Hazard Mitigation Plan

Region 2 Planning & Development Council

Updated 2024

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REGION 2 HAZARD MITIGATION PLAN

RELEASED 2024
FOR THE MEMBER GOVERNMENTS SERVED BY THE REGION 2 PLANNING & DEVELOPMENT COUNCIL

REGION 2 PLANNING & DEVELOPMENT COUNCIL
HAZARD MITIGATION PLAN
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REGION 2 PLANNING & DEVELOPMENT COUNCIL
HAZARD MITIGATION PLAN
EXECUTIVE SUMMARY

The *Region 2 Planning & Development Council Hazard Mitigation Plan* of 2024 is an update to the 2018 mitigation plan. The Region 2 Planning & Development Council (PDC) sponsored this update. This plan considers all the jurisdictions in the region, which includes the following six counties and all of the municipalities located within these geographic boundaries: Cabell, Lincoln, Logan, Mason, Mingo, and Wayne. In all, this plan serves as the official hazard mitigation plan for 30 participating jurisdictions.

The PDC coordinates this update following federal requirements outlined in the Disaster Mitigation Action of 2000 (DMA2K), which requires jurisdictions to formulate a hazard mitigation plan to be eligible for mitigation funds made available by the U.S. Department of Homeland Security (USDHS), Federal Emergency Management Agency (FEMA). Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (PL 100-707) requires that all states and local jurisdictions develop and submit hazard mitigation plans designed to meet the criteria outlined in 44 CFR Parts 201 and 206. This plan has been approved by the participating jurisdictions, the steering committee that participated in its development, the PDC, the West Virginia Emergency Management Division (WVEMD), and FEMA Region III.

Procedurally, the PDC convened a steering committee three times and asked participants to complete four additional activities to generate content for the plan. Meetings also served as opportunities to share information about risks and vulnerabilities. The region's consultant ran the meetings and compiled minutes to document the decisions made. See Section 1.1 and Appendix 1 for notes about these meetings and activities.

Public participation occurred through an online survey and six town hall meetings. The survey received 40 responses and identified the types of risks to which the public was most concerned, as well as the types of mitigation projects the public might support. The 40 respondents represented a 93.11% decrease in the number of respondents from the 2018 survey. Substance use crisis was the hazard to which the highest number of respondents indicated being "Concerned" or "Very Concerned" (n=35, 87.50% of respondents), followed by flood (n=31, 77.50% of respondents) and severe winter weather (n=24, 60.00% of respondents). Regarding the types of mitigation actions respondents would support in their communities, six types of projects (out of 17 possible choices) received 25 or more selections.

- Burying power lines to provide for uninterrupted power during severe weather (n=30)
- Upgrading the water and sewer systems (n=30)
- Establishing standards for all utilities regarding tree pruning around lines (n=29)
- Installing generators in critical facilities such as clinics, police stations, fire stations, etc. (n=29)
- Upgrading infrastructure, such as increasing the capacity of drain systems, etc. (n=29)
- Planting trees to prevent erosion and promote cooler micro-climates (n=25)

Like the survey, public meetings also served as an opportunity to participate in the development of the plan. Public attendance at meetings was lower than desired, though planners recognized that weather conditions likely played a role in the lower attendance (i.e., the meetings occurred during the most hazardous stretch of what had been an otherwise mild winter). To enable an ongoing public review of the completed plan, this document appears on the PDC's website.

Hazard considerations for the 2024 update were similar to those examined in 2018. The only major change was the addition of "cyber incidents." Steering committee members felt strongly that, even though the cyber hazard impacts the region in seemingly different ways than the other hazards profiled by the plan, it poses the possibility of crippling critical governmental and economic operations. Further, a cyber incident could hamper a response to any of the other hazards in the plan. Other, more subtle changes included altering the name of the "opioid crisis" to "substance use crisis" to be more inclusive of the full range of addiction-related issues, changing "land movements" to "landslides and land subsidence" for greater accuracy, and adding an explicit mention of levees to the dam failure profile. Section 2.4 of the plan summarizes vulnerability to the hazards. The following table appears in that section. It presents the risk ranking calculations for each of the hazards in the plan.

SUMMARY OF RISK RANKINGS									
Hazard	*Risk Ranking*	***Total***	*Frequency*	*Response*	*Onset*	*Magnitude*	*Business*	*Human*	*Property*
Substance Use Crisis	High	**24**	5	5	4	4	1	4	1
Cyber Incidents	High	**22**	3	5	4	2	4	2	2
Severe Summer Weather	High	**21**	5	3	3	4	2	2	2
Severe Winter Weather	High	**21**	5	3	2	4	2	3	2
Landslides & Land Subsidence	Medium	**20**	5	4	4	1	3	2	1
Flood	Medium	**19**	5	3	3	1	2	3	2
Tornado	Medium	**19**	2	3	4	1	3	3	3
Epidemic & Pandemic	Medium	**18**	2	5	1	4	1	4	1
Acts of Violence	Medium	**17**	4	3	4	1	1	3	1
Wildfire	Medium	**17**	4	3	4	1	2	2	1
Hazardous Material Incidents	Medium	**16**	5	2	4	1	1	2	1
Drought	Low	**15**	2	4	1	3	2	1	2
Extreme Temperatures	Low	**15**	5	2	1	4	1	1	1
Dam Failure	Low	**14**	2	2	3	1	4	1	1
Earthquake	Low	**12**	2	2	4	1	1	1	1

The steering committee revised the goal and objectives guiding activities in this plan. The group agreed that a single goal targeting community resilience remains a good fit for the region, and it is easily communicated to participating counties and municipalities. However, the list of objectives underwent a significant overhaul. The 2018 version of the plan had five objectives under that goal, and the steering committee felt that they were not measurable. As such, members consolidated and revised the objectives using language that would more easily enable the measurement of progress. The 2024 goal and objectives are as follows.

GOAL: Maximize resilience by lessening the loss of life and property from the impacts of all hazards in Cabell, Lincoln, Logan, Mason, Mingo, and Wayne Counties and the jurisdictions therein.

- Objective 1: Increase the number of resources available for creating and enforcing codes, rules, regulations, ordinances, and programs for reducing hazard risk.
- Objective 2: Educate and train 25% of the local officials and 10% of the public in the region on the present hazard risks and measures they can take to reduce risks from those

hazards (as measured by the number of individuals or households outreach initiatives reach).

- Objective 3: Sustain 100% of the existing, ongoing preparedness activities, partnerships, and programs supporting mitigation, response, and recovery in the region.
- Objective 4: Decrease the number of deficient high-hazard potential dams in the region.

The plan includes 160 mitigation actions to drive progress toward these objectives. The actions cover a range of measures, including planning and regulatory efforts, structure and infrastructure projects, natural systems protection efforts, and education and outreach activities. The steering committee felt strongly that participating jurisdictions should prioritize actions that seek to mitigate repetitive loss properties, and as such, it added a mechanism for weighted scoring for those actions in the prioritization methodology.

Region 2's steering committee met annually to review the plan during the 2018-2024 cycle. That process was effective, and the group agreed to keep it in place for the upcoming cycle. The annual review will give the committee an opportunity to keep this plan dynamic and useful, and the PDC will work to drive more participation from jurisdictions and the public in these annual reviews.

- Year 1: Focus on and support plan adoption by all 30 participating jurisdictions
- Years 2, 3, and 4: Provide opportunities to track the progress/status of mitigation actions and evaluate the overall effectiveness of the plan
- Year 3: Begin securing funding to support the next formal update

This plan will serve as a vehicle for ensuring eligibility for hazard mitigation funding for participating jurisdictions throughout the next five years. Moving forward, the participatory processes set as a foundation in 2018 and reinforced in 2024 will enable an engaged, mature planning process in 2029 and, through regular plan review, continue to paint a richer, more inclusive picture of risk and vulnerability in the region.

1.0 INTRODUCTION

Purpose

The purpose of this mitigation plan is to identify risks and vulnerabilities from hazards that affect the Region 2 Planning and Development Council service area in southwestern West Virginia. With these risks and vulnerabilities identified, local officials can reduce losses of life, injuries, and limit future impacts by developing methods to mitigate or eliminate damages.

Scope

The *Region 2 Hazard Mitigation Plan* follows a planning methodology that includes public involvement, a risk assessment for various identified hazards, an inventory of critical facilities and at-risk areas, a mitigation strategy for high-risk hazards, and a method to maintain and update the plan.

The plan is "multi-jurisdictional," meaning that it includes several jurisdictions. Regional stakeholders prepared this plan per federal requirements outlined in the Disaster Mitigation Act of 2000 (DMA2K), which requires communities to formulate a hazard mitigation plan to be eligible for mitigation funds made available through the Federal Emergency Management Agency (FEMA). As such, this plan, dated 2024, serves as the official hazard mitigation plan for the 30 participating jurisdictions, and it supersedes all previous versions.

Plan Authority

Section 322 of the Robert T. Stafford Act requires that local jurisdictions develop and submit plans meeting the criteria outlined in 44 CFR Part 201.6. The following table lists those requirements and identifies the sections of the plan fulfilling the guidance.

44 CFR 201.6 REQUIREMENTS IN THIS PLAN		
Section	*Description*	*Section in Plan*
§ 201.6	The local mitigation plan is the representation of the jurisdiction's commitment to reducing risks from natural hazards, serving as a guide for decision makers as they commit resources to reduce the effects of natural hazards. Local plans will also serve as the basis for the state to provide technical assistance and to prioritize project funding.	• Entire Document
§ 201.6(a)(4)	Multi-jurisdictional plans may be accepted, as appropriate, as long as each jurisdiction has participated in the process and has officially adopted the plan.	• Section 1.1 Documentation of the Planning Process
§ 201.6(b)(1)	An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.	• Section 1.1 Documentation of the Planning Process • Section 4.3 Continued Public Involvement • Section 5.0 Appendix 4
§ 201.6(b)(2)	An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and non-profit interests to be involved in the planning process.	• Section 1.1 Documentation of the Planning Process • Section 5.0 Appendix 1
§ 201.6(b)(3)	Review and incorporate, if appropriate, existing plans, studies, reports, and technical information.	• Section 1.3 Capabilities • Section 1.2 Description of the Planning Area • Section 2.3 Analyze Impacts • Section 4.2 Implementation through Existing Programs

44 CFR 201.6 REQUIREMENTS IN THIS PLAN		
Section	*Description*	*Section in Plan*
§ 201.6(c)(1)	Documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.	• Section 1.1 Documentation of the Planning Process
§ 201.6(c)(2)	A risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.	• Section 2.0 Risk Assessment
§ 201.6(c)(2)(i)	The risk assessment shall include a description of the type, location, and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and the probability of future hazard events.	• Section 2.1 Identify Hazards • Section 2.2 Describe Hazards
§ 201.6(c)(2)(ii)	The risk assessment shall include a description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. All plans approved after October 1, 2008, must also address NFIP-insured structures that have been repetitively damaged by floods.	• Section 2.2 Describe Hazards • Section 2.4 Vulnerability Summary
§ 201.6(c)(2)(ii)(A)	The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.	• Section 2.2 Describe Hazards
§ 201.6(c)(2)(ii)(B)	The plan should describe vulnerability in terms of an estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate.	• Section 2.2 Describe Hazards
§ 201.6(c)(2)(ii)(c)	The risk assessment shall provide a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.	• Section 1.2 Description of the Planning Area • Section 2.3 Analyze Impacts
§ 201.6(c)(2)(iii)	For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.	• Section 2.2 Describe Hazards
§ 201.6(c)(3)	A mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, and resources, and its ability to expand on and improve these existing tools.	• Section 3.0 Mitigation Strategy
§ 201.6(c)(3)(i)	This section shall include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.	• Section 3.1 Mitigation Goals & Objectives

44 CFR 201.6 REQUIREMENTS IN THIS PLAN		
Section	*Description*	*Section in Plan*
§ 201.6(c)(3)(ii)	This section shall include a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.	• Section 3.2 Mitigation Actions
§ 201.6(c)(3)(iii)	This section shall include an action plan describing how the actions identified in paragraph (c)(3)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost-benefit review of the proposed projects and their associated costs.	• Section 3.2 Mitigation Actions
§ 201.6(c)(3)(iv)	For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.	• Section 3.2 Mitigation Actions
§ 201.6(c)(4)(i)	A plan maintenance process that includes a section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.	• Section 4.1 Monitoring, Evaluating & Updating the Plan
§ 201.6(c)(4)(ii)	A plan maintenance process that includes a process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.	• Section 4.2 Implementation through Existing Programs
§ 201.6(c)(4)(iii)	A plan maintenance process that includes discussion on how the community will continue public participation in the plan maintenance process.	• Section 4.3 Continued Public Involvement
§ 201.6(c)(5)	Documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commission, Tribal Council). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.	• Section 5.0 Appendix 7
§ 201.6(d)(1)	Plans must be submitted to the State Hazard Mitigation Officer (SHMO) for initial review and coordination. The State will then send the plan to the appropriate FEMA Regional Office for formal review and approval. Where the State point of contact for the FMA program is different from the SHMO, the SHMO will be responsible for coordinating the local plan reviews between the FMA point of contact and FEMA.	• Section 5.0 Appendix 7
§ 201.6(d)(3)	A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five years in order to continue to be eligible for mitigation project grant funding.	• Section 3.1 Mitigation Goals & Objectives • Section 3.2 Mitigation Actions • Section 5.0 Appendix 3

1.0 INTRODUCTION

1.1 Documentation of the Planning Process

§201.6(c)(1)	Documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

The Region 2 Planning & Development Council (PDC) coordinated the update to the region's plan in 2023 and early 2024. The PDC contracted JH Consulting, LLC, a consultant, to assist in the process. The following planning process was a joint effort between the PDC, the region's steering committee, participating jurisdictions, and consultant staff.

Planning Committee

The PDC utilized a steering committee approach to accomplish the goals of the mitigation planning process. The committee provided overall strategic direction for jurisdictional and public outreach, listed the hazards to include in the plan, and outlined plan maintenance. The steering committee did not include representation from all of the participating municipalities, though the region's six counties were represented. The PDC also invited other regional partners into the steering committee, including public health departments, community and economic development, floodplain managers, and Marshall University.

Using the committee approach for strategic direction allowed for a more significant consideration of region-wide mitigation goals, it also allowed for a more intentional integration of non-municipal and non-emergency management voices into the planning process. The smaller membership of the committee encouraged more robust discussion, which planners then conveyed to all other participating municipalities. Steering committee membership was as follows.

REGION 2 MITIGATION PLAN STEERING COMMITTEE		
Agency/Jurisdiction Name	*Representative*	*Participant Type*
Region 2 Planning & Development Council	Chris Chiles, Executive Director	Partner Entity (Plan Developer)
Region 2 Planning & Development Council	Kathy Elliott, Deputy Director	Partner Entity (Plan Developer)
CABELL COUNTY		
Cabell County Office of Emergency Services	Gordon Merry, Director	Participant (County Government)
Cabell County Floodplain Management	Chad Nelson, Floodplain Manager	Participant (Local Agency Involved in Hazard Mitigation Activities)

REGION 2 MITIGATION PLAN STEERING COMMITTEE		
Agency/Jurisdiction Name	*Representative*	*Participant Type*
Cabell-Huntington Health Department	Tim Hazelett, Chief Operating Officer	Partner Entity (Health & Social Services)
Huntington Planning Department	Breanna Shell, Planning Director	Participant (Municipal Government)
Huntington Stormwater Utility	Sherry Wilkins	Participant (Municipal Government)
LINCOLN COUNTY		
Lincoln County Floodplain Management	Mary Napier, Floodplain Manager	Participant (Local Agency Involved in Hazard Mitigation Activities)
Lincoln County Economic Development	Tommy Adkins, Director	Partner Entity (Agency w/ Authority to Regulate Development)
Lincoln County Office of Emergency Management	Allen Holder, Director	Participant (County Government)
Lincoln County Office of Emergency Management	Francis Holton, Deputy Director	Participant (Local Agency Involved in Hazard Mitigation Activities)
LOGAN COUNTY		
Logan County Floodplain Management	Ray Perry, Code Enforcement Officer	Participant (Local Agency Involved in Hazard Mitigation Activities)
Logan County Office of Emergency Management	Roger Bryant, Director	Participant (County Government)
MASON COUNTY		
Mason County Office of Emergency Management	Jeremy Bryant, Director (Floodplain Manager, Pt. Pleasant FD Chief)	Participant (County Government)
MINGO COUNTY		
Mingo County Floodplain Management	Amanda Starr, Floodplain Manager	Participant (Local Agency Involved in Hazard Mitigation Activities)
Mingo County Health Department	Amanda Davis, Nurse III	Partner Entity (Health & Social Services)
Mingo County Office of Emergency Management	Doug Goolsby, Director	Participant (County Government)
WAYNE COUNTY		
Wayne County Floodplain Management	Stephen Brown, Floodplain Manager	Participant (Local Agency Involved in Hazard Mitigation Activities)
Wayne County Office of Emergency Management	BJ Willis, Director	Participant (County Government)
EXTENDED PARTNERS		
Huntington Area Development Council	Adams Phillips, Business Development Specialist	Partner Entity (Agency w/ Authority to Regulate Development)
Huntington Area Development Council	Dave Lieving, President & CEO	Partner Entity (Agency w/ Authority to Regulate Development)
Huntington Sanitary Board	Wes Leek, Director	Partner Entity (Special District)
Logan (City of) Sanitary Board	Herb Staten, Sanitary Board Manager	Partner Entity (Special District)
Man (Town of) Sanitary Board	John Fekete, Mayor	Partner Entity (Special District)
Marshall University	Isabella Dragovich, EH&S Specialist	Partner Entity (Businesses, Academia & Other Private Interests)
West Virginia Emergency Management Division	Matthew Gregg, Region 6 Liaison (Mason County Resident)	Partner Entity (Regional Agency Involved in Hazard Mitigation Activities)

Steering Committee Meetings

The steering committee met three times throughout the update process. See Appendix 1 for meeting minutes. Though most steering committee members attended regularly, some could not attend at the times designated for the meetings. To boost participation, all in-person meetings were hybrid in nature, allowing virtual participation if time to travel to Huntington was an issue.

APRIL 12, 2023

The initial steering committee served as a kick-off for the 2024 update. During the discussion, committee members reviewed their roles and responsibilities with the consultant, and they reviewed the progress associated with the interim plan reviews and updates. The committee also held a robust discussion about the goals and objectives for the current plan, as well as initially discussed the hazards to address.

JUNE 14, 2023

The second steering committee was a virtual meeting, with the primary agenda items to approve the hazards list and to guide municipal and public outreach. Committee members held a lively discussion about the items to include in the public survey, with comments requesting not only new or revised questions, but also considerations for the ordering of questions.

SEPTEMBER 27, 2023

The final steering committee meeting enabled committee members to talk about regional projects as well as general or “preferred” project types. Of course, flood mitigation took on a high priority, but there was also support for attempting to address more human disaster impacts. Committee members also discussed the project prioritization methodology, and though largely keeping it the same as in the 2018 cycle, recommended adding weight for projects addressing repetitive loss properties (from any hazard). Finally, the committee agreed to the plan maintenance procedure for the 2024-2029 cycle.

Other Planning Meetings

The PDC scheduled public meetings in each of its municipalities, though these meetings allowed an opportunity for more county-specific discussions of issues. They served as additional planning meetings (the dates appear in the discussion of public meetings below), with topics of conversation as follows.

CABELL COUNTY

Cabell County (i.e., the Cabell-Huntington Health Department) and Huntington (i.e., Stormwater Utility) stakeholders discussed the low public participation and brainstormed ways to bolster input with the PDC and the consultant. Attendees discussed the messaging to accompany a posting of the survey link online, as well as sharing the link with their staffs and clientele.

LINCOLN COUNTY

Lincoln County's meeting moved to a virtual format in anticipation of incoming severe winter weather. Representatives from Lincoln County Emergency Management, the county floodplain manager, the region's liaison for the West Virginia Emergency Management Division and the National Weather Service (NWS) were online. The primary topic of discussion was information sharing, with NWS attendees sharing how best to invite them into planning processes.

LOGAN COUNTY

Representatives from the Logan County Office of Emergency Management attended with the PDC and the consultant. The focus of their conversation was the viability and maturity of the West Virginia Flood Tool as a resource for mitigation decision-making.

MASON COUNTY

During the planning process, Mason County changed emergency management directors. The attendees at this meeting included the county administrator and new EM director (in addition to the PDC and the consultant), so much of the discussion was on the background of the mitigation planning process. Attendees also discussed the Town of Henderson's dissolution as well as economic development (e.g., Nucor) in southern Mason County.

MINGO COUNTY

Representatives from the PDC, the consultant's office, and the Mingo County Health Department attended this meeting. The group discussed the epidemic/pandemic hazard, and reflected on lessons learned from the COVID-19 pandemic.

WAYNE COUNTY

Wayne County's meeting also moved to a virtual format, with attendees from the PDC, the consultant, the West Virginia Emergency Management Division, and the Wayne County

Commission. Attendees discussed increasing public participation, ultimately agreeing to put paper copies of the public survey in the courthouse, collect any that are completed, and provide them back to the PDC for consideration.

The Region 2 Planning & Development Council hosted interim update meetings in Years 2, 3, and 4 of the 2018-2024 planning cycle. The primary focus of the updates in Years 2 and 3 was project status. In Year 4, as noted elsewhere, the committee focused on adding epidemic/pandemic to the hazard profiles section. The minutes for annual planning meetings appear in Appendix 1.

Jurisdictional Participation

As a regional document (and as noted earlier), the steering committee did not include representation from all 30 jurisdictions in Region 2. Jurisdictional participation occurred via the full Region 2 Planning and Development Council, which consists of representatives from the six county commissions, 24 municipal councils, the general public, and several other regional assets. The PDC's executive director briefed participating jurisdictions on the mitigation process during the May 23, 2023, meeting of the full council. The following jurisdictions were represented at this meeting and participated in the discussion.

- Cabell County
- Chapmanville, Town of
- Hamlin, Town of
- Huntington, City of
- Lincoln County
- Logan, City of
- Man, Town of
- Mason County
- Milton, City of
- Wayne County
- Williamson, City of

Additional jurisdictional participation occurred through one-on-one interactions with the PDC's consultant, particularly regarding action plan updates, asset inventory updates, the capabilities assessment, and the integration of Total Exposure in Floodplain (TEIF) and Total Exposure Area Landslide (TEAL) data. The following table summarizes participation by the region's jurisdictions.

JURISDICTIONAL PARTICIPATION, 2024 UPDATE																
	ANNUAL UPDATES			MEETINGS									ACTIVITIES			
MUNICIPALITY	*Year 2 02/04/20*	*Year 3 10/14/21*	*Year 4 04/12/22*	*Mtg. 1 04/12/24*	*Mtg. 2 06/14/23*	*Mtg. 3 09/27/23*	*Mason Public 01/17/24*	*Cabell Public 01/17/24*	*Wayne Public 01/18/24*	*Lincoln Public 01/19/24*	*Logan Public 02/15/24*	*Mingo Public 02/15/24*	*Capability*	*Assets*	*Projects*	*Misc. Contact*
Region 2 PDC	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
Cabell County			X[1]	X[1]	X	X[1]		X					X	X	X	X
Barboursville, Village of													X	X	X	X
Huntington, City of	X	X	X		X	X		X					X	X	X	X
Milton, City of													X	X	X	X
Lincoln County	X		X	X[2]	X	X				X			X	X	X	X
Hamlin, Town of													X	X	X	X
West Hamlin, Town of													X	X	X	X
Logan County	X	X	X	X	X	X					X		X	X	X	X
Chapmanville, Town of													X	X	X	X
Logan, City of													X	X	X	X
Man, Town of													X	X	X	X
Mitchell Heights, Town of													X	X	X	X
West Logan, Town of													X	X	X	X
Mason County							X						X	X	X	X
Hartford, Town of													X	X	X	X
Leon, Town of													X	X	X	X
Mason, Town of													X	X	X	X
New Haven, Town of													X	X	X	X
Point Pleasant, City of							X[3]						X	X	X	X
Mingo County		X	X[1]		X[1]							X[1]	X	X	X	X
Delbarton, Town of													X	X	X	X
Gilbert, Town of													X	X	X	X
Kermit, Town of													X	X	X	X
Matewan, Town of													X	X	X	X
Williamson, City of													X	X	X	X

[1] Represented by the county health department.
[2] Represented by the county economic development authority.
[3] The county's emergency management director is also the city's fire chief.

JURISDICTIONAL PARTICIPATION, 2024 UPDATE																
	ANNUAL UPDATES			MEETINGS									ACTIVITIES			
MUNICIPALITY	*Year 2 02/04/20*	*Year 3 10/14/21*	*Year 4 04/12/22*	*Mtg. 1 04/12/24*	*Mtg. 2 06/14/23*	*Mtg. 3 09/27/23*	*Mason Public 01/17/24*	*Cabell Public 01/17/24*	*Wayne Public 01/18/24*	*Lincoln Public 01/19/24*	*Logan Public 02/15/24*	*Mingo Public 02/15/24*	*Capability*	*Assets*	*Projects*	*Misc. Contact*
Wayne County		X	X		X	X			X				X	X	X	X
Ceredo, Town of													X	X	X	X
Fort Gay, Town of													X	X	X	X
Kenova, City of													X	X	X	X
Wayne, Town of													X	X	X	X
Huntington Sanitary Board (Special District)	X	X	X		X	X		X							X	X
Logan Sanitary Board (Special District)																X
Man Sanitary Board (Special District)																X

The right side of the table identifies the scripted activities noted above. These activities correspond with the major elements of the mitigation plan.

- Capability: Formerly completed as an online survey, for the 2024 update, the PDC's consultant conducted a brief discussion with several representatives from the municipalities to gather capability data. In many cases, the data had not changed from the 2018 version of the plan (see 201.6[c][3]; see also Element C1-a of the *Local Mitigation Plan Review Tool* [FEMA, 2023c]).
- Assets: This activity included instructions for updating the asset inventory that appeared in the previous plan. Though not explicitly referenced by the *Local Mitigation Plan Review Tool*, it enabled participating jurisdictions to describe risks to critical and other vital facilities in their communities.
- Projects: Participating jurisdictions had projects in the previous version of the plan, and this activity enabled an updated status statement for each of them. The project updates activity also provided an opportunity for the participating jurisdiction and consultant to discuss new projects for the 2024 version (per requirement 201.6[c][3][iii]; see also Elements C4-1 and C4-b of the *Local Mitigation Plan Review Tool* [FEMA, 2023c]).

Of course, planners targeted the completion of all activities for each jurisdiction; though an admirable goal, it was not always feasible. The last activity (i.e., Misc. Contact) confirmed the plan's applicability for each participating jurisdiction. Planners (typically from the PDC's consultant) used these interactions for clarification; to ensure, at minimum, a project status response for each jurisdiction. As such, all governmental jurisdictions participated in the 2023 update.

Additional Stakeholders

The PDC ensured opportunities for a range of stakeholders to participate in the 2024 update. These stakeholders included the following.

- Local and Regional Agencies Involved in Hazard Mitigation Activities: These entities participated via the steering committee and through jurisdictional outreach. This effort saw local government, code enforcement, floodplain management, emergency management, stormwater management, community and economic development, and public health departments exercise their voice in this update. See Appendix 1 for additional information.

- Agencies with the Authority to Regulate Development: Code enforcement, floodplain management, and zoning officers participated in the steering committee and through jurisdictional outreach. See Appendix 1 for additional information.
- Neighboring Communities: As a regional document, the 2024 update includes significant neighbor-to-neighbor consideration. Additionally, the PDC's contractor notified the neighboring county emergency managers *not in Region 2* and asked them for feedback on hazards and proposed strategies that could impact their jurisdictions. See Appendix 1 for copies of emails to neighboring emergency managers as well as received replies.
- Businesses, Academic, and Other Private Interests: The steering committee included representation from a county-level economic development entity and Marshall University, the largest institution of higher education in the region (see Appendix 1 as appropriate). Additionally, the PDC's contractor pulled information from all six economic development entities in the region. The Region 2 Planning & Development Council represents several businesses and private interests through its private sector membership.

HISTORICALLY UNDER-SERVED POPULATIONS

Revised hazard mitigation planning guidance from FEMA (2023c, pp. 35-38) understandably and necessarily advises communities to create an equitable planning process. The PDC and its member governments support boosting participation by historically under-served communities and socially vulnerable populations. During the 2024 update, the steering committee identified and considered many ways to reach out to historically under-served populations, and then chose the most "implementable" for this update. As such, most of the outreach represents "procedural equity" (FEMA, 2023c, p. 35), whereby the PDC attempted to engage communities and populations that have not regularly participated in emergency preparedness or hazard mitigation planning in the past. These communities include the following.

- Congregate settings (through steering committee participation)
- Health and social services departments (via meetings)

Not only was Marshall University invited to participate on the steering committee for its potential knowledge about hazards, planning processes, and other specialized areas, it is a major stakeholder in the region for its economic impact and its status as a home-away-from-home for many of its 10,000+ students (ref: **congregate settings**, i.e., semi-permanent residents without knowledge of the broader area). As such, the university's input about the hazards that most concern it and the challenges its students might face was invaluable.

Additionally, during Year 4 of the planning cycle, the PDC used the interim cycle annual update process to add "epidemic/pandemic" as a profiled hazard in the plan. The region's public health departments participated heavily in that process, and several public health representatives served on the steering committee for the 2024 update (ref: **health and social services departments**). Aside from insight about the epidemic/pandemic hazard, public health participants shared insights about their outreach with numerous other under-represented populations (e.g., the homeless population, those in substance abuse recovery, those without health insurance, etc.).

The region has been proactive in recognizing substance use issues as a hazard impacting many aspects of life in its communities. For the 2018 version of this plan, the PDC included "opioid epidemic" as a profiled hazard. During the 2024 update, a meeting with representatives from the Williamson Health and Wellness Center in Williamson (Mingo County) (ref: **health and social services**) led to re-naming that profile as "substance use crisis." Per that discussion, substance use and abuse extends beyond opioids. The renaming of the profile is, thus, sensitive to that reality. Additionally, this planning partner discussed the challenges of convincing some of the region's residents as to the need to mitigate certain hazards. West Virginians pride themselves on resilience and heritage. Many residents accept flooding as a part of life, and simply clean-up, recover, and move on. When faced with a decision to mitigate a property and move, the associated break with one's ancestral land is too difficult to bear. Future updates can feature greater attempts to educate the region's residents as to a range of mitigation actions that may not impact those heritage concerns (e.g., elevations, mitigation to non-flood hazards, etc.).

Attempts to identify under-served populations, though necessary, run the risk of inadvertently excluding various groups as the focus narrows on specific population groupings. The PDC and its planning partners are sensitive to that reality. This sub-section identified several populations to which the PDC reached out; however, there are likely other under-served communities. Section 3.0 will include regional mitigation actions to identify and incorporate the perspectives of other groups.

OUTREACH TO STAKEHOLDERS REPRESENTING COMMUNITY LIFELINES

Per FEMA, "community lifelines" are vital services in a community and, when stabilized in the aftermath of (or hardened before) a major incident, they enable other aspects of life in a community to continue (FEMAa, 2023, p. 23). There are currently eight lifelines: (a) safety and security, (b) hazardous materials, (c) food, hydration, and shelter, (d) health and medical, (e)

energy, (f) transportation, (g) communications, and (h) water systems (FEMAa, 2023). Region 2 PDC's planning process included people who represent several of those lifelines.

a. Safety and Security: Emergency management (EM) directors from the six counties served on the steering committee, many of whom are responders in addition to their EM roles. Other government officials also served on the steering committee. **These participants provided first-hand knowledge of past events, the impacts associated with them, and the performance of response systems.**
b. Hazardous Materials: N/A
c. Food, Hydration, Shelter: N/A
d. Health and Medical: The steering committee included public health representation and extended outreach included entities serving socially vulnerable populations. **These participants provided insight as to how hazards impacting the region might affect chronic health concerns.**
e. Energy: N/A
f. Transportation: N/A
g. Communications: The EM directors referenced above work closely with emergency communications (i.e., 911) officials in their jurisdictions (and, in some cases – e.g., Wayne County, fill both roles). Further, the PDC is heavily involved in the development of broadband infrastructure in its jurisdictions (as are all of the PDCs in West Virginia). **Participants were able to talk about how the hazards that could affect the region could impact communications systems (e.g., the impacts of the 2021 ice storm in Mason and Wayne Counties).**
h. Water Systems: The region is unique in that it contains several municipal jurisdictions with levee systems. Though not water systems in the sense of water distribution, they are infrastructure that are critical to these municipalities. The steering committee included representation from the Huntington Stormwater Utility. **These participants grounded the strategies considered for levees per cost, technical feasibility, etc.** As "special districts" (FEMA, 2023c) and water system lifeline representatives, the Huntington Sanitary Board, Logan Sanitary Board, and Man Sanitary Board participated at an additional level. **They surveyed their customers about hazard concerns and their support for infrastructure mitigation projects** (see Appendix 1).

Public Involvement

The following narrative describes the results of the PDC's public participation effort. See Appendix 4 for additional information.

Public Participation During Drafting

The public had the opportunity to participate during the drafting of the 2024 update via in-person meetings and an online survey.

ONLINE SURVEY

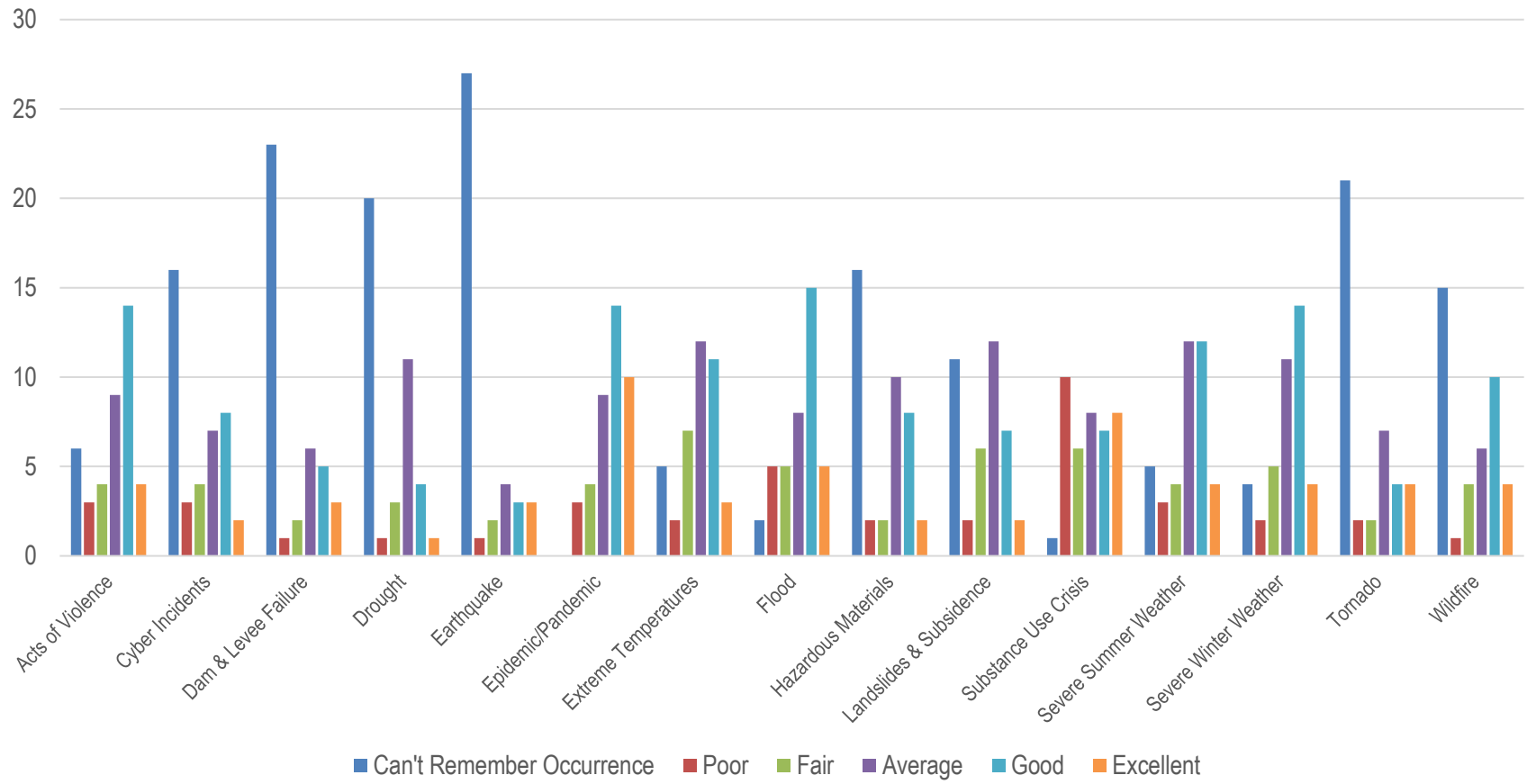
The PDC had great success with an online survey for its 2018 update, and as such, the steering committee decided to utilize the approach for the 2024 update. Steering committee members, the PDC itself, and participating jurisdictions shared access to the survey via social media channels and websites. The PDC linked the public survey on its website homepage, and as such, when partners shared "the link" to the survey, members of the public found the PDC's website, a legitimate, recognizable local entity (as opposed to a random string of letters generated by an online survey tool). Unfortunately, the number of responses for the 2024 survey were far fewer than the number in 2018.

Forty individuals responded to the 2023/2024 survey during the plan update. This figure was 93.11% below the totals from 2018. It is difficult to determine the precise reason for the decline, though the steering committee will consider adding the public outreach effort in upcoming years. Substance use crisis was the hazard to which the highest number of respondents indicated being "Concerned" or "Very Concerned" (n=35, 87.50% of respondents), followed by flood (n=31, 77.50% of respondents) and severe winter weather (n=24, 60.00% of respondents). Regarding the types of mitigation actions respondents would support in their communities, six types of projects (out of 17 possible choices) received 25 or more selections.

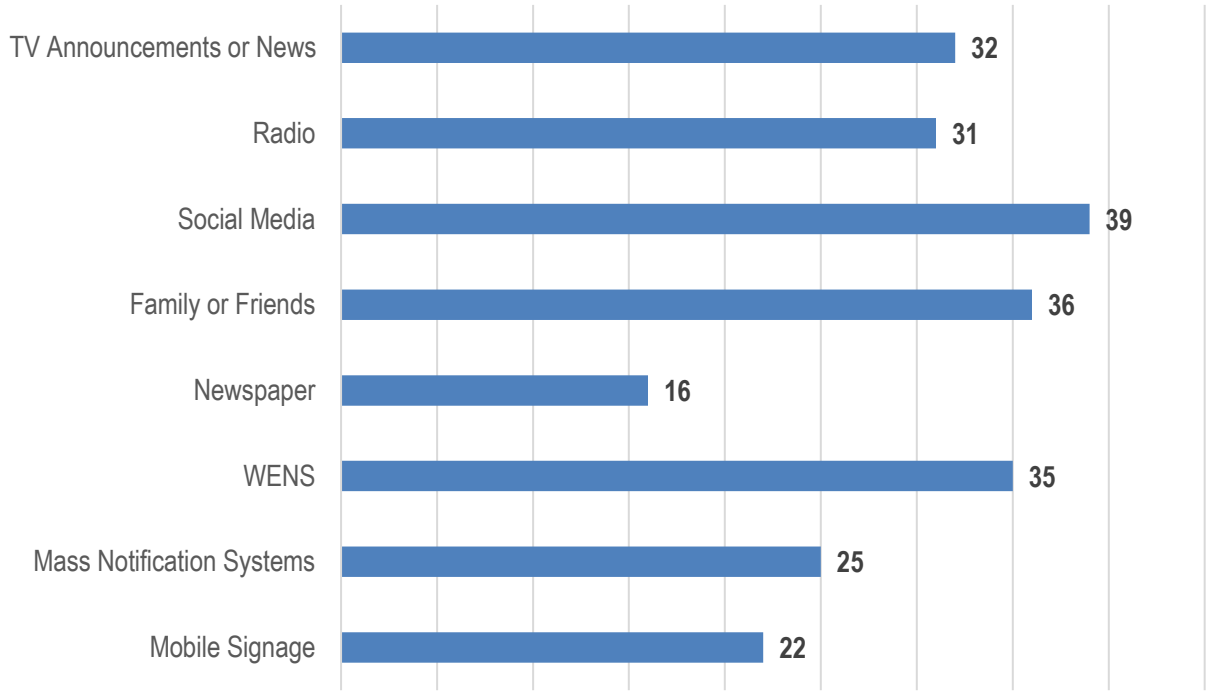
- Burying power lines to provide for uninterrupted power during severe weather (n=30)
- Upgrading the water and sewer systems (n=30)
- Establishing standards for all utilities regarding tree pruning around lines (n=29)
- Installing generators in critical facilities such as clinics, police stations, fire stations, etc. (n=29)
- Upgrading infrastructure, such as increasing the capacity of drain systems, etc. (n=29)
- Planting trees to prevent erosion and promote cooler micro-climates (n=25)

References to the survey responses appear in the hazard profiles in Section 2.2 below. These references report the results for the levels of concern for the hazards included in the plan and the memory of past occurrences. Other results appear as follows.

Think back to a recent occurrence of these hazards. How would you rate your community's ability to respond to each?



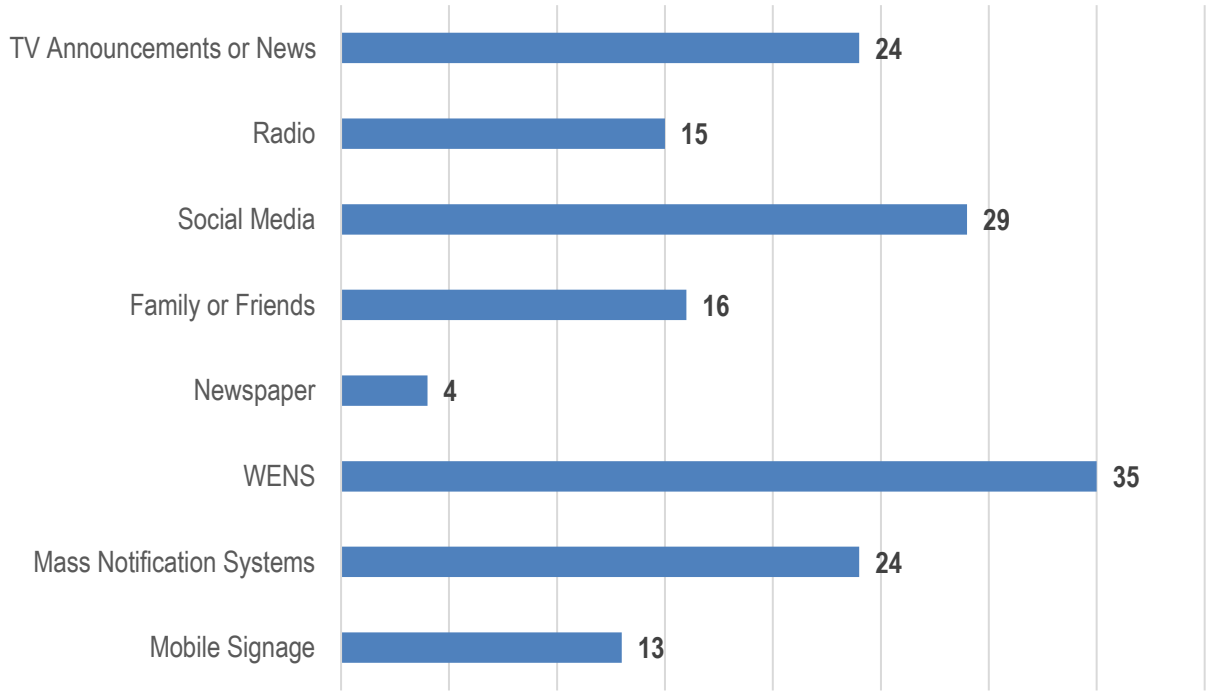
Which methods of notification (about hazard events) are available to you? (Check all that apply.)



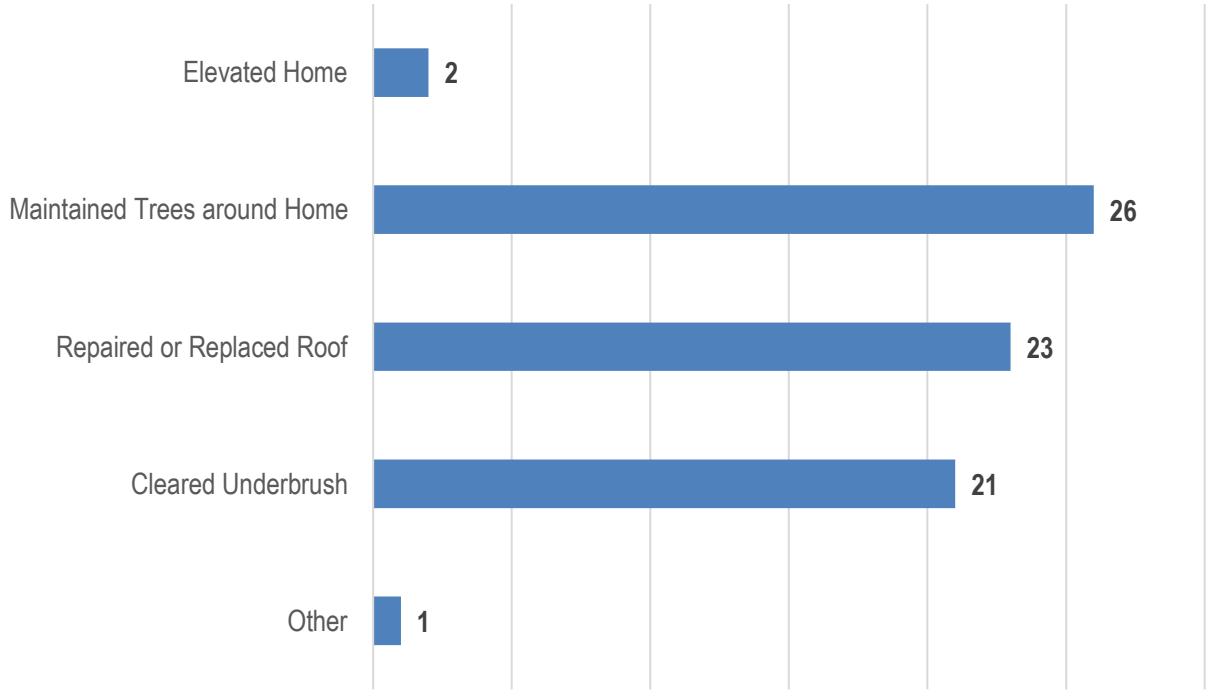
Do you receive timely, accurate, and effective notifications from these sources that allow you to make appropriate decisions about what to do?

- Yes = 33
- No = 3
- N/A = 3
- No Answer = 1

Which methods of notification do you prefer? (Check all that apply.)



Mitigation is an effort by you, your community, and/or your local officials to reduce the negative impacts of hazards. Have you ever… (Check all that apply.)



As noted in the community lifelines discussion above, the sanitary boards for Huntington, Logan, and Man issued a survey to their customers regarding hazard perceptions, but with a focus on infrastructure impacts. Sixty-three (63) customers responded to these surveys, 59 of which live in Cabell County and four of which live in Wayne County. These public representatives were most concerned about the substance use crisis, severe summer weather, severe winter weather, and acts of violence.

The hazards causing the most impacts to infrastructure, per the survey, were severe winter weather (43 responses), severe summer weather (37 responses), and flooding (36 responses). Epidemic/pandemic (22 responses) and extreme temperatures (25 responses) were the only other hazards to receive 20 or more responses. Power outages was by far the most-frequently experienced infrastructure impact (60 responses), followed by internet outages (48 responses) and road closures (43 responses). See Appendix 4 for the results of the full survey.

IN-PERSON MEETINGS

To supplement the online survey (and to mirror the 2018 update), the PDC also worked with its member governments to schedule an in-person public meeting in each of its counties. These meetings occurred as follows.

- Mason County Courthouse, January 17, 2024
- Region 2 Planning & Development Council Office, January 17, 2024
- Wayne County Courthouse, January 18, 2024
- Lincoln County (Virtual), January 19, 2024
- Logan County (Virtual), February 15, 2024
- Mingo County (Virtual), February 15, 2024

Unfortunately, winter weather impacted three of these meetings, forcing local leaders to move them to a virtual format at the last minute. Of course, this change (and the weather itself) likely impacted attendance, though local officials felt overall safety was of paramount importance.

No one from the public attended the in-person (or rescheduled virtual) meeting options. The meetings were held during regular work hours, a decision with known drawbacks, but necessary due to jammed schedules. For future updates, the PDC will consider evening options. The PDC will also seek to obtain public participation during the interim update cycles.

Public Participation Prior to Adoption

Upon receipt of "approved pending adoption" (APA) status from FEMA Region III, the PDC will update the plan that the public can access via the PDC's website (region2pdc.org). Additionally, local government meetings at which the governing bodies adopt resolutions are public, and the public notices for meetings in which the body intends to adopt the plan can include a link to the plan on the PDC's website.

1.0 INTRODUCTION

1.2 Description of the Planning Area

The description of the planning area contextualizes the remainder of this document. It provides the background information on the areas impacted by various hazards and serves as a foundation for mitigation decisions.

LOCAL GOVERNMENTS IN REGION 2

Name	*Level*	*Location*
Barboursville	Village	Cabell County
Cabell	County	N/A
Ceredo	Town	Wayne County
Chapmanville	Town	Logan County
Delbarton	Town	Mingo County
Fort Gay	Town	Wayne County
Gilbert	Town	Mingo County
Hamlin*	Town	Lincoln County
Hartford	Town	Mason County
Huntington*	City	Cabell County
Huntington Sanitary Board	Special District	Cabell & Wayne Counties
Kenova	City	Wayne County
Kermit	Town	Mingo County
Leon	Town	Mason County
Lincoln	County	N/A
Logan	County	N/A
Logan*	City	Logan County
Logan Sanitary Board	Special District	Logan County
Man	Town	Logan County
Man Sanitary Board	Special District	Logan County
Mason	Town	Mason County
Mason	County	N/A
Matewan	Town	Mingo County
Milton	City	Cabell County
Mingo	County	N/A
Mitchell Heights	Town	Logan County
New Haven	Town	Mason County
Point Pleasant*	City	Mason County
Wayne	County	N/A
Wayne*	Town	Wayne County
West Hamlin	Town	Lincoln County
West Logan	Town	Logan County
Williamson*	City	Mingo County

* Denotes a county seat

Geography

The Region 2 Planning and Development Council (PDC) consists of six counties situated mostly on the Appalachian Plateau in southwest West Virginia (WVGES, 2020). The counties in the region include Cabell, Lincoln, Logan, Mason, Mingo, and Wayne. The region also contains 24 municipalities. The region covers 2,564 square miles, of which approximately 30 square miles are water (QuickFacts, 2023). The region has a total population of 229,518.

The only West Virginia PDC region that borders Region 2 is Region 3. The counties within West Virginia that border Region 2 include Boone, Jackson, Kanawha, McDowell, Putnam, and Wyoming. The region is bordered on the west by the Ohio River and the States of Kentucky and Ohio.

The median elevation of the region is 609 feet above sea level, with the topography considered rolling rather than mountainous. The major rivers that traverse the region include the Ohio River which flows along the western edge of Mason, Cabell, and Wayne Counties, The Big Sandy and Tug Fork Rivers which flow along the southwestern border of the state, flowing along the western edge of Wayne and Mingo Counties, the Guyandotte River that

runs through Cabell, Lincoln, Logan, and part of Mingo Counties, and the Kanawha River that runs through Mason County.

Cabell County

Cabell County is located in the northern portion of the region, the Ohio River establishes its western border. The county was organized in 1809 and named for William H. Cabell, Governor of Virginia from 1805 to 1808. The population of Cabell County is 92,730, making it the most populace county in the region and the fourth most in the state. In fact, Cabell County accounts for 40% of the region's total population, and its county seat, the City of Huntington with a population of 46,842, accounts for 20% of the regions total population. Despite being the most populace county in the region, it is the smallest with regards to land area, covering 288 square miles, seven of which are water (QuickFacts, 2023). Cabell County's other municipalities include The Village of Barboursville and the Town of Milton. The county is part of the Huntington-Ashland, WV-KY-OH Metropolitan Statistical Area.

Cabell County is predominantly urban with 78% of the population living in urban areas. The rural parts of Cabell County include 179,853 acres of farmland with 407 working farms. The county is also home to Marshall University and the Thundering Herd football team, which draws nearly 30,000 people to the City of Huntington during home games.

The Huntington Sanitary Board is a "special district" (FEMA, 2023c, p. 10) operating in Cabell and portions of Wayne County. Headquartered in the City of Huntington, personnel operate in six teams: field maintenance, sewer, plant operations, pretreatment, street sweeping, and administration. The board operates the city's wastewater treatment plant with a team of 18 operators. The pretreatment team oversees commercial and industrial customers who discharge waste through the city's sewer lines, and the field maintenance team operates and maintains 12 major sewage pump stations that deliver wastewater to the treatment plan. The field maintenance team also operates and maintains 32 submersible pump stations and 131 individual home systems in the Inwood Shockey Project, as well as inspects 25 combined sewer outfalls (CSOs) (Huntington Sanitary Board, n.d.).

Lincoln County

Lincoln County is located in the central portion of the region. The county was created in 1867 and named for Abraham Lincoln. Lincoln County contains the least amount of municipal jurisdictions among the counties within the region, as the county is home to just two incorporated municipalities; the towns of Hamlin which serves as the county seat and West Hamlin. The vast majority of the county is considered rural. With a population of 19,901, Lincoln County is the least populated county in the region. The county has a land area is 439 square miles (QuickFacts, 2023).

The county is known for its distinction as the birthplace of General Charles "Chuck" Yeager, whose statue stands outside of the Town of Hamlin's Middle School.

Logan County

Logan County covers 456 square miles in the southern portion of the region. The county was formed in 1824 from parts of Giles, Tazewell, Cabell, and Kanawha counties, which at the time were all part of the state of Virginia. The county is named for Chief Logan, a famous Native American chief of the Mingo tribe. It has a population of 31,316 and is home to Towns of Chapmanville, Logan which serves as the county seat, Man, Mitchell Heights, and West Logan.

Logan County is home to Chief Logan State Park, which serves as a tourist's location, where visitors can enjoy the beautiful landscape the county has to offer. Thrill seekers can also visit the Bearwallow Trail System, which is one of the three original Hatfield and McCoy Trails for all-terrain vehicles. The West Virginia Air National Guard installation is located adjacent to the Logan County Airport, this facility is utilized as a low altitude drop zone and unimproved airstrip that enables guard officers to acquire dirt runway certifications.

Two additional "special districts" (FEMA, 2023c, p. 10) operate in Logan County; both are municipal utility (i.e., sewer) systems. The City of Logan Sanitary Board operates and maintains the wastewater collection and treatment system in and around Logan's municipal limits. Similarly, the Town of Man Sanitary Board operates and maintains the wastewater collection and treatment system for the town.

Mason County

Mason County is the northern most county in the region situated along the Ohio River. The county was founded in 1804 and named for George Mason, delegate to the U.S. Constitutional Convention. It covers 445 square miles and contains the most municipal jurisdictions of the counties within the region. The six municipalities include the towns of Hartford, Henderson, Leon, Mason, New Haven, and the City of Point Pleasants which serves as the county seat. Mason County's population is 25,000 (QuickFacts, 2023). The county also contains part of the Ohio River Islands National Wildlife Refuge which is a nationally protected area.

Of the six counties in the region, Mason is the most agricultural with farmland comprising 45.2% of the county's area, with 876 working farms.

Mason County is home to the popular Mothman Festival and Mothman Museum, which were named after the much-discussed "moth-like" creature sightings that occurred in the county in the late 1960's after the tragic Silver Bridge collapse. Both the festival and museum found their genesis in response to renewed interest in the Mothman generated by the 2002 release of the Lakeshore Entertainment film, The Mothman Prophecies, starring Richard Gere.

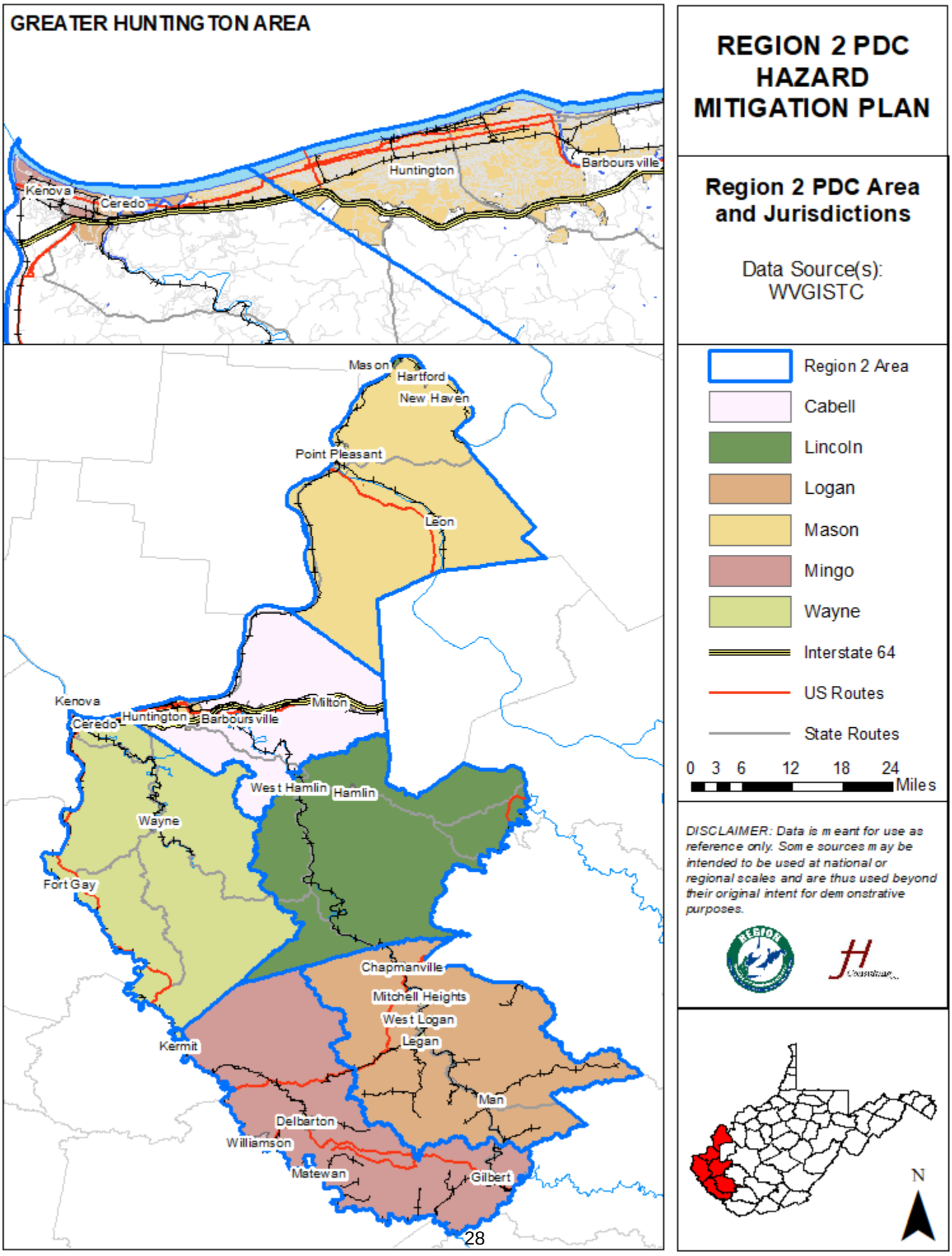
Mingo County

Mingo County is located in the southern most portion of the region and covers 424 square miles. Created in 1895 from parts of Logan County, Mingo is West Virginia's newest county, named for the historic Iroquoian people. The county's western border is established by the Tug Fork River. The population of the county is 22,573 (QuickFacts, 2023). Mingo County is home to the towns of Delbarton, Gilbert, Kermit, Matewan, and the City of Williamson which serves as the county seat.

Mingo County is situated in the heart of the Hatfield-McCoy Trail System and offers ATV riding enthusiast the options of three separate trails. The trails span over 300 miles and have designated community connectors in the Towns of Gilbert, Matewan and Delbarton, the Horsepen Mountain Community, and the City of Williamson. The Town of Gilbert is now home to Trailfest, one of the premier ATV/UTV and dirt bike riding events in the nation. The Town of Matewan's Historic District brings considerable mining history to life as it boasts sites from both the notorious Hatfield-McCoy family feud and the Coal Wars, including the Matewan Massacre and the Battle of Blair Mountain.

Wayne County

Wayne County is located in the west central portion of the region and is the westernmost county in West Virginia, situated along the banks of the Ohio River. The county was founded in 1842 from part of Cabell County and named for General “Mad” Anthony Wayne. The county covers 512 square miles, making it the largest county in the region regarding land area. The county has a population of 37,998 making it the second most populace county in the region. The municipalities within Wayne County include the Towns of Ceredo and Fort Gay, the City of Kenova, and the Town of Wayne which serves as the county seat. Wayne County is the home of the award-winning tourist attraction and educational program, Heritage Farm Museum and Village. Heritage Farm is the recipient of the Mountain State Award, recognized for “standing above the rest in excellence in programming”, and the first West Virginia Smithsonian-affiliated museum. Wayne County is also home to Beech Fork State Park, which offers some of the best recreational opportunities in the state’s southwestern region. Located in the City of Kenova, is Virginia Point Park, the western most point in the state of West Virginia.


GREATER HUNTINGTON AREA
Kenova
Ceredo
Huntington
Barboursville
Mason
Hartford
New Haven
Point Pleasant
Leon
Milton
West Hamlin
Hamlin
Wayne
Fort Gay
Chapmanville
Mitchell Heights
West Logan
Logan
Kermit
Man
Delbarton
Williamson
Matewan
Gilbert
REGION 2 PDC HAZARD MITIGATION PLAN
Region 2 PDC Area and Jurisdictions
Data Source(s): WVGISTC
Region 2 Area
Cabell
Lincoln
Logan
Mason
Mingo
Wayne
Interstate 64
US Routes
State Routes
0 3 6 12 18 24
Miles
DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.
N

Demographics

Population and demographic data provide baseline information for assessing the potential magnitude of hazards and can support trend analysis in potentially-vulnerable populations. The totals for individual decennial Census counts have fluctuated by county, and the region's population has seen a reasonably steady decline since 1950. Population estimates peaked for this period in 1950 (316,893), fell precipitously until 1980 (291,591), and then continually declined again from 1980 through 2020.

REGIONAL POPULATION TRENDS BY COUNTY, 1950-2020

County	*1950*	*1960*	*1970*	*1980*	*1990*	*2000*	*2010*	*2020*
Cabell	107,803	108,202	106,918	106,835	96,827	96,784	96,319	94,350
Lincoln	22,431	20,267	18,912	23,675	21,382	22,108	21,720	20,463
Logan	77,221	61,570	46,269	50,679	43,032	37,710	36,743	32,567
Mason	23,506	24,459	24,306	27,045	25,178	25,957	27,324	25,453
Mingo	47,304	39,742	32,780	37,336	33,739	28,253	26,839	23,568
Wayne	38,628	38,977	37,581	46,021	41,636	42,903	42,481	38,982
Region	**316,893**	**293,217**	**266,766**	**291,591**	**261,794**	**255,715**	**253,436**	**235,383**

Source: U.S. Census Bureau (i.e., various decennial Census products available online)

The following table depicts the demographic breakdown of the region by jurisdiction. The source for the data is the U.S. Census Bureau, American Community Survey, 2021 (Five-Year Estimates), except for the square miles (taken from Gazetteer Files, 2022) and the persons per square mile, which utilizes is a calculation between the total population for the jurisdiction and the land area in square miles.

REGION 2 DEMOGRAPHICS												
Jurisdiction	*Population (2022 Est.)*	*White*	*African American*	*American Indian & Alaska Native*	*Asian*	*Hispanic or Latino*	*Two or More Races*	*Veterans*	*Housing Units*	*MHI[1]*	*Persons in Poverty*	*Pop. Per Mile*
Cabell County	92,730	84,199	4,544	185	1,205	1,484	2,596	4,920	46,040	$48,944	17,990	322
Barboursville	4,456	3,972	150	4	140	48	171	405	1,812	$61,236	517	1,066
Huntington	45,746	38,884	3,248	46	640	778	2,653	2,264	24,338	$39,066	11,665	2,478
Milton	2,811	2,674	18	2	12	40	84	233	1,456	$42,857	255	1,399
Lincoln County	19,901	19,463	100	20	80	159	239	919	9,595	$50,985	4,776	45
Hamlin	1,039	1,002	5	1	0	4	31	61	524	$48,611	184	1,732
West Hamlin	524	500	1	3	1	3	18	79	326	$36,354	91	953
Logan County	31,316	30,283	564	31	94	376	344	1,273	14,788	$42,194	7,986	69
Chapmanville	1,020	973	3	2	6	21	28	102	598	$33,500	180	1,500
Logan	1,439	1,263	82	4	1	17	87	66	785	$38,267	366	1,199
Man	772	729	15	1	5	5	21	51	357	$70,481	126	643
Mitchell Heights	314	307	0	0	1	3	5	21	147	$73,438	14	924
West Logan	399	373	1	0	0	1	25	12	198	$56,094	83	1,174
Mason County	25,000	24,200	275	50	100	225	350	1,687	12,194	$53,058	6,375	56
Hartford	503	468	2	0	0	2	30	39	273	$50,114	81	406
Leon	137	129	0	1	0	0	7	10	66	$32,083	45	370
Mason	866	802	2	3	7	8	47	72	451	$46,406	189	1,493
New Haven	1,476	1,424	12	5	3	12	30	151	727	$58,533	103	1,135
Point Pleasant	4,070	3,837	54	9	29	28	137	240	2,207	$45,996	761	1,313
Mingo County	22,573	21,828	384	23	68	203	271	1,144	11,561	$38,305	5,759	53
Delbarton	422	411	0	2	1	2	8	27	223	$34,688	137	212
Gilbert	333	327	0	0	0	3	5	26	202	$39,375	77	320
Kermit	317	305	0	2	0	3	9	31	147	$30,625	107	813
Matewan	412	377	15	2	0	6	16	29	270	$22,250	127	749
Williamson	3,083	2,599	275	16	23	32	158	160	1,742	$23,173	987	943
Wayne County	37,998	36,972	304	114	114	304	456	2,401	18,283	$52,694	9,689	74
Ceredo	1,408	1,323	11	3	1	38	60	139	687	$32,305	367	690
Fort Gay	675	662	1	0	0	0	11	24	335	$24,519	256	776
Kenova	3,033	2,906	12	7	5	29	91	249	1,563	$49,896	252	1,827
Wayne	1,443	1,376	9	1	1	6	52	85	721	$25,391	312	1,223

The total population of the region, according to 2022 Census estimates is 229,518, which is a decrease of 5,865 over the past two years. Of that, 33.5% (i.e., 76,926) live within the 25 municipalities while 66.48% (i.e., 152,592) live in the unincorporated counties. Census figures also indicate that there are 112,461 housing units in the region creating an average of 2.04 persons per household. As illustrated in the table above Cabell County is the most populace county in the region and the City of Huntington is by far the most populace municipality in the region. The more densely populated jurisdictions of the region include; Huntington, Kenova, Hamlin, and Chapmanville.

Transportation

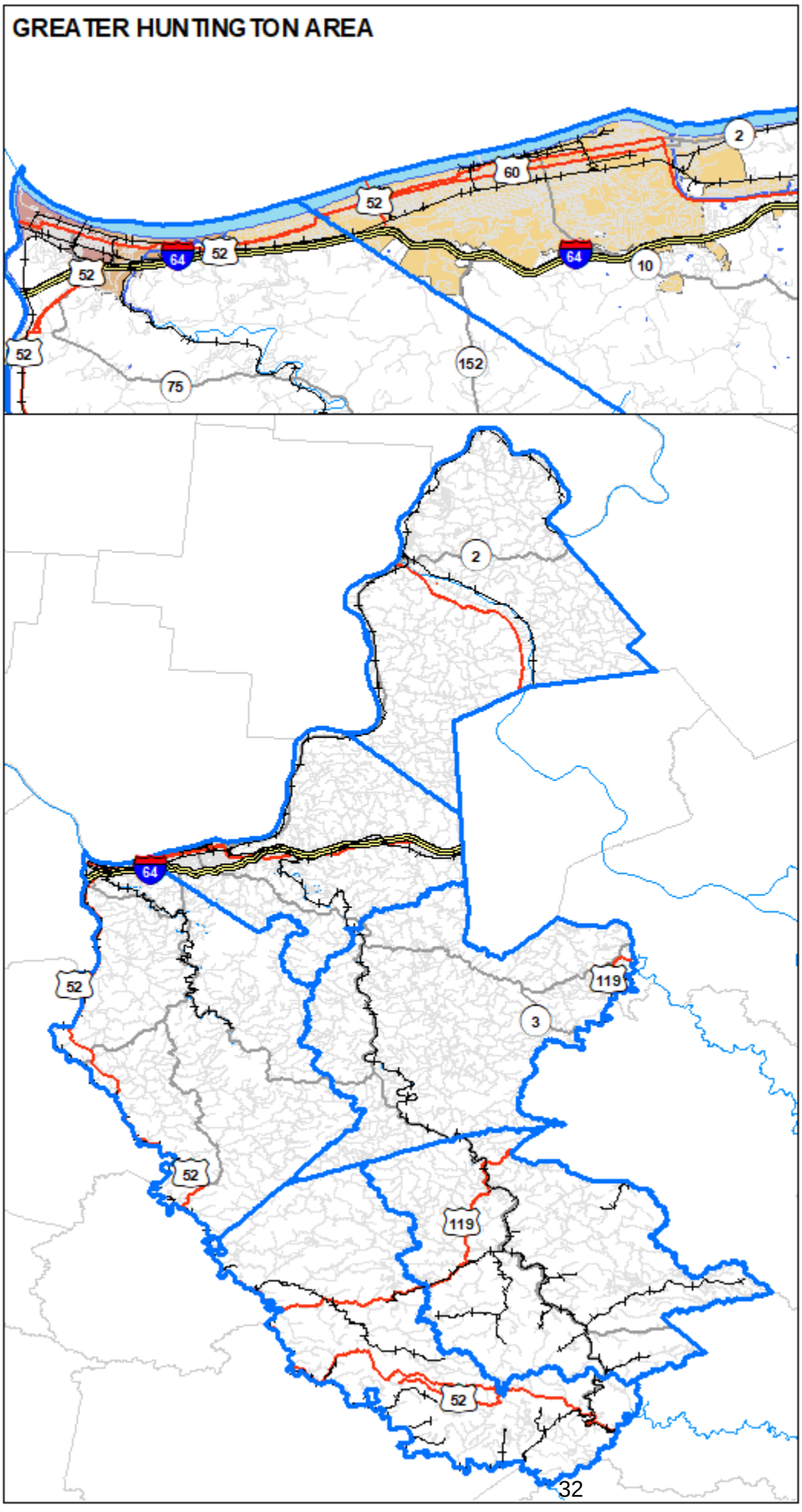
Despite having several rural areas, the region's transportation infrastructure does include roadway, railway, waterway, and airway modes.

Roadway

The transportation network of the Region 2 area includes four-lane, divided highways, two-lane roadways, and single-lane roadways. Interstate 64 and U.S. highways 35, 52, 60 and 119, along with State Routes 2, 10 and 152 make up the major arteries of ground transportation through the region. This network passes through several rural areas; therefore, many of the routes are curvy and traverse moderate grades. The major primary and secondary transportation routes that serve Region 2 are included in the table at right and are illustrated in the map below.

REGION 2 ROADWAY INFRASTRUCTURE	
Primary Routes	*Secondary Routes*
Interstate 64	State Route 2
U.S. Route 35	State Route 3
U.S. Route 52	State Route 10
U.S. Route 60	State Route 37
U.S. Route 119	State Route 75
	State Route 80
	State Route 152
	State Route 214

There are a few public transit options available in Region 2, the Tri-State Transit Authority (TTA) operates buses in and around the Huntington Area, the Tri-River Transit operates bus service in Lincoln, Logan and Mingo Counties as well as portions of Wayne. Commercial buses such as Greyhound also have stations in Huntington that offer service to various location.



REGION 2 PDC HAZARD MITIGATION PLAN

Roadway Network

Data Source(s):
U.S. Census
(Tiger Data)

Interstate 64
US Routes
State Routes
Miscellaneous Rds.

0 3 6 12 18 24
Miles

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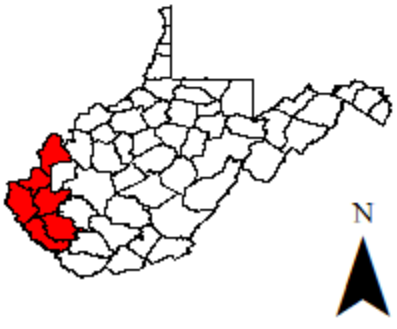
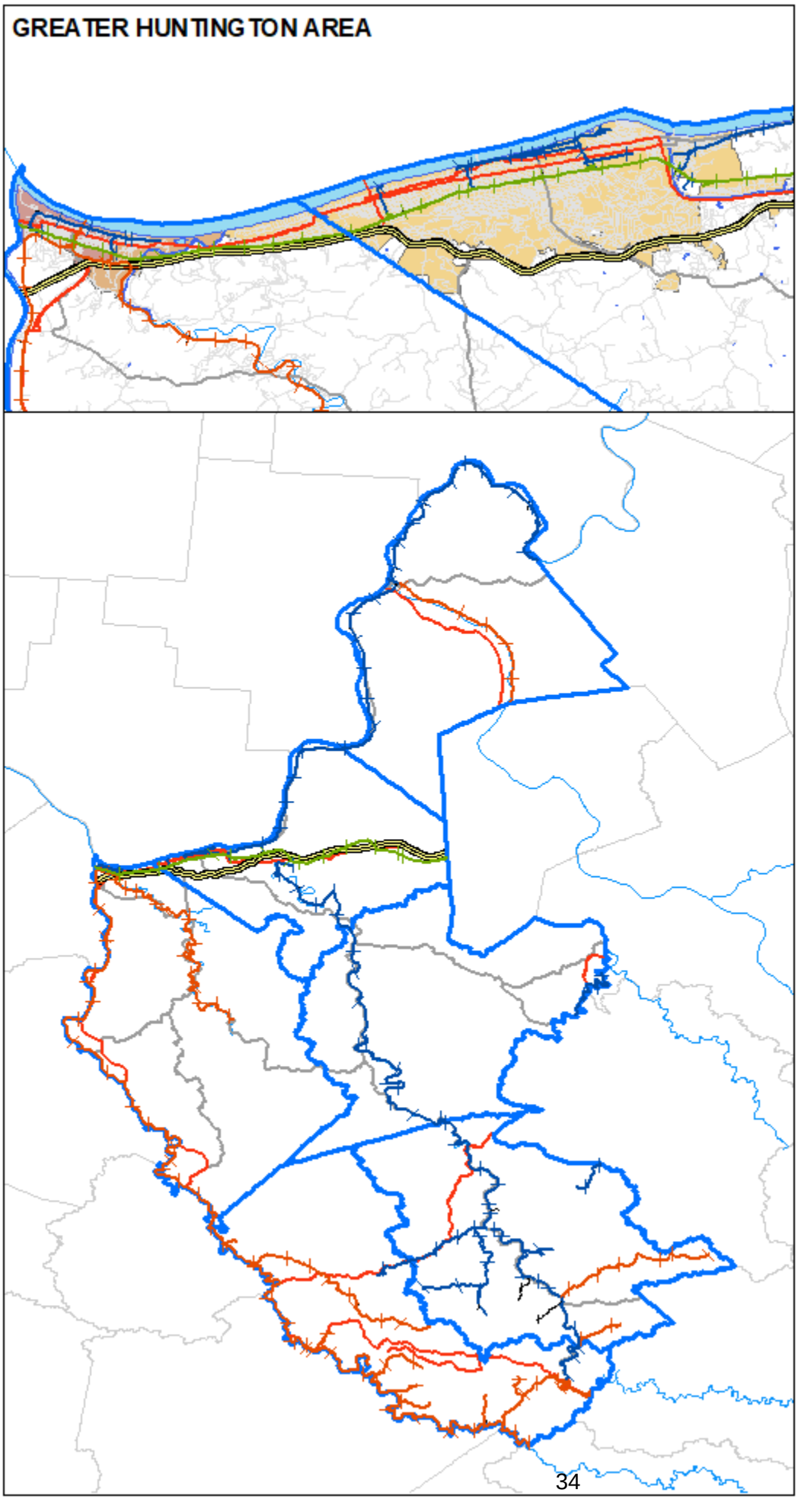


Railway

In addition to highways, all of the region is served in varying degrees by railway infrastructure. The region's railway network is comprised of Norfolk & Southern and CSX Transportation. The Heartland Intermodal Gateway located at Prichard in Wayne County, is served by the Norfolk & Southern railway which connects the Port of Virginia in Norfolk to Chicago and beyond. The CSX railway network passes through every county within the region, whereas the Norfolk & Southern railway network passes through Mason, Mingo and Wayne Counties only. The map below illustrates the railway infrastructure within Region 2.



REGION 2 PDC HAZARD MITIGATION PLAN

Railway Network

Data Source(s): U.S. Census (Tiger Data), WVGISTC

New River Train (Passenger)
CSX Transportation
Norfolk Southern
Interstate 64
US Routes
State Routes

0 3 6 12 18 24 Miles

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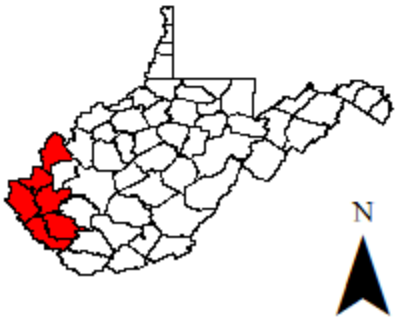


Waterway

Major waterways in the region include the Big Sandy, Tug, Guyandotte and Ohio Rivers. The Ohio River is the largest and most navigable of these rivers. The Port of Huntington Tri-State, located on the Ohio River, is the largest inland shipping port in the United States. The Port moves over 80 million tons of cargo annually. The Cabell-Wayne Port District is also located on the Ohio River.

Airway

The Huntington Tri-State Airport (HTS) located in Wayne County just outside of the City of Kenova and south of Interstate 64 is the primary air transportation provider for the region. Commercial air services is provided by Allegiant Air and American Airlines. Flights depart daily to not only regional hubs, such as Charlotte, but also, by direct flight, to other locations as far away as Florida. FedEx operations located at HTS is significant in the support of cargo flights that transport packages between the Tri-State region, and the FedEx and UPS global hubs in Memphis, Tennessee and Louisville, Kentucky.

Smaller, general aviation airports located in Cabell, Logan, Mason, and Mingo Counties connect private and corporate aircraft the public airports throughout the United States. The Logan County Airport serves as a base of operations for Air Evac Lifeteam which provides emergency air medical transportation via helicopter from the remote areas of the state to specialty hospitals throughout the region.

Utilities

Region 2 is served by a variety of power, water, sewer, cable, telephone, and internet companies. For a detailed list of services, refer to the table below.

REGION 2 UTILITIES

Utility Type	*Name*	*Cabell*	*Lincoln*	*Logan*	*Mason*	*Mingo*	*Wayne*
Cable/Internet	Armstrong Cable Services	X	X				
Cable/Internet	Cebridge Acquisition, LLC		X		X		X
Cable/Internet	Cequel III Communications I LLC		X				
Cable/Internet	Colane Cable Television			X		X	
Cable/Internet	Comcast Communications	X	X				X
Cable/Internet	Frontier West Virginia	X					
Cable/Internet	Lycom Communications, Inc.						X
Cable/Internet	Mikrotec CATV, LLC					X	

REGION 2 UTILITIES							
Utility Type	*Name*	*Cabell*	*Lincoln*	*Logan*	*Mason*	*Mingo*	*Wayne*
Cable/Internet	Shenandoah Cable Television, LLC		X	X		X	X
Cable/Internet	Time Warner Cable, Inc.				X		
Cable/Internet	Vogeler CATV		X				
Electric	Appalachian Power Company	X	X	X	X	X	X
Electric	Big Sandy Peaker Plant, LLC						X
Electric	Panda Culloden Power, L.P.	X					
Gas	Consumers Gas Utility Company	X					X
Gas	Hope Gas, Inc.		X				
Gas	Mountaineer Gas Company	X	X	X	X	X	X
Gas	Southern Public Service Company	X	X	X	X		
Gas	Union Oil & Gas Inc	X					
Sewer	Alva Lynn Vance, dba A. Vance Environmental	X					
Sewer	Boone County Public Service District			X			
Sewer	Buffalo Creek Public Service District			X			
Sewer	City of Huntington Sanitary Board	X					
Sewer	City of Huntington Sanitary Board						X
Sewer	City of Kenova						X
Sewer	City of Logan Sanitary Board			X			
Sewer	City of Milton	X					
Sewer	City of Point Pleasant				X		
Sewer	City of Williamson (Sewer)					X	
Sewer	Culloden Public Service District	X					
Sewer	Graham Meadows Service District, Inc.	X					
Sewer	Hamlin Public Service District		X				
Sewer	Hidden Valley Treatment, Inc.			X			
Sewer	Hubbard Heights Subdivision Homeowners Association						X
Sewer	Kermit Municipal Sewer Department					X	
Sewer	Linmont Sanitation System, Inc.	X					
Sewer	Logan County Public Service District			X			
Sewer	Mason County Public Service District	X					
Sewer	Mason County Public Service District				X		
Sewer	Mingo County Public Service District					X	
Sewer	Northern Wayne County Public Service District						X
Sewer	Pea Ridge Public Service District	X					
Sewer	Pleasant View Public Service District		X				
Sewer	Prichard Public Service District						X
Sewer	Salt Rock Sewer Public Service District	X					
Sewer	Sewage Systems, Inc.	X					
Sewer	Spring Valley Public Service District						X
Sewer	Town of Ceredo Sewer System						X
Sewer	Town of Chapmanville (Sewer)			X			
Sewer	Town of Delbarton (Sewer)					X	

REGION 2 UTILITIES							
Utility Type	*Name*	*Cabell*	*Lincoln*	*Logan*	*Mason*	*Mingo*	*Wayne*
Sewer	Town of Fort Gay						X
Sewer	Town of Gilbert (Sewer)					X	
Sewer	Town of Hartford				X		
Sewer	Town of Leon				X		
Sewer	Town of Man Sanitary Board			X			
Sewer	Town of Mason Sewer Department				X		
Sewer	Town of Matewan					X	
Sewer	Town of New Haven (Municipal Sewer System)				X		
Sewer	Town of Wayne						X
Sewer	Town of West Hamlin		X				
Sewer	Village of Barboursville	X					
Sewer	Wastewater Management, Inc.						X
Sewer	Williamsburg Sewer System, Inc.	X					
Telephone	Armstrong Telephone Company - West Virginia Division	X	X				
Telephone	Citizens Telecommunications Company of West Virginia	X	X		X		X
Telephone	Frontier West Virginia Inc.	X	X	X	X	X	X
Water	Boone County Public Service District			X			
Water	Branchland-Midkiff Public Service District		X				
Water	Branchland-Midkiff Public Service District						X
Water	Buffalo Creek Public Service District			X			
Water	Ceredo Municipal Water Department						X
Water	Chapmanville Municipal Water Works			X			
Water	City of Logan Municipal Water Department			X			
Water	City of Milton	X					
Water	City of Point Pleasant				X		
Water	City of Williamson (water)					X	
Water	Cottageville Public Service District				X		
Water	Crum Public Service District						X
Water	Fort Gay Municipal Water Department						X
Water	Gallipolis Ferry Water Association, Inc.				X		
Water	J-2-Y-35 Water Association, Inc.				X		
Water	Justice Public Service District					X	
Water	Kenova Water Department						X
Water	Kermit Municipal Water Department					X	
Water	Lavalette Public Service District						X
Water	Lincoln Public Service District		X				
Water	Logan County Public Service District			X			
Water	Mason County Public Service District	X					
Water	Mason County Public Service District				X		
Water	Mingo County Public Service District					X	
Water	Salt Rock Water Public Service District	X					

REGION 2 UTILITIES							
Utility Type	*Name*	*Cabell*	*Lincoln*	*Logan*	*Mason*	*Mingo*	*Wayne*
Water	Town of Delbarton (Water)					X	
Water	Town of Gilbert Water Works					X	
Water	Town of Hartford Water Department				X		
Water	Town of Man			X			
Water	Town of Mason Water Department				X		
Water	Town of Matewan					X	
Water	Town of New Haven (Municipal Water Department)				X		
Water	Town of West Hamlin		X				
Water	Wayne Municipal Water Department						X
Water	West Logan Water Company			X			
Water	West Virginia-American Water Company	X	X	X	X		

Source: Public Service Commission of West Virginia

Economy

In terms of economic health, three of Region 2's counties (i.e., Lincoln, Logan, and Mingo) are designated as "Distressed" by the Appalachian Regional Commission. This exceeds the number located in any other Regional Planning & Development Council's jurisdiction in the state. In terms of poverty rates, the average for the six-county region is 22%, in comparison to the 17.8% state rate and the 11.8% national rate.

Throughout the region, major employment sectors include health care, education, manufacturing and retail. Cabell Huntington Hospital and St. Mary's Hospital in Cabell County are two of the larger employers in the Region, along with Marshall University.

Historically, extraction industries, specifically coal and timber, and associated supply chain businesses, have constituted the mainstay of employment in Mingo and Logan counties. However, jobs in the mining and timber industries have suffered a 46% decrease over the last six years. The closure of a coal-fired power plant in Mason County in 2016 idled hundreds of workers. The loss of tax revenues and coal severance income has sharply reduced the counties' capability to provide support for even the most critical of services (i.e., fire and police protection, medical transport, and disaster recovery personnel).

The asset inventory included in the mitigation planning process often-times includes major employers as economic assets. When a disaster strikes and individuals are unable to work, this results in loss of income as well as a loss in tax revenue for the counties. The top employers among the counties within Region 2 are mostly associated with boards of education, medical facilities (i.e., hospitals) and large retail stores (i.e., Wal-Mart)

REGION 2 – TOP 10 EMPLOYERS BY COUNTY					
Cabell	*Lincoln*	*Logan*	*Mason*	*Mingo*	*Wayne*
Mountain Health Network	County BOE	County BOE	County BOE	County BOE	County BOE
County BOE	Lincoln County Opportunity Co.	Lifepoint Hospitals	Mountain Health	Mingo Logan Coal Company	Allevard Sogefi USA
Marshall University	Lincoln Nursing & Rehab Ctr.	Contura Energy	Wal-Mart	Coalfield Comm. Action Partnership	Diversified Assessment & Therapy
Village Caregiving	Lincoln County Primary Care Ctr.	Arch Coal	APG Polytech	West Virginia Personnel	Wal-Mart
Wal-Mart	Lincoln County Commission	Coronado Global Resources	Appalachian Power Company	Williamson Health & Wellness Center	Wayne County Commission
Huntington Alloys Corp.	Clay's Performance Construction	Ramaco Resources	WVDCR Dept. Corrections	Trinity Healthcare Services	Braskem America
Alcon Research	WVDHHR	Wal-Mart	Mason County Commission	Mingo County Commission	Coalfield Development Corp.
Steel of West Virginia	WVDOH	Logan County Commission	ICL Supresta	Virginia Drilling Company	House-Hasson Hardware
West Virginia's Choice	Tri River Transit	Southern WV Comm. & Tech College	Campbell Transportation Company	WVDHHR	Zim's Bagging Company
Marshall University Research Corp.	Forth's Foods	Lowe's Home Centers	Lakin State Hospital	Professional Transportation	Wayne Nursing & Rehab Ctr.

Source: WorkForceWV; Largest Employers in West Virginia by Area, First Quarter 2023

The unemployment rates throughout the region had been steadily falling over the past several years, from average highs around 6.4% in 2018 to average lows of 4.45% in 2022. The average unemployment rates did jump to a high of 10.13% in 2020, possibly influenced by the Coronavirus pandemic.

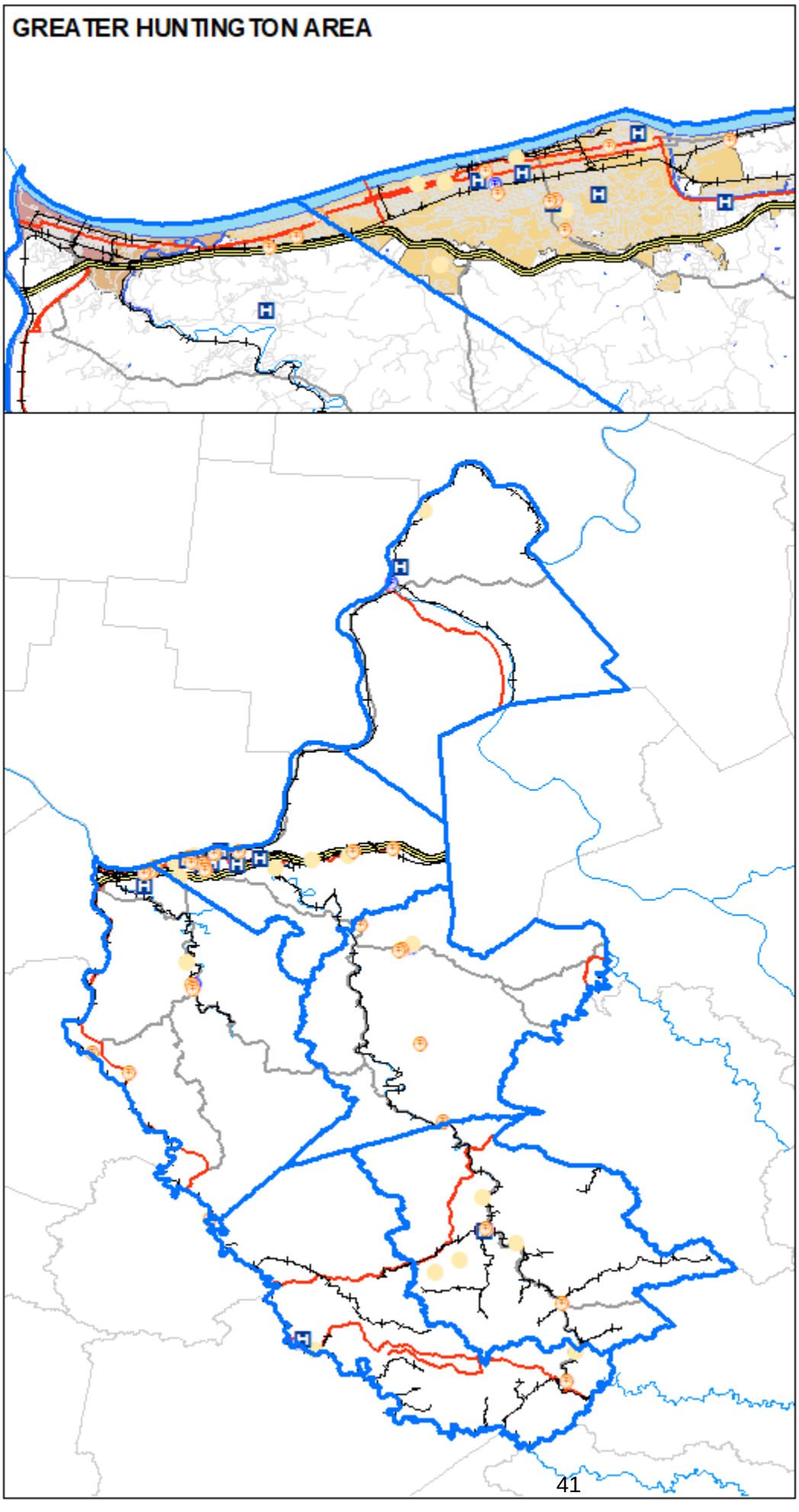
REGION 2 UNEMPLOYMENT RATES BY COUNTY					
County	*2018*	*2019*	*2020*	*2021*	*2022*
Cabell	4.6	4.2	7.9	4.7	3.5
Lincoln	6.8	6.4	10.0	6.6	5.0
Logan	6.8	6.0	12.0	6.6	4.3
Mason	6.9	6.0	8.4	5.5	4.3
Mingo	7.5	6.8	14.2	8.9	5.6
Wayne	5.8	5.4	8.3	5.2	4.0

Source: WorkForceWV; Annual Report on Civilian Labor Force, Employment & Unemployment

Healthcare

There are five hospitals that serve the region, two located in Cabell County, and one in Logan, Mason, and Mingo Counties. Each county has a public health department that serves the community through immunizations, education, general wellness, and sanitary/environmental technical assistance. The table below lists healthcare facility throughout the region by county.

REGION 2 HEALTH & WELLBEING FACILITIES	
Cabell County	
Cabell Huntington Hospital St. Mary's Medical Center Marshall University Medical Center	CHH Women's & Family Medical Center Huntington VA Medical Center Edwards Comprehensive Cancer Center
Lincoln County	
Lincoln Primary Care Center Valley Health – Harts Alum Creek Medical Center	Prestera Mental Health Center Community Mental Health Center St. Mary's Physical Therapy – Hamlin
Logan County	
Logan Regional Medical Center Prestera Center Logan-Mingo Area Mental Health Logan Regional Cancer Center	Vigo Family Health Care Trinity Health Care Services KVC Behavioral Healthcare
Mason County	
Pleasant Valley Hospital Pleasant Valley Rehabilitation Center Point Pleasant Medical Center	Prestera Center Family Medicine Clinic Valley Health – Point Pleasant Pediatrics
Mingo County	
Trinity Health Care Services – Mingo Logan Mingo Area Mental Health Williamson Memorial Hospital	Tug Valley ARH Regional Medical Center Family Medical Center
Wayne County	
Valley Health – Various locations Three Rivers Medical Center	KVC Behavioral Healthcare



REGION 2 PDC HAZARD MITIGATION PLAN

Healthcare Facilities

Data Source(s):
WVGISTC

- Comm. Health Providers
- Hospitals
- Nursing Homes
- Public Health Depts.

0 3 6 12 18 24
Miles

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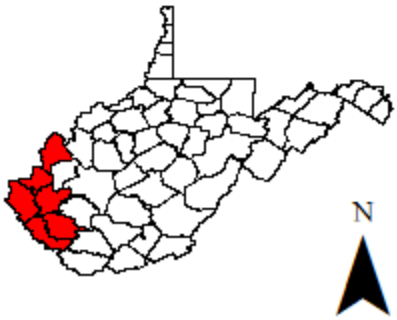

Land Uses / Climate

In the region, a very small percentage of land is devoted to industrial sites, most of which are clustered in and around the growth centers. The designated growth centers are made up primarily of residential, retail, service and light manufacturing uses, while rural areas include mainly conservation, recreation and wetland uses scattered throughout the timberlands. Heritage tourism, agriculture and recreation are three particular sectors that have seen resurgence, and growth in emphasis on their contribution to the diversification of the economies, which is essential to the economic viability and well-being of the regional population. Agribusiness exemplified by such initiatives as Refresh Appalachia and local form-to-table initiatives are among the endeavors to recapture and reinvent the significant agricultural business segment in the region.

Recreationally, the award-winning Hatfield-McCoy Trail system which consist of over 700 miles of professionally managed trails, is ranked as one of the nation's top-rated systems. With facilities in four of the six counties (i.e., Lincoln, Logan, Mingo and Wayne) the trails annually generate a total economic impact of more than $22 million.

West Virginia generally has a humid subtropical climate. The climate is predominantly influenced by air from the west. There is considerable variation in seasonal temperature, with none of the temperatures being considered severe. The climate is seasonal in nature, with west stormy springs, hot humid summers, colorful falls, and cold winters. The Ohio River creates a microclimate in its valley where temperatures tend to be moderated by the river, resulting in longer growing seasons compared to the rest of the region. Other microclimates, known as frost hollows or frost pockets, exist throughout locations near the river in small isolated valleys. Nocturnal temperatures are often several degrees colder near the river than the surrounding terrain. The majority of Region 2 Counties' climate is very similar. The average temperature varies from around 30 degrees Fahrenheit in the winter to around 75 degrees in the summer. Typical precipitation throughout the year averages to about 42.5 inches.

Asset Inventory

§201.6(c)(2)(ii)	[The risk assessment shall include a] description of the jurisdiction's vulnerability of the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.
§201.6(c)(2)(ii)(A)	The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.

Assets "include anything that is important to the character and function of a community" (USDHS FEMA, 2023c, p. 60). This plan stays consistent with that FEMA guidance document, defining assets as people (including underserved communities and socially vulnerable populations), structures, community lifelines and other critical facilities, natural, historic, and cultural resources, and economic and other activities having value in the region's communities (USDHS FEMA, 2023c, pp. 60-61).

The table below lists the assets for Region 2's communities. In the 2024 update, the region's communities had latitude to determine their own asset lists, with the previous (i.e., 2018) list and the broad FEMA definition above as starting points. Thus, while there will be some consistency as to the types of assets appearing on the lists, readers should expect slight variance. The table below includes built environment assets. The demographic and social vulnerability discussions above consider *people* assets in detail, as will the social vulnerability and underserved community discussions in the profiles of Section 2.2. Other assets, like natural areas, appear in the discussion of development trends below. Stakeholders in Region 2 recognize its rural nature as a key asset, and this recognition elevates the status of designated naturalized areas as assets. The region's economy is developing around these natural assets, and while all communities support broad economic growth, such growth must be consistent with a preservation of designated areas. Further, hazards such as floods, land subsidence, and landslides may permanently alter the look, feel of, and access to naturalized areas. Other hazards, such as wildland fires, may represent opportunities and threats for natural areas (e.g., burns and burn scars altering appearances yet serving the natural ecological cycle of the areas). A map of these assets follows the table.

REGION 2 HAZARD MITIGATION PLAN ASSET INVENTORY											
				Structures		*Community Lifelines & Other Critical Facilities*					
County	*Asset Name*	*Address*	*City/Town*	*Vulnerable*	*Special*	*Government (General)*	*Emergency Services*	*Medical*	*Utilities*	*Historic*	*Economic*
Cabell	Home Depot	1050 Thundering Herd Dr.	Barboursville								X
Cabell	Village of Riverview	1356 Riverview Dr.	Barboursville	X							
Cabell	Barboursville Middle School	1400 Central Ave.	Barboursville	X							
Cabell	Walmart	25 Nichols Dr.	Barboursville								X
Cabell	Martha Elementary	3067 Martha Rd.	Barboursville	X							
Cabell	Nichols Elementary	3505 Erwin Rd.	Barboursville	X							
Cabell	Package Treatment Plant	N/A	Barboursville						X		
Cabell	Post Office	404 Huntington Mall	Barboursville		X						
Cabell	Huntington Mall	500 Mall Rd.	Barboursville								X
Cabell	EMS Station 5	5233 Hale Branch Rd.	Barboursville				X				
Cabell	Davis Creek Elementary	6330 Davis Creek Rd.	Barboursville	X							
Cabell	Post Office	680 Central Ave.	Barboursville		X						
Cabell	Lowe's	700 Mall Rd.	Barboursville								X
Cabell	Village of Barboursville Elem.	718 Central Ave.	Barboursville	X							
Cabell	Barboursville City Hall	721 Central Ave.	Barboursville			X					
Cabell	Barboursville Public Library	728 Main St.	Barboursville		X						
Cabell	Wyngate Senior Living	750 Peyton St.	Barboursville	X							
Cabell	Barboursville Police Dept.	815 Main St.	Barboursville				X				
Cabell	US Coast Guard	95 Peyton St.	Barboursville			X					
Cabell	EMS Station 8	Riverview Dr.	Barboursville				X				
Cabell	Cabell Health Care Center	1 Hidden Brooke Way	Culloden					X			
Cabell	Post Office	2000 US Rt. 60	Culloden		X						
Cabell	Culloden Elementary	2100 US Rt. 60	Culloden	X							
Cabell	Culloden VFD	2102 3rd St.	Culloden				X				

REGION 2 HAZARD MITIGATION PLAN ASSET INVENTORY												
				Structures		*Community Lifelines & Other Critical Facilities*						
County	*Asset Name*	*Address*	*City/Town*	*Vulnerable*	*Special*	*Government (General)*	*Emergency Services*	*Medical*	*Utilities*	*Historic*	*Economic*
Cabell	Service Wire	310 Davis Rd.	Culloden								X
Cabell	Post Office	29272 Huntington Rd.	Glenwood		X						
Cabell	Riverview East	225 Short St.	Guyandotte	X							
Cabell	Station 5 HFD	301 5th Ave	Guyandotte				X				
Cabell	Guyandotte Elementary	607 5th Ave.	Guyandotte	X							
Cabell	Woodlands Retirement Community	1 Bradley Foster Dr.	Huntington	X							
Cabell	Huntington East Middle School	1 Campbell Dr.	Huntington	X							
Cabell	Big Sandy Superstore Arena	1 Center Plaza	Huntington								X
Cabell	Huntington High School	1 Highlander Way	Huntington	X							
Cabell	Huntington Steel	100 3rd Ave	Huntington								X
Cabell	Post Office	1000 Virginia Ave.	Huntington		X						
Cabell	Heritage Center	101 13th St.	Huntington	X							
Cabell	Cabell County Career Center	1035 Norway Ave.	Huntington	X							
Cabell	EMS Station 3	108 8th Ave. West	Huntington				X				
Cabell	Tri-State Transit Authority	1120 Virginia Ave.	Huntington						X		
Cabell	Highlawn Place	1130 3rd Ave.	Huntington	X							
Cabell	EMS Station 9	1133 20th St.	Huntington				X				
Cabell	Post Office	1200 Veterans Memorial Blvd.	Huntington		X						
Cabell	River Park Hospital	1230 6th Ave.	Huntington					X			
Cabell	Salvation Army Shelter	1277 3rd Ave.	Huntington		X						
Cabell	Cabell County 911	129 Gallagher St.	Huntington				X				
Cabell	Madison Manor	1329 Madison Ave.	Huntington	X							

REGION 2 HAZARD MITIGATION PLAN ASSET INVENTORY												
				Structures		Community Lifelines & Other Critical Facilities						
County	Asset Name	Address	City/Town	Vulnerable	Special	Government (General)	Emergency Services	Medical	Utilities	Historic	Economic
Cabell	Cabell/Huntington Hospital	1340 Hal Greer Blvd.	Huntington					X			
Cabell	Station 4 HFD	1431 West 5th Ave.	Huntington				X				
Cabell	Mildred Mitchel Bateman Hospital	1530 Norway Ave.	Huntington					X			
Cabell	VA Hospital	1540 Spring Valley Dr.	Huntington					X			
Cabell	Meadows Elementary	1601 Washington Blvd.	Huntington	X							
Cabell	Steel of WV	1700 2nd Ave.	Huntington								X
Cabell	Huntington Health and Rehab	1720 17th St	Huntington					X			
Cabell	Dawson/Thompson Oil Co.	1746 Virginia Ave.	Huntington								X
Cabell	EMS Station 6	1766 Washington Ave.	Huntington				X				
Cabell	Washington Square	17th St. and 8th Ave.	Huntington	X							
Cabell	Spring Hill Elementary	1901 Hall Ave.	Huntington	X							
Cabell	Trowbridge Manor	1st St. and 8th Ave.	Huntington	X							
Cabell	State Electric	2010 2nd Ave.	Huntington								X
Cabell	Post Office	2016 3rd Ave.	Huntington		X						
Cabell	Guyandotte Public Library	203 Richmond St.	Huntington		X						
Cabell	Central City Elementary	2100 Washington Ave.	Huntington	X							
Cabell	Christ Temple Church Shelter	2400 Johnstown Rd.	Huntington	X							
Cabell	Flint Pigment	2401 5th Ave	Huntington								X
Cabell	WV Electric	250 12th St. W	Huntington								X
Cabell	Altizer Elementary School	250 3rd St	Huntington	X							
Cabell	Rubberlite	2501 Guyan Ave.	Huntington								X
Cabell	Highlawn Elementary	2549 1st Ave.	Huntington	X							
Cabell	CSX	2550 6th Ave.	Huntington								X

REGION 2 HAZARD MITIGATION PLAN ASSET INVENTORY											
				Structures		*Community Lifelines & Other Critical Facilities*					
County	*Asset Name*	*Address*	*City/Town*	*Vulnerable*	*Special*	*Government (General)*	*Emergency Services*	*Medical*	*Utilities*	*Historic*	*Economic*
Cabell	St. Mary's Medical Center	2900 1st Ave.	Huntington					X			
Cabell	Explorer Academy	2901 Saltwell Rd.	Huntington	X							
Cabell	Station 10 HFD	3131 Washington Blvd.	Huntington				X				
Cabell	Special Metals	3200 Riverside Dr.	Huntington								X
Cabell	Post Office	323 Olive St.	Huntington		X						
Cabell	Walmart	3333 US - 60	Huntington								X
Cabell	EMS Station 2	343 Norway Ave	Huntington				X				
Cabell	Gallagher Village Public Library	368 Norway Ave.	Huntington		X						
Cabell	Hite Saunders Elementary	3708 Green Valley Rd.	Huntington	X							
Cabell	Earthen Levee	4.55 miles around Huntington	Huntington		X						
Cabell	Fletchers	402 High St.	Huntington								X
Cabell	Grief Brothers	409 Buffington St.	Huntington								X
Cabell	Tri-State Fire Academy	4200 Ohio River Rd.	Huntington			X					
Cabell	Nelson Apartments	422 9th St West	Huntington	X							
Cabell	Cabell County Public Library	455 9th St.	Huntington		X						
Cabell	Corps of Engineers	502 8th St.	Huntington			X					
Cabell	Station 8 HFD	509 Camden Rd.	Huntington				X				
Cabell	Station 2 Huntington Fire Dept.	534 20th St.	Huntington				X				
Cabell	Heistad House	534 7th Ave	Huntington		X						
Cabell	Huntington Water Quality Board	555 7th Ave	Huntington						X		
Cabell	Concrete Floodwall	6.70 miles around Huntington	Huntington		X						

REGION 2 HAZARD MITIGATION PLAN ASSET INVENTORY												
				Structures		*Community Lifelines & Other Critical Facilities*						
County	*Asset Name*	*Address*	*City/Town*	*Vulnerable*	*Special*	*Government (General)*	*Emergency Services*	*Medical*	*Utilities*	*Historic*	*Economic*
Cabell	Martin Steel	603 16th St. W	Huntington								X
Cabell	New Baptist Church Shelter	610 28th St.	Huntington	X							
Cabell	Vanity Fair	621 4th Ave	Huntington		X						
Cabell	Huntington City Mission	624 10th St	Huntington		X						
Cabell	Harmony House Day Center	627 4th Ave	Huntington	X	X						
Cabell	VA Huntington Regional Benefit Office	640 4th St. #100	Huntington			X					
Cabell	Columbia Paint	641 Jackson Ave.	Huntington								X
Cabell	Huntington Police Dept.	675 10th St.	Huntington				X				
Cabell	Fairhaven Rest Home	700 Madison Ave.	Huntington	X							
Cabell	Cabell Huntington Health Department	703 7th Ave.	Huntington			X					
Cabell	Cabell County Courthouse	750 5th Ave.	Huntington			X					
Cabell	Huntington City Hall	800 5th Ave.	Huntington			X					
Cabell	Grayson's Caring Hands	828 Washington Ave.	Huntington	X							
Cabell	Centennial Fire Station	839 7th Ave.	Huntington				X				
Cabell	US Federal Courthouse	845 5th Ave.	Huntington			X					
Cabell	Cabell County EMS Headquarters	846 8th Ave.	Huntington				X				
Cabell	Carter G. Woodson Apartments	8th Ave and Hal Greer Blvd.	Huntington	X							
Cabell	West Huntington Public Library	901 14th St West	Huntington		X						
Cabell	Huntington Middle School	925 3rd St.	Huntington	X							
Cabell	Southside Elementary	930 2nd St.	Huntington	X							

REGION 2 HAZARD MITIGATION PLAN ASSET INVENTORY											
				Structures		*Community Lifelines & Other Critical Facilities*					
County	*Asset Name*	*Address*	*City/Town*	*Vulnerable*	*Special*	*Government (General)*	*Emergency Services*	*Medical*	*Utilities*	*Historic*	*Economic*
Cabell	WK Elliott Apartments	Bridge St. and Buffington St.	Huntington	X							
Cabell	Marcum Terrace	Olive St.	Huntington	X							
Cabell	Huntington Internal Medicine Group	5170 US 60	Huntington					X			
Cabell	Mount West Community and Technical College	1 Mount West Dr.	Huntington	X							
Cabell	Marshall University	1 John Marshall Dr.	Huntington	X							
Cabell	Seaton Taylor	402 7th Ave	Huntington								X
Cabell	Alcon	2 Vision Lane	Lesage								X
Cabell	Cox Landing Elementary	6358 Cox Lane	Lesage	X							
Cabell	Cabell County Public Library	6363 Cox Landing Lane	Lesage		X						
Cabell	Cabell County School Bus Garage	6370 Cox Lane	Lesage			X					
Cabell	Ohio River Road VFD	6521 Ohio River Rd.	Lesage				X				
Cabell	Post Office	6596 Ohio River Rd.	Lesage		X						
Cabell	Milton Middle School	1 Panther Trail Way	Milton	X							
Cabell	Milton Baptist Church	1123 Church St.	Milton	X							
Cabell	Milton City Hall	1139 Smith St.	Milton			X					
Cabell	Milton Police Dept.	1139 Smith St.	Milton				X				
Cabell	Milton Public Library	1140 Smith St.	Milton		X						
Cabell	Post Office	1177 W Main St.	Milton		X						
Cabell	Milton Elementary	1201 Pike St.	Milton	X							
Cabell	EMS Station 7	1597 US Route 60	Milton				X				
Cabell	Cenergy	1763 US 60	Milton								X
Cabell	Milton VFD	341 East Main St.	Milton				X				

REGION 2 HAZARD MITIGATION PLAN ASSET INVENTORY											
				Structures		*Community Lifelines & Other Critical Facilities*					
County	*Asset Name*	*Address*	*City/Town*	*Vulnerable*	*Special*	*Government (General)*	*Emergency Services*	*Medical*	*Utilities*	*Historic*	*Economic*
Cabell	Blenko Glass	9 Bill Blenko Dr.	Milton								X
Cabell	Midland Meadows	100 Weatherholt Dr.	Ona	X							
Cabell	Cabell Midland High School	2300 Rt. 60 East	Ona	X							
Cabell	Post Office	2332 US 60	Ona		X						
Cabell	EMS Station 1	2500 Rt. 60 East	Ona				X				
Cabell	Ona Elementary	2701 Elementary Dr.	Ona	X							
Cabell	Ona VFD	2900 Howell's Mill Rd.	Ona				X				
Cabell	Salt Rock Senior Center Shelter	5490 WV-10	Salt Rock		X						
Cabell	Salt Rock Elementary	5570 Madison Creek Rd.	Salt Rock	X							
Cabell	Salt Rock Public Library	5575 Madison Creek Rd.	Salt Rock		X						
Cabell	Post Office	5577 Madison Creek Rd.	Salt Rock		X						
Cabell	Salt Rock VFD	Rt. 10 and Madison Creek Rd.	Salt Rock				X				
Lincoln	Little General Store 4075 - Sam's HD / GF Pizza	403 Midway Rd	Alum Creek								X
Lincoln	Lincoln Schools - Midway PK-5	Rt.1 Rd	Alum Creek	X							X
Lincoln	Little General Store 4075 - Retail	403 Midway Rd	Alum Creek								
Lincoln	Little General Store 4015 - Retail	571 Midway Rd	Alum Creek								
Lincoln	Lincoln Schools - GVMS	St. Rt. 10 Rd	Branchland	X							
Lincoln	El Rancho Grande	McClellan HWY	Branchland		X						
Lincoln	Clark's Pump N Shop #9	McClellan HWY	Branchland		X						

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County	*Asset Name*	*Address*	*City/Town*	*Vulnerable*	*Special*	*Government (General)*	*Emergency Services*	*Medical*	*Utilities*	*Historic*	*Economic*
Lincoln	Henry's Camping Retreat - Restaurant	5109 Upper Mud River. Rd	Branchland		X						X
Lincoln	Speedway #9327 - Retail	5404 McClellan HWY Rd	Branchland								X
Lincoln	Walgreens #1655 - Retail (West Hamlin)	5798 McClellan HWY Rd	Branchland		X						
Lincoln	Speedway #9327 - Deli	5404 McClellan HWY Rd	Branchland								
Lincoln	Dollar General #907	Lynn Ave	Hamlin								
Lincoln	Lincoln Schools - Hamlin PK-8	8137 Court Ave	Hamlin	X							
Lincoln	Burger King- Little General Store 5135	Court Ave	Hamlin		X						
Lincoln	LCOC - Hamlin Senior Ctr.	360 Main St	Hamlin	X							
Lincoln	Lincoln Schools (Duval) - Board Office	10 Marland Ave	Hamlin	X							X
Lincoln	Forth's Foods (H) - Retail	8337 Court Ave.	Hamlin		X						X
Lincoln	Forth's Foods (H) - Deli	8337 Court Ave.	Hamlin		X						
Lincoln	Family Dollar #21108	Court Ave	Hamlin								
Lincoln	Gino's Pizza of Hamlin	Court Ave	Hamlin		X						
Lincoln	Tudor's Biscuit World - Hamlin	8229 Court Ave	Hamlin		X						
Lincoln	McDonald's	7305 Lynn Ave	Hamlin		X						
Lincoln	Lincoln Schools - LCHS	81 Panther Way Rd	Hamlin	X							X
Lincoln	Lincoln Health Care Center.	200 Monday Drive	Hamlin								X
Lincoln	Lincoln Primary Well Ctr.	7400 Lynn Ave	Hamlin								
Lincoln	Little General Store 5135 - Retail	Court Ave	Hamlin								

REGION 2 HAZARD MITIGATION PLAN ASSET INVENTORY											
				Structures		Community Lifelines & Other Critical Facilities					
County	Asset Name	Address	City/Town	Vulnerable	Special	Government (General)	Emergency Services	Medical	Utilities	Historic	Economic
Lincoln	Walgreens #1634 - Retail (Hamlin)	8315 Court Ave	Hamlin		X						
Lincoln	M & R Restaurant	7250 Lynn Ave	Hamlin		X						
Lincoln	Harts Galaxy - Retail	1085 McClellan HWY	Harts								
Lincoln	Lincoln Schools - Harts PK-8	Rt. 10 Rd	Harts	X							X
Lincoln	Little General Store 4037 - Godfather's Pizza	1062 McClellan HWY	Harts								X
Lincoln	Harts Galaxy - Deli	1085 McClellan HWY	Harts		X						
Lincoln	Family Dollar #26799	McClellan HWY	Harts								X
Lincoln	LCOC - Harts Senior Ctr.	Little Harts Creek Rd	Harts	X							
Lincoln	Little General Store 4037 - Subway	1062 McClellan HWY Rd	Harts								
Lincoln	Little General Store 4035 - Retail	1062 McClellan HWY Rd	Harts								X
Lincoln	Lincoln Schools - Ranger PK-5	104 Ranger Bottom Rd	Ranger	X							X
Lincoln	Gino's Pizza of West Hamlin	Lincoln Plaza	West Hamlin		X						X
Lincoln	Family Dollar #22796	McClellan Hwy	West Hamlin								X
Lincoln	Forth's Foods - Deli	Lincoln Plaza	West Hamlin		X						
Lincoln	Forth's Foods, Inc. - Retail	Lincoln Plaza	West Hamlin								X
Lincoln	Pam's #7 - Video Lottery	Rt. 10 & Rt.3	West Hamlin		X						
Lincoln	Pam's #7 - Retail	Rt.10 & Rt. 3	West Hamlin								
Lincoln	Prestera - Woodside Manor	8134 Scites St	West Hamlin								X

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				Structures		Community Lifelines & Other Critical Facilities					
County	Asset Name	Address	City/Town	Vulnerable	Special	Government (General)	Emergency Services	Medical	Utilities	Historic	Economic
Lincoln	Lincoln Schools - West Hamlin PK-5	Rt.1 Rd	West Hamlin	X							
Lincoln	Lincoln Daycare	9544Straight Fork Rd	West Hamlin	X							
Lincoln	Tudor's Biscuit World - West Hamlin	Rt. 10 Lincoln Plaza	West Hamlin		X						X
Lincoln	Giovanni's/Jamie's Pizza	Straight Fork Rd	Yawkey		X						
Lincoln	Yawkey Quick Mart	Rt.3 & Rt. 214	Yawkey								X
Logan	Buffalo ES	2367 Buffalo Creek Rd.	Accoville	X							
Logan	Buffalo Creek VFD	70 Garrison Dr.	Amhertdale				X				
Logan	Chapmanville East ES	161 Conley St.	Chapmanville	X							
Logan	Chapmanville MS	774 Crawley Creek Rd.	Chapmanville	X							
Logan	Chapmanville Regional HS	506 Crawley Creek Rd.	Chapmanville	X							
Logan	Chapmanville VFD	128 Tracy Vickers Ave.	Chapmanville				X				
Logan	Chief Logan Lodge	1131 Conference Center Dr.	Chapmanville		X						
Logan	West Chapmanville ES	100 W. Tiger Lane	Chapmanville	X							
Logan	WVSP Logan	8040 Old Logan Rd.	Chapmanville				X				
Logan	Omar ES	7061 Jerry West Hwy	Chauncey	X							
Logan	Aracoma Coal Inc.	634 Bandmill Holly Rd.	Ethel								X
Logan	Logan County Airport	3236 Bandmill Hollow Rd.	Ethel		X						
Logan	Hugh Dingess ES	29 Hugh Dingess School Rd.	Harts	X							
Logan	Main Harts Creek VFD	7984 Harts Creek Rd.	Harts				X				
Logan	Henlawaon VFD	3710Old Logan Rd.	Henlawson				X				
Logan	Cora VFD	28 Old Aldrich Branch Rd.	Holden				X				
Logan	Holden ES	1034 Copperas Fork Rd.	Holden	X							

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County	*Asset Name*	*Address*	*City/Town*	*Vulnerable*	*Special*	*Government (General)*	*Emergency Services*	*Medical*	*Utilities*	*Historic*	*Economic*
Logan	Lake VFD	1343 Hewitt Creek Rd.	Lake	X							
Logan	Chafin House	581 Main St.	Logan		X						
Logan	Crooked Creek Resource Center	100 Recovery Rd.	Logan		X						
Logan	Justice ES	70 Circle Dr.	Logan	X							
Logan	LEASA	26 1/2 Main Ave.	Logan				X				
Logan	Logan County BOE	506 Holly Ave.	Logan			X					
Logan	Logan County Courthouse	300 Stratton Street	Logan			X					
Logan	Logan County S.O	300 Stratton Street	Logan				X				
Logan	Logan EOC/911 Center	28 Main Ave.	Logan				X				
Logan	Logan ES	18 Wildcat Way	Logan	X							
Logan	Logan FD	219 Dingess Street	Logan				X				
Logan	Logan General Hospital	20Hospital Drive	Logan					X			
Logan	Logan HS	1 Wildcat Way	Logan	X							
Logan	Logan MS	14 Wildcat Way	Logan	X							
Logan	Logan PD	219 Dingess Street	Logan				X				
Logan	RR Willis Vocational Tech Center	144 Vocational Rd.	Logan	X							
Logan	Southern WV Community College	66 District Office Dr.	Logan	X							
Logan	Town of West Logan PD	515 2nd Ave.	Logan				X				
Logan	Wal-Mart Logan	77 Norman Morgan Blvd.	Logan								X
Logan	WV State Office Complex	130 Stratton St.	Logan			X					
Logan	Man ES	1 Pioneer Path	Mallory	X							
Logan	Logan County #2 VFD	64 Hollinsworth Field Rd.	Man	X							
Logan	Man HS	1 Hillbilly Circle	Man	X							
Logan	Man PD	105 Market St.	Man				X				

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County	*Asset Name*	*Address*	*City/Town*	*Vulnerable*	*Special*	*Government (General)*	*Emergency Services*	*Medical*	*Utilities*	*Historic*	*Economic*
Logan	South Man ES	301 E. McDonald Ave.	Man	X							
Logan	Town of Man VFD	12 Broad St.	Man				X				
Logan	Main Island Creek VFD	8 Firehouse Rd.	Omar				X				
Logan	Sharples VFD	25 Signature Circle	Sharples				X				
Logan	Verdunville ES	251 Mustang Hill Rd.	Verdunville	X							
Logan	Verdunville VFD	2270 Mud Fork Road	Verdunville				X				
Mason	M&G Polymers	27610 Huntington Road	Apple Grove								X
Mason	Mason County EMS - Apple Grove	Huntington Road	Apple Grove				X				
Mason	Valley Fire Department	28409 Huntington Road	Apple Grove				X				
Mason	Ashton Elementary	997 Ashton Upland Road	Ashton	X							
Mason	Hannan High	1 Wild Cat Way	Ashton	X							
Mason	Beale Elementary	12897 Huntington Road	Gallipolis Ferry	X							
Mason	R.C. Byrd Locks and Dam	1300 R C Byrd Drive	Gallipolis Ferry		X						
Mason	ICL Chemicals	11636 Huntington Road	Gallipolis Ferry								X
Mason	Hartford City Building	133 2nd Street	Hartford			X					
Mason	Hartford Police Department	133 2nd Street	Hartford				X				
Mason	Leon City Hall	136 Main Street	Leon			X					
Mason	Leon Elementary	1226 Burdette St	Leon	X							
Mason	Leon Fire Department	76 Vine Street	Leon				X				
Mason	AEP - Mountaineer Plant	1347 Graham Station Road	Letart						X		
Mason	Racine Locks and Dam	9909 Graham Station Road	Letart		X						
Mason	Mason City Building	656 2nd Street	Mason			X					

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County	*Asset Name*	*Address*	*City/Town*	*Vulnerable*	*Special*	*Government (General)*	*Emergency Services*	*Medical*	*Utilities*	*Historic*	*Economic*
Mason	Mason County EMS - Mason	331 Anderson Street	Mason				X				
Mason	Mason Fire Department	1501 2nd Street	Mason				X				
Mason	Mason Police Department	656 2nd Street	Mason				X				
Mason	Wahama High	1 White Falcon Dr	Mason	X							
Mason	New Haven Elementary	135 Mill St	New Haven	X							
Mason	New Haven Fire Department	407 5th Street	New Haven				X				
Mason	New Haven Police Department	218 5th Street	New Haven				X				
Mason	New Haven Town Hall	218 5th Street	New Haven			X					
Mason	Flatrock Fire Department	14480 Ripley Road	Point Pleasant				X				
Mason	Mason Count Sheriff's Department	525 Main Street	Point Pleasant				X				
Mason	Mason County Career Center	281 Scenic Dr.	Point Pleasant	X							
Mason	Mason County Courthouse	200 6th Street	Point Pleasant			X					
Mason	Pleasant Valley Hospital	2520 Valley Drive	Point Pleasant					X			
Mason	Pleasant Valley Nursing and Rehab	640 Sandhill Road	Point Pleasant	X							
Mason	Point Pleasant City Building	400 Viand Street	Point Pleasant			X					
Mason	Point Pleasant Fire Department	2309 Jackson Ave	Point Pleasant				X				
Mason	Point Pleasant Intermediate	1 Walden Roush Way	Point Pleasant	X							
Mason	Point Pleasant Jr/Sr High	280 Scenic Dr.	Point Pleasant	X							

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County	*Asset Name*	*Address*	*City/Town*	*Vulnerable*	*Special*	*Government (General)*	*Emergency Services*	*Medical*	*Utilities*	*Historic*	*Economic*
Mason	Point Pleasant Police Department	400 Viand Street	Point Pleasant				X				
Mason	Point Pleasant Primary	2200 Lincoln Ave	Point Pleasant	X							
Mason	Roosevelt Elementary	7953 Ripley Rd	Point Pleasant	X							
Mason	Mason County EMS - Point Pleasant	913 Emergency Drive	Point Pleasant				X				
Mason	AEP - River Division	2226 Tug Drive	West Columbia		X						
Mason	Lakin State Hospital	11522 Ohio River Road	West Columbia	X							
Mason	WV DOC -Lakin Womens Prision	11264 Ohio River Road	West Columbia	X							
Mason	WV State Police	11344 Ohio River Road	West Columbia				X				
Mingo	Baisden VFD	Rte. 13	Baisden				X				
Mingo	Dingess Grade School	Main Branch 12 Pole	Chapmanville	X							
Mingo	City Hall	1 Riverside Dr.	Delbarton			X					
Mingo	Delbarton PD	1 Riverside Dr.	Delbarton				X				
Mingo	Delbarton VFD	Co. Hwy 65/12	Delbarton				X				
Mingo	Mingo Career & Tech Center	Route 2 Box 52A	Delbarton	X							
Mingo	Burch PK-6	177 Bulldog Blvd	Delbarton	X							
Mingo	Laurel Creek Co. Inc.	3/3 School House Hollow Rd	Dingess								X
Mingo	Gilbert HS	US 52	Gilbert	X							
Mingo	City Hall	292 Main St.	Gilbert			X					
Mingo	Gilbert ES	132 US 52	Gilbert	X							
Mingo	Gilbert PD	44 US 52	Gilbert				X				
Mingo	Gilbert SP	41 Snowflake Lane	Gilbert				X				
Mingo	Gilbert VFD	175 3rd Ave	Gilbert				X				

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County	*Asset Name*	*Address*	*City/Town*	*Vulnerable*	*Special*	*Government (General)*	*Emergency Services*	*Medical*	*Utilities*	*Historic*	*Economic*
Mingo	Stafford EMS	4071 Venus St	Gilbert				X				
Mingo	Phoenix Coal Mac, Inc.	22 Mine Rd	Holden								X
Mingo	City Hall	US 52	Kermit			X					
Mingo	Kermit K-8	25674 US 52	Kermit	X							
Mingo	Kermit PD	101 Main Street	Kermit				X				
Mingo	Kermit VFD	3 Firehouse Ln	Kermit				X				
Mingo	Kermit Fire & Rescue HQ Station	49 Main St	Kermit				X				
Mingo	Rockhouse Creek Dev. Corp.	Rte. 10	Man								X
Mingo	City Hall	306 McCoy Alley	Matewan			X					
Mingo	MatewanPK-8	100 Chambers St	Matewan	X							
Mingo	Mingo Central High School	1000 King Coal Highway	Matewan	X							
Mingo	Beech Creek VFD	34 Hc 81	Meador				X				
Mingo	Mingo Logan Coal Company	1000 Mingo Logan Ave	Wharncliffe								X
Mingo	Ben Creek VFD	Right Fork Bens Creek Road	Wharncliffe				X				
Mingo	City Hall	107 E 4th Ave	Williamson			X					
Mingo	Mingo BOE	110 Cinderella Rd	Williamson			X					
Mingo	Mingo SO	72 E 2nd Ave	Williamson				X				
Mingo	Mountaineer Hotel	31 E 2nd Ave	Williamson								X
Mingo	Tug Valley HS	555 Panther Ave	Williamson	X							
Mingo	Williamson FD	104 E 4th Ave	Williamson				X				
Mingo	Williamson Memorial Hospital	859 Alderson St	Williamson					X			
Mingo	Williamson PK-8	5 Parkway Dr	Williamson	X							

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County	*Asset Name*	*Address*	*City/Town*	*Vulnerable*	*Special*	*Government (General)*	*Emergency Services*	*Medical*	*Utilities*	*Historic*	*Economic*
Mingo	Williamson PD	108 E 4th Ave	Williamson				X				
Mingo	WV State Police	200 E 3rd Ave	Williamson				X				
Mingo	Lenore K-8	Pigeon Creek	Williamson	X							
Mingo	Stat Ambulance Service	Harvey St	Williamson				X				
Wayne	Beech fork State Park	5601 Long Branch Road	Barboursville		X						
Wayne	AEP Ceredo Peaker Station	Walker Br Road	Ceredo								X
Wayne	American National Rubber Co.	626 Main St	Ceredo								X
Wayne	Ceredo ES	700 B Street	Ceredo	X							
Wayne	Ceredo Flood Wall	Main Street & Ohio River	Ceredo		X						
Wayne	Ceredo Kenova Middle School	500 High Street	Ceredo	X							
Wayne	Ceredo Liquid Dock	Main St And River	Ceredo		X						
Wayne	Ceredo Manor	601 High Street	Ceredo	X							
Wayne	Ceredo PD	700 B Street	Ceredo				X				
Wayne	Ceredo Town Hall	699 B Street	Ceredo			X					
Wayne	Ceredo VFD/EMS	700 B Street	Ceredo				X				
Wayne	Ceredo Water	Main Street	Ceredo						X		
Wayne	Ceredo-Kenova MS	500 High Street	Ceredo	X							
Wayne	Columbia Gas Ceredo Compressor Station	1664 Walker Br Road	Ceredo						X		
Wayne	Columbia Gas Kenova Compressor Station	70 Big Sandy Road	Ceredo						X		
Wayne	CSX Rail Yard Ceredo	Ceredo	Ceredo								X
Wayne	Federal Express Depot	1400 Airport Road	Ceredo								X
Wayne	Huntington TriState Airport	1449 Airport Road	Ceredo		X						

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County	*Asset Name*	*Address*	*City/Town*	*Vulnerable*	*Special*	*Government (General)*	*Emergency Services*	*Medical*	*Utilities*	*Historic*	*Economic*
Wayne	Kanawha River Terminals, Inc.	1 Main St	Ceredo		X						
Wayne	Kosmos Cement Cemex	100 Main Street	Ceredo								X
Wayne	Mistras Testing	1200 Airport Road	Ceredo								X
Wayne	Playmates Day Care	111 4Th St	Ceredo	X							
Wayne	ZD Ramsdell House	1108 B Street	Ceredo		X						
Wayne	Crum K-8 School	150 Crum Road	Crum	X							
Wayne	N&W Railroad Tunnels	Crum	Crum		X						
Wayne	Crum PSD	414 Crum Road	Crum						X		
Wayne	CabWaylingo Community Center	1475 L fork Dunlow Bypass Road	Dunlow		X						
Wayne	Cabwaylingo state Park	4279 Cabwaylingo Road	Dunlow		X						
Wayne	Dunlow Grade School	32800 WV 152	Dunlow	X							
Wayne	Dunlow VFD/EMS	Rte. 1 Box 41	Dunlow				X				
Wayne	Argus Energy WV, LLC.	Rural Rte. 1	Dunlow								X
Wayne	East Lynn Dam	683 Overlook Trail Road	East Lynn		X						
Wayne	East Lynn ES	19549 East Lynn Road	East Lynn	X							
Wayne	EastLynn VFD	119123 East Lynn Road	East Lynn				X				
Wayne	Rockspring Development, Inc.	1 Camp Creek Road East Lynn	East Lynn								X
Wayne	CSX Railroad Bridge Big Sandy	Kenova	Fort Gay		X						
Wayne	Fort Gay K-8 School	1 Viking Drive	Fort Gay	X							
Wayne	Fort Gay Sewer Plant	3408 Wayne Street	Fort Gay						X		
Wayne	Fort Gay Town Hall	3407 Wayne Street	Fort Gay			X					
Wayne	Fort Gay VFD	Court Street	Fort Gay				X				
Wayne	Fort Gay Water Plant	3407 Wayne Street	Fort Gay						X		

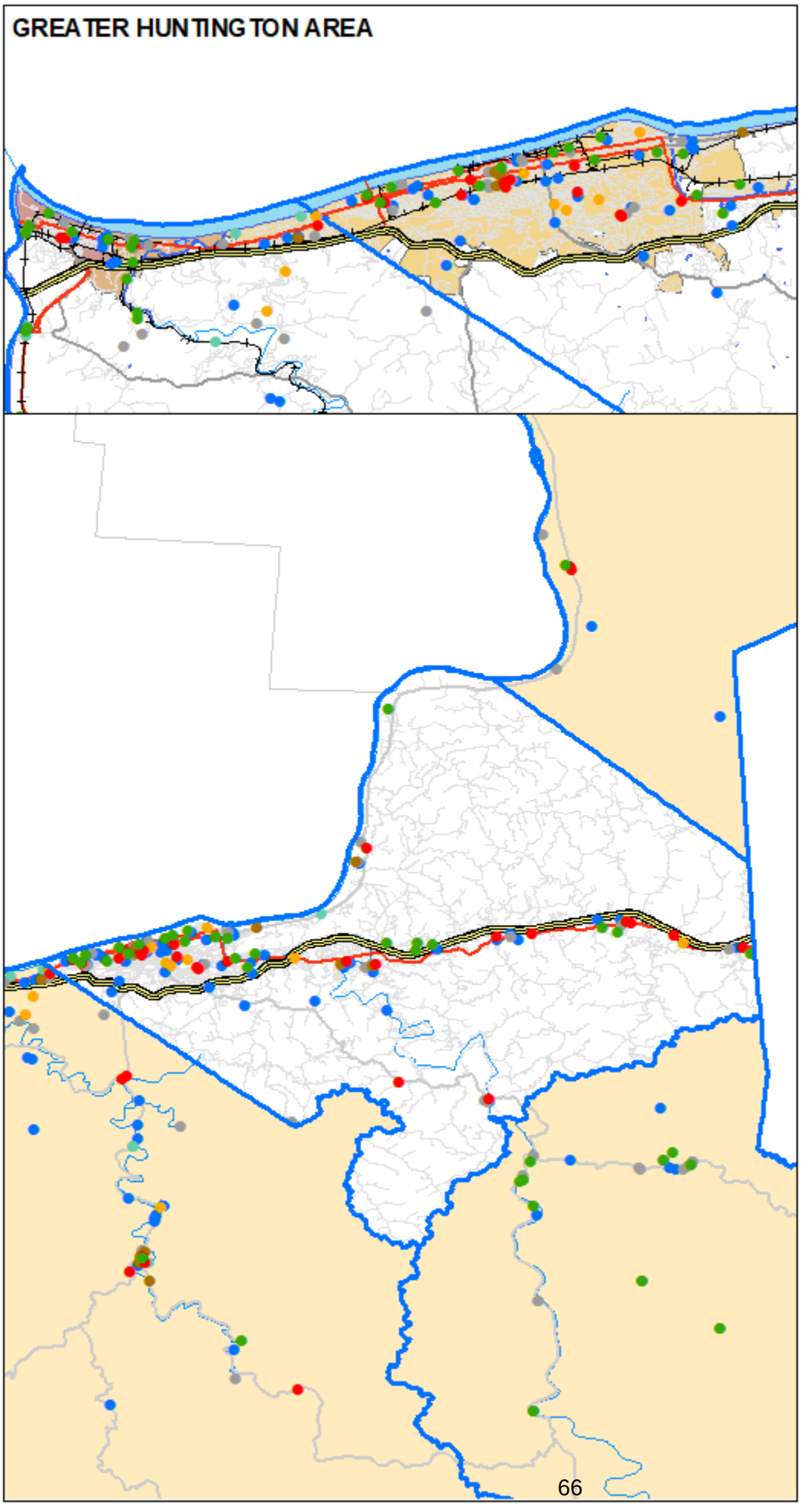
REGION 2 HAZARD MITIGATION PLAN ASSET INVENTORY												
				Structures		*Community Lifelines & Other Critical Facilities*						
County	*Asset Name*	*Address*	*City/Town*	*Vulnerable*	*Special*	*Government (General)*	*Emergency Services*	*Medical*	*Utilities*	*Historic*	*Economic*
Wayne	Fortgay Highway Bridge	Fort Gay	Fort Gay		X						
Wayne	Wildcat Branch Petroglyphs	Fort Gay	Fort Gay								X
Wayne	Tolsia HS	1 Rebel Drive	Glenhayes	X							
Wayne	Buffalo Middle School	298 Buffalo Creek Rd	Huntington	X							
Wayne	Buffalo Grade School	331 Buffalo CK Road	Huntington	X							
Wayne	Camden Park Recreation Area	5000 Waverley Road	Huntington		X						
Wayne	Camp Mad Anthony Wayne	2125 Spring Valley Dr.	Huntington		X						
Wayne	Corbin park	810 Vernon St	Huntington		X						
Wayne	Heritage Farm and Museum	3300 Harvey Road	Huntington		X						
Wayne	Huntington Flood wall	555 7th Ave	Huntington		X						
Wayne	Huntington Sanitary Treatment plant	5010 Sunset Dr.	Huntington						X		
Wayne	Kellog ES	4415 Piedmont Rd	Huntington	X							
Wayne	Playmates Day Care	3609 Hughes St	Huntington	X							
Wayne	Playmates Day Care	33 Buffalo Creek	Huntington	X							
Wayne	Playmates Day Care	418 Bridge St	Huntington	X							
Wayne	Playmates Day Care	3606 Hughes St	Huntington	X							
Wayne	RPA Park	300 Spring Valley Dr.	Huntington		X						
Wayne	Spring Valley High School	1 Timberwolf Drive	Huntington	X							
Wayne	Spring Valley PSD Sewer	203 33rd Street	Huntington						X		
Wayne	Valley Health	2908 Auburn Road	Huntington					X			
Wayne	Veteran's Admin Hosp.	1340 Spring Valley Dr.	Huntington					X			
Wayne	Vinson Middle School	3851 Piedmont Rd	Huntington	X							

REGION 2 HAZARD MITIGATION PLAN ASSET INVENTORY											
				Structures		*Community Lifelines & Other Critical Facilities*					
County	*Asset Name*	*Address*	*City/Town*	*Vulnerable*	*Special*	*Government (General)*	*Emergency Services*	*Medical*	*Utilities*	*Historic*	*Economic*
Wayne	Wayne County Commission Service Org, Inc.	3609 Hughes St	Huntington			X					
Wayne	West Virginia American Water	40002 Ohio River Road	Huntington						X		
Wayne	Kevova /Willart Chemical Co	100 21 St Street	Kenova								X
Wayne	Kenova FD	1600 Pine Street	Kenova				X				
Wayne	2/19 SFG Tristate Airport	1 Booth Road	Kenova		X						
Wayne	Federal Express Depot	700 Walnut St	Kenova								X
Wayne	I 64 Highway Bridge Big Sandy River	Kenova	Kenova		X						
Wayne	Joseph S. Miller House	748 Beech Street	Kenova	X							
Wayne	Kenova City Hall	1501 Pine Street	Kenova			X					
Wayne	Kenova ES	1600 Pine Street	Kenova	X							
Wayne	Kenova Floodwall	1631 Beech St	Kenova		X						
Wayne	Kenova PD	1501 Pine Street	Kenova				X				
Wayne	Kenova VFD 2	3985 RT 75	Kenova				X				
Wayne	Kenova/Ceredo Elementary	300 9th Street	Kenova	X							
Wayne	Marathon Petroleum Kenova Tank Farm	227 23 Street	Kenova								X
Wayne	Marathon Transportation Kenova Ohio River Dock	23 Street and Ohio River	Kenova								X
Wayne	Marathon Tri-State Tank Farm	23 Street and US 60	Kenova								X
Wayne	N&S Rail Yard Kenova	Kenova	Kenova								X

REGION 2 HAZARD MITIGATION PLAN ASSET INVENTORY											
				Structures		*Community Lifelines & Other Critical Facilities*					
County	*Asset Name*	*Address*	*City/Town*	*Vulnerable*	*Special*	*Government (General)*	*Emergency Services*	*Medical*	*Utilities*	*Historic*	*Economic*
Wayne	N&W Ohio River Bridge	Kenova	Kenova		X						
Wayne	Playmates Day Care	725 Chestnut St	Kenova	X							
Wayne	Roxanna Booth manor	1315 Chestnut St	Kenova	X							
Wayne	US RT 60 Highway Bridge	Kenova	Kenova		X						
Wayne	Beech Fork Dam	3900 Beech Fork Road	Lavalette		X						
Wayne	Lakeview Manor	5100 W US 152	Lavalette	X							
Wayne	Lavalette PSD Water	5308 US 152	Lavalette						X		
Wayne	Lavalette ES	1150 Beech fork Road	Lavalette	X							
Wayne	Lavalette PSD	5308 Rte. 152	Lavalette						X		
Wayne	Lavalette VFD	4502 WV 152	Lavalette				X				
Wayne	North Wayne PSD Sewer	5308 US 152	Lavalette						X		
Wayne	Playmates Day Care	5185 Rte. 152	Lavalette	X							
Wayne	Aristech Chemical Corp.	200 Big Sandy Road	Neal								X
Wayne	Ashland Chemical	100 Big Sandy Road	Neal								X
Wayne	AXO Nobel Explosives	2625 US 52	Neal								X
Wayne	Kenova Peaker Station	2570 Rte. 52	Neal								X
Wayne	Kenova Water Plant	US 152	Neal						X		
Wayne	Marathon Butane & Propane Cavern	150 Big Sandy River Rod	Neal								X
Wayne	Heartland Intermodal Facility	401 Heartland Road	Prichard								X
Wayne	Prichard DOH Garage	Prichard	Prichard			X					
Wayne	Prichard ES	Fire Department Road	Prichard	X							
Wayne	Prichard Grade School	519 Prichard Road	Prichard	X							
Wayne	Prichard Industrial Park	Industrial Way	Prichard								X
Wayne	Prichard Post Office	295 Prichard Road	Prichard		X						
Wayne	Prichard PSD Sewer	213 Gay Lane	Prichard						X		

REGION 2 HAZARD MITIGATION PLAN ASSET INVENTORY											
				Structures		*Community Lifelines & Other Critical Facilities*					
County	*Asset Name*	*Address*	*City/Town*	*Vulnerable*	*Special*	*Government (General)*	*Emergency Services*	*Medical*	*Utilities*	*Historic*	*Economic*
Wayne	Prichard VFD/EMS	Fire Department Road	Prichard				X				
Wayne	Administrative Annex 2	4 Memorial St	Wayne			X					
Wayne	Administrative Annex 1	2 Memorial ST	Wayne			X					
Wayne	Bus Garage	1302 US Rte. 152	Wayne			X					
Wayne	Charter House	1607 Mose Aasburry Rd	Wayne	X							
Wayne	County Courthouse	707 Hendricks St	Wayne			X					
Wayne	CSX Main Line Huntington Sub	Wayne	Wayne								X
Wayne	Genoa ES	21269 RT 152	Wayne	X							
Wayne	Norfolk Southern Pocahontas Division	Wayne	Wayne								X
Wayne	Valley Health	42 McGinnis Drive	Wayne					X			
Wayne	Walmart Inc.	100 McGuiness Dr.	Wayne								X
Wayne	Wayne 911 Communications Center	1 Hendricks St	Wayne				X				
Wayne	Wayne Continuous Care & Rehab	6999 RT 152	Wayne	X							
Wayne	Wayne County BOE	212 N Court St	Wayne			X					
Wayne	Wayne County Commission	707 Hendricks St	Wayne			X					
Wayne	Wayne County DHHR	26452 East Lynn Road	Wayne			X					
Wayne	Wayne County ES	80 McGinnis Dr.	Wayne	X							
Wayne	Wayne County Health Department	217 Kenova Ave	Wayne			X					
Wayne	Wayne County HS	100 Pioneer Road	Wayne	X							
Wayne	Wayne County MS	200 Pioneer Road	Wayne	X							
Wayne	Wayne County Sheriff	707 Hendricks ST	Wayne				X				

REGION 2 HAZARD MITIGATION PLAN ASSET INVENTORY											
				Structures		*Community Lifelines & Other Critical Facilities*					
County	*Asset Name*	*Address*	*City/Town*	*Vulnerable*	*Special*	*Government (General)*	*Emergency Services*	*Medical*	*Utilities*	*Historic*	*Economic*
Wayne	Wayne DOH Garage	326 3Rd St Wayne	Wayne		X						
Wayne	Wayne Grade School	80 McGinnis Drive	Wayne	X							
Wayne	Wayne High School	1 Pioneer Drive	Wayne	X							
Wayne	Wayne PD	305 Bluefield St	Wayne				X				
Wayne	Wayne Sewer Plant	308 Bluefield	Wayne						X		
Wayne	Wayne VFD	12345 WV 152 S	Wayne				X				
Wayne	Wayne Water Plant	305 Bluefield St	Wayne						X		



REGION 2 PDC HAZARD MITIGATION PLAN

Asset Inventory (Cabell Co.)

Data Source(s):
Steering Committee

- Economic
- Emergency Svcs.
- Govt. (General)
- Medical
- Special Considerations
- Utilities
- Vulnerable Populations

0 1.25 2.5 5 7.5 10
Miles

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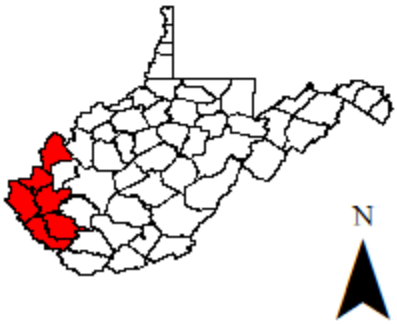

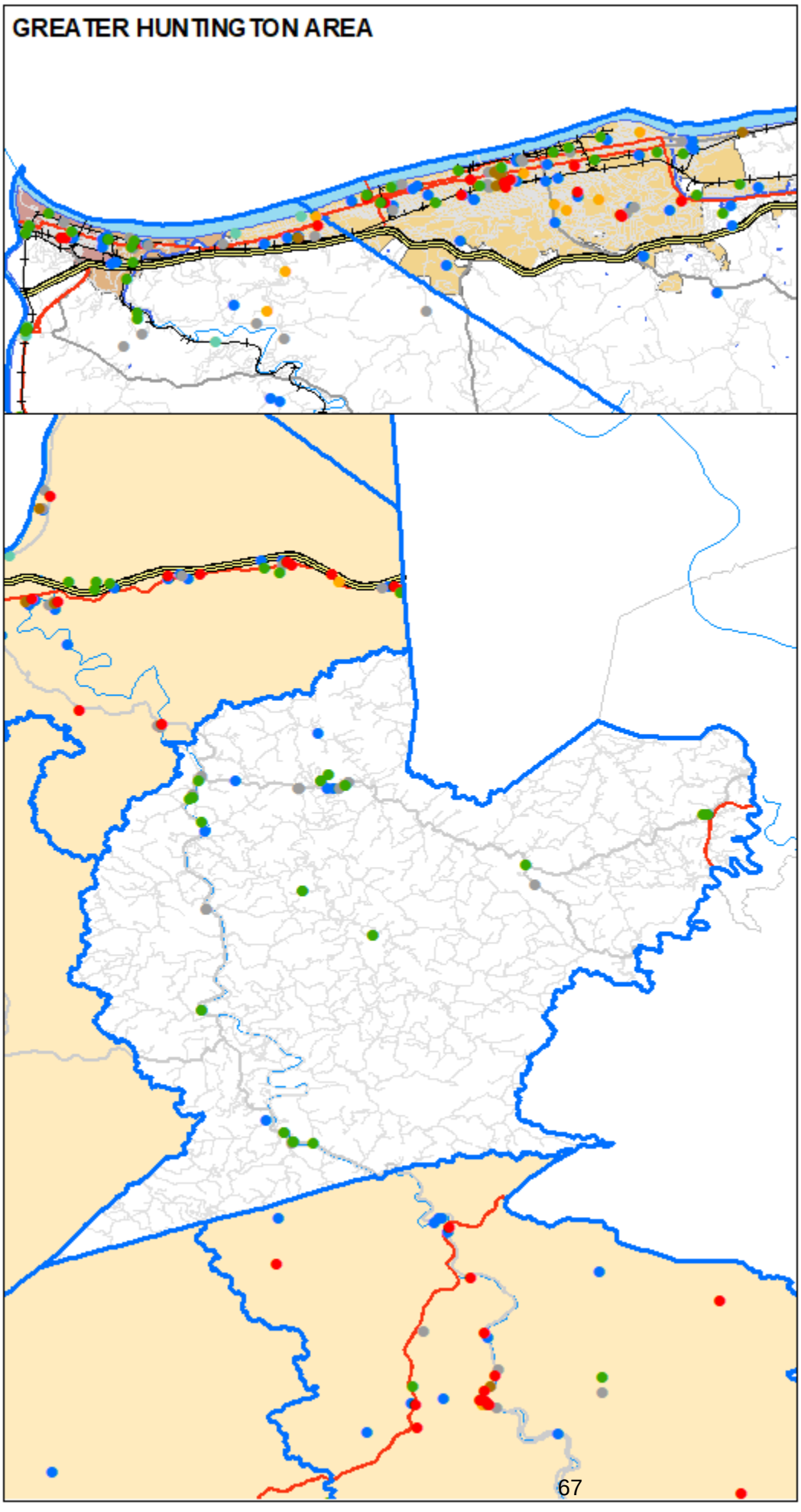

REGION 2 PDC HAZARD MITIGATION PLAN

Asset Inventory (Lincoln Co.)

Data Source(s):
Steering Committee

- Economic
- Emergency Svcs.
- Govt. (General)
- Medical
- Special Considerations
- Utilities
- Vulnerable Populations

0 1.25 2.5 5 7.5 10
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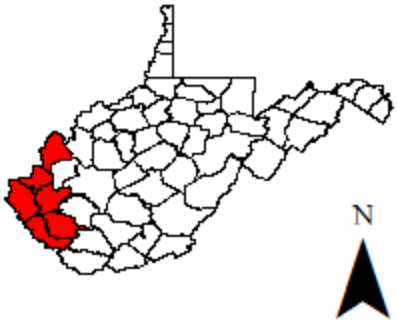

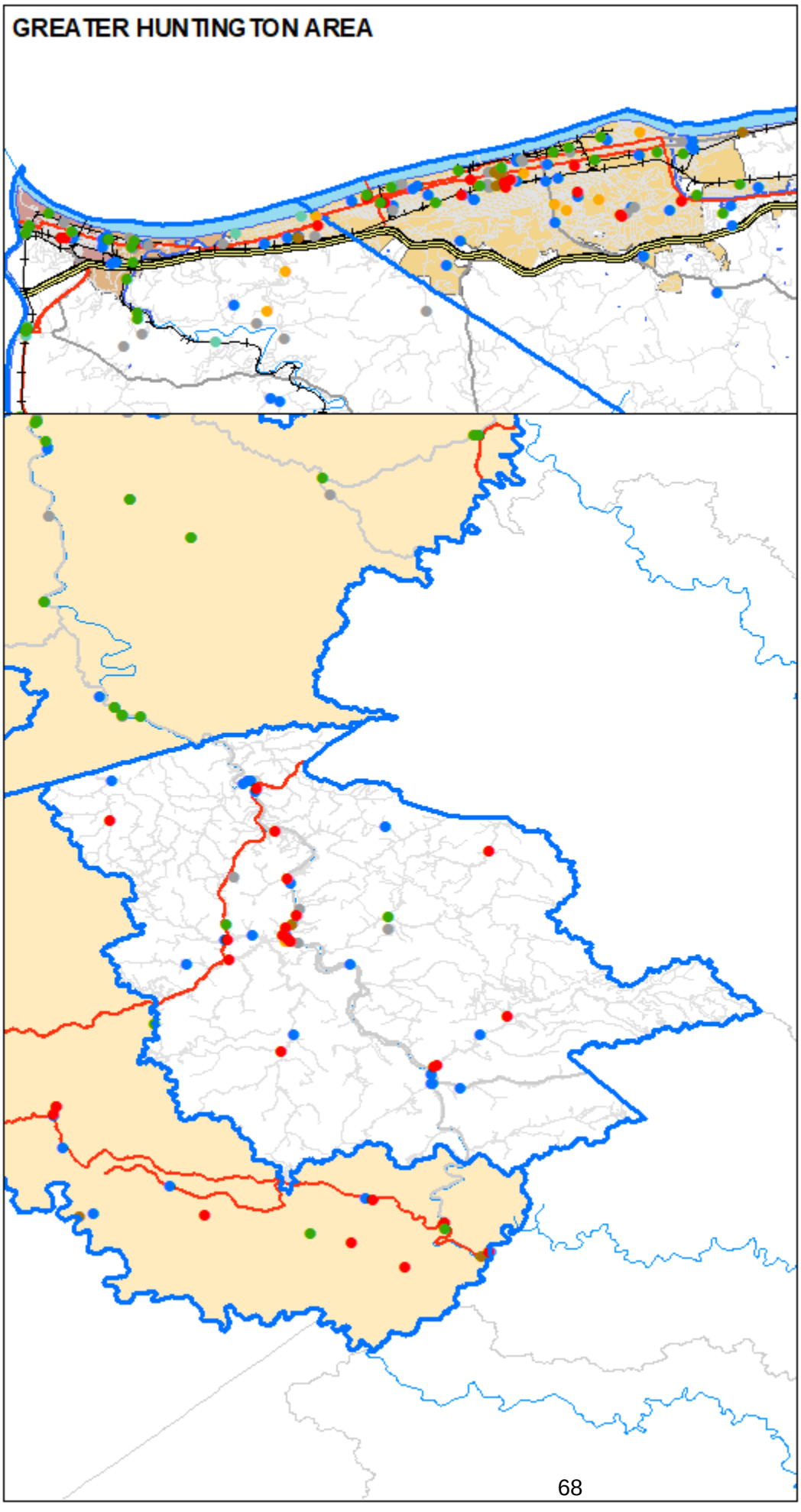

REGION 2 PDC HAZARD MITIGATION PLAN

Asset Inventory (Logan Co.)

Data Source(s):
Steering Committee

- Economic
- Emergency Svcs.
- Govt. (General)
- Medical
- Special Considerations
- Utilities
- Vulnerable Populations

0 1.5 3 6 9 12
Miles

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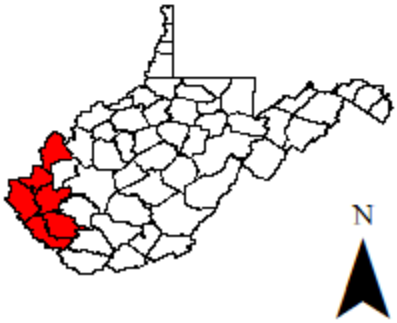

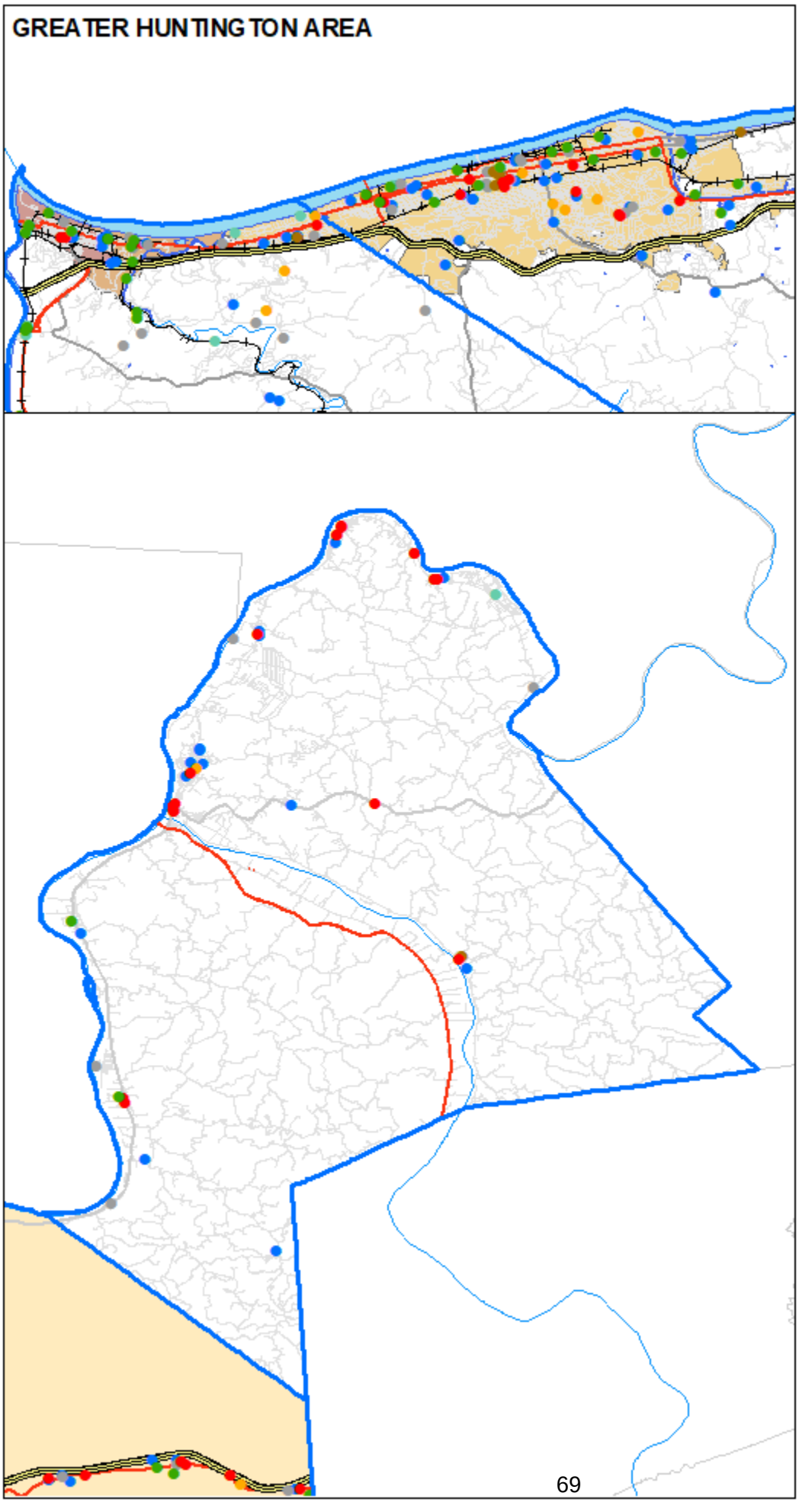

REGION 2 PDC HAZARD MITIGATION PLAN

Asset Inventory (Mason Co.)

Data Source(s):
Steering Committee

- Economic
- Emergency Svcs.
- Govt. (General)
- Medical
- Special Considerations
- Utilities
- Vulnerable Populations

0 1.25 2.5 5 7.5 10
Miles

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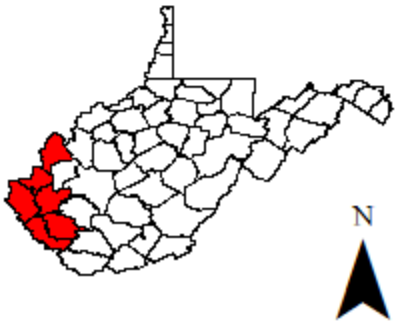

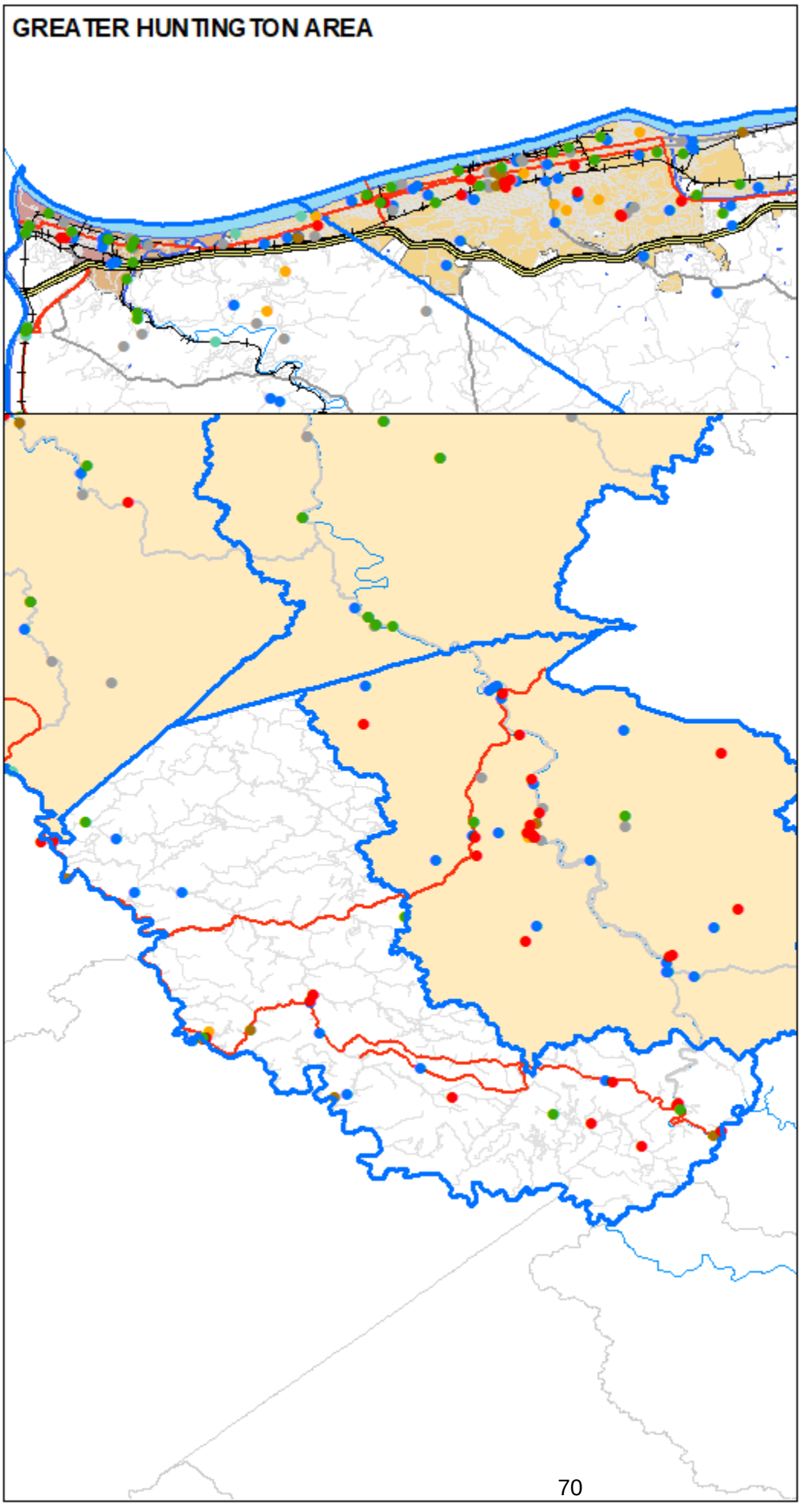

REGION 2 PDC HAZARD MITIGATION PLAN

Asset Inventory (Mingo Co.)

Data Source(s):
Steering Committee

- Economic
- Emergency Svcs.
- Govt. (General)
- Medical
- Special Considerations
- Utilities
- Vulnerable Populations

0 1.753.5 7 10.5 14
Miles

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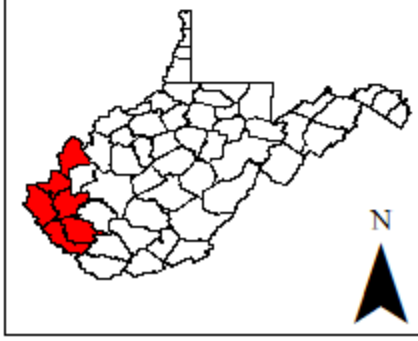

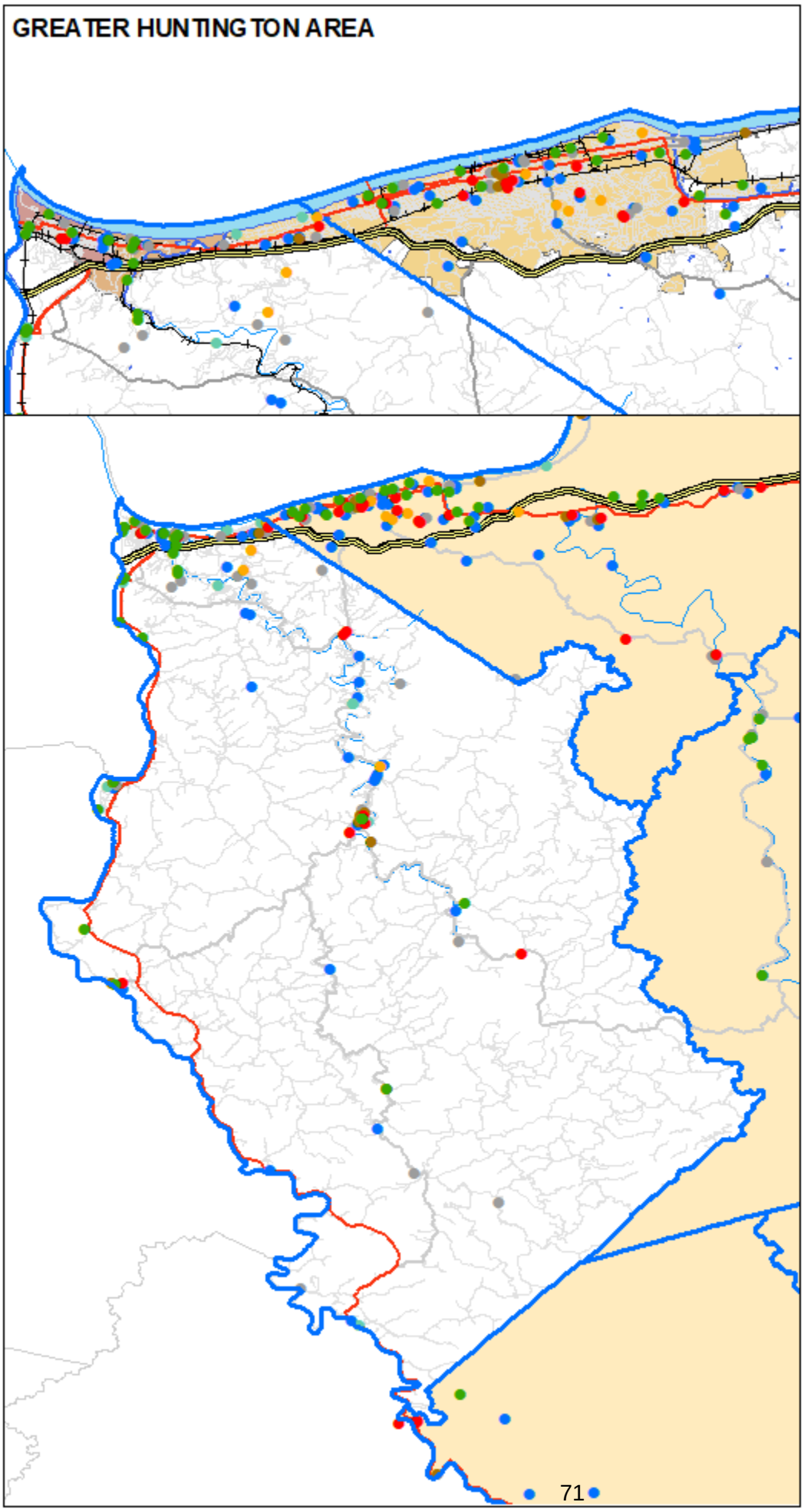

REGION 2 PDC HAZARD MITIGATION PLAN

Asset Inventory (Wayne Co.)

Data Source(s): Steering Committee

- Economic
- Emergency Svcs.
- Govt. (General)
- Medical
- Special Considerations
- Utilities
- Vulnerable Populations

0 1.25 2.5 5 7.5 10 Miles

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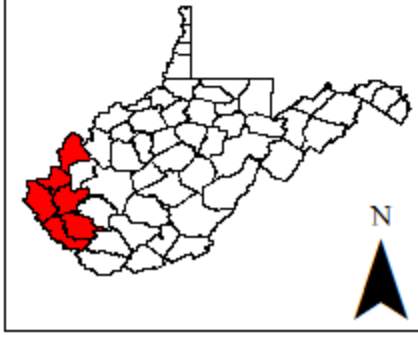
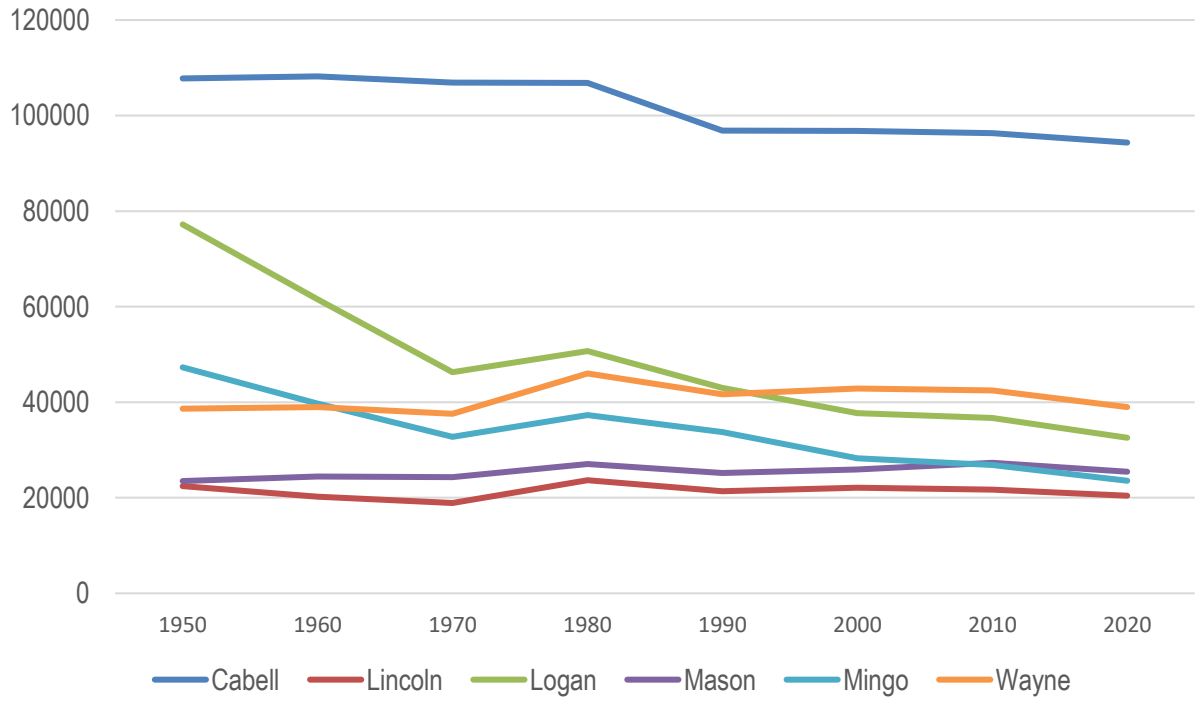


Development and Other Trends

§201.6(c)(2)(ii)(C)	[The plan should describe vulnerability in terms of] providing a general discussion of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

Historically, general development and hazard mitigation have co-existed, albeit as separate efforts. When an area develops, though, its makeup changes, and some decisions related to how the development unfolds may either increase or decrease risk and exposure. For the 2023/2024 plan update, Region 2 Planning & Development Council (PDC) was more intentional in noting the types of trends in the region, and in Section 2.3 below, the plan will compare these trends with known risks and attempt to identify any items of note or opportunities for furthering mitigation.

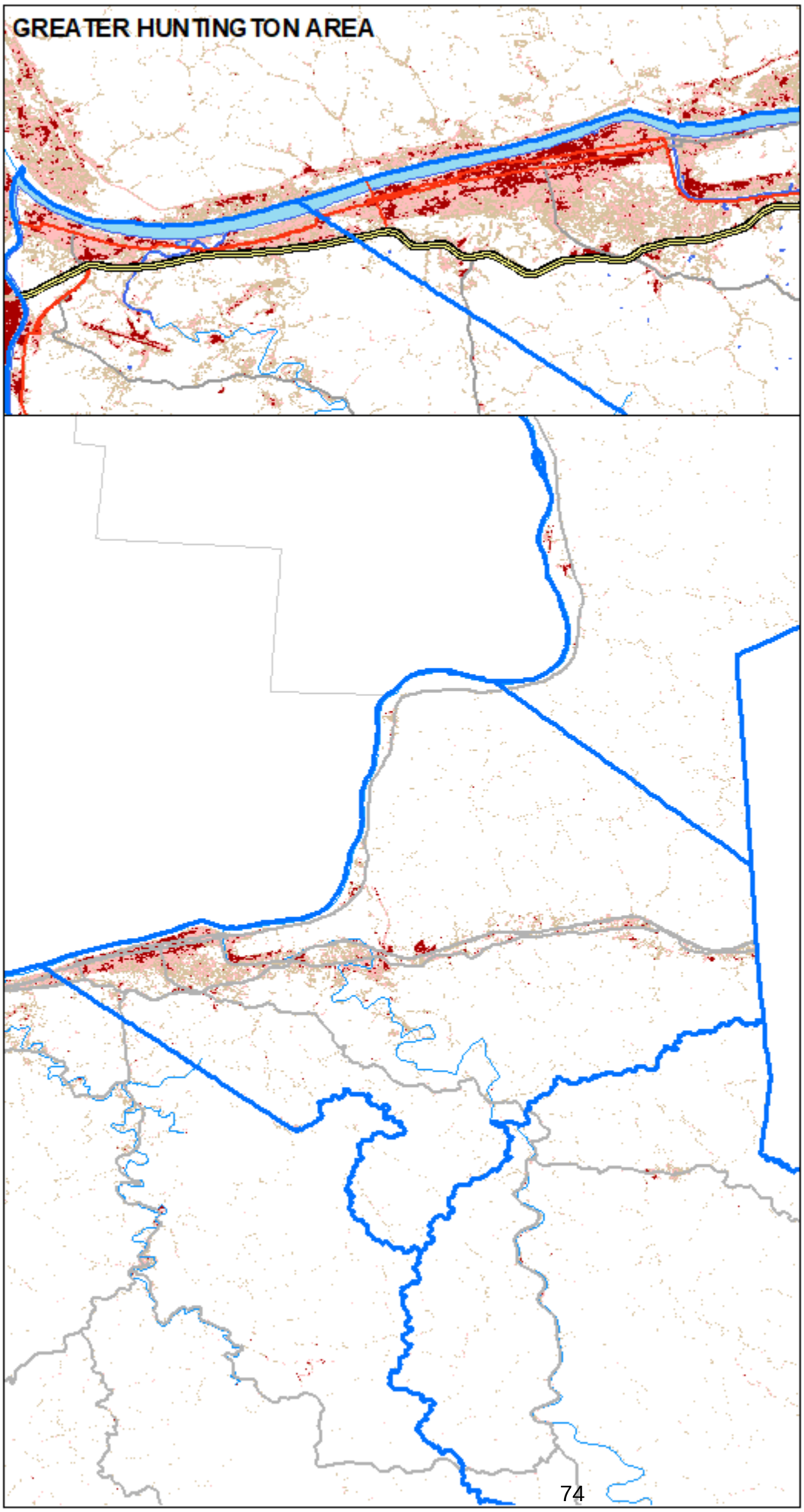
As noted above, the region's population has generally declined since 1950, sometimes precipitously over a decennial Census. The change was an increase of just under 25,000 residents between 1970 and 1980, the only decennial gain. The following line graph plots those population trends.



Mason and Wayne Counties is the only two in the region to have a higher 2020 population as compared to 1950. This statistic is somewhat misleading, as, for example, Wayne County's peak population of 46,021 in 1980 reveals a significant decline to the 2020 figure of 38,982. Logan and Mingo Counties have had substantial and steady decreases. Logan County's population was highest in 1950 (77,221), which has decreased by 58% to the 2020 population of 32,567. Mingo County's 1950 population of 47,304 decreased by 50% to the 2020 population of 23,568.

The PDC's *Comprehensive Economic Development Strategy 2020-2024* (CEDS) (Region 2 PDC, 2020, p. 22) also examined population changes. In a table presenting components of population change between 2000 and 2018, the CEDS indicates that the overall population decreased by 6% (or approximately 16,400 people). Domestic migration (i.e., out-migration) contributed to a loss of an estimated 1,045 residents and migration contributed to the loss of another estimated 962 residents. (This trend appeared in the 2018 version of this plan as well.)

Housing trends have generally mirrored population trends, with rates of new construction fluctuating through the years. Development trends in the Kanawha Valley and along the I-64 and US Route 119 corridors has not mimicked that of other areas of the state (e.g., Morgantown in the north central portion of the state or the Eastern Panhandle near Martinsburg). Consequently, the housing stock is aging. As residents leave the area, the homes they leave behind may be left empty if new owners choose not to develop the properties. Local leaders have been concerned about vacant properties. Persons experiencing homelessness or struggling with substance abuse may squat in those empty structures. If emergencies occur in them, responders may not be aware there is an occupant (or occupants) inside, potentially leading to unnecessary injury or death. The following maps, by county, show areas with residential land uses.



REGION 2 PDC HAZARD MITIGATION PLAN

Residential Land Uses (Cabell Co.)

Data Source(s):
USGS NLCD (2021)

Med. Intensity; Single Fam. (most common)

Low Intensity: Single Fam. (most common)

High Intensity: Multi-Fam. (w/ comm./ind. included)

0 1.25 2.5 5 7.5 10
Miles

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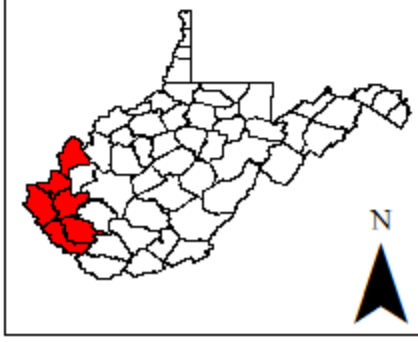

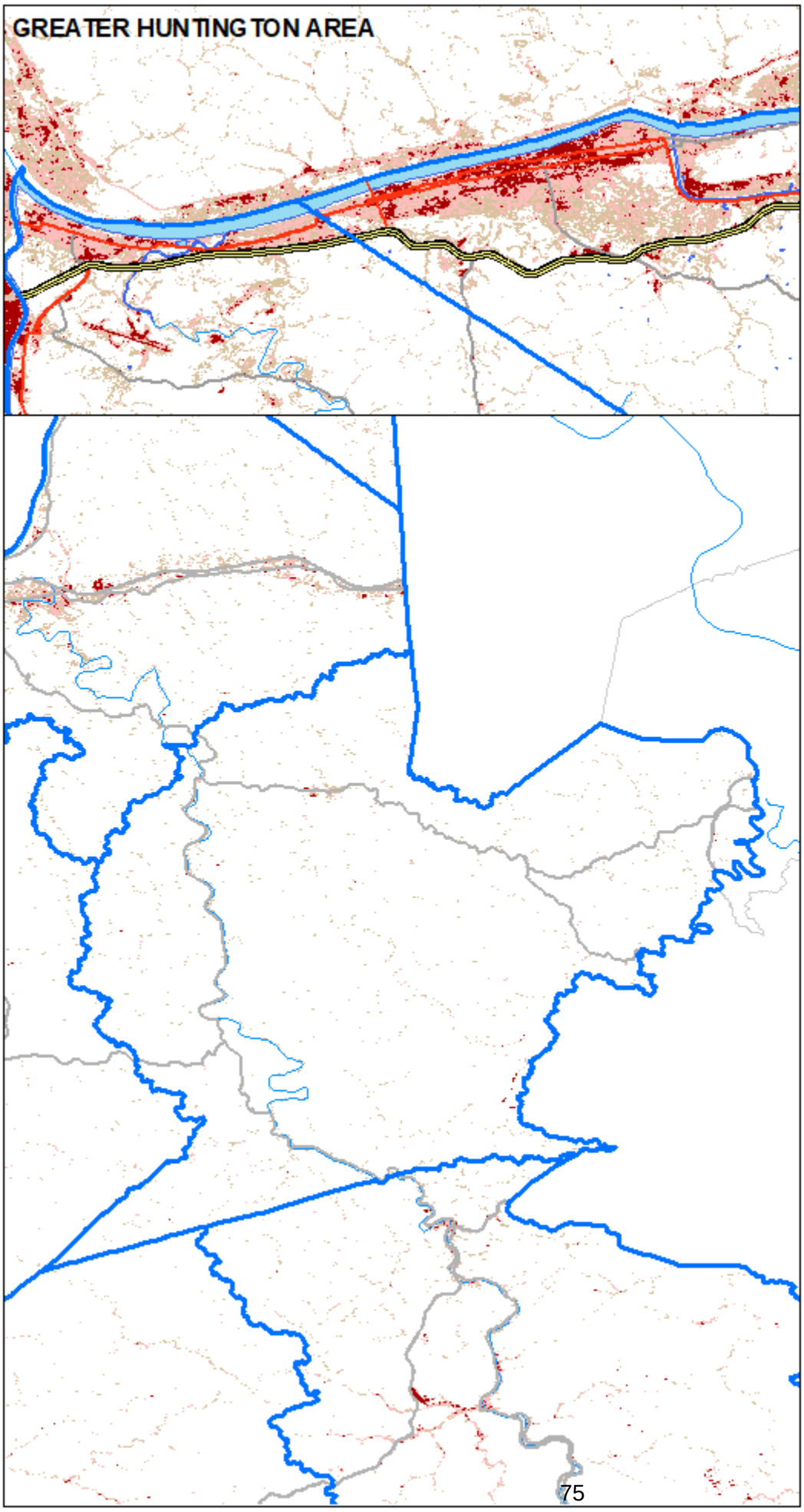

REGION 2 PDC HAZARD MITIGATION PLAN

Residential Land Uses (Lincoln Co.)

Data Source(s):
USGS NLCD (2021)

Med. Intensity; Single Fam. (most common)

Low Intensity: Single Fam. (most common)

High Intensity: Multi-Fam. (w/ comm./ind. included)

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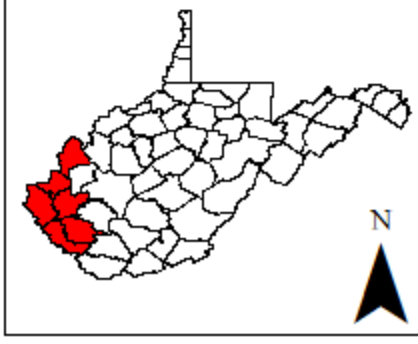

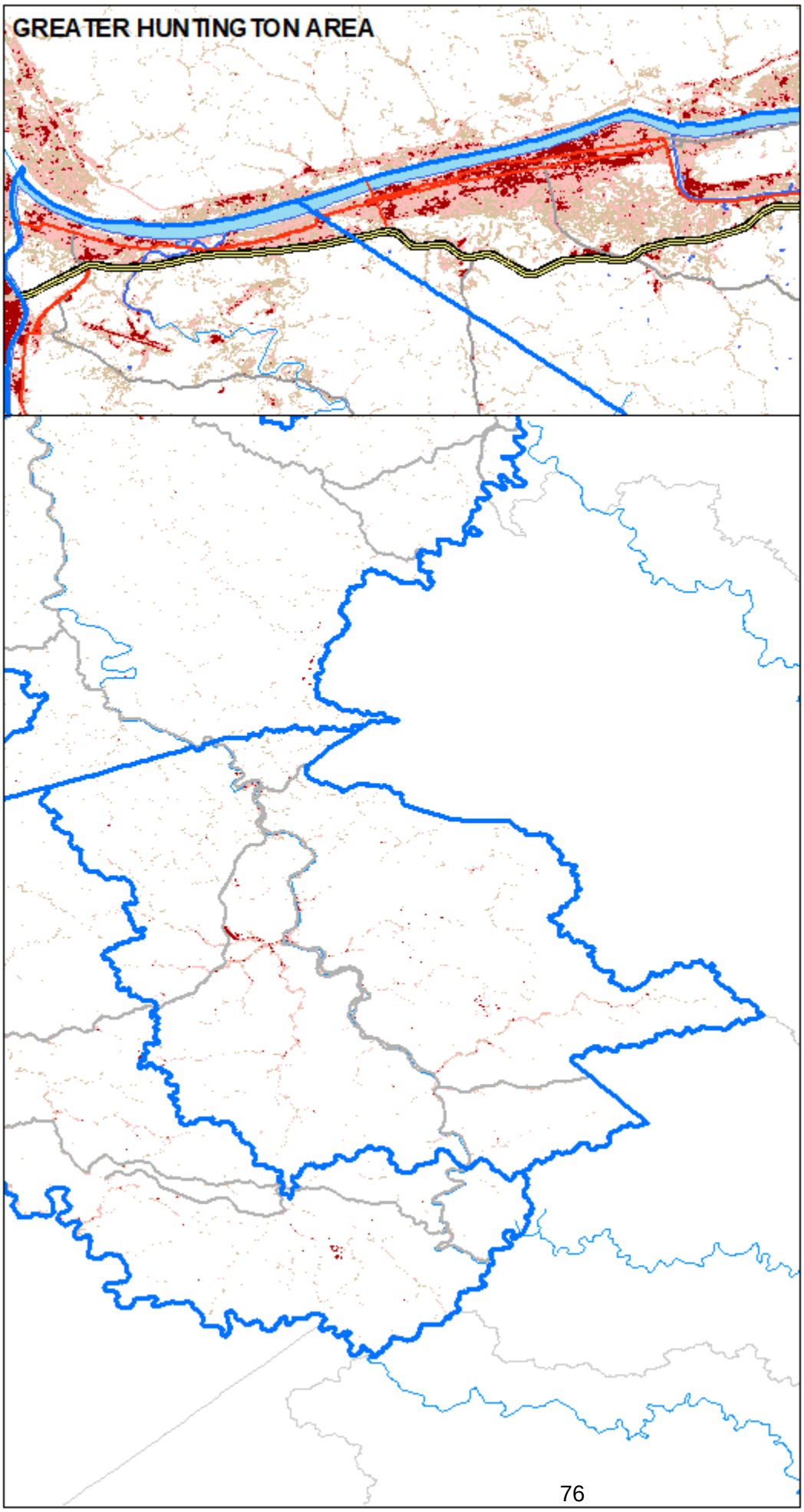

REGION 2 PDC HAZARD MITIGATION PLAN

Residential Land Uses (Logan Co.)

Data Source(s):
USGS NLCD (2021)

- Med. Intensity; Single Fam. (most common)
- Low Intensity: Single Fam. (most common)
- High Intensity: Multi-Fam. (w/ comm./ind. included)

0 1.5 3 6 9 12
Miles

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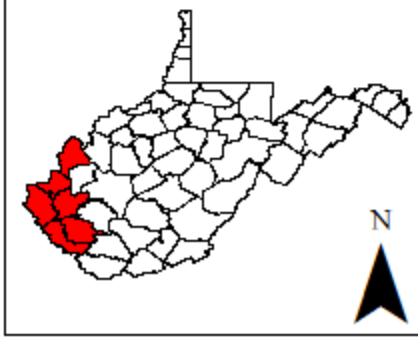

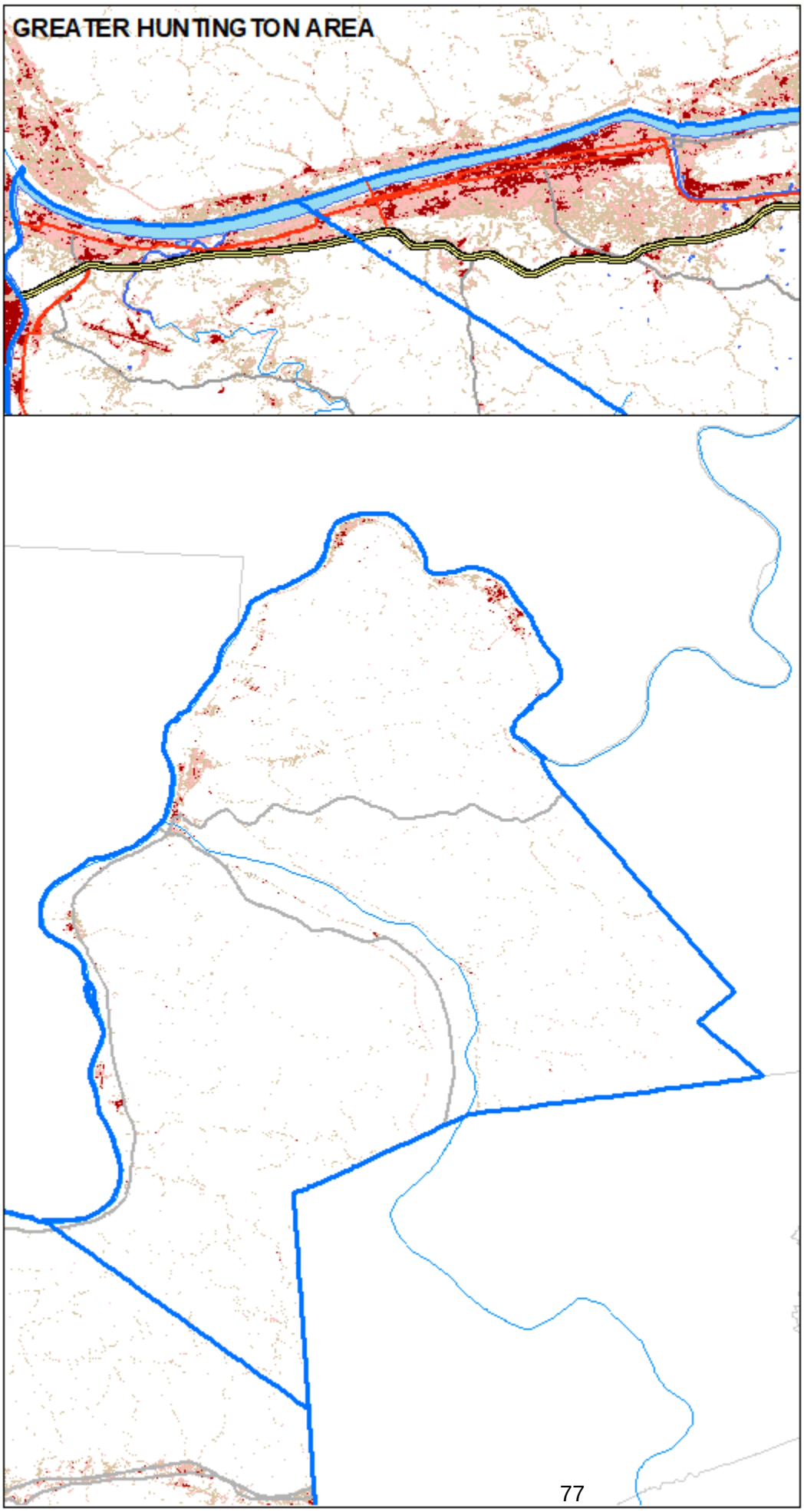

REGION 2 PDC HAZARD MITIGATION PLAN

Residential Land Uses (Mason Co.)

Data Source(s):
USGS NLCD (2021)

Med. Intensity; Single Fam. (most common)

Low Intensity: Single Fam. (most common)

High Intensity: Multi-Fam. (w/ comm./ind. included)

0 1.25 2.5 5 7.5 10
Miles

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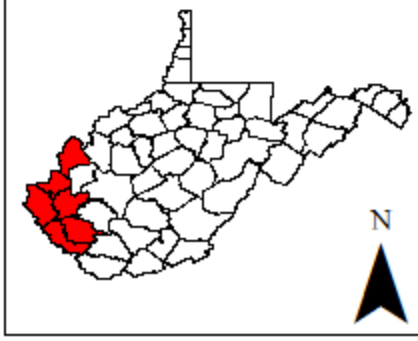

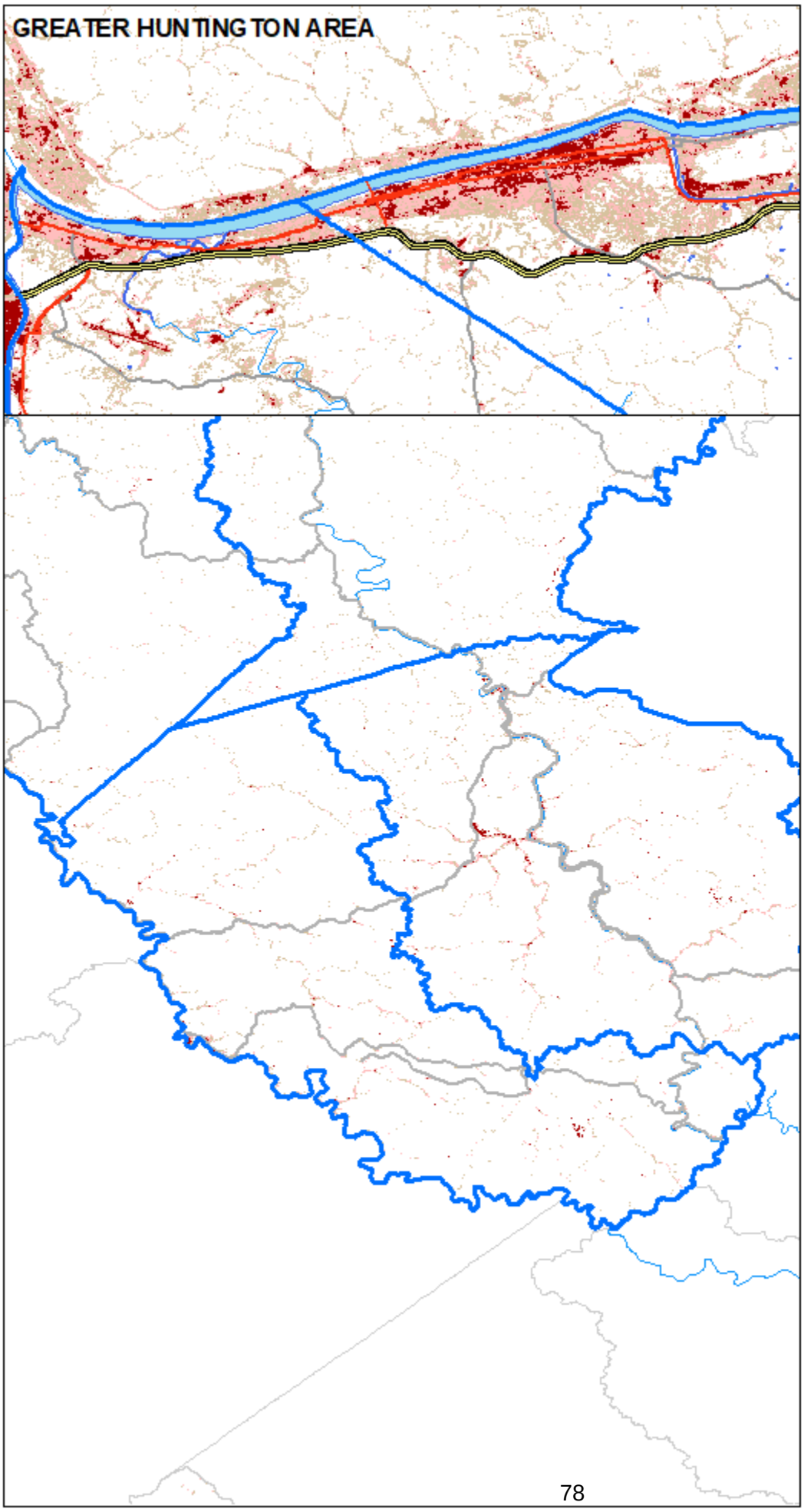

REGION 2 PDC HAZARD MITIGATION PLAN

Residential Land Uses (Mingo Co.)

Data Source(s):
USGS NLCD (2021)

Med. Intensity; Single Fam. (most common)

Low Intensity: Single Fam. (most common)

High Intensity: Multi-Fam. (w/ comm./ind. included)

0 1.753.5 7 10.5 14
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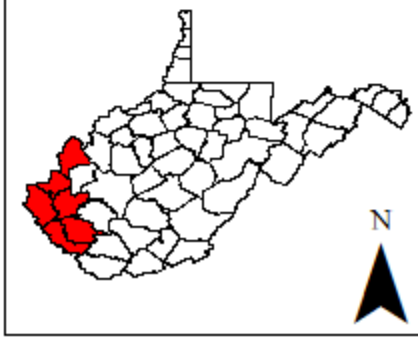
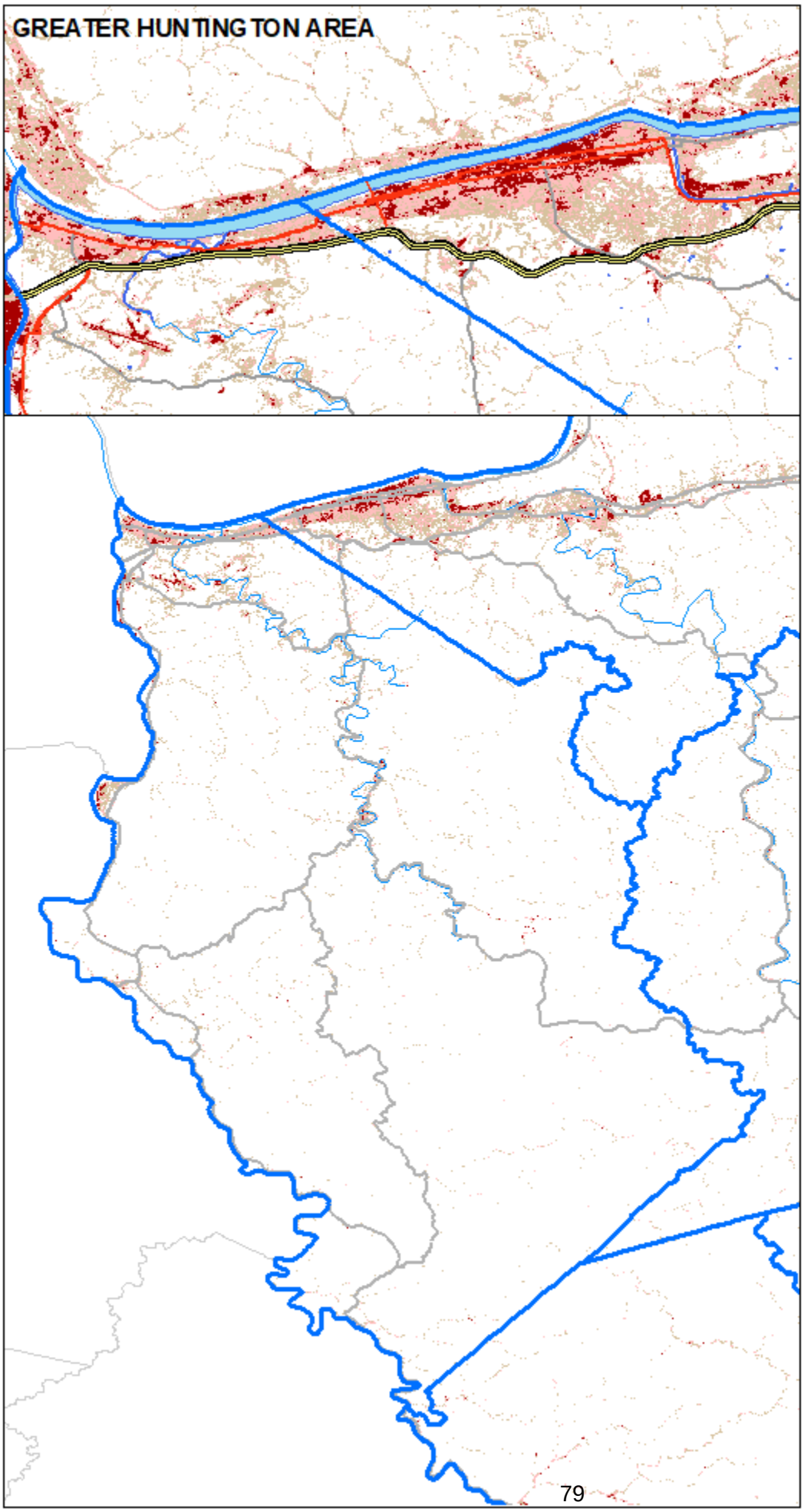




REGION 2 PDC HAZARD MITIGATION PLAN

Residential Land Uses (Wayne Co.)

Data Source(s):
USGS NLCD (2021)

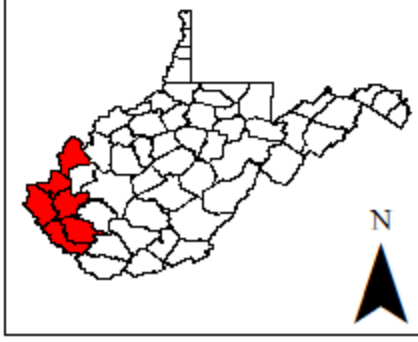
Med. Intensity; Single Fam. (most common)

Low Intensity: Single Fam. (most common)

High Intensity: Multi-Fam. (w/ comm./ind. included)

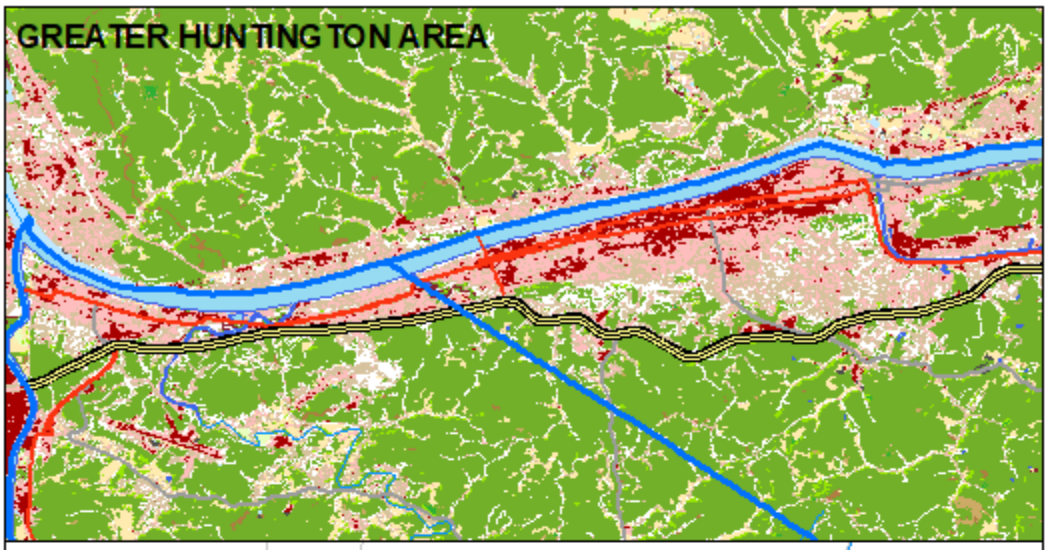
0 1.25 2.5 5 7.5 10
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



Societally, the region has experienced the negative impacts of increased substance abuse and addiction. The 2018 version of this plan included a profile for the “opioid crisis,” and while further considering that hazard for this update, an extended range of partners recommended broadening the coverage to more substances. The region’s communities are continuing to see opiates, but that is alongside other drugs, methamphetamine, etc. The human impacts of unnecessary and tragic deaths and the fractures experienced by families are undeniable and worthy of attention (which is occurring); however, the substance use crisis has also impacted the region’s economy. Employers continue to struggle to fill positions as applicants are either not healthy enough for the work or repeatedly fail drug tests.

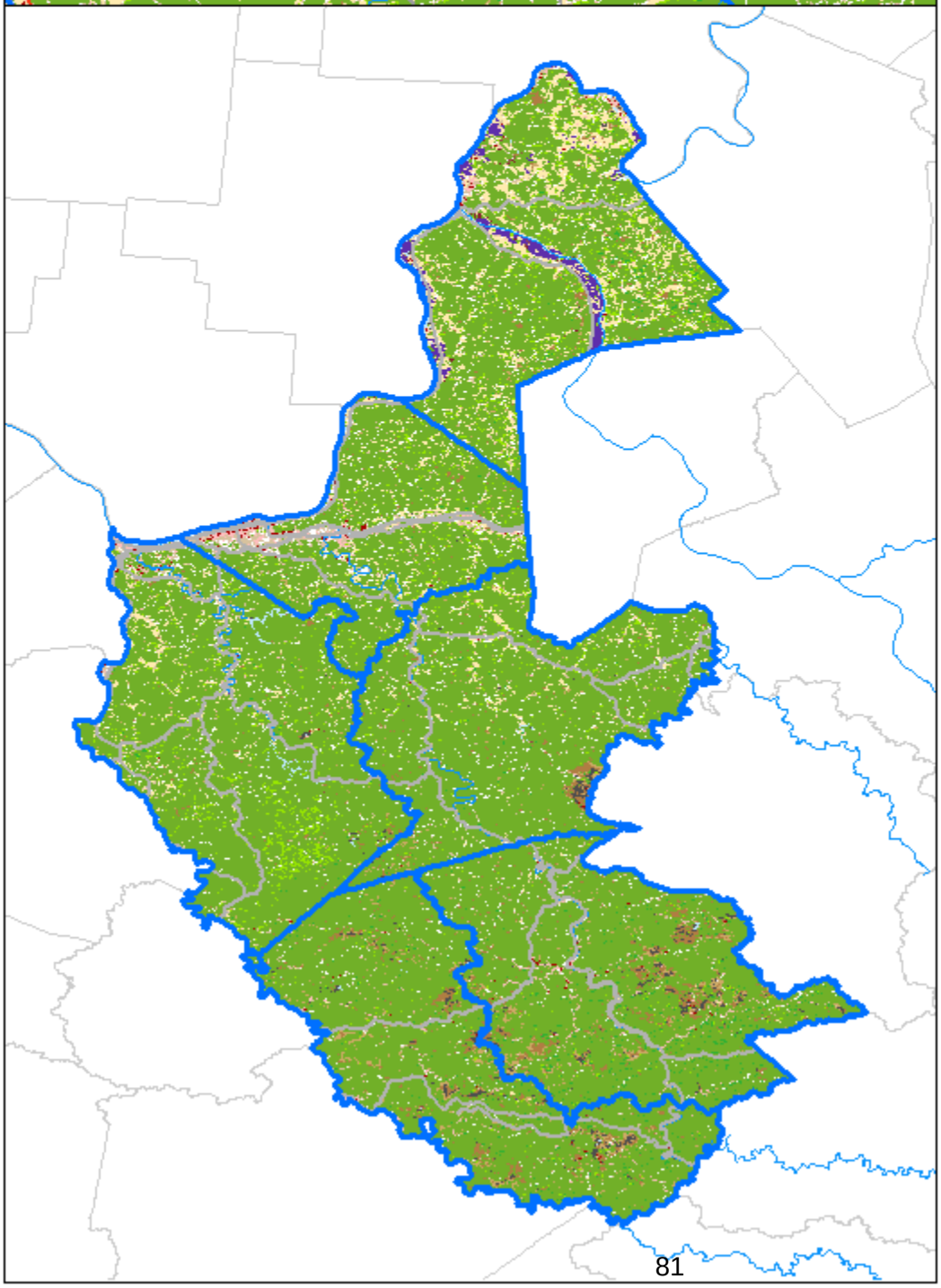
The region’s land use is varied. Generally, the areas that are prime for residential, commercial, and industrial development are the areas that already see that type of land use. They are the areas most accessible to transportation infrastructure (i.e., highways and rails as well as air transport and waterways). In some cases, re-development of those areas may be the fiscally-responsible way to invest in the region’s communities. The following map shows the land use of the region.



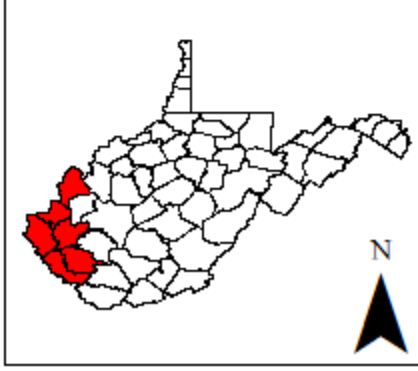
REGION 2 PDC HAZARD MITIGATION PLAN

Region-Wide Land Use

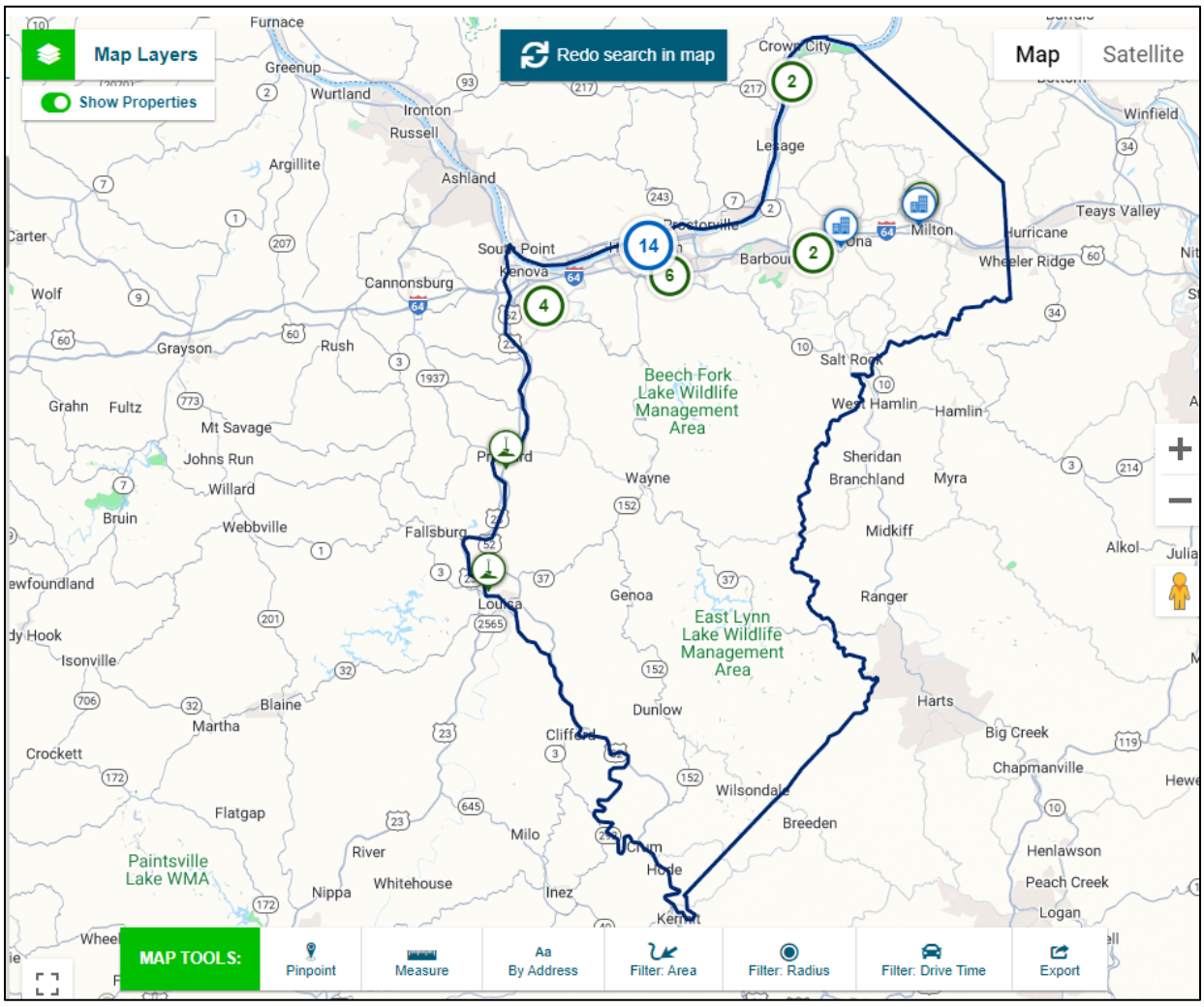
Data Source(s):
USGS NLCD (2021)



DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

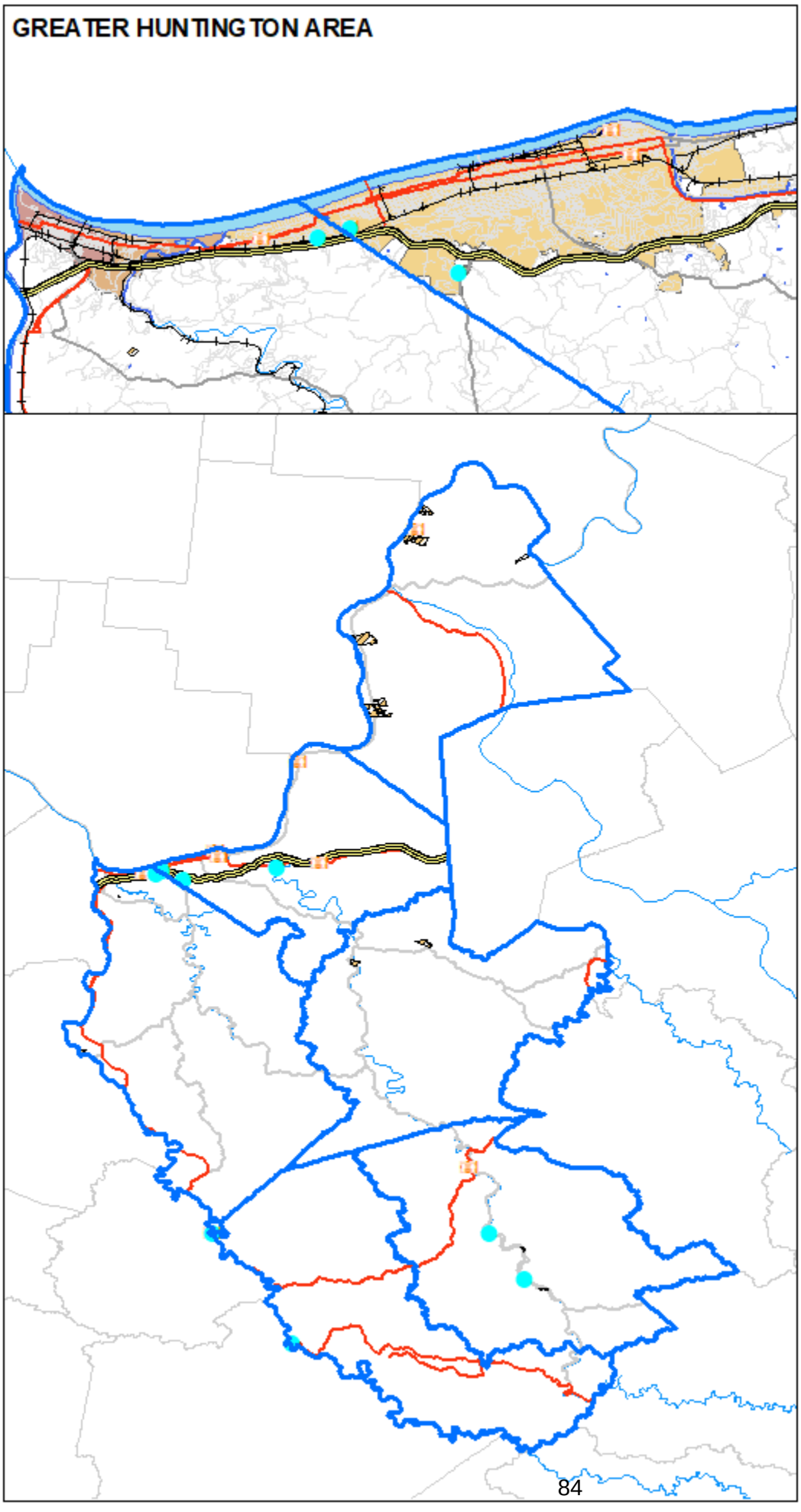


This is not to say that these areas are the *only* ones available for development. In Mason County, the Nucor development just south of Point Pleasant along the Ohio River is a large industrial project, and local (and regional) officials are anticipating ancillary development once Nucor begins operations. The Huntington Area Development Council (HADCO) is an accredited economic development organization working to attract new employers to Cabell and Wayne Counties as well as help existing businesses expand their business. Through this mission, HADCO identifies sites that could be targeted for development (as shown in the following image).



All of the region's counties are targeting commercial and economic development. Geographic information system (GIS) mapping data from the West Virginia Development Office (WVDO) lists 37 developable locations, including vacant land suitable for development, industrial/business park areas, office spaces, and flex locations. The first of the following maps

shows those locations in the region. The second map, also using WVDO data, shows the industrial sites and parks in the region. (Note: Some of these areas may overlap with the HADCO data presented above.)



REGION 2 PDC HAZARD MITIGATION PLAN

Developable Locations/Bldgs.

Data Source(s):
WVDO, WVGISTC

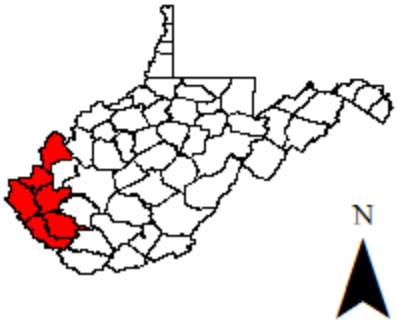
Office Buildings

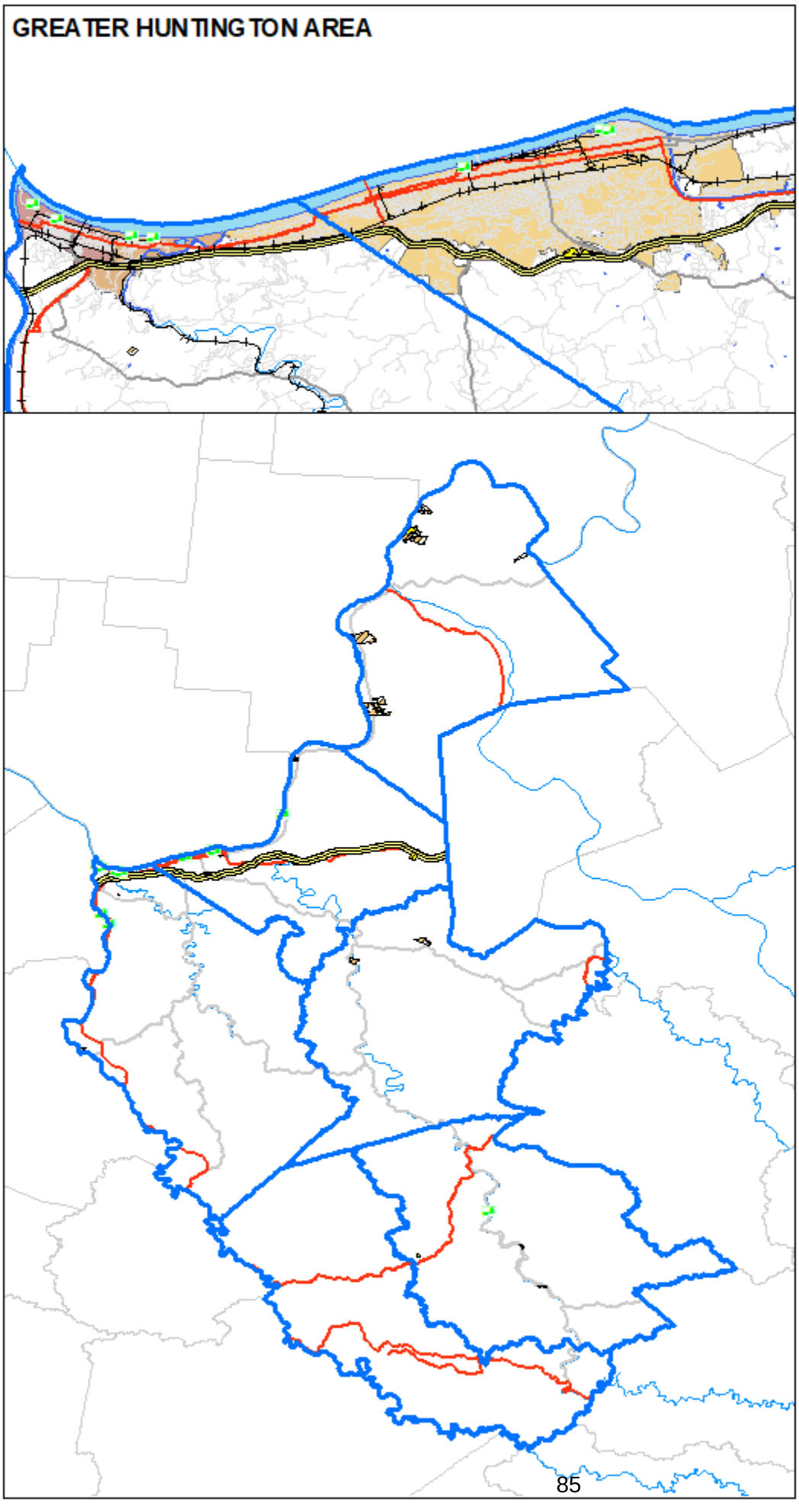
Industrial Buildings

Industrial Sites

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.





REGION 2 PDC HAZARD MITIGATION PLAN

Existing Industrial Sites

Data Source(s):
WVDO, WVGISTC

Industrial Sites

Industrial Parks

Intermodal Terminal Facilities

0 3 6 12 18 24
Miles

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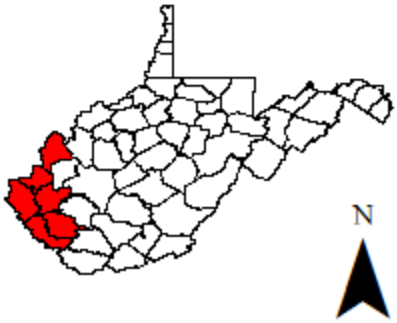


Perhaps one of the most significant trends has to do with the climate changes that communities are experiencing. “Climate change” is a divisive topic, and it has garnered substantial political attention in recent years. However, changes to the climate, regardless of the root cause, carry implications for risk and vulnerability to natural hazards is an important distinction between weather and climate. Weather refers to the atmospheric conditions of a geographical region over a short period, such as days or weeks. Climate, in contrast, refers to the atmospheric conditions of a geographic area over long periods, such as years or even decades (Keller & Devecchio, 2015, pp. 406-407). According to the U.S. Global Change Research Program, there are weather and climate changes already observed in the United States.

- Since recordkeeping began in 1895, the average U.S. temperature has increased by 1.3°F to 1.9°F, with most of the increase happening since 1970. Also, the first decade of the 2000s was the warmest on record.
- The average precipitation across the U.S. has increased since 1900, with some areas experiencing higher than the national average and some lower. Heavy downpours are increasing, especially over the last 30-50 years.
- Drought events have increased in the west. Changes in precipitation and runoff, combined with changes in consumption and withdrawal, have reduced surface and groundwater supplies in many areas.
- Some types of severe weather events have experienced changes. Heatwaves are more frequent and intense, and cold waves have become less frequent and intense overall.
- The intensity, frequency, and duration of North Atlantic hurricanes have increased since the early 1980s.

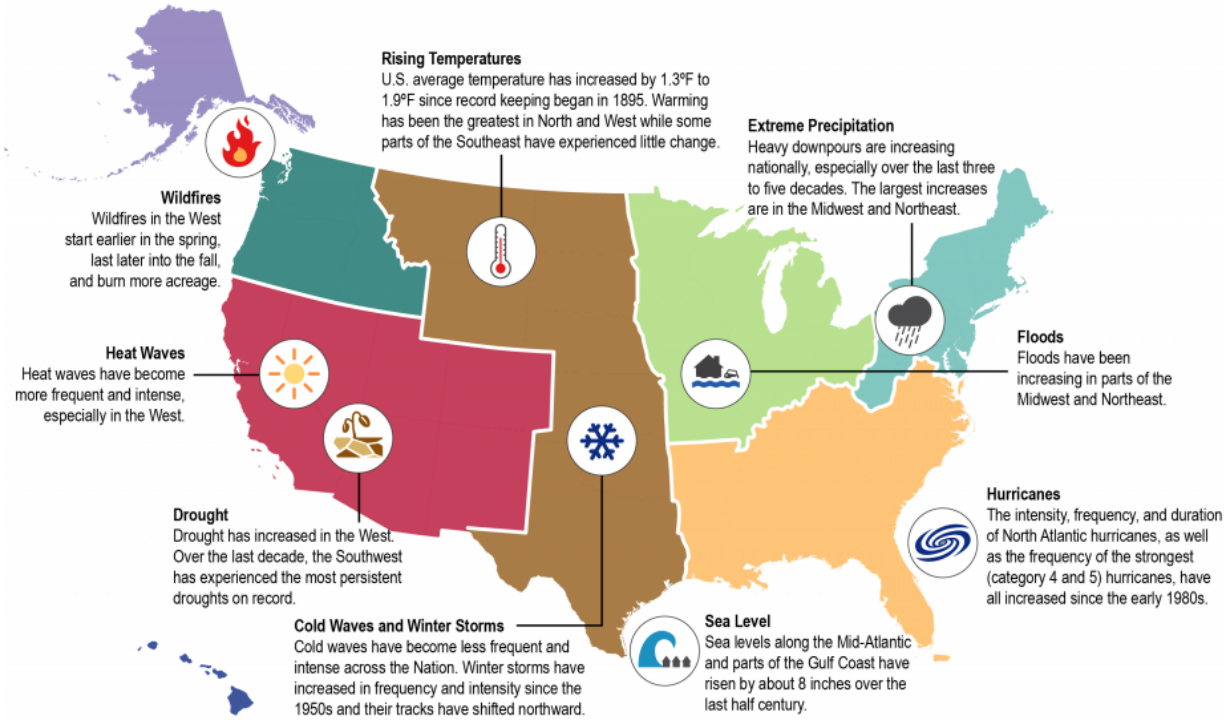
Climate change can have a significant impact on human health and the environment. The changes mentioned above can affect the environment by leading to changes in land use, ecosystems, infrastructure conditions, geography, and agricultural production. Extreme heat, poor air quality, reduced food and water supply and quality, changes in infectious agents, and population displacement can lead to public health concerns such as heat-related illnesses, cardiopulmonary illnesses, food, water, and vector-borne diseases and have consequences on mental health and stress (USGCRP, 2016).

The National Climate Assessment (NCA) defined climate trends for national U.S. regions in 2017 (USGCRP, 2018). The major trends are:

- wildfires and heat waves on the west coast,

- rising temperatures and increased severity and frequency of winter storms in the middle of the country,
- more rain and flooding in the Midwest and northeastern parts of the country, and
- an increase in sea levels in the mid-Atlantic with a rise in hurricane activity in the southeastern states.

The Intergovernmental Panel on Climate Change (IPCC) largely concurs with the above list (IPCC, n.d.). In West Virginia, the trend will likely be an increase in extreme precipitation, as noted in the graphic below.



A balanced assessment of climate change trends recognizes areas of emerging scholarship alongside more thoroughly-researched data. For instance, many of the talking points in the IPCC data are supported by scientific research, but it is important to understand that vast numbers of studies are currently underway. As those studies conclude, new ones begin, and more longitudinal approaches contribute to the knowledge-based, what informs our understanding today may change, and perhaps significantly. Put more directly within the context of this hazard mitigation plan, evidence linking temperature extremes with climate is stronger than the evidence linking the rise in extreme precipitation, increased flooding, increased wildfires, etc. (C2ES, n.d.;

Myhre et al., 2019; Rajkovich & Schwarz, 2022; Tabari, 2020). The evidence supporting the latter is more emergent (i.e., resulting from more recently-initiated study) than the former.

Regional leaders recognize the nexus of the impacts from a changing climate with other trends. For instance, despite reasonably consistent investment, the region's infrastructure is aging (with much of it at the end of its design life) and necessitates much higher investment (with the Huntington Floodwall being a prime example). Will, for example, electricity grids withstand the additional load brought about by increased air conditioner usage during extreme heat events? Will storm systems and other flood control systems (like levees) hold if the amount of precipitation increases? The Region 2 area, particularly in and around the City of Huntington, has generally embraced green infrastructure practices, though local leaders admit there is far more progress to make before these ideas are commonplace (and implemented at scale). With the slow uptake of low-impact development, will traditional construction practices withstand more intense future incidents or, worse yet, contribute to their impacts?

Additionally, communities may experience climate-related impacts that are very different from weather-related risks. There is a growing body of research examining whether climate migration will strain communities in various parts of the United States. For instance, sea level rise is an oft-noted impact of climate change, and one that will necessitate a series of very visible adaptations. People may move away from coasts or migrate to other areas besides coastal communities. Former Rust Belt communities along the Great Lakes, for example, may be a destination for the climate migrants because they have established infrastructures, and they are in areas that are relatively climate stable (as compared to coastal communities) (Hakala, 2022; Van Berkel, Kalafatis, Gibbons, Naud, & Lemos, 2022). Though not "Great Lakes communities," areas in West Virginia are perhaps perceived as more climate stable than coastal communities, accessible via a variety of transportation means, etc. Communities may be faced with re-envisioning development decisions that have, for decades, focused on slowing out-migration toward a rapid escalation of growth to handle in-migration of individuals seeking relief from climate-related impacts[1].

[1] Local leaders should recognize that this is an area of emerging scholarship. It appears here as a trend worth monitoring.

1.0 INTRODUCTION

1.3 Capabilities

§201.6(b)(3)	Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.
§201.6(c)(4)(ii)	[This plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

This section discusses the capabilities present within the region that can support risk reduction. The counties and the municipalities within the region have many resources to implement mitigation activities, including complementary plans, development ordinances, available state and federal funding sources, and various materials to support educational outreach. These resources facilitate community resilience by supporting actions before, during, and after hazard occurrences.

This section adds to data collected during the 2017-2018 mitigation plan update. Specifically, it seeks to expand discussions of what capabilities are available at municipal levels as well as better describe how the available capabilities support hazard mitigation. Perhaps most significantly, this section represents the first effort in the region to outline the complementarity of planning efforts heretofore considered separate (e.g., comprehensive planning and hazard mitigation). In doing so, this section identifies opportunities to strengthen the mitigation-adjacent elements of those capabilities. It is important to understand that these opportunities for improvement are data-supported measures, but in that, they are devoid of the context of the local community. Local leaders should consider these measures, to include whether they apply (or not) to their communities, or if they might apply, what changes would be appropriate to maximize their benefit for regional communities.

Capability Assessment Findings

This section presents the findings of the capability assessment; the table below summarizes the capabilities by county and municipality. Data sources for the summary included the self-assessment survey responses as well as web-based searches for existing ordinances.

JURISDICTIONAL CAPABILITIES (SUMMARY)						
Jurisdiction	*Planning Body / Commission*	*Comprehensive Plan*	*NFIP*	*Building Codes*	*Zoning Ordinance*	*SALDOs*
Cabell County	Yes	Yes	Yes	Yes[1]	No	No
Barboursville, Village of	Yes	Yes	Yes	Yes[1]	Yes	No[2]
Huntington, City of	Yes	Yes	Yes	Yes[1]	Yes	Yes
Milton, City of	Yes	No	Yes	Yes[1]	No	No
Lincoln County	Yes	Yes	Yes	Yes[1]	No	No
Hamlin, Town of	Yes	No	Yes	Yes[1]	No	No
West Hamlin, Town of	Yes	No	Yes	Yes[1]	No	No
Logan County	Yes	Yes	Yes	Yes[1]	No	No
Chapmanville, Town of	Yes	No	Yes	Yes[1]	UNK	No
Logan, City of	Yes	Yes	Yes	Yes[1]	Yes	No
Man, Town of	Yes	No	Yes	Yes[1]	No	No
Mitchell Heights, Town of	Yes	No	Yes	Yes[1]	No	No
West Logan, Town of	Yes	No	Yes	Yes[1]	No	No
Mason County	Yes	Yes	Yes	Yes[1]	UNK	No
Hartford, Town of	Yes	No	Yes	Yes[1]	UNK	No
Leon, Town of	Yes	No	Yes	Yes[1]	No	No
Mason, Town of	Yes	No	Yes	Yes[1]	No	No
New Haven, Town of	Yes	No	Yes	Yes[1]	UNK	No
Point Pleasant, City of	Yes	No	Yes	Yes[1]	Yes	No
Mingo County	Yes	Yes	Yes	Yes[1]	No	No
Delbarton, Town of	Yes	No	Yes	Yes[1]	UNK	No
Gilbert, Town of	Yes	No	Yes	Yes[1]	UNK	No
Kermit, Town of	Yes	Yes[3]	Yes	Yes[1]	Yes[3]	No
Matewan, Town of	Yes	No	Yes	Yes[1]	UNK	No
Williamson, City of	Yes	Yes	Yes	Yes[1]	Yes	No
Wayne County	Yes	Yes	Yes	Yes[1]	No	No
Ceredo, Town of	Yes	No	Yes	Yes[1]	Yes	No
Fort Gay, Town of	Yes	No	Yes	Yes[1]	UNK	No
Kenova, City of	Yes	No	Yes	Yes[1]	UNK	No
Wayne, Town of	Yes	No	Yes	Yes[1]	Yes	No

[1] All jurisdictions may utilize the statewide building code (W. Va. Code §15A-11-5), though enforcement varies widely across the region.
[2] No, though the village's planning and zoning ordinance discusses mobile homes
[3] In progress as of September 2023 (per Mingo Messenger).

Planning and Regulatory Capability

Designated planning commissions serve the region's participating jurisdictions. These commissions support general community planning within their designated jurisdictions. Miscellaneous powers and duties include (but may not be limited to) the following.

- Promote planning
- Enter on any land and make examinations and surveys
- Accept and use gifts and public or private grants for the performance of the commission's functions (i.e., planning activities)
- Enact, adopt, amend, and execute a comprehensive plan
- Adopt zoning regulations to control street congestion; promote health, public safety, and general welfare; provide adequate light and air; promote the conservation of natural resources; prevent environmental pollution; properly manage growth and development; and promote or facilitate adequate transportation, water, sewerage, schools, recreation, parks, and other public facilities
- Recommend subdivision regulations to the legislative body
- Support the preservation of historic structures

Though these commissions do not directly coordinate hazard mitigation planning, their responsibilities for coordinating community-level planning make them valuable resources for creating actionable mitigation strategies.

The Region 2 Planning & Development Council (PDC) is a planning and regulatory resource for the 30 member governments in the region. PDC staff has expertise in not only the compilation of plans, but also in data collection and analysis, geographic information system (GIS) mapping, and data presentation. This expertise is particularly valuable for small jurisdictions whose local government staffing may be part-time or volunteer.

COMPREHENSIVE PLANS

Comprehensive plans promote sound land use and regional cooperation among local governments to address planning issues. These plans serve as the official policy guide for influencing the location, type, and extent of future development by establishing the fundamental decision-making and review processes on zoning matters, subdivision and land development, land uses, public facilities, and housing needs over time.

Lincoln County's plan is a traditional comprehensive plan that addresses population, housing, infrastructure, economic growth and land use, transportation, and community

development (LCDA, 2017). As such, many of the more known ways to integrate this effort with the risk reduction conversation apply. The plan contains a series of implementation strategies, though it does not appear that the Lincoln County Office of Emergency Management was involved in the process, which may limit consideration of how the hazards that could impact the county might affect the strategies.

Logan County's plan (Logan County EDA, 2022) focuses on economic development, but it includes strategic initiatives aimed at improving public health and tackling very low food security. These novel approaches position Logan County well for convening a collaborative approach to address these items as social vulnerability variables exacerbated by hazards like epidemic/pandemic, flooding, severe summer storms, and severe winter storms. Mason County has a current "economic development strategic plan" (Mason County EDA, 2021), and that document discusses the location of future development extensively. It also addresses the preparation of a suitable workforce. Interestingly, having the resilient space available for housing development may be key to effectively managing the growth associated with economic development.

Mingo County's plan is very similar to Logan County's (in terms of formatting). It contains a table (Mingo County Redevelopment Authority, 2022, pp. 15-18) with strengths and corresponding challenges. The challenges section can serve as a framework from which Mingo County and its county and municipal leaders examine the hazards that impact the community. For example, how might a hazard like flooding or severe summer weather affect the poor health outcomes noted as challenges? Conducting this type of examination may lead to the future formation is interesting and novel risk reduction strategies.

The Wayne County Family Resource Network (FRN) and Wayne County Commission led Wayne County's economic development analysis and strategic planning project (2009). The FRN in a coordinating role ensures that the county's (and its communities') human needs will be included. Examining the recommended goals for the project, these human needs feature with a focus on improving health and building social capital. The social capital goal offers a prime opportunity for alignment with risk reduction. Research suggests that communities higher in social capital tend to recovery more quickly, and in some cases, a heightened sense of place can prompt community decisions aimed at community preservation (Dinger, Conger, & Bustamante, 2012; Nigg, 1995; Rumbach, Makarewicz, & Nemeth, 2016). Thus, this goal provides an interesting opportunity to study the connection between said preservation and how it can be achieved through mitigating known destructive hazards.

Both Huntington (City of Huntington, 2013) and Logan (City of Logan, 2022) have excellent municipal-level comprehensive plans. The documents are detailed with a range of accessible and useful information. At a municipal level, local leaders might be better able to address risks stemming from site-specific hazards like flooding and, in some cases, landslides or land subsidence. During future updates, inviting emergency managers and responders into the process could shed some light on those issues. Additionally, the City of Huntington has conducted extensive planning efforts in addition to its comprehensive plan. These include deep-dives into stormwater management (KYOVA, 2017) and overall resilience (USEPA, 2018; USEPA, 2019). These documents are not part of the city's comprehensive plan, per se, but they demonstrate an awareness of how the city's future development must consider and address known hazard risks.

OPPORTUNITIES FOR EXPANDING AND IMPROVING REGIONAL CAPABILITIES: COMPREHENSIVE PLANS		
Jurisdictions	*Capability in Place*	*Considerations for Expansion or Improvement*
Cabell County	Date Unavailable	Ensure regular updates (e.g., every five years); add a chapter addressing risk/exposure reduction
Barboursville	Date Unavailable	Ensure regular updates (e.g., every five years); add a chapter addressing risk/exposure reduction
Huntington	2013 (Update in Progress)	Update the plan every five years (an update was in process at the time of the 2023/2024 mitigation plan update); invite emergency management and emergency response personnel to participate in future updates (for the purpose of considering how hazards might impact development goals *and* to identify ways for development projects to lessen (or not further contribute to) risks in various areas
Lincoln County	2017	Update the plan every five years; invite emergency management representatives to participate in the process
Logan County	2022	Include the ways that hazards may impact the community as complicating variables for food security and public health challenges
Logan	2022	Invite emergency management and emergency response personnel to participate in future updates (for the purpose of considering how hazards might impact development goals *and* to identify ways for development projects to lessen (or not further contribute to) risks in various areas
Mason County	2021	When discussing the improved readiness of development sites, include features meant to buffer against losses from known hazards in those areas
Mingo County	2022	Consider uniformly discussing how (a) the hazards in this plan add to the challenges noted on pp. 15-18, and (b) talk about how addressing those challenges may position the county's residents for greater resilience
Kermit	In Progress	Ensure participation by emergency managers and responders serving the area
Williamson	Date Unavailable	Consider how the hazards that could impact the community might add wrinkles for the projects listed by the city's Redevelopment Authority
Wayne County	2009	Includes an excellent list of recommended goals; ensure these goals include resilience, and expand the discussion on "additional social capital" to include mitigation, preparedness, and recovery (as data shows communities high in social capital tend to recovery more quickly and completely)

OPPORTUNITIES FOR EXPANDING AND IMPROVING REGIONAL CAPABILITIES: COMPREHENSIVE PLANS		
Jurisdictions	*Capability in Place*	*Considerations for Expansion or Improvement*
All Other Participating Jurisdictions (not otherwise listed):		Either compile a comprehensive plan or consider partnering with the county or other jurisdiction in the creation of a plan; ensure the plan includes a chapter on resilience and risk/exposure reduction for common hazards

BUILDING CODES

Building codes regulate construction standards for new construction and substantially renovated buildings. Communities can adopt standards that require resistant or resilient building design practices to address common hazard impacts. Common standards include the *2018 International Property Maintenance Code, the 2018 International Residential Code (IRC),* the *2015 International Energy Conservation Code* (IECC), *the 2020 National Electrical Code* and the *2018 International Mechanical Code*. These codes contain wind and snow loading requirements for new structures. All participating jurisdictions have access to the statewide building code (and may adopt it as a whole or in sections).

OPPORTUNITIES FOR EXPANDING AND IMPROVING REGIONAL CAPABILITIES: BUILDING CODES		
Jurisdictions	*Capability in Place*	*Considerations for Expansion or Improvement*
All Participating Jurisdictions	Yes	For those that rely exclusively on the state building code, consider creating and adopting a locally-specific building code. For those with locally-specific measures, regularly review opportunities to address high-potential impact hazards.

ZONING ORDINANCES

Zoning ordinances allow local communities to regulate the use of land to protect the interests and safety of the general public. Zoning ordinances can address unique conditions or concerns within a given community. They may be used to create buffers between structures and high-risk areas, limit the type or density of development, or require land development to consider specific hazard vulnerabilities. Eight jurisdictions in the region have zoning regulations.

OPPORTUNITIES FOR EXPANDING AND IMPROVING REGIONAL CAPABILITIES: ZONING ORDINANCES		
Jurisdictions	*Capability in Place*	*Considerations for Expansion or Improvement*
Cabell County	No	Consider the creation of generalized zoning measures
Barboursville	Yes	Consider designated known hazard risk areas as restricted areas (similar to floodplain management designations)

OPPORTUNITIES FOR EXPANDING AND IMPROVING REGIONAL CAPABILITIES: ZONING ORDINANCES		
Jurisdictions	*Capability in Place*	*Considerations for Expansion or Improvement*
Huntington	Yes	Consider creating and adopting a locally-specific zoning ordinance that designates known hazard risk areas as restricted areas
Milton	No	Consider the creation of generalized zoning measures
Lincoln County	No	Consider the creation of generalized zoning measures
Hamlin	No	Consider the creation of generalized zoning measures
West Hamlin	No	Consider the creation of generalized zoning measures
Logan County	No	Consider the creation of generalized zoning measures
Chapmanville	Unknown	Consider the creation of generalized zoning measures
Logan	Yes	Consider designated known hazard risk areas as restricted areas (similar to floodplain management designations)
Man	No	Consider the creation of generalized zoning measures
Mitchell Heights	No	Consider the creation of generalized zoning measures
West Logan	No	Consider the creation of generalized zoning measures
Mason County	Unknown	Consider the creation of generalized zoning measures
Hartford	Unknown	Consider the creation of generalized zoning measures
Leon	No	Consider the creation of generalized zoning measures
Mason	No	Consider the creation of generalized zoning measures
New Haven	Unknown	Consider the creation of generalized zoning measures
Point Pleasant	Yes	Consider designated known hazard risk areas as restricted areas (similar to floodplain management designations)
Mingo County	No	Consider the creation of generalized zoning measures
Delbarton	Unknown	Consider the creation of generalized zoning measures
Gilbert	Unknown	Consider the creation of generalized zoning measures
Kermit	Yes	Consider designated known hazard risk areas as restricted areas (similar to floodplain management designations)
Matewan	Unknown	Consider the creation of generalized zoning measures
Williamson	Yes	Consider creating and adopting a locally-specific zoning ordinance that designates known hazard risk areas as restricted areas
Wayne County	No	Consider the creation of generalized zoning measures
Ceredo	Yes	Consider designated known hazard risk areas as restricted areas (similar to floodplain management designations)
Fort Gay	Unknown	Consider the creation of generalized zoning measures
Kenova	Unknown	Consider the creation of generalized zoning measures
Wayne	Yes	Consider designated known hazard risk areas as restricted areas (similar to floodplain management designations)

Special Note: Building and Zoning Codes

The PDC's steering committee discussed the ability of many of the region's municipalities to enforce building and zoning codes. Personnel and staffing constraints often mean that enforcement is minimal despite the presence of a thorough and well-meaning ordinance on the books. To strengthen enforcement capabilities, steering committee members discussed the potential feasibility of an operating agreement between jurisdictions that may allow for personnel to support one another, particularly in the aftermath of a significant incident.

SUBDIVISION AND LAND USE ORDINANCES

Subdivision and land development ordinances (SALDOs) regulate the development of housing, commercial, industrial, or other uses, including associated public infrastructure, as communities and developers subdivide land into buildable lots. Within these ordinances, guidelines on how to divide the land, the placement and size of roads, and the location of infrastructure can reduce exposure of development to hazard events. SALDOs are easily the most limited capability, though Huntington has land use regulations in place and Barboursville's zoning ordinance addresses mobile homes. Jurisdictions currently without a SALDO may consider accomplishing similar aims through a revised building or zoning code.

NATIONAL FLOOD INSURANCE PROGRAM (NFIP) PARTICIPATION & FLOODPLAIN MANAGEMENT ORDINANCES

The NFIP is a FEMA-managed program designed to provide flood insurance to property owners, renters, and businesses. The program intends to help those property owners recover more quickly following a flood event. The NFIP, though, is not *just* an insurance program. Program representatives work with communities to adopt and enforce floodplain management regulations to lessen the exposure to damages in flood-prone areas. All of the jurisdictions in the region participate in the NFIP. The first table below identifies the current map date for the jurisdictions in the region; the second table outlines NFIP policies in force throughout Region 2.

CURRENT EFFECTIVE MAP DATE (PER NFIP PARTICIPATION)			
Jurisdiction	*Date*	*Jurisdiction*	*Date*
Cabell County	02/19/2014	Leon, Town of	12/03/2013
Barboursville, Village of	02/19/2014	Mason, Town of	12/03/2013
Huntington, City of	02/19/2014	New Haven, Town of	12/03/2013
Milton, City of	06/16/2005	Point Pleasant, City of	12/03/2013
Lincoln County	10/16/2013	Mingo County	08/17/2016
Hamlin, Town of	10/16/2013	Delbarton, Town of	10/02/2012
West Hamlin, Town of	10/16/2013	Gilbert, Town of	10/02/2012
Logan County	02/06/2008	Kermit, Town of	08/17/2016
Chapmanville, Town of	02/06/2008	Matewan, Town of	08/17/2016
Logan, City of	02/06/2008	Williamson, City of	08/17/2016
Man, Town of	02/06/2008	Wayne County	09/02/2016
Mitchell Heights, Town of	02/06/2008	Ceredo, Town of	09/02/2016
West Logan, Town of	02/06/2008	Fort Gay, Town of	09/02/2016
Mason County	12/03/2013	Kenova, City of	09/02/2016
Hartford, Town of	12/03/2013	Wayne, Town of	01/02/2013

NFIP POLICIES IN FORCE, REGION 2 PDC PARTICIPATING JURISDICTIONS			
Community Name (Number)	*Policies in Force*	*Total Coverage*	*Total Written Premium + FPF*
Cabell County	**192**	**$36,538,000**	**$222,960**
Barboursville, Village of	16	$3,765,000	$16,553
Huntington, City of	152	$29,885,000	$181,868
Milton, City of	59	$9,767,000	$88,619
Lincoln County	**107**	**$17,750,000**	**$117,561**
Hamlin, Town of	17	$3,181,000	$32,603
West Hamlin, Town of	1	$40,000	$893
Logan County	**354**	**$49,492,000**	**$456,160**
Chapmanville, Town of	5	$1,001,000	$7,396
Logan, City of	7	$2,503,000	$29,019
Man, Town of	14	$1,647,000	$23,065
Mitchell Heights, Town of	8	$2,107,000	$6,546
West Logan, Town of	1	$126,000	$543
Mason County	**64**	**$10,688,000**	**$71,901**
Hartford, Town of	20	$2,210,000	$13,544
Henderson, Town of	6	$216,000	$9,334
Leon, Town of	1	$ 292,000	$1,082
Mason, Town of	8	$763,000	$5,529
New Haven, Town of	11	$1,901,000	$8,031
Point Pleasant, City of	6	$1,590,000	$9,068
Mingo County	**259**	**$41,616,000**	**$256,207**
Delbarton, Town of	17	$3,178,000	$25,998
Gilbert, Town of	10	$2,489,000	$9,329
Kermit, Town of	18	$4,016,000	$21,078

NFIP POLICIES IN FORCE, REGION 2 PDC PARTICIPATING JURISDICTIONS			
Community Name (Number)	*Policies in Force*	*Total Coverage*	*Total Written Premium + FPF*
Matewan, Town of	9	$1,491,000	$6,178
Williamson, City of	25	$7,459,000	$33,266
Wayne County	**136**	**$20,086,000**	**$172,859**
Ceredo, Town of	7	$1,708,000	$6,101
Fort Gay, Town of	3	$322,000	$1,957
Huntington, City of	25	$2,788,000	$23,091
Kenova, City of	9	$2,366,000	$15,707
Wayne, Town of	18	$2,893,000	$31,061

When structures experience more than one flooding event, they can become "repetitive loss" or "severe repetitive loss" properties. The Flood Mitigation Assistance (FMA) grant and the NFIP define repetitive loss and severe repetitive loss slightly differently. The table below outlines both definitions.

REPETITIVE LOSS AND SEVERE REPETITIVE LOSS DEFINITIONS		
Program	*Repetitive Loss*	*Severe Repetitive Loss*
Flood Mitigation Assistance (FMA) Grant	*A repetitive loss (RL) property is a structure covered by a contract for flood insurance made available under the NFIP that:* Has incurred flood-related damage on 2 occasions, in which the cost of the repair, on average, equaled or exceeded 25% of the market value at the time of each such flood event; At the time of the second incidence of flood-related damage, the contract for flood insurance contains increased cost of compliance coverage.	(a) Is covered under a contract for flood insurance made available under the NFIP; and (b) Has incurred flood-related damage i. For which 4 or more separate claims payments (including building and contents) have been made under flood insurance coverage with the amount of each such claim exceeding $5,000, and with the cumulative amount of such claim's payments exceeding $20,000, or ii. For which at least 2 separate claims payments (including only building) have been made under such coverage, with the cumulative amount of such claims exceeding the market value of the insured structure.

REPETITIVE LOSS AND SEVERE REPETITIVE LOSS DEFINITIONS		
Program	*Repetitive Loss*	*Severe Repetitive Loss*
National Flood Insurance Program (NFIP)	A repetitive loss (RL) property is any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period since 1978.	A single-family property (consisting of one to four residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which four or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding $5,000 and with the cumulative amount of such claims payments exceeding $20,000; or for which at least two separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

There are 1,552 repetitive loss properties in Region 2. The table below[4] shows the repetitive loss by county and municipality.

REPETITIVE LOSS RECORD, REGION 2					
Jurisdiction	*Max of Community Number*	*Sum of Total Losses*	*Sum of Cumulative Building Payments*	*Sum of Cumulative Contents Payments*	*Sum of Total Paid*
Cabell County	**540019**	**251**	**$3,828,087.05**	**$761,011.11**	**$4,589,098.16**
Cabell Co. (Unincorporated)	540016	95	$1,317,195.46	$346,575.51	$1,663,770.97
Business, Nonresidential	540016	14	$284,983.52	$61,322.18	$346,305.70
Other, Nonresidential	540016	2	$53,563.91	$19,261.53	$72,825.44
Single Family	540016	79	$978,648.03	$265,991.80	$1,244,639.83
Huntington, City of	540018	83	$1,048,884.89	$134,758.93	$1,183,643.82
Other, Nonresidential	540018	2	$4,718.15	$0.00	$4,718.15
Single Family	540018	81	$1,044,166.74	$134,758.93	$1,178,925.67
Milton, City of	540019	73	$1,462,006.70	$279,676.67	$1,741,683.37
Business, Nonresidential	540019	14	$776,892.77	$137,451.17	$914,343.94
Other, Nonresidential	540019	4	$74,050.97	$12,833.46	$86,884.43
Single Family	540019	55	$611,062.96	$129,392.04	$740,455.00
Lincoln County	**545536**	**118**	**$2,006,665.89**	**$824,304.16**	**$2,830,970.05**
Lincoln Co. (Unincorporated)	540088	109	$1,979,277.02	$815,524.06	$2,794,801.08
2-4 Family	540088	13	$321,133.67	$0.00	$321,133.67
Other, Nonresidential	540088	21	$800,090.75	$607,678.66	$1,407,769.41
Single Family	540088	75	$858,052.60	$207,845.40	$1,065,898.00
Hamlin, Town of	540089	6	$13,766.00	$7,951.77	$21,717.77

[4] Planners derived this table from a PIVOT table provided to the West Virginia Emergency Management Division by FEMA Region III. In the source data, there were several jurisdictions tracked under the incorrect county. Planners reconciled that data for the presentation in this plan. As such, the figures may appear different than the source export.

REPETITIVE LOSS RECORD, REGION 2					
Jurisdiction	*Max of Community Number*	*Sum of Total Losses*	*Sum of Cumulative Building Payments*	*Sum of Cumulative Contents Payments*	*Sum of Total Paid*
Single Family	540089	6	$13,766.00	$7,951.77	$21,717.77
West Hamlin, Town of	540090	3	$13,622.87	$828.33	$14,451.20
Single Family	540090	3	$13,622.87	$828.33	$14,451.20
Logan County	**545539**	**770**	**$8,152,469.22**	**$9,210,323.45**	**$17,362,792.67**
Logan Co. (Unincorporated)	545536	754	$8,058,121.63	$9,181,689.84	$17,239,811.47
2-4 Family	545536	14	$66,274.54	$70,398.24	$136,672.78
Business, Nonresidential	545536	26	$622,247.45	$498,670.41	$1,120,917.86
Other Resid	545536	11	$120,229.55	$7,739.26	$127,968.81
Other, Nonresidential	545536	360	$4,121,271.30	$7,490,953.16	$11,612,224.46
Single Family	545536	341	$3,122,282.68	$1,113,928.77	$4,236,211.45
Unknown	545536	2	$5,816.11	$0.00	$5,816.11
Chapmanville, Town of	540092	4	$47,840.35	$0.00	$47,840.35
Other, Nonresidential	540092	2	$33,574.76	$0.00	$33,574.76
Single Family	540092	2	$14,265.59	$0.00	$14,265.59
Logan, City of	545535	6	$38,947.40	$16,598.94	$55,546.34
Other, Nonresidential	545535	2	$15,541.28	$14,196.64	$29,737.92
Single Family	545535	4	$23,406.12	$2,402.30	$25,808.42
Man, Town of	545537	2	$0.00	$4,468.26	$4,468.26
Single Family	545537	2	$0.00	$4,468.26	$4,468.26
West Logan, Town of	545539	4	$7,559.84	$7,566.41	$15,126.25
Other, Nonresidential	545539	2	$4,172.50	$0.00	$4,172.50
Single Family	545539	2	$3,387.34	$7,566.41	$10,953.75
Mason County	**540251**	**54**	**$829,520.30**	**$197,299.90**	**$1,026,820.20**
Mason Co. (Unincorporated)	540112	35	$665,283.22	$151,053.29	$816,336.51
2-4 Family	540112	10	$113,440.08	$0.00	$113,440.08
Business, Nonresidential	540112	13	$490,035.85	$133,157.21	$623,193.06
Other, Nonresidential	540112	4	$6,871.70	$3,789.73	$10,661.43
Single Family	540112	8	$54,935.59	$14,106.35	$69,041.94
Henderson, Town of[5]	540251	5	$17,727.19	$14,200.00	$31,927.19
Other, Nonresidential	540251	2	$5,383.06	$13,000.00	$18,383.06
Single Family	540251	3	$12,344.13	$1,200.00	$13,544.13
New Haven, Town of	540249	5	$66,661.58	$12,326.98	$78,988.56
Single Family	540249	5	$66,661.58	$12,326.98	$78,988.56
Point Pleasant, City of	540250	9	$79,848.31	$19,719.63	$99,567.94
Business, Nonresidential	540250	2	$50,140.42	$13,300.00	$63,440.42
Single Family	540250	7	$29,707.89	$6,419.63	$36,127.52
Mingo County	**545538**	**244**	**$4,665,758.27**	**$2,203,663.85**	**$6,869,422.12**
Mingo Co. (Unincorporated)	540133	154	$2,320,088.30	$795,744.21	$3,115,832.51
2-4 Family	540133	3	$47,710.92	$22,917.90	$70,628.82
Other, Nonresidential	540133	15	$890,056.30	$287,475.47	$1,177,531.77

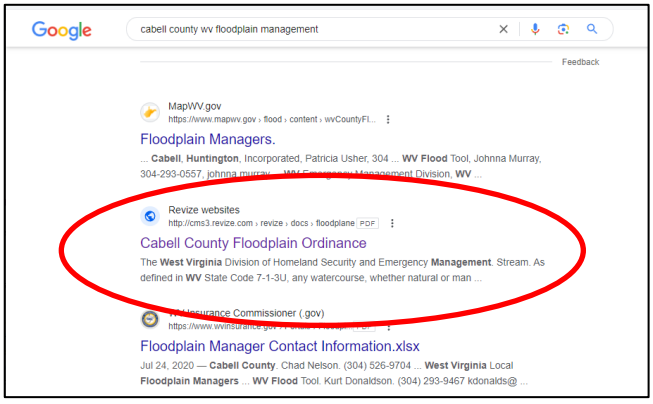
[5] The Town of Henderson dissolved as an incorporated municipality between the 2018 and 2023/2024 plan updates. It appears here because of the way the data appears in the FEMA records.

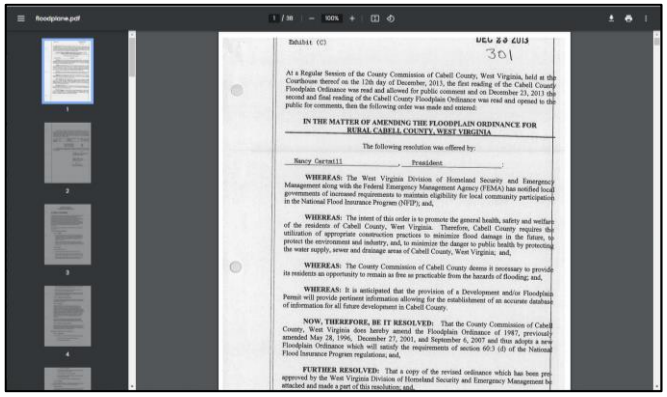
REPETITIVE LOSS RECORD, REGION 2					
Jurisdiction	*Max of Community Number*	*Sum of Total Losses*	*Sum of Cumulative Building Payments*	*Sum of Cumulative Contents Payments*	*Sum of Total Paid*
Single Family	540133	136	$1,382,321.08	$485,350.84	$1,867,671.92
Delbarton, Town of	540134	6	$27,787.77	$13,419.05	$41,206.82
Single Family	540134	6	$27,787.77	$13,419.05	$41,206.82
Gilbert, Town of	540135	15	$751,898.26	$188,079.91	$939,978.17
Other, Nonresidential	540135	13	$609,426.64	$130,956.08	$740,382.72
Single Family	540135	2	$142,471.62	$57,123.83	$199,595.45
Kermit, Town of	540136	4	$41,375.24	$12,951.46	$54,326.70
Single Family	540136	4	$41,375.24	$12,951.46	$54,326.70
Matewan, Town of	545538	27	$556,888.79	$344,371.41	$901,260.20
Other, Nonresidential	545538	17	$326,703.32	$244,105.88	$570,809.20
Single Family	545538	10	$230,185.47	$100,265.53	$330,451.00
Williamson, Town of	540138	38	$967,719.91	$849,097.81	$1,816,817.72
2-4 Family	540138	4	$34,058.55	$0.00	$34,058.55
Other Resid	540138	2	$327,417.11	$2,105.87	$329,522.98
Other, Nonresidential	540138	20	$436,057.76	$784,736.90	$1,220,794.66
Single Family	540138	12	$170,186.49	$62,255.04	$232,441.53
Wayne County	**540282**	**115**	**$1,261,310.40**	**$449,462.66**	**$1,710,773.06**
Wayne Co. (Unincorporated)	540200	90	$923,128.55	$289,421.16	$1,212,549.71
Business, Nonresidential	540200	3	$63,531.03	$0.00	$63,531.03
Single Family	540200	87	$859,597.52	$289,421.16	$1,149,018.68
Ceredo, Town of	540232	3	$18,798.15	$18,594.52	$37,392.67
Single Family	540232	3	$18,798.15	$18,594.52	$37,392.67
Fort Gay, Town of	540202	5	$135,444.64	$30,000.00	$165,444.64
Single Family	540202	5	$135,444.64	$30,000.00	$165,444.64
Huntington, City of	540018	15	$126,339.06	$1,015.94	$127,355.00
Single Family	540018	15	$126,339.06	$1,015.94	$127,355.00
Wayne, Town of	540231	2	$57,600.00	$110,431.04	$168,031.04
Other, Nonresidential	540231	2	$57,600.00	$110,431.04	$168,031.04
	Grand Totals	**1,552**	**$20,743,811.13**	**$13,646,065.13**	**$34,389,876.26**

Through the administration of floodplain ordinances, jurisdictions can ensure that all new construction or substantial improvements to existing structures located in the floodplain are flood-proofed, dry-proofed, or built above anticipated flood elevations. Floodplain ordinances may also prohibit development in certain areas. The NFIP establishes minimum ordinance requirements that must be met for that community to participate in the program. However, a community is permitted and (in fact) encouraged to adopt standards that exceed NFIP requirements. The following images provide selected samples of how jurisdictions in Region 2 make their floodplain ordinances available online.

Cabell County

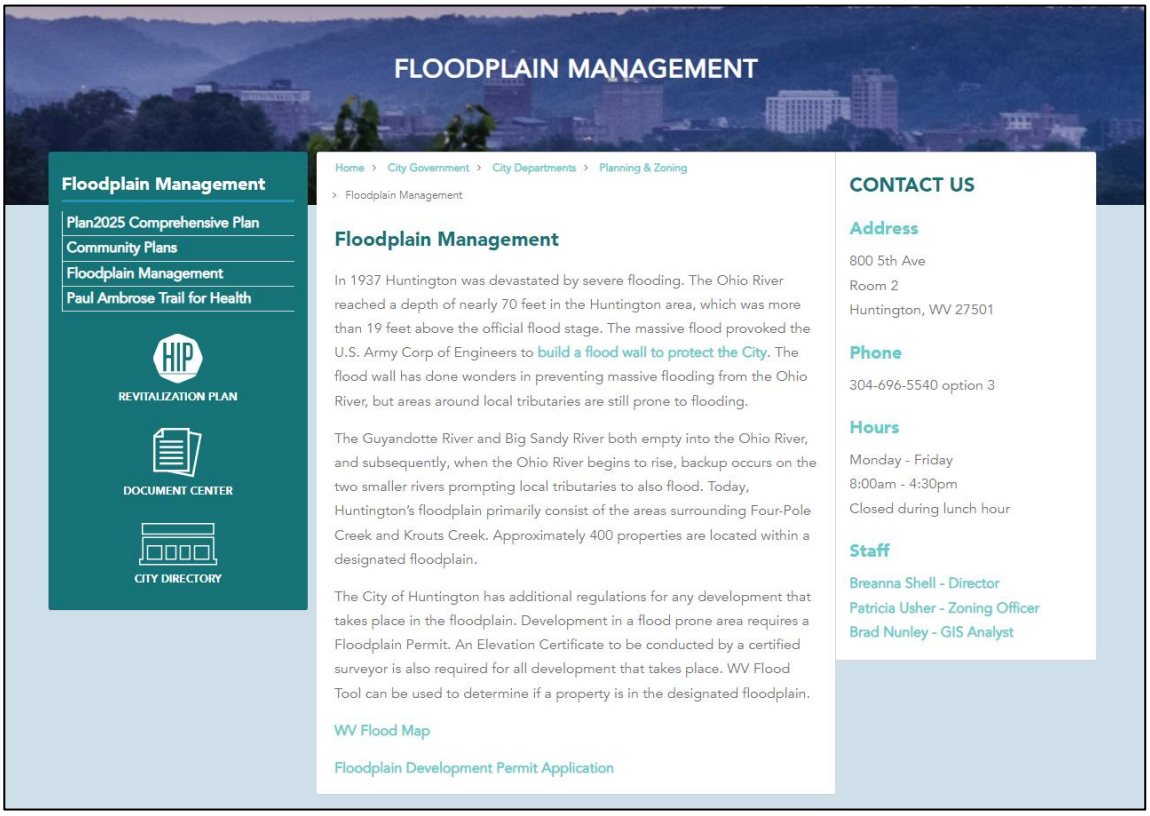
When searching for Cabell County's ordinance, a Google search takes a resident directly to the county's ordinance.





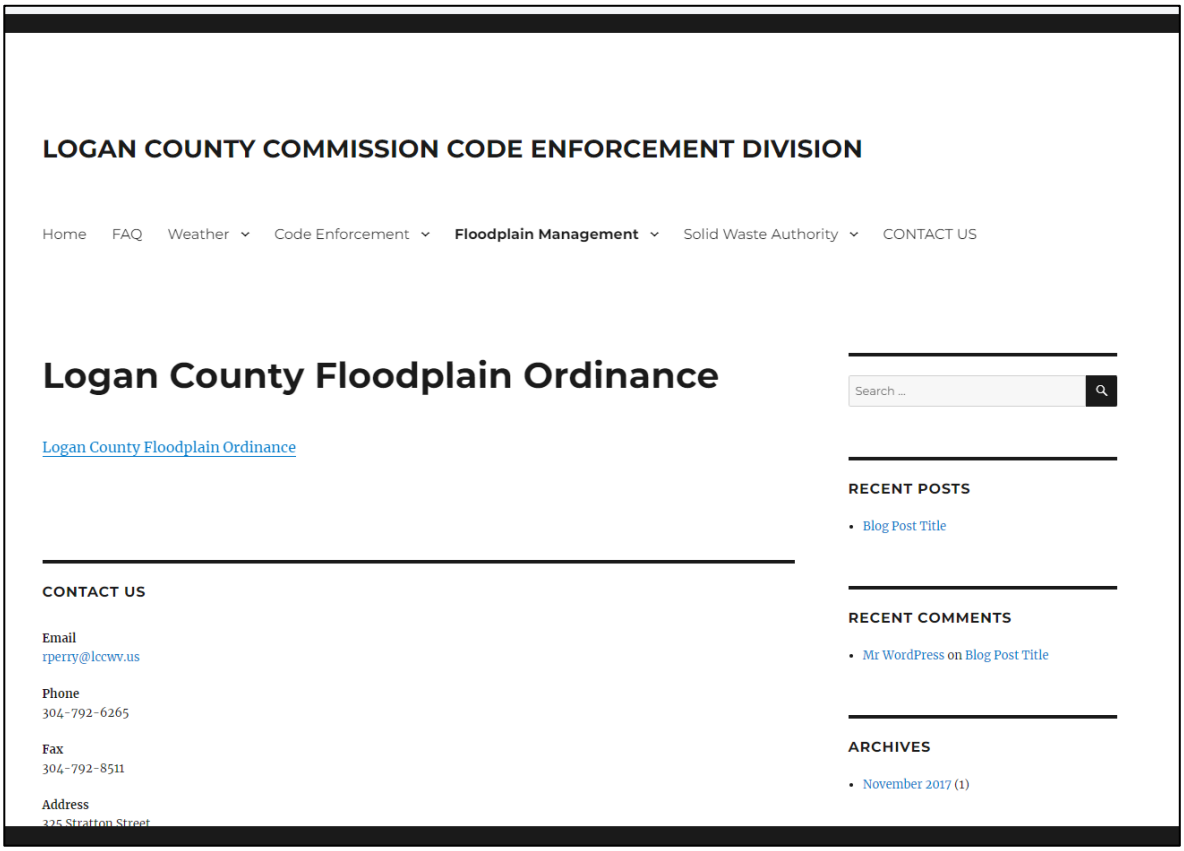
Huntington (https://www.cityofhuntington.com/city-government/city-departments/planning-zoning/floodplain/)

Huntington's floodplain management webpage includes links to community plans, the floodplain ordinance, the West Virginia Flood Tool, and the city's floodplain development permit application.



Logan County

Logan County's Code Enforcement Division website makes both contact information and the county's ordinance quickly available.



As with Cabell County, a Google search for Wayne County, West Virginia's floodplain management ordinance takes users to a direct link with a PDF version of the ordinance.

Floodplain management at the jurisdictional level typically originates with the floodplain coordinator. While all participants in the NFIP have a designated floodplain coordinator, many smaller jurisdictions look for assistance in filling the role. As an example, Lincoln County's floodplain coordinator also provides the same service to both the Towns of Hamlin and West Hamlin, and Mingo County's floodplain coordinator fills the role for all five of the municipalities in the county: Delbarton, Gilbert, Kermit, Matewan, and Williamson. A table listing the floodplain coordinators in the region appears in Appendix 1.

Typical means of keeping new and substantially-improved construction reasonably safe from flooding, per floodplain ordinances, include anchoring, using flood-resistant materials, and designing/locating utilities and services to prevent water damage. Generally speaking, the region's communities utilize the state's model floodplain ordinance, though there was significant

discussion during steering committee meetings about creating a more regional capability to support jurisdictional enforcement, which could be a motivator for revising ordinances to be more stringent. Currently, many jurisdictions feel as though they cannot keep up with the enforcement of the existing ordinances.

Site inspections during construction are the most common way jurisdictions in the region monitor compliance. During the new construction phase, this process is reasonably straight forward. It is more nuanced when considering non-disaster related major improvements. Improvements are considered "substantial" when the cost of them equals or exceeds 50% of the fair market value of the structure before the start of construction of the improvement. Jurisdictions often rely on local realtors for determining fair market value. If obtaining these values from multiple sources, they may be inconsistent (and the inconsistency can be frustrating for both the home owner and the floodplain coordinator). When making repairs to substantial damage after a disaster occurs, similar frustrations are present, though with the added stress of trying to rebuild one's home.

OPPORTUNITIES FOR EXPANDING AND IMPROVING REGIONAL CAPABILITIES: FLOODPLAIN MANAGEMENT		
Jurisdictions	*Capability in Place*	*Considerations for Expansion or Improvement*
All Participating Jurisdictions:		
	Yes	Add measures beyond minimum requirements; Make the floodplain management ordinance more readily available (e.g., via the jurisdiction's website); Clarify SubI costs as being one-time or cumulative; Add a local in-construction inspection capability

Administrative and Technical Capability

"Administrative capability" refers to the adequacy of departmental and personnel resources for implementing mitigation-related activities. "Technical capability" relates to the adequacy of local government employees' knowledge and technical expertise to effectively execute mitigation activities (or the ability to contract outside resources for this expertise). Common examples of skill sets and technical personnel for hazard mitigation include planners with knowledge of land development/management practices, engineers or professionals trained in construction practices related to buildings or infrastructure (e.g., building inspectors), planners or engineers with an understanding of natural and human-caused hazards, emergency managers, floodplain managers, land surveyors, scientists familiar with hazards in the community, staff with the education or expertise to assess community vulnerability to hazards, personnel skilled in

geographic information systems, resource development staff or grant writers, and fiscal staff to handle complex grant application processes.

Throughout the planning process, steering committee members recognized the limited administrative and technical capabilities at the municipal levels, not from a lack of knowledge, but rather from a lack of personnel to carry out administrative tasks. As noted in the opportunities for enhancement of building and zoning ordinances above, the steering committee floated the idea of creating a regional technical assistance hub through which the municipalities could obtain assistance in managing programmatic elements from other jurisdictions in the region. Currently, the memoranda of understanding (MOUs) necessary to frame such efforts are not in place, but they represent an intriguing option for increasing region-wide administrative and technical capabilities.

The Region 2 Planning & Development Council provides technical assistance to member governments. State agencies that can provide technical assistance for mitigation activities include, but are not limited to:

- West Virginia Department of Agriculture,
- West Virginia Emergency Management Division,
- West Virginia Department of Homeland Security,
- West Virginia Department of Environmental Protection,
- West Virginia Development Authority,
- West Virginia Department of Transportation,
- West Virginia Office of the Governor's Housing Assistance, and
- West Virginia State Resiliency Office.

Federal agencies which can provide technical assistance for mitigation activities include, but are not limited to:

- U.S. Army Corps of Engineers (USACE)
- U.S. Department of Agriculture (USDA)
- U.S. Department of Homeland Security (USDHS), Federal Emergency Management Agency (FEMA)
- USDHS/FEMA Emergency Management Institute (EMI)
- U.S. Department of Housing and Urban Development (HUD)
- U.S. Economic Development Administration (USEDA)
- U.S. Environmental Protection Agency (USEPA)

- U.S. Small Business Administration (SBA)

Financial Capability

The decision and capacity to implement mitigation-related activities often depend on funding availability. While some mitigation actions are less costly than others, money must be available locally to implement policies and projects. Financial resources are particularly important if communities are trying to take advantage of state or federal mitigation grant funding opportunities that require local-match contributions. The PDC staff are specialized grants management personnel that are available to participating jurisdictions.

Financial capabilities are limited in the region, particularly at the municipal level. Most of the municipalities in the region are quite small. Therefore, grant or loan programs will be crucial to the completion of significant mitigation projects. State programs that may provide financial support for mitigation activities include, but are not limited to the following.

STATE PROGRAMS WITH POTENTIAL FINANCIAL SUPPORT FOR MITIGATION ACTIVITIES		
Program	*Notes*	*Relevant Hazard(s)*
319 Nonpoint Source Program West Virginia Department of Environmental Protection	Grant funds from the Federal Clean Water Act Section §319(h) to fund projects to help reduce water quality impairments caused by nonpoint sources. Funds can be used for staff, planning activities, operating costs, outreach and education, and additional grant opportunities (AGOs). The maximum reimbursement is 60% of the total project cost; there must be a 40% non-federal match. Administrative, overhead, and indirect costs cannot exceed 10% of the grant award. There is a 20% limit on grant funds for non-implementation activities such as planning and monitoring.	Flooding Hazardous Materials (i.e., contamination)

STATE PROGRAMS WITH POTENTIAL FINANCIAL SUPPORT FOR MITIGATION ACTIVITIES		
Program	*Notes*	*Relevant Hazard(s)*
Brownfields & Voluntary Cleanup Programs West Virginia Department of Environmental Protection	Brownfields Assistance Program TECHNICAL ASSISTANCE: Empowers communities, developers, and stakeholders to assess, clean up, and sustainably reuse brownfields. Includes grant writing assistance. • EPA Brownfields Grants: Assessment, cleanup, and multipurpose grants for assessment and remediation of brownfields. • Revolving Loan Fund (RLF): Low-interest loans to eligible entities to assist in the cleanup of properties contaminated with petroleum or hazardous substances. Interest rates range from 0% to 1.5% for government and non-profit borrows, and from 1.0% to 3.0% for private sector businesses. Voluntary Remediation Program (VRP) TECHNICAL ASSISTANCE: Encourages voluntary cleanup and redevelopment of abandoned or under-utilized contaminated properties by providing certain environmental liability protections under West Virginia law.	Hazardous Materials
Emergency Management Performance Grant (EMPG) Program West Virginia Emergency Management Division	Reimbursement for expenditures related to operating an emergency management program in local communities (focused on all phases of emergency management).	All Hazards
Hazardous Materials Emergency Preparedness (HMEP) Program West Virginia State Emergency Response Commission	Grant funds to support planning for transportation-based hazardous materials emergencies.	Hazardous Materials
Non-Profit Security Grant Program (NSGP) West Virginia Emergency Management Division	Grant funds for physical and cybersecurity enhancements and other security-related activities to non-profit organizations at high risk of terrorist or other extremist attack.	Acts of Violence (including cybersecurity)
State Homeland Security Grant Program (SHSP) West Virginia Emergency Management Division	Risk-based grants to support local efforts in preventing, protecting against, mitigating, responding to, and recovering from acts of terrorism and other threats.	Acts of Violence
West Virginia Flood Resiliency Trust Fund West Virginia State Resiliency Office	Funds to assist in leveraging other funds (e.g., CDBG-DR) to recover from a flood disaster event, with a minimum of 6% to be dedicated to flood resiliency plan development and implementation activities.	Flooding

Federal programs that may provide financial support for mitigation activities include, but are not limited to the following.

FEDERAL PROGRAMS WITH POTENTIAL FINANCIAL SUPPORT FOR MITIGATION ACTIVITIES		
Program	*Notes*	*Relevant Hazard(s)*
Building Resilient Infrastructure and Communities (BRIC) Federal Emergency Management Agency	Grant funds (via a competitive program) for research-supported, data-driven, and proactive investment in community resilience and risk reduction.	Natural Hazards
Community Development Block Grant (CDBG) U.S. Dept. of Housing & Urban Development	CDBG-MIT grant funds enable communities to carry out strategic and high-impact activities to mitigate disaster risks and reduce future losses.	Natural Hazards
Emergency Conservation Program U.S. Department of Agriculture	Matching grant funds to repair damage to farmlands and to put in place water conservation measures during severe drought.	Drought Flooding Severe Summer Storms
Emergency Watershed Protection Program USDA Natural Resources Conversation Service	Technical assistance and grant funds to help relieve imminent threats to life and property that impair a watershed. Eligible activities can include debris removal from streams channels, culverts, and bridges; streambank protection; correcting damaged drainage facilities; establishing vegetative cover on eroded lands; repairing levees and structures; repairing certain conservation practices; or EWP buyouts.	Flooding Severe Summer Storms Tornadoes Wildfire Winter Storms
Flood Mitigation Assistance (FMA) Program Federal Emergency Management Agency	Grant funds (via a competitive program) to states and local governments to eliminate or reduce the risk of repetitive flood damage to buildings insured by the NFIP.	Flooding
Hazard Mitigation Grant Program (HMGP) Federal Emergency Management Agency	Grant funds to state, local, tribal, and territorial governments to develop hazard mitigation plans or rebuild in a way that reduces future losses. Available after a Presidentially-declared disaster, HMGP funds also often fund mitigation projects such as acquisition, elevation, etc.	Natural Hazards
High-Hazard Potential Dams (HHPD) Program Federal Emergency Management Agency	Grant funds for technical, planning, design, and construction assistance to rehabilitate eligible high-hazard potential dams.	Dam Failure
Individuals and Households Program (IHP) Federal Emergency Management Agency	Financial assistance and direct services to eligible individuals and households affected by a disaster; regarding mitigation, IHP can help eligible homeowners repair or rebuild stronger, more durable homes.	Natural Hazards
Non-Insured Crop Disaster Assistance Program (NAP) U.S. Department of Agriculture	Grant funds to producers of non-insurable crops when low yields, loss of inventory, or prevented planting occur due to natural disasters.	Natural Hazards
Repetitive Flood Claims (RFC) Program Federal Emergency Management Agency	Grant funds to reduce flood damages to insured properties that have had one or more claims with the NFIP.	Flooding

FEDERAL PROGRAMS WITH POTENTIAL FINANCIAL SUPPORT FOR MITIGATION ACTIVITIES		
Program	*Notes*	*Relevant Hazard(s)*
Section 108 Loan Guarantee Programs U.S. Dept. of Housing & Urban Development	Loan program that allows CDBG recipients to leverage grant allocations to access low-cost, flexible financing for economic development, housing, public facilities, and infrastructure projects.	Natural Hazards (for purposes of the mitigation plan)
Severe Repetitive Loss (SRL) Program Federal Emergency Management Agency	Grant funds to states, territories, and local governments to reduce or eliminate the long-term risk of flood damage to severe repetitive loss properties insured under the NFIP.	Flooding
Weatherization Assistance Program (WAP) U.S. Department of Energy	Administered at the state level (through the West Virginia Weatherization Assistance Program [WAP]); assists income-eligible homeowners and renters in reducing heating and cooling costs through energy conservation measures. In Region 2, three organizations are in the weatherization service network: Southwestern Community Action Council, Inc. (Cabell, Lincoln, Mason, and Wayne Counties); PRIDE Community Services, Inc. (Logan County); and Coalfield Community Action Partnership, Inc. (Mingo County).	Extreme Temperatures Severe Summer Storm Winter Storms

Political Capability

One of the most challenging capabilities to evaluate involves the political will of a jurisdiction to enact meaningful policies and projects designed to mitigate hazard losses. Some officials may view adopting mitigation measures as an impediment to growth and economic development. Further, mitigation may not generate interest among local officials compared to competing priorities. The local political climate must be considered when designing mitigation strategies, as it could be the most difficult hurdle to overcome in accomplishing the adoption or implementation of specific actions.

The communities of Region 2 represent an array of perspectives when it comes to risk reduction. Generally, all participating jurisdictions seek to reduce risk to known hazards. There is debate about the urgency associated with some hazards. Do acts of violence, for instance constitute a region-wide threat, or are they more localized. Yet, for other hazards such as flooding, there is widespread agreement as to the negative impacts of the hazard, yet there is hesitancy about barring development in some areas out of a recognition of the limited available and developable land. The region's communities would likely be more avid supporters of traditional

mitigation measures when there were suitable alternatives available (e.g., areas where relocated households could move that remain within a jurisdiction's corporate limits, etc.).

2.0 RISK ASSESSMENT

"A risk assessment is a robust, data-driven analysis. It explains what might happen. It also finds where the local jurisdiction is vulnerable to hazards" (FEMA, 2023c, p. 48). This section contains information on identified hazards that threaten the region and the vulnerability of the Region 2 Planning & Development Council's member governments as it relates to their assets.

2.0 RISK ASSESSMENT

2.1 Identify Hazards

§201.6(c)(1)	[The risk assessment shall include a] description of the…location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

This section identifies the hazards included in the *Region 2 PDC Hazard Mitigation Plan*. Planners used several research methods to identify the hazards to which the region is susceptible, and the steering committee validated the research with the members' experiences living and working in the area. When meeting with participating jurisdictions one-on-one, representatives from those jurisdictions provided context on this list from their perspectives, further validating and adding context to the list. This process led to the inclusion of the following 15 hazards.

- Acts of Violence
- Cyber Incidents
- Dam & Levee Failure
- Drought
- Earthquake
- Epidemic/Pandemic
- Extreme Temperatures
- Flood
- Hazardous Materials Incident
- Landslides & Land Subsidence
- Substance Use Crisis
- Severe Summer Weather
- Severe Winter Weather
- Tornado
- Wildfire

The 2024 plan will be the first one to feature epidemic/pandemic as a stand-alone hazard. When the steering committee came together in 2022 to conduct the annual plan review, the group began collecting data for epidemic and pandemic situations with the intent to add it to this update. When the steering committee began meeting for the 2024 update, members had a robust discussion about the region's vulnerability to cyber incidents. The result of that discuss was to add it as a new hazard in 2024 as well. Other, more subtle changes included separating "tornado" from the severe summer weather hazard, changing the name of the dam failure hazard to "dam and levee failure," and changing the name of the opioid epidemic hazard to "substance use crisis." This final name change was suggested by extended partners participating in the update, noting that those struggling with addiction are using more than opioids.

Planners utilized additional sources as lists to ensure the steering committee's consideration of a full range of hazard types. FEMA's National Risk Index (NRI) (2021b) summarizes risks to communities from a range of hazards, including the following.

- Avalanche
- Coastal Flooding
- Cold Wave
- Drought
- Earthquake
- Hail
- Heat Wave
- Hurricane
- Ice Storm
- Landslide
- Lightning
- Riverine Flooding
- Strong Wind
- Tornado
- Tsunami
- Volcanic Activity
- Wildfire
- Winter Weather

Region 2's committee included most of these hazards in the 2024 update. *Drought*, *earthquake*, *tornado*, and *wildfire* appear in this plan verbatim, and *landslide* and *riverine flooding* appear as expanded considerations with land subsidence and flash flooding, respectively. (Significantly, during the second steering committee meeting, members specifically identified the need to call attention to the differing impacts associated with flash flooding and riverine flooding in the "flood" profile.) *Cold waves* and *heat waves* will appear under "extreme temperatures," and *hail*, *lightning*, and *strong wind* will appear together under "severe summer weather." Finally, *ice storm* and *winter weather* will be under the heading of "severe winter weather." *Hurricane* is a bit different. Though the region could feel the impacts of hurricane remnants, the steering committee avoiding listing "hurricane" as a hazard, instead recognizing these events as severe summer storms. The committee did not include the following FEMA-identified hazards.

- Avalanche: FEMA's NRI (2021b) notes that this hazard does not apply to any county in West Virginia.
- Coastal Flooding: None of West Virginia's counties include coastlines.
- Tsunami: As noted, none of the state includes coastlines, nor are any of its counties close enough to coastlines to feel the effects of a tsunami.
- Volcanic Activity: FEMA's NRI (2021b) notes that this hazard does not apply to any county in West Virginia.

Another source was the West Virginia state hazard mitigation plan. At the time of this update, the West Virginia Emergency Management Division (WVEMD) had recently completed its own update to the state's plan. In that process, the state identified 16 hazards (WVEMD, 2023). The following table compares the hazards from the state plan with the list generated by the steering committee above.

INCLUDED HAZARD TYPES – COMPARISON OF REGION 2 AND WEST VIRGINIA PLANS		
Hazard	*In R2 Plan? (Y/N)*	*Notes*
Dam Failure	Y	Region 2 Profile Title: Dam & Levee Failure See notes below regarding "Levee Failure."
Drought	Y	Region 2 Profile Title: Drought
Earthquake	Y	Region 2 Profile Title: Earthquake
Extreme Temperature	Y	Region 2 Profile Title: Extreme Temperatures
Flood	Y	Region 2 Profile Title: Flood
Hazardous Materials	Y	Region 2 Profile Title: Hazardous Materials Incident
Landslide	Y	Region 2 Profile Title: Landslides & Land Subsidence The previous version of the regional plan included a broad consideration of "land movements." That profile considered several types of geologic hazards, including landslides, mud flows, rock falls, land subsidence, and expansive soils. The steering committee elected to focus this updated profile on two known and frequent issues: landslides and land subsidence. Further, the newly-available Total Exposure Area Landslide (TEAL) data from the state enabled a spatial consideration of landslides. Though land subsidence and landslides are defined differently, the steering committee elected to group them for general consistency with earlier versions of this plan.
Levee Failure	Y	Region 2 Profile Title: Dam & Levee Failure Though there are levees in Region 2, the total number of structures is low. Considering risks from failed levees is important, and since those risks are similar to those of dam failures (i.e., inundation of and damage within protected areas), the steering committee combined levee failure with dam failure.
Pandemic	Y	Region 2 Profile Title: Epidemic/Pandemic The steering committee recognized the risks associated with pandemics, but it also felt a need to acknowledge risks from other outbreaks, including the potential strains on the small local health departments in the region.

INCLUDED HAZARD TYPES – COMPARISON OF REGION 2 AND WEST VIRGINIA PLANS		
Hazard	*In R2 Plan? (Y/N)*	*Notes*
Radiological Incidents	N	The state's profile for radiological incidents refers to the release of significant levels of radiation and the subsequent worker exposure to that radiation. While this may be a hazard for other counties in West Virginia (e.g., counties in the Northern Panhandle that may be impacted by an incident at the Beaver Valley plant), large releases of radiation are not likely in the Region 2 area. Smaller releases are possible but would be consistent with hazardous materials incidents.
Radon Exposure	N	The state's recent plan update estimated 29% of West Virginia homes as having a high level of radon, and while that is a notable figure, the steering committee felt it to be better addressed by ongoing education rather than organized community-level risk reduction efforts.
Severe Storm	Y	Region 2 Profile Title: Severe Summer Weather
Subsidence	Y	Region 2 Profile Title: Landslides & Land Subsidence See notes above regarding "Landslide."
Utility Failure	N	Utility interruptions could certainly cause problems in the region, and the steering committee recognized those challenges. In most cases, though, steering committee members felt addressing those challenges as cascading impacts of the hazards listed in the risk assessment would be appropriate.
Wildfire	Y	Region 2 Profile Title: Wildfire
Winter Weather	Y	Region 2 Profile Title: Severe Winter Weather

Though Region 2's hazard list varies slightly from FEMA and WVEMD, a comparison of the lists suggests that the region's steering committee assembled a viable and understandable list. A final step in validating the steering committee's thoughts came by reviewing disaster declarations for the region's six counties (FEMA, 2023b; FSA, 2024; SBA, 2024).

The following table denotes the disaster declarations by county (*n* = 77). Readers should recognize that some disasters received a Presidential declaration *and* a U.S. Small Business Administration (SBA) declaration. For declarations referenced by the SBA and the U.S. Department of Agriculture's Farm Service Agency (FSA), "P" refers to counties designated as "primary," while "C" refers to those designated as "contiguous," when that data was available. If a "P" or "C" designation was not available for SBA or FSA declarations, planners marked the column with an "X." References to these declarations appear, as appropriate, in the profiles in Section 2.2 below.

DISASTER DECLARATIONS IMPACTING REGION 2 COUNTIES						
Declaration Information	*Cabell*	*Lincoln*	*Logan*	*Mason*	*Mingo*	*Wayne*
1967, DR-224-WV Flooding	X	X	X	X	X	X
1972, DR-323-WV Heavy Rains and Flooding		X	X		X	
1972, DR-349-WV Heavy Rains and Flooding			X		X	
1974, DR-416-WV Severe Storms and Flooding		X	X		X	X
1977, DR-531-WV Severe Storms and Flooding	X	X	X		X	X
1977, EM-3052-WV Severe Storms, Landslides, and Flooding			X		X	
1979, DR-569-WV Severe Storms and Flooding	X	X			X	X
1984, DR-706-WV Severe Storms and Flooding			X		X	X
1993, EM-3109-WV Severe Snowfall and Winter Storm	X	X	X	X	X	X
1996, DR-1084-WV Blizzard of '96 (Severe Snow Storm)	X	X	X	X	X	X
1996, DR-1096-WV Flooding				X		
1996, DR-1115-WV Flooding, Heavy Winds		X	X		X	X
1996, DR-1132-WV Heavy Rains, High Winds, Flooding, and Slides (Fire)	X					
1997, DR-1168-WV Heavy and Wind-Driven Rain, High Winds, Flooding, Slides	X	X		X		X
1998, DR-1229-WV Severe Storms and Flooding	X					
2000, DR-1319-WV Flooding, Severe Storms, and Landslides	X	X		X		
2000, WV-L0076 (SBA) N/A	X					
2001, DR-1378-WV Severe Storms, Flooding, and Landslides	X	X	X	X	X	X
2001, WV-L0080 (SBA) Severe Storms/Floods	X	X	X	X		X
2002, DR-1410-WV Severe Storms, Flooding, and Landslides			X		X	
2002, FM-2391-WV WV-Southeast Fire Complex, 11/16/2001	X	X	X	X		X

DISASTER DECLARATIONS IMPACTING REGION 2 COUNTIES						
Declaration Information	*Cabell*	*Lincoln*	*Logan*	*Mason*	*Mingo*	*Wayne*
2002, WV-L0082 (SBA) Severe Storms and Flooding	X					X
2002, WV-L0083 (SBA) Severe Storms and Flooding					X	
2003, DR-1455-WV Severe Winter Storm, Record/Near Record Snow, Heavy Rains, Flooding, and Landslides	X	X	X	X	X	X
2003, DR-1474-WV Severe Storms, Flooding, and Landslides	X	X	X	X	X	X
2003, WV-L0091 (SBA) Severe Winter Storm	X	X	X	X	X	X
2003, WV-L0094 (SBA) Severe Storms	X	X	X	X	X	X
2004, DR-1500-WV Severe Storms, Flooding, and Landslides	X	X	X			X
2004, DR-1522-WV Severe Storms, Flooding, and Landslides	X	X	X	X	X	X
2004, DR-1536-WV Severe Storms, Flooding, and Landslides		X	X		X	
2004, DR-1558-WV Severe Storms, Flooding, and Landslides	X	X	X	X	X	X
2005, EM-3221-WV Hurricane Katrina Evacuation	X	X	X	X	X	X
2007, DR-1696-WV Severe Storms, Flooding, Landslides, and Mudslides	X	X	X		X	X
2008, WV-00010 (SBA) N/A	X					
2009, DR-1838-WV Severe Storms, Flooding, Mudslides, and Landslides					X	
2009, WV-00012 (SBA) Severe Storms, Flooding, Mudslides, and Landslides		C	C		P	C
2010, DR-1881-WV Severe Winter Storm and Snowstorm					X	
2010, DR-1918-WV Severe Storms, Flooding, Mudslides, and Landslides			X		X	
2010, OH-00022 (SBA) N/A	C					
2010, WV-00020 (SBA) Severe Storms, Flooding, Mudslides, and Landslides		C	P		P	C
2012, DR-4059-WV Severe Storms, Tornadoes, Flooding, Mudslides, and Landslides		X			X	X

DISASTER DECLARATIONS IMPACTING REGION 2 COUNTIES						
Declaration Information	*Cabell*	*Lincoln*	*Logan*	*Mason*	*Mingo*	*Wayne*
2012, DR-4061-WV Severe Storms, Flooding, Mudslides, and Landslides		X	X		X	
2012, DR-4071-WV Severe Storms and Straight-Line Winds	X	X	X	X	X	X
2012, EM-3345-WV Severe Storms	X	X	X	X	X	X
2012, S3349 (USDA FSA) Drought					C	C
2012, S3386 (USDA FSA) Excessive Rain, Flooding, Flash Flooding	C			C		
2012, WV-00023 (SBA) Severe Storms, Tornadoes, Flooding, Mudslides, and Landslides	C	P	C		C	P
2012, WV-00027 (SBA) Severe Storms, Flooding, Mudslides, and Landslides	C	P			P	C
2012, WV-00029 (SBA) Severe Storms and Straight-Line Winds		C				
2013, DR-4132-WV Severe Storms and Flooding				X		
2013, EM-3358-WV Hurricane Sandy	X	X	X	X	X	X
2014, EM-3366-WV Chemical Spill	X	X	X			
2015, DR-4210-WV Severe Winter Storm, Flooding, Landslides, and Mudslides	X	X	X		X	X
2015, DR-4219-WV Severe Storms, Flooding, Landslides, and Mudslides	X	X	X		X	X
2015, DR-4221-WV Severe Storms, Flooding, Landslides, and Mudslides	X					
2015, DR-4236-WV Severe Storms, Straight-Line Winds, Flooding, Landslides, and Mudslides		X	X			
2015, S3934 (USDA FSA) Excessive Rain, Flash Flooding, Flooding, Excessive Heat, Landslides, Mudslides, High Winds, Hail, and Lightning	C			C		C
2015, WV-00036 (SBA) Severe Storms, Heavy Snow, and Record Low Temperatures		C	C		P	C
2016, DR-4273-WV Severe Storms, Flooding, Landslides, and Mudslides		X				X

DISASTER DECLARATIONS IMPACTING REGION 2 COUNTIES						
Declaration Information	*Cabell*	*Lincoln*	*Logan*	*Mason*	*Mingo*	*Wayne*
2018, DR-4359-WV Severe Storms, Flooding, Landslides, and Mudslides	X	X	X	X		X
2018, S4444 (USDA FSA) Excessive Rain, Excessive Moisture, Flooding, and Flash Flooding						C
2018, S4480 (USDA FSA) Hurricanes Florence and Michael (and Remnants)	C			P		
2019, S4532 (USDA FSA) Excessive Rain and Flooding	C			C		C
2019, S4589 (USDA FSA) Drought and High Temperatures						C
2020, DR-4517-WV COVID-19 Pandemic	X	X	X	X	X	X
2020, EM-3450-WV COVID-19	X	X	X	X	X	X
2020, S4734 (USDA FSA) Excessive Moisture and Cold Temps	C					C
2020, S4735 (USDA FSA) Excessive Rain and Cold Temps	C			C		
2021, DR-4603-WV Severe Winter Storms (Ice Storm)	X	X		X		X
2021, DR-4605-WV Severe Storms and Flooding	X	X	X		X	X
2021, WV-00053 (SBA) Severe Storms and Flooding	P	C	C	C	P	P
2021, WV-00054 (SBA) Severe Winter Storms				P		P
2022, S5322 (USDA FSA) Excessive Rain, Landslides, Flooding, and Flash Flooding					C	C
2022, KY-00091 (SBA) Severe Storms, Straight-Line Winds, Tornadoes, Flooding, Landslides, Mudslides					C	
2022, WV-00057 (SBA) Severe Storms and Flooding	P	C		C		C
2023, WV-00058 (SBA) Floods		C				
2023, WV-20001 (SBA) Floods		C	C			

This list of declarations also suggests that the hazards identified by the steering committee are appropriate; all incident types resulting in declarations (except for the Hurricane Katrina evacuation – a special consideration) appear in the hazard list.

2.0 RISK ASSESSMENT

2.2 Describe Hazards

The following profiles detail each hazard considered by this plan, which includes a discussion on how the hazard impacts the region. Within each profile, research and historical data inform the following elements.

- Hazard Overview: Defines and presents a summary table of the hazard.
- Location and Extent: Identifies the physical places in the region that are vulnerable to the hazard and the severity of the hazard in a given area.

§201.6(c)(2)(i)	A description of the type, location, and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

- Impacts and Vulnerability: Describes the impacts on different topics such as health, the environment, or infrastructure that may result from the hazard as well as specific populations that may be vulnerable.[1]

§201.6(c)(2)(ii)	A description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. All plans approved after October 1, 2008, must also address NFIP-insured structures that have been repetitively damaged by floods.

- Previous Occurrences: Summarizes significant past events related to the hazard.

§201.6(c)(2)(i)	A description of the type, location, and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

- Loss and Damages: Outlines the methods used for loss amounts (of deaths, injuries, and property/crop damage depending on available information) and estimates based on historical data and projections.

[1] The "Impacts and Vulnerability" section includes a consideration of the region's social vulnerability to each of the identified hazards. These discussions vary in length and depth as per both the nature of the hazard itself and the data available. See below for a discussion of specific social vulnerability variables as they are available in the data.

§201.6 (c)(2)(ii)(B)	An estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate.

- Future Occurrences: Describes the probability of future occurrences of the hazard under consideration. This section of each profile also includes a description of future climate considerations, where appropriate.

§201.6(c)(2)(ii)(A)	The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.

- Risk Assessment: Includes a summary of public sentiment about the hazard as well as risk categories (see below), and multi-jurisdictional considerations.

§201.6(c)(2)(ii)(A)	The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.
§201.6(c)(2)(iii)	For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

One of the components of the risk assessment is to quantify, to the extent possible, the risk of hazards as determined by the probability of occurrence and the potential severity of those occurrences. This process helps to identify which hazards pose the most significant concerns to the region's participating jurisdictions. It is essential to recognize the value of implementing several categories to determine the overall risk. The following narrative and tables describe the categories utilized by this plan and how they relate to the available data. Historical occurrences inform all calculations, and where planners forecast potential risks, the narrative will present the methodology. In cases with zero events, other available data (which varies across the hazards and is outlined in each profile) supports determinations.

"Frequency" refers to the number of times a hazard occurs in a specific period. In most instances, the total historical occurrences (e.g., three occurrences) are divided by the length of time (in years) that data is available (e.g., 10 years). Thus, in the example, three occurrences divided by 10 years equals 0.3. The table above translates the resultant numeric values into a narrative frequency description. The hazard would have a "low" frequency in the example described here. At times, no historical data is available; in those cases, the hazard receives the lowest possible points for the category (i.e., one).

FREQUENCY CATEGORIES			
Value	*Score*	*Description*	*Definition*
0.76 - >1.0	5	Excessive	Will occur during a year
0.51 – 0.75	4	High	Likely to occur in a year
0.26 – 0.50	3	Medium	May (or may not) occur in a year
0 – 0.25	2	Low	Unlikely to occur in a year
0	1	None	So unlikely that it can be assumed it will not occur in a year

Other qualitative categories enable a clearer understanding of a hazard's potential impacts (i.e., severity). The table below depicts the variables used in this plan. Planners assigned values to these categories based on available research (cited, as appropriate, in the profiles), and each profile includes a brief description to contextualize the selection of the proper variable. Notably, the qualitative nature of these variables enables planners to consider potential future impacts, which is helpful when considering the nexus of risk and future development as well as the potential impacts of climate change. These variables should be considered as a set. For instance, in the following profiles, a hazard like severe summer storms would receive a *Magnitude* score of "catastrophic" simply because the entire region (i.e., well over 50% of the land area) is at risk. A catastrophic score, though, could mislead a reader without the context provided by the other variables that would receive a much lower score (such as *Onset* and *Human*, which would both receive the lowest scores available).

QUALITATIVE RISK VARIABLES						
	Response	*Onset*	*Magnitude*	*Business*	*Human*	*Property*
1	Less than half a day	Over 24 hours	Localized (less than 10% of land area affected)	Less than 24 hours	Minimum (minor injuries)	Less than 10% of property affected
2	One day	12-24 hours	Limited (10-25% of land area affected)	One week	Low (some injuries)	10-25% of property affected
3	One week	6-12 hours	Critical (25-50% of land area affected)	At least two weeks	Medium (multiple severe injuries)	25-50% of property affected
4	One month	Less than 6 hours	Catastrophic (more than 50% of land area affected)	More than 30 days	High (multiple deaths)	More than 50% of property affected
5	More than one month	N/A	N/A	N/A	N/A	N/A

All hazards receive a score for each category corresponding to the number in the far-left column. Hazards receive scores of between 7 (i.e., all seven categories receive a value of one) and 30 points (i.e., all seven categories receive a value of four or five). The list below represents a broad range by which planners ranked all of the hazards in this plan.

Range of Points (Score)	*Hazard Ranking*
7 – 10	Lowest
11 – 15	Low
16 – 20	Medium
21 – 25	High
26 – 30	Highest

Social Vulnerability

The Agency for Toxic Substances and Disease Registry (ATSDR), a division of the Centers for Disease Control and Prevention (CDC) has developed a “social vulnerability index” (SVI) that measures and compares social vulnerability among census tracts. The ATSDR defines social vulnerability as the degree to which certain social conditions in a community, including poverty, car ownership, or the number of people in a household may affect the community’s ability to prevent human suffering and financial loss in the event of a disaster (2022). The dataset includes numerous variables informed by data collected and developed by the Census Bureau;

data sources include the American Community Survey (ACS) administered between 2018 and 2020 (ATSDR, 2022).

Poverty and Educational Attainment

The SVI includes a variable that measures the estimated number of persons who live below the poverty level. Researchers at the CDC, who authored *A Social Vulnerability Index for Disaster Management*, explain that "economically disadvantaged populations are disproportionately affected by disasters" (Flanagan, Gregory, Hallisey, Heitgard, & Lewis, 2011). The poor are less likely to have the income or assets needed to properly prepare for a possible disaster, or to recover after a disaster occurs (Cutter, Boruff, & Shirley, 2003). These areas will need significant support during recovery activities and could greatly benefit from targeted mitigation. Closely associated with the poverty level is the unemployment rate.

Scholars consider education as a socioeconomic variable, though the relationship between education and vulnerability is not absolutely understood (Flanagan et al, 2011). Education correlates with both income and poverty. Many people without a high school diploma will struggle to find steady, well-paying jobs. For people with less education, the practical and bureaucratic hurdles to cope with and recover from disaster prove increasingly difficult to surmount (Morrow & Gladwin, 1997).

Access to Internet

During the COVID-19 pandemic, the internet kept many connected to work, school, family, and friends. However, a Gallup analysis shows "more than half a billion of the world's most-vulnerable people, who were struggling to meet even their basic food and shelter needs and didn't have anyone to help them, didn't have internet access" (Ray, Pugliese, & Espova, 2020). Inequality in income and of opportunity worsens due to disadvantaged groups of people who live in rural areas that have limited, or no internet access (Garcia-Escribano, 2020).

Household Composition

The household composition section of the SVI includes variables measuring vulnerable ages and vulnerable households. Vulnerable ages include those under the age of 18 and those over the age of 65. Multiple researchers have concluded that children and elders are the most vulnerable groups in disaster events (Flanagan et al, 2011). Nearly 75% of the victims of Hurricane Katrina were elderly (Phillips, Thomas, Fothergill, & Blinn-Pike, 2010). Many elderly citizens have disabilities that require the assistance of either machines (e.g., oxygen

concentrators) or other individuals (e.g., difficulty walking). The family members or neighbors who typically assist elderly persons may be either overwhelmed by the disaster or physically unable to gain access to those persons (Flanagan et al, 2011). Extended power outages will disproportionality effect elderly populations.

Children, and especially the very young, generally cannot protect themselves and are heavily reliant on their care takers for protection and care. Scholars have determined that children are rarely incorporated into disaster planning and scenario exercises due to the assumption of parental responsibility (Martin, Bush, & Lynch 2006). By not including this population in the planning process, responders are not adequately prepared or equipped to deal with children.

The final variable among the housing composition grouping is the percent of single-parent households with children who are under the age of 18. Like the discussion of previous variables, children are among the most vulnerable of populations, while single-parent households are among the lowest socioeconomic status households. These households are especially vulnerable during a disaster because all the caretaker duties fall to one parent, who must also deal with the disaster event and recovery from that event (Flanagan et al, 2011).

Housing/Transportation

The SVI includes several variables that describe housing and transportation, three of which appear here: mobile homes, vehicle ownership/access, and institutionalized housing. Housing quality is an important factor in evaluating vulnerability and is closely tied with socioeconomic status and personal wealth (Flanagan et al, 2011). Mobile homes, typically inhabited by those of lower socioeconomic groups, are not designed to withstand severe weather events or flooding. Mobile homes are frequently found outside of metropolitan areas, making access difficult in regular conditions and even more so during and immediately after a disaster (Flanagan et al, 2011). Mobile homes are often clustered in communities, which increases the overall vulnerability of these communities (Flanagan et al, 2011).

Vehicle ownership/access is crucial to being prepared as well as evacuating, when needed. Those who do not possess (or have access to) a vehicle will have difficulty going to stores to obtain preparedness supplies and will have less capacity to bring those supplies back to their home. This is even more pronounced in rural areas, which typically lack robust public transportation networks. Two entities in the region provide public transit services: Tri-River Transit (Lincoln, Logan, Mason, and Wayne) and Tri-State Transit Authority (Cabell, Wayne, and the rest of the Huntington urbanized area). Providers may be overwhelmed prior to an impending disaster such as a snowstorm and might not operate immediately following an event. Mingo County does

not have available public transit services (though there is specialized transit service in the county) (WV Division of Public Transit, 2023).

The final housing vulnerability variable to discuss is those who live in institutional settings. These include college dorms, farm workers' dormitories, health institutions, and prisons, which present special concerns for evacuations (Flanagan et al, 2011). Nursing homes and other residential medical facilities are particularly vulnerable. The increased vulnerability is due to the special and timely needs of the residents and because of understaffing in these institutions in emergencies (Flanagan et al, 2011). Evacuating these facilities is a time and resource consuming operation, requiring numerous specialty vehicles and staff such as advanced life support ambulances. While these facilities will have backup generators for vital machines, in an extended power outage, these generators will need additional fuel deliveries. According to data from the West Virginia Office of Health Facility Licensure & Certification (2013), there are 12 licensed nursing homes in the region (five in Cabell County, two each in Logan and Mason Counties, and one each in Lincoln, Mingo, and Wayne Counties). College dormitories are present in Cabell County, associated with Marshall University.

Minority Status/Language

Several studies have found that the overall marginalization of racial and ethnic minority groups has made these populations more vulnerable during all stages of a disaster (Flanagan et al, 2011). Specifically, studies have shown that populations of African Americans, Native Americans, Asian Americans, Pacific Islanders, and those of Hispanic origin are correlated with higher vulnerability rates (Flanagan et al, 2011).

A specific variable among minorities that can greatly increase their vulnerability during a disaster is an inability to speak or read English well, or at all. While small in comparison to the overall population of the region, these individuals are exceedingly vulnerable. Without accurate translations, they may not understand impending disasters, preparedness warnings, or evacuation notices. Research has shown that immigrant populations are more likely to rely on relatives, friends, and neighbors for information, rather than official sources (Flanagan et al., 2011).

Section 2.0: Risk Assessment concludes with a “risk ranking” table that summarizes the scores for all the hazards. Profiles appear in the following order.

2.2.1 Acts of Violence
2.2.2 Cyber Incidents
2.2.3 Dam & Levee Failure
2.2.4 Drought
2.2.5 Earthquake
2.2.6 Epidemic/Pandemic
2.2.7 Extreme Temperatures
2.2.8 Flood
2.2.9 Hazardous Materials Incident
2.2.10 Landslides & Land Subsidence
2.2.11 Substance Use Crisis
2.2.12 Severe Summer Weather
2.2.13 Severe Winter Weather
2.2.14 Tornado
2.2.15 Wildfire

2.2.1 Acts of Violence

This profile includes the following:

- Physical breach; contravening security and confidentiality laws and procedures; burglary, unreasonable search and seizure, for example.
- Workplace or school violence; some environments are more likely than others to experience violence including occupations involving contact with the public.

Risk				
HIGHEST HIGH **MEDIUM** LOW LOWEST	**Period of Occurrence:**	At any time	**Risk Ranking:**	Medium
	Warning Time:	Less than 6 hours	**Type of Hazard:**	Human-caused
	Probability:	High (Likely to occur in a year)	**Impact:**	Localized (less than 10% of land area affected)
	Disaster Declarations:	None		

Hazard Overview

The World Health Organization defines violence as “an intentional use of force or power, against oneself, another person, or against a group or community, which either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment, or deprivation” (2023).

Location and Extent

Generally, the entire region is at risk of criminal behavior. An active shooter is anyone who kills or attempts to kill people in a populated area (FBI, n.d.A). Stress is an established correlate of criminal behavior, including those who commit active shooter crimes. The Federal Bureau of Investigation (FBI) studied physical, psychological, and social stressors, including finances, health concerns, substance abuse, etc., to identify any correlation between a particular stressor and an individual becoming an active shooter. The study showed active shooters typically suffer from multiple stressors. Mental health was a stressor in 62% of all active shooters studied (FBI, 2018).

Domestic terrorism is a subset of more general conversations about terrorism. It involves U.S. citizens perpetrating terrorist acts on domestic soil. The FBI defines domestic terrorism as “violent, criminal acts committed by individuals and/or groups to further ideological goals stemming from domestic influences, such as those of a political, religious, social, racial, or environmental nature” (n.d.). Acts can take many different forms.

Acts of violence can affect a small area, such as a single business or government building, or an entire city, county, or state. Due to the perceived rise of workplace and school violence, drug manufacturing and use, "homegrown" and "lone-wolf" terrorists, and racially motivated attacks, the entire region is at risk for acts of violence. The U.S. Department of Labor Statistics shows in 2020, nationwide, there were 481 workplace homicides, with 387 involving a firearm (BLS, 2023). The FBI reports 61 school shootings in 2021 with 103 fatalities. Twelve of these incidents met their definition of "mass killing" which is a "lone shooter who fires a weapon in a public place and kills at least three people" (2021).

Impacts and Vulnerability

The Verisk Maplecroft Civil Unrest Index quantifies the risk of civil unrest in the United States and 197 other countries. The index currently has the United States in the "High-Risk" category due to political polarization and distrust in the electoral process, police reform, and socio-economic inequities.

As school shootings are among the deadliest events a school may face, 96% of all schools have written plans and 98% of those schools practice lockdown procedures (Winn & Rock, 2022). Even with plans, these incidents still occur, causing physical injuries, death, mental trauma, and physical property damage. The table below shows the incidents involving physical injuries and fatalities in the United States (between the 2001-2002 school year through the 2020-2021 school year).

NUMBER OF SCHOOL SHOOTINGS WITH CASUALTIES AT PUBLIC AND PRIVATE SCHOOLS IN THE UNITED STATES

School Year	*Shootings with Injuries Only*	*Shootings with Fatalities*	*Total*
2001-2002	8	5	13
2002-2003	7	12	19
2003-2004	16	12	28
2004-2005	27	12	39
2005-2006	30	12	42
2006-2007	35	21	56
2007-2008	8	6	14
2008-2009	19	22	41
2009-2010	5	6	11
2010-2011	7	10	17
2011-2012	8	6	14
2012-2013	8	14	22
2013-2014	22	15	37
2014-2015	20	15	35
2015-2016	19	8	27

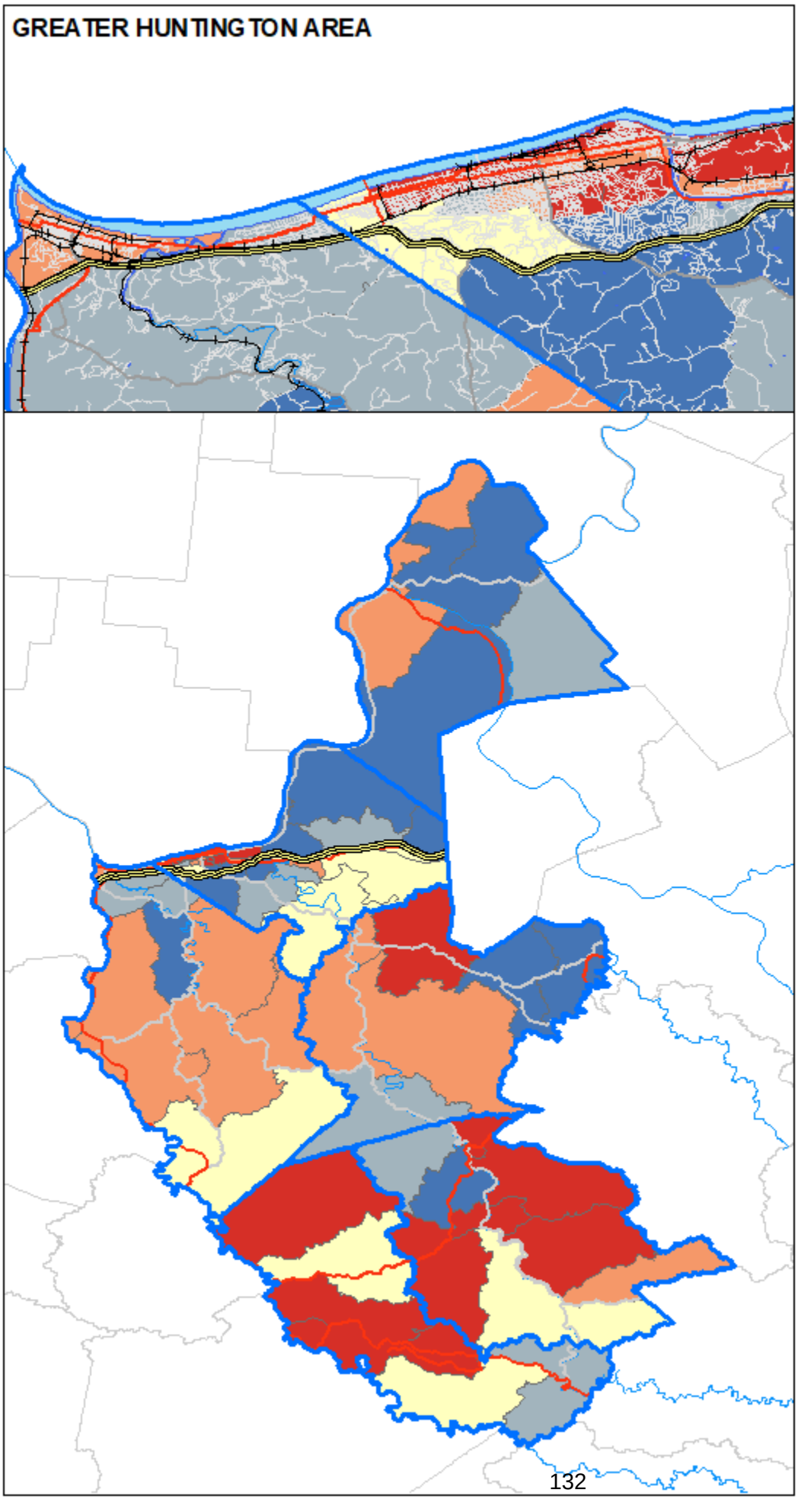
NUMBER OF SCHOOL SHOOTINGS WITH CASUALTIES AT PUBLIC AND PRIVATE SCHOOLS IN THE UNITED STATES			
School Year	*Shootings with Injuries Only*	*Shootings with Fatalities*	*Total*
2016-2017	26	12	38
2017-2018	37	22	59
2018-2019	45	33	78
2019-2020	50	27	77
2020-2021	50	43	93

Social Vulnerability Considerations

Acts of violence can occur anywhere, though trends in various sources of data suggest social vulnerability impacts. Children are also at higher risk when violence comes in the form of school shootings. Anecdotally, lower-income neighborhoods appear to suffer more damage during civil incidents (particularly those that occurred between 2020 and 2022). Kwon, Rice-Townsend, and Agoubi found, as part of a recent cross-sectional study, that "death rates increased in a stepwise fashion with increasing community-level social vulnerability" for children between the ages of 10 and 19 who died of an assault-related firearm injury (2023b, abstract). In another study, Kwon and colleagues (2023a) found that adolescents living in the highest socially vulnerable areas (per variables listed in the CDC's Social Vulnerability Index [ATSDR, 2022]) experience significantly higher odds of intentional injury. This second Kwon et al. study used the four subindex scores within the CDC's social vulnerability data. The table below shows those scores for the region's counties. Per the ASTDR (2022) data, percentile values range from 0 to 1, with higher values (i.e., closer to one) indicating higher vulnerability.

SOCIAL VULNERABILITY SUMMARY THEME RANKINGS BY COUNTY, 2020					
County	*Socioeconomic*	*Household Composition & Disability*	*Minority Status & Language*	*Housing Type & Transportation*	*Overall County Ranking Summary*
Cabell	0.83	0.31	0.83	0.94	0.87
Lincoln	0.48	0.61	0.09	0.55	0.54
Logan	0.98	0.67	0.35	0.85	0.94
Mason	0.17	0.15	0.31	0.52	0.13
Mingo	1.00	0.80	0.37	0.96	0.96
Wayne	0.65	0.44	0.15	0.46	0.50

The first of the following maps shows the region's Census tracts by composite subindex scores. The second and third maps show the Census tracts with the highest percentage of persons 17 and under and those tracts with the highest percentage of persons below the poverty estimate, respectively.



REGION 2 PDC HAZARD MITIGATION PLAN

SVI Considerations: Acts of Violence (Subindex Scores)

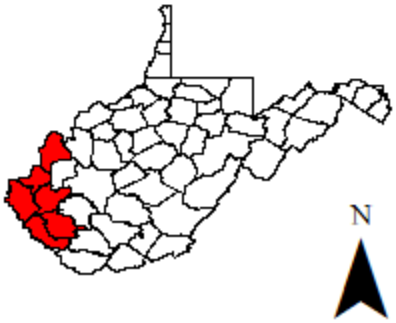
Data Source(s):
CDC SVI Index (2020)

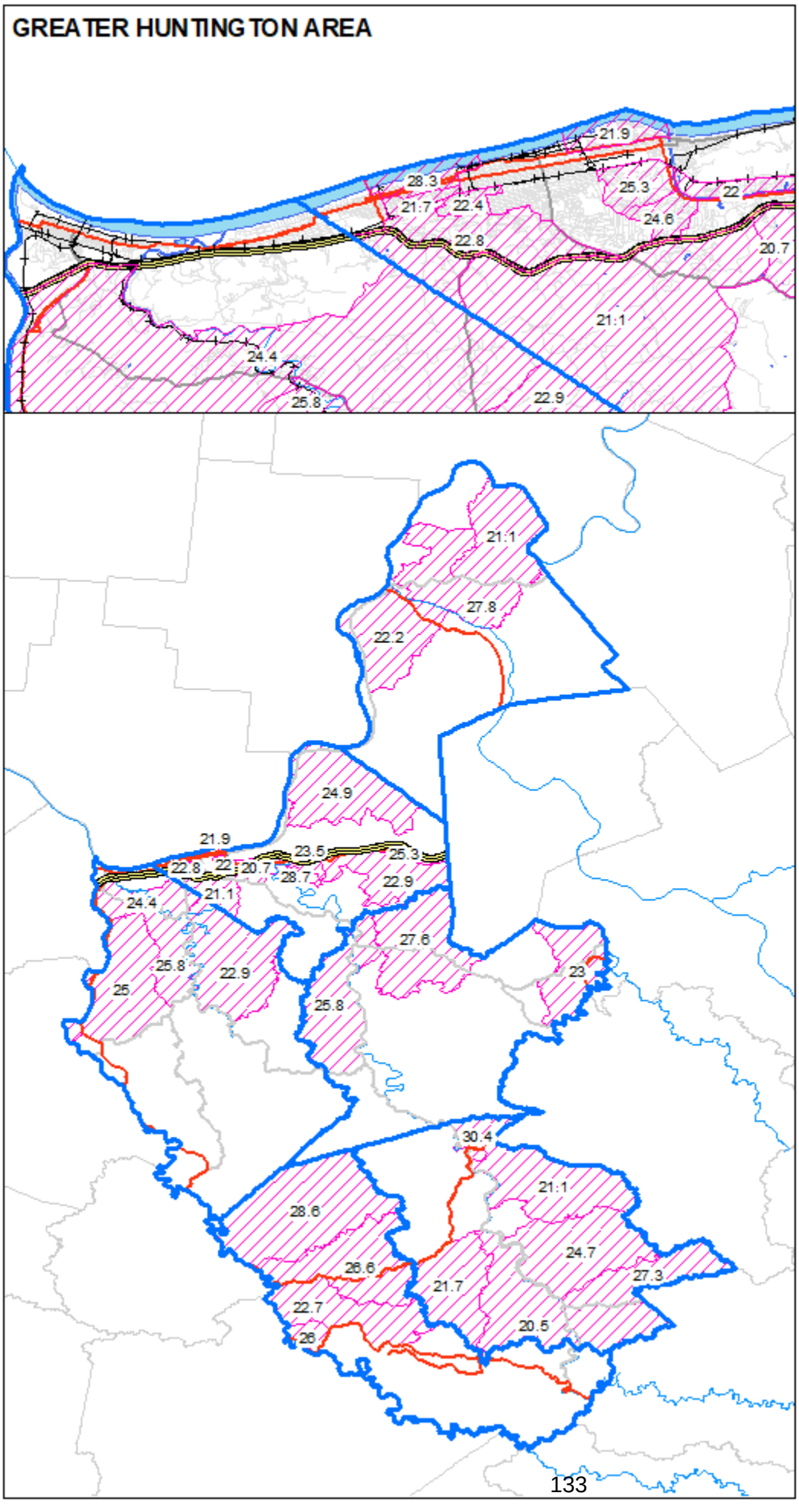
Composite Subindex Scores

- 0.0147 - 0.2426
- 0.2427 - 0.4577
- 0.4578 - 0.6232
- 0.6233 - 0.7996
- 0.7997 - 0.9963

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.





REGION 2 PDC HAZARD MITIGATION PLAN

SVI Considerations: Tracts by Population, 17 & Under

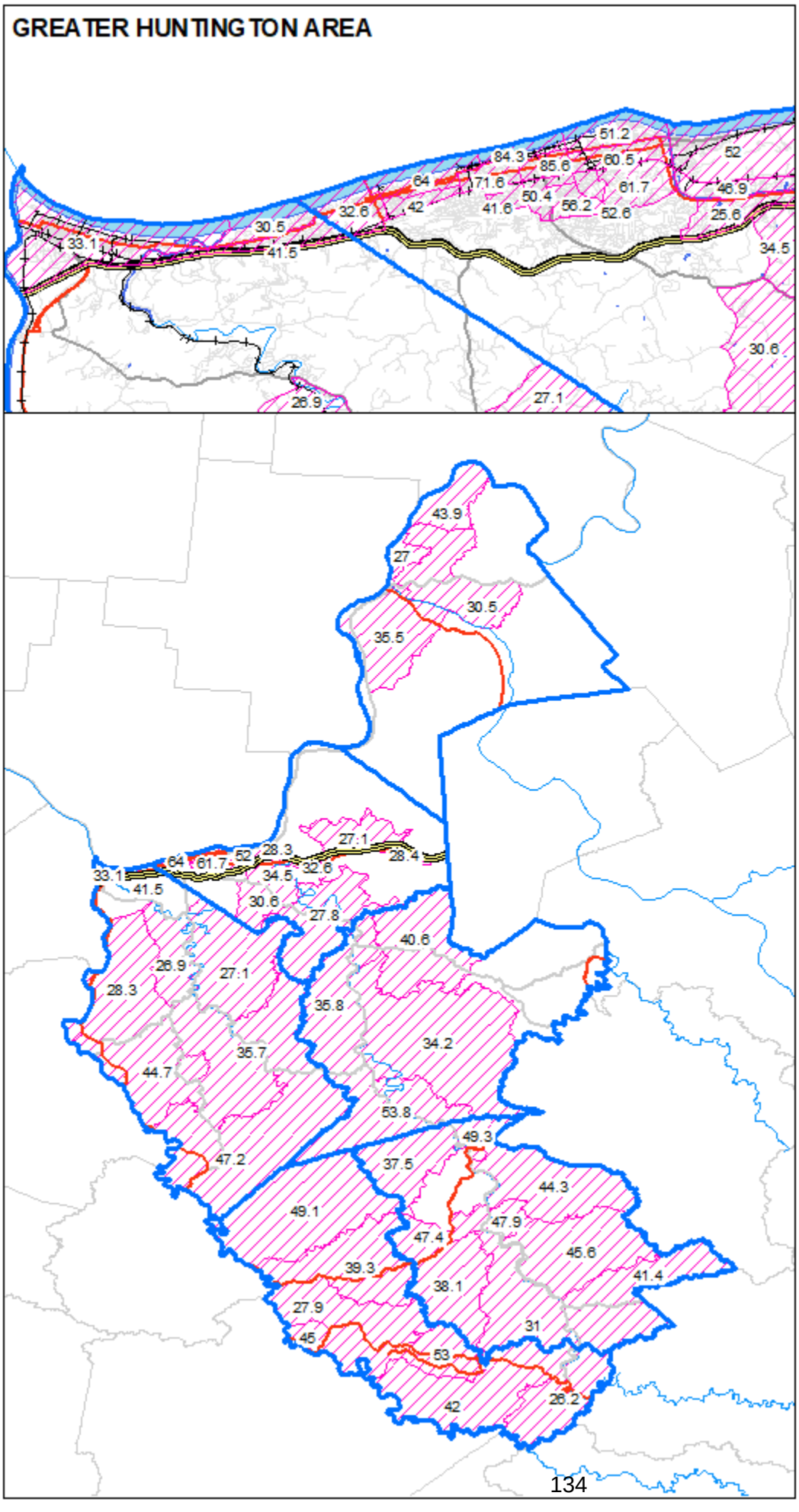
Data Source(s):
CDC SVI Index (2020)

20% or More, 17 & Under

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

N



REGION 2 PDC HAZARD MITIGATION PLAN

SVI Considerations: Tracts by Poverty Level

Data Source(s):
CDC SVI Index (2020)

25% or More, Below Poverty Est.

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

Previous Occurrences

Though there is no direct correlation between the criminal acts outlined above and crime statistics, local crime data can provide a foundation for understanding the potential for escalation into the types of instances considered in this profile. The FBI maintains data on several types of crimes, and this data (for 2022) includes reporting by several of the region's sheriff's departments, as shown in the following table.

OFFENSES KNOWN TO LAW ENFORCEMENT, 2022

	Violent Crime					Property Crime				
County	**Total**	Murder & Non-Negligent Manslaughter	Rape	Robbery	Aggravated Assault	**Total**	Burglary	Larceny-Theft	Motor Vehicle Theft	Arson
Cabell	**43**	0	13	3	27	**539**	74	438	27	0
Lincoln	No Data Available									
Logan	**67**	1	2	0	64	**6**	0	3	0	3
Mason	**8**	0	2	1	5	**46**	6	35	3	2
Mingo	**30**	0	0	0	30	**19**	8	5	6	0
Wayne	No Data Available									

The Office of Research and Strategic Planning (within the Justice and Community Services Section of the West Virginia Division of Administrative Services) compiled an analysis of crime rates for West Virginia (by county) from 2015 to 2019. The annual rates of both violent crime and property crime per 1,000 persons for each of the five years, by the counties in the region, are as follows (Murphy & Otunuga, 2020).

ANNUAL RATES OF CRIME BY COUNTY (PER 1,000 PERSONS), 2015-2019

	Violent Crime					Property Crime				
County	2015	2016	2017	2018	2019	2015	2016	2017	2018	2019
Cabell	0.56	6.15	10.78	6.83	4.39	15.88	46.34	52.08	33.16	31.06
Lincoln	4.14	2.80	2.30	1.75	1.57	12.45	12.98	18.30	12.34	9.60
Logan	6.50	5.02	5.39	4.85	5.31	12.63	9.53	8.17	6.50	7.84
Mason	1.02	0.63	0.61	0.55	0.69	12.60	11.92	7.20	12.46	13.33
Mingo	2.37	1.82	1.20	2.26	1.54	5.96	5.02	7.00	6.67	6.40
Wayne	1.33	1.13	0.52	1.28	0.89	17.76	13.82	7.09	5.56	8.40

City of Huntington, January 2020

On December 31, 2019, a 33 year old male was thrown out of a New Year's Eve party at a bar in Huntington, West Virginia. Sometime after midnight on January 1, 2020, the male subject returned and began firing a gun through the front door before fleeing the scene. Officials

reported seven patrons were shot and injured with no fatalities reported. The incident began as a dispute and was not a random act.

Logan County, November 2006

A robbery of a local pharmacy turned into a hostage situation on November 13, 2006. A male entered a pharmacy in Stollings and fire several shots before demanding drugs. Six people were held barricaded inside the store with the gunman. Two of the hostages were able to escape before the four others were able to overpower the robber after he ingested an unknown quantity of pain killers and anti-anxiety drugs. All six hostages were unharmed.

City of Williamson, September 2023

Law enforcement was called to the Social Security Office in Williamson after a male became irate and threatened to blow up the government building. When law enforcement officers arrived the male was found outside the building yelling profanities and again repeated his threat. Williamson Police officers were able to take the subject into custody.

Loss and Damages

Estimating losses for acts of violence is difficult because the range of what "a loss" can cover is vast. DeLuco, Burke, and Pillai-Essex (2021) recently estimated losses for business and commercial property owners from civil unrest. The table that follows shows their findings for 2016 through 2020.

RIOT AND CIVIL COMMOTION LOSSES IN THE UNITED STATES		
Year	*Business Losses*	*Commercial Property Losses*
2016	$51,015.00	$2,592,906.00
2017	$315,783.00	$1,355,114.00
2018	$102,029.00	$640,511.00
2019	$660,097.00	$402,862.00
2020	$153,479,388.00	$86,849,354.00

Future Occurrences[1]

The region is not immune to criminal activity such as civil disturbance, workplace and school violence, and cyberattacks. The political climate, social injustice, and economic

[1] Future climate considerations are not included (as a subsection) because acts of violence are a human-caused hazard.

inequality are all factors that can play a part in future disturbances and criminal acts. Future incidents may target specific sites such as government buildings, schools, banks, etc. Climate changes may also influence future acts of violence, as resource scarcity can contribute to violent acts. Though not a direct result, changes in the climate may become a "threat multiplier" in the decades to come (United Nations, n.d.).

Risk Assessment

This section summarizes the vulnerability of the region to acts of violence. The planning and development council conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding acts of violence.

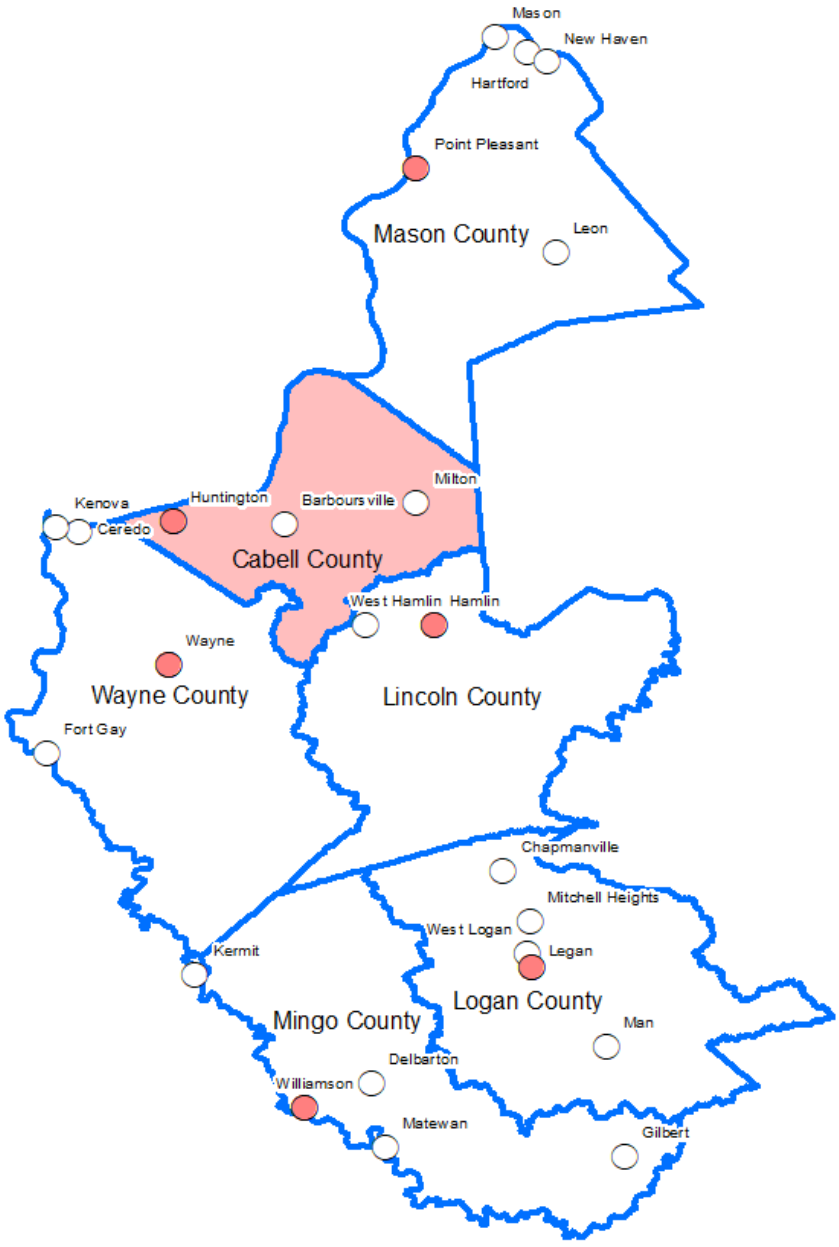
PUBLIC SENTIMENT, ACTS OF VIOLENCE					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Acts of Violence	4 (10.0%)	18 (45.0%)	11 (27.5%)	7 (17.5%)	40
In the past ten years, do you remember this hazard occurring in your community?				22 (55.0%)	40
Have you noticed an increase in the occurrences or intensity of this hazard?				20 (50.0%)	40
Have you noticed a decrease in the occurrences or intensity of this hazard?				20 (50.0%)	40

The following table assigns point totals based on the methodology identified in Section 2.2: Describe Hazards above.

ACTS OF VIOLENCE RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	4	High (Likely to occur in a year)	Acts of violence as defined in this hazard occur regularly.
Response	3	One week	Though the tactical response to resolve the incident may occur quickly, investigative aspects and psychological recovery would likely extend beyond a single day.
Onset	4	Less than 6 hours	Acts of violence can occur with no warning.
Magnitude	1	Localized (less than 10% of land area affected)	Acts of violence are usually contained in a building, a campus, or a community.
Business	1	Less than 24 hours	The site of an act may be impacted for several days (up to and including permanent closure, contingent on the scale of the incident). However, community-wide, the impact would likely be less than 24 hours.

ACTS OF VIOLENCE RISK RANKING			
Category	*Points*	*Description*	*Notes*
Human	3	Medium (multiple severe injuries)	The threat of multiple severe injuries is always present during acts of violence events.
Property	1	Less than 10% of property affected	Acts of violence are typically single-site events.
Totals	**17**	**Medium**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks are more or less prevalent as compared to the rest of the planning area. The following map identifies those multi-jurisdictional risks with respect to acts of violence. Those labels not underlaid by a shaded drop shadow are not more or less at risk of acts of violence. Those with red drop shadows are more at risk; those with green are less at risk.



2.2.2 Cyber Incidents

Actions taken through the use of an information system or network that result in an actual or potentially adverse effect on an information system, network, or the information residing therein.				
Risk HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	At any time	**Risk Ranking:**	High
	Warning Time:	Less than 6 hours	**Type of Hazard:**	Technological
	Probability:	Medium (May or may not occur in a year)	**Impact:**	Limited
	Disaster Declarations:	None		

Hazard Overview

Cybersecurity incidents are generally defined as an event that actually or imminently jeopardizes, without lawful authority, the confidentiality, integrity, or availability of information or an information system; or constitutes a violation or imminent threat of violation of law, security policies, security procedures, or acceptable use policies. According to the Department of Homeland Security – Industrial Control Systems Cyber Emergency Response Team, cyber threats to a control system refer to persons who attempt unauthorized access to a control system device and/or network using a data communications pathway. This access can be directed from within an organization by trusted users or from remote locations by unknown persons using the Internet. Threats to control system can come from numerous sources, including hostile governments, terrorist groups, disgruntled employees, and malicious intruders.

A cyber-attack targets an organization's use of cyberspace for the purpose of disrupting, disabling, destroying, or maliciously controlling a computing environment/infrastructure, or destroying the integrity of the data or stealing controlled information. Cyber-attacks are unpredictable and typically occur without warning. To protect against these threats, it is necessary to create a secure cyber-barrier around the Industrial Control System (ICS). Though other threats exist, including natural disasters, environmental, mechanical failure, and inadvertent actions of an authorized user, this discussion will focus deliberate threats as categorized in the Statement for the Record to the Joint Economic Committee by Lawrence K. Gershwin, the Central Intelligence Agency's National Intelligence Officer for Science and Technology (June 21, 2001). These include national governments, terrorist, industrial spies,

organized crime groups, hacktivists, and hackers. Activities could include espionage, hacking, identity theft, crime, and terrorism.

Location and Extent

According to Cybersecurity Ventures, approximately 800,000 cyber-attacks occur throughout the world per day. Because cyber-attacks can cause severe disruptions to computers and electronics associated with critical infrastructure, statewide transportation, data centers, public safety, and utility services, all of which use Supervisory Control and Data Acquisition (SCADA) systems, are all vulnerable to attack. Because of this, the member governments of Region 2, as well as individuals, businesses and other institutions are potential targets for cyber-attacks. Specific organizations or facilities that *could* be at risk[1] include courthouses (e.g., county courthouses, the Christie Federal Courthouse in Huntington), utility facilities (e.g., Huntington Sanitary Board, Logan Sanitary Board, Man Sanitary Board), Marshall University, county boards of education (i.e., central offices that store personally identifiable information for students), healthcare facilities (e.g., Cabell Huntington Hospital, Logan Regional Medical Center, Pleasant Valley Hospital, St. Mary's Medical Center, Williamson Memorial Hospital), etc. The actual cause of cyber-attacks can be difficult to identify because the internet provides cover for those responsible for attack initiation.

Although the most numerous and publicized cyber intrusions and other incidents are ascribed to lone computer-hacking hobbyists, such hackers pose a negligible threat of widespread long-duration damage to national-level infrastructure. Nevertheless, the large worldwide population of hackers poses a relatively high threat of an isolated or brief disruption causing serious damage, including extensive property damage or loss of life. As the hacker population grows, so does the likelihood of an exceptionally skilled and malicious hacker attempting and succeeding in such an attack. Hackers are subdivided as follows:

- Sub-communities of hackers.
- Script kiddies are unskilled attackers who do NOT have the ability to discover new vulnerabilities or write exploit code and are dependent on the research and tools from others. Their goal is achievement and to gain access and deface web pages.
- Worm and virus writers are attackers who write the propagation code used in the worms and viruses but not typically the exploit code used to penetrate the systems infected.

[1] Note there is no specific threat to these facilities; they appear here as samples simply because of the nature of their operations, the data they potentially store, etc. Further, the specific examples are not meant to represent an exhaustive listing.

Their goals is notoriety and to cause disruption of networks and attacked computers systems.

- Security researcher and white hat have two sub-categories; bug hunters and exploit coders. Their goal is profit, to improve security, earn money, and achieve recognition with an exploit.
- Professional hacker-black hat who gets paid to write exploits or actually penetrate networks, also falls into the two sub-categories; bug hunters and exploit coders. Their goal is profit.

Hackers and researchers interact with each other to discuss common interest, regardless of color of hat. Hackers and researchers specialize in one or two areas of expertise and depend on the exchange of ideas and tools to boost their capabilities in other area. Information regarding computer security research flows slowly from the inner circle of the best researchers and hackers to the general IT security world, in a ripple-like pattern.

The table below was excerpted from NIST 800-82, "Guide to Supervisory Control and Data Acquisition (SCADA) and Industrial Control System Security" and provides a description of the extent of various threats to computer system networks.

UNITED STATES GOVERNMENT ACCOUNTABILITY OFFICE THREAT TABLE	
Cyber-Threat	*Description*
Bot-network operations	Bot-network operators are hackers; however, instead of breaking into systems for the challenge of bragging rights, they take over multiple systems in order to coordinate attacks and to distribute phishing schemes, spam, and malware attacks.
Criminal groups	Seek to attack systems for monetary gain. Organized crime groups are using spam, phishing, and spyware/malware to commit identify theft and online fraud.
Foreign intelligence services	Use cyber tools as part of their information-gathering and espionage activities. In addition. Several nations are aggressively working to develop information warfare doctrine, programs, and capabilities. Such capabilities enable them to have a significant impact by disrupting the supply, communications, and economic infrastructures that support military power.
Hackers	Hackers break into networks for the thrill of the challenge or for bragging rights in the hacker community. While remote cracking once required a fair amount of skill or computer knowledge, hackers can now download attack scripts and protocols from the Internet and launch them against victim sites. While attack tools have become more sophisticated, they have also become easier to use.

UNITED STATES GOVERNMENT ACCOUNTABILITY OFFICE THREAT TABLE	
Cyber-Threat	*Description*
Insiders	The disgruntled organization insider is a principal source of computer crime. Insiders may not need a great deal of knowledge about computer intrusions because their knowledge of a target system often allows them to gain unrestricted access to cause damage to the system or to steal system data. The insider threat also includes outsourcing vendors as well as employees who accidentally introduce malware into systems.
Phishers	Individuals, or small groups, who execute phishing schemes to steal identities or information for monetary gain. Phishers may also use spam and spyware/malware to accomplish their objectives.
Spammers	Individuals or organizations who distribute unsolicited e-mail with hidden or false information to sell products, conduct phishing schemes, distribute spyware/malware, or attack organizations (i.e., denial of service).
Spyware/malware authors	Individuals or organizations carry out attacks by producing and distributing spyware and malware. Several destructive computer viruses and worms have harmed files and hard drives, including the Melissa Macro Virus, Explore.Zip worm, CIH (Chernobyl) Virus, Nimda, Code Red, Slammer, and Blaster.
Terrorist	Terrorist seek to destroy, incapacitate, or exploit critical infrastructures to threaten national security, cause mass casualties, weaken the U.S. economy, and damage public morale and confidence. Terrorists may use phishing schemes or spyware/malware to generate funds or gather sensitive information.

Source: Government Accountability Office, U.S. DHS-Role in Critical Infrastructure Protection Cybersecurity, GAO-05-434 (Washington, D.C.: May, 2005).

Impacts and Vulnerability

Impacts from a large-scale cyber-attack could disrupt the region's economy and potentially threaten its economic stability. The magnitude of a cyber-attack will vary greatly based on the extent of systems affected, the attacks durations, and the type of attack. The magnitude will vary based upon which specific system is affected by an attack and the ability to preempt and address emerging issues.

While physical structures are generally not at risk, all networked electronic devices are vulnerable to cyber-attacks. Because computer networks contain sensitive information that is integral to the member governments' security, they will likely continue to be the focus of coordinated cyber-attacks. Computer networks are also entrusted with many forms of personal and financial information, including tax filings, birth and death records, Social Security numbers, medical information, and more. Additionally, many critical facilities that are essential to government operations rely upon computer networks to monitor and control critical functions. For example an attack on the power grid could have detrimental impacts on county or municipal services and functions. A large-scale computer breach would likely lead to significant economic costs in lost productivity to the impacted government's agencies and potentially related businesses and industries.

Cyber-attack impacts can range from insignificant to catastrophic. The overwhelming majority of cyber-attacks involve targeted attacks on a single computer. These happen every day and cause little impact on the jurisdiction or region as a whole. However, a coordinate attack could render county or municipal run networks useless.

In recent years, cyber-attacks have become a significant threat and can impact people, businesses, institutions, local governments, and state agencies to varying degrees. The table below describes the types of cyber-attacks and the associated impacts likely to be encountered.

TYPES OF CYBER ATTACKS	
Threat	*Description*
Malware	Malware is a term used to describe malicious software, including spyware, ransomware, viruses, and worms. Malware breaches a network through a vulnerability, typically when a user clicks a dangerous link or email attachment that then installs risky software. Once inside the system, malware can do the following: • Block access to key components of the network (ransomware) • Install malware or additional harmful software • Covertly obtain information by transmitting data from the hard drive (spyware) • Disrupt certain components and render the system inoperable
Botnet	A collection of computers subject to control by an outside party, usually without the knowledge of the owners, using secretly installed software robots. The robots are spread by Trojan horses and viruses. The botnets can be used to launch denial-of-service attacks and transmit spam.
Denial-of-Service Attack	Flooding the networks or servers of individuals or organizations with false data requests so they are unable to respond to requests from legitimate users.
Phishing	Phishing is the practice of sending fraudulent communications that appear to come from a reputable source, usually through email. The goal is to steal sensitive data such as credit care and login information or to install malware on the victim's machine. Phishing is an increasingly common cyber-threat.
SQL Injection	A Structured Query Language (SQL) injection occurs when an attacker inserts malicious code into a server that uses SQL and forces the server to reveal information it normally would not. An attacker could carry out an SQL injection simply by submitting malicious code into a vulnerable website search box.
Spoofing	Making a message or transaction appear to come from a source other than the originator. Spyware software that collects information without a user's knowledge and transfers it to a third party.
Trojan Horse	A destructive program that masquerades as a benign application. Unlike viruses, Trajan horses do not replicate themselves, but they can be just as destructive. One of the most insidious types of Trojan horse is a program that claims to rid your computer of viruses but instead introduces viruses onto your computer.
Virus	A program designed to degrade service, cause inexplicable symptoms, or damage networks.
Worm	Program or algorithm that replicates itself over a computer network and usually performs malicious actions, such as using up the computer's resources and possibly shutting the system down. A worm, unlike a virus, has the capability to travel without human action and does not need to be attached to another file or program.

The West Virginia Emergency Management Division (WVEMD) considers cybersecurity a shared responsibility. Working with the West Virginia Fusion Center, WVEMD provides information and education to local governments, private citizens, businesses, and health care facilities to help ensure the security of their data. Marshall University is also set to open the Institute for Cyber Security (ICS). The ICS will provide cyber education and outreach as conduct cyber research.

Social Vulnerability Considerations

The latest Cybercrime Report from LexisNexis Risk Solutions reveals that the people most vulnerable to cybercrime tend to be adults over the age of 75 and younger adults. “It is believed that the particular vulnerability of young and older adults is largely due to the surge of new customers going online or working from home during the 2020 COVID-19 pandemic” (Cybernews, 2024). The report suggests that it is easy to assume that young adults are tech-savvy and therefore relatively immune from cyberattacks, but they often have a false sense of their capabilities and therefore tend to be more relaxed, especially in terms of their willingness to share personal information. “While younger adults are most susceptible to online fraud attacks, the average fraud loss per customer increases progressively with age, likely influenced by larger disposable incomes later in life” (Cybernews, 2024).

The older demographic, by contrast, are much less familiar with the latest technologies, and their lack of familiarity raises their susceptibility to the various scams and phishing attacks. “Protection of the older, and potentially more vulnerable population, is critical for organizations that are prioritizing a digital-first strategy” (Cybernews, 2024).

Previous Occurrences

Discussion with the steering committee and online research yielded no major cybersecurity events in the past. The steering committee did feel as though member governments, residents, and businesses are at risk as more and more data is passed online and stored on computers. The steering committee did discuss several of the larger cyberattacks in the U.S and recognized they could occur in the region.

Healthcare Cyberattack, 2023

A Thanksgiving Day cyberattack affected hospitals in Texas, New Jersey, New Mexico and Oklahoma. The ransomware attack led to ambulances being diverted to different hospitals as the affected facilities were unable to process patient intake. Three days before Thanksgiving,

the parent company, Ardent Health detected an anomaly on their systems and engaged in an investigation leading to the discovery of the ransomware on November 23rd.

Pipeline Cyberattack, 2021

On May 7, 2021, the Colonial Pipeline suffered a ransomware attack that impacted the computerized equipment managing the pipeline. The pipeline, which carries gasoline and jet fuel, originating in Texas provides the commodities to the southeastern part of the United States. The target of the attack was the billing infrastructure of the company. Being unable to bill customers, the pipeline operations were halted. However, the attackers had stolen 100 gigabytes of data and threatened to release it on the internet forcing the company to pay a $4.4 million dollars ransom. Due to the shutdown that was restarted on May 12, 2021, airlines had to change flight schedules or add fueling stops during flights. Fuel shortages were also seen at filling stations and panic buying set in. By May 14, 2021, fuel prices rose to their highest since 2014 reaching an average of $3 per gallon.

Loss and Damages

Cyberattacks can lead to loss of money, theft of personal information, and damage to an individual's or company's reputation and safety. Cyberattacks can be carried out using computers, mobile phones, gaming systems, and other electronic devices. The attacks may include identity theft, fraud, or block access to or delete documents and pictures.

According to a February 2018 report from The Council of Economic Advisers, malicious cyber activity cost the U.S. economy between $57 billion and $109 billion in 2016. The *IBM Cost of Data Breach Report 2023* indicated that the average cost of a data breach reached an all-time high in 2023 of USD 4.45 million. This represents a 2.3% increase from the 2022 cost of USD 4.35 million. This report revealed that an alarming 83% of organizations experienced more than one data breach during 2022. If a major cyber-attack was to strike the State of West Virginia and cripple power plants and other critical lifeline utilities for an extended time, the economic impact would be in the billions.

As cybercriminals become more ruthless, the risks and damages that they can unleash become more serious to include physical losses and personal injury. Such events are now known as "cyber-physical attacks", according to the International Risk Management Institute's online glossary, this is a security breach in cyberspace that impacts on the physical environment. A malicious user can take control of the computing or communication component

of water pumps, transportation system, pipeline valves, etc. and cause damage to property and put lives at risk.

Future Occurrence

Based on past historical data and trends, the future probability of cyber-attacks occurring within Region 2 are moderate to high. Cyberterrorism is an emerging hazard that has the potential to impact the member governments' computer infrastructure and the systems and services that are provided to the public. Concerns about cyber-attacks throughout the United States are growing as its impacts could have potentially crippling effects. Security experts describe the threat of cyberterrorism as imminent and highly likely to occur in any given year.

In today's threat landscape, defenders have a huge disadvantage, attackers have to get it right once to accomplish their goal. Whereas the defender must patch, keep up on every possible vulnerability in all the systems, as you are only as strong as the weakest link. With more and more data accessible from anywhere in the world, passwords are not enough protection alone.

Risk Assessment

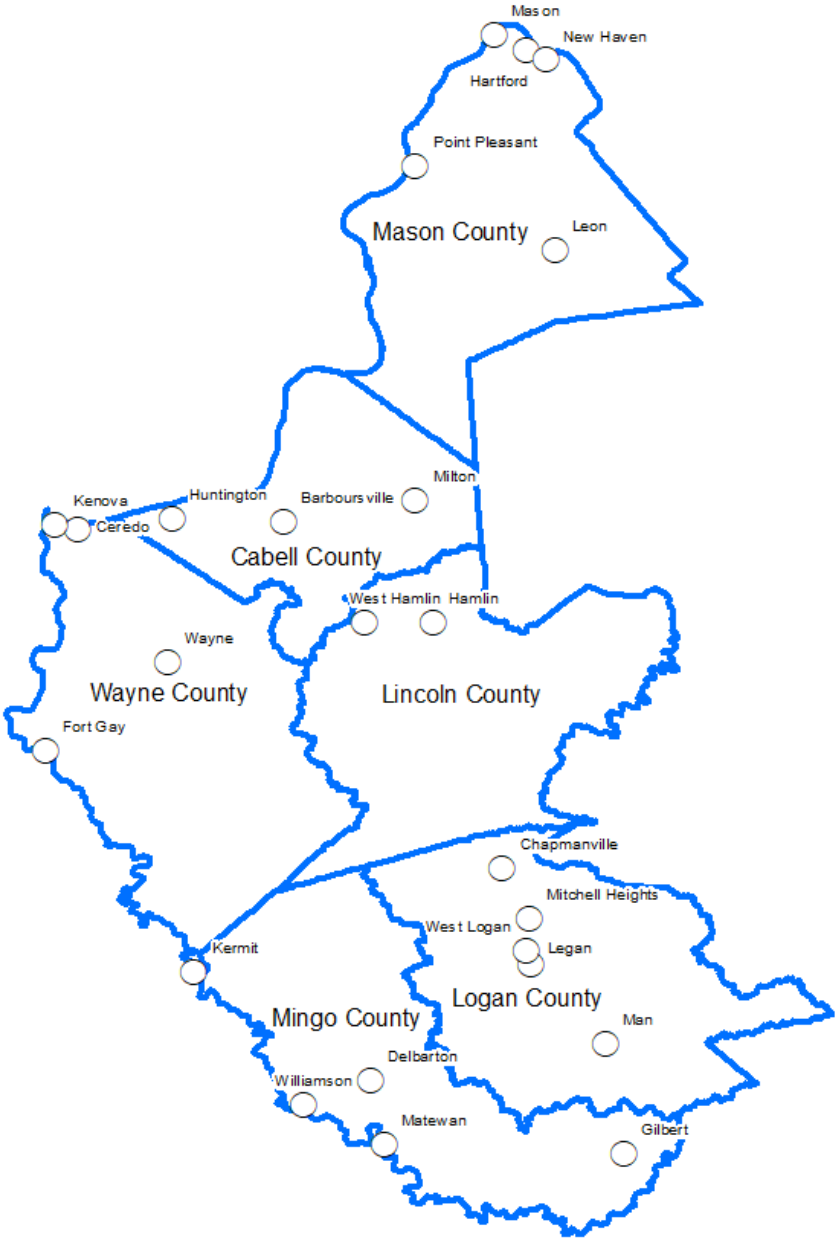
This section summarizes the vulnerability of the region to cyber incidents. The planning and development council conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding cyber incidents.

PUBLIC SENTIMENT, CYBER INCIDENTS					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Cyber Incidents	8 (20.00%)	15 (37.50%)	12 (30.00%)	5 (12.50%)	40
In the past ten years, do you remember this hazard occurring in your community?				7 (17.50%)	40
Have you noticed an increase in the occurrences or intensity of this hazard?				13 (32.50%)	40
Have you noticed a decrease in the occurrences or intensity of this hazard?				0 (0.00%)	40

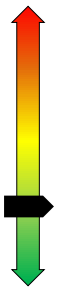
The following table assigns point totals based on the methodology identified in Section 2.2: Describe Hazards above.

CYBER INCIDENTS RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	3	Medium (may or may not occur in a year)	According to the Cybersecurity Ventures, approximately 800,000 major cyber-attacks occur throughout the world per day.
Response	5	More than a month	The IBM's 2022 data security report indicates the average time to identify a breach is 206 days, and another 73 days to contain the breach for a total average response time of approximately nine months.
Onset	4	Less than 6 hours	Cyberattacks are unpredictable and typically occur without warning.
Magnitude	2	Limited (10-25% land area affected)	Cyberattacks can cause severe disruptions to computers and electronics associated with critical infrastructure, transportation systems, and utility services. Magnitude will vary greatly based on the extent of systems affected, the attack durations, and type of attack.
Business	4	More than 30 days	Cyberattacks can impact people, businesses, institutions, local governments, to varying degrees. A large-scale attack could lead to significant economic costs in lost productivity to the impacted agencies.
Human	2	Low (some injuries)	Human impacts would likely stem from cascading effects. A malicious user could take control of critical infrastructure or a transportation system and cause damage to property and put several lives at risk.
Property	2	10-25% property affected	Impacts to property would likely stem from cascading effects.
Totals	**22**	**High**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks are more or less prevalent as compared to the rest of the planning area. The following map identifies those multi-jurisdictional risks with respect to cyber incidents. Those labels not underlaid by a shaded drop shadow are not more or less at risk of cyber incidents. Those with red drop shadows are more at risk; those with green are less at risk.


Mason
New Haven
Hartford
Point Pleasant
Mason County
Leon
Milton
Kenova
Huntington
Barboursville
Ceredo
Cabell County
West Hamlin
Hamlin
Wayne
Wayne County
Lincoln County
Fort Gay
Chapmanville
Mitchell Heights
West Logan
Logan
Kermit
Logan County
Mingo County
Man
Delbarton
Williamson
Matewan
Gilbert

2.2.3 Dam & Levee Failure

A dam is an artificial barrier or obstruction that impounds or will impound water. A dam failure is a failure of that structure, which occurs when the barrier does not obstruct/restrain water as designed. Dam failures can rapidly result in large areas of completely inundated land.				
Risk  HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	At any time, but typically following a period of prolonged precipitation	**Risk Ranking:**	Low
	Warning Time:	6-12 hours	**Type of Hazard:**	Technological
	Probability:	Low (Unlikely to occur in a year)	**Impact:**	Localized (less than 10% of land area affected)
	Disaster Declarations:	None		

Hazard Overview

This hazard profile addresses both dam and levee failures in the region. The three leading causes of dam failure in the United States include overtopping, foundation defects and slope instability, and piping.

- **Overtopping** occurs when water spills over the top of the dam. Overtopping due to inadequate spillway design, debris blockage of spillways, or settlement of the dam crest accounts for approximately 34% of all dam failures in the U.S.
- **Foundation defects and slope instability**, including settlement, cause approximately 30% of all dam failures.
- **Piping** is the internal erosion caused by seepage. Seepage occurs around hydraulic structures, such as pipes and spillways, through animal burrows, around roots of vegetation, and through cracks in the dam. Piping accounts for another 20% of dam failures in the U.S.
- These types of failures are often interrelated in a complex manner. For example, uncontrolled seepage may weaken the soil and lead to structural failure. A structural failure may shorten the seepage path and lead to a piping failure. Surface erosion may result in structural failure, and so on. Minor defects, such as cracks in the embankment, could be the first visual sign of a significant problem, which could lead to the failure of the structure. Someone experienced in dam design and construction should evaluate the seriousness of all deficiencies as soon as they are detected.

- Dam failures can be no-notice failures that occur during non-flooding situations when reservoirs are at normal levels. No-notice failures are generally more hazardous because of their unexpected nature and little warning time for evacuation. Other failures occur during periods of excessive rainfall or flooding and can exacerbate inadequate spillway capacity. Dam failures can be a cascading event following a large wildland fire, where heavy rains may rapidly run off of burnt areas unable to absorb the excess water into an impoundment that subsequently cannot handle the additional water. Finally, though improbable and likely low-impact, seismic events could destabilize a dam just enough to prompt deterioration or failure.
- Though levees are designed to a certain level of potential flood, the U.S. Army Corps of Engineers (USACE) notes that levees are not subject to consistent design, construction, operations, and maintenance standards. Levees function as part of a system. In other words, a levee in one area may overtop by design to protect larger populations downstream (USACE, 2018). A levee “failure” implies that something about the levee failed to operate as designed, and impacts to the protected area(s) occurred. Levee failures can result from overtopping, water flow through or under a levee, erosion, an object hitting the levee, or an object on the levee (e.g., tree or building) falling and taking a portion of the structure with it (USACE, 2018). The USACE also maintains the National Levee Database (NLD).

Location and Extent

The West Virginia Department of Environmental Protection (WVDEP) defines a dam as "an artificial barrier or obstruction that impounds or will impound, water" (WVDEP, 2023). The WVDEP does not maintain a list of dams on its website; however, the website does state that the agency contributes to the National Inventory of Dams. As such, the USACE National Inventory of Dams (NID) identifies 44 dams in the region.

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DAMS IN THE REGION 2 PLANNING & DEVELOPMENT COUNCIL AREA											
National ID	*County*	*Name*	*Hazard Class*	*River/Stream*	*Dam Type*	*Purpose*	*Year Completed*	*EAP (w/ Rev. Date)*	*Dam Height (ft.)*	*Normal Storage (Acre ft.)*	*Dam Length (ft.)*
WV01101	Cabell	Culloden Water Supply Dam	High	Indian Fork	Earth	Recreation	1963	Yes 2/6/2001	25	54	300
WV01105	Cabell	Hatfield Lake Dam	High	Guyandotte River	Earth	Recreation	1955	No	28	29	210
WV01102	Cabell	Lake of Eden	High	Goose Run	Earth	Recreation	1971	No	25	17	600
WV01104	Cabell	Lakeview Dam	High	Tributary Tom Creek	Earth	Recreation	1965	Yes 10/11/2017	34.5	35	265
WV01103	Cabell	Melody T. Ranch Lake	Low	Tributary Mud River of the Guyandotte River	Earth	Recreation	1962	N/A	34	42	190
WV01107	Cabell	Trout Lake	Low	Tributary Guyandotte River	Earth	Recreation	1991	N/A	32.3	100	3,390
WV04301	Lincoln	Lee's Fishing Lake Dam	High	Mahoney Creek	Earth	Other	1963	No	30	14	211
WV04307	Lincoln	Upper Mud River No. 2a	High	Mud River	Rockfill, Earth	Flood Risk Reduction, Recreation	1992	Yes 2/6/2017	75	4,494	650
WV04513	Logan	Holden #22 Slurry Impoundment	High	Unknown	Earth	Tailings	Unknown	Yes Unknown	355	Unknown	600
WV83546	Logan	Little White Oak Slurry Impoundment	High	Unknown	Earth	Tailings	Unknown	Yes Unknown	290	Unknown	785
WV83527	Logan	Old House Branch Impoundment No. 3	High	Unknown	Earth	Tailings	Unknown	Yes Unknown	440	Unknown	1,195

DAMS IN THE REGION 2 PLANNING & DEVELOPMENT COUNCIL AREA											
National ID	*County*	*Name*	*Hazard Class*	*River/Stream*	*Dam Type*	*Purpose*	*Year Completed*	*EAP (w/ Rev. Date)*	*Dam Height (ft.)*	*Normal Storage (Acre ft.)*	*Dam Length (ft.)*
WV04531	Logan	Rock House Branch Slurry Impoundment	High	Unknown	Earth	Tailings	Unknown	Yes Unknown	482	Unknown	1,170
WV04533	Logan	Tinsley Branch Refuse Impoundment	Undetermined	Tinsley branch	Earth	Tailing	2005	N/A	405	8,921	2,630
WV05317	Mason	Huffman Dam	High	Tributary of West Creek	Unknown	Recreation	2010	No	35	57	250
WV05311	Mason	McClintic #23 Dam	High	Old Town Creek	Earth	Recreation	Unknown	Yes 5/23/218	31	66.73	Unk
WV05315	Mason	McClintic #7B Dam	High	Old Town Creek	Earth	Fish & Wildlife Pond, Recreation	Unknown	Yes 5/23/2018	14.35	25.31	2,275
WV05316	Mason	McClintic Pon #11	High	Old Town Creek	Earth	Recreation	Unknown	Yes 5/23/2018	13.45	12.75	2,425
WV05314	Mason	McClintic #7A Dam	High	Old Town Creek	Earth	Fish & Wildlife Pond, Recreation	Unknown	Yes 5/23/2018	11.75	57.41	3,027
WV05320	Mason	Little Broad Run #7 Dam	High	Unknown	Unknown	Unknown	Unknown	Yes 5/31/2017	Unk	Unk	Unk
WV05319	Mason	Little Broad Run #6 Dam	High	Unknown	Unknown	Unknown	Unknown	Yes 5/31/2017	Unk	Unk	Unk
WV05302	Mason	Robert C. Byrd Locks and Dam	Significant	Ohio River	Concrete	Navigation, Recreation	1937	No	167	390,600	1,408
WV05301	Mason	Racine Locks and Dam	Significant	Ohio River	Concrete	Navigation, Recreation, Hydroelectric	1971	No	100	153,700	1,530
WV05312	Mason	Sporn Unit 5 Fly Ash Dam	Significant	Unknown	Earth	Tailings	Unknown	Yes 10/24/2017	65	1,840	2,219
WV05313	Mason	Sporn Bottom Ash Dam	Significant	Ohio River	Other	Tailings	Unknown	Yes 10/24/2017	42	205	2,500

DAMS IN THE REGION 2 PLANNING & DEVELOPMENT COUNCIL AREA											
National ID	*County*	*Name*	*Hazard Class*	*River/Stream*	*Dam Type*	*Purpose*	*Year Completed*	*EAP (w/ Rev. Date)*	*Dam Height (ft.)*	*Normal Storage (Acre ft.)*	*Dam Length (ft.)*
WV05307	Mason	AEP Proj. 1301 Ash Pond	Significant	Little Broad Run	Earth	Tailings	1978	No	30	955	13,000
WV05318	Mason	R.C. Byrd On-Site Fish Hatchery Dam	Significant	Unknown	Earth	Fish & Wildlife Pond	Unknown	No	Unk	Unk	Unk
WV05308	Mason	McClintic #16 Dam	Undetermined	Mill Creek	Earth	Recreation	Unknown	No	30	138	1,847
WV05917	Mingo	Delbarton Slurry Impoundment	High	Pigeon Creek	Earth	Other	2004	No	760	14,526	3,460
WV05919	Mingo	Aldrich Branch Slurry Impoundment	High	Unknown	Earth	Tailings	Unknown	Yes Unknown	560	Unk	3,191
WV05922	Mingo	Ragland Slurry Impoundment	High	Unknown	Earth	Tailings	Unknown	Yes Unknown	370	Unk	1,000
WV05921	Mingo	Ben Creek Slurry Impoundment	High	Unknown	Earth	Tailings	Unknown	Yes Unknown	358	Unk	2,195
WV10924	Mingo	R.D. Baily Dam	High	Guyandot River	Rockfill, Other	Flood Risk Reduction, Other, Fish & Wildlife Pond, Recreation	1976	Yes 10/22/2009	310	34,000	1,397
WV05918	Mingo	Nile Stone Slurry Impoundment	High	Conley fork	Earth	Other	1993	No	272	1,500	1,440
WV05920	Mingo	Twelvepole Refuse impoundment	High	Unknown	Earth	Tailings	Unknown	Yes Unknown	235	Unk	1,165

DAMS IN THE REGION 2 PLANNING & DEVELOPMENT COUNCIL AREA											
National ID	*County*	*Name*	*Hazard Class*	*River/Stream*	*Dam Type*	*Purpose*	*Year Completed*	*EAP (w/ Rev. Date)*	*Dam Height (ft.)*	*Normal Storage (Acre ft.)*	*Dam Length (ft.)*
WV83518	Mingo	Fresh Water Impoundment	High	Unknown	Earth	Water Supply	Unknown	Yes Unknown	75	Unk	335
WV05901	Mingo	Laurel Creek Lake No. 1	High	Laurel Fork	Rockfill, Earth	Fish & Wildlife Pond, Recreation	1960	Yes 5/23/2018	47	408	325
WV83515	Mingo	Fresh Water Impoundment	Significant	Unknown	Earth	Water Supply	Unknown	Yes Unknown	66	Unk	397
WV09913	Wayne	Maynard Branch Slurry Impoundment	High	Unknown	Earth	Tailings	Unknown	Yes Unknown	262	Unk	1,165
WV09914	Wayne	Left Abutment Slurry Impoundment	High	Unknown	Earth	Tailings	Unknown	Yes Unknown	130	Unk	1,600
WV09901	Wayne	East Lynn Dam	High	East Fork Twelvepole Creek	Earth	Flood Risk Reduction, Fish & Wildlife Pond, Recreation	1971	Yes 6/27/2011	113	17,190	652
WV09903	Wayne	Beech Fork Dam	High	Beech of Twelvepole Creek	Earth	Flood Risk Reduction, Fish & Wildlife Pond, Recreation	1976	Yes 8/1/2011	86	9,180	1,080
WV83544	Wayne	Fresh Water Dam	High	Unknown	Earth	Water Supply	Unknown	Yes Unknown	61	Unk	650
WV09905	Wayne	Moses Fork Fishing Lake	High	Right Fork	Rockfill, Earth	Recreation	1959	Yes 3/13/1995	25	16	160
WV09902	Wayne	National Steel-Ohio River Site	Undetermined	Ohio River	Rockfill	Tailings	1963	No	65	Unk	2,000

The average height of the region's dams is 174.05', while the average length is 1,884.17'. The oldest dam is the Robert C. Byrd Locks and Dam, constructed in 1937, while the most recently constructed dam (i.e., 2010) is the Huffman Dam in Mason County. The hazard classification breakdown is as follows: 32 dams are HIGH hazard (72.73%), seven facilities are SIGNIFICANT hazard (15.91%), two facilities are LOW hazard (4.54%), and the remaining three are undetermined (6.82%). Of the 32 high-hazard facilities, 14 had known completion dates with an average age (per original construction) of 48.43 years.

The 2018 version of this plan listed significantly more dams sourced to the NID than currently appear in the inventory. The breakdown in difference by county is as follows.

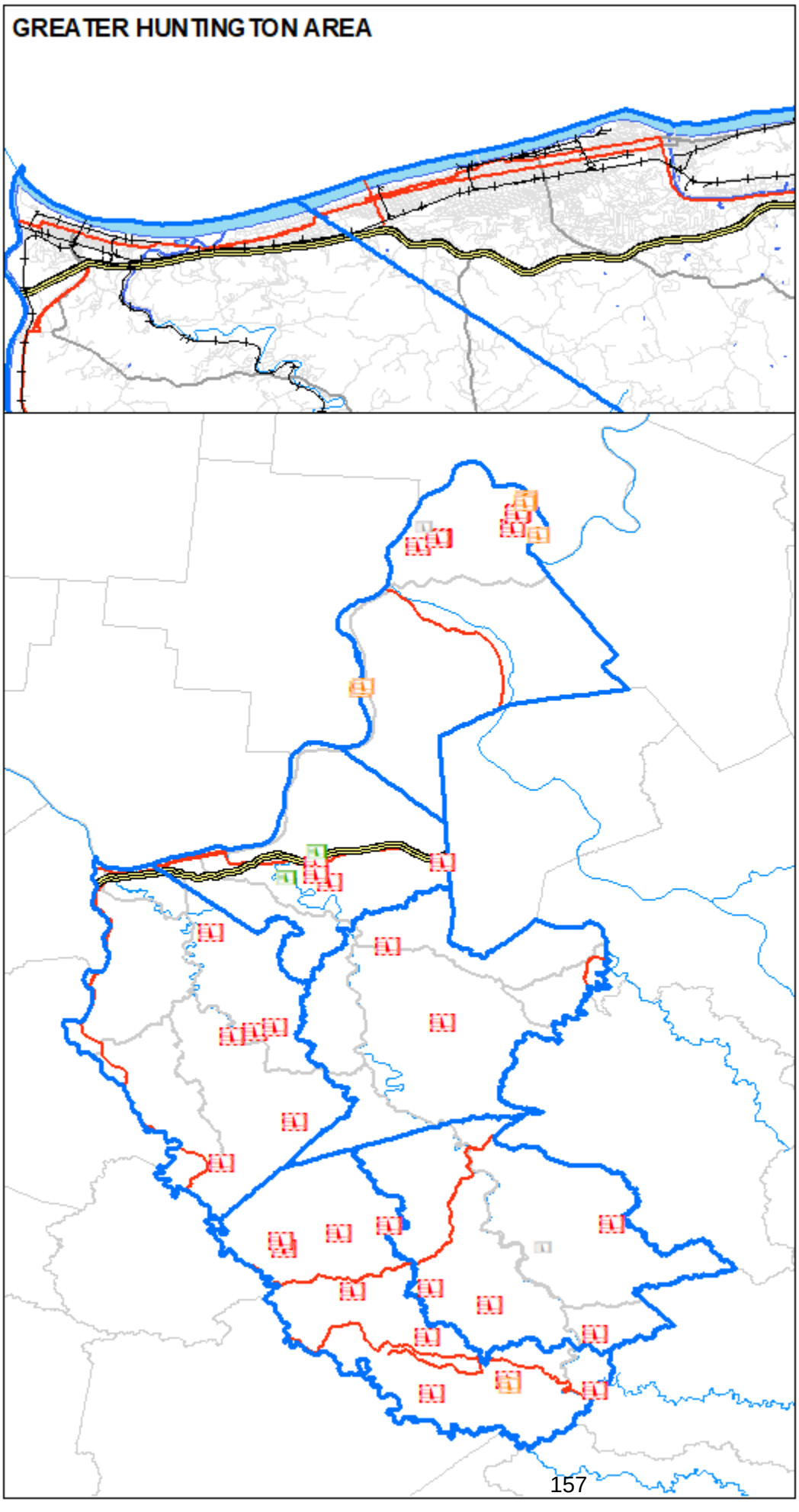
- Cabell County: Six noted in both 2018 and 2024
- Lincoln County: Two noted in both 2018 and 2024
- Logan County: 16 noted in 2018; five noted in 2024
- Mason County: 14 noted in both 2018 and 2024
- Mingo County: 15 dams listed in 2018; 10 noted in 2024
- Wayne County: Nine noted in 2018; seven noted in 2024

The structures noted in the previous plan that do not currently appear in the NID are as follows.

- Big Lick Branch Dam (Logan Co.)
- Elk Creek #10 Slurry Impoundment (Logan Co.)
- Elk Creek #10 Lower Slurry Impoundment (Logan Co.)
- Elk Creek #10 Upper Slurry Impoundment (Logan Co.)
- Freshwater Dam (Wayne Co.)
- Left Fork Kermit Coal Co. Impoundment Dam (Mingo Co.)
- Left Fork Slurry Imp. (Mingo Co.)
- Little Oak Branch Dam/Guyan #5 Dam (Logan Co.)
- Marrowbone F.W. Dam (Mingo Co.)
- Moncolo Creek Impoundment Dam (Logan Co.)
- Moncolo Slurry Impoundment (Logan Co.)
- Pine Creek Dam (Logan Co.)
- Rich Creek Slurry Impoundment (Logan Co.)
- Right Fork of Pine Creek #22 (Logan Co.)
- Rockhouse Branch #15 (Logan Co.)
- Spring Branch (Holden #25) Dam (Mingo Co.)
- Sprouse Creek Dam (Mingo Co.)
- Sprouse Creek Slurry Impoundment (Mingo Co.)
- Titanic Hollow Dam (Logan Co.)
- Trace Branch Slurry Impoundment (Wayne Co.)

Of the difference with dams in Logan County, eight of those that appeared in 2018 listed "N/A" as the river or stream impounded and the downstream city or town. These structures may be flood control structures that do not impound water. One of the other three lists "N/A" for river or stream impounded; the final two are Elk Creek #10 slurry impoundments near Emmett (with "N/A" for the river or stream impounded). However, the 2024 NID lists Old House Branch Impoundment near Emmett which did not appear in the 2018 list. Similarly, four of the five dams not appearing in Mingo County's 2024 list also appear with "N/A" for both river impounded and downstream town. Wayne County's differences include three facilities from 2018 that do not appear in 2024 and one facility in 2024 that did not appear in 2018.

The following map shows the locations of the dams in the region (with the hazard classifications denoted), as they *currently* appear in the NID. (NOTE: None of the dams in the region are located such that they appear in the "Greater Huntington Area" inset.)



REGION 2 PDC HAZARD MITIGATION PLAN

Dams by Hazard Classification

Data Source(s):
USACE NID

High

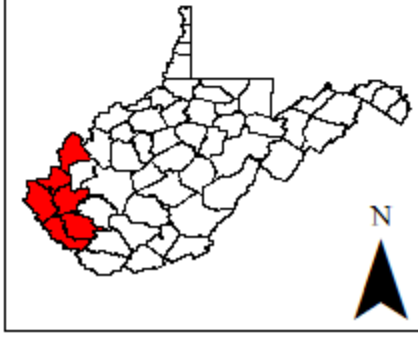
Significant

Low

Undetermined

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



As noted, the West Virginia Department of Environmental Protection (WVDEP) oversees the state's dam safety program. As overseer, the WVDEP works with dam owners and engineers to ensure design, construction, operation, and maintenance to prevent failures and the resulting consequences to the extent possible. The WVDEP issues Certificates of Approval, reviews design proposals, performs maintenance inspections, and observes dams under construction (WVDEP, 2024).

WVDEP also coordinates with dam owners and emergency management professionals to develop an EAP for high and significant-hazard structures. WVDEP makes an MS Word template available on its website (https://dep.wv.gov/WWE/ee/ds/services/Pages/dseap.aspx) for reference and to ensure that EAPs meet a minimum set of requirements. EAPs must include data on event detection, emergency level determination, notifications and communications, expected actions, and plan termination. They should include inundation maps. Of the 32 required EAPs, none have been updated since 2020 and six are listed as not having an EAP on file (at the time of this plan's update in 2024).

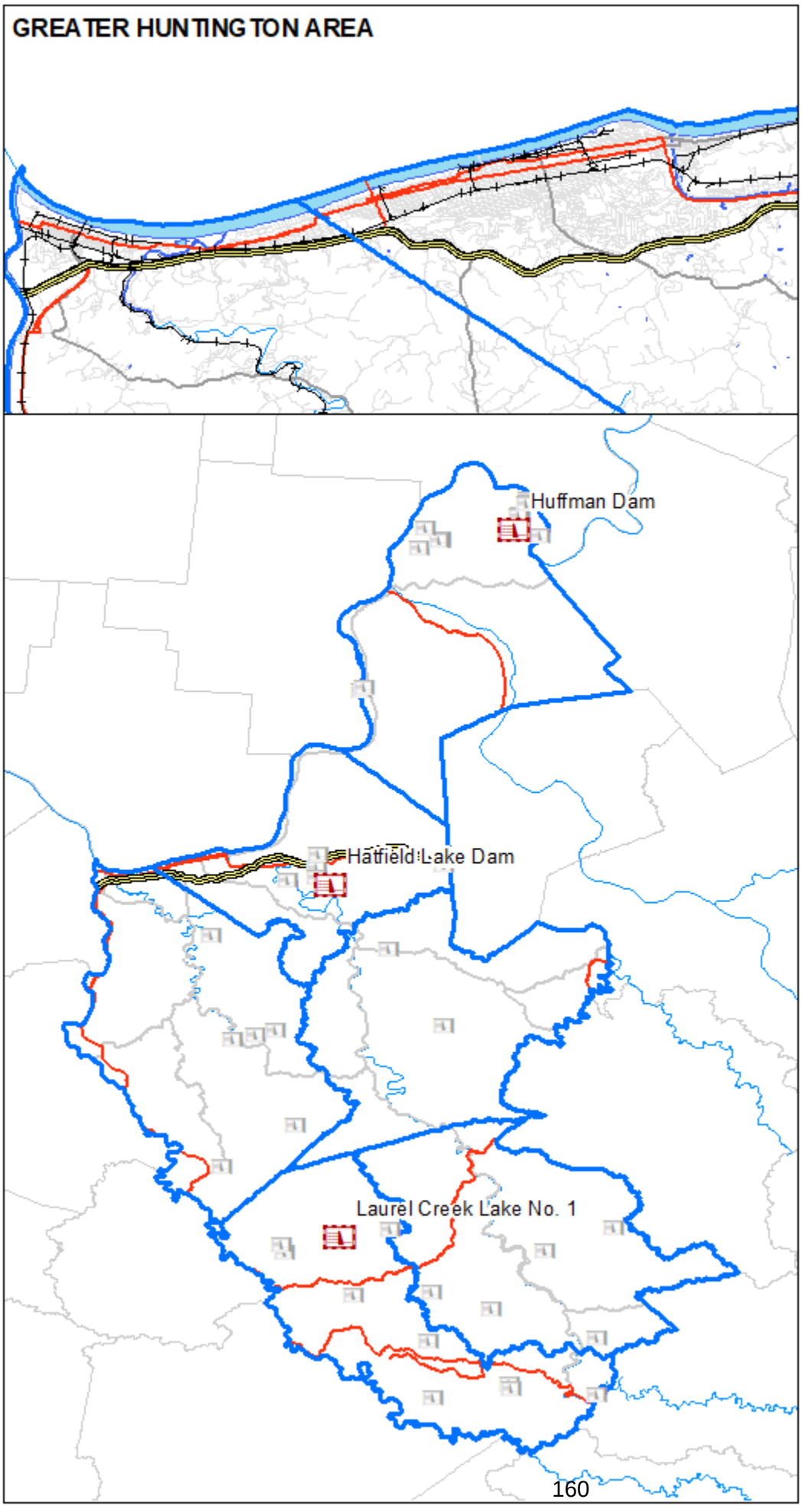
The EAPs are important in mitigating risk for two primary reasons. First, and most obviously, the plans outline the emergency response guidelines should an incident occur. Part of an EAP discusses how dam owners would notify emergency response personnel and warn those downstream from a dam. During EAP preparation, dam owners should coordinate with local authorities to determine the capabilities and limitations of emergency response agencies. Secondly, EAPs for high-hazard dams identify a potential inundation area that allows responders to work directly with potentially impacted communities and facilities. Current and accurate inundation areas also identify areas where property owners can consider mitigation actions. The following maps show, by county, the dams listed by the age of their EAP.

The NID includes many of the dams in the region, but not all of them. There are several National Resources Conservation Service (NRCS)/West Virginia Conservation Agency (WVCA) dams in the region. The WVCA is responsible for the maintenance and repair of 170 watershed dams and 22 channels throughout West Virginia (WVCA, n.d.). Local communities, in partnership with the USDA Natural Resources Conservation Service (NRCS), constructed over 11,000 dams in 47 states, including West Virginia, since 1948, and many of those dams are nearing or at the end of their 50-year design life. The NRCS's West Virginia Watershed Rehabilitation program supports the rehabilitation of these dams to address critical safety issues (NRCS, n.d.). Currently, the WVCA is conducting a preliminary investigation and feasibility report to consider actions on the Mill Creek Watershed in Mason County.

During the 2023/2024 update cycle, the PDC directed the addition of plan elements to meet the requirements for the High-Hazard Potential Dams (HHPD) program. As such, planners reached out to WVDEP Dam Safety for information, and Mr. Aaron Tonkery, and engineer with WVDEP Dam Safety, participated in this update. WVDEP confirmed its main focus is to assist in the mitigation planning process as necessary to ensure that HHPD requirements are met. Per WVDEP, for the regional plans (and, thus, for local consideration), it is beneficial for jurisdictions to know which dams are both "deficient" (out of compliance) *and* high hazard (i.e., have the potential for loss of life). The risk potential for these structures is greatly increased over those structures that are in compliance. At the time of this update, WVDEP was working to compile an official "deficient dams" list, though the agency supplied a list of the dams in Region 2 that appear as out of compliance (i.e., deficient).

- Hatfield Lake Dam (Hazard Class 1, no EAP on file with WVDEP) – **Cabell County**
- Huffman Dam (potential Hazard Class 1, no EAP on file with WVDEP) – **Mason County**
- Laurel Lake Dam (Hazard Class 1, has a current EAP on file with WVDEP) – **Mingo County**

The following map shows the dams in the region and highlights those that are both high hazard (i.e., Hazard Class 1) and deficient.



REGION 2 PDC HAZARD MITIGATION PLAN

Deficient/Haz. Class 1 Dam Locations

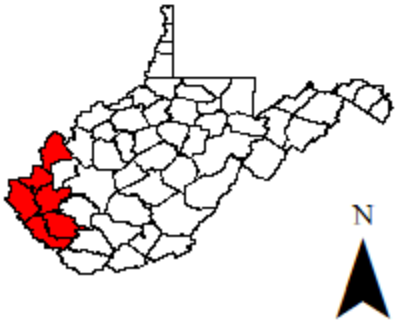
Data Source(s):
USACE NID, WVDEP
Dam Safety

"Deficient" & HC 1

Dams

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

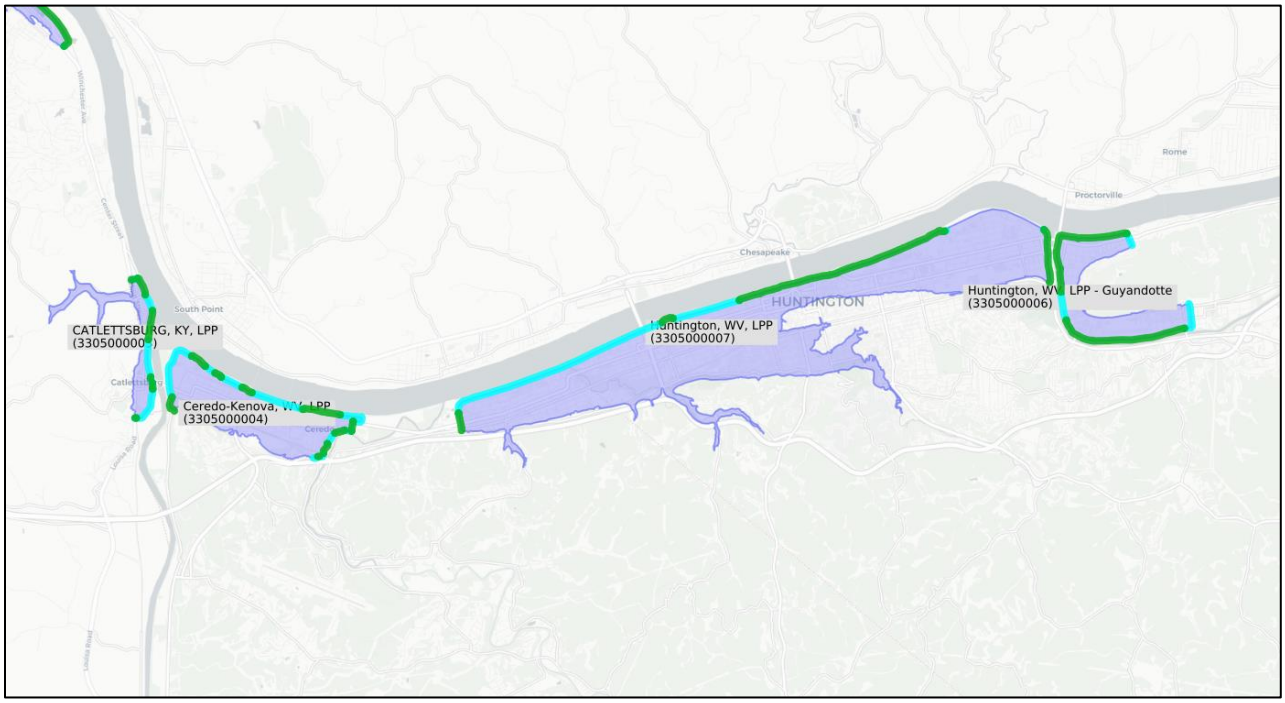


There are far fewer levees throughout the region, though the Region 2 area has one of the highest numbers of levees in West Virginia. According to the National Levee Database (USACE, 2024), there are eight levees located in the region. The map below the table shows the location of the region's levee systems.

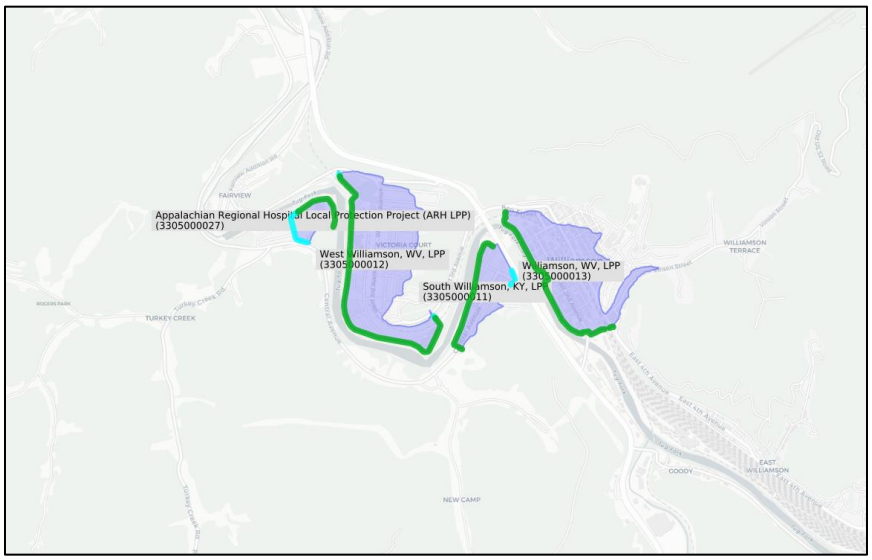
LEVEES IN THE REGION 2 PLANNING & DEVELOPMENT COUNCIL AREA						
County	*Name*	*Ranking*	*Flooding Source*	*Length (miles)*	*Average Height (in feet)*	*Year Completed*
Cabell	Huntington LPP – Guyandotte	Moderate*	Guyandotte & Ohio Rivers	4.069	21	1943
Cabell, Wayne	Huntington LPP	High*	Ohio River	7.48	12	1943
Mason	Point Pleasant Levee System	Moderate	Kanawha & Ohio Rivers	2.276	No Data	1951
Mingo	Magnolia Ringwall	Low*	No Data	0.014	247	No Data
Mingo	Matewan LPP	Low	No Data	.0497	26	1997
Mingo	West Williamson Levee System	Low	Tug Fork of the Big Sandy	1.15	10	2004
Mingo	Williamson Levee System	Low	No Data	0.79	43	1991
Wayne	Ceredo-Kenova LPP	Moderate	Big Sandy & Ohio Rivers, Twelvepole Creek	4.332	22	1940
*Risk classification currently under review						

The images below, taken from the U.S. Army Corps of Engineers National Levee Database (2016), show these graphically along with the leveed, or protected, areas.

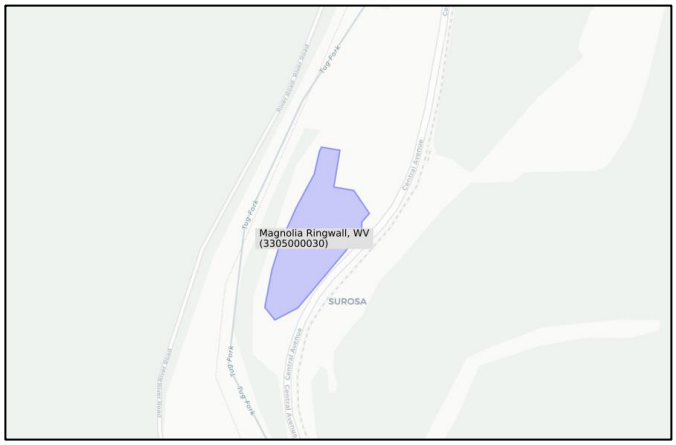
Levee Systems in Greater Huntington



Levee Systems in Williamson Area



Magnolia Ringwall Levee System



Levee System in Matewan Area

The City of Huntington is undertaking major projects designed to upgrade its floodwall. There are no major failures on the city's levee, but the system works with antiquated technology and is in need of upgrades *before* more significant problems occur. Recently, Point Pleasant had deficiencies with its floodwall, but it corrected those between 2018 and 2024.

Impacts and Vulnerability

The hazard classification of a dam (referenced above) corresponds to the potential for downstream flooding, not the structural integrity of a dam. The table below describes the downstream effects of a dam failure based on the hazard class.

DAM HAZARD CLASSIFICATIONS			
Dam Hazard Potential Classification	*LOW Hazard Potential*	*SIGNIFICANT Hazard Potential*	*HIGH Hazard Potential*
Loss of Human Life	None expected	None expected	Probable
Economic Loss	Low and generally limited to owner	Yes	Yes (but not necessary for this classification)
Environmental Damages	Low and generally limited to owner	Yes	Yes (but not necessary for this classification)
Lifeline Interest Impacted	No	Yes	Yes (but not necessary for this classification)

Further, there are generally three types of risks associated with dams: incremental risk, non-break risk, and residual risk.

- **Incremental Risk:** The risk (likelihood and consequences) to the pool area and downstream floodplain occupants attributed to the presence of the dam should the dam

breach prior to or after overtopping or undergo component malfunction or mis-operation, where the consequences considered are over and above those that would occur without dam breach. The consequences typically are due to downstream inundation, but a loss of the pool can result in significant impacts in the pool area upstream of the dam.

- **Non-Breach Risk:** The risk in the reservoir pool area and affected downstream floodplain due to 'normal' operation of the dam (e.g., large spillway flows within the design capacity that exceeds channel capacity) or 'overtopping of the dam without breaching' scenarios.
- **Residual Risk:** The risk remaining after completing all mitigation and risk reduction actions. Concerning dams, FEMA defines residual risk as "risk remaining at any time" (FEMA, 2018). It is the risk that remains after decisions related to a specific dam safety issue are made and prudent actions have been taken to address the risk. It is the remote risk associated with the condition that was judged not to be a credible dam safety issue.

Media outlet USA Today compiled an in-depth story on threats posed by dams throughout the United States (Crowe & Amico, 2023). The data specifically examined dam performance under heavy rain conditions, noting the failure of several dams across the country during rain storms. According to a map compiled by the authors, none of the dams in the region appeared as “unsatisfactory.” Five dams appeared as “poor,” though. They were as follows.

- Culloden Water Supply Dam (Cabell County)
- Hatfield Lake Dam (Cabell County)
- Huffman Dam (Mason County)
- Lake of Eden (Cabell County)
- McClintic #23 Dam (Mason County)
- The USACE has adopted six classes of levees as it pertains to risk. The table below further explains these risk classification ratings.

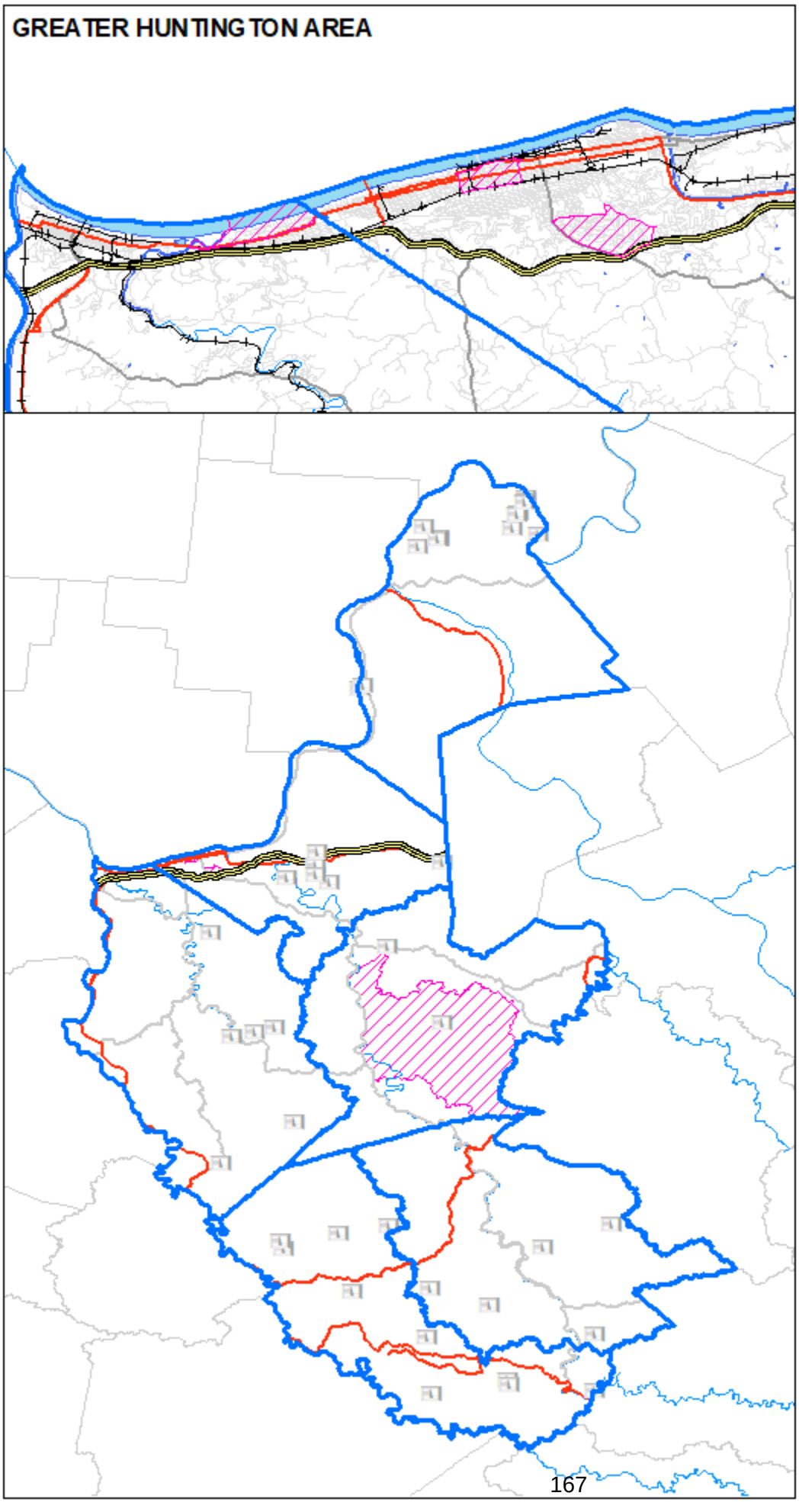
The USACE has adopted six classes of levees as it pertains to risk. The Huntington LPP levee system (Cabell & Wayne Counties) is the only levee in the region classified as high. Three others were listed as moderate (Huntington LPP – Guyandotte [Cabell County], Point Pleasant Levee System [Mason County], and Ceredo-Kenova [Wayne County]). The table below further explains these risk classification ratings.

LEVEE RISK CLASSIFICATIONS		
Classification	*Actions for Levee Systems and Leveed Areas in this Class*	*Risk Characteristics of this Class*
Very High (1)	Based on risk drivers, take immediate action to implement interim risk reduction measures. Increase frequency of levee monitoring, communicate risk characteristics to the community within an expedited timeframe; verify emergency plans and flood inundation maps are current; ensure the community is aware of flood warning systems and evacuation procedures; and, recommend purchase of flood insurance. Support risk reduction as a very high priority.	The likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in very high risk.
High (2)	Based on risk drivers, implement interim risk reduction measures. Increase frequency of levee monitoring; communicate risk characteristics to the community within an expedited timeframe; verify emergency plans and flood inundation maps are current; ensure community is aware of flood warning and evacuation procedures; and, recommend purchase of flood insurance. Support risk reduction as a high priority.	The likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in high risk.
Moderate (3)	Based on risk drivers, implement interim risk reduction measures as appropriate. Verify risk information is current and implement routine monitoring program; assure O&M is up to date; communicate risk characteristics to the community in a timely manner; verify emergency plans and flood inundation maps are current; ensure the community is aware of flood warning and evacuation procedures; and, recommend purchase of flood insurance. Support risk reduction as a priority.	The likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in moderate risk.
Low (4)	Verify risk information is current and implement routine monitoring program and interim risk reduction measures if appropriate; assure O&M is up to date; communicate risk characteristics to the community as appropriate; verify emergency plans and flood inundation maps are current; ensure the community is aware of flood warning and evacuation procedures; and, recommend purchase of flood insurance. Support risk reduction actions to further reduce risk to as low as practicable.	The likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in low risk.
Very Low (5)	Continue to implement routine levee monitoring program, including operation and maintenance, inspections, and monitoring of risk. Communicate risk characteristics to the community as appropriate; verify emergency plans and flood inundation maps are current; ensure the community is aware of flood warning and evacuation procedures; and recommend purchase of flood insurance.	The likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in very low risk.
No Verdict	Not enough information is available to assign risk.	N/A

Social Vulnerability Considerations

There may be social vulnerability variables at play concerning both dam failure risk and impacts. When constructing dams, locations are typically those where should the structure fail, resultant damage would be minimal (e.g., farmland or wildland). There are instances, though, where large infrastructure projects like highway projects displaced socially vulnerable populations thanks to a perception of lower property values (Norwood, 2021). Examples of similar dam projects are much fewer than roadways, and with the benefit of this hindsight, future dam projects can avoid those mistakes, thereby minimizing risks and some impacts exclusively to socially vulnerable populations.

Regarding impacts, an imminent dam failure necessitates rapid notification of potentially impacted populations. Those with low English proficiency may not understand immediate warnings to evacuate. Further, they may be caught off guard by imminent warnings because of similar effects surrounding awareness messages about deteriorating conditions associated with nearby dams. Further, upon receiving an evacuation notice, households with no vehicle can experience difficulty evacuating. The following maps show, first, areas with higher percentages of people speaking English “less than well,” and second, the percentage of households with no vehicle available.



REGION 2 PDC HAZARD MITIGATION PLAN

SVI Considerations: English Proficiency (Dam Failure)

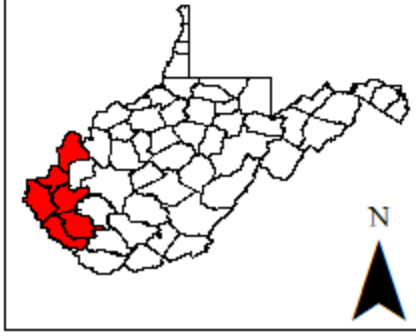
Data Source(s):
CDC SVI Index (2020)

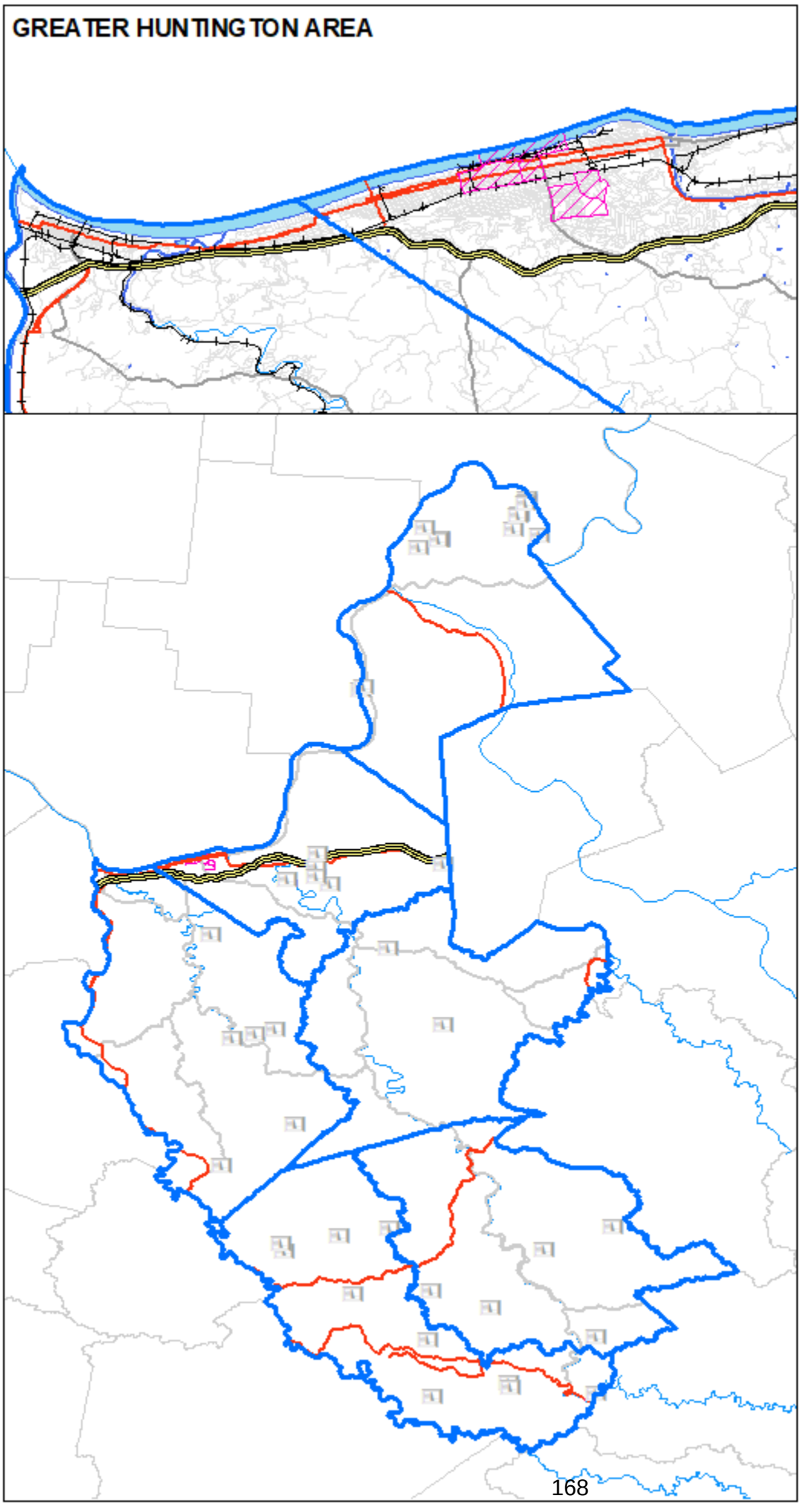
Dams

1% or More w/ Limited Eng. Proficiency

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.





REGION 2 PDC HAZARD MITIGATION PLAN

SVI Considerations: Vehicle Access (Dam Failure)

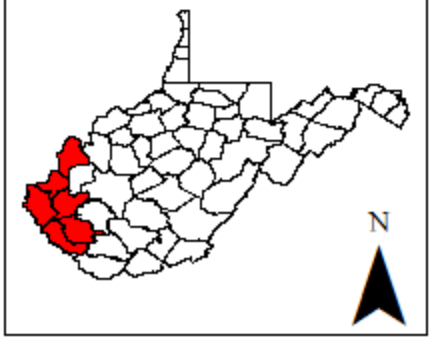
Data Source(s):
CDC SVI Index (2020)

Dams

25% or More w/ No Vehicle Access

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



West Virginia's state hazard mitigation plan (WVEMD, 2023) estimates socially vulnerable populations within dam failure inundation areas by county. The following table provides the estimates for the region's counties (pp. 5.1-18-5.1-19).

REGIONAL POPULATION IN DAM FAILURE INUNDATION AREAS BY COUNTY			
County	*Total Population (in Inundation Areas)*	*Vulnerable Populations (in Inundation Areas)*	*% Population Socially Vulnerable*
Cabell	11,667	2,508	21.5%
Lincoln	821	0	0.0%
Logan	4,457	2,578	57.9%
Mason	3,076	0	0.0%
Mingo	162	0	0.0%
Wayne	4,281	0	0.0%

Previous Occurrences

The National Performance of Dams Program (NPDP) at Stanford University maintains records on modifications, repairs, incidents and their consequences, and inspections for dams in the United States and worldwide. According to the NPDP, there have been no incidents in the region (NPDP, n.d.). A search of the “Dam Incident Database” maintained by the Association of State Dam Safety Officials (2023) lists five failure incidents in West Virginia between 1916 and 2023, including the Buffalo Creek Dam failure of 1916. The most recent version of the West Virginia state mitigation plan lists the following:

- 1914 Lincoln County failure,
- 1972 Buffalo Creek Dam failure and flooding,
- 1975 R.D. Bailey Dam incident,
- 1996 Chief Logan State Park Dam incident,
- 2002 Logan County dam failure,
- 2007 Lee’s Fishing Lake Dam failure.

Buffalo Creek Dam, February 1972

The Buffalo Creek Dam failed on February 26, 1972 flooding the valley and killing 118 people. Three days of rain exacerbated two small dam breaks that had occurred several years earlier. The dam burst, unleashing a 20-foot wall of water that roared into the valley.

About 4,000 people were living in 17 towns and villages in Buffalo Creek Valley at the time. Hundreds of homes and buildings were swept away by the powerful flood. The Buffalo

Mining Company, which was responsible for the tailings, was forced to pay $30 million in damages.

Loss and Damages

The National Inventory of Dams (NID) included a consequence estimate for two of the dams in the region. The tables below are taken from the database.

BEECH FORK DAM CONSEQUENCES ESTIMATE (USACE)					
Scenario	*Pool Elevation*	*Daytime People at Risk*	*Nighttime People at Risk*	*Buildings at Risk*	*Economic Cost*
Maximum High Pool – Breach	N/A	3,605	4,231	2,018	$458,087,784
Maximum High Pool – Non Breach	N/A	569	964	475	$60,990,246
Top of Active Storage Pool – Breach	N/A	1,578	1,992	1,002	$211,286,804
Top of Active Storage Pool – Non Breach	N/A	0	0	0	$0
Security Scenario Pool (1% EDP) - BREACH	N/A	N/A	N/A	N/A	N/A
Security Scenario Pool (1% EDP) - NON BREACH	N/A	N/A	N/A	N/A	N/A
Normal High Pool (10% EDP) – Breach	N/A	504	828	415	$60,822,453
Normal High Pool (10% EDP) – Non Breach	N/A	0	0	0	$0
Normal High Pool (90% EDP) – Breach	N/A	476	791	393	$53,769,024
Normal High Pool (90% EDP) – Non Breach	N/A	0	0	0	$0

EAST LYNN DAM CONSEQUENCES ESTIMATE (USACE)					
Scenario	*Pool Elevation*	*Daytime People at Risk*	*Nighttime People at Risk*	*Buildings at Risk*	*Economic Cost*
Maximum High Pool – Breach	N/A	6,822	6,867	2,873	$817,300,522
Maximum High Pool – Non Breach	N/A	4,968	4,096	1,704	$408,331,299
Intermediate High Pool – Breach	N/A	6,216	5,939	2,465	$657,251,593
Intermediate High Pool – Non Breach	N/A	3,254	2,494	1,051	$137,736,507
Top of Active Storage Pool – Breach	N/A	5,070	4,241	1,761	$452,229,629
Top of Active Storage Pool – Non Breach	N/A	21	27	25	$2,647,223
Security Scenario Pool (1% EDP) – Breach	N/A	N/A	N/A	N/A	N/A
Security Scenario Pool (1% EDP) – Non Breach	N/A	N/A	N/A	N/A	N/A
Normal High Pool (10% EDP) – Breach	N/A	475	731	315	$29,344,687
Normal High Pool (10% EDP) – Non Breach	N/A	0	0	0	$0

To determine the exposed population, structures, and estimated losses, planners used the USACE's National Levee Database's "What's Behind the Levee?" section (USACE, 2024). The table below displays this information.

LEVEE SYSTEM LOSS ESTIMATES				
Name	*Population*	*Buildings*	*Critical Structures*	*Property Value*
Ceredo-Kenova LPP	4,256	2,496	10	$600,000,000
Huntington LLP	9,100	31,800	31	$4,000,000,000
Huntington LLP – Guyandotte	2,913	1,667	6	$1,000,000,000
Magnolia Ringwall	0	4	1	$400,000
Matewan LLP	49	63	3	$10,000,000
Point Pleasant Levee System	1,298	582	5	$200,000,000
West Williamson Levee System	532	293	2	$70,000,000
Williamson Levee System	854	450	6	$200,000,000

Future Occurrences

The state of dam infrastructure in West Virginia is a concern. As dams age, they become susceptible to issues related to that age (concerning the life span of materials used in construction). The average age of dams in the region is 60.5 years. The communities around

dams, particularly upstream along the waterways they impound, also change. While some changes, such as declining population in those upstream areas, might not alter the risk profile in measurable ways, other changes, such as increased development (leading to increased runoff) upstream, can strain dams.

The American Society of Civil Engineers (ASCE) regularly issues a "report card" on America's infrastructure with state-by-state breakdowns. The ASCE's 2020 grade for West Virginia's dams was a "D" (ASCE, 2023). The ASCE notes that 75% of the state's dams are classified as high-hazard potential. Eighty-nine percent of the state-regulated high-hazard dams are rated to be in fair or satisfactory condition, compared to 71% nationally.

Future Climate Considerations

As a technological hazard, one might not readily think of the implications of future climate impacts on dam or levee failures. However, though indirect, future conditions may impact dams and levees, particularly as those dams and levees age and greater quantities of precipitation fall. The aforementioned USA Today article plotted the probabilities of "4.6 inches of rainfall in 24 hours" in 1995, 2025, and 2085 (Crowe & Amico, 2023). For all four of the dams listed as being in poor condition (as well as all other dams) in the region, the probability of such an event increased. For reference, the following table shows the increase for the four "poor condition" dams.

PROBABILITY CHANGE, 4.6 INCHES/24 HOURS RAINFALL EVENT AT "POOR CONDITION" DAMS				
Dam	*1995*	*2025*	*2085*	*% Change*
Culloden Water Supply Dam	1-in25 (4.0%)	1-in-17	1-in-14 (7.1%)	65%
Hatfield Lake Dam	1-in25 (4.0%)	1-in-17	1-in-14 (7.1%)	65%
Huffman Dam	1-in25 (4.0%)	1-in-17	1-in-15 (6.7%)	67.5%
Lake of Eden	1-in25 (4.0%)	1-in-17	1-in-14 (7.1%)	65%
McClintic #23 Dam	1-in25 (4.0%)	1-in-17	1-in-15 (6.7%)	67.5%

Risk Assessment

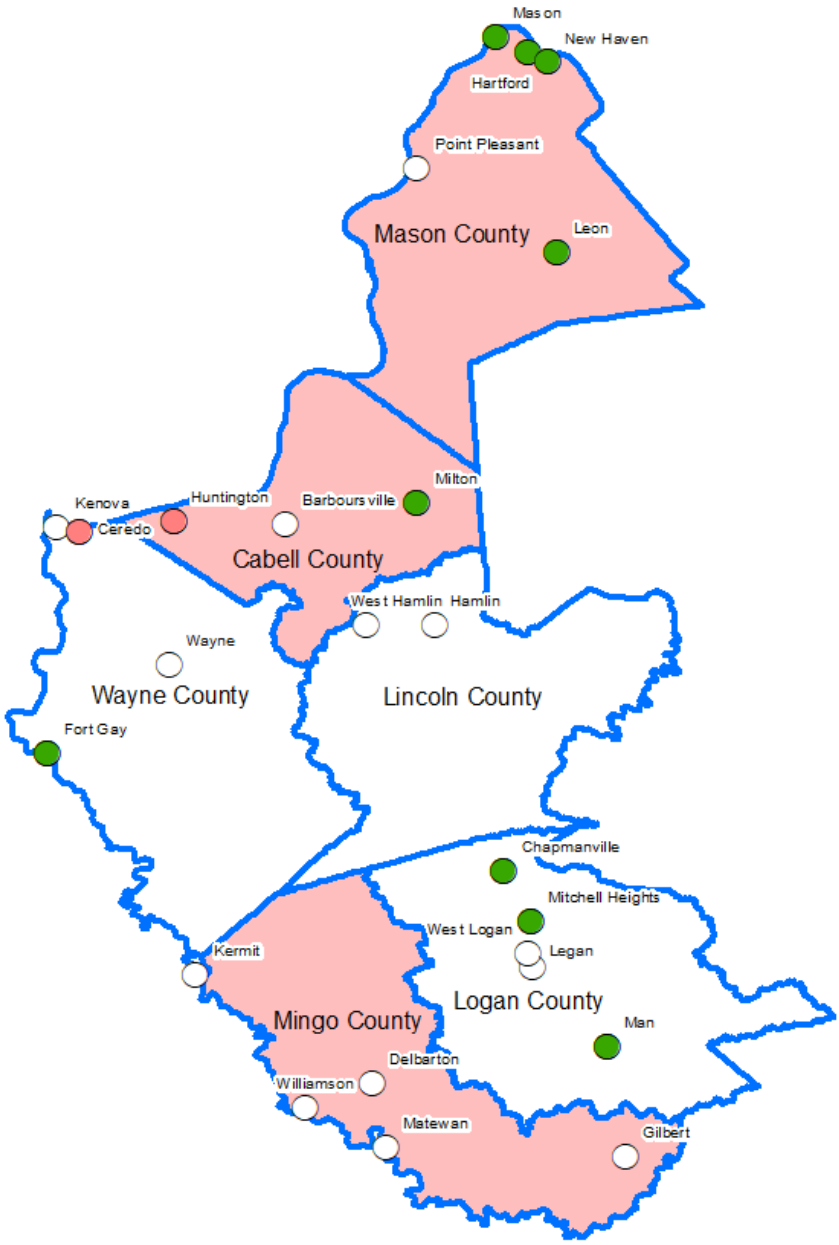
This section summarizes the vulnerability of the region to dam and levee failure. The planning and development council conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding dam and levee failure.

PUBLIC SENTIMENT, DAM & LEVEE FAILURE					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Dam & Levee Failure	26 (65.00%)	8 (20.00%)	4 (10.00%)	2 (5.00%)	40
In the past ten years, do you remember this hazard occurring in your community?				1 (2.50%)	40
Have you noticed an increase in the occurrences or intensity of this hazard?				0 (0.00%)	40
Have you noticed a decrease in the occurrences or intensity of this hazard?				3 (7.50%)	40

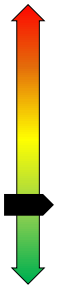
The following table assigns point totals based on the methodology identified in Section 2.2: Describe Hazards above.

DAM & LEVEE FAILURE RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	2	Low (Unlikely to occur in a year)	Region 2 experienced five dam incidents since for an average of 0.04 incidents per year.
Response	2	One day	Though recovery or reconstruction operations may extend past a single day, the initial response to a dam failure would likely be one day.
Onset	3	6-12 hours	The available EAPs include monitoring for potential emergency incidents, and with tracking in place, some warnings would be available. While a catastrophic failure could occur without notice, planners used a more plausible scenario as the basis of this estimate.
Magnitude	1	Localized (less than 10% of land area affected)	The inundation area impacted by any single potential dam failure would be less than 10% of the regional planning area as well as, most likely, a county's land area.
Business	4	More than 30 days	A catastrophic dam failure that impacted a business would likely necessitate rebuilding that business.
Human	1	Minimum (minor injuries)	There are no injuries on record from the Thomas Dam dam-related incident.
Property	1	Less than 10% of property affected	Again, absent previous occurrences, planners considered the entire property inventory of the region. Damage from a dam failure would not likely exceed 10% of the property inventory of a county (nor would it for the region).
Totals	**14**	**Low**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks are more or less prevalent as compared to the rest of the planning area. The following map identifies those multi-jurisdictional risks with respect to dam & levee failure. Those labels not underlaid by a shaded drop shadow are not more or less at risk of dam & levee failure. Those with red drop shadows are more at risk (and represent those jurisdictions with high hazard and deficient dams per the WVDEP and those jurisdictions served by the Huntington floodwall); those with green are less at risk (and represent the municipal jurisdictions not located downstream of a dam).



2.2.4 Drought

A drought is a period of abnormally dry weather that persists long enough to produce a serious hydrological imbalance, and a temporary shortage of water for humans, animals, and plants.				
Risk  HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	Typically after a period of prolonged absence of precipitation	**Risk Ranking:**	Low
	Warning Time:	Over 24 hours	**Type of Hazard:**	Natural
	Probability:	Low (Unlikely to occur in a year)	**Impact:**	Critical (25-50% of land area affected)
	Disaster Declarations:	S3349 (USDA FSA) (2012) S4589 (USDA FSA) (2019)		

Hazard Overview

"Drought" is a period of abnormally dry weather, which persists long enough to produce a serious hydrological imbalance. Drought is a term used in relation to who or what is affected by the lack of moisture. Drought can be a result of multiple causes, including global weather patterns that produce persistent, upper-level high-pressure systems with warm, dry air, resulting in less precipitation. According to the National Centers for Environmental Information (NCEI), a drought is a complex event that is difficult to either monitor or clearly define. Droughts develop slowly; typically, they are already underway when officially identified. There are several types of drought (Sears, 2017, p. 138).

- Meteorological Drought: Differences from the normal precipitation amounts. Because different areas receive different amounts of rainfall, a drought in one place might not be considered a drought in another.
- Agricultural Drought: Moisture deficiency seriously injurious to crops, livestock, or other agricultural commodities. Parched crops may wither and die. Pastures may become insufficient to support livestock. The effects of agricultural droughts are difficult to measure because many other variables may impact production during the same growing season.
- Hydrological Drought: Reduction in stream flow, lake and reservoir levels, depletion of soil moisture, and a lowering of the groundwater table. Consequently, there is a decrease in groundwater discharge to streams and lakes. Prolonged hydrological drought will affect the water supply.

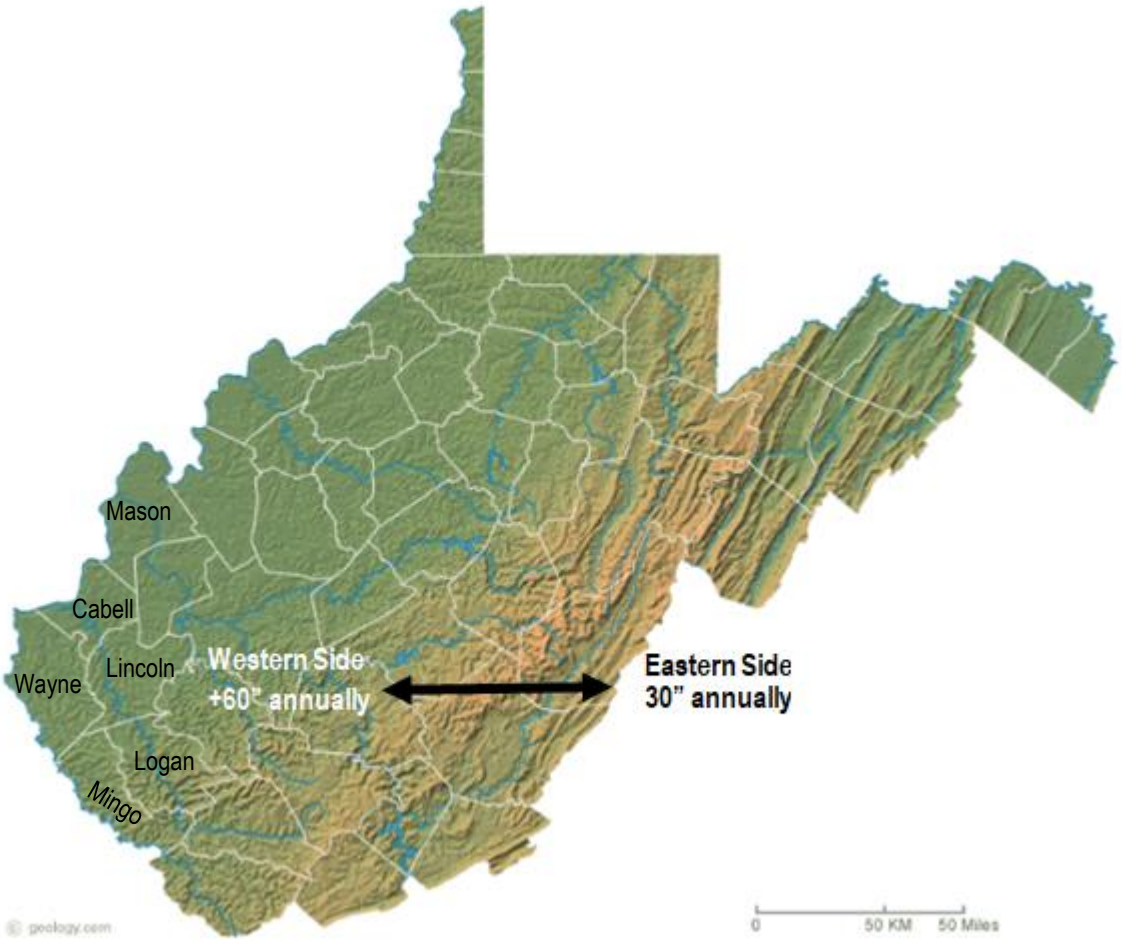
- Socioeconomic Drought: A lack of water that begins to affect people's daily lives. "A socioeconomic drought occurs when the demand for an economic good exceeds supply as a result of a weather-related shortfall in water supply" (NDMC, 2023).

Precipitation falls in uneven patterns across the region; the amount of precipitation at a particular location varies from year to year, but over the years, the average amount is reasonably constant. The amount of rain and snow also varies with the seasons. Even if the total amount of rainfall for a year is about average, rainfall shortages can occur during a period when moisture is critically necessary for plant growth, such as in early summer. When little to no rail falls, soils can dry out, and plants can die. When rainfall is less than normal for several weeks, months, or years the water in wells decreases. "If dry weather persists and water-supply problems develop, the dry period can become a drought" (USGS, 2018).

Location and Extent

Droughts occur throughout North America, and in any given year, at least one region of the country is likely to experience drought conditions. Droughts are region-wide phenomena that can affect many areas and jurisdictions simultaneously. The severity of drought can evolve throughout the year; what begins as a mild drought can become severe or extreme, then subside to a mild incident. This process can take weeks or months, and the effects can be felt after drought conditions end.

"Over 60 inches of precipitation falls annually on the western side of West Virginia, while just a little over 30 inches falls annually in the eastern mountainous terrain. All of Region 2 is in the western portion of the state (see illustration below) (NOAA NIDIS, n.d.).



The Palmer Drought Severity Index (PDSI) is a measure of drought that is widely used to track moisture conditions. The PDSI is "an interval of time, generally in months or years in duration, during which the actual moisture supply at a given place rather consistently falls short of the climatically appropriate moisture supply." The range of PDSI is from -4.0 (extremely dry) to +4.0 (excessively wet), with the central half (-0.5 to +0.5) representing normal or near-normal conditions. In the United States, the USDA, National Drought Mitigation Center at the University of

USDM AND PDSI COMPARISON

U.S. Drought Monitor		*Palmer Drought Severity Index*	
N/A		> 4.0	Extreme moist spell
		3.0 to 3.99	Very moist spell
		2.0 to 2.99	Unusual moist spell
		1.0 to 1.99	Moist spell
		0.50 to 0.99	Incipient moist spell
		-0.49 to 0.49	Near normal
		-0.5 to -0.99	Incipient dry spell
D0	Abnormally dry	-1.0 to -1.99	Mild drought
D1	Moderate drought	-2.0 to -2.99	Moderate drought
D2	Severe drought	-3.0 to -3.99	Severe drought
D3	Extreme drought	< -4.0	Extreme drought
D4	Exceptional drought	N/A	

Nebraska-Lincoln, the U.S. Department of Commerce, and the National Oceanic and Atmospheric Administration (NOAA) developed another measurement of droughts named the U.S. Drought Monitor (USDM). The table above shows the two scales and how they compare.

As illustrated in the table above, D0, described as **Abnormally Dry**, corresponds with the PDSI of -1.0 to -1.9. Possible impacts include "short-term dryness, slowing of crop and pasture growth" (NDMC, 2016). **Moderate Drought**, level D1, corresponds to a PDSI of -2.0 to -2.9. "These conditions can result in damage to crops and pastures and can cause the development of some water shortages" (NDMC, 2023). The D2 level, known as a **Severe Drought**, is a condition where "crop or pasture losses are likely and water shortages will be common" (NDMC, 2016). This correlates with a PDSI of -3.0 to -3.9. The D3 (PDSI of -4.0 to -4.9), or **Extreme Drought** level includes impacts such as "major crop and pasture losses as well as widespread water shortages and restrictions" (NDMC, 2016). The most critical drought category (D4, **Exceptional Drought**), with a PDSI of -5.0 or less, will create exceptional and widespread loss and will lead to water emergencies as reservoirs, streams, and wells are short of water (NDMC, 2016).

In addition to the PDSI, the Crop Moisture Index (CMI) calculates the change in moisture available from week to week, which gives a short-term status of agricultural moisture (NOAA NIDIS, n.d.). The table at right describes the Crop Moisture Index.

CROP MOISTURE INDEX	
Crop Moisture Index Value	*Drought Condition*
3.0 and up	Excessively Wet
2.0 to 2.9	Wet
1.0 to 1.9	Moist
-0.9 to 0.9	Slightly Dry/ Favorable Moist
-1.0 to -1.9	Abnormally Dry
-2.0 to -2.9	Excessively Dry
-3.0 or less	Severely Dry

Growing populations in portions of the region, individual and commercial demands upon water supplies, and regular industrial and agricultural water usage can combine to affect water availability during both normal and drought conditions. Water supplies in the region are a mix of public and private systems (i.e., cities/towns/public service districts and private corporations). A moderate percentage of the region utilizes private water wells. Many of these wells may become dry or contaminated during a drought (long before public systems), depending on the use, size, and depth of the wells.

Impacts and Vulnerability

Droughts can impact drinking water both in terms of availability and demand. According to the U.S. Environmental Protection Agency (USEPA), as temperatures rise, people and animals need more water to maintain health. Additionally, a large number of economic activities

require abundant water sources, such as energy production and growing food crops. As droughts reduce available water sources, local officials will need to monitor water usage closely to maintain enough for critical uses. An extreme drought could harm the large agricultural or open urban area sectors of Region 2. According to the United States Department of Agriculture's (USDA) 2012 Census of Agriculture, there are 1,647 farms in the region encompassing over 229,929 acres of land. In total, the region produced over $46 million worth of agricultural products (based on market prices at the time). The effects of drought would negatively impact the following business types throughout the region: farmers, local water utilities, restaurants, the tourism industry (i.e., parks, lakes, golfing, boating, fishing, etc.), laundry mats, community swimming pools, and car washes.

Prolonged droughts can affect a municipality's ability to provide adequate water supplies as storage could become critically low. Mandatory water conservation measures and water use priorities may be necessary. Local health departments may have to conduct water quality sampling of private water wells as a buildup of contaminants in these wells is common during extreme drought conditions. Local clinics and hospitals may begin to see a significant increase in respiratory infections (i.e., asthma, bronchitis, and pneumonia) resulting from the dry and windy conditions potentially affecting air quality.

The lowering of the ground-water table and a decrease in ground-water discharge to streams and lakes may affect tourism and the recreational attractions at parks, trout streams, and lakes. Local and state agencies may be required to post no boating and no swimming signs at various lakes and streams where water quality standards are not being met due to stagnant and contaminated water. Stagnant water from reduced levels can provide a breeding ground for disease-carrying mosquitoes.

The National Drought Mitigation Center (NDMC) has developed the U.S. Drought Monitor. The Drought Monitor is a map that is updated weekly using data from the previous week to show areas of the U.S. that are in a drought. The following table lists the U.S. Drought Monitor classifications of drought, along with potential impacts (NDMC, 2024).

U.S. DROUGHT MONITOR CLASSIFICATION			
Category	*Description*	*Possible Impacts*	*Palmer Drought Severity Index*
D0	Abnormally Dry	Going into drought: • Short-term dryness slows planting, growth of crops or pastures Coming out of drought • Some lingering water deficits • Pastures or crops not fully recovered	-1.0 to -1.9
D1	Moderate Drought	• Some damage to crops, pastures • Streams, reservoirs, or wells are low, and some water shortages developing or imminent • Voluntary water-use restrictions requested	-2.0 to -2.9
D2	Severe Drought	• Crop or pasture losses likely • Water shortages common • Water restrictions imposed	-3.0 to -3.9
D3	Extreme Drought	• Major crop/pasture losses • Widespread shortages or restrictions	-4.0 to -4.9
D4	Exceptional Drought	• Exceptional and widespread crop/pasture losses • Shortages of water in reservoirs, streams, and wells create water emergencies	-5.0 or less

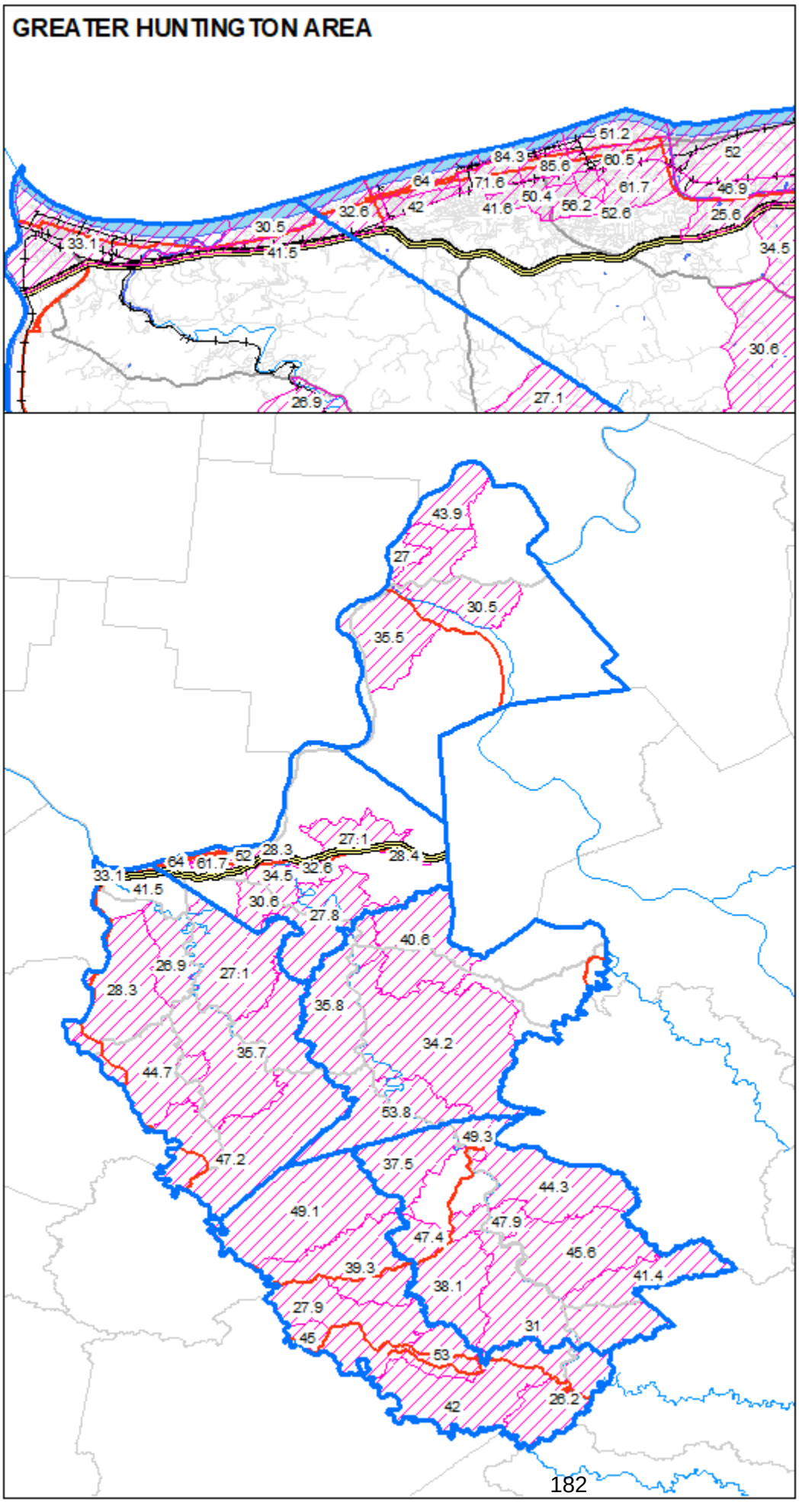
Severe drought conditions can negatively affect human health (CDC, 2020). Some effects are short-term and can be directly observed and measured, while others are indirect and are not easy to anticipate or monitor. The possible health implications of drought include:

- Compromised quantity and quality of drinking water,
- Increased recreational risks,
- Effects on air quality,
- Diminished living conditions related to energy, air quality, sanitation, and hygiene,
- Compromised food and nutrition, and
- Increased incidence of illness and disease.

Social Vulnerability Considerations

Other human-centric impacts are possible. Drought vulnerability has generally been linked to poverty and drought-related health outcomes have been associated with air quality. The reliance on small or poorly-maintained water distribution systems puts populations at increased risk of morbidity due to exposure to contaminated drinking water or issues resulting from reduced use of water resources for hygiene and food washing. Finally, children and the elderly are vulnerable to various drought-related health outcomes, such as air and waterborne diseases (Fard, Puvvula, & Bell, 2022). The following images show (a) Census tracts in the

region where more than 25% of the tract's population is below 150% of the poverty level and (b) Census tracts showing the highest percentages of vulnerable populations (i.e., those under 18 and 65+) as a function of the total population.



REGION 2 PDC HAZARD MITIGATION PLAN

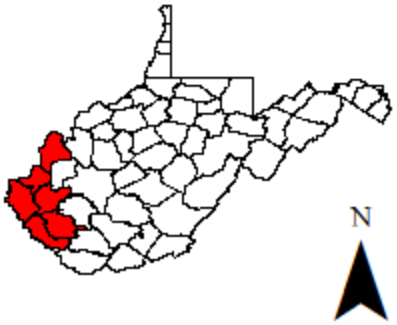
SVI Considerations: Tracts by Poverty Level

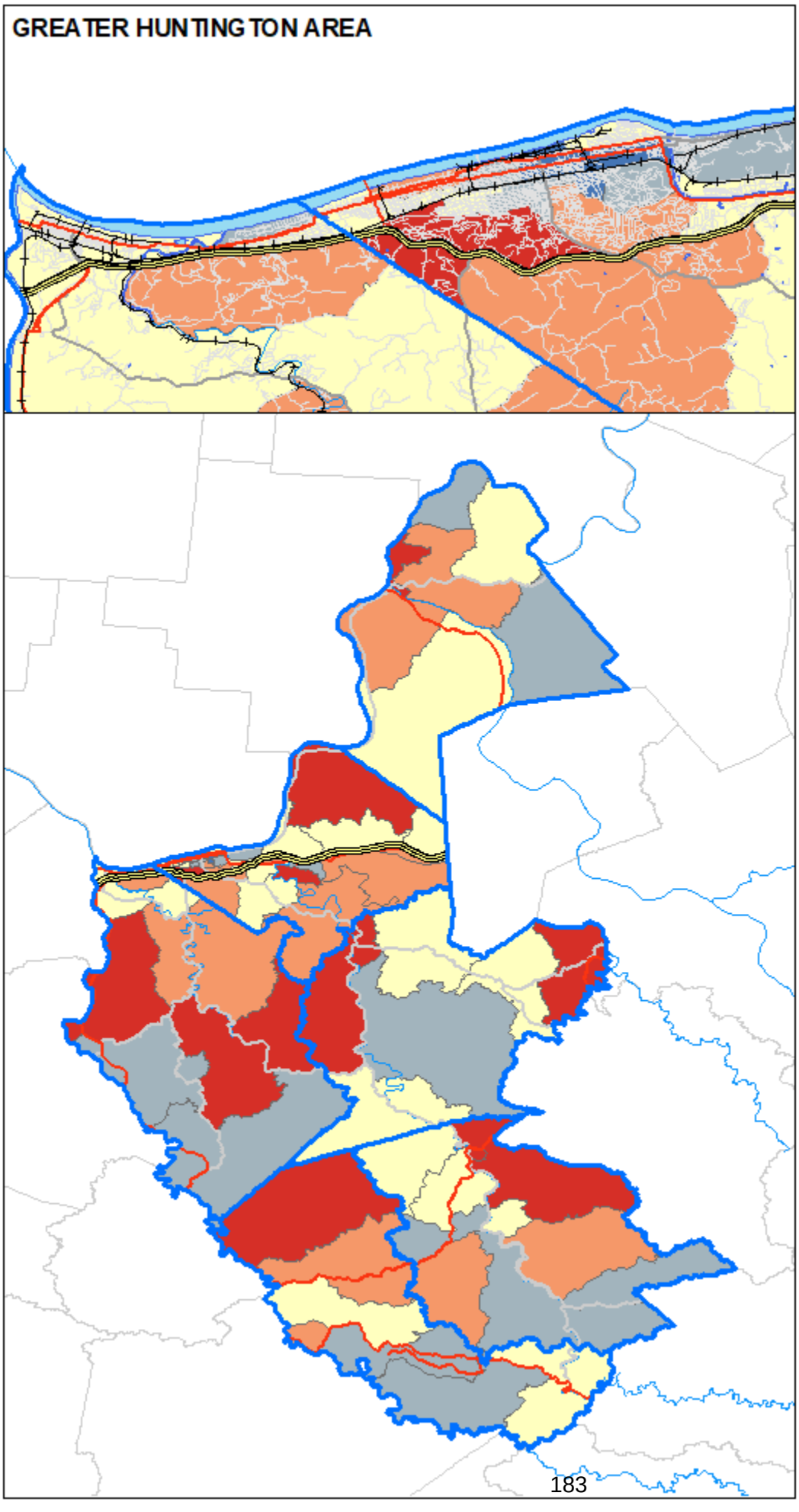
Data Source(s):
CDC SVI Index (2020)

25% or More, Below Poverty Est.

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.





REGION 2 PDC HAZARD MITIGATION PLAN

SVI Considerations: Aggregated Age, 17-Under & 65-Over

Data Source(s):
CDC SVI Index (2020)

- 0.8% - 24.29% of persons
- 24.3% - 36.5% of persons
- 36.51% - 41.5% of persons
- 41.51% - 46.2% of persons
- 46.21% - 54.2% of persons

0 3 6 12 18 24 Miles

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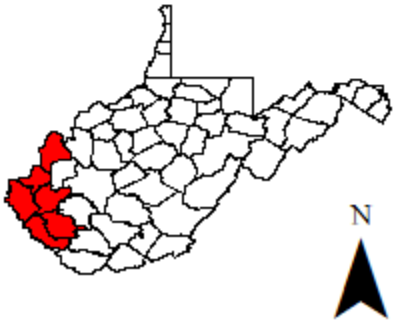


Previous Occurrences

According to the National Integrated Drought Information System (NIDIS), West Virginia has experienced several noteworthy droughts since the 1900s. During the drought of 1930-31, nearly 100% of the state experienced what would currently be referred to as a D4, or "exceptional drought," for eight months. More recently, a widespread exceptional drought occurred during the summers of 1988 and 1999, accompanied by heatwaves. During the 2000s, increased precipitation amounts have reduced the severity of drought periods in the state. Five of the top 10 wettest years on record have occurred since 2000.

The National Centers for Environmental Information (NCEI) Storm Event Database records instances of drought from 1997 to the present. The following table presents the NCEI droughts that have affected the region's six counties.

PREVIOUS DROUGHT OCCURRENCES – WV REGION 2 PDC

Location	*Date*	*Injuries*	*Deaths*	*Property Damage*	*Crop Damage*
All Counties	2/01/1997	0	0	$0 Reported	$0 Reported
All Counties	5/01/1999	0	0	$0 Reported	$0 Reported
All Counties	6/01/1999	0	0	$0 Reported	$0 Reported
All Counties	7/01/1999	0	0	$0 Reported	$0 Reported
All Counties	8/01/1999	0	0	$0 Reported	$0 Reported
All Counties	9/01/1999	0	0	$0 Reported	$0 Reported
All Counties	10/01/1999	0	0	$0 Reported	$0 Reported
All Counties	9/01/2002	0	0	$0 Reported	$0 Reported
Cabell, Lincoln, Mason, Wayne	6/08/2007	0	0	$0 Reported	$0 Reported
Cabell, Lincoln, Mason, Wayne	7/1/2007	0	0	$0 Reported	$0 Reported
All Counties	8/1/2007	0	0	$0 Reported	$0 Reported
All Counties	9/1/2007	0	0	$0 Reported	$0 Reported
All Counties	10/1/2007	0	0	$0 Reported	$0 Reported
All Counties	11/1/2007	0	0	$0 Reported	$0 Reported

Loss and Damages

Loss estimates concerning drought are difficult to quantify, though droughts generally affect crops rather than structures. There is no need for a loss estimate for structural damage.

The varying severity levels of drought make estimating crop loss difficult, especially considering the numerous possible mitigating factors such as time of year, heartiness of crops, etc.

The worst-case scenario would involve the entire agricultural sector being affected by a prolonged and serious drought. Based on 2022 numbers, the most recent Census of Agriculture published by the USDA, the market value of crops sold in the region was $38,364,000. Drought conditions also affect livestock production. Low rainfall causes a drop in available drinking water precluding the effective grazing of pastures. During drought years, a study from Africa demonstrated that livestock suffers a lower conception rate due to an incomplete return to peak body weight and a higher rate of miscarriage due to high-stress levels as the dry season proceeds. Therefore, drought in one year will lead to lower calving rates in the following year. As access to grazing pastures is reduced there will be a decrease in livestock body weight reducing the value of livestock sold at market. Female milk output will also decrease as fodder access is reduced. Once food intake is below a certain level, lactation will cease, reducing products for the market and affecting a calf's nutrition (Toumlin, 1986).

CENSUS OF AGRICULTURE (USDA, 2022)							
	Cabell	*Lincoln*	*Logan*	*Mason*	*Mingo*	*Wayne*	*Region 2*
Number of Farms	420	173	21	805	12	216	1,647
Land in Farms	39,347 ac	28,840 ac	752 ac	124,768 ac	4,083 ac	32,139 ac	22,929 ac
Average Size of Farm	94 ac	167 ac	36 ac	155 ac	340 ac	149 ac	157 ac
Market Value of Products Sold	$2,488,000	$1,602,000	$83,000	$40,697,000	$137,000	$1,767,000	$46,774,000
Crop Sales	$1,237,000	$1,017,000	$72,000	$34,870,000	N/A	$1,168,000	$38,364,000
Crop Sales %	49.7%	63.5%	86.7%	85.7%	N/A	66.1%	82.3%
Livestock Sales	$1,251,000	$584,000	$11,000	$5,827,000	N/A	$599,000	$8,272,000
Livestock Sales %	50.3%	36.5%	13.3%	14.3%	N/A	33.9%	17.7%
Average Sales Per Farm	$5,923.80	$9,260.11	$3,952.38	$50,555.28	$11,416.67	$8,180.55	$28,399.51

Although there is no direct correlation between the presence of farms and drought risk, the market value of agricultural products sold provides evidence of total economic activity exposed to losses from drought. On average, $46.7 million of agricultural products in Region 2 are vulnerable to drought conditions in any given year.

For planning purposes, utilizing research on average crop yield losses provides the basis for a mathematical loss calculation. Kuwayama (2019), focused on corn and soybeans and found that a week of drought in non-irrigating counties results in average crop yield reductions ranging from 0.1% to 1.2%. The average market value of agricultural products sold

annually (i.e., across 52 weeks) in the region suggests an average weekly value of approximately $899,500 (for a potential exposure ranging from $900 to $10,800).

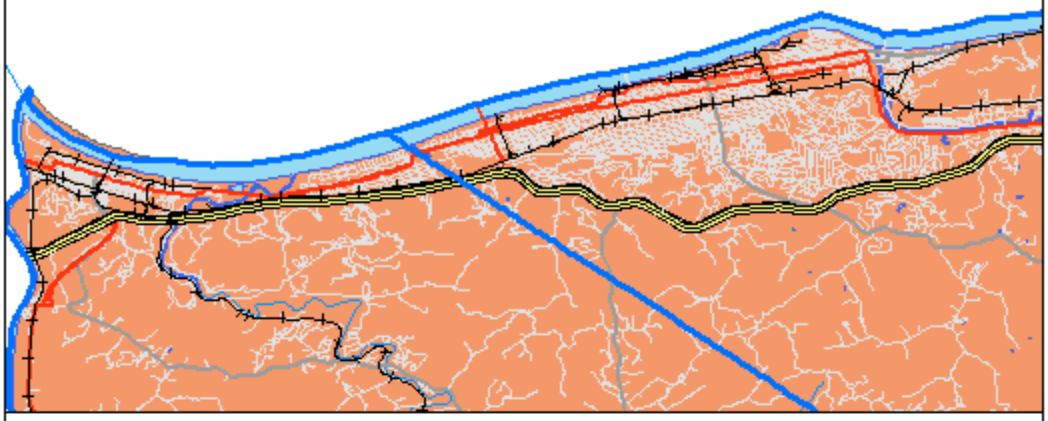
The declared incident cited above indicates the length of the 1999 drought was from May through October (six months). The average length of historic droughts (receiving a secretarial designation) in the region is five months (or 24 weeks). Combining these calculations suggests a range of exposure of $21,600 to $259,200 per drought.

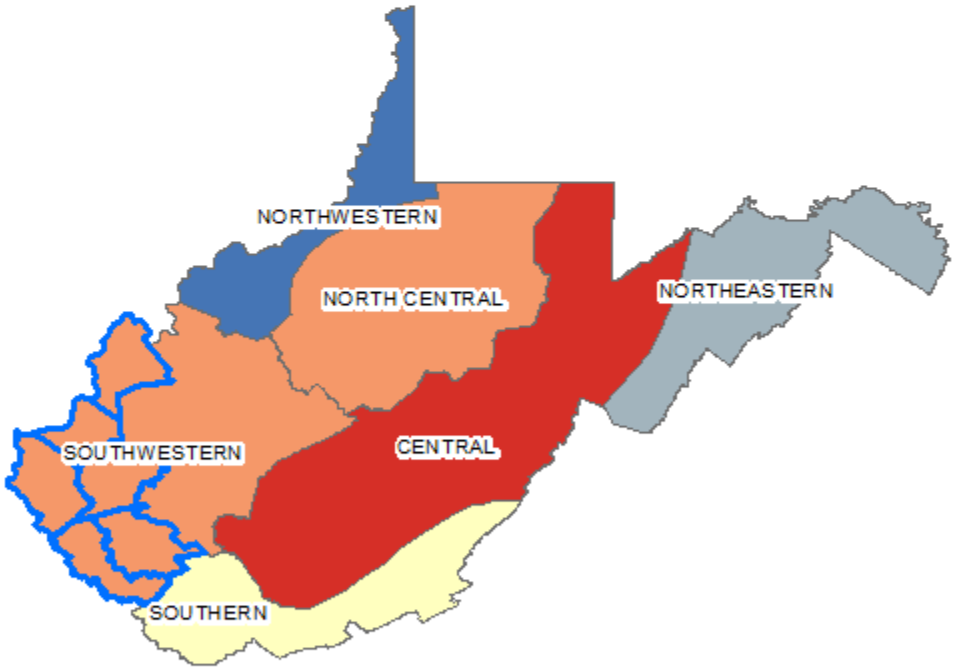
Future Occurrences

Though it is difficult to anticipate precisely where drought conditions will occur in the future, the region's member governments can estimate the chances of experiencing drought conditions generally. The National Oceanic and Atmospheric Administration's (NOAAs) Earth System Research Laboratory (ESRL) has divided the U.S. into "climate divisions." ESRL further maintains data for each of these areas, including the Palmer Drought Severity Index (PDSI) values for all months between 1895 and 2022.

The region falls into Southwestern division. The region has experienced severe or extreme drought conditions during 100 of the 1,536 months comprising the 1895-2022 period. The map below displays ESRL Climate Divisions' months spent in severe or extreme drought in the region (NOAA NCEI, 2023).

GREATER HUNTINGTON AREA





REGION 2 PDC HAZARD MITIGATION PLAN

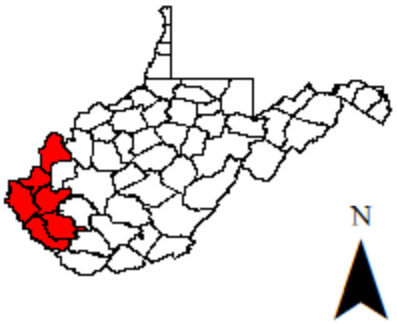
Months in Severe/ Extreme Drought, 1895-2022

Data Source(s): NOAA Earth System Research Lab.

- 5.73% or Less of Months
- 5.74% - 6.05% of Months
- 6.06% - 6.25% of Months
- 6.26% - 6.64% of Months
- More than 6.65% of Months

0 12.5 25 50 75 100 Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



Future Climate Considerations

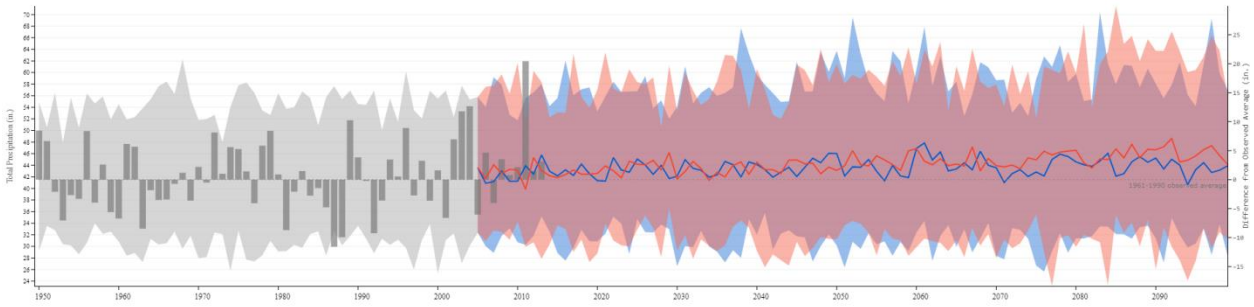
The following images, taken from The Climate Explorer (NEMAC, n.d.), show the numbers and ranges of dry days experienced and anticipated (by year) in the region. The images show data (as gray bars) above and below the mean for 1950 through 2013 foreach of the counties. The blue and red bands from the center of the image through the right model conditions under lower greenhouse gas emissions (the blue line and band) and increasing emissions (the red line and band). Per these graphics, the number of dry days shows relatively little fluctuation.

CABELL COUNTY

LINCOLN COUNTY

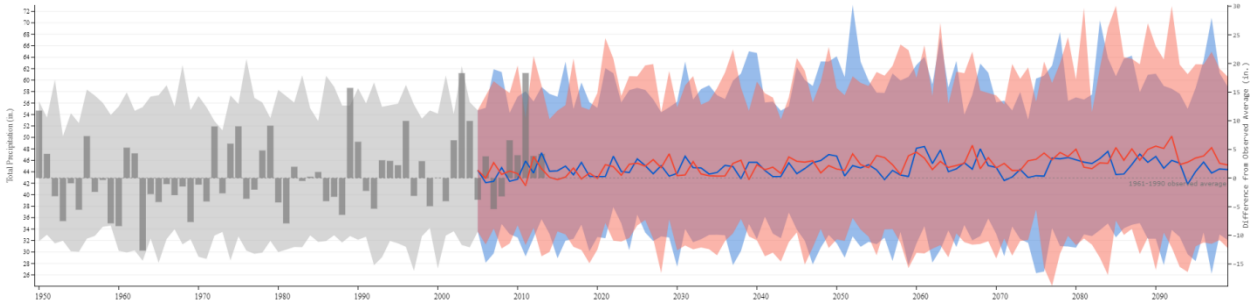
LOGAN COUNTY

MASON COUNTY



MINGO COUNTY

WAYNE COUNTY



Risk Assessment

This section summarizes the vulnerability of the region to drought. The planning and development council conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding drought.

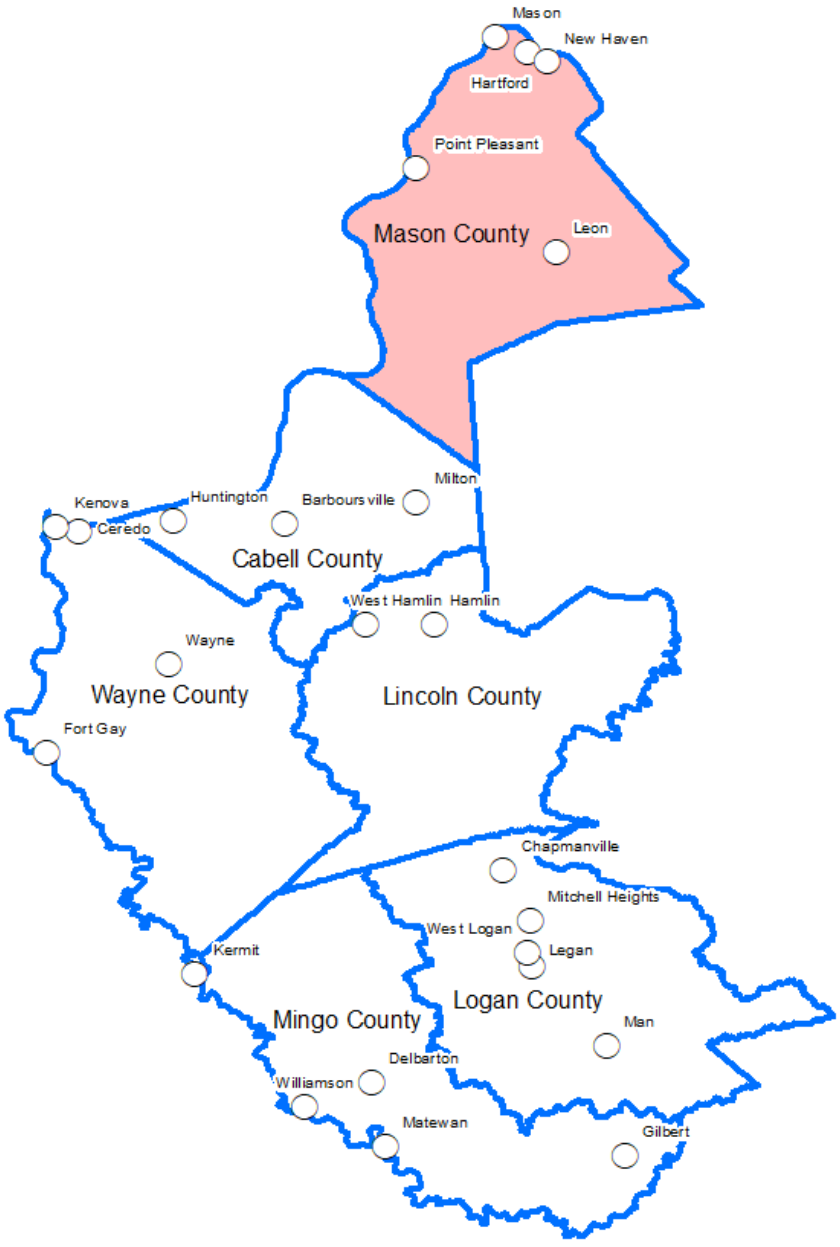
PUBLIC SENTIMENT, DROUGHT					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Drought	19 (47.50%)	14 (35.00%)	6 (15.00%)	1 (2.50%)	40
In the past ten years, do you remember this hazard occurring in your community?				4 (10.00%)	40
Have you noticed an increase in the occurrences or intensity of this hazard?				3 (7.50%)	40
Have you noticed a decrease in the occurrences or intensity of this hazard?				1 (2.50%)	40

The following table assigns point totals based on the methodology identified in Section 2.2: Describe Hazards above.

DROUGHT RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	2	Low (Unlikely to occur in a year)	Six events in 25 years (i.e., 1997-2023) yield an estimate of 0.24 incidents per annum.
Response	4	One month	Though the agricultural response may be extensive and much longer, it is a response that is not as acute as many other emergency responses.
Onset	1	Over 24 hours	Drought conditions occur following an extended period of specific hydrological circumstances.
Magnitude	3	Critical (25-50% of land area affected)	Historically, drought conditions have impacted the entire region simultaneously.
Business	2	One week	Drought is not likely to necessitate widespread business closures for extended periods.
Human	1	Minimum (Few minor illnesses)	Drought is not likely to result in injuries; however, can result in a slight increase in respiratory infections such as bronchitis and pneumonia.
Property	2	10-25% of property affected	Though a significant amount of the land area could be impacted, drought conditions do not affect personal property as severely.
Totals	**15**	**Low**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks are more or less prevalent as compared to the rest of the planning area. The following map identifies those multi-jurisdictional risks with respect to drought. Those labels not underlaid by a shaded drop shadow are not more or less at risk of drought. Those with red drop shadows are more at risk (and represent those counties with more agriculture); those with green are less at

risk. The region is generally at low risk of drought. Mason County appears red because it sees more agricultural activity than the rest of the region. As such, all other jurisdictions are described accurately by the above discussion, with no jurisdiction being notably less at risk than others (which is why there are no green denotations).



2.2.5 Earthquake

An earthquake is a sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of the Earth's tectonic plates.				
Risk HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	Any time	**Risk Ranking:**	Low
	Warning Time:	None	**Type of Hazard:**	Natural
	Probability:	Low (Unlikely to occur in a year)	**Impact:**	Localized (Less than 10% of land area affected)
	Disaster Declarations:	None		

Hazard Overview

Earth consists of four layers: the inner core (innermost layer), outer core, mantle, and crust (outermost layer). Further, the crust consists of many tectonic plates that are slowly moving, sliding past, and bumping into one another. Most earthquakes originate along the edges of these tectonic plates, called fault lines. The rough edges of the tectonic plates become lodged against each other. When a plate moves enough, the edges become dislodged, causing an earthquake. The epicenter of the earthquake is the location directly above the ruptured fault.

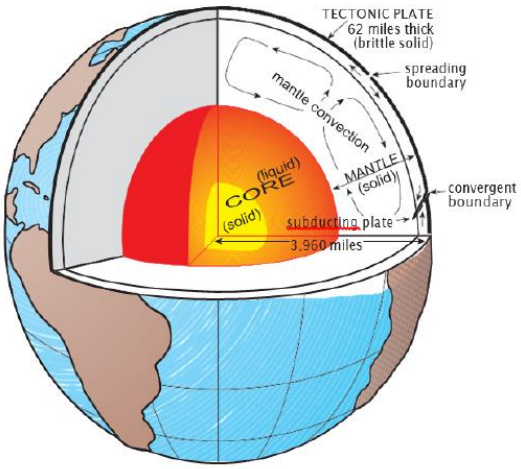


Diagram of Earth's layers

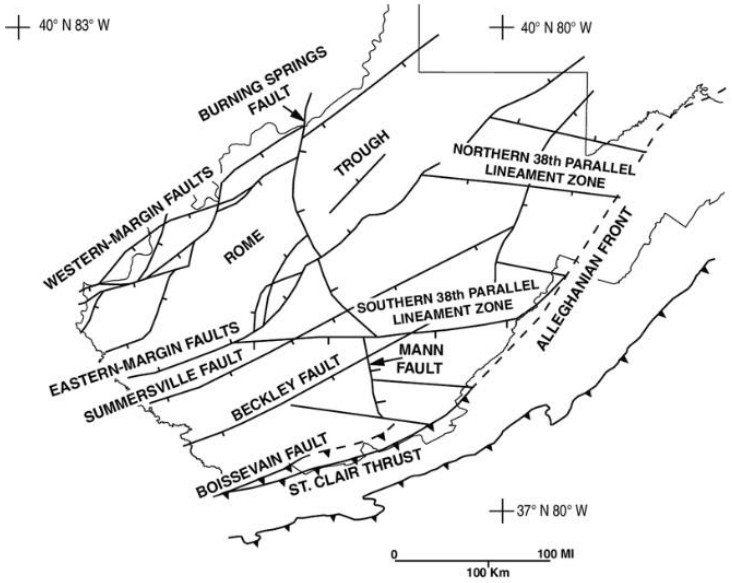
Some earthquakes have foreshocks, which are smaller earthquakes that happen at the same location as the larger earthquake that follows. The largest, main earthquake is called the main shock, which always has aftershocks that follow. Current technology does not allow scientists to determine that an earthquake is a foreshock until the larger earthquake follows.

Regulators and researchers have documented earthquakes induced by human activity in the United States, Japan, and Canada. The source of these human-caused earthquakes has been the injection of fluids into deep wells for waste disposal and secondary recovery of oil and filling of large reservoirs for water supplies. Deep mining and nuclear testing can also cause

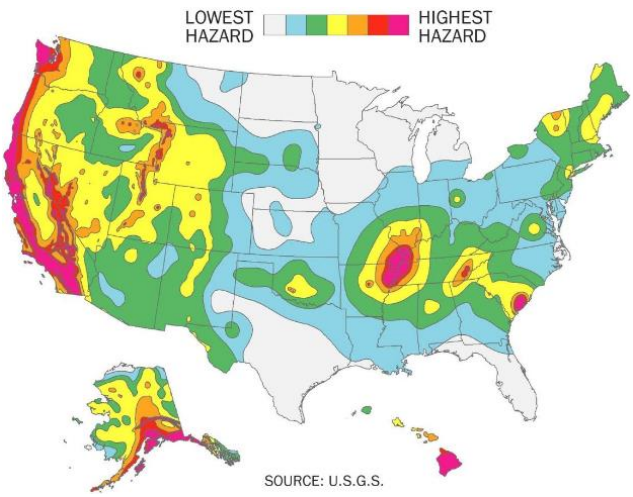
small to moderate quakes. A common misconception is that hydraulic fracturing, or "fracking," is causing *all* of the induced earthquakes. In reality, fracking "is directly causing a small percentage of the felt-induced earthquakes observed in the United States. Most induced earthquakes in the United States are a result of the deep disposal of fluids (wastewater) related to oil and gas production" (Rubinstein and Mahani, 2015).

Location and Extent

Earthquakes are one of nature's most damaging hazards and are more widespread than is often realized. The area of greatest seismic activity in the United States is along the Pacific Coast in the states of California and Alaska; however, as many as 40 states have moderate earthquake risk. Although most people do not think of West Virginia as an earthquake-prone state, at least 110 earthquakes with epicenters in West Virginia have been felt since 1824.

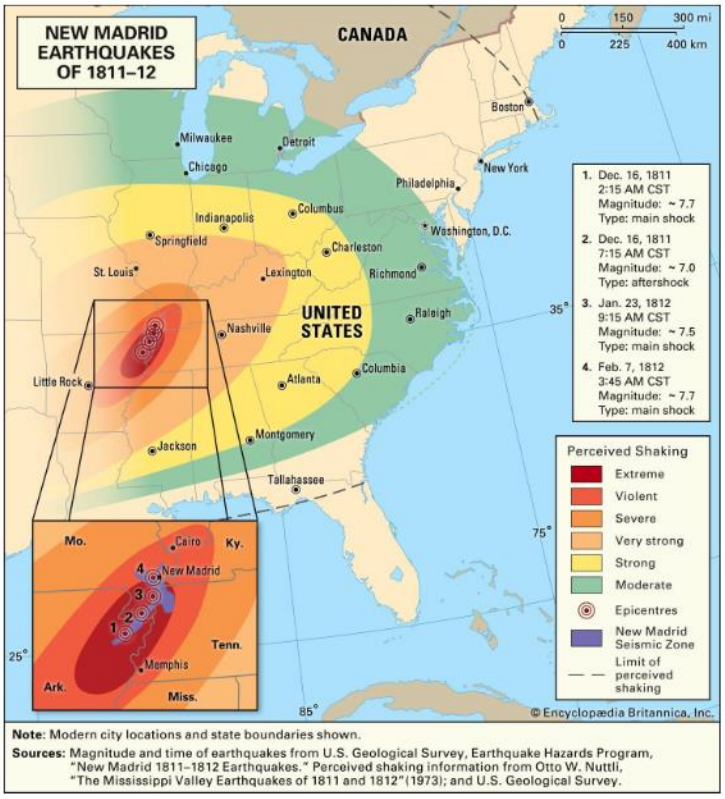


Earthquake epicenters occur on fault lines; however, their effects can be felt miles away. There are approximately eight known fault lines traversing West Virginia, as illustrated in the image to the right. This image portrays several faults and other structures that have been identified by a variety of geologic studies. Known faults located beneath the region include the Rome Trough, the Eastern-Margin Faults, and the Summersville Fault. These faults indicate the locations where earthquakes could occur, with the implication being that the entire region could feel the effects of an earthquake, though those effects would likely be light. The U.S. Geological Survey (USGS) has denoted the Region 2 area as the second- and third-lowest risk areas per earthquakes that it will assign. The line between these areas (appearing as



green and blue in the image) runs horizontally from roughly the point at which West Virginia, Ohio, and Kentucky meet eastward across southern West Virginia. As such, despite a generally low risk throughout the region, the USGS estimates southern Cabell County, Lincoln, Logan, Mingo, and Wayne Counties as having slightly higher risk.

West Virginia is on the periphery of the New Madrid Seismic Zone, an area in Missouri and adjacent states that was the site of the largest earthquake sequence to occur in historical times in the continental United States. Based on data from the New Madrid earthquakes of 1811 and 1812, all six counties in the region could perceive moderate shaking emanating from an event in this zone (Britannica.com, n.d.). The graphic at right shows the areas in the eastern U.S. that could feel the impacts of a large New Madrid zone event.



Impacts and Vulnerability

Although there are numerous intensity scales to evaluate the effect of earthquakes, the Modified Mercalli Intensity Scale (MMI) is the scale currently (officially) used in the United States. Seismologists Harry Wood and Frank Neumann developed the MMI scale in 1931. It assigns a value (as a Roman numeral) to a site after an earthquake based on observed effects, ranging from acceptable to catastrophic. The MMI scale appears below (with a comparison to the previously used Richter magnitude scale).

MODIFIED MERCALLI AND MAGNITUDE SCALE COMPARISON		
Modified Mercalli Scale		*Magnitude Scale*
I	Felt by few people under especially favorable conditions.	1.5
II	Felt by few persons at rest, especially on upper floors of buildings.	2.0
		2.5
III	Felt quite noticeably indoors, especially on the upper floors of buildings. Many do not recognize it as an earthquake. Standing vehicles may rock slightly. The vibration feels like a passing truck.	3.0
IV	During the day, felt indoors by many and outdoors by few. At night, some awakened. Dishes, windows, and doors disturbed; walls make a cracking sound. A sensation of a heavy truck striking a building; standing vehicles rock noticeably.	3.5
V	Felt by nearly everyone; many awakened. Some dishes and windows are broken. Unstable objects overturned.	4.0
		4.5
VI	Felt by all; many frightened. Some heavy furniture moved, a few instances of fallen plaster or damaged chimneys. Damage slight.	5.0
VII	Damage is negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; and considerable in poorly built or badly designed structures; some chimneys are broken. Noticed by vehicle drivers.	5.5
VIII	Damage is slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse; damage is great in poorly built structures; chimneys, factory stacks, columns, monuments, and walls fall. Heavy furniture overturned.	6.0
IX	Damage is considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage is great in substantial buildings, with partial collapse. Buildings shifted off foundations. Underground pipes break.	6.5
		7.0
X	Some well-built wooden structures destroyed; most masonry and frame structures with foundations destroyed; train rails bent.	7.5
XI	Few, if any, masonry structures remain standing. Bridges destroyed. Underground pipelines taken out of service. Train rails bent significantly.	8.0
XII	Damage total. Waves are seen on ground surfaces. Lines of sight and level are distorted. Objects are thrown into the air.	8.5

The severity of the effects of earthquakes depends on the amount of energy released from the fault or epicenter. The effects of an earthquake can be felt far beyond the site of its occurrence. They usually occur without warning and after just a few seconds can cause massive damage and extensive causalities. Common effects of earthquakes are ground motion and shaking, surface ruptures, and ground failure. Ground shaking refers to the vibration of the ground during an earthquake. Generally, the severity of ground shaking increases as magnitude increases, and decreases as distance from the causative fault increases.

The most significant human risk during an earthquake is structure movement and collapse. Contents within structures may fall or fail and injure or kill occupants inside of the structures. Older structures may be more susceptible to cracks and damage. Earthquakes further cause a variety of cascading effects, including fires due to broken electrical lines and gas mains, ancillary structural damage, and utility and communication system outages. They can trigger landslides, and, less commonly, tsunamis.

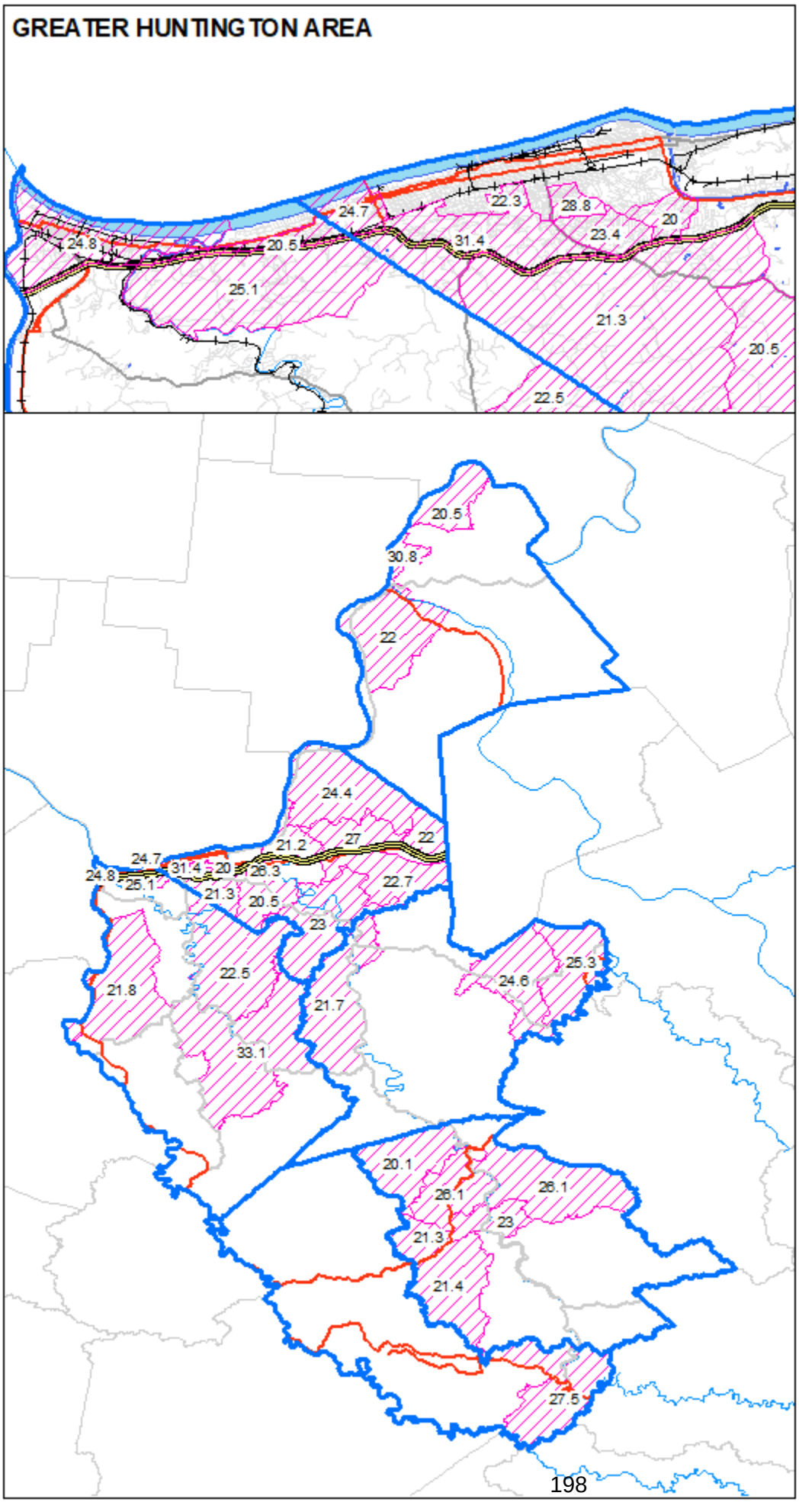
Earthquake fatalities fall into three categories: instantaneous, rapid, and delayed. Instantaneous fatalities are usually due to head and chest injuries or internal and external bleeding. Rapid deaths occur within hours and include hypovolemic shock, asphyxia, chest compression, or environmental exposure such as hypothermia. Delayed fatalities occur within a few days due to wound infections, dehydration, sepsis, environmental exposure, or crush syndrome (Naghii, 2005).

Patients may also require acute care for non-surgical problems such as acute myocardial infarction, exacerbation of chronic diseases such as diabetes or hypertension, anxiety and other mental health problems, respiratory disease from exposure to dust and asbestos fibers from the rubble, and near-drowning resulting from significant, rapid flooding as a result of earthquakes. Dust from building damage or collapse causes eye injuries and respiratory tract irritation (Naghii, 2005). Damaged infrastructure such as drinking water and sewer pipes can lead to the spread of disease and death. Delivery of electricity and natural gas can be disrupted causing individuals to succumb to environmental exposure (Naghii, 2005).

Social Vulnerability Considerations

The elderly, children, and the chronically ill and disabled seem to be at an elevated risk for injury or death following an earthquake. Mobility impairment, inability to compensate for trauma, and underlying disease contribute to the vulnerability of these groups (Naghii, 2005). The following maps show the Census tracts of the region with the highest percentages of (a)

elderly populations, (b) children, and (c) non-institutionalized populations with functional/access needs.



REGION 2 PDC HAZARD MITIGATION PLAN

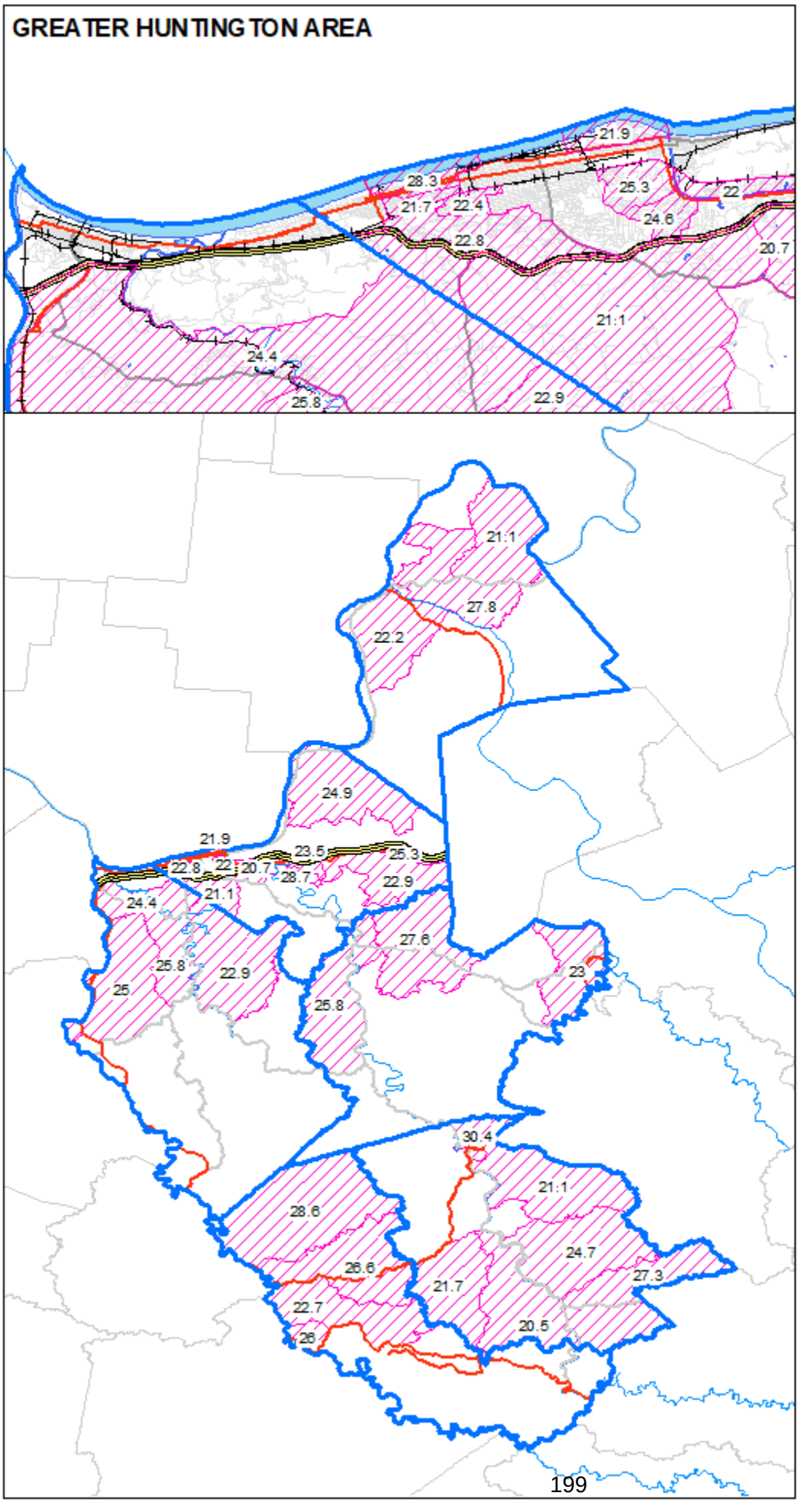
SVI Considerations: Tracts by Population, 65 & Over

Data Source(s):
CDC SVI Index (2020)

20% of More, 65 & Over

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



REGION 2 PDC HAZARD MITIGATION PLAN

SVI Considerations: Tracts by Population, 17 & Under

Data Source(s):
CDC SVI Index (2020)

20% or More, 17 & Under

0 3 6 12 18 24
Miles

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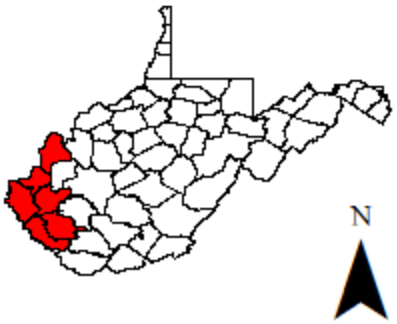
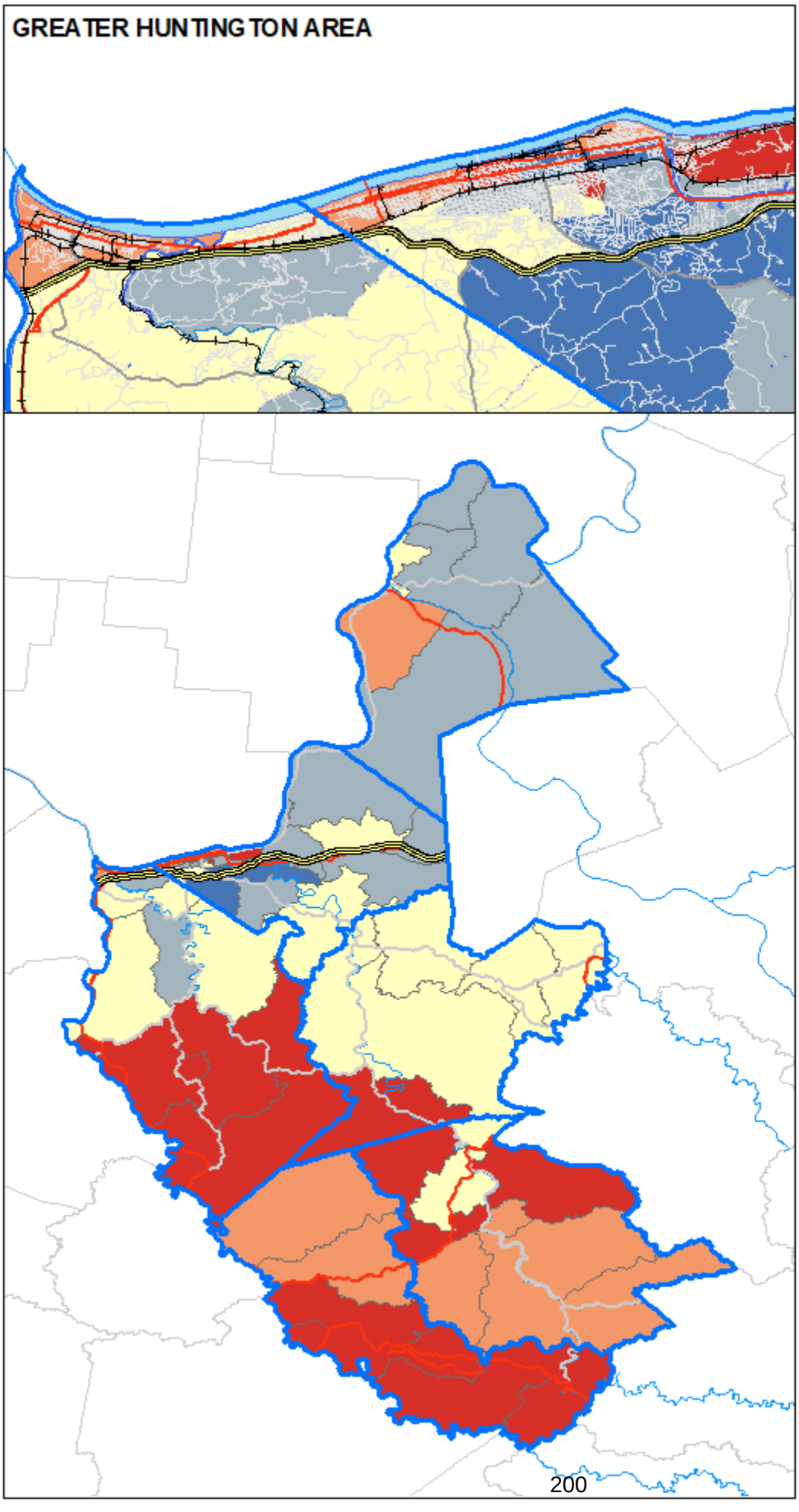




REGION 2 PDC HAZARD MITIGATION PLAN

SVI Considerations: Tracts by Functional/ Access Needs

Data Source(s):
CDC SVI Index (2020)

% Pop., w/ Needs

- 8.9 - 13.9%
- 14.0 - 19.2%
- 19.3 - 24.2%
- 24.3 - 30.5%
- 30.6 - 47.9%

0 3 6 12 18 24 Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

N

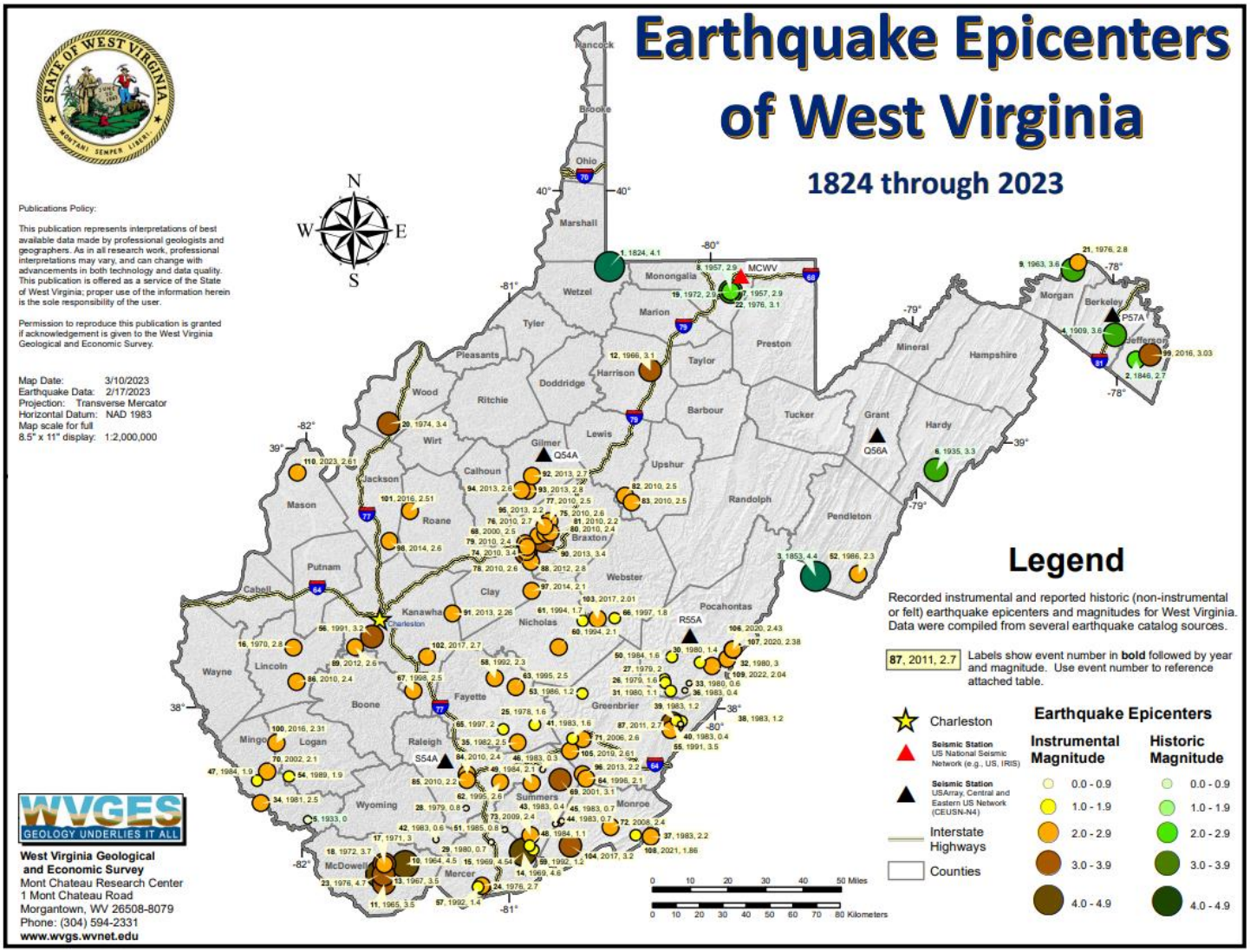
Low-income populations are also at an elevated risk. They often live in the most vulnerable housing and lack the resources to undertake mitigation or evacuation measures. Low-income individuals tend to reside in older homes and low- or moderate-income apartments that are not subject to the most advanced building codes. Those who live in rental units depend on landlords for structural loss prevention (Insurance Institute for Business & Home Safety, n.d.).

Previous Occurrences

The West Virginia Geological and Economic Survey maintains the "Earthquake Epicenters of West Virginia" database, which lists all earthquakes detected in West Virginia. According to the database, there have been nine earthquakes epicentered in the region between 1824 and 2023, as illustrated in the table and map below. There have been no reported earthquakes epi-centered in Cabell or Wayne Counties since 1824 (WVGES, 2024b).

EARTHQUAKE EPICENTERS IN THE REGION (1824-2023)

Date	*Location*	*Magnitude*	*MMI Rating*
June 15, 1933	Mingo County	0.0	Null (not felt)
August 11, 1970	Lincoln County	2.8	IV
November 30, 1981	Mingo County	2.5	Null (not felt)
February 2, 1984	Mingo County	1.9	Null (not felt)
March 19, 1989	Logan County	1.9	Null (not felt)
March 27, 2002	Mingo County	2.1	Null (not felt)
September 13, 2010	Lincoln County	2.4	Null (not felt)
August 6, 2016	Mingo County	2.31	I
February 17, 2023	Mason County	2.61	III



Lincoln County Earthquake, August 1970

The largest recorded earthquake in the region occurred in Lincoln County on August 11, 1970, at approximately 6:15 a.m. The epicenter of the Magnitude 2.8 quake was south of Sweetland off of County Route (CR) 22 (just north of the intersection of Summers Trail with CR 22). The depth of the earthquake was approximately 10 kilometers. There were no reported injuries or damage.

Mason County Earthquake, February 2023

The most recent recorded earthquake (at the time of the 2024 submission) was a February 27, 2023, event in Mason County. The epicenter was seven kilometers southeast of

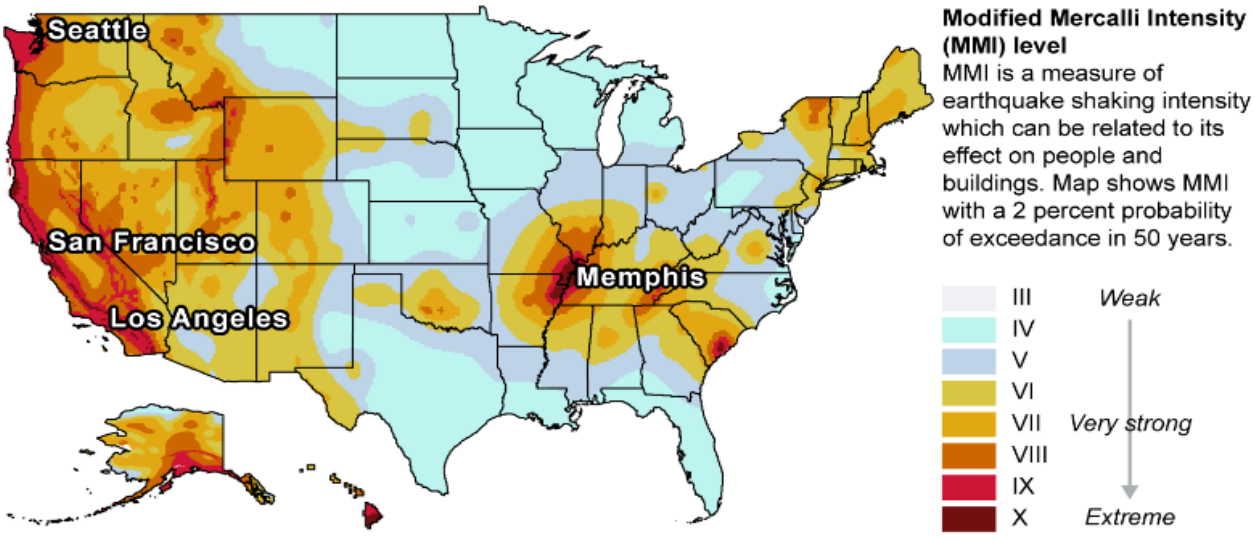
Cheshire, Ohio, roughly to the east of the McClintic Wildlife Management area in Mason County. This event was a Magnitude 2.61, and there were no injuries or significant damage reported.

Loss and Damages

Though experience is not always an accurate predictor of future impacts, history suggests that earthquake losses and damages will be minimal throughout the region. Further, when examining the likely MMI levels of earthquakes that could occur in the region (i.e., averaging in the MMI III and IV ranges with events topping out at the MMI V level), significant damages would not be expected.

Future Occurrences[1]

According to the USGS, the region has a very low earthquake risk. As such, future occurrences remain a low priority of concern. In a study examining risks to federal buildings, the Government Accountability Office (GAO) included a map illustrating MMI level earthquakes with a 2% probability of exceedance in 50 years. For reference "A 2% in 50-year probability equates to an earthquake recurring and exceeding a given MMI level about every 2,475 years" (GAO, 2016). As can be seen in the map below the entirety of the region is within a maximum MMI V level. The USGS indicates that MMI V earthquakes would be felt with potential dishes and/or window damage and an overturning of unstable objects, yet damage would be minimal.



Source: GAO presentation of U.S. Geological Survey mapping; MapInfo (map). | GAO-16-680

[1] Though earthquake is a natural hazard, it is not as readily connected to climate fluctuations as the other natural hazards considered by this plan. Notably, though, the USGS has noted a correlation between weather and large changes in atmospheric pressure caused by major storms and earthquakes (Buis, 2019).

Risk Assessment

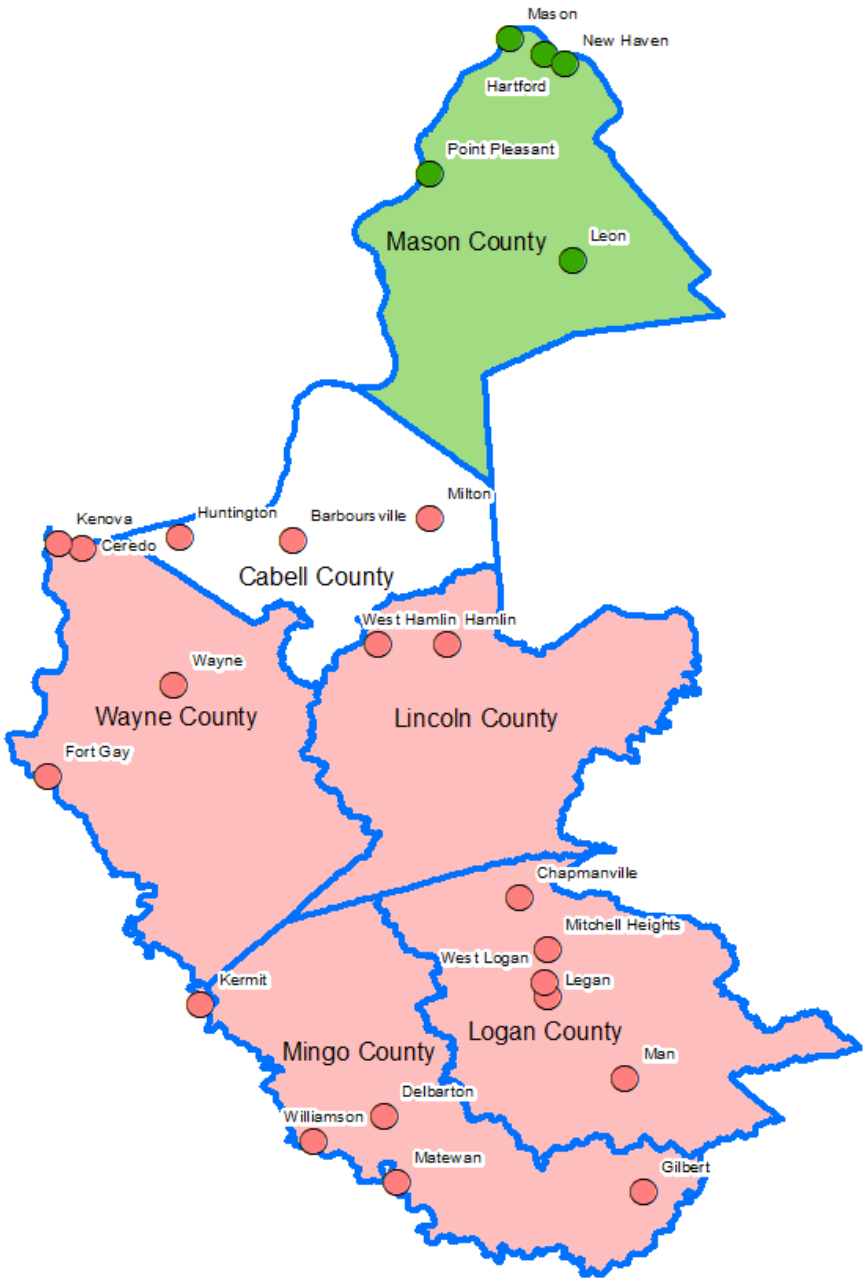
This section summarizes the vulnerability of the region to earthquakes. The planning and development council conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding earthquakes.

PUBLIC SENTIMENT, EARTHQUAKES					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Earthquakes	29 (72.5%)	10 (25.0%)	0 (0.0)	1 (2.5%)	40
In the past ten years, do you remember this hazard occurring in your community?				2 (5.0%)	40
Have you noticed an increase in the occurrences or intensity of this hazard?				0 (0.0)	40
Have you noticed a decrease in the occurrences or intensity of this hazard?				3 (7.5%)	40

The following table assigns point totals based on the methodology identified in Section 2.2: Describe Hazards above.

EARTHQUAKES RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	2	Low (Unlikely to occur in a year)	There have been nine earthquakes reported throughout the region in the past 199 years (i.e., 1824-2023), which yields an estimate of 0.05 incidents per annum.
Response	2	One day	Data indicate that earthquakes have caused little to no damage in the region; thus, the response, if there was one, would likely be one day or less.
Onset	4	Less than 6 hours	Earthquakes occur with little to no advanced warning.
Magnitude	1	Localized (less than 10% of land area affected)	The most powerful earthquake in the region was a 2.8 magnitude with an MMI rating of IV. This event did not cause any recorded damage.
Business	1	Less than 24 hours	No previous earthquakes have disrupted the regional economy.
Human	1	Minimum (minor injuries)	Past earthquakes have been low magnitude and have not resulted in any reported injuries or fatalities.
Property	1	Less than 10% of property affected	Earthquakes in the region have been low magnitude and have resulted in little to no reported property damage.
Totals	**12**	**Low**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks are more or less prevalent as compared to the rest of the planning area. The following map identifies those multi-jurisdictional risks with respect to earthquakes. Those labels not underlaid by a shaded drop shadow are not more or less at risk of earthquakes. Those with red drop shadows are more at risk; those with green are less at risk. Cabell County appears with neutral white because it contains areas of both higher and lower risk (per the discussion above).


Mason
New Haven
Hartford
Point Pleasant
Mason County
Leon
Milton
Kenova
Huntington
Barboursville
Ceredo
Cabell County
West Hamlin
Hamlin
Wayne
Wayne County
Lincoln County
Fort Gay
Chapmanville
Mitchell Heights
West Logan
Logan
Kermit
Logan County
Mingo County
Man
Delbarton
Williamson
Matewan
Gilbert

2.2.6 Epidemic/Pandemic

An epidemic is an increase in the number of cases of a disease above the usual level in a population or area. A pandemic is an epidemic that has spread over several countries or continents, typically affecting a large number of people.				
Risk HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	At any time	**Risk Ranking:**	Medium
	Warning Time:	Over 24 hours	**Type of Hazard:**	Natural
	Probability:	Unlikely to occur in a year	**Impact:**	Catastrophic (This is a health related hazard and does not affect land or property)
	Disaster Declarations:	EM-3450-WV (2020) DR-4517-WV (2020)		

Hazard Overview

According to the Centers for Disease Control and Prevention (CDC), there are three widely-accepted levels of disease presence. This profile focuses on epidemics and pandemics.

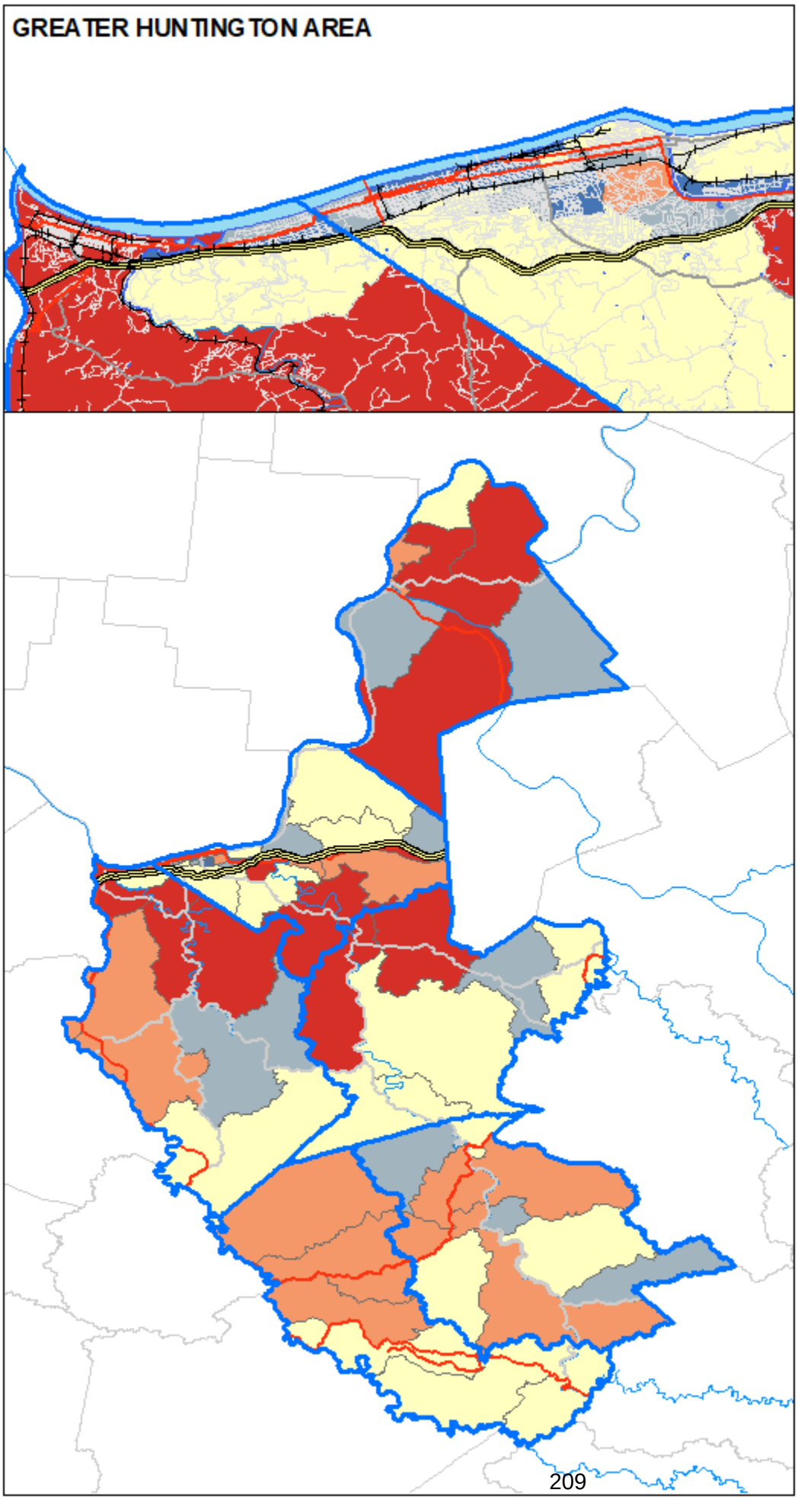
- Endemic: The baseline level of a particular disease in population of area. This level is not necessarily the desired level, but the observed level.
- Epidemic: An increase in the number of cases of a disease above the usual level in that population or area. Epidemics may result from an increase of the disease's virulence, presence of a disease in a new outbreak, enhanced disease transmission, increased susceptibility among exposed persons, or increased exposure to the disease-causing agent. Note that while the term "epidemic" originally included infectious diseases, some non-infectious health conditions (such as obesity and the opioid misuse) have reached epidemic status in the United States.
- Pandemic: An epidemic that has spread over several countries or continents, typically affecting a large number of people.

Location and Extent

An epidemic can affect all parts of Region 2, but it is more likely to impacted densely-populated areas and congregate populations, such as multi-unit residential complexes, nursing homes, detention facilities, etc. The first graphic below shows the region's population by Census block group. Some of the densest areas of population are in and around Huntington; however,

some larger, more rural block groups also report higher populations (in large part due to geographic size).

The second graphic below identifies nursing homes and detention facilities in the region. These facilities house populations in close quarters, and outbreaks are common (during both epidemics and pandemics). The map also identifies the schools in the region. During the Covid-19 pandemic, virus spread in schools was a major concern. Similar to congregate housing, schools see concentrated populations of vulnerable individuals on a frequent basis. Cabell County is also home to Marshall University with 10 on-campus living facilities as well as 10 fraternities and six sororities that provide housing.



REGION 2 PDC HAZARD MITIGATION PLAN

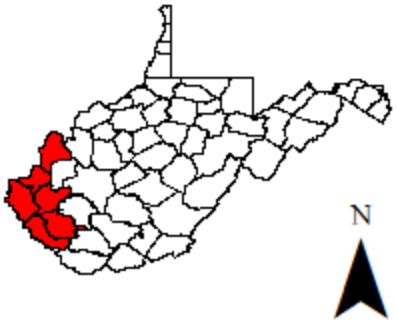
Region 2 PDC Population Distribution

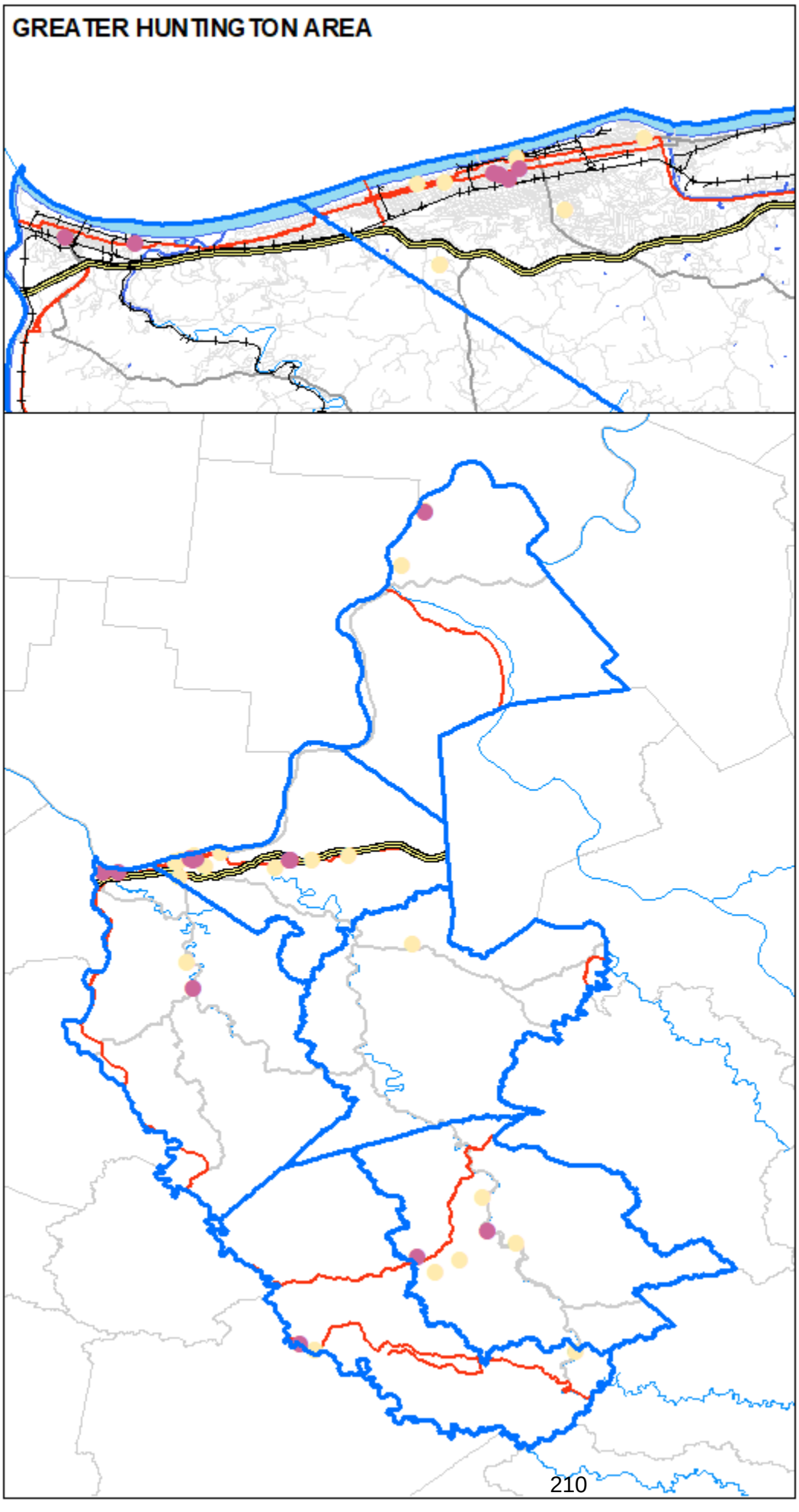
Data Source(s):
CDC SVI Index (2020)

882 - 1728 persons
1729 - 2595 persons
2596 - 3400 persons
3401 - 4280 persons
4281 - 6644 persons

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.





REGION 2 PDC HAZARD MITIGATION PLAN

Nursing Homes & Detention Facilities

Data Source(s):
WVGISTC

Correctional Institutions

Nursing Homes

0 3 6 12 18 24
Miles

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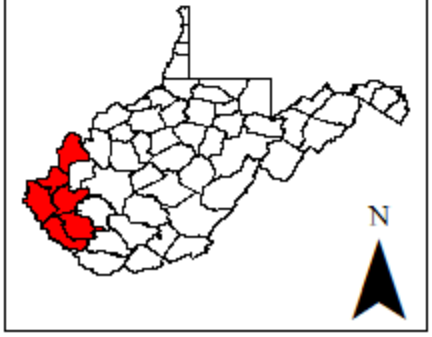


Impacts and Vulnerability

Major concerns during any outbreak include the ability of local health care providers to provide medical attention to everyone who becomes ill and the ability to identify the source or what is causing the population to become ill. The cascading effects of epidemics and pandemics can include the following.

- Illness or death
- Civil disturbance
- Distrust of government
- Poor water quality
- Temporary loss of income

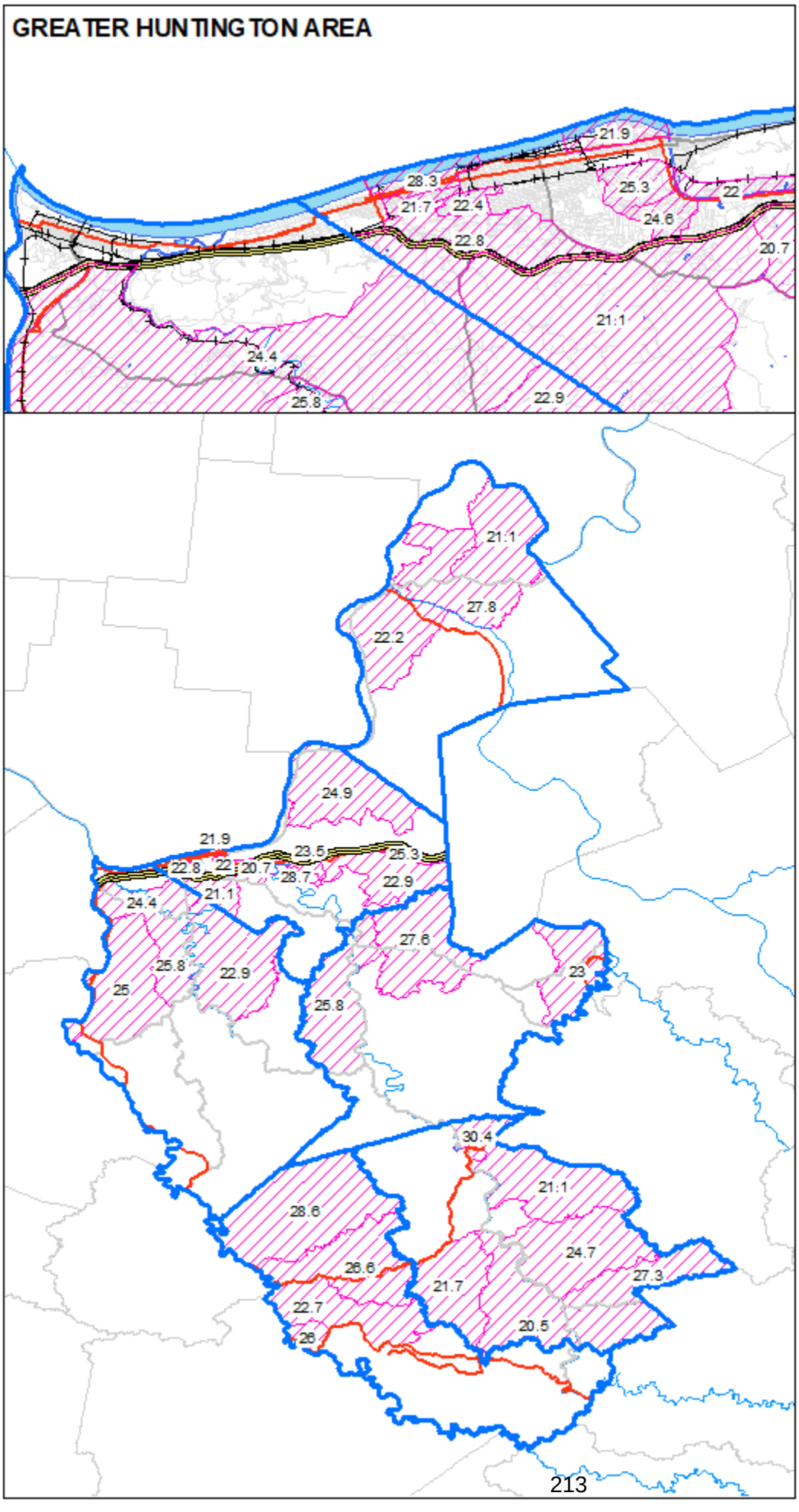
There are also economic impacts of a pandemic. The global COVID-19 pandemic has had sweeping impacts on society; some of the direst are economic in nature. In West Virginia, stay-at-home orders enacted by Governor Justice in March 2020 resulted in many West Virginians losing work, in part or altogether. The shutdowns also shifted consumption patterns, with more spending online and at grocery stores taking the place of entertainment, travel, and accommodations. To respond to the economic hardships felt by the pandemic, beginning in late March, the United States federal government issued multiple rounds of financial assistance in the form of business loans, stimulus checks, grants, and contracts.

Yet, broad indications of impacts from the COVID-19 pandemic do not tell the whole story. West Virginia's highest rate of new cases per day occurred in December of 2021 and January of 2022, when the seven-day average of new cases was 4,668. The highest seven-day average for COVID-related deaths occurred in October 2021 with 21. In West Virginia, the economic impacts were substantial. On April 18, 2020, the state reported 146,566 unemployment claims, which was a substantial increase over the 14,154 claims noted for March 14th of the same year. Unemployment claims fell back to the neighborhood of 20,000 by the end of 2020, and as of August 12, 2023, reported claims had fallen to 6,664 (USA Facts, 2024).

Social Vulnerability Considerations

Disease can affect any age group; however, it can more easily affect the youngest and oldest populations. The maps on the following pages use U.S. Census data to identify concentrations of younger (i.e., under 18) and older (i.e., 65 and over) populations. Another consideration is those do not seek medical treatment due to lack of health insurance. The US Census (2022) provides information on the population of uninsured non-institutionalized

population. Of the estimated 229,713 non-institutionalized residents, 17,804 (7.75%) do not have health insurance. Cabell County has the highest rate of uninsured at 9.1% while Lincoln County has the lowest at 4.5%. The third map below shows the percentage of the population without health insurance by county.



REGION 2 PDC HAZARD MITIGATION PLAN

SVI Considerations: Tracts by Population, 17 & Under

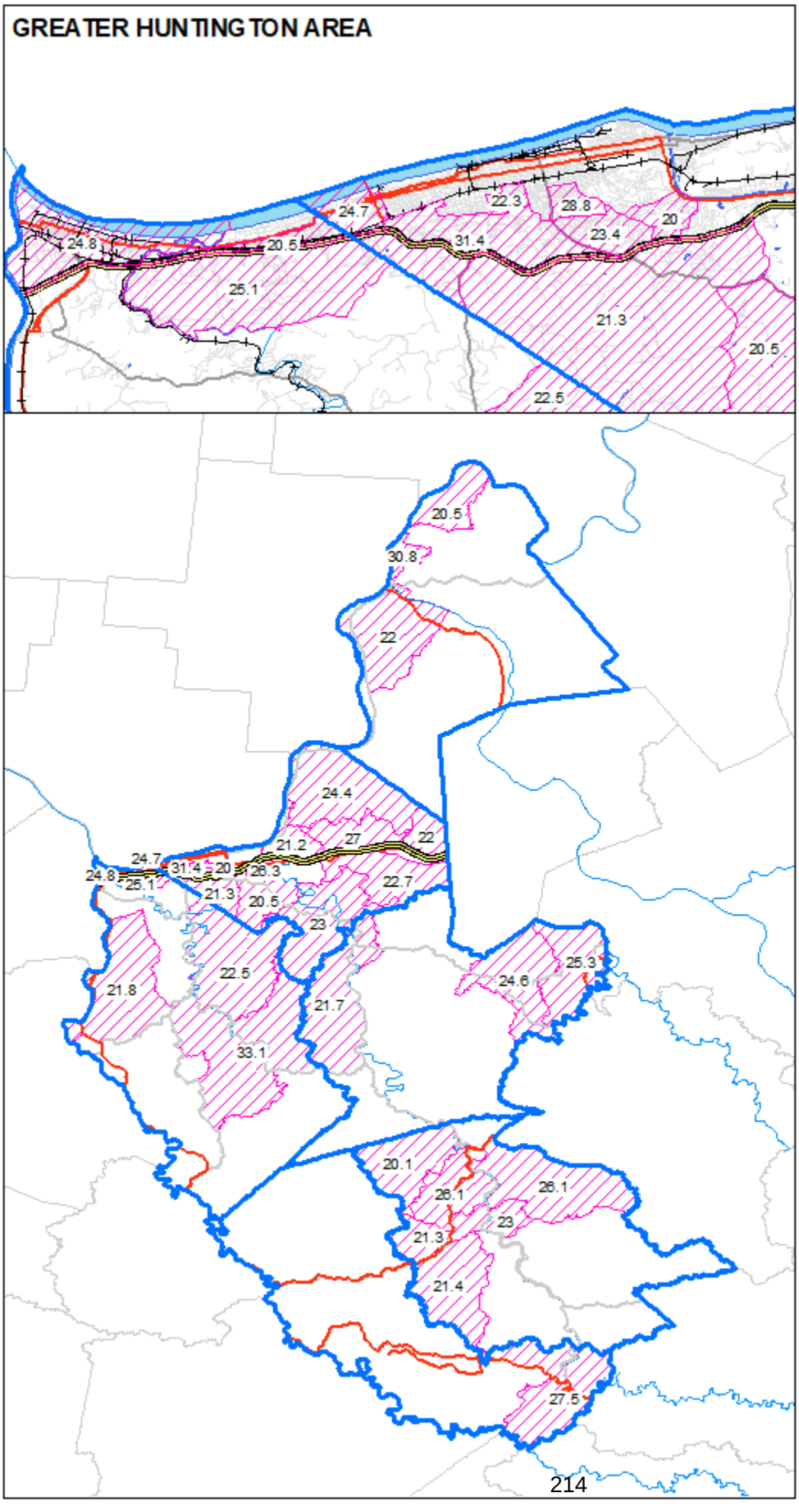
Data Source(s):
CDC SVI Index (2020)

20% or More, 17 & Under

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

N



REGION 2 PDC HAZARD MITIGATION PLAN

SVI Considerations: Tracts by Population, 65 & Over

Data Source(s):
CDC SVI Index (2020)

20% of More, 65 & Over

0 3 6 12 18 24
Miles

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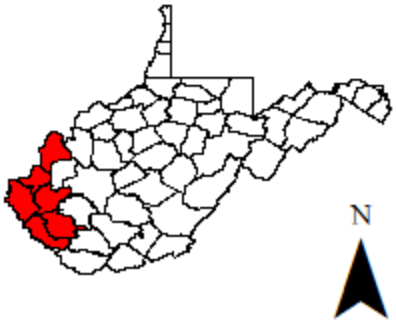
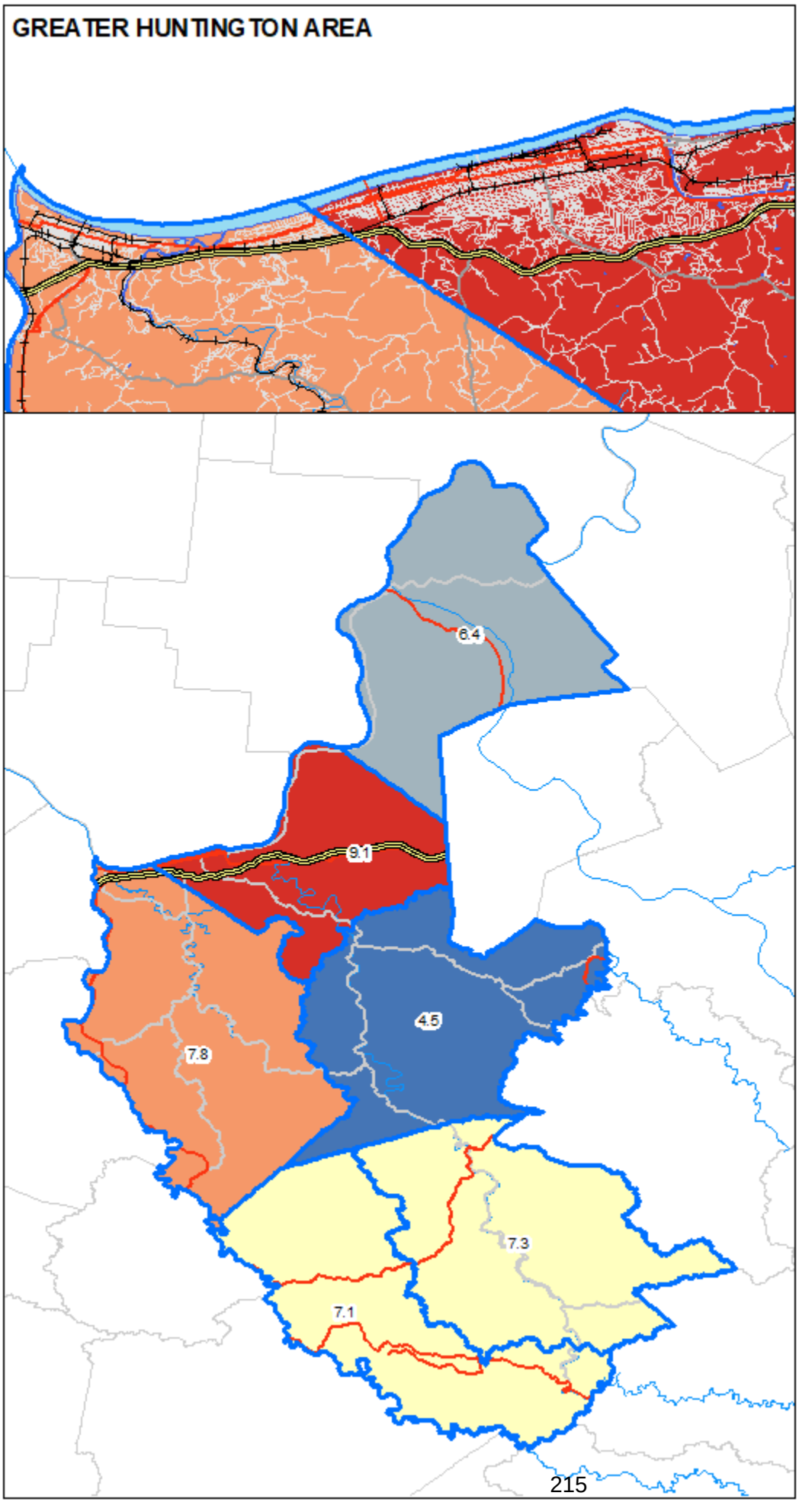




REGION 2 PDC HAZARD MITIGATION PLAN

SVI Considerations: Health Insurance Coverage

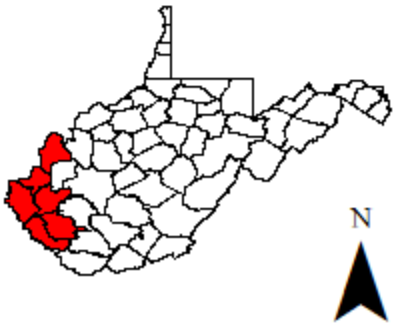
Data Source(s):
US Census (ACS, 2021)

Percent of Population Un-Insured

- 4.5% or less of persons
- 4.51% - 6.4% of persons
- 6.41% - 7.3% of persons
- 7.31% - 7.8% of persons
- More than 7.81% of persons

0 3 6 12 18 24 Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



Previous Occurrences

Five pandemic influenza events have occurred in the last century. The 1918 Spanish Influenza outbreak remains the worst-case pandemic on record, with the number of deaths dramatically decreasing with each event, with the exception of the current and on-going Corona Virus, 2019 (COVID-19) pandemic.

PREVIOUS WORLDWIDE PANDEMIC EVENTS		
Date	*Pandemic Name/Subtype*	*Worldwide Deaths (Est.)*
1918-1920	Spanish Flu / H1N1	50 million Est. 675,000 in the U.S.
1957-1958	Asian Flu / H2N2	1.1 million Est. 116,000 in the U.S.
1968-1969	Hong Kong Flu / H3N2	1 million Est. 100,000 in the U.S.
2009-2010	Swine Flu / A/H1N1	152,000 – 575,000 Est. 12,000 in the U.S.
2020-2023	Corona Virus 2019 (COVID-19) / (SARS)	7 million[1],[2] Est. 1.2 million in the U.S.[1, 2]

H1N1 Pandemic of 2009

A recent pandemic influenza event was the H1N1 (swine flu) incident in 2009. The CDC monitored the spread of the disease on a near-daily basis. The H1N1 flu was relatively mild for most people, but the virus spread rapidly; more than 700 schools in the United States closed, and many hospitals quarantined infected individuals. H1N1 was almost entirely responsible for total anomalies resolved as health events for 2009.

In West Virginia, a total of 99 outbreaks were identified and reported to local health departments. Forty of the 55 counties in West Virginia (73%) reported outbreaks, including multi-county outbreaks. The number of outbreaks in Region 2 counties were: Cabell (3), Lincoln (1), Logan (5), Mason (3), Mingo (0), and Wayne (2). Influenza A (H1N1) accounted for 23 (43.4%) of all respiratory disease outbreaks in 2009 (WVBPH, 2009). Applying this percentage to the total outbreaks for each county yields the following estimates of H1N1 outbreaks for Region 2 counties: Cabell (1), Lincoln (less than 1), Logan (2), Mason (1), Mingo (0), and Wayne (less than 1).

[1] Figures estimated at the time of this update
[2] Data from the World Health Organization; all other data from the CDC

Coronavirus Disease of 2019 (COVID-19 / SARS-CoV-2)

The most recent pandemic to impact the United States was the COVID-19 pandemic. The pandemic was arguably ongoing at the time of the 2024 update to this plan. The virus causing the pandemic is believed to have started spreading as early as 2018, originating in Wuhan, China. To date, there have been nearly 775 million confirmed cases of the virus, resulting in over seven million deaths worldwide (WHO, 2024). The virus has impacted every continent and country in the world.

As of March 2023, there were approximately 641,000 confirmed cases and just over 8,000 deaths in West Virginia. The table below provides statistics for Region 2 counties, current as of July 23, 2023 (USA Facts, 2024).

COVID-19 SURVEILLANCE INFORMATION, REGION 2 AREA				
County	*Population (2022 estimate)*	*Confirmed Cases*	*Deaths*	*(Presumed) Recovered*[3]
Cabell	92,730	33,871	442	33,429
Lincoln	19,901	7,267	96	7,171
Logan	31,316	12,893	204	12,689
Mason	25,000	8,899	111	8,788
Mingo	22,573	9,976	135	9,841
Wayne	37,998	11,678	148	11,530
Region 2 Totals	**229,518**	**84,584**	**1,136**	**83,448**

Loss and Damages

Losses based on historical epidemics are difficult to estimate. Epidemics rarely affect structures, though because they affect people, at times, the operations of critical facilities, businesses, and other community assets may be impacted. According to a study, seasonal influenza results in a substantial economic impact, estimated, in part, at $16.3 billion in lost earnings (Molinari et al., 2007). By population, Region 2 represents 0.07% of the United States (calculations based on Census data). Since seasonal influenza primarily impacts the human population, using the region's composition of the U.S. as a multiplier (i.e., 0.0007) and applying it to the potential economic impact, lost earnings in the region could reach $11,410,000 each year. Though that number appears high, it equates to approximately $49.71 per year for each person listed by the U.S. Census Bureau.

According to a study of inpatient costs for COVID-19 patients, from August of 2020 through July 15, 2023, there were approximately 6.2 million hospital admissions per the CDC.

[3] Planners derived the "(Presumed) Recovered" total by subtracting the deaths from the cases.

Using the cost to provide care (direct medical resources and hospitals delivery of services) of $11,275, the cost to treat patients with COVID-19 was an estimated $70 billion dollars. This number does not include outpatient treatment, testing, immunization, or patients released directly from an emergency department visit (Kapinos, 2024). The United States Office of Personnel Management (OPM) reports that "from February to August 2020, the six federal health care programs spent at least $695.5 million on COVID-19 testing for their beneficiaries" (2021).

Future Occurrences[4]

Seasonal influenza activity peaks every winter, generally from December to February (CDC, 2022b). These spikes may reach outbreak status, particularly in congregate settings such as nursing homes, detention facilities, and schools. Other bacterial and viral sicknesses, such as the common cold, RSV, hand-foot-mouth disease, etc., may also yield localized (i.e., site-specific) outbreaks. In the United States, the CDC surveils various conditions in concert with state and local public health entities. At the global level, it coordinates with the World Health Organization (WHO) regarding outbreaks and epidemics that have the potential to evolve into a pandemic.

It is likely that new variants will continue to influence the trajectory of COVID-19. It is almost impossible; however, to predict the characteristics of a new variant prior to its arrival, making forecasting a complex and challenging task.

"There is a growing concern over illegal immigration bringing infectious diseases into the United States. Approximately 500,000 legal immigrants and 80,000 refugees come to the United States each year, and an additional 700,000 illegal immigrants enter annually. Legal immigrants and refugees are required to have a medical examination (i.e., skin test, chest x-ray examinations, blood tests, etc.) for migration to the US. Individuals who fail the exam due to certain health-related conditions are not admitted to the US. Such conditions include drug addiction or communicable diseases of public health significance such as tuberculosis (TB), syphilis, gonorrhea, leprosy, and a changing list of current threats such as polio, cholera, diphtheria, smallpox, or severe acute respiratory syndromes. Illegal immigrants crossing into the United States could bring any of these threats. (Glick, 2015)"

[4] Future climate considerations are not included (as a subsection).

Risk Assessment

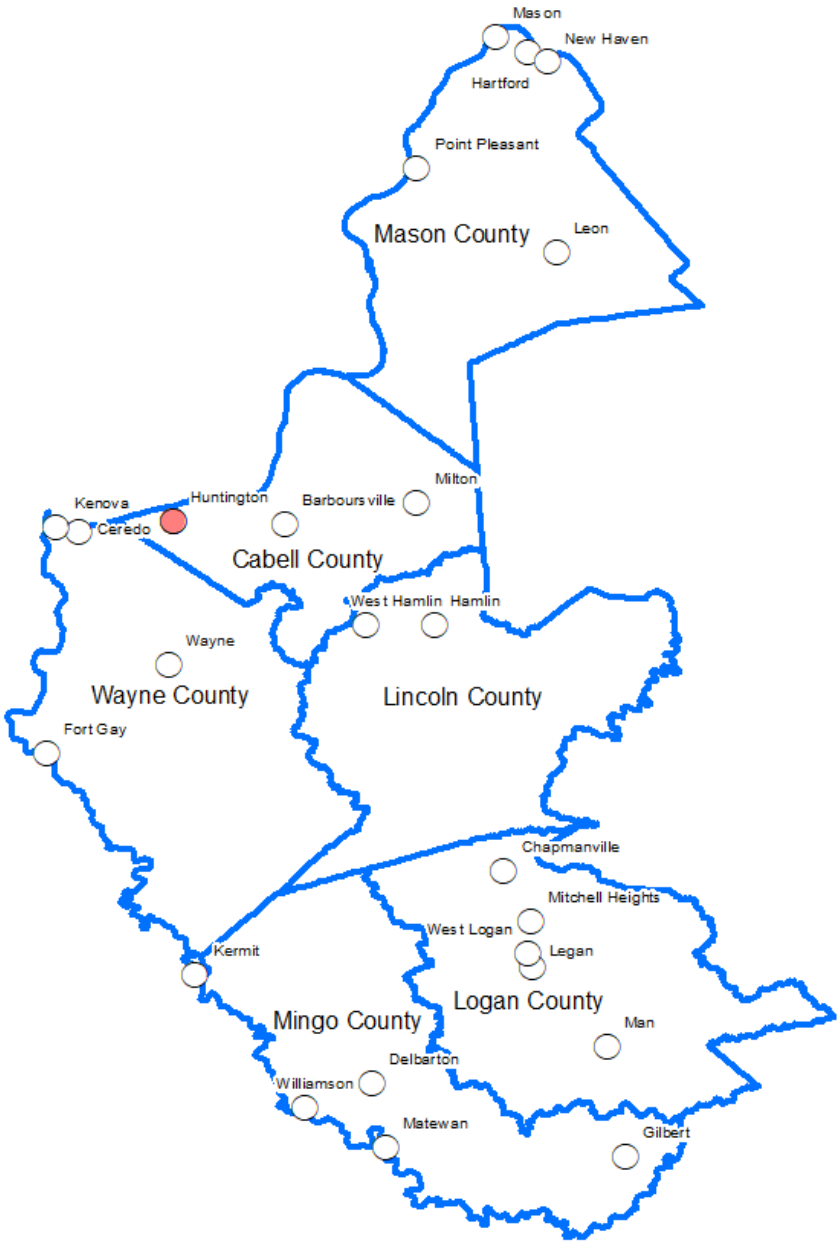
This section summarizes the vulnerability of the region to epidemic/pandemic. The planning and development council conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding epidemic/pandemic.

PUBLIC SENTIMENT, EPIDEMIC/PANDEMIC					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Epidemic/Pandemic	6 (15.00%)	12 (30.00%)	16 (40.00%)	6 (15.00%)	40
In the past ten years, do you remember this hazard occurring in your community?				34	40
Have you noticed an increase in the occurrences or intensity of this hazard?				18	40
Have you noticed a decrease in the occurrences or intensity of this hazard?				8	40

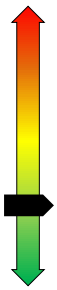
The following table assigns point totals based on the methodology identified in Section 2.2: Describe Hazards above.

EPIDEMIC/PANDEMIC RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	2	Low (Unlikely to occur in a year)	There have been five pandemics (i.e., the worst-case when compared to epidemics) in 106 years that impacted Region 2, yielding an estimated 0.047 events per year.
Response	5	More than one month	The response to the Covid-19 pandemic exceeded two years in length. The response to epidemics will be much smaller; planners opted to estimate based on the worst-case.
Onset	1	Over 24 hours	Disease surveillance efforts typically will suggest an escalating problem prior to a formal pandemic declaration. Epidemics occur somewhat more quickly, but are detectable in a similar manner.
Magnitude	4	Catastrophic (more than 50% of land area affected)	The term "catastrophic" is a bit dramatic in this instance, yet the entire region is susceptible to a pandemic.
Business	1	Less than 24 hours	Even though some businesses shut down during the Covid-19 pandemic, many businesses continued operations virtually; restaurants and retail establishments offered drive through, delivery, or pick-up services; etc.
Human	4	High (multiple deaths)	The region experienced 1,002 deaths from the Covid-19 pandemic.
Property	1	Less than 10% of property affected	Epidemics and pandemics impact human populations, not physical property.
Totals	**18**	**Medium**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks are more or less prevalent as compared to the rest of the planning area. The following map identifies those multi-jurisdictional risks with respect to epidemic/pandemic. Those labels not underlaid by a shaded drop shadow are not more or less at risk of epidemic/pandemic. Those with red drop shadows are more at risk (i.e., the City of Huntington *solely* because of a higher density population and the influx of students from out of the area); those with green are less at risk.



2.2.7 Extreme Temperatures

<table>
<tr><td colspan="4">Extreme heat often results in the highest number of annual deaths of all weather-related hazards. In most of the United States, extreme heat is defined as a long period (two to three days) of high heat and humidity with temperatures above 90 degrees (Ready.gov, 2023). Extremely cold air comes every winter in at least part of the country and affects millions of people across the United States. The arctic air, together with brisk winds, can lead to dangerously cold wind chill values. People exposed to extreme cold are susceptible to frostbite and hypothermia in a matter of minutes.</td></tr>
<tr><td rowspan="4">Risk
 
</td><td>Period of Occurrence:</td><td>At any time, typically during the middle summer and middle winter months</td><td>Risk Ranking: Low</td></tr>
<tr><td>Warning Time:</td><td>More than 24 hours</td><td>Type of Hazard: Natural</td></tr>
<tr><td>Probability:</td><td>Will occur within a year</td><td>Impact:</td></tr>
<tr><td>Disaster Declarations:</td><td colspan="2">S3934 (USDA FSA) (2015)
WV-00036 (SBA) (2015)
S4589 (USDA FSA) (2019)
S4734 (USDA FSA) (2020)
S4735 (USDA FSA) (2020)</td></tr>
</table>

Hazard Overview

Temperatures can vary widely over a year, but each season is associated with general, expected temperature ranges. Summer and winter will generally have the highest and lowest temperature ranges, respectively. *Extreme* temperatures are those 10 degrees above or below the average high or low temperature for an area. For example, an *extremely* cold temperature for Lincoln County (for example), would be below 14.6º F in January (based on the average minimum January temperature of 24.6º F for the county). Those temperatures above 97º F in July (per the average maximum of 86.6º F) would constitute an *extremely* hot temperature. Ready.gov uses a slightly different definition for extreme heat, identifying it as "a period of high heat *and humidity* with temperatures above 90 degrees *for at least two to three days*" (Ready.gov, 2023, emphasis added). Significantly, this definition adds a time element and the moderating variable of humidity. Duration can be significant in that the inability to get relief from the extreme temperatures contributes to the impact.

The National Weather Service (NWS) chart below shows the various temperatures and humidity levels that can be a danger to humans and animals. These conditions can also have serious impacts on crops, causing below-average harvests. Repeated years of extreme temperatures can easily cause significant economic impacts on agricultural industries.

NOAA'S NATIONAL WEATHER SERVICE HEAT INDEX																
Temperature (°F)																
	80	82	84	86	88	90	92	94	96	98	10	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										
Likelihood of heat disorders with prolonged exposure or strenuous activity																
	Caution			Extreme Caution			Danger			Extreme Danger						

Extremely cold temperatures are immediately dangerous to both humans and livestock by causing frostbite and hypothermia, which can lead to permanent injury and death. The chart below, again from the NWS, shows how quickly frostbite can occur at different temperatures and wind speeds. In unprotected structures cold temperatures can freeze water pipes causing them to burst upon thawing, leading to significant damage. Cold snaps during typically warmer weather during the growing season can damage and destroy some crops, depending on their sensitivity to temperature.

NOAA'S NATIONAL WEATHER SERVICE WINDCHILL CHART																			
Temperature (°F)																			
Wind (mph)	Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
	5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
	10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
	15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
	20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
	25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
	30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-76	-80	-87
	35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
	40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
	45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
	50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
	55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
	60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98
	Frostbite Times																		
				30 Minutes			10 Minutes			5 Minutes									

Location and Extent

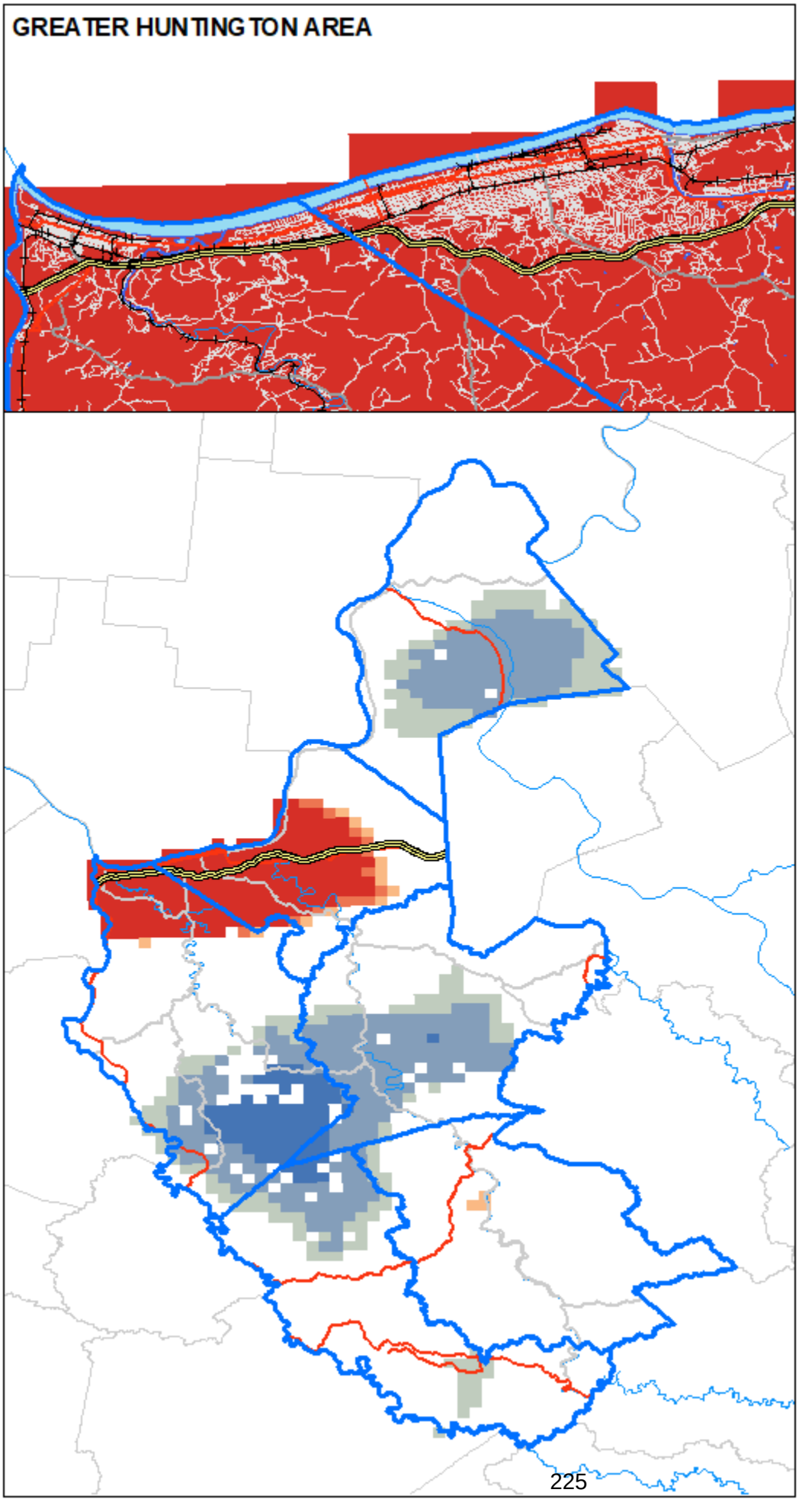
Extreme temperatures can affect all participating jurisdictions throughout the region. The average minimum temperatures for the region's counties, taken from data reporting January low temperatures between 1895 and 2024 (NOAA, 2024), are 24.1ºF (Cabell), 24.8ºF (Lincoln), 25.1ºF (Logan), 23.2ºF (Mason), 23.3ºF (Mingo), 24.4ºF (Wayne). The high temperatures, representing an average of the July highs between 1895 and 2023 are 86.6ºF (Cabell), 86.6ºF (Lincoln), 85.5ºF (Logan), 86.3ºF (Mason), 86.2ºF (Mingo), 86.4ºF (Wayne) (NOAA, 2024). If using these data for calculation, an average January minimum temperature for the region is 24.2º F, while a July high is 86.3º F.

The National Weather Service, in collaboration with local partners, issues several heat-related products as conditions warrant. Descriptions of those products are in the table below.

NWS, HEAT-RELATED PRODUCTS	
Product	*Description*
Excessive Heat Warning	Issued within 12 hours of extremely dangerous heat conditions. Issued when the maximum heat index temperature is expected to be 105°F or higher for at least two days and nighttime air temperatures will not drop below 75°.
Excessive Heat Watch	Issued when conditions are favorable for an excessive heat event in the next 24 to 72 hours. A watch is used when the risk of a heatwave has increased, but its occurrence and timing are still uncertain.
Heat Advisory	Issued within 12 hours of the onset of extremely dangerous heat conditions. This Advisory is issued when the maximum heat index temperature is expected to be 100°F or higher for at least two days, and nighttime temperatures will not drop below 75°.
Excessive Heat Outlook	Issued when the potential exists for an excessive heat event in the next 3-7 days. Provides information to those who need considerable lead time to prepare for an event.

A potential variable to consider is the urban heat island. Urban heat islands occur when urbanized areas replace natural land cover with dense concentrations of pavement, buildings, and other surfaces that absorb and retain heat. Urbanized areas experience higher temperatures than outlying rural areas as these buildings, infrastructure, etc. absorb and re-emit the sun's heat. Daytime temperatures in urban areas can be approximately 1° to 1.7° F higher than temperatures in more rural areas, and nighttime temperatures can be between 2° and 5° F higher (USEPA, 2023b). These conditions thus exacerbate heat events.

Portions of some municipalities are more *urbanized* than others, with the greater Huntington area being the most urban of the region. The following graphic estimates areas susceptible to the urban heat island effect in the region. The denser concentration of structures serves as a proxy for "urbanized areas." (Planners conducted an "optimized hot spot analysis" within the ArcMap 10.8.2 GIS software, using structure points as the input feature.) The red and orange areas on the map, largely around the greater Huntington area (though there is a small area in the Logan area), represent denser clusters of structures. The blue areas of the map are those in the region that are the least-densely built-out.



REGION 2 PDC HAZARD MITIGATION PLAN

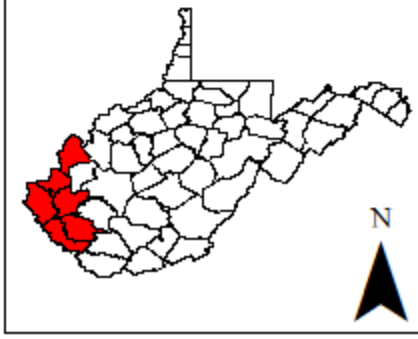
Urban Heat Island Effect (Est.)

Data Source(s):
WVGISTC

Cold Spot - 99% Confidence
Cold Spot - 95% Confidence
Cold Spot - 90% Confidence
Not Significant
Hot Spot - 90% Confidence
Hot Spot - 95% Confidence
Hot Spot - 99% Confidence

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



The National Weather Service also issues products regarding extremely cold temperatures. Such products include frost advisories, freeze watches and warnings, and hard freeze watches and warnings. The descriptions are in the table below.

NWS, PRODUCTS RELATED TO EXTREME COLD	
Product	*Description*
Frost Advisory	Issued when temperatures, winds, and sky cover are favorable for frost development. This is most likely when temperatures are less than or equal to 36 degrees.
Freeze Watch	Freeze Watches are issued a few days ahead of a cold front in which temperatures are expected to be 29-32 degrees.
Freeze Warning	Freeze Warnings are issued when low temperatures are expected to be 29-32 degrees.
Hard Freeze Watch	Hard Freeze Watches are issued days ahead of a cold front in which temperatures are expected to be 28 degrees or less.
Hard Freeze Warning	Hard Freeze Warnings issued when temperatures are expected to be 28 degrees or less

Impacts and Vulnerability

The impacts of extreme temperatures can affect the population's health rather than structures. The extent of damage to infrastructure would consist of broken pipes, cracks in the pavement due to expansion/contraction, and power outages. Infrastructure systems may be constrained during both hot and cold events, as residents push air conditioners (during hot spells) and furnaces (during cold snaps).

Extreme heat can impact health in a variety of ways. High temperatures can trigger a variety of heat stress conditions such as heat stroke, heat exhaustion, heat cramps, sunburn, and heat rash. High relative humidity exacerbates these conditions. High humidity also reduces the ability of sweat to evaporate from the skin, reducing the body's ability to cool itself. Prolonged exposure to heat can necessitate medical intervention; in extreme cases, prolonged exposure could cause death. The table below outlines the possible heat disorders for people in high-risk groups (i.e., children, elderly, etc.).

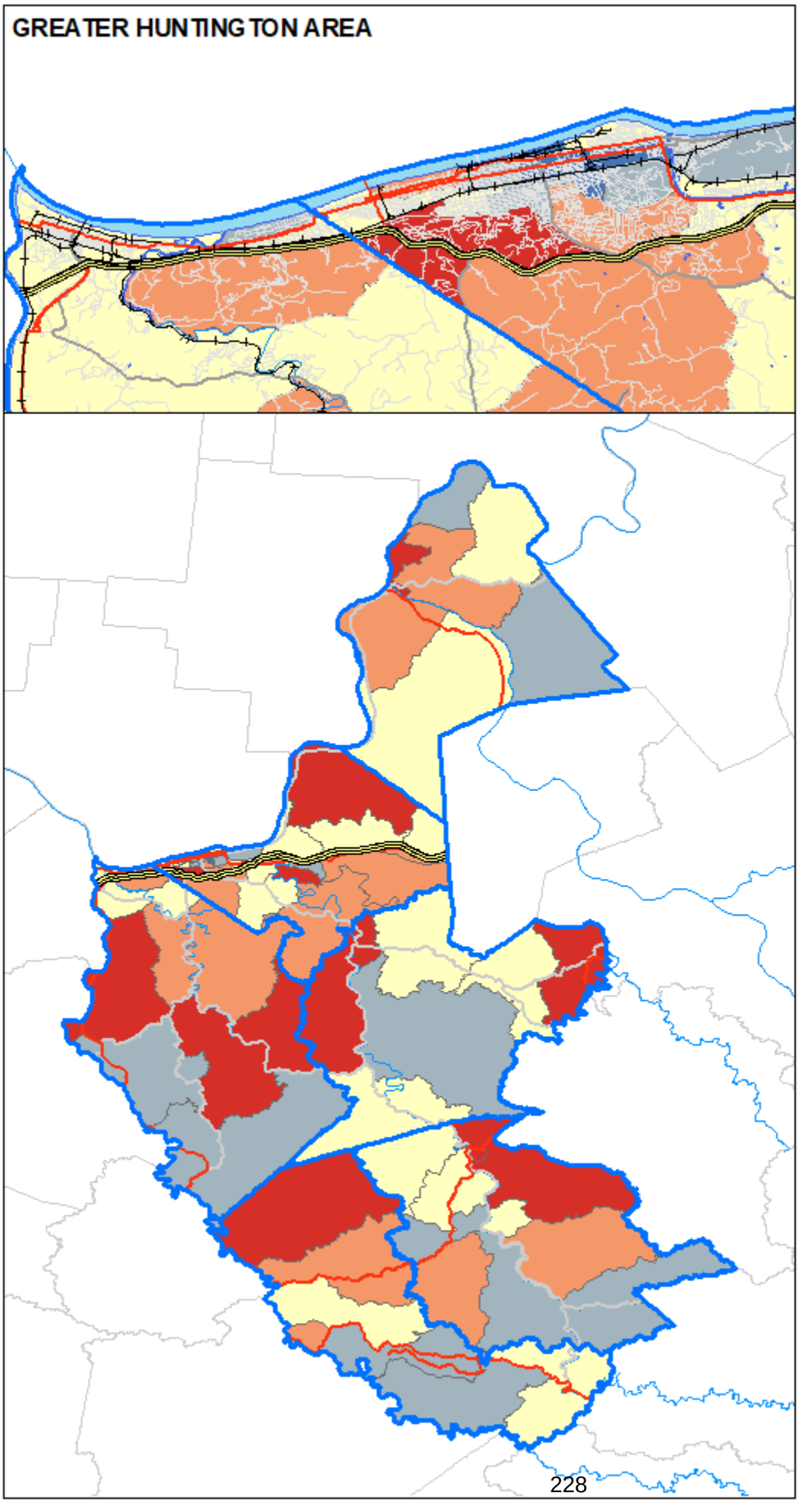
HEAT RISKS	
Heat Index	*Possible Heat Disorders for People in High-Risk Groups*
80°F-90°F	Fatigue is possible with prolonged exposure to physical activity
90°F -105°F	Sunstroke, heat cramps, or heat exhaustion is possible with prolonged exposure and/or physical activity
105°F -130°F	Sunstroke, heat cramps, or heat exhaustion are likely, and heatstroke is possible with prolonged exposure and/or physical activity
130°F +	Heat/Sunstroke highly likely with continued exposure

Extreme cold conditions also impact human health in several ways. Cold weather acts as a vasoconstrictor, meaning it constricts blood vessels and raises the risk of a heart attack. Prolonged exposure to cold weather can cause cold-related illnesses, which include hypothermia, frostbite, trench foot/immersion foot, and chilblains.

Social Vulnerability Considerations

Extreme temperatures of either type, heat or cold, appear to impact children and the elderly more severely than other population groups. The first of the following maps shows concentrations of the elderly (i.e., 65 and over) as well as children (i.e., under 18) in the region. Many seniors live alone, isolated from children and other younger family members who established careers and live in other areas. This problem is potentially acute in a state like West Virginia which is experiencing a high instance of out-migration. It is difficult to map areas with high concentrations of socially isolated senior citizens, though connections need not be limited to family. Areas with active senior citizens centers, congregate living areas with programs serving seniors, etc., foster community and social capital. Even in areas with high concentrations of elderly populations, this social capital can mitigate the effects of extreme temperatures (Klinenberg, 2015).

Further, elderly populations living in the areas above as potentially susceptible to the urban heat island effect may experience exacerbated severe heat illnesses. Similarly, those living in poverty may find themselves in areas more impacted by the urban heat island effect, and these individuals may not have the resources to contribute toward medical care if suffering from heat-related illnesses. The second of the following maps shows the intersection of Census tracts with greater than 25% of persons living below the poverty line with the estimated urban heat islands.



REGION 2 PDC HAZARD MITIGATION PLAN

SVI Considerations: Aggregated Age, 17-Under & 65-Over

Data Source(s):
CDC SVI Index (2020)

- 0.8% - 24.29% of persons
- 24.3% - 36.5% of persons
- 36.51% - 41.5% of persons
- 41.51% - 46.2% of persons
- 46.21% - 54.2% of persons

0 3 6 12 18 24 Miles

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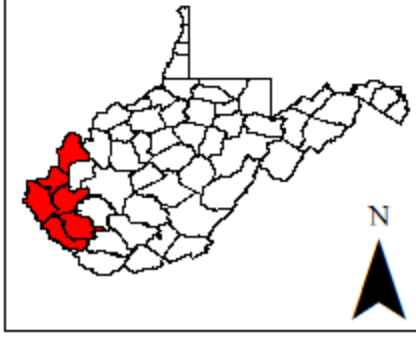
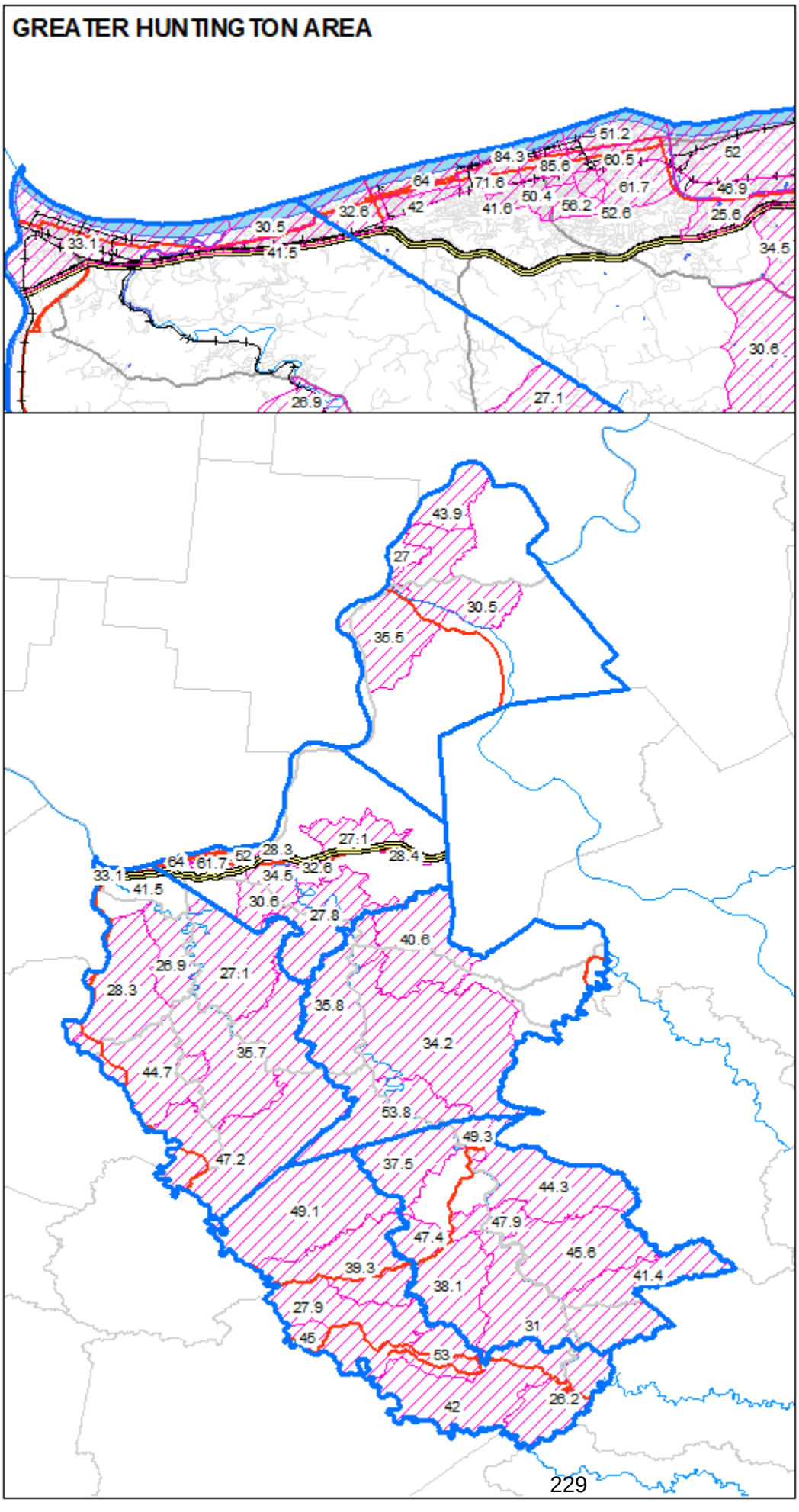




REGION 2 PDC HAZARD MITIGATION PLAN

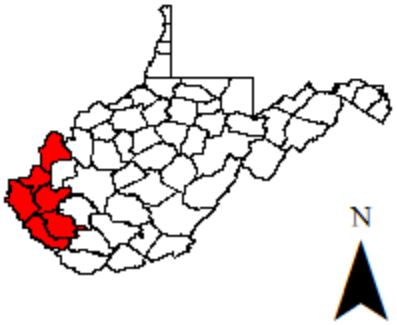
SVI Considerations: Tracts by Poverty Level

Data Source(s):
CDC SVI Index (2020)

25% or More, Below Poverty Est.

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



Finally, the homeless population could also be more at risk simply from being exposed to the elements. Many communities in West Virginia anecdotally feel that homelessness is becoming more of a problem, with it manifesting not only as people living outdoors of a structure but also those "couch surfing" or staying with friends and acquaintances. These populations are nearly impossible to map, but an awareness of their potential risk is helpful.

Previous Occurrences

According to the NOAA's National Centers for Environmental Information (NCEI), there have been 269 extreme temperature events in the region since 1996. As with other weather-related hazards, many of these events are duplicates because the hazard impacts the region as a whole (and, as such, multiple counties are listed separately as having had an event). In the table below, there are 49 unique dates (NOAA NCEI, 2024), which yields a more accurate number of incidents. This revised figure, 49, suggests an average of 1.75 incidents per year.

PREVIOUS EXTREME TEMPERATURE EVENTS						
Location	*Date*	*Type*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	2/4/1996	Cold/Wind Chill	0	0	$15,000	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	2/27/1996	Heat	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	3/10/1996	Cold/Wind Chill	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	5/13/1996	Cold/Wind Chill	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	1/1/1997	Heat	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	1/16/1997	Cold/Wind Chill	0	0	$10,000	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	2/21/1997	Heat	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	4/1/1997	Cold/Wind Chill	0	0	$0	$0
Logan, Mingo Counties	5/1/1997	Cold/Wind Chill	0	0	$0	$0

PREVIOUS EXTREME TEMPERATURE EVENTS						
Location	*Date*	*Type*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Logan, Mingo Counties	5/11/1997	Cold/Wind Chill	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	9/4/1997	Cold/Wind Chill	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	10/23/1997	Cold/Wind Chill	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	11/1/1997	Cold/Wind Chill	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	3/10/1998	Cold/Wind Chill	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	3/26/1998	Heat	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	9/14/1998	Heat	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	12/6/1998	Heat	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	1/22/1999	Heat	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	2/11/1999	Heat	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	3/1/1999	Cold/Wind Chill	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	1/2/2000	Excessive Heat	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	1/28/2000	Extreme Cold/Wind Chill	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	2/25/2000	Excessive Heat	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	2/26/2000	Excessive Heat	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	3/8/2000	Excessive Heat	0	0	$0	$0

PREVIOUS EXTREME TEMPERATURE EVENTS						
Location	*Date*	*Type*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	10/8/2000	Cold/Wind Chill	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	11/21/2000	Extreme Cold/Wind Chill	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	12/1/2000	Cold/Wind Chill	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	2/9/2001	Excessive Heat	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	3/1/2001	Cold/Wind Chill	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	10/8/2001	Cold/Wind Chill	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	12/1/2001	Heat	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	1/28/2002	Excessive Heat	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	1/31/2002	Excessive Heat	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	4/16/2002	Excessive Heat	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	5/19/2002	Extreme Cold/Wind Chill	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	1/14/2003	Cold/Wind Chill	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	8/16/2007	Excessive Heat	0	0	$0	$0
Cabell, Lincoln, Mason, Wayne Counties	7/12/2011	Heat	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	7/20/2011	Heat	0	0	$0	$0

PREVIOUS EXTREME TEMPERATURE EVENTS						
Location	*Date*	*Type*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	7/28/2011	Heat	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	1/6/2014	Extreme Cold/Wind Chill	0	0	$680,000	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	1/27/2014	Extreme Cold/Wind Chill	0	0	$200,000	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	2/14/2015	Cold/Wind Chill	0	0	$0	$0
Cabell, Lincoln, Logan, Mason, Mingo, Wayne Counties	2/18/2015	Extreme Cold/Wind Chill	0	0	$50,000	$0
Mason County	2/23/2015	Cold/Wind Chill	0	0	$0	$0
Cabell, Lincoln Mason, Wayne Counties	3/6/2015	Cold/Wind Chill	0	0	$0	$0
Mingo County	7/10/2019	Heat	0	0	$0	$0
Cabell, Mingo, Wayne Counties	12/23/2022	Extreme Cold/Wind Chill	0	0	$1,040,000	$0
		Totals	**0**	**0**	**$1,995,000**	**$0**

Extreme Cold, December 2022

An arctic cold front swept into the region on December 23, 2022, with temperatures dropping more than 40 degrees over six hours. Wayne County began experiencing water issued on Christmas evening as waterlines throughout the county froze. The Kermit and Mingo PSDs in Mingo County, which feeds Wayne County, failed due to ice jams. Once the water plants were restored, Wayne County was once again cut off due to multiple leaks in the lines caused mostly by main line shifts and breaks and burst water lines under residences. Lines were not restored until after Christmas leaving residents under a boil water advisory well into the new year as restoration projects were completed.

Loss and Damages

Extreme temperatures can impact all areas and jurisdictions of the region and are typically widespread events. Extreme temperature events have resulted in $1,995,000 in property damage over the past 28 years with $1,040,000 coming from one extreme cold event in December of 2022. There have been no reported damages during extreme heat events.

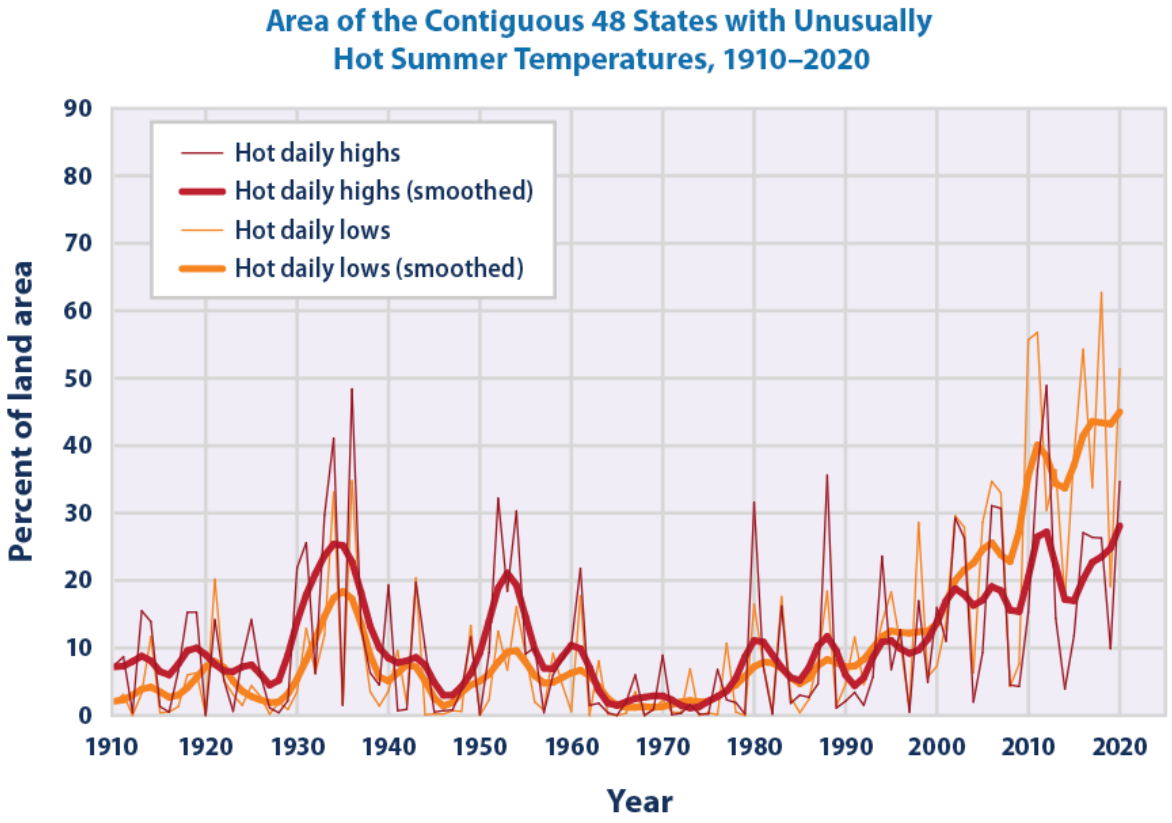
As shown in the table above, most extreme temperature events do not result in property damage; however, dividing the total property damage by the number of events (i.e., $1,995,000/49), planners estimated that the region can expect property damages of approximately $40,714 per event. Data indicates that the region experiences 1.75 events per annum, resulting in an average of $71,250 in property damage per year.

Future Occurrences

The U.S. Environmental Protection Agency notes that extreme weather is likely to become more frequent. Since 1901, average temperatures have continued to rise in the contiguous 48 states with nine of the 10 warmest years having occurred since 1998. Since the 1970s, summer highs and winter lows have become more common and occur at a more frequent rate (2023). As such, participating jurisdictions can expect to see more extreme highs and lows more frequently than in the past.

Future Climate Considerations

The following graphic shows an upward trend in the hot daily lows in the contiguous 48 states (USEPA, 2021). The smoothed line of the hot daily highs is not trending upward as much, but it appears as though the nation is not getting the relief on those hot days that it once did.

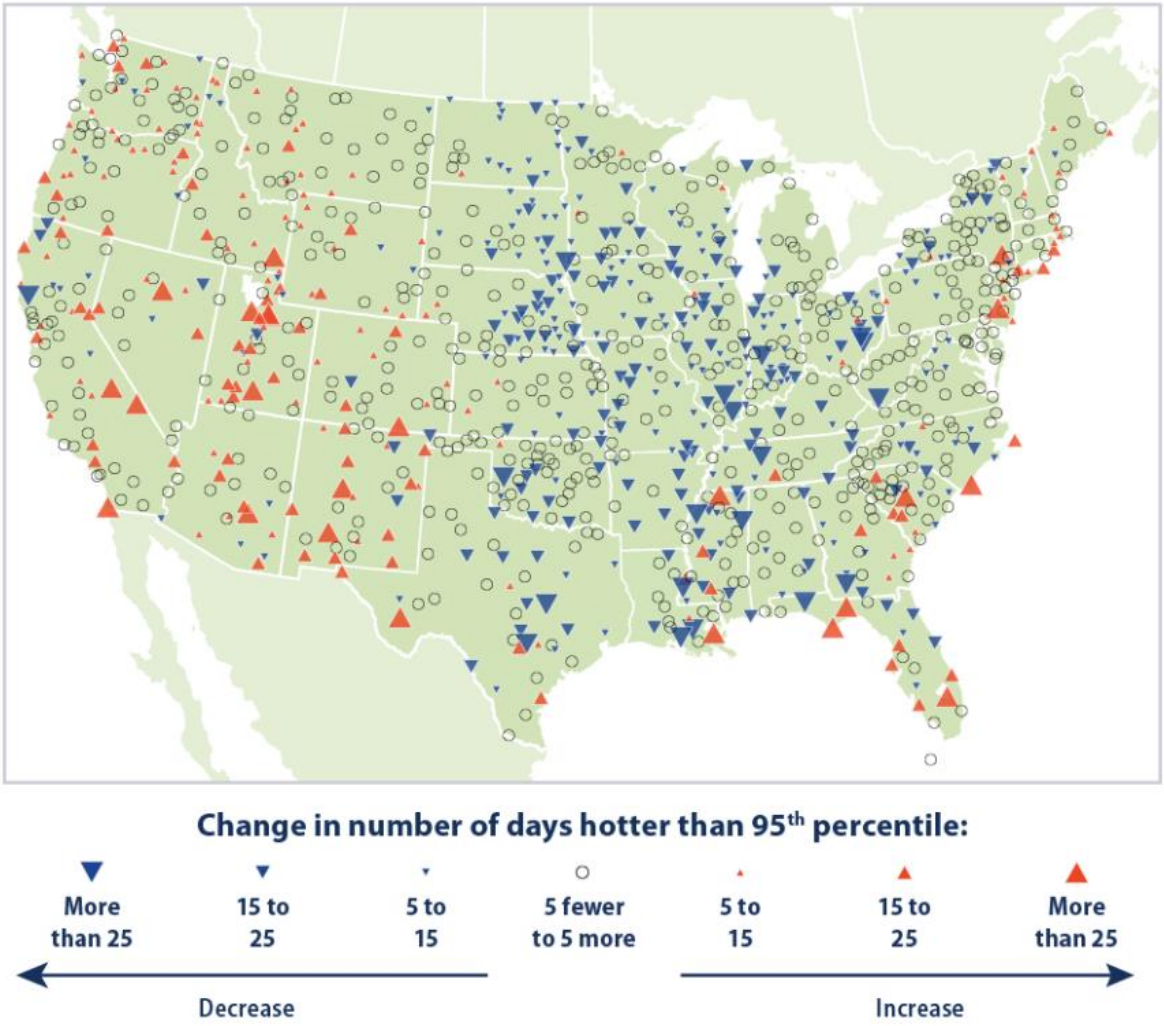


Data source: NOAA (National Oceanic and Atmospheric Administration). 2021. U.S. Climate Extremes Index. Accessed March 2021. www.ncdc.noaa.gov/extremes/cei.

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at www.epa.gov/climate-indicators.

The general regional area appears to be an outlier in this trend, as shown in the graphic below (USEPA, 2021). While the region may continue to experience pockets of extreme heat, this graphic shows the heat trends to be more pronounced in the western states, small areas of the south, and along the eastern coast. The northern and mountainous areas of West Virginia are mainly within the five-day change (+/-).

Change in Unusually Hot Temperatures in the Contiguous 48 States, 1948–2020

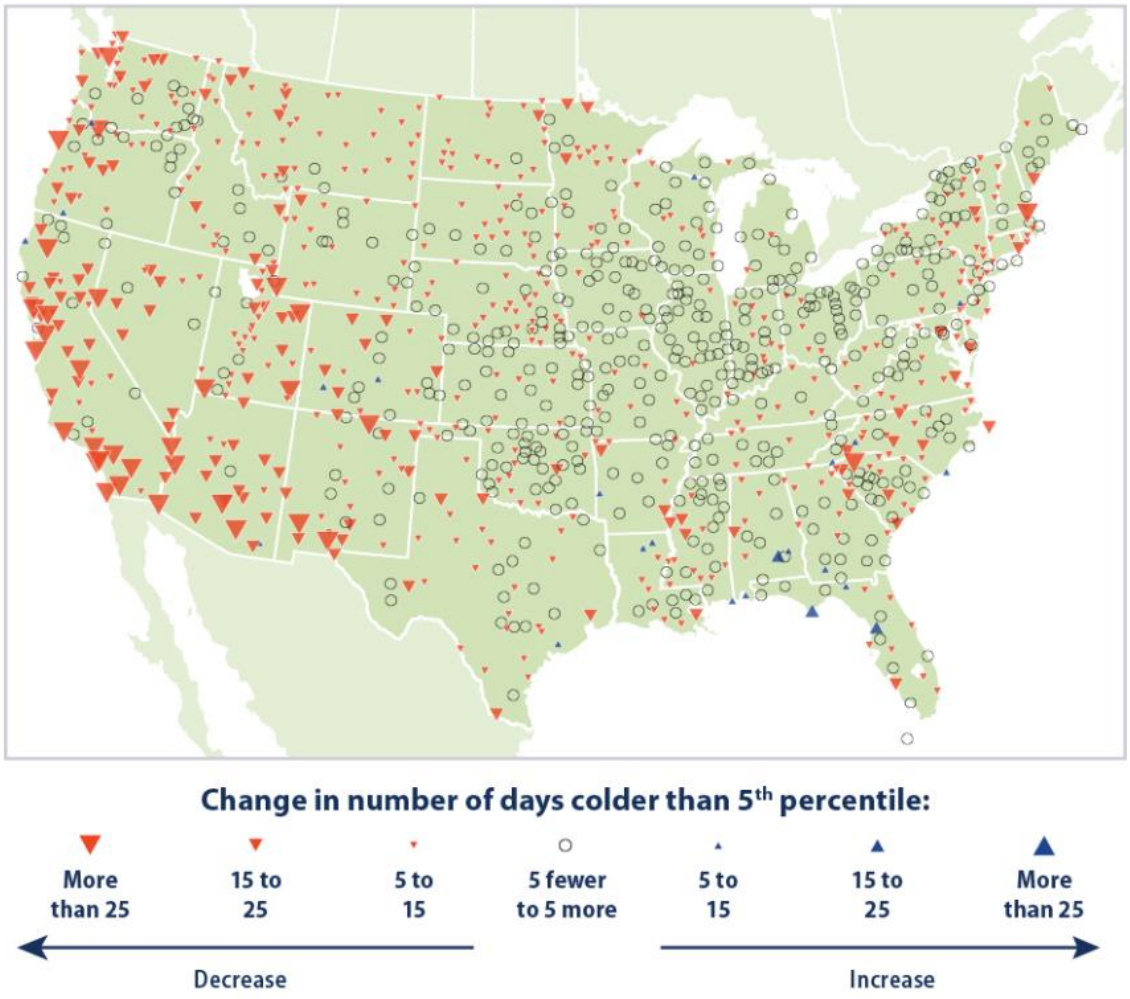


Data source: NOAA (National Oceanic and Atmospheric Administration). 2021. National Centers for Environmental Information. Accessed March 2021. www.ncdc.noaa.gov.

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at www.epa.gov/climate-indicators.

West Virginia has seen, on the whole, little change in the number of days colder than the fifth percentile (USEPA, 2021), though there are pockets of areas registering as within the five- to 15-day range.

Change in Unusually Cold Temperatures in the Contiguous 48 States, 1948–2020



Data source: NOAA (National Oceanic and Atmospheric Administration). 2021. National Centers for Environmental Information. Accessed March 2021. www.ncdc.noaa.gov.

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at www.epa.gov/climate-indicators.

While these graphics may suggest that the region should anticipate similar extreme conditions in the future, this data is purely climatological. It does not consider the interaction between fluctuations in temperatures and vulnerable populations. Despite a trend of out-migration, other evidence suggests that the state's population is aging, which could exacerbate the heat- and cold-related health issues noted above.

Risk Assessment

This section summarizes the vulnerability of the region to extreme temperatures. The planning and development council conducted an online survey for the public to share its

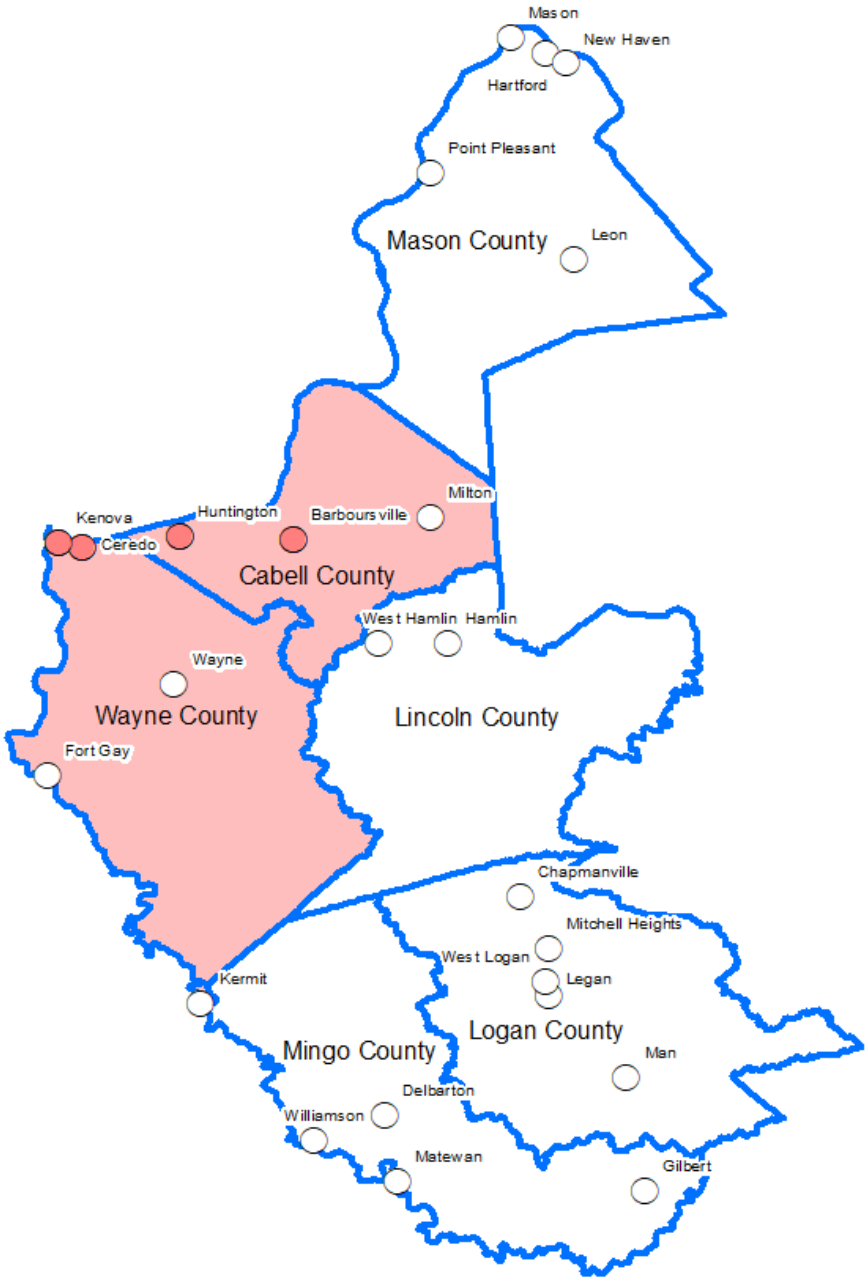
thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding extreme temperatures.

PUBLIC SENTIMENT, EXTREME TEMPERATURES					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Extreme Temperatures	5 (12.5%)	14 (35.0%)	17 (42.5%)	4 (10.0%)	40
In the past ten years, do you remember this hazard occurring in your community?				21 (52.5%)	40
Have you noticed an increase in the occurrences or intensity of this hazard?				17 (42.5%)	40
Have you noticed a decrease in the occurrences or intensity of this hazard?				3 (7.5%)	50

The following table assigns point totals based on the methodology identified in Section 2.2: Describe Hazards above.

EXTREME TEMPERATURES RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	5	Excessive (Will occur during a year)	According to historic data, extreme temperatures affect the region an average of 1.75 times per year.
Response	2	One day	The communities in the region can open warming and cooling stations, as needed, to assist residents during extreme temperature events. Planners noted that the length of these operations can vary significantly and opted to use an average of one day for this calculation.
Onset	1	Over 24 hours	Extreme temperatures can be predicted several days in advance.
Magnitude	4	Catastrophic (more than 50% of land area affected)	Extreme temperature incidents often affect multiple or all counties of the region.
Business	1	Less than 24 hours	Extreme temperature incidents do not usually affect business or the economy.
Human	1	Minimum (minor injuries)	The region has not experienced any injuries or fatalities from extreme temperature events.
Property	1	Less than 10% of property affected	Historically, there has been a reported $1,995,000 in property damage. All recorded damages occurred during six events as most extreme temperature events do not cause property damage.
Totals	**15**	**Low**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks are more or less prevalent as compared to the rest of the planning area. The following map identifies those multi-jurisdictional risks with respect to extreme temperatures. Those labels not underlaid by a shaded drop shadow are not more or less at risk of extreme temperatures. Those with red drop shadows are more at risk; those with green are less at risk. The greater Huntington area appears more at risk because of the urban heat island effect.



2.2.8 Flood

A flood is a general or temporary condition of partial or complete inundation of normally dry land areas or the rapid accumulation of runoff surface water from any source. A flash flood is a sudden local flood, typically due to heavy rainfall

Risk

Period of Occurrence:	At any time, typically after prolonged periods of precipitation	**Risk Ranking:**	Medium
Warning Time:	6-12 hours	**Type of Hazard:**	Natural
Probability:	Excessive (will occur in a year)	**Impact:**	Localized (less than 10% of land area affected)

Disaster Declarations:

DR-224-WV (1967)
DR-323-WV (1972)
DR-349-WV (1972)
DR-416-WV (1974)
DR-531-WV (1977)
EM-3052-WV (1977)
DR-569-WV (1979)
DR-706-WV (1984)
DR-1096-WV (1996)
DR-1115-WV (1996)
DR-1132-WV (1996)
DR-1168-WV (1997)
DR-1229-WV (1998)
DR-1319-WV (2000)
DR-1378-WV (2001)
WV-L0080 (SBA) (2001)
DR-1410-WV (2002)
WV-L0082 (SBA) (2002)
WV-L0083 (SBA) (2002)
DR-1455-WV (2003)
DR-1474-WV (2003)
DR-1500-WV (2004)
DR-1522-WV (2004)
DR-1536-WV (2004)
DR-1558-WV (2004)
DR-1696-WV (2007)
DR-1838-WV (2009)
WV-00012 (SBA) (2009)
DR-1918-WV (2010)
WV-00022 (SBA) (2010)
DR-4059-WV (2012)
DR-4061-WV (2012)
S3386 (USDA FSA) (2012)
WV-00023 (SBA) (2012)
WV-00027(SBA) (2012)
DR-4132-WV (2013)
DR-4210-WV (2015)
DR-4219-WV (2015)
DR-4221-WV (2015)
DR-4236-WV (2015)
S3934 (USDA FSA) (2015)
DR-4273-WV (2016)
DR-4359-WV (2018)
S4444 (USDA FSA) (2018)
S4532 (USDA FSA) (2019)
DR-4605-WV (2021)
WV-00053 (SBA) (2021)
S5322 (USDA FSA) (2022)
KY-00091 (SBA) (2022)
WV-00057 (SBA) (2022)
WV-00058 (SBA) (2023)
WV-20001 (SBA) (2023)

Hazard Overview

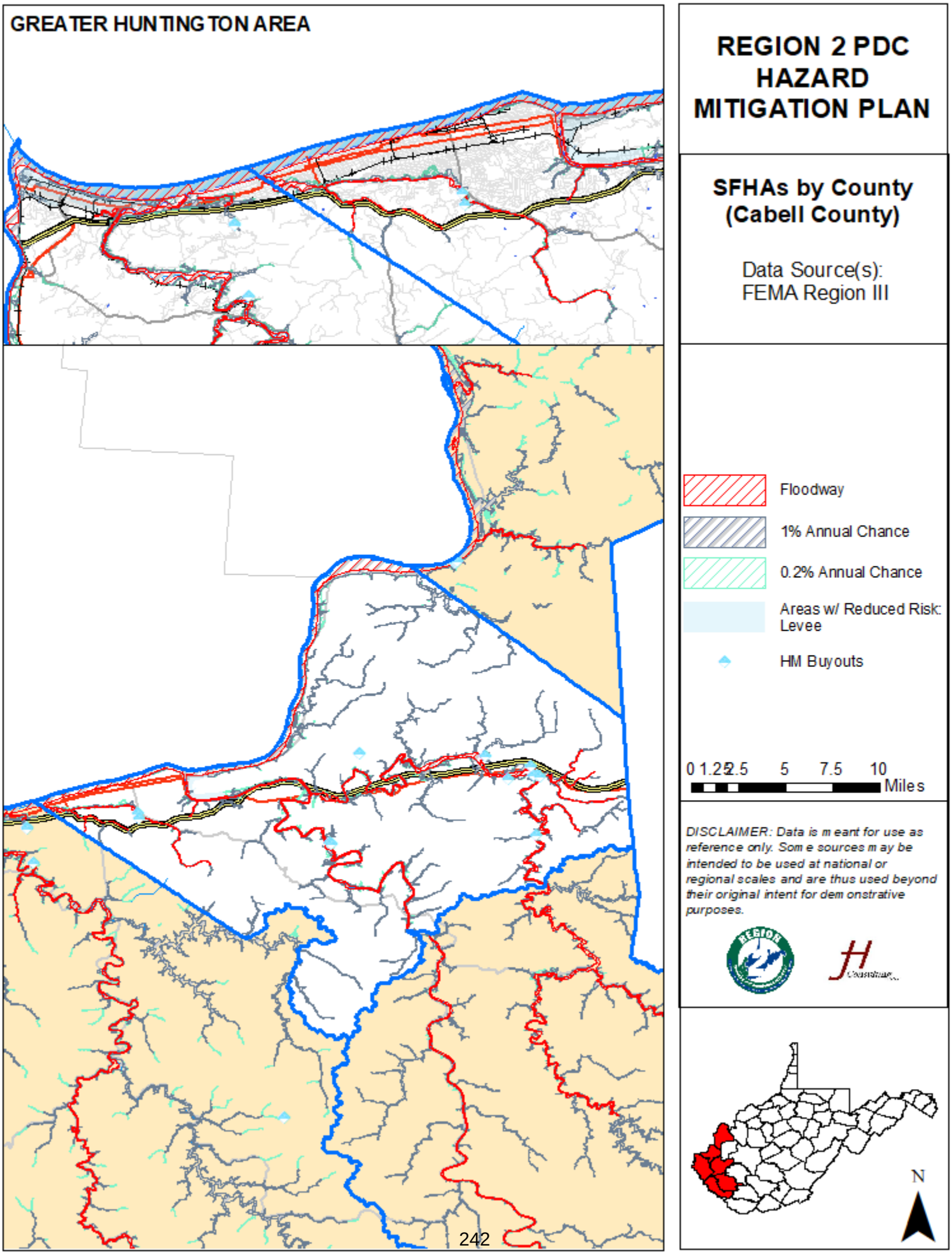
Floods are the most prevalent hazard in the United States. Each year, floods cause more property damage in the U.S. than any other type of natural disaster, killing an average of 150 people a year. According to NOAA, some of the possible causes of flooding include the following.

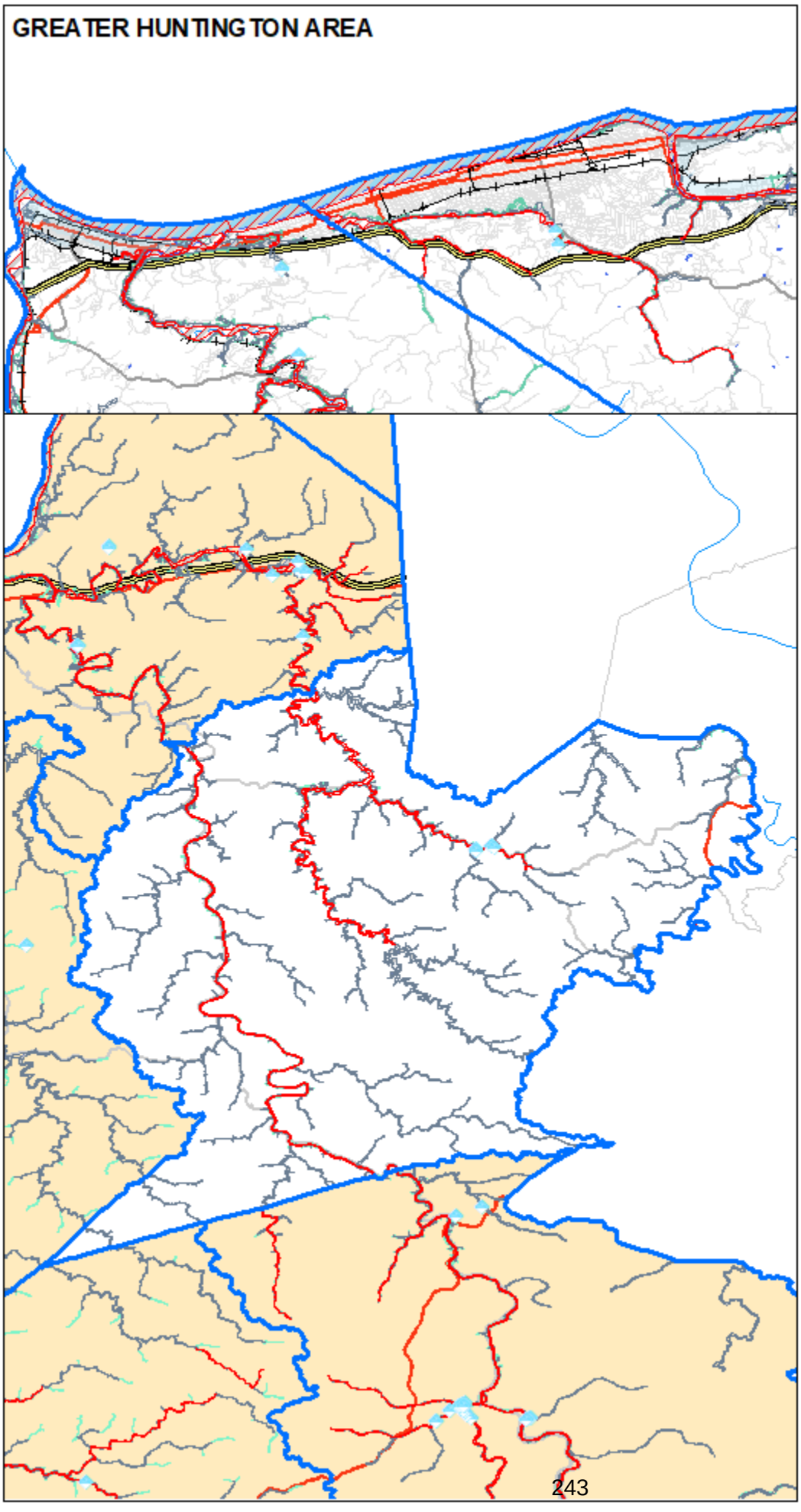
- Excessive Rainfall: This is the most common cause of flooding. Water accumulates quicker than the soil can absorb, resulting in flooding.
- Snowmelt: It occurs when the primary source of water involved is melting snow. Unlike rainfall which can reach the soil almost immediately, the snowpack can store the water for an extended period until temperatures rise above freezing, and the snow melts.
- Ice or Debris Jams: Common during the winter and spring along rivers, streams, and creeks. As ice or debris moves downstream, it may get caught in obstructions to the water flow. When this occurs, water can be held back, causing upstream flooding. When the jam finally breaks, flash flooding can occur downstream.
- Dam Breaks or Levee Failure: Dams can overtop, have excessive seepage, or have a structural failure. For more information, see Section 2.2.3 Dam and Levee Failure.

Location and Extent

Floods are described by their horizontal extents, the depth of the floodwaters, and the probability of occurrence. Unfortunately, meteorological officials historically have expressed the likelihood of occurrence in terms such as a “100-year flood”, which the general public logically assumes means a flood that happens once in 100 years. The probability of occurrence is interpreted best as a percent chance of occurring. So, a 100-year flood is a flood level that has a 1% chance of occurring in any given year. The 100-year, or 1% flood, is often a function of risk planning. Smaller floods are more likely to occur; thus, a 10-year flood has a 10% chance of occurring in any given year.

The following maps identify the special flood hazard areas (SFHAs) for the region’s six counties. The SFHAs shown include the floodway (the channel of a river or other watercourse and the adjacent land areas that must be reserved to discharge the base flood without cumulatively increasing the water surface elevation by more than a designated height), 1% annual chance hazard areas (see the above definition), and the 0.2% annual chance areas (moderate flood hazard areas, formerly referred to as the “500-year flood”) (FEMA, 2020). Flood hazard mapping by participating jurisdiction appears in Appendix 5.


GREATER HUNTINGTON AREA
REGION 2 PDC HAZARD MITIGATION PLAN
SFHAs by County (Cabell County)
Data Source(s): FEMA Region III
Floodway
1% Annual Chance
0.2% Annual Chance
Areas w/ Reduced Risk: Levee
HM Buyouts
0 1.25 2.5 5 7.5 10
Miles
DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.
N



REGION 2 PDC HAZARD MITIGATION PLAN

SFHAs by County (Lincoln County)

Data Source(s):
FEMA Region III

Floodway

1% Annual Chance

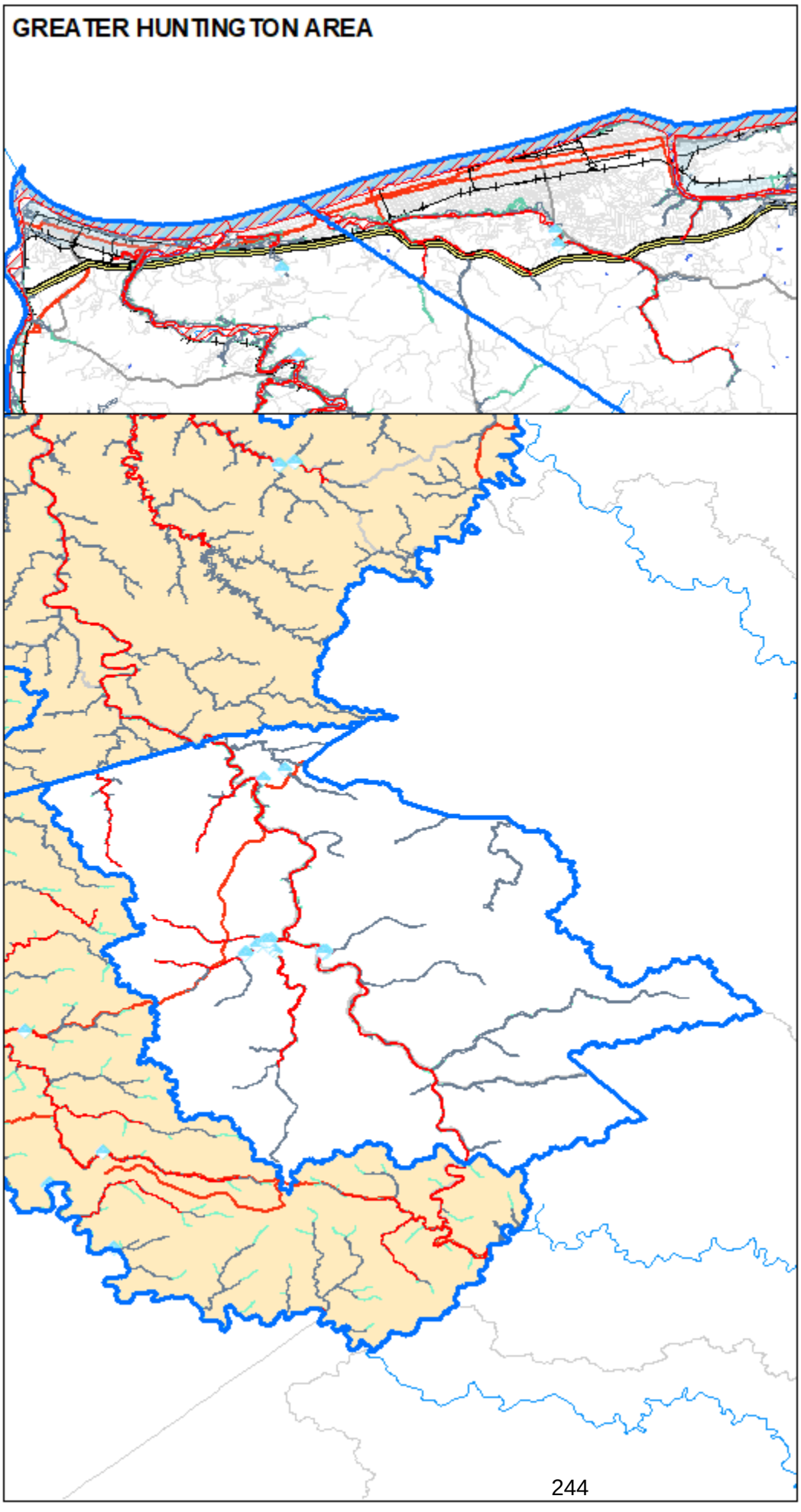
0.2% Annual Chance

Areas w/ Reduced Risk: Levee

HM Buyouts

0 1.25 2.5 5 7.5 10 Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



REGION 2 PDC HAZARD MITIGATION PLAN

SFHAs by County (Logan County)

Data Source(s):
FEMA Region III

Floodway

1% Annual Chance

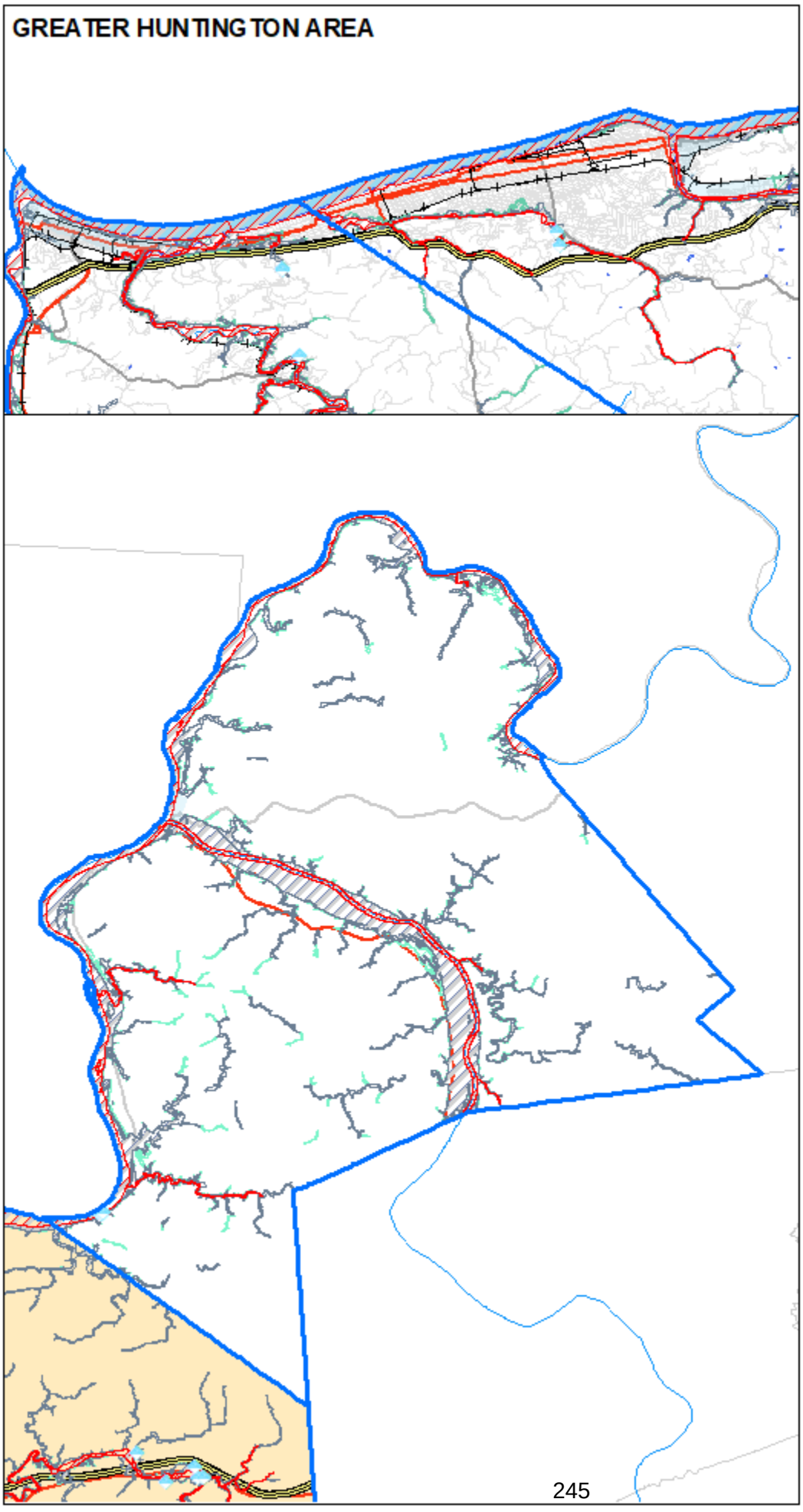
0.2% Annual Chance

Areas w/ Reduced Risk: Levee

HM Buyouts

0 1.5 3 6 9 12
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



REGION 2 PDC HAZARD MITIGATION PLAN

SFHAs by County (Mason County)

Data Source(s):
FEMA Region III

Floodway

1% Annual Chance

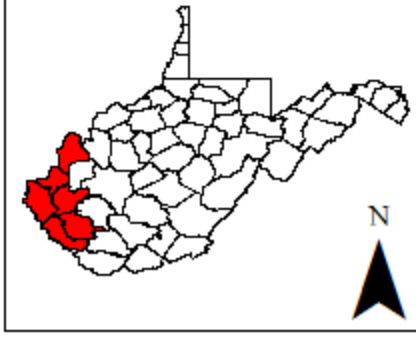
0.2% Annual Chance

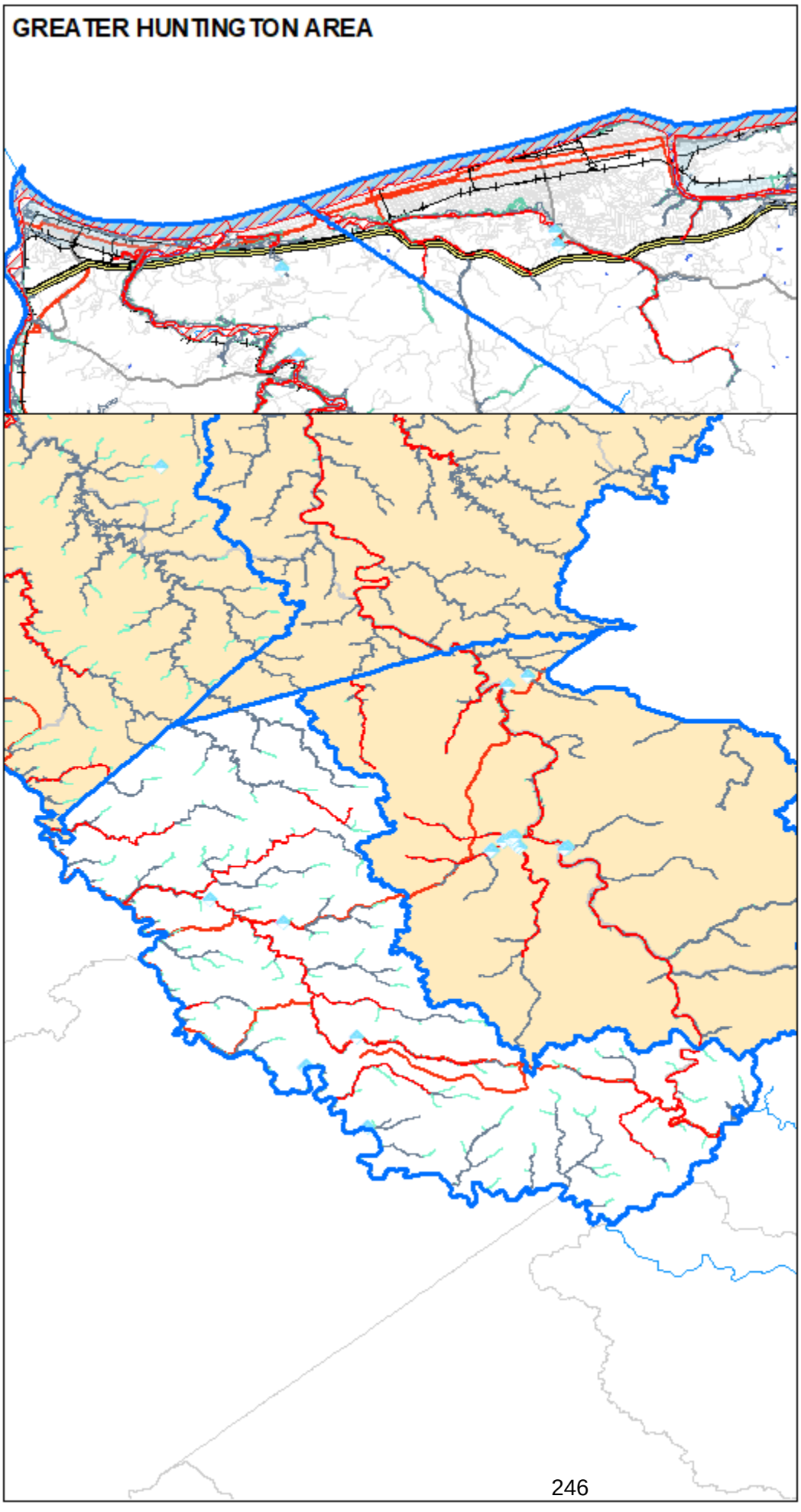
Areas w/ Reduced Risk: Levee

HM Buyouts

0 1.252.5 5 7.5 10
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.





REGION 2 PDC HAZARD MITIGATION PLAN

SFHAs by County (Mingo County)

Data Source(s):
FEMA Region III

Floodway

1% Annual Chance

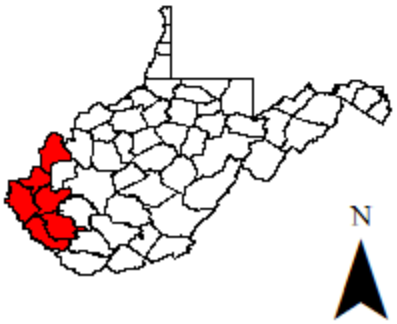
0.2% Annual Chance

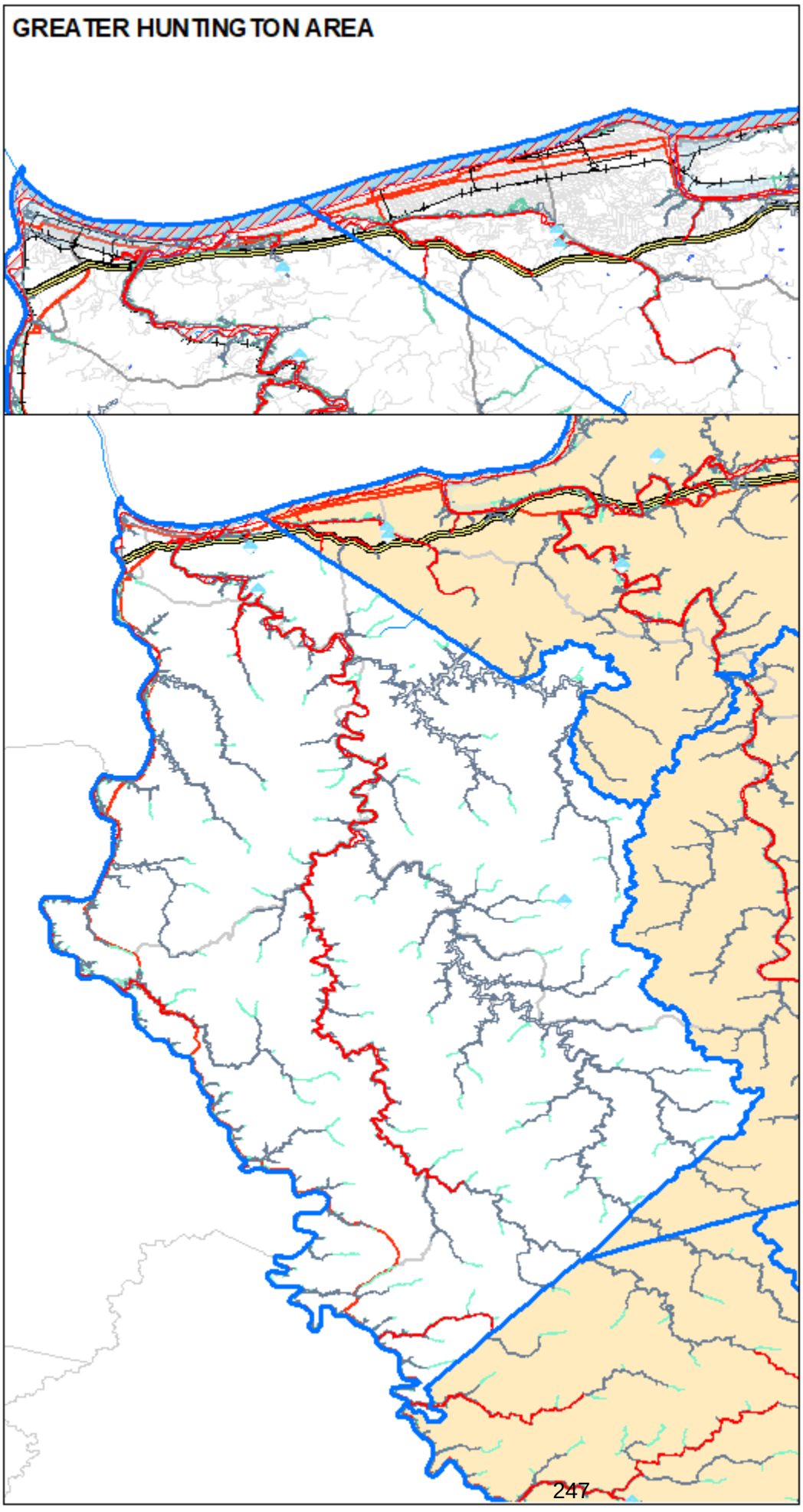
Areas w/ Reduced Risk: Levee

HM Buyouts

0 1.753.5 7 10.5 14
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.





REGION 2 PDC HAZARD MITIGATION PLAN

SFHAs by County (Wayne County)

Data Source(s):
FEMA Region III

Floodway

1% Annual Chance

0.2% Annual Chance

Areas w/ Reduced Risk: Levee

HM Buyouts

0 1.25 2.5 5 7.5 10
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

Impacts and Vulnerability

Impacts from flooding can be primary or secondary. Primary effects are those that occur due to contact with water. Secondary effects occur because of flooding, such as disruption of services and changes in the position of river channels.

EFFECTS OF FLOODING	
Type	*Description*
Primary Impacts	• With higher velocities, streams can transport larger particles as suspended loads. Such large particles include not only rocks and sediment, but, during a flood, could include such large objects as automobiles, houses, and bridges. • Massive amounts of erosion can be accomplished by floodwaters. Such erosion can undermine bridge structures, levees, and buildings causing their collapse. • Water entering human-built structures causes water damage. Even with minor flooding of homes, furniture is ruined, floors and walls are damaged, and anything that comes in contact with the water is likely to be damaged or lost. Flooding of automobiles usually results in damage that cannot easily be repaired. • The high velocity of floodwater allows the water to carry more sediment as a suspended load. When the floodwaters retreat, velocity is generally much lower, and sediment is deposited. After the retreat of the floodwaters, everything is usually covered with a thick layer of stream-deposited mud, including the interior of buildings. • Flooding of farmland usually results in crop loss. Livestock, pets, and other animals are often carried away and drown. • Humans that get caught in the high-velocity floodwaters are often drowned by the water. • Floodwaters can concentrate garbage, debris, and toxic pollutants that can cause the secondary effects of health hazards.
Secondary Impacts	• Drinking water supplies may become polluted, especially if sewerage treatment plants are flooded. This may result in disease and other health effects, especially in underdeveloped countries. • Gas and electrical service may be disrupted. • Transportation systems may be disrupted, resulting in shortages of food and clean-up supplies. In underdeveloped countries, food shortages often lead to starvation.
Long-Term (Tertiary) Impacts	• The location of river channels may change as a result of flooding, new channels develop, leaving the old channels dry. • Sediment deposited by flooding may destroy farmland (although silt deposited by floodwaters could also help to increase agricultural productivity). • Jobs may be lost due to the disruption of services, destruction of business, etc. (although jobs may be gained in the construction industry to help rebuild or repair flood damage). • Insurance rates may increase. • Corruption may result from the misuse of relief funds. • Destruction of wildlife habitat.

In addition to property and structure damage, flood waters pose a risk to human health. Floodwater can contain downed power lines, human and livestock waste, household, medical,

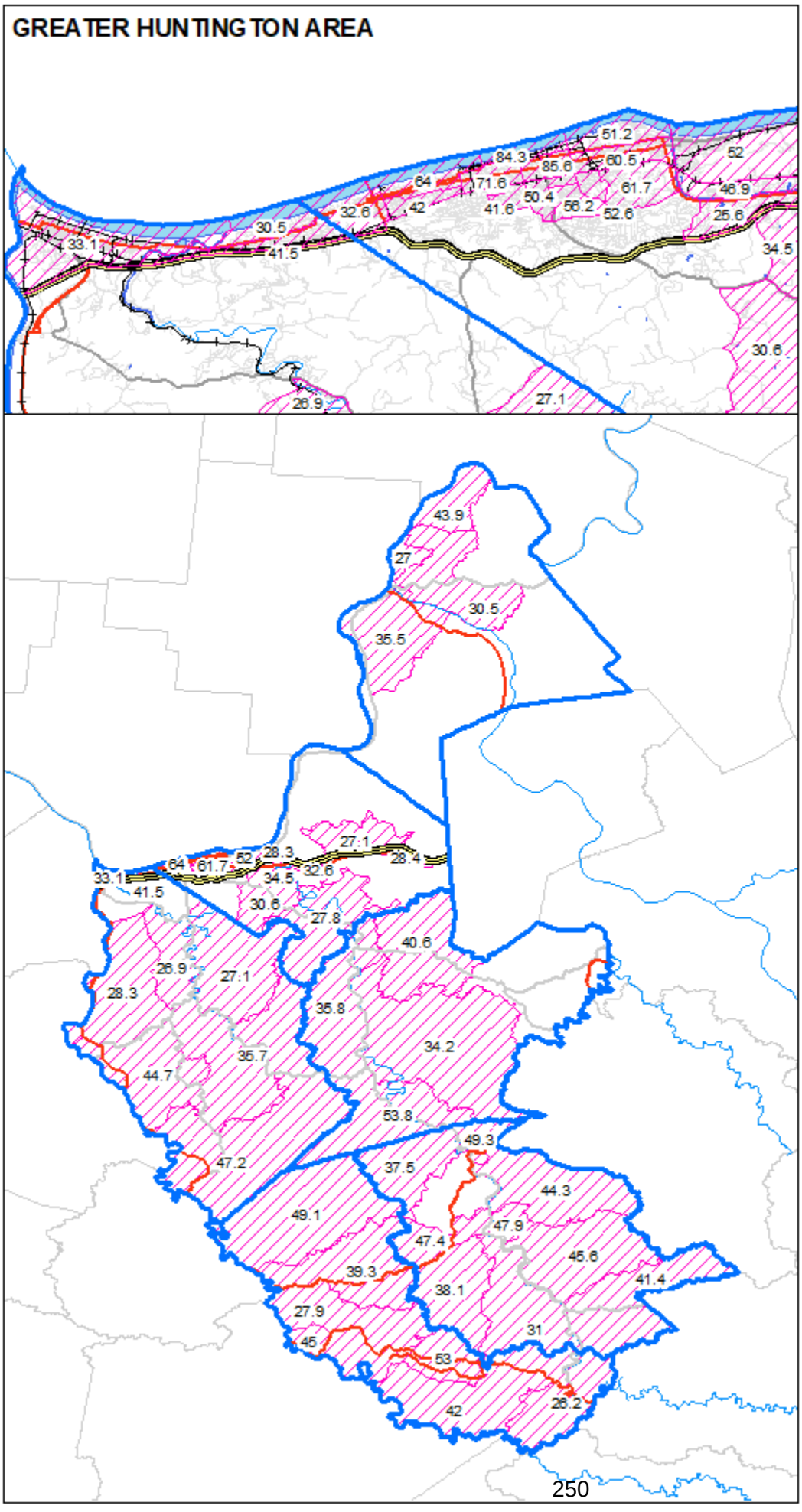
and industrial waste and debris, wild or stray animals, and other contaminants that can cause illnesses (CDC, 2022a).

Flash floods are often the most dangerous floods. Flash flood waters are fast-moving and can destroy buildings and bridges and scour new channels. Occasionally, debris floating in flash floodwaters accumulates at natural or human-made obstructions and restricts the flow of water. This obstruction causes upstream flooding and subsequent downstream flooding if the obstacle suddenly releases.

Flooding impacts include injuries and potential fatalities, damage to property, lost revenue and other economic damages, and increased demand for public safety and infrastructure-related services. Response activities include unplanned overtime for emergency operations center (EOC) activations, evacuations and sheltering of displaced individuals, rerouting traffic destined for impassible roads, bridge and road repairs, and rescue or medical missions related to motorists and isolated individuals. Private property damages to homes and vehicles, as well as land erosion, river channel changes, agricultural damages, and livestock losses resulting in significant rural economic impacts to residents.

Social Vulnerability Considerations

Flooding can impact numerous social vulnerability categories, in both direct and subtle ways. Direct impacts include the following. Flood insurance can be costly, and those living in poverty may not be able to afford coverage. As a result, they forego coverage and feel disproportionate impacts if their home floods. Renters may not be aware that they can purchase flood insurance, and as such, they may face similar impacts when floods occur. The following map shows the Census tracts with more than 25% of their persons living in poverty overlaid by flood hazard data.



REGION 2 PDC HAZARD MITIGATION PLAN

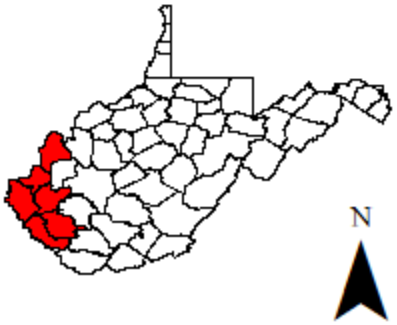
SVI Considerations: Tracts by Poverty Level

Data Source(s):
CDC SVI Index (2020)

25% or More, Below Poverty Est.

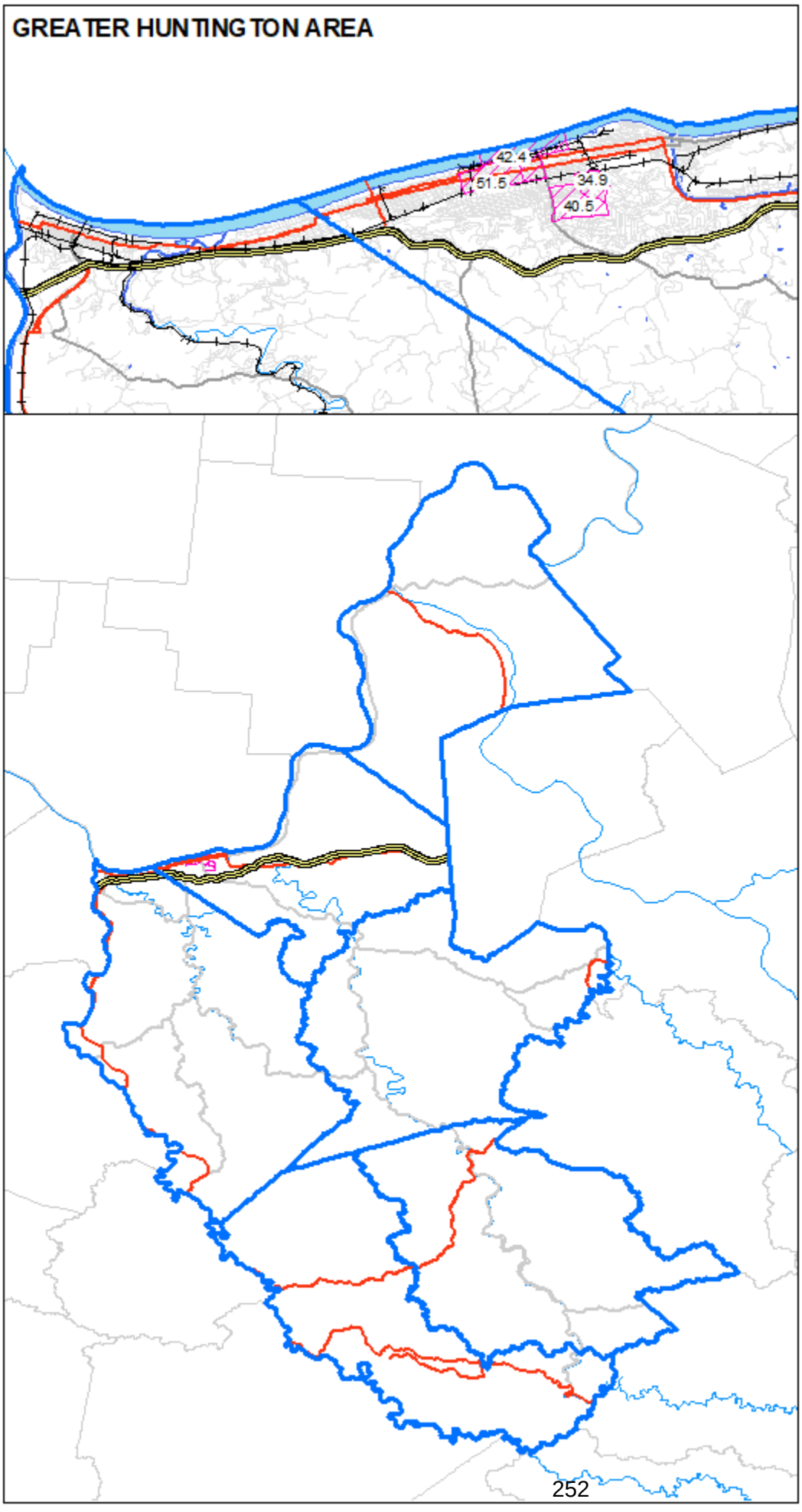
0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



In the aftermath of disasters such as Hurricane Katrina in New Orleans and Hurricane Harvey in Houston, Texas, more affluent (often white) impactees chose to purchase or rebuild in less hazard-prone areas, further concentrating lower-income, often racially segregated populations in hazard-prone areas (Craemer, 2010; Olin, 2021). Regional steering committee representatives were not aware of this having occurred after previous floods (e.g., 1985), though awareness of the possibility can help to prevent it from occurring (to the extent possible) in the future.

Other direct impacts are related to response capabilities. Households with no vehicle can experience difficulty evacuating. The following map shows the relationship between special flood hazard areas and the Census tracts with the highest percentage of households with no vehicle (i.e., tracts with more than 15% of the households having no vehicle). (NOTE: The map zooms as close as possible while still capturing the Census tracts in question.)



REGION 2 PDC HAZARD MITIGATION PLAN

SVI Considerations: Tracts by Lack of Vehicle Access

Data Source(s):
CDC SVI Index (2020)

25% or More w/ No Vehicle Access

0 3 6 12 18 24
Miles

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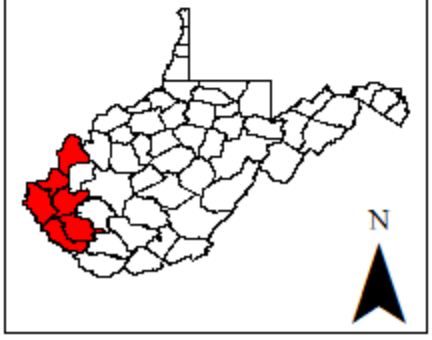


Other effects can be more subtle. Frequent flooding (or the potential for frequent flooding) can depress property values in hazard areas, which can (over time) steer lower-income residents into those areas as a matter of what they can afford. These individuals not only have difficulty affording flood insurance premiums (as noted above), but also homeowner's insurance more generally. The lack of insurance hampers their ability to recover when floods occur.

Previous Occurrences

There have been 175 floods and 223 flash floods in the region since 1996 (NOAA NCEI, 2024). Some of these events are duplicates (i.e., flooding occurred in multiple counties as a result of the same storm system). As with other weather-related data from the NCEI for the region, it is more accurate to examine the number of unique dates with flooding (i.e., 88) or flash flooding (i.e., 130) to determine the per annum estimate. Doing so yields 3.26 floods and 4.81 flash floods, on average, per year. The table below lists the instances of flooding.

PREVIOUS FLOOD OCCURRENCES

Location	*Date*	*Event Type*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Wayne County	1/20/1996	Flood	0	0	$50,000	$0
Mason County	1/20/1996	Flood	0	0	$150,000	$0
Cabell County	1/20/1996	Flood	0	0	$50,000	$0
Mason County	3/2/1997	Flood	0	0	$700,000	$0
Cabell County	3/2/1997	Flood	0	0	$700,000	$0
Wayne County	3/2/1997	Flood	2	0	$500,000	$0
Mason County	1/10/1998	Flood	0	0	$10,000	$0
Mason County	6/29/1998	Flood	0	0	$5,000	$0
Wayne County	2/19/2000	Flood	0	0	$0	$0
Mason County	2/19/2000	Flood	0	0	$0	$0
Cabell County	2/19/2000	Flood	0	0	$0	$0
Logan County	5/18/2001	Flood	2	0	$0	$0
Mason County	1/24/2002	Flood	0	0	$0	$0
Wayne County	3/20/2002	Flood	0	0	$50,000	$0
Mason County	3/20/2002	Flood	0	0	$15,000	$0
Cabell County	3/20/2002	Flood	0	0	$ 200,000	$0
Mason County	4/21/2002	Flood	0	0	$0	$0
Mason County	4/28/2002	Flood	0	0	$0	$0
Mingo County	5/2/2002	Flood	0	0	$4,000,000	$0
Cabell County	2/15/2003	Flood	0	0	$1,000,000	$0
Mingo County	2/15/2003	Flood	0	0	$300,000	$0
Logan County	2/15/2003	Flood	0	0	$400,000	$0
Lincoln County	2/15/2003	Flood	1	0	$2,500,000	$0
Lincoln County	2/22/2003	Flood	0	0	$0	$0

PREVIOUS FLOOD OCCURRENCES						
Location	*Date*	*Event Type*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Mingo County	2/22/2003	Flood	0	0	$0	$0
Logan County	2/22/2003	Flood	0	0	$0	$0
Mason County	9/2/2003	Flood	0	0	$15,000	$0
Lincoln County	9/4/2003	Flood	0	0	$30,000	$0
Logan County	9/4/2003	Flood	0	0	$30,000	$0
Cabell County	11/12/2003	Flood	0	0	$850,000	$0
Wayne County	11/12/2003	Flood	0	0	$400,000	$0
Lincoln County	11/12/2003	Flood	0	0	$5,000,000	$0
Cabell County	11/19/2003	Flood	0	0	$500,000	$0
Lincoln County	11/19/2003	Flood	0	0	$200,000	$0
Wayne County	11/19/2003	Flood	1	0	$300,000	$0
Logan County	11/19/2003	Flood	1	0	$200,000	$0
Lincoln County	2/6/2004	Flood	0	0	$0	$0
Wayne County	2/6/2004	Flood	0	0	$0	$0
Cabell County	3/6/2004	Flood	0	0	$0	$0
Mason County	3/6/2004	Flood	0	0	$0	$0
Lincoln County	3/6/2004	Flood	0	0	$0	$0
Mingo County	6/4/2004	Flood	0	0	$850,000	$0
Logan County	6/4/2004	Flood	0	0	$150,000	$0
Mingo County	6/12/2004	Flood	0	0	$400,000	$0
Logan County	6/12/2004	Flood	0	0	$100,000	$0
Logan County	6/25/2004	Flood	0	0	$0	$0
Mingo County	6/25/2004	Flood	0	0	$25,000	$0
Mason County	9/8/2004	Flood	0	0	$10,000	$0
Cabell County	9/8/2004	Flood	0	0	$50,000	$0
Cabell County	9/17/2004	Flood	0	0	$1,000,000	$0
Mingo County	9/17/2004	Flood	0	0	$250,000	$0
Wayne County	9/17/2004	Flood	0	0	$500,000	$0
Mason County	9/17/2004	Flood	0	0	$500,000	$0
Lincoln County	9/17/2004	Flood	1	0	$125,000	$0
Mason County	11/4/2004	Flood	0	0	$10,000	$0
Mason County	1/8/2005	Flood	0	0	$50,000	$0
Cabell County	1/8/2005	Flood	0	0	$20,000	$0
Wayne County	1/8/2005	Flood	0	0	$10,000	$0
Cabell County	9/1/2006	Flood	0	0	$2,000	$0
Mason County	3/17/2007	Flood	0	0	$5,000	$0
Logan County	4/15/2007	Flood	0	0	$750,000	$0
Mingo County	4/15/2007	Flood	0	0	$600,000	$0
Lincoln County	4/15/2007	Flood	0	0	$200,000	$0
Cabell County	4/15/2007	Flood	0	0	$5,000	$0
Wayne County	12/10/2007	Flood	0	0	$5,000	$0
Cabell County	12/10/2007	Flood	1	0	$30,000	$0
Mason County	3/6/2008	Flood	0	0	$2,000	$0
Cabell County	4/4/2008	Flood	0	0	$0	$0
Mingo County	5/9/2009	Flood	0	0	$24,000,000	$0
Logan County	5/9/2009	Flood	0	0	$25,000.00	$0

PREVIOUS FLOOD OCCURRENCES						
Location	*Date*	*Event Type*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Mason County	2/5/2010	Flood	0	0	$2,000	$0
Lincoln County	2/5/2010	Flood	0	0	$1,000.00	$0
Cabell County	2/5/2010	Flood	0	0	$1,000	$0
Cabell County	5/2/2010	Flood	0	0	$50,000	$0
Mason County	5/2/2010	Flood	0	0	$25,000	$0
Wayne County	5/2/2010	Flood	0	0	$5,000	$0
Mason County	3/10/2011	Flood	0	0	$30,000	$0
Wayne County	3/11/2011	Flood	0	0	$3,000	$0
Cabell County	3/11/2011	Flood	0	0	$25,000	$0
Mingo County	1/31/2013	Flood	0	0	$5,000	$0
Lincoln County	12/6/2013	Flood	0	0	$20,000	$0
Logan County	2/21/2015	Flood	0	0	$20,000	$0
Mingo County	3/4/2015	Flood	0	0	$800,000	$0
Logan County	3/4/2015	Flood	0	0	$400,000	$0
Wayne County	3/4/2015	Flood	0	0	$450,000	$0
Lincoln County	3/4/2015	Flood	0	0	$1,000,000	$0
Cabell County	3/4/2015	Flood	0	0	$750,000	$0
Mason County	3/4/2015	Flood	0	0	$75,000	$0
Lincoln County	4/3/2015	Flood	0	0	$100,000	$0
Cabell County	4/3/2015	Flood	0	0	$200,000	$0
Lincoln County	4/14/2015	Flood	0	0	$20,000	$0
Logan County	4/14/2015	Flood	0	0	$10,000	$0
Lincoln County	5/12/2017	Flood	0	0	$3,000	$0
Mingo County	2/10/2018	Flood	0	0	$2,000	$0
Wayne County	2/11/2018	Flood	0	0	$1,000	$0
Mingo County	2/11/2018	Flood	0	0	$10,000	$0
Logan County	2/11/2018	Flood	0	0	$3,000	$0
Mingo County	2/11/2018	Flood	0	0	$2,000	$0
Cabell County	2/16/2018	Flood	0	0	$1,000	$0
Logan County	2/16/2018	Flood	0	0	$2,000	$0
Wayne County	2/16/2018	Flood	0	0	$20,000	$0
Lincoln County	2/16/2018	Flood	0	0	$2,000	$0
Mason County	2/17/2018	Flood	0	0	$20,000	$0
Cabell County	2/18/2018	Flood	0	0	$0	$0
Cabell County	2/24/2018	Flood	0	0	$0	$0
Mason County	2/25/2018	Flood	0	0	$0	$0
Mason County	4/5/2018	Flood	0	0	$0	$0
Mason County	4/17/2018	Flood	0	0	$0	$0
Cabell County	5/6/2018	Flood	0	0	$10,000	$0
Lincoln County	5/6/2018	Flood	0	0	$2,000	$0
Wayne County	9/23/2018	Flood	0	0	$500	$0
Lincoln County	9/27/2018	Flood	0	0	$4,000	$0
Cabell County	12/20/2018	Flood	0	0	$2,000	$0
Wayne County	12/20/2018	Flood	0	0	$2,000	$0
Mason County	12/20/2018	Flood	0	0	$2,000	$0
Mason County	12/22/2018	Flood	0	0	$2,000	$0

PREVIOUS FLOOD OCCURRENCES						
Location	*Date*	*Event Type*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Mason County	2/14/2019	Flood	0	0	$2,000	$0
Mason County	2/20/2019	Flood	0	0	$2,000	$0
Lincoln County	2/24/2019	Flood	0	0	$2,000	$0
Mingo County	2/24/2019	Flood	0	0	$2,000	$0
Logan County	2/24/2019	Flood	0	0	$2,000	$0
Lincoln County	2/24/2019	Flood	0	0	$2,000	$0
Mason County	2/25/2019	Flood	0	0	$2,000	$0
Wayne County	12/16/2019	Flood	0	0	$2,000	$0
Mason County	12/16/2019	Flood	0	0	$4,000	$0
Lincoln County	12/16/2019	Flood	0	0	$,6000	$0
Lincoln County	12/16/2019	Flood	0	0	$10,000	$0
Cabell County	12/17/2019	Flood	0	0	$4,000	$0
Mingo County	2/6/2020	Flood	0	0	$5,000	$0
Lincoln County	2/11/2020	Flood	0	0	$3,000	$0
Wayne County	2/11/2020	Flood	0	0	$2,000	$0
Mason County	2/12/2020	Flood	0	0	$6,000	$0
Cabell County	2/13/2020	Flood	0	0	$2,000	$0
Mason County	2/13/2020	Flood	0	0	$2,000	$0
Cabell County	2/14/2020	Flood	0	0	$4,000	$0
Lincoln County	5/21/2020	Flood	0	0	$2,000	$0
Cabell County	2/28/2021	Flood	0	0	$5,000	$0
Wayne County	2/28/2021	Flood	0	0	$5,000	$0
Lincoln County	2/28/2021	Flood	0	0	$2,000	$0
Mason County	2/28/2021	Flood	0	0	$3,000	$0
Wayne County	2/28/2021	Flood	0	0	$5,000	$0
Mingo County	2/28/2021	Flood	0	0	$1,000	$0
Lincoln County	2/28/2021	Flood	0	0	$3,000	$0
Lincoln County	3/1/2021	Flood	0	0	$1,000	$0
Cabell County	3/1/2021	Flood	0	0	$12,000	$0
Lincoln County	3/1/2021	Flood	0	0	$10,000	$0
Mingo County	3/1/2021	Flood	0	0	$3,000	$0
Mingo County	3/1/2021	Flood	0	0	$30,000	$0
Logan County	3/1/2021	Flood	0	0	$3,000	$0
Mingo County	3/1/2021	Flood	0	0	$15,000	$0
Lincoln County	3/1/2021	Flood	0	0	$7,000	$0
Wayne County	3/1/2021	Flood	0	0	$10,000	$0
Lincoln County	3/1/2021	Flood	0	0	$5,000	$0
Logan County	3/1/2021	Flood	0	0	$4,000	$0
Mason County	3/1/2021	Flood	0	0	$8,000	$0
Wayne County	3/2/2021	Flood	0	0	$15,000	$0
Cabell County	3/2/2021	Flood	0	0	$15,000	$0
Mason County	3/2/2021	Flood	0	0	$5000	$0
Mason County	3/2/2021	Flood	0	0	$5,000	$0
Mingo County	3/29/2021	Flood	0	0	$5,000	$0
Lincoln County	8/18/2021	Flood	0	0	$500	$0
Cabell County	8/30/2021	Flood	0	0	$6,000	$0

PREVIOUS FLOOD OCCURRENCES						
Location	*Date*	*Event Type*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Mingo County	1/1/2022	Flood	0	0	$1,000	$0
Cabell County	1/1/2022	Flood	0	0	$1,000	$0
Wayne County	1/1/2022	Flood	0	0	$3,000	$0
Cabell County	1/1/2022	Flood	0	0	$3,000	$0
Mason County	1/2/2022	Flood	0	0	$1,000	$0
Wayne County	1/2/2022	Flood	0	0	$1,000	$0
Wayne County	1/9/2022	Flood	0	0	$500	$0
Cabell County	2/3/2022	Flood	0	0	$1,000	$0
Lincoln County	2/4/2022	Flood	0	0	$500	$0
Mason County	2/26/2022	Flood	0	0	$2,000	$0
Lincoln County	5/6/2022	Flood	0	0	$250	$0
Mason County	5/8/2022	Flood	0	0	$2,000	$0
Lincoln County	7/5/2022	Flood	0	0	$200	$0
		Totals	**9**	**0**	**$52,177,450**	**$0**

The table below lists the instances of flash flooding.

PREVIOUS FLASH FLOOD OCCURRENCES						
Location	*Date*	*Event Type*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Lincoln County	1/19/1996	Flash Flood	0	0	$5,000	$0
Wayne County	5/5/1996	Flash Flood	0	0	$20,000	$0
Cabell County	5/15/1996	Flash Flood	0	0	$25,000	$0
Mingo County	5/15/1996	Flash Flood	0	0	$300,000	$0
Lincoln County	5/15/1996	Flash Flood	0	0	$150,000	$0
Wayne County	5/15/1996	Flash Flood	0	0	$150,000	$0
Logan County	5/15/1996	Flash Flood	1	0	$3,500,000	$0
Logan County	5/21/1996	Flash Flood	0	0	$5,000	$0
Cabell County	6/8/1996	Flash Flood	0	0	$35,000	$0
Cabell County	6/23/1996	Flash Flood	1	0	$700,000	$0
Mason County	6/23/1996	Flash Flood	0	0	$250,000	$0
Lincoln County	7/2/1996	Flash Flood	0	0	$10,000	$0
Cabell County	7/31/1996	Flash Flood	0	0	$100,000	$0
Mason County	7/31/1996	Flash Flood	0	0	$100,000	$0
Wayne County	3/1/1997	Flash Flood	0	0	$2,000,000	$0
Lincoln County	3/1/1997	Flash Flood	0	0	$700,000	$0
Mason County	3/1/1997	Flash Flood	0	0	$300,000	$0
Wayne County	3/2/1997	Flash Flood	0	0	$100,000	$0
Cabell County	3/2/1997	Flash Flood	0	0	$1,000,000	$0
Lincoln County	3/2/1997	Flash Flood	0	0	$15,000	$0
Lincoln County	3/3/1997	Flash Flood	0	0	$5,000	$0
Lincoln County	6/1/1997	Flash Flood	0	0	$150,000	$0
Wayne County	6/2/1997	Flash Flood	0	0	$10,000	$0
Logan County	6/26/1997	Flash Flood	0	0	$8,000	$0
Mingo County	7/2/1997	Flash Flood	0	0	$250,000	$0

PREVIOUS FLASH FLOOD OCCURRENCES						
Location	*Date*	*Event Type*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Cabell County	5/24/1998	Flash Flood	0	0	$275,000	$0
Lincoln County	5/24/1998	Flash Flood	0	0	$10,000	$0
Lincoln County	6/15/1998	Flash Flood	0	0	$30,000	$0
Mason County	6/15/1998	Flash Flood	0	0	$5,000	$0
Cabell County	7/18/1998	Flash Flood	0	0	$85,000	$0
Mingo County	7/30/1999	Flash Flood	0	0	$15,000	$0
Wayne County	7/30/1999	Flash Flood	0	0	$5,000	$0
Mason County	2/18/2000	Flash Flood	0	0	$50,000	$0
Cabell County	2/18/2000	Flash Flood	0	0	$400,000	$0
Cabell County	7/10/2000	Flash Flood	0	0	$50,000	$0
Cabell County	7/29/2000	Flash Flood	0	0	$5,000	$0
Logan County	7/30/2000	Flash Flood	0	0	$25,000	$0
Wayne County	7/31/2000	Flash Flood	0	0	$5,000	$0
Mason County	8/9/2000	Flash Flood	0	0	$5,000	$0
Mason County	8/24/2000	Flash Flood	0	0	$15,000	$0
Wayne County	5/18/2001	Flash Flood	0	0	$10,000	$0
Lincoln County	5/18/2001	Flash Flood	0	0	$200,000	$0
Cabell County	5/19/2001	Flash Flood	0	0	$15,000	$0
Lincoln County	5/22/2001	Flash Flood	0	0	$10,000	$0
Logan County	5/22/2001	Flash Flood	0	0	$10,000	$0
Wayne County	6/5/2001	Flash Flood	0	0	$20,000	$0
Lincoln County	6/6/2001	Flash Flood	0	0	$10,000	$0
Mingo County	7/29/2001	Flash Flood	0	0	$10,000	$0
Logan County	7/29/2001	Flash Flood	0	0	$15,000	$0
Mingo County	5/2/2002	Flash Flood	0	0	$300,000	$0
Logan County	5/2/2002	Flash Flood	0	0	$250,000	$0
Mingo County	6/1/2002	Flash Flood	0	0	$5,000	$0
Logan County	7/19/2002	Flash Flood	0	0	$800,000	$0
Logan County	7/27/2002	Flash Flood	0	0	$25,000	$0
Wayne County	5/5/2003	Flash Flood	0	0	$130,000	$0
Lincoln County	6/14/2003	Flash Flood	0	0	$25,000	$0
Logan County	6/14/2003	Flash Flood	0	0	$20,000	$0
Cabell County	6/14/2003	Flash Flood	0	0	$25,000	$0
Mingo County	6/16/2003	Flash Flood	0	0	$500,000	$0
Logan County	6/16/2003	Flash Flood	0	0	$4,000,000	$0
Wayne County	6/16/2003	Flash Flood	0	0	$350,000	$0
Mason County	6/16/2003	Flash Flood	0	0	$100,000	$0
Cabell County	6/16/2003	Flash Flood	0	0	$50,000	$0
Logan County	6/17/2003	Flash Flood	0	0	$20,000	$0
Wayne County	6/17/2003	Flash Flood	0	0	$10,000	$0
Mason County	6/19/2003	Flash Flood	0	0	$250,000	$0
Lincoln County	7/9/2003	Flash Flood	0	0	$250,000	$0
Wayne County	7/9/2003	Flash Flood	0	0	$350,000	$0
Logan County	11/12/2003	Flash Flood	0	0	$100,000	$0
Mingo County	11/12/2003	Flash Flood	0	0	$100,000	$0
Mason County	5/27/2004	Flash Flood	0	0	$40,000	$0

PREVIOUS FLASH FLOOD OCCURRENCES						
Location	*Date*	*Event Type*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Mingo County	5/30/2004	Flash Flood	0	0	$9,000,000	$0
Logan County	5/30/2004	Flash Flood	0	0	$7,000,000	$0
Logan County	7/25/2004	Flash Flood	0	0	$500,000	$0
Lincoln County	7/25/2004	Flash Flood	0	0	$200,000	$0
Logan County	4/30/2005	Flash Flood	0	0	$40,000	$0
Wayne County	4/30/2005	Flash Flood	0	0	$5,000	$0
Mingo County	4/30/2005	Flash Flood	0	0	$20,000	$0
Lincoln County	4/30/2005	Flash Flood	0	0	$5,000	$0
Mingo County	8/19/2005	Flash Flood	0	1	$225,000	$0
Wayne County	7/13/2006	Flash Flood	0	0	$900,000	$0
Mingo County	8/7/2006	Flash Flood	0	0	$5,000	$0
Logan County	8/11/2006	Flash Flood	0	0	$700,000	$0
Wayne County	8/30/2006	Flash Flood	0	0	$50,000	$0
Cabell County	8/30/2006	Flash Flood	0	0	$150,000	$0
Mingo County	6/2/2009	Flash Flood	0	0	$10,000	$0
Mingo County	6/11/2009	Flash Flood	0	0	$2,000	$0
Wayne County	8/2/2009	Flash Flood	0	0	$10,000	$0
Cabell County	8/10/2009	Flash Flood	0	0	$100,000	$0
Wayne County	8/12/2009	Flash Flood	0	0	$75,000	$0
Lincoln County	5/17/2010	Flash Flood	0	0	$250,000	$0
Logan County	5/17/2010	Flash Flood	0	0	$50,000	$0
Logan County	5/18/2010	Flash Flood	0	0	$10,000	$0
Logan County	6/12/2010	Flash Flood	0	0	$4,000,000	$0
Mingo County	6/12/2010	Flash Flood	0	0	$600,000	$0
Cabell County	7/20/2010	Flash Flood	0	0	$15,000	$0
Wayne County	7/20/2010	Flash Flood	0	0	$150,000	$0
Lincoln County	7/21/2010	Flash Flood	0	0	$20,000	$0
Cabell County	8/11/2010	Flash Flood	0	0	$200,000	$0
Lincoln County	4/9/2011	Flash Flood	0	0	$300,000	$0
Logan County	4/9/2011	Flash Flood	0	0	$175,000	$0
Wayne County	4/16/2011	Flash Flood	0	0	$10,000	$0
Lincoln County	4/16/2011	Flash Flood	0	0	$5,000	$0
Cabell County	5/10/2011	Flash Flood	0	0	$200,000	$0
Wayne County	5/10/2011	Flash Flood	0	0	$200,000	$0
Wayne County	5/14/2011	Flash Flood	0	0	$50,000	$0
Wayne County	7/30/2011	Flash Flood	0	0	$5,000	$0
Wayne County	7/30/2011	Flash Flood	0	0	$125,000	$0
Logan County	3/2/2012	Flash Flood	0	0	$10,000	$0
Mingo County	3/2/2012	Flash Flood	0	0	$10,000	$0
Lincoln County	3/2/2012	Flash Flood	0	0	$350,000	$0
Wayne County	3/2/2012	Flash Flood	0	0	$100,000	$0
Logan County	3/15/2012	Flash Flood	0	0	$5,500,000	$0
Mingo County	3/15/2012	Flash Flood	0	0	$900,000	$0
Lincoln County	3/15/2012	Flash Flood	0	0	$450,000	$0
Mason County	5/4/2012	Flash Flood	0	0	$75,000	$0
Wayne County	7/1/2013	Flash Flood	0	0	$75,000	$0

PREVIOUS FLASH FLOOD OCCURRENCES						
Location	*Date*	*Event Type*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Mason County	7/19/2013	Flash Flood	0	0	$125,000	$0
Cabell County	4/29/2014	Flash Flood	0	0	$15,000	$0
Mingo County	5/13/2014	Flash Flood	0	0	$5,000	$0
Cabell County	6/4/2014	Flash Flood	0	0	$20,000	$0
Lincoln County	6/4/2014	Flash Flood	0	0	$5,000	$0
Cabell County	8/22/2014	Flash Flood	0	0	$350,000	$0
Wayne County	8/22/2014	Flash Flood	0	0	$50,000	$0
Mingo County	8/22/2014	Flash Flood	0	0	$200,000	$0
Logan County	8/22/2014	Flash Flood	0	0	$15,000	$0
Lincoln County	9/4/2014	Flash Flood	0	0	$10,000	$0
Wayne County	4/3/2015	Flash Flood	1	0	$450,000	$0
Lincoln County	4/3/2015	Flash Flood	0	0	$400,000	$0
Logan County	4/3/2015	Flash Flood	0	0	$10,000	$0
Lincoln County	6/16/2015	Flash Flood	0	0	$5,000	$0
Mason County	6/26/2015	Flash Flood	0	0	$25,000	$0
Mingo County	7/5/2015	Flash Flood	0	0	$10,000	$0
Logan County	7/5/2015	Flash Flood	0	0	$10,000	$0
Cabell County	7/13/2015	Flash Flood	0	0	$0	$0
Mason County	7/14/2015	Flash Flood	0	0	$50,000	$0
Lincoln County	7/14/2015	Flash Flood	0	0	$500,000	$0
Cabell County	7/14/2015	Flash Flood	0	0	$25,000	$0
Cabell County	7/14/2015	Flash Flood	0	0	$100,000	$0
Cabell County	7/21/2015	Flash Flood	0	0	$10,000	$0
Wayne County	12/25/2015	Flash Flood	0	0	$20,000	$0
Lincoln County	12/25/2015	Flash Flood	0	0	$50,000	$0
Cabell County	4/27/2016	Flash Flood	0	0	$10,000	$0
Logan County	5/1/2016	Flash Flood	0	0	$10,000	$0
Mingo County	5/1/2016	Flash Flood	0	0	$10,000	$0
Lincoln County	5/1/2016	Flash Flood	0	0	$5,000	$0
Logan County	5/1/2016	Flash Flood	0	0	$2,000	$0
Lincoln County	5/1/2016	Flash Flood	0	0	$25,000	$0
Logan County	5/1/2016	Flash Flood	0	0	$2,000	$0
Mingo County	5/2/2016	Flash Flood	0	0	$5,000	$0
Lincoln County	6/27/2016	Flash Flood	0	0	$475,000	$0
Logan County	6/27/2016	Flash Flood	0	0	$20,000	$0
Cabell County	7/14/2016	Flash Flood	1	0	$500,000	$0
Cabell County	7/14/2016	Flash Flood	0	0	$0	$0
Mingo County	7/27/2016	Flash Flood	0	0	$10,000	$0
Cabell County	8/17/2016	Flash Flood	0	0	$10,000	$0
Mason County	3/1/2017	Flash Flood	0	0	$2,000	$0
Cabell County	5/20/2017	Flash Flood	0	0	$1,000	$0
Lincoln County	5/24/2017	Flash Flood	0	0	$2,000	$0
Mingo County	5/24/2017	Flash Flood	0	0	$5,000	$0
Logan County	6/19/2017	Flash Flood	0	0	$25,000	$0
Cabell County	6/23/2017	Flash Flood	0	0	$5,000	$0
Cabell County	6/23/2017	Flash Flood	0	0	$2,000	$0

PREVIOUS FLASH FLOOD OCCURRENCES						
Location	*Date*	*Event Type*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Mingo County	7/14/2017	Flash Flood	0	0	$2,000	$0
Cabell County	7/28/2017	Flash Flood	0	0	$2,000	$0
Cabell County	7/28/2017	Flash Flood	0	0	$7,000	$0
Cabell County	5/28/2018	Flash Flood	0	0	$2,000	$0
Cabell County	7/1/2018	Flash Flood	0	0	$1,000	$0
Cabell County	9/9/2018	Flash Flood	0	0	$1,000	$0
Cabell County	9/9/2018	Flash Flood	0	0	$0	$0
Mason County	5/31/2019	Flash Flood	0	0	$5,000	$0
Cabell County	6/2/2019	Flash Flood	0	0	$2,000	$0
Lincoln County	7/7/2019	Flash Flood	0	0	$2,000	$0
Lincoln County	7/22/2019	Flash Flood	0	0	$1,000	$0
Cabell County	7/22/2019	Flash Flood	0	0	$1,000	$0
Wayne County	7/22/2019	Flash Flood	0	0	$1,000	$0
Logan County	7/22/2019	Flash Flood	0	0	$1,000	$0
Cabell County	8/7/2019	Flash Flood	0	0	$500	$0
Mingo County	3/13/2020	Flash Flood	0	0	$4,000	$0
Lincoln County	6/30/2020	Flash Flood	0	0	$4,000	$0
Logan County	6/30/2020	Flash Flood	0	0	$4,000	$0
Cabell County	7/30/2020	Flash Flood	0	0	$5,000	$0
Wayne County	3/18/2021	Flash Flood	0	0	$5,000	$0
Mason County	6/9/2021	Flash Flood	0	0	$4,000	$0
Lincoln County	6/10/2021	Flash Flood	0	0	$1,000,000	$0
Cabell County	6/10/2021	Flash Flood	0	0	$10,000	$0
Logan County	6/11/2021	Flash Flood	0	0	$15,000	$0
Lincoln County	6/11/2021	Flash Flood	0	0	$8,000	$0
Logan County	6/11/2021	Flash Flood	0	0	$8,000	$0
Cabell County	7/1/2021	Flash Flood	0	0	$3,000	$0
Lincoln County	8/15/2021	Flash Flood	0	0	$10,000	$0
Lincoln County	8/15/2021	Flash Flood	0	0	$20,000	$0
Lincoln County	8/18/2021	Flash Flood	0	0	$3,000	$0
Lincoln County	8/18/2021	Flash Flood	0	0	$2,000	$0
Cabell County	8/18/2021	Flash Flood	0	0	$10,000	$0
Lincoln County	8/18/2021	Flash Flood	0	0	$3,000	$0
Wayne County	8/19/2021	Flash Flood	0	0	$5,000	$0
Wayne County	8/19/2021	Flash Flood	0	0	$5,000	$0
Mason County	8/19/2021	Flash Flood	0	0	$8,000	$0
Mason County	8/19/2021	Flash Flood	0	0	$3,000	$0
Mason County	8/19/2021	Flash Flood	0	0	$3,000	$0
Mingo County	8/30/2021	Flash Flood	0	0	$4,000	$0
Mingo County	8/30/2021	Flash Flood	0	0	$3,000	$0
Mingo County	8/30/2021	Flash Flood	0	0	$20,000	$0
Lincoln County	8/30/2021	Flash Flood	0	0	$5,000	$0
Wayne County	8/30/2021	Flash Flood	0	0	$4,000	$0
Wayne County	8/30/2021	Flash Flood	0	0	$4,000	$0
Mingo County	1/1/2022	Flash Flood	0	0	$2,000	$0
Wayne County	5/6/2022	Flash Flood	0	0	$165,000	$0

PREVIOUS FLASH FLOOD OCCURRENCES						
Location	*Date*	*Event Type*	*Deaths*	*Injuries*	*Property Damage*	*Crop Damage*
Cabell County	5/6/2022	Flash Flood	1	0	$900,000	$0
Lincoln County	5/6/2022	Flash Flood	0	0	$1,000	$0
Lincoln County	5/6/2022	Flash Flood	0	0	$1,000	$0
Wayne County	7/5/2022	Flash Flood	0	0	$250	$0
Cabell County	7/18/2022	Flash Flood	0	0	$500	$0
Wayne County	7/18/2022	Flash Flood	0	0	$250	$0
Mingo County	7/26/2022	Flash Flood	0	0	$500,000	$0
Mingo County	7/27/2022	Flash Flood	0	0	$500	$0
Wayne County	7/29/2022	Flash Flood	0	0	$200	$0
Cabell County	7/31/2022	Flash Flood	0	0	$500	$0
Wayne County	7/31/2022	Flash Flood	0	0	$500	$0
Mingo County	8/1/2022	Flash Flood	0	0	$30,000	$0
Cabell County	8/10/2022	Flash Flood	0	0	$500	$0
Wayne County	8/10/2022	Flash Flood	0	0	$2,000	$0
		Totals	**5**	**1**	**$58,100,700**	**0**

Loss and Damages

Floods and flash floods have caused $110,278,150 in damages in the region since 1996 (NOAA NCEI, 2024), which translates to an average loss per year of 4,084,376 (or $277,081 per event). Further, West Virginia statewide Total Exposure in Floodplains (TEIF) data can support loss estimation. The table below shows potential losses by structure use type, as it appears in the TEIF data, for each jurisdiction in the region.

TEIF DATA SUMMARY – WEST VIRGINIA PDC 2											
Community Name	RESIDENTIAL				COMMERCIAL NON-RESIDENTIAL		OTHER NON-RESIDENTIAL		TOTAL BUILDING VALUE		
	#	*% Count*	*Value ($)*	*% Value*	*#*	*Value ($)*	*#*	*Value ($)*	*#*	*Value ($)*	*Rank[1]*
Barboursville	31	70.5%	$2,025K	25.1%	12	$5,116K	1	$938K	44	$8,079K	11
Cabell County*	1712	90.7%	$102,502K	49.4%	135	$32,365K	40	$72,683K	1887	$207,550K	2
Huntington**	879	96.0%	$84,329K	69.2%	26	$6,156K	11	$31,313K	916	$121,798K	1**
Milton	317	75.7%	$19,505K	34.5%	81	$10,219K	21	$26,835K	419	$56,560K	2
CABELL	**2939**	**90.0%**	**$208,361K**	**52.9%**	**254**	**$53,856K**	**73**	**$131,770K**	**3266**	**$393,986K**	**1**
Hamlin	110	94.0%	$3,339K	85.6%	3	$156K	4	$404K	117	$3,899K	19
Lincoln County*	2402	93.9%	$82,723K	68.2%	79	$6,542K	78	$32,079K	2559	$121,344K	4
West Hamlin	39	90.7%	$817K	78.5%	4	$224K	0	$0K	43	$1,040K	23
LINCOLN	**2551**	**93.8%**	**$86,879K**	**68.8%**	**86**	**$6,922K**	**82**	**$32,482K**	**2719**	**$126,283K**	**5**
Chapmanville	45	66.2%	$5,456K	10.1%	20	$3,687K	3	$44,810K	68	$53,954K	3
Logan	1	25.0%	$164K	9.3%	3	$1,601K	0	$0K	4	$1,764K	22

TEIF DATA SUMMARY – WEST VIRGINIA PDC 2											
Community Name	RESIDENTIAL				COMMERCIAL NON-RESIDENTIAL		OTHER NON-RESIDENTIAL		TOTAL BUILDING VALUE		
	#	% Count	Value ($)	% Value	#	Value ($)	#	Value ($)	#	Value ($)	Rank[1]
Logan County*	4761	90.7%	$167,448K	63.3%	361	$41,200K	125	$55,882K	5247	$264,530K	1
Man	108	65.9%	$5,144K	47.1%	48	$3,837K	8	$1,933K	164	$10,914K	8
Mitchell Heights	30	100.0%	$4,204K	100.0%	0	$0K	0	$0K	30	$4,204K	17
West Logan	13	72.2%	$309K	77.5%	5	$90K	0	$0K	18	$399K	25
LOGAN	**4958**	**89.6%**	**$182,725K**	**54.4%**	**437**	**$50,415K**	**136**	**$102,625K**	**5531**	**$335,765K**	**2**
Hartford	192	92.4%	$8,296K	92.4%	6	$159K	11	$536K	209	$8,991K	10
Henderson	114	85.1%	$2,648K	70.6%	18	$914K	2	$187K	134	$3,748K	20
Leon	28	87.5%	$692K	75.3%	0	$0K	4	$227K	32	$919K	24
Mason	102	93.6%	$3,600K	46.5%	5	$135K	2	$3,999K	109	$7,734K	13
Mason County*	831	95.0%	$37,482K	90.0%	28	$3,264K	16	$893K	875	$41,639K	6
New Haven	69	97.2%	$4,406K	44.3%	0	$0K	2	$5,550K	71	$9,956K	9
Point Pleasant	64	92.8%	$2,619K	53.3%	4	$817K	1	$1,475K	69	$4,911K	16
MASON	**1400**	**93.4%**	**$59,742K**	**76.7%**	**61**	**$5,288K**	**38**	**$12,867K**	**1499**	**$77,898K**	**6**
Delbarton	108	82.4%	$3,267K	45.3%	16	$969K	7	$2,974K	131	$7,210K	14
Gilbert	52	66.7%	$2,105K	31.5%	23	$1,910K	3	$2,662K	78	$6,677K	15
Kermit	67	83.8%	$2,868K	70.6%	10	$852K	3	$512K	80	$4,061K	18
Matewan	45	88.2%	$1,406K	17.8%	2	$95K	4	$6,398K	51	$7,900K	12
Mingo County*	3189	94.0%	$92,552K	59.0%	122	$13,444K	81	$50,856K	3393	$156,852K	4
Williamson	31	77.5%	$1,300K	6.3%	5	$14,296K	4	$5,148K	40	$20,743K	5
MINGO	**3492**	**92.6%**	**$103,498K**	**50.8%**	**178**	**$31,565K**	**102**	**$68,551K**	**3773**	**$203,614K**	**4**
Ceredo	63	77.8%	$4,066K	35.5%	13	$1,958K	5	$5,440K	81	$11,465K	7
Fort Gay	73	90.1%	$2,346K	10.1%	4	$161K	4	$20,734K	81	$23,241K	4
Huntington**	207	89.2%	$9,500K	38.3%	18	$1,501K	7	$13,808K	232	$24,808K	1**
Kenova	85	97.7%	$2,439K	91.1%	1	$38K	1	$201K	87	$2,678K	21
Wayne	177	88.1%	$5,860K	39.6%	15	$1,830K	9	$7,105K	201	$14,795K	6
Wayne County*	2009	90.5%	$86,360K	53.2%	140	$18,315K	70	$57,557K	2219	$162,231K	3
WAYNE	**2614**	**90.1%**	**$110,572K**	**46.2%**	**191**	**$23,803K**	**96**	**$104,845K**	**2901**	**$239,219K**	**3**
SUMMARY	**17,954**	**91.6%**	**$751,776K**	**58.3%**	**1,207**	**$171,849K**	**527**	**$453,140K**	**19,689**	**$1,376,765K**	
1**: Parts of Huntington in each county represented separately, ranking is based on the sum of values in the city:											
Huntington**	1086	94.6%	$93,828K	64.0%	44	$7,657K	18	$45,121K	1148	$146,607K	1

Future Occurrences

Floods can occur at any time but are most likely to occur between March and September. While this trend is expected to continue, intense severe storms at various times in the year may result in floods at uncommon times. The Intergovernmental Panel on Climate Change (IPCC) notes that the most likely impact of climate change on West Virginia will be an

increase in extreme precipitation (IPCC, n.d.). Interestingly, a secondary impact of that precipitation is a quick-rising flood. Further, the IPCC lists increased flooding as a primary impact in the Midwest and a significant impact in the Northeast (which includes West Virginia in the IPCC report).

Future Climate Considerations

Many climate researchers anticipate periods of heavy rain becoming more common as the future climate changes. The *Fourth National Climate Assessment*[1] suggests that rainfall in the most severe of rain events increased across the United States between 1958 and 2016 (USGCRP, 2018). Hersher (2022) reports that floods have become larger in rivers and streams throughout the Northeast and Midwest, while frequencies have decreased in other parts of the country. FEMA further reports that, generally, floodplain inundation is expected to increase by approximately 45% by the end of the 21st century (AECOM, n.d.).

Researchers have also documented that a warmer atmosphere holds more water, and as such, it can release that water (USGCRP, 2018). Climate assessments often point out potential changes in seasonal patterns, which can influence the number of rain-on-snow events (USGCRP, 2018) that occur. Fluctuations in precipitation, to include more precipitation and increased instances of locally contained heavy downpours may contribute to the runoff flooding noted above.

Risk Assessment

This section summarizes the vulnerability of the region to flooding. The planning and development council conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding floods.

[1] Researchers released the *Fifth National Climate Assessment* as the 2023 update was unfolding. The next update will include its recommendations.

PUBLIC SENTIMENT, FLOOD					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Flood	1 (2.50%)	8 (20.00%)	21 (52.50%)	10 (25.00%)	40
In the past ten years, do you remember this hazard occurring in your community?				35 (87.50%)	40
Have you noticed an increase in the occurrences or intensity of this hazard?				19 (47.50%)	40
Have you noticed a decrease in the occurrences or intensity of this hazard?				2 (5.00%)	40

The following table assigns point totals based on the methodology identified in Section 2.2: Describe Hazards above.

FLOOD RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	5	Excessive (Will occur during a year)	Per NCEI records, the region experiences approximately 3.26 floods and 4.81 flash floods per year.
Response	3	One week	Not all floods require a major response, but larger floods require, at minimum, a multi-day response.
Onset	3	6-12 hours	Though storm systems are forecasted, the accuracy of estimates necessary to determine actionable flood data is much closer to the onset of the event.
Magnitude	1	Localized (less than 10% of land area affected)	Flooding typically occurs in SFHAs near creeks and streams. Flash floods, though not bound geographically like riverine flooding, typically occur quickly in localized areas. Though destructive, neither event impacts more than 10% of the region's land area on a per-incident basis.
Business	2	One week	Some floods, like the 1985 flood, impacted and closed businesses, However, *community-wide* business closure would be rare. Planners selected one week as a mid-point between the experiences of non-impacted and impacted businesses.
Human	3	Medium (multiple severe injuries)	Per NCEI, there have been nine deaths from flooding, five deaths from flash flooding, and one injury from flash flooding since 1996. However, flooding is destructive and can cause significant injuries and loss of life.
Property	2	10-25% of property affected	Flood/flash flood events may not impact 10-25% of the building stock on a per-incident basis, but property damage is typically substantial due to infrastructure impacts.
Totals	**19**	**Medium**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks are more or less prevalent as compared to the rest of the planning area. See Appendix 5 for jurisdictional risks pertaining to flooding.

2.2.9 Hazardous Materials Incident

Hazardous material releases can contaminate air, water, and soils and have the potential to cause injury or death. Dispersion can take place rapidly when transported by water and wind. While often accidental, releases can occur as a result of human carelessness, intentional acts, or natural hazards. When caused by natural hazards, these incidents are known as secondary events.				
Risk  HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	At any time	**Risk Ranking:**	Medium
	Warning Time:	Less than 6 hours	**Type of Hazard:**	Technological
	Probability:	Excessive (Will occur in a year)	**Impact:**	Localized (Less than 10% of land area affected)
	Disaster Declarations:	EM-3366-WV (2014)		

Hazard Overview

According to the National Fire Protection Association (NFPA) 400 (Hazardous Materials Code), a hazardous material is matter or energy that, when released, is capable of creating harm to people, the environment, or property, including weapons of mass destruction, as well as any other criminal use of hazardous materials, such as illicit labs, environmental crimes, or industrial sabotage. Hazardous materials come in the form of explosives, flammable and combustible substances, poisons, and radioactive materials. They are in nearly every home and most hospitals and factories.

Incidents involving chemical releases are common and (anecdotally) on the rise. Before World War II, these events primarily affected employees of specific occupations, but the expansion of the chemical industry and increased industrialization has led to danger to people outside work environments. The manufacture, storage, transportation, and utilization of large amounts of varying types of chemicals and growing population densities in areas near chemical manufacturing have contributed to an increase in the exposed population.

Hazardous material incidents can occur because of an industrial accident during production, while in storage, in transportation, during use or disposal, or as part of an intentional attack. They can also occur due to (or in tandem with) natural hazard events, such as earthquakes, floods, windstorms, or winter storms (Planning for Hazards, n.d.). The large-scale release of hazardous materials in combination with natural hazard events can increase the

spread of contamination to large geographic areas and amplify the potential for long-term impacts on human and ecological health.

Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, in 1980 to provide broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA established prohibitions and requirements concerning closed and abandoned hazardous waste sites, provided for the liability of persons responsible for releasing hazardous wastes at these sites, and established a trust to provide for cleanup when no responsible party could be identified.

The U.S. Environmental Protection Agency's (USEPA) Toxic Release Inventory (TRI) program tracks the management of certain toxic chemicals that pose a threat to human health and the environment. U.S. facilities report the amounts of chemicals released into the environment or managed through recycling, energy recovery, and treatment. Since its inception in 1986, the TRI program has provided citizens access to information about potentially hazardous chemicals in their communities.

Location and Extent

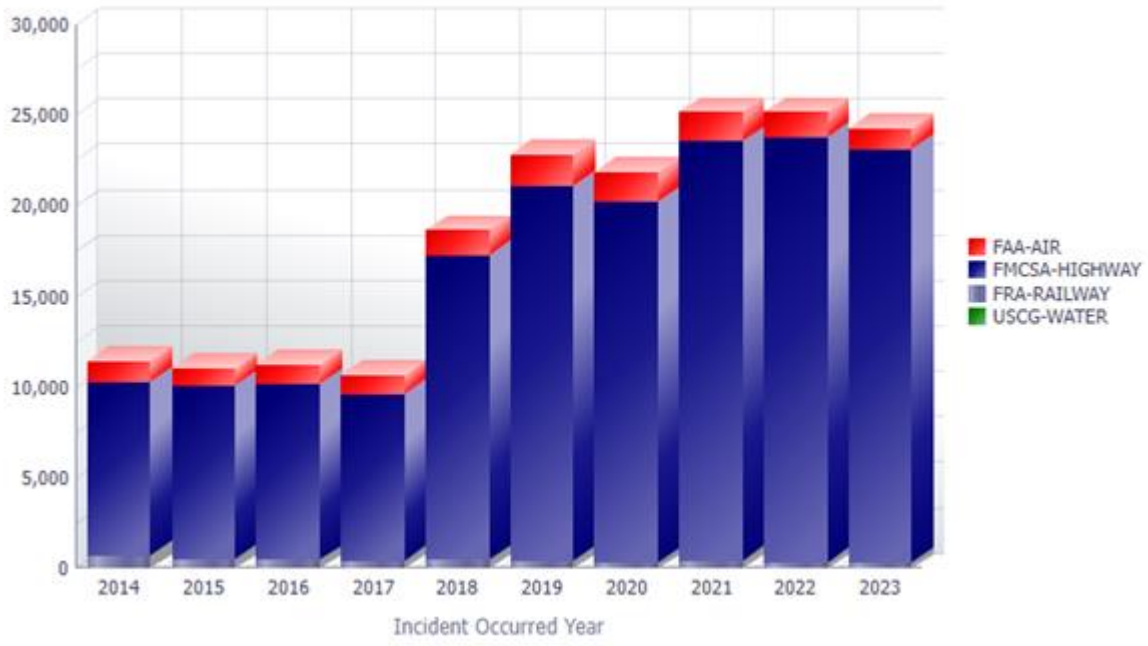
Hazardous material releases can be localized events, such as minor releases at a fixed site, or regional events, such as radiological incidents. Several factors determine a community's risk of hazardous material releases, including the size of the community, the location and number of sites containing hazardous materials, and the community's proximity to mobile hazardous material risk areas, such as roads and railways.

Regulators classify hazardous materials in several ways. The U.S. Department of Transportation (USDOT) organizes substances into nine classes, as shown below. Other agencies further categorize hazardous materials, but the nine USDOT classifications are consistent across most reporting agencies.

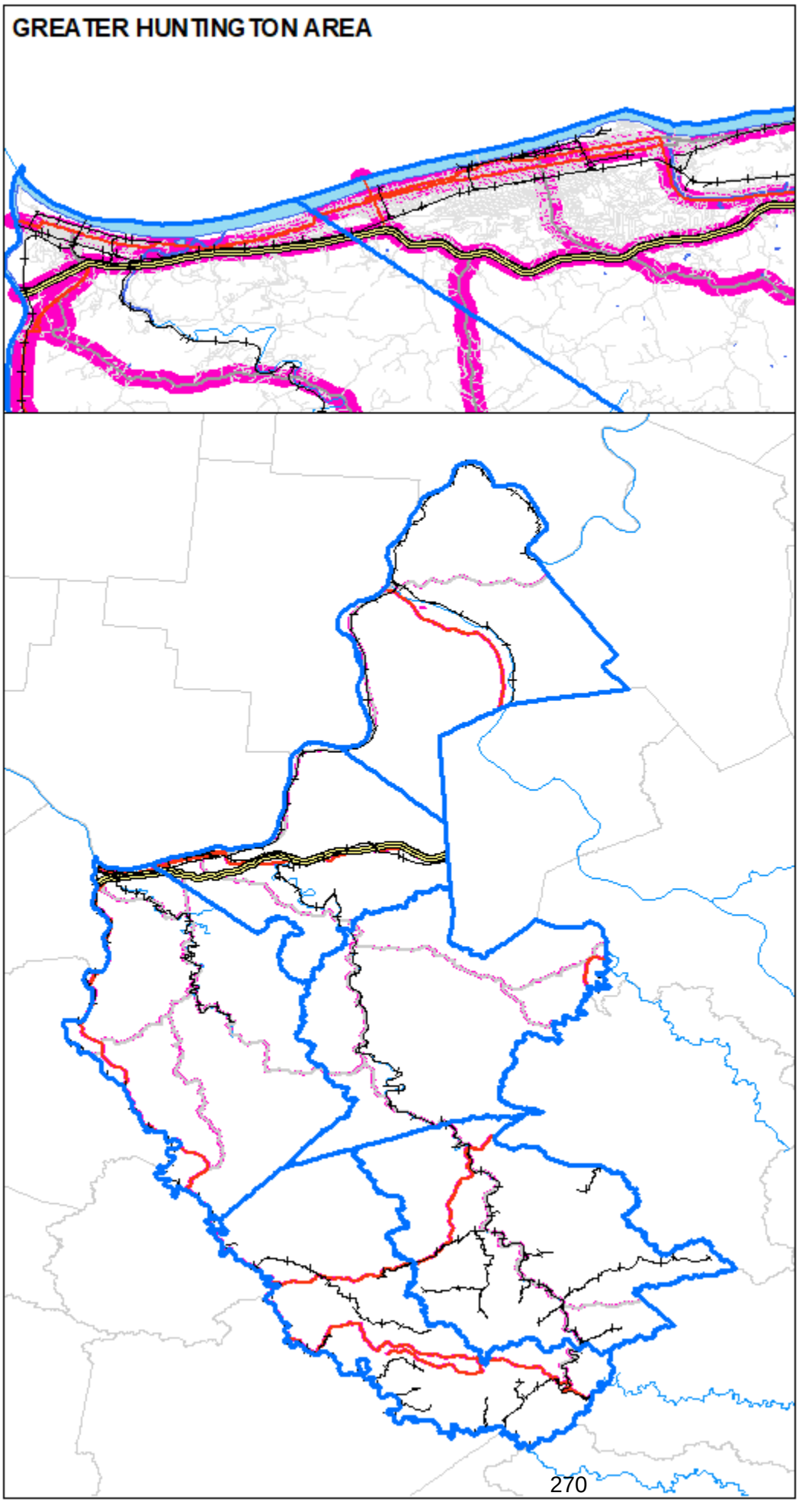
U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION SYSTEM	
Hazard Classification	*Category*
Class 1	Explosives
Class 2	Gases
Class 3	Flammable (and combustible) liquids
Class 4	Flammable solids
Class 5	Oxidizing substances and organic peroxides
Class 6	Toxic substances
Class 7	Radioactive materials

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION SYSTEM	
Hazard Classification	*Category*
Class 8	Corrosive substances
Class 9	Miscellaneous dangerous goods, hazardous materials, and articles

The most common mode in which hazardous material incidents occur is highway transport (PHMSA, 2024). The following image shows the breakdown of incidents by mode (between 2014 and 2023).



The region has several primary thoroughfares, with Interstate 64 in Cabell, and Wayne Counties the most notable for hazardous material transport. U.S. Route 119 in Lincoln, Logan, and Mingo Counties may also see significant hazardous material transport. Other thoroughfares in other counties may see hazardous materials, but most will be to, from, and amongst covered facilities operating in those or contiguous counties. The following map shows the most likely thoroughfares to see hazardous material traffic. As a spatial reference, it shows a buffer of 1,000' from these routes that estimates potential isolation areas should an incident occur at any point along these routes. (NOTE: Given the scale of the map that allows for a view of the entire region, the buffer area is difficult to see.)



REGION 2 PDC HAZARD MITIGATION PLAN

Major Roadway Buffers

Data Source(s):
U.S. Census
(Tiger Data)

1,000' Buffer, Major Roadways

Railways

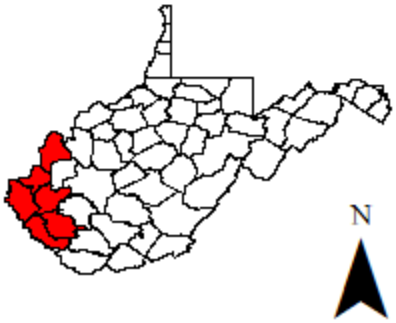
Interstate 64

US Routes

State Routes

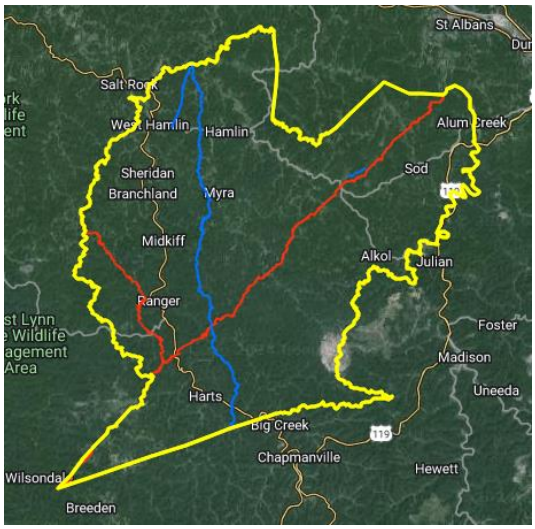
0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



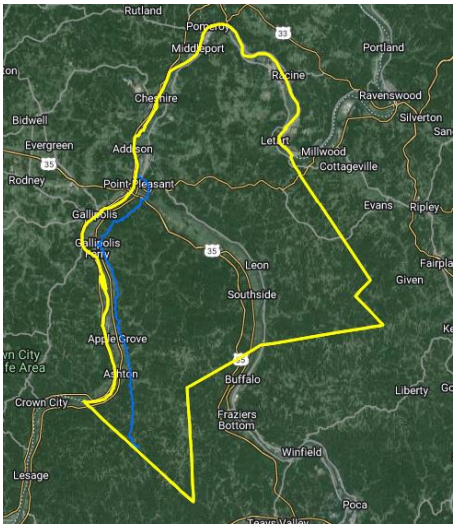
Companies also transport hazardous commodities via pipelines. The most recognizable commodity shipped via pipeline is natural gas. According to the USDOT's National Pipeline Mapping System (NPMS), several natural gas transmission lines traverse the region. The images below are taken from the NPMS Public Viewer (PHMSA, 2023b). The blue lines represent natural gas transmission lines, while red lines represent hazardous liquid pipelines. Significantly, the NPMS does not identify distribution and feeder gas lines.

Cabell County



Lincoln County

Logan County



Mason County

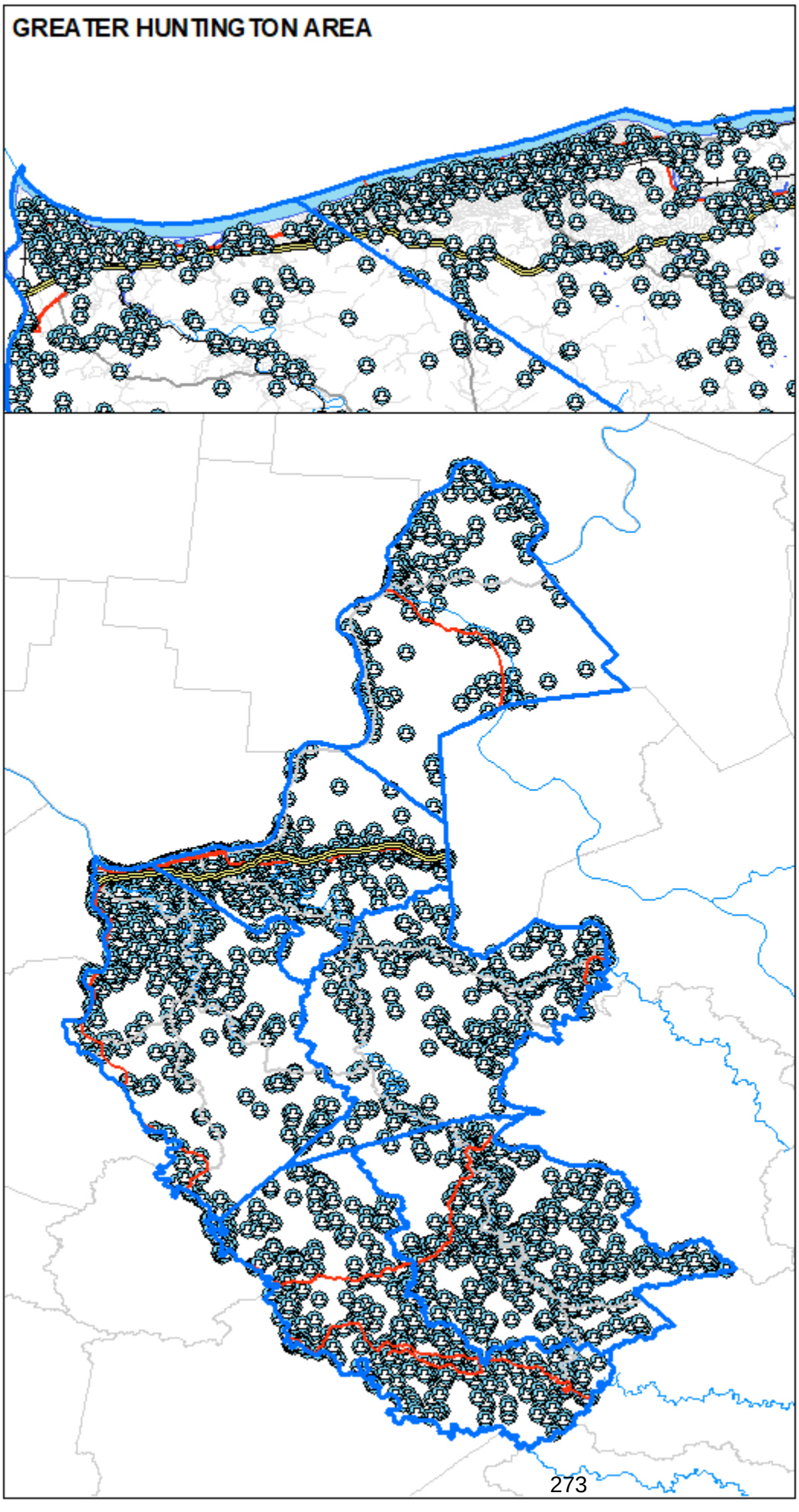
Mingo County

Wayne County

The HVL lines through western Lincoln County transport natural gas liquids, while the line through the center of the county is abandoned. The HVL lines in Wayne County also carry natural gas liquids.

Other common transport modes for hazardous materials, per the graphic above, include airway, railway, and waterway. Huntington Tri-State Airport located in Wayne County has terminals for commodity shippers. As such hazardous material incident may occur during storage, loading and unloading, and during transport. CSX Transportation and Norfolk Southern (NS) are Class 1 freight rail operators that have extensive networks in the region. All six counties have CSX and NS lines, and there is extensive rail infrastructure in the densely built areas of Ceredo, Huntington, and Kenova. Finally, the Port of Huntington Tri-State is a 100-mile designation along the Ohio River including Cabell, Mason, and Wayne Counties. Over 80 million tons of cargo (including hazardous materials) are moved from the port each year.

Hazardous materials incidents may occur at fixed facilities. As noted per the CERCLA paragraphs above, facilities using or storing hazardous materials report to the six LEPCs serving the region (i.e., Cabell and Wayne Counties share an LEPC). Generally, these facilities are located along major transportation routes. The USEPA also monitors and regulates sites that use or produce hazardous materials. The USEPA's Enforcement and Compliance History Online (ECHO) database lists regulated sites. The list is far more extensive than the list of facilities that annually report the counties' local emergency planning committees (LEPCs). The ECHO database identifies facilities with permitted discharges, those against whom the USEPA has taken enforcement actions, etