes, and locations with no pull-off or speed limits can be dangerous. Think carefully and develop the questions absolutely needed. Consider the implications of adding field pictures to the application functionality.
Create and share accessible onboarding materials and provide comprehensive training for field workers. Schedule time to meet to go over all aspects of the project, including project purpose, goals, technical instruction on the use of application, and data entry rules to support confidence and comfortability to complete the assignment.	Confident and well-trained field workers are vital to the success of the project, providing boots-on-the-ground perspective for your project.
Prior to field collection ensure team has tested the use of the application on different devices (e.g., iPhone and/or Android), consistent data entry rules, and has downloaded route maps (e.g., from Google Maps or Waze) so they can be used offline.	Testing the application, setting standard data entry protocols, and downloading route maps prior to departure will help streamline field validation work.

Lesson:	Why it Matters:
Ensure at least two field workers are always working together, one to drive and the other to validate addresses using the application. However, three-person teams are optimal.	Working in pairs increases safety and efficiency of the validation. The driver is focused on the safest ways to collect information (e.g., pulling off the road, doubling back). The validator is focused on confirming addresses accurately and will track route progress because validated addresses may not be easily tracked in the application. With two validators, work can be streamlined.
Equip the field teams with basic equipment (e.g., device charging cables, device mounts; first aid kit, paper/pen). Additionally other useful equipment includes binoculars and hotspots for internet access.	Adequate equipment will ensure that field teams are prepared to complete field validation effectively and efficiently.
Rely on the applications' GPS system to determine the correct house number when physical numbers affixed the house or on the mailbox do not match the route on the application.	Field workers will encounter structures where the house numbers are inconsistent with other records. The application will record coordinates for the structure of concern. Instruct field workers to document inconsistent house numbers in the notes section of the application.
Identifying electric meters or running power, garbage collection, observable pets, and package delivery can be helpful in determining if a structure is inhabitable.	It can be difficult to determine if a structure is inhabitable. These items are helpful indicators of the status of the structure.

Resources

- Job Description for Field Workers
- Survey Questions Template
  - LUCA overview (https://www.census.gov/programs-surveys/decennial-census/about/luca.html) and housing unit definitions

Step 5: Data Cleaning

Data cleaning is an important part of any project. Strong data cleaning protocols ensure the quality of your final data. Due to time constraints and safety concerns during field data operations, some data attributes could not be completed.

Create and document data cleaning protocols based on the LUCA standards:

- Determine data cleaning protocols. After field validation the team will decide on the steps to ensure finalized datasets are complete. The SHAPE team cleaned data during the final phases of the project and decided:
  - Housing unit locations with no obvious anomalies or livability concerns were considered complete, and no data was completed for these units in the field survey, or in the data sets.
  - New housing units that were added to the original datasets were scanned for completeness, and correct addresses were added to the dataset after field validation.
- Create step-by-step instructions on data cleaning. Use clear and concise language that is easy to read and comprehend. Add technical support contact information and any other relevant information that will support the data cleaning process.
- Train and assist data cleaners. Assist with technical issues such as logins and accessing the field data and ensure availability of printed instructions with technical support contact information. Support data cleaner confidence and comfortability to filter and identify missing or incorrect addresses in the field maps, completing addresses for newly mapped locations, and saving and updating completed work.

Lessons Learned: Step 5: Data Cleaning

Table 6: Lessons Learned: Step 5: Data Cleaning

Lesson:	Why it Matters:
Create and share data cleaning instructions with data cleaners. Schedule time for training and demonstrations.	Confident and well-trained data cleaners are vital to the success of the project, ensuring data quality.

Resources

- Data Cleaning Rules and Tasks

Step 6: Variance Mapping & Analysis

Variance mapping is an optional validation step to ensure address locations collected in the field are accurate when measured against a specific baseline geographic dataset. For this project, the SHAPE team used the initial E911 dataset received from McDowell County as the

geographic baseline. Lessons learned from the SHAPE pilot study could be applied to other areas with similar characteristics to McDowell County.

Variance Mapping:

- Visualize each initial address and field collected address layered over their census block group. Consider coloring-coding categorical variables to distinguish newly identified addresses, vacant addresses, and unlivable addresses, allowing for visual inspection for potential trends and differences.
- Bin the data by census block group to create counts of occupied addresses and vacant addresses for both initial addresses and field collected addresses. These counts were visualized in various maps colored with gradients representing counts. The percent change between the occupied counts of initial addresses and field collected addresses was calculated and visualized. Accuracy of the field collected addresses was determined by calculating the RMSE (root mean squared error) of the Euclidean distance compared to the initial addresses.
- Use American Community Survey (ACS) estimated counts by census block group for occupied addresses as a comparison. Bivariate choropleths were used to visualize the percent difference of field collected address counts and the initial address counts and the difference between the ACS counts and the field collected counts. This informative map provided insights into block groups that have improved in accuracy while also identifying block groups that are the most undercounted by ACS.

Lessons Learned: Step 6: Variance Mapping and Analysis

Table 7: Lessons Learned: Step 6: Variance Mapping and Analysis

Lesson:	Why it Matters:
Variance mapping allows projects to demonstrate effectiveness and highlights the need for further collaboration and funding.	While grounded in McDowell County, many communities across the U.S., particularly rural, disaster-affected, or historically underserved areas face similar challenges of missing or inaccurate housing data.

Resources

- *You can view SHAPE's Mapping and Data Collection Process Documentation by visiting healthaffairsinstitute.org/featured-work/shape.*

Dissemination and Next Steps

Conducting a pilot study provides valuable learning opportunities for the project team. To support replicability of similar local address updating projects, the SHAPE team documented processes, challenges, and successful methods discovered while conducting the project, which builds transparency, credibility, and scalability.

Document processes, challenges, and successful methods encountered during the pilot:

- Collaborate with internal team. Create processes for team to share perspective on the project via weekly meeting and/or a shared electronic collaboration space that the team can access asynchronously.
- Compile documentation from team: organize and synthesize into useful processes, challenges, and successful methods.

Package field-tested guidance, adaptable templates, data collection protocols, and partnership models into a toolkit:

- Gather all project documentation. Review all project documentation to determine the most effective way to organize the toolkit and what information is vital to include.
- Organize and synthesize into a practical toolkit. Ensure toolkit provides a concise and easy-to-understand guide for others interested in replicating the project.
- Create and format an offline version. Compile the toolkit with appendices for all templates and resources that can be printed and shared.
- Create and format an online version. Provide a central online repository (e.g., project website, cloud-based document library) where users can easily access and download project materials. Whenever possible, provide materials in accessible formats by using built-in accessibility checkers for Word, PowerPoint, PDFs, and other documents. Avoid image-only files and ensure PDFs are searchable and Optical Character Recognition (OCR)-enabled. Establish version control practices to help users access the most current materials and maintain consistency across project resources. Additionally, develop and follow a standardized file naming convention to improve organization, searchability, and long-term maintenance of project documents.
- Organize your files. Organize repository files by toolkit step to make resources easy to locate and maintain. The SHAPE team recommends creating folders that align with each toolkit step (e.g., Project Management and Monitoring, Stakeholder Engagement and Community Outreach, GIS and Mapping Resources, Address Verification and Field Work, Data Cleaning, Variance Mapping and Analysis, and Dissemination and Replication). This approach supports navigation, version control, and long-term sustainability of project materials.

- File Naming Convention: Use a standardized naming convention that aligns with each toolkit step (e.g., SHAPE_S1_ProjectTaskTracker, SHAPE_S2_StakeholderAssessment, SHAPE_S3_GISWorkflowDocumentation) to improve organization, searchability, and version control.

Identify and document key partner organizations that support implementation and replication potential:

- Create process for identifying, assessing, prioritizing, and documenting key partner organizations. Facilitate structured discussion with the project team to discuss key partner organizations.
- Discuss partners at regular intervals to ensure productive engagement. Ensure team has time and space to discuss key partners (e.g., monthly)

Present findings in a final meeting or presentation to key stakeholders:

- Schedule a meeting with key stakeholders. Include stakeholders whose support has been critical to the success of the project, for example the funder, Census Bureau, LUCA collaborative, project team, and other key stakeholders.
- Develop presentation slide deck. Include slides and visuals that support audience engagement and subject comprehension.
- Deliver presentation leaving room for discussion. Ensure adequate time for all attendees to benefit from hearing the discussion after the presentation is completed.

Execute toolkit dissemination:

- Collaborate with LUCA stakeholders. Align on what materials and information are the most valuable to others and where and how best to disseminate toolkit.
- Disseminate toolkit. Share via conference presentations; webinars hosted by WVU or relevant federal/state agencies; training sessions for other regional or local governments; possible collaborations with the Census Bureau or federal emergency agencies.

Lessons Learned: Dissemination and Next Steps

Table 8: Lessons Learned: Dissemination and Next Steps

Lesson:	Why it Matters:
Create processes for the team to easily share and/or document risks, issues, and opportunities from their unique perspective on the project.	Including all project team perspectives will ensure quick identification of concerns and team problem-solving.
Package all documentation into an accessible and practical toolkit.	Supports replicability of other organizations interested in conducting their own local address update project.
Maintain relationships with key implementation and replication partners.	Increases engagement and opportunities to share lessons learned and inspire further collaboration.
Work with LUCA stakeholders to develop and disseminate a toolkit that includes field-tested guidance, adaptable templates, data collection protocols, and partners.	Sharing results on project challenges, successful methods, and key partners will accelerate other teams interested in conducting their own local address updating project.

Resources

- Project Lessons Learned Template

The SHAPE pilot project provided the team with an abundance of growth opportunities via lessons learned. Moreover, lessons learned from the work in McDowell County, West Virginia could be applied and adapted to meet the needs of other groups conducting their own local address update ahead of the 2030 Census. We look forward to the opportunity to share lessons learned and effective practices with other groups interested in updating their local addresses ahead of the 2030 Census.

Appendix A: Monthly Report Template

Date:

To:

From:

Subject:

Priority: Medium

Overall Project Status:	
On Track *The project is progressing as planned. Milestones, deliverables, and timelines are being met. No major issues or risks are present, and resources are sufficient.*	▪ Bullet 1 ▪ Bullet 2 ▪ Bullet 3
Minor Issue *The project is experiencing minor issues or delays that could impact progress if not addressed. Mitigation plans are in place, and the situation is being monitored closely.*	▪ Bullet 1 ▪ Bullet 2 ▪ Bullet 3
Major Issue *The project is facing significant challenges or delays. Key milestones are at risk or missed, and corrective action is required to bring the project back on course.*	▪ Bullet 1 ▪ Bullet 2

<u>Highlights</u>

- Highlight 1
- Highlight 2

<u>Next Steps</u>

- Next step 1
- Next step 2

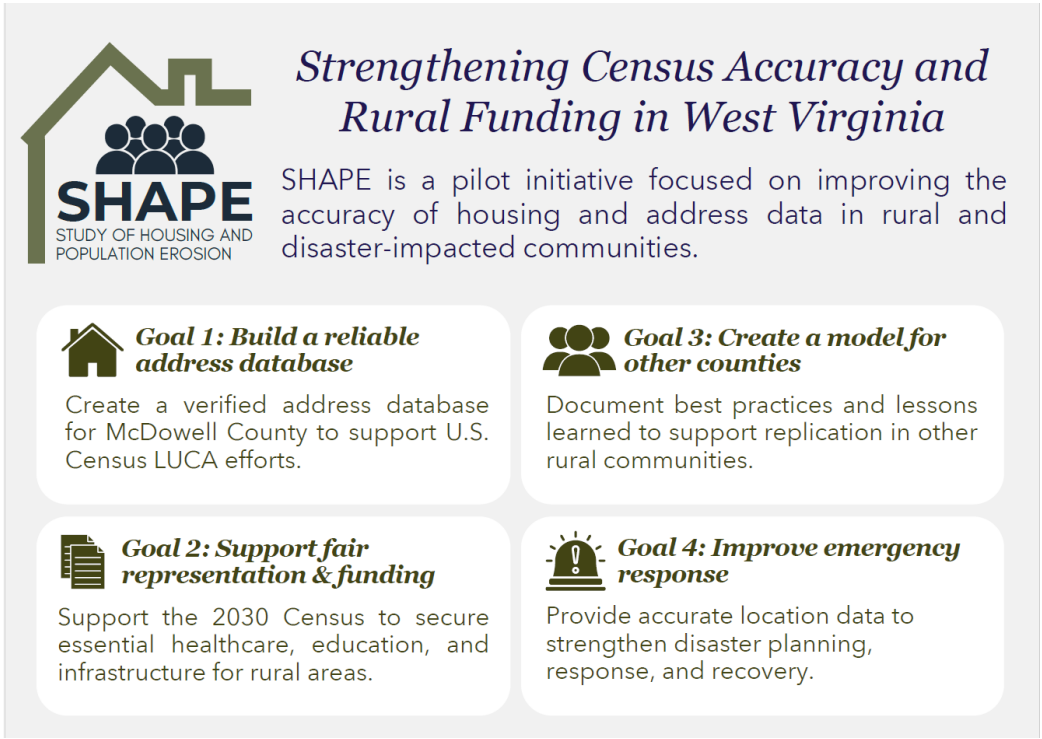
Appendix B: Project Task Tracking Template

Task	Team Lead	Priority	Status	Due Date	Timeline	Notes
Ex: Schedule Project Kick-Off Meeting	*Project Manager*	*High*	*in progress*	*9/15/2026*	*8/1 - 9/15*	*Finding common time availability*
Ex: Gather and validate available maps	*GIS Specialist*	*Medium*	*in progress*	*11/30/2026*	*8/1 - 11/30*	*Connecting with stakeholders to gather resources; validation is next*

Appendix C: Flyer 7 x 5



Front of flyer

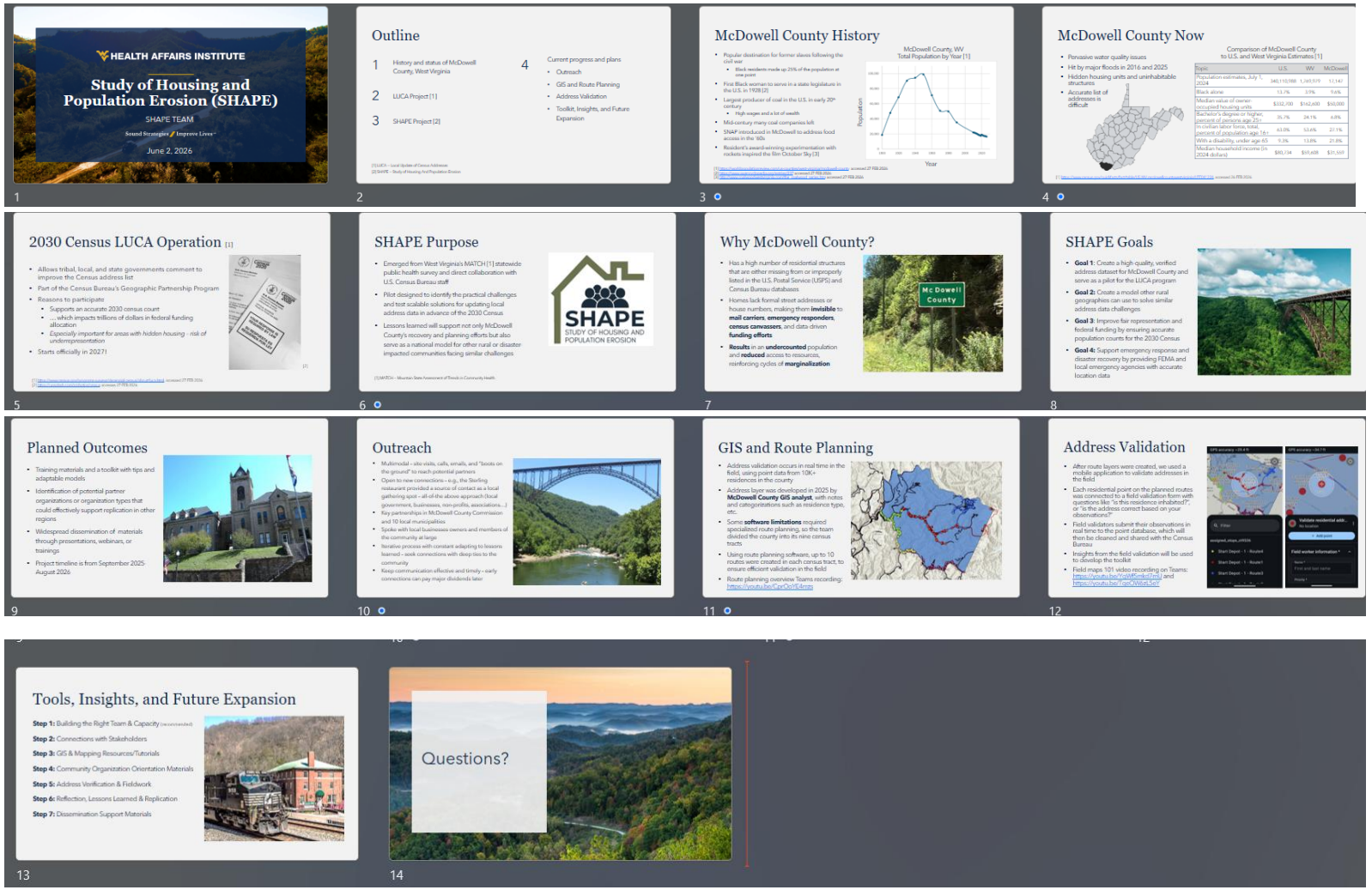


Back of flyer

Appendix D: Logo



Appendix E: Overview Presentation (slides)



Appendix F: Presentation Email Message – sample

Dear Stakeholder,

It was great speaking with your town clerk this morning!

In reference to our conversation, I have included some information in this email to highlight the big picture of the project we are working on in McDowell County. Our goal is to get this message in front of as many "decision-makers" in McDowell County as possible. We need to raise awareness, and I was hoping you could help with the effort.

The following is stock language describing the project in more detail:

I am reaching out about a project that seeks to use McDowell County as a test case for a pilot project for the upcoming 2030 Census. The following are just a few items lifted from the draft proposal for context:

"A critical issue facing McDowell County is the high number of residential structures that are either missing from or improperly listed in the U.S. Postal Service (USPS) and Census Bureau databases. Many homes lack formal street addresses or house numbers, making them invisible to mail carriers, emergency responders, census canvassers, and data-driven funding efforts. This results in an undercounted population and reduced access to resources, reinforcing cycles of marginalization.

This project is a pilot designed to identify the practical challenges and test scalable solutions for updating local address data in advance of the U.S. Census Bureau's Local Update of Census Addresses (LUCA) operations for the 2030 Census and associated surveys such as the American Community Survey. The lessons learned will support not only McDowell County's recovery and planning efforts but also serve as a national model for other rural or disaster-impacted communities facing similar challenges.

The project will leverage Geographic Information Systems (GIS), Address-Based Sampling (ABS), and field verification to enhance accuracy. Publicly available datasets from the U.S. Census Bureau, USPS, FEMA, and local government sources will inform the initial housing unit list, which will then be updated with findings from the field.

While grounded in McDowell County, this pilot has clear national relevance. Many communities across the U.S., particularly rural, disaster-affected, or historically underserved areas, face similar challenges of missing or inaccurate housing data. The intent of this pilot is not only to support equitable data collection and emergency preparedness in West Virginia but also to create transferable knowledge, tools, and practices that can be used in other geographies."

I have several organizations on my radar that I'm hoping can help generate awareness within the community.

I have attached a digital flyer that outlines the intent of this project. We would greatly appreciate it if you could share it with your network as well as the broader community if possible.

Please feel free to reach out if you have any questions or need additional information.

I would appreciate any assistance you can provide!

Best,

Appendix G: Project Overview

SHAPE Project Overview

Name: SHAPE: Study of Housing and Population Erosion

Slogan: Ensuring Rural Communities Are Seen, Counted, and Prepared

Project Logo:

The SHAPE logo represents both housing and people at the center of the project's mission.

The outline of a house symbolizes homes, stability, and community infrastructure. The group of people inside represents residents and population. Together, these elements reflect SHAPE's focus on understanding where people live and highlighting the connection between housing data, population counts, and access to resources.



Background/Project Need:

- A high number of residential structures are missing from or incorrectly listed in USPS and Census Bureau databases.
- Many homes lack formal street addresses or house numbers, making them invisible to mail carriers, emergency responders, census canvassers, and data-driven funding efforts.
- These gaps contribute to population undercounts and reduced access to services and funding, reinforcing long-standing inequities in rural communities.

Project Goals:

- To support McDowell County in updating and submitting updated addresses to the Census Bureau.
- To identify the practical challenges and test scalable solutions for updating local addresses in advance of the 2030 Census.
- To develop training materials and documentation of lessons learned, and a toolkit with tips and adaptable models for similar efforts elsewhere.

What is SHAPE:

The Study of Housing and Population Erosion (SHAPE) is a pilot project designed to ensure rural communities are fully seen and counted.

Using McDowell County, West Virginia as a starting point, SHAPE addresses a critical challenge: housing units that are missing from or inaccurately represented in official address systems due to economic decline, natural disasters, aging infrastructure, and changing community conditions.

By combining GIS mapping with on-the-ground verification, SHAPE identifies where people live today, especially in areas that are often overlooked.

Why Does It Matter:

Many homes in rural communities:

- Are missing from official address databases
- Lack formal street addresses or house numbers
- Are difficult for emergency responders and service providers to locate
- May not be accurately reflected in planning and census-related data

These gaps can contribute to population undercounts and reduced access to services, resources, and funding.

Improving address accuracy helps strengthen:

- Emergency response
- Community planning
- Census preparedness
- Data quality
- Population visibility
- Access to resources

How Community Organizations Can Help

Community organizations play an important role in the success of SHAPE by:

- Sharing project information
- Building community awareness
- Connecting project teams with residents and local leaders
- Identifying local concerns and address challenges

- Supporting trust-building efforts

When community partners understand the "why," they become effective advocates and messengers.

A Replicable Model:

SHAPE is intentionally designed to be shared.

The tools, lessons learned, and processes developed through this pilot can be adapted by other rural and disaster-impacted communities to support accurate counting, resource access, emergency preparedness, and informed decision-making.

Learn More

🌐 https://healthaffairsinstitute.org/

🌐 https://healthaffairsinstitute.org/featured-work/shape-ensuring-rural-communities-are-seen-counted-and-prepared/

Appendix H: Stakeholder Identification and Assessment Tool

Name	Industry Type	Counties Served	Date of Contact	Contact	Phone	Email	Notes
Chamber of Commerce for County	County Government						
Chamber of Commerce for County	County Government						
United Way of Southern WV	Non-Profit						
County Extension	County Government						
Governor's Office	State Government						
Governor's Office	State Government						
Hatfield McCoy Regional Recreation Authority	City Government						
Region I RPDC	County & Municipal Government						
Region I RPDC	County & Municipal Government						
County Commissioners Association	Association						
WV Geological and Economic Survey	State Government						
Census Bureau	Federal Government						
McDowell County Commission	County Government						
George Washington University	Academia						
West Virginia Department of Transportation	State Government						
West Virginia Department of Transportation	State Government						

Appendix I: Field Map App Instructions

Step 1: Download ArcGIS Field Maps App

Please download and install the ESRI Field Map application.

- For Android: Open Google Play Store and search ArcGIS Field Maps
- For iOS: Open App Store and search ArcGIS Field Maps

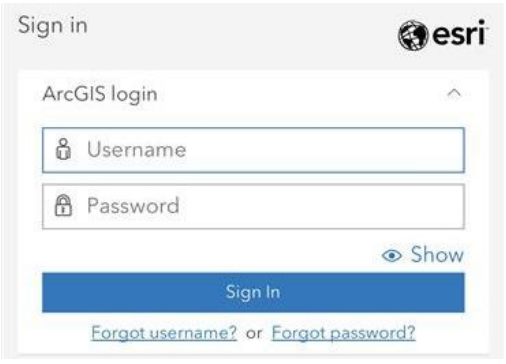
NOTE: Some of the steps, images, and settings we indicated may be slightly different depending on the device and the device's operational system.

Step 2. Open the App and use your credentials to Login

1. Open ArcGIS Field Maps by clicking on the app icon.



2. Tap on Sign In with ArcGIS Online
    a. Enter your username and password





    b. Text or call (681) 271-3656 if you need assistance

Step 3. Scan a QR Code to Access the Map

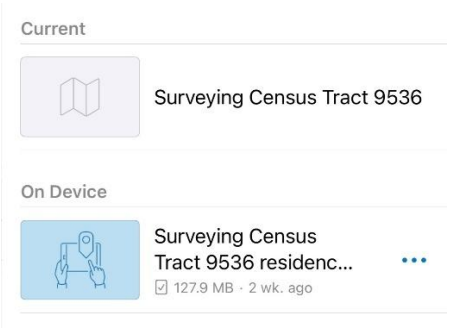
You will be assigned a Tract number to start surveying and collecting data. Each Tract has color-coded routes. As soon as you are in your first assignment, please scan the QR code associated with your map area, located at the end of this document. It will take you directly to the Survey Area.

After you scan the QR code for your tract with your camera and click on the Field Maps button (as shown below), the ArcGIS Field Map app will open again.

Tract	Link	QR Code	Route Legend
9536	https://fieldmaps.arcgis.app/?itemID=84ebc30f96b3410c9048a06881213c8e&referenceContext=open&anonymousAccess=true		Start Depot - 1 - Route1 Start Depot - 1 - Route2 Start Depot - 1 - Route3 Start Depot - 1 - Route4 Start Depot - 1 - Route5

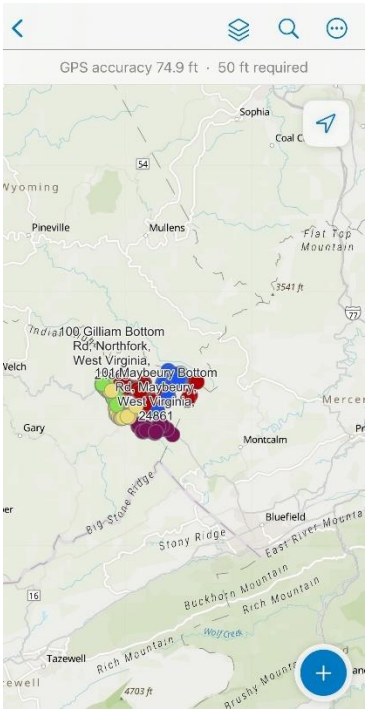
Field Maps ×

The app will quickly direct you to the tract you selected.



And then open the map with the Routes for that tract.

Depending on your initial location, you may need to zoom in on the map to get to your starting point.

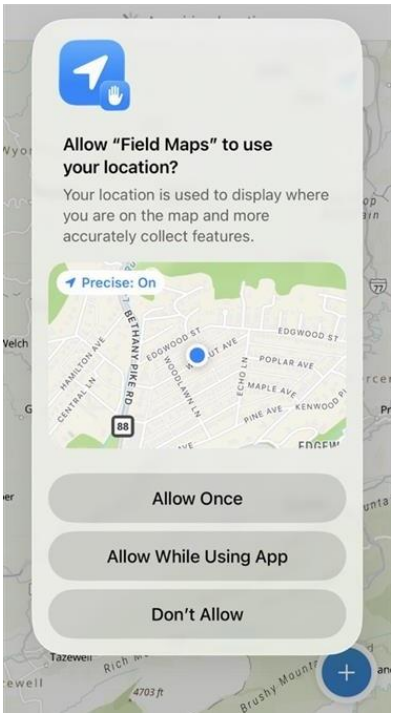


NOTE:

It may take some time to load the map on your device.

If your map doesn't load, close your app and open it again, then click on the Survey Area you are going to work on.

After you open your map, you may receive a message from the app asking if you "Allow Field Maps to access this device's location?" Or "Allow Field Maps to use your location"



You should select *Allow all the time*

- Select *Precise Location
- Allow notifications

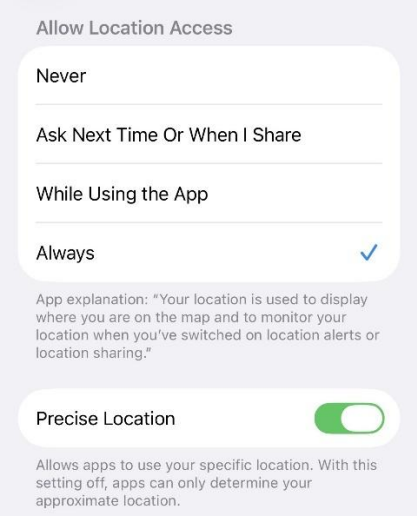
If your screen only shows Allow Once, or Allow While Using the App, please go to your device

Settings > Privacy and Security > Location Settings

Look for the Field Maps app (ArcGIS Field Maps), and change the settings to

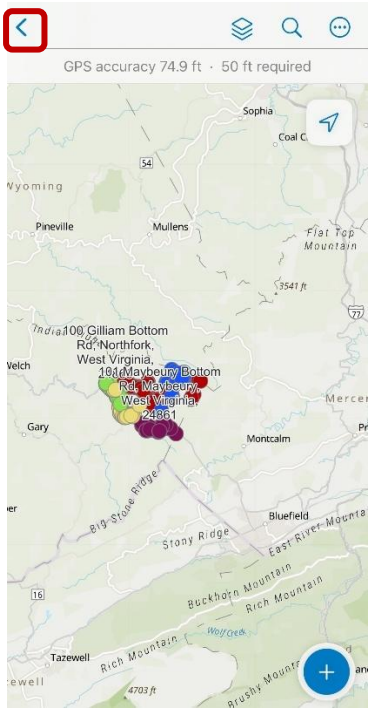
Allow Location Access: *Always*

- Enable *Precise Location

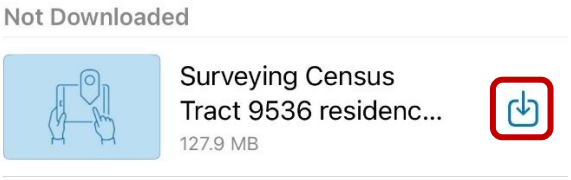


Step 4. Download the Offline Map

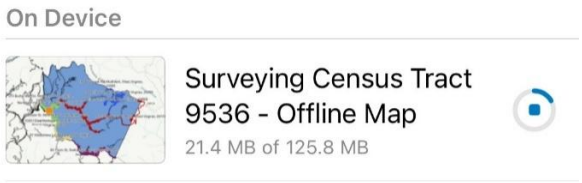
Use the back button on the online map to access the offline map.



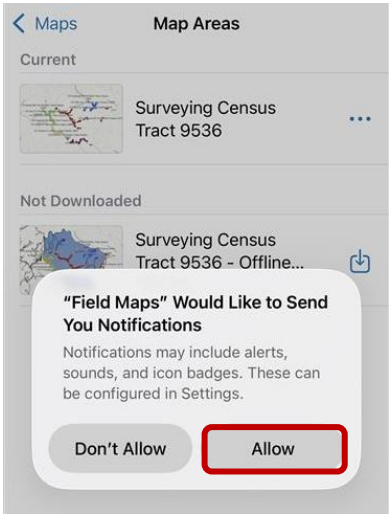
Your tract will be in the Not Downloaded section, please click on the download icon:



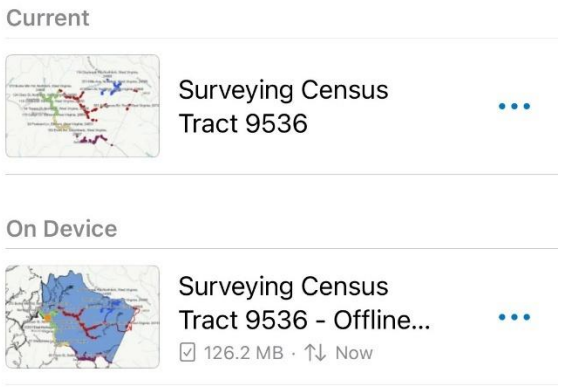
Your map will start to download to your device.



When you click on download the map, you may get a message from the app saying, "Field Maps" Would Like to Send You Notifications'. Please click on Allow, so when there are data updates, map updates, or need for sync, you will receive notifications.

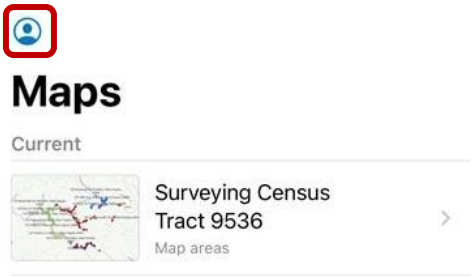


On your device, you will be able to see both the Online Map, and the Offline Map. This is important because if you are in an area without cellphone service/ cellphone data, you will still be able to use your planned route for your field work.



Step 5. Verify your App Settings

One extra step that can help while you are on field work can be made from your Field Maps app. While in the app, please select the Profile icon on the left top corner.



Under General, you want to make sure to enable the Auto-Sync option, so anytime you have signal, Cellular Data, or are connected to the Wi-Fi, the information you entered during your field data collection (using the survey) syncs and sends the data to the server, being securely stored.



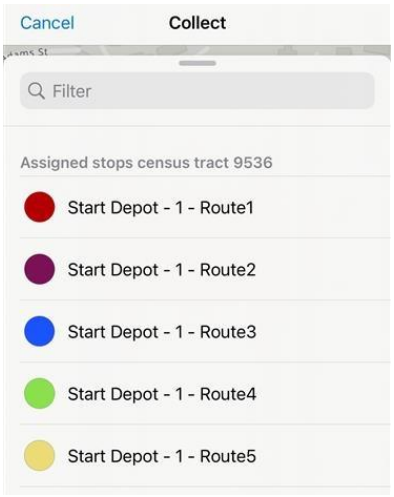
Also, under General > Cellular Data, please enable both Sync and Update, and Download options.

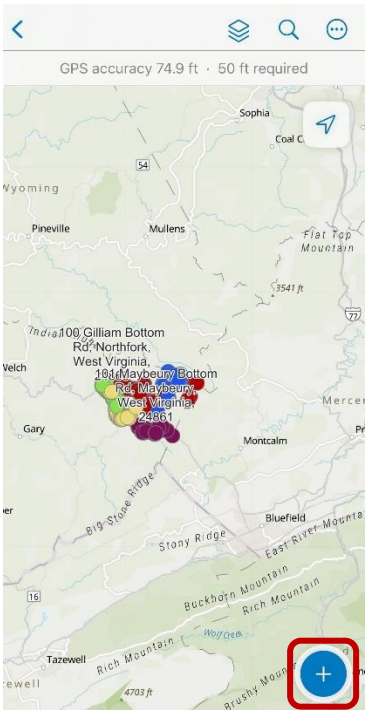


Step 6. Open the Field Validation Form

Depending on your cellphone service access, select the online or offline map to start the field validation form.

The *blue plus sign* opens a filter, with all the routes for the tract you selected (and based on your location):



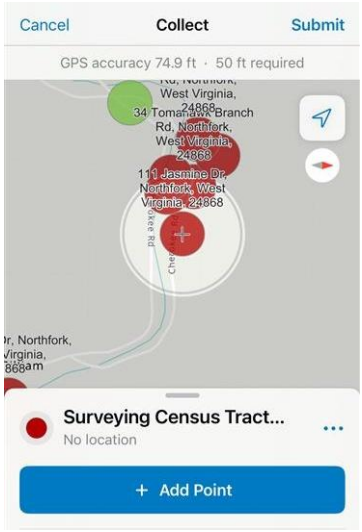


Based on your immediate location in the survey area, select the route color you are closest to, and access the field validation form.

> NOTE: Remember the route color you selected, since you will drive in sequence to one address (colored point in the route) after another!

To access the form, you may need to use the *zoom tool* and position the crosshairs on the residence you are surveying and select *Add point*. The new point is now added to the field map.

If you need to add a *new residence*, place the point in the new location.

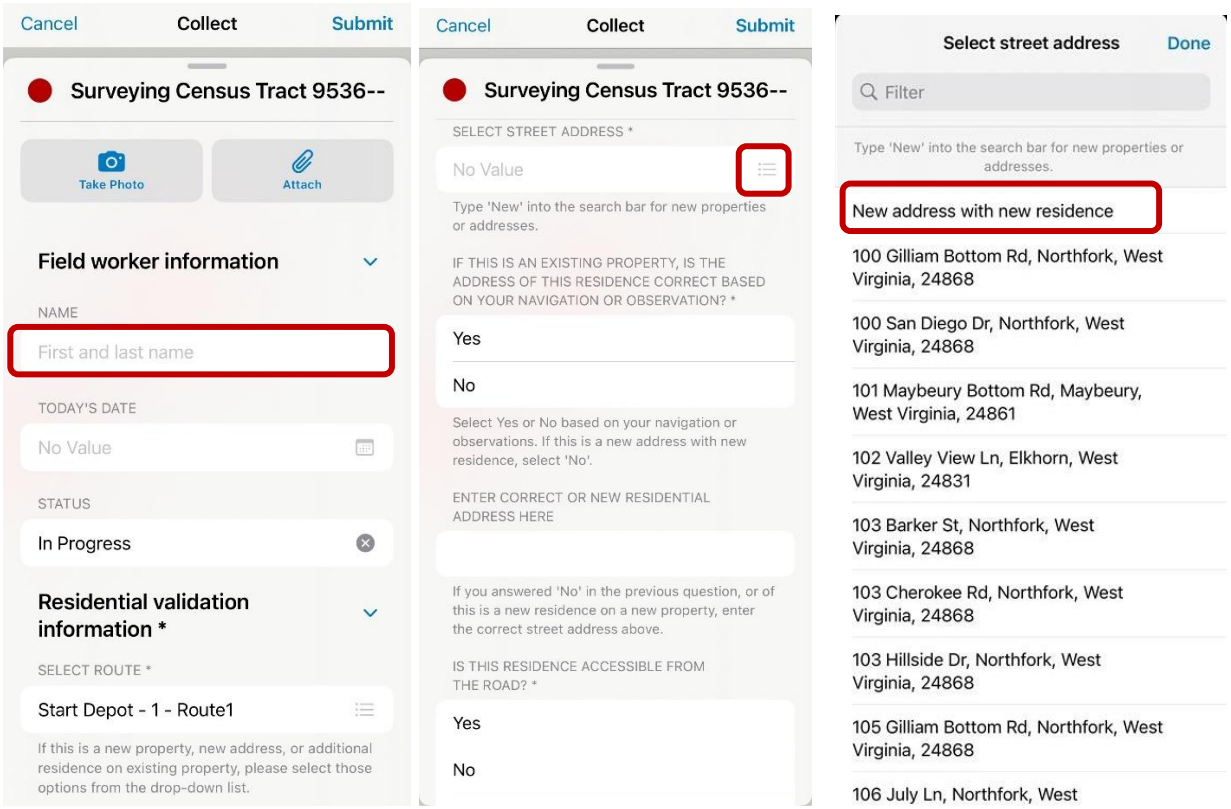


Step 7. Begin Field Validation

After you "Add Point," you can start to complete the Survey by filling out the form for validation. Please complete the **Field worker information** (only once at the beginning of your field validation day) and start responding to the questionnaire in order. Add the date, and please leave the *Status* as *In Progress*

Under **Residential validation information**, select the route you are on, or any of the other options in the drop-down menu. This will list the residential addresses associated with the Route in the Select Address drop-down menu.

Type the house number or street name in the **Filter box** to find the address or select *New address with new residence* for a new residence (from the top of the list).



Please complete all the survey questions to the best of your ability, and select Submit (on top of the screen, on the right top corner).

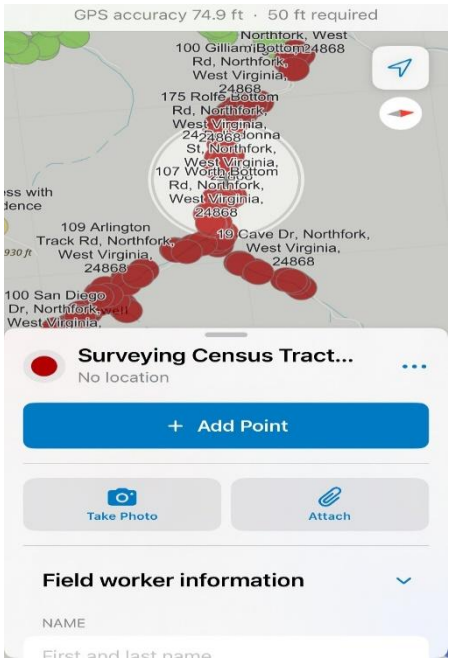


Step 8. Moving to the Next Location

After you click Submit, close out the GPS location page.

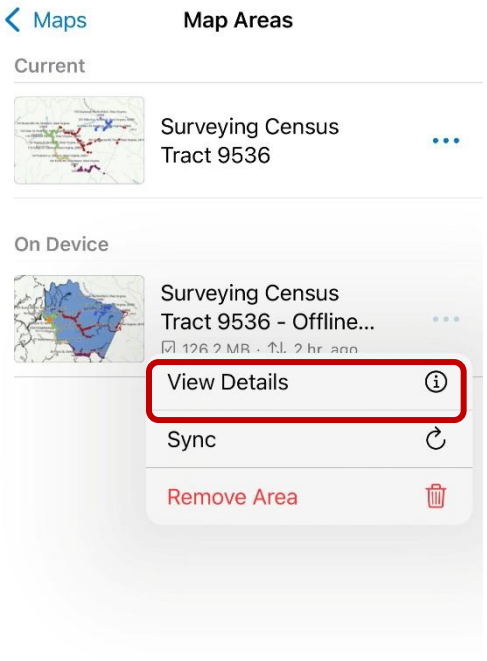
Zoom or pan to the next location on the field map and use the blue plus sign to complete the field survey for that location.

Repeat Step 7. Complete the field validation form for each stop/point of your route.



Step 9. Sync your Data

If you need to work offline, please don't forget to sync your survey data when reconnected. Your phone should do this automatically if you follow Step 5. But if you are uncertain, please use the Sync button.



Tips for Success

- Charge your device before heading out.
- Bring a cellphone charger that can be used in your car.
- Bring a notebook and pen.
- Turn off Virtual Private Network (NordVPN, Surfshark, ExpressVPN, etc.) if you use one. A VPN may restrict your access to the field maps while collecting data in the field.
- Turn on 'precise' Location Services/GPS in your phone settings, and allow 'precise location' when you install ArcGIS Field Maps.
- Remember to select 'Complete' in the Field worker information section of the form before submitting your field data for the location you surveyed.

Survey Area Links & QR Codes

Tract	Link	QR Code	Route Legend
9536	https://fieldmaps.arcgis.app/?itemID=84ebc30f96b3410c9048a06881213c8e&referenceContext=open&anonymousAccess=true		Start Depot - 1 - Route1 Start Depot - 1 - Route2 Start Depot - 1 - Route3 Start Depot - 1 - Route4 Start Depot - 1 - Route5
9538	https://fieldmaps.arcgis.app/?itemID=2a79bfd9d84642c0947e2bf706fe8f31&referenceContext=open&anonymousAccess=true		Start Depot - 1 - Route1 Start Depot - 1 - Route2 Start Depot - 1 - Route3 Start Depot - 1 - Route4 Start Depot - 1 - Route5 Start Depot - 1 - Route6 Start Depot - 1 - Route7 Start Depot - 1 - Route8
9539	https://fieldmaps.arcgis.app/?itemID=3258f3747ea840c1901369c237bc2761&referenceContext=open&anonymousAccess=true		Start Depot - 1 - Route1 Start Depot - 1 - Route2 Start Depot - 1 - Route3 Start Depot - 1 - Route4 Start Depot - 1 - Route5 Start Depot - 1 - Route6
9540	https://fieldmaps.arcgis.app/?itemID=c60100b439824bb1a86e3208c66232e8&referenceContext=open&anonymousAccess=true		Start Depot - 1 - Route1 Start Depot - 1 - Route2 Start Depot - 1 - Route3 Start Depot - 1 - Route4 Start Depot - 1 - Route5 Start Depot - 1 - Route6 Start Depot - 1 - Route7
9542	https://fieldmaps.arcgis.app/?itemID=676c26fd1a30403f888f297f6d1f293a&referenceContext=open&anonymousAccess=true		Start Depot - 1 - Route1 Start Depot - 1 - Route2 Start Depot - 1 - Route3 Start Depot - 1 - Route4 Start Depot - 1 - Route5 Start Depot - 1 - Route6

FAQ (Frequent Asked Questions)

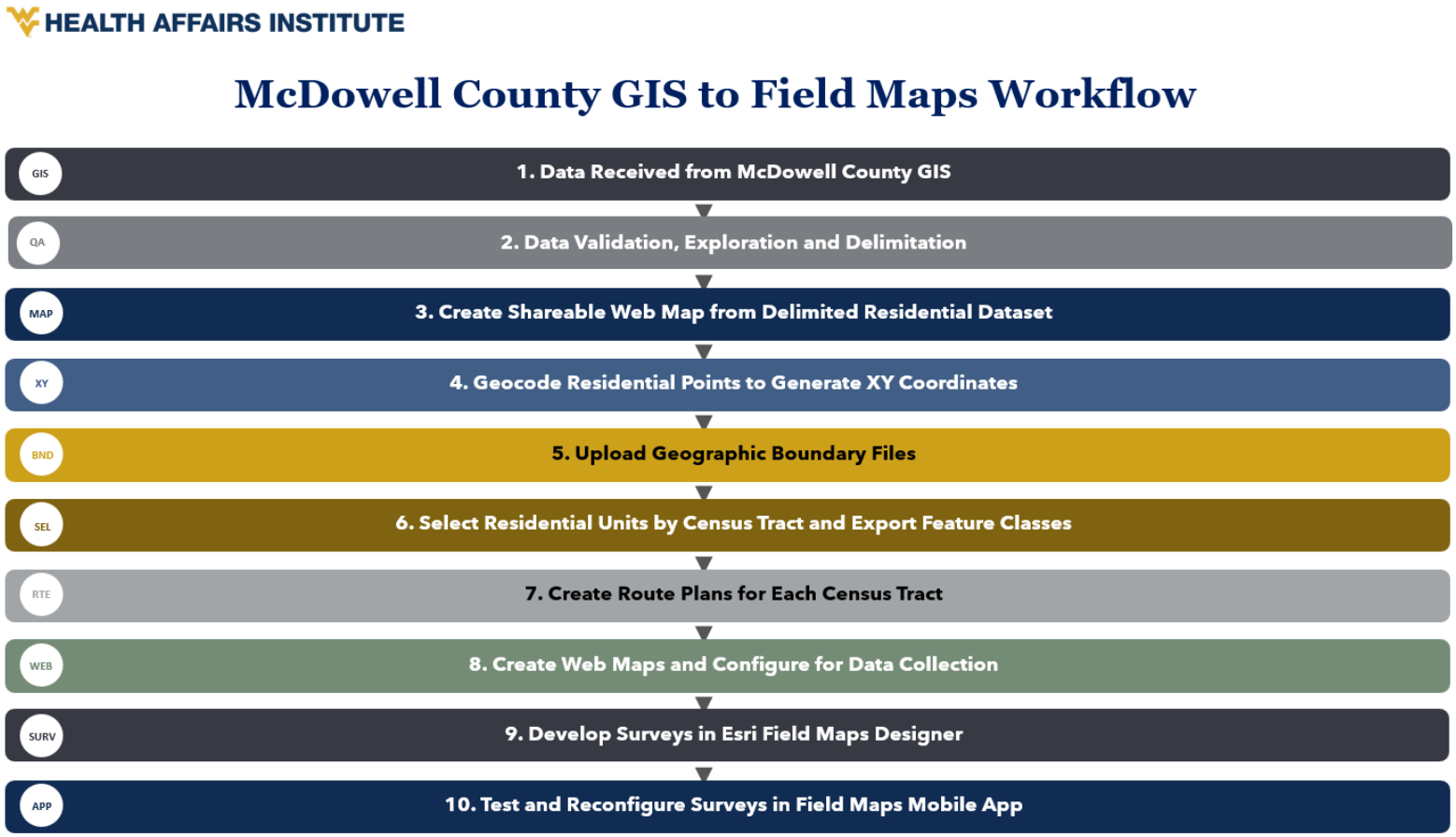
Defining housing types:

Type of residence	Definition	Example
Single family home	Free-standing, detached housing units on a lot or attached housing units, each with dividing walls and a unique house number	Single house in a yard or on a larger property; a duplex, or a townhome
Multi-family housing	A single structure containing more than one housing unit	Apartment complexes or structures used as group quarters
Mobile home	Parked in one place and used as permanent housing, built on a chassis and connected to utilities. May have a unique address or identifier if part of a mobile home park	Trailer or mobile home in a mobile home park, lot or larger property.
Other residential	Other types of housing used as permanent living quarters	Tiny homes, house boats, converted barns, yurts
Camp or bungalow	Specific areas set aside for temporary housing, typically charging per day	Tent sites, RV sites or recreational cabins
Seasonal home	Second homes not used as permanent housing and occupied by the owners only part of the year	Vacation homes

Contact us!

For technical issues or support in the field, please contact _____

Appendix J: GIS Workflow Documentation



Appendix K: Mapping Methodology Summary

Receive complete geodatabase with shapefile of almost 13,000 business and residential points from GIS Specialist in McDowell County, WV.

Select by attribute and export to shapefile all residential points (R1 through R6) for a total of 10,899 housing units. This dataset was geocoded using ESRI's World Geocoder Service with a mean matched address score of 99.56% (SD of 1.12). With a variance of 1.25, it is evident that the points are distributed over a large geographic area.

For route planning purposes, Census Bureau suggested using Boundary and Annexation files at census tract level to divide the county into nine census tracts, using the select layer by location tool. This step resulted in nine individual shapefiles, with each housing unit located within its respective census tract.

With technical support and confirmation from the Census Bureau, route planning for five out of the nine census tracts was completed using ESRI's Route Planner tool, with a maximum of 200 assigned stops per route within each census tract. Route planning summary:

Census Tract	Number of Routes	Total housing units received from McDowell County GIS Department:	Total housing units verified and collected by SHAPE Team:	Live field data collection links:
9536	5	656	844	https://arcg.is/0brW4i2
9538	8	1,500	1,608	https://arcg.is/1Dan513
9539	6	1,077	1,193	https://arcg.is/OHqze0
9540	7	1,400	1,488	https://arcg.is/iGXS40
9542	6	1,079	1,114	https://arcg.is/1eD5Pv8

With recent software updates, it was decided to create field surveys in ESRI's mobile Field Maps Application. Using the assigned stops (housing unit points) in each of the five census tract route plans, five separate surveys with identical configurations were developed to divide the field surveying work into manageable groupings for the SHAPE team's field workers.

The surveys can be accessed in ESRI's mobile Field Maps application by searching for 'Surveying Census Tract 9536 / 9538 / 9539 / 9540 / 9542', or by scanning the QR codes in the application instructions document. These surveys are publicly accessible, and field data collection is currently operational. Please do not add points or data to the maps if you are not a field worker.

Live field data collection can be viewed through the links in the table above.

Appendix L: Job Description for Field Workers

SHAPE
STUDY OF HOUSING AND POPULATION EROSION

Job Description

Temporary (Hybrid) Community Data Liaison

Description

The Health Affairs Institute at West Virginia University is currently accepting applications for a **Temporary (Hybrid) Community Data Liaison**

About the Opportunity

The SHAPE project is a pilot designed to identify the practical challenges and test scalable solutions for updating local address data in advance of the U.S. Census Bureau's Local Update of Census Addresses (LUCA) operations for the 2030 Census and associated surveys such as the American Community Survey.

The project will leverage Geographic Information Systems (GIS), Address-Based Sampling (ABS), and field verification to enhance accuracy. Publicly available datasets from the U.S. Census Bureau, USPS, FEMA, and local government sources will inform the initial housing unit list, which will then be updated with findings from the field.

What You'll Do:

- Systematically drive and document all roads within McDowell County using GPS-enabled vehicles.
- Utilize GIS technology to record precise routes and collect geospatial data.
- Verify address points, structures, and access points using USPS list during the fieldwork.
- Log road conditions, key infrastructure elements, and other relevant observations as needed based on natural disaster recovery conditions.

Pay Grade: 17

Length of Assignment: Two weeks / not to exceed 75 hours

Qualifications

- Bachelor's degree
- A minimum of two (2) years of relevant experience
    - Previous in-field data collection experience on state, federal, or municipal lands is preferred, but not required
- Any equivalent combination of related education and/or experience will be considered.
- All qualifications must be met by the time of employment.

Knowledge, Skills and Abilities

- Competency in written and oral communication.
- Ability to drive on various types of roads to remote locations.
- Ability to keep neat and concise notes and surveys.
- Ability to meet deadlines.
- Maintain a professional demeanor and appearance at all times.
- Skilled in effective communication.
- Skilled in strategic planning and logistics.
- Skilled in critical thinking, including using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions, or approaches to problems.
- Skilled in monitoring/assessing the performance of yourself, other individuals, or organizations to make improvements or take correction.

Requirements

Valid driver's license - mileage for surveying travel will be reimbursed at the current WVU rate.

Posting Classification: Temporary

Exemption Status: Non-Exempt

Benefits Eligible: No

Schedule: Full-time

Appendix M: Survey Questions Template

Field Worker Information

1. Name (text field)
2. Today's Date (to be selected from calendar)
3. Status (drop down options for:)
   - In Progress
   - Completed

Residential Validation Information

1. Select Route (drop down options for)
   - Pre-planned routes (a list of the tract and routes you select will show here)
   - New/additional residence on existing property
   - New address with new residence
   - Existing address with no residence
   - Access issue, i.e. bridge out or road closure, impassible road

2. Select Street Address (can be seen by your location and can also be filtered as soon as you start typing the address)
   - Yes
   - No
   - Other

3. If this is an existing property, is the address of this residence correct based on your navigation or observation?
   - Yes
   - No

4. Enter correct or new residential address (if answered "no")
   - Select: can be seen by your location and can also be filtered as soon as you start typing the address

5. Is this residence accessible from the road?
   - Yes
   - No
   - Undetermined

6. Select the type of residence

- Single family home
- Multi-family housing
- Mobile home
- Other residential, i.e. tiny homes, converted barns, etc.
- Camp or bungalow, i.e. recreational housing or commercial lodging
- Seasonal home, i.e. a second home occupied part of the year, not a primary home

7. Select the type of mail service at this address
   - Mailbox on property
   - Group mailboxes, not USPS cluster box
   - USPS cluster box
   - No mail service observed

8. Is this residence livable? I.E. does it have an intact roof, sealed windows, etc.?
   - Yes
   - No
   - Undetermined

9. Based on your observation, is this residence inhabited?
   - Yes
   - No
   - Undetermined

10. Add any additional notes or information here (text field)

Attachments

Take a photo or attach

Appendix N: Data Cleaning Rules and Tasks

- Use ESRI account to log into ArcGIS Online: https://www.arcgis.com/index.html
- Navigate to the 'Content' tab
- Navigate to hosted feature layer titled '**assigned_stops_95xx**'
- Find all the '**New addresses**' in the online mapping application and enter the address information there:
    - Open the map using the 'Open in Map Viewer' box
    - **Right-click** on or very near the 'New address' dot on the map, then you'll see a pop-up that reads 'What's here?'
    - Copy the actual address
    - Close the 'What's here' pop-up and **click on the dot** then select 'Edit' in the pop-up box
    - Scroll to the 'If you answered 'No' in the previous question, enter the correct address', then **paste** the copied address in that box
    - Select '**Update**' and wait for the editor to close, then move to the next new address location

Appendix O: Project Lessons Learned Template

Use this template to facilitate and document a project lessons learned session at project closeout.

Item	Details
Project Name	
Project Sponsor	
Project Manager	
Project Team Members	
Project Start Date	
Project End Date	
Lessons Learned Session Date	
Facilitator	

Purpose

Capture successes, improvement opportunities, best practices, and recommendations for future projects.

Session Ground Rules

Focus on processes, not people. Be respectful and constructive. Encourage participation.

Session Process

Silent brainstorming, group discussion, and prioritization.

What Went Well?

Category	Lesson Learned	Impact	Recommendation for Future Projects

Areas for Improvement

Category	Challenge	Root Cause	Recommendation

Key Themes Identified

Planning

What worked well:

What should improve:

Communication

What worked well:

What should improve:

Team Collaboration

What worked well:

What should improve:

Stakeholder Engagement

What worked well:

What should improve:

Project Management & Governance

What worked well:

What should improve:

Tools, Systems & Processes

What worked well:

What should improve:

Recommendations for Future Projects:

Recommendation	Owner/Role	Priority

Best Practices to Replicate:

Key Takeaways:

Biggest Success:

Biggest Challenge:

Most Valuable Lesson Learned:

What We Would Do Differently Next Time:

Action Plan Follow-Up:

Action Item	Owner	Due Date	Status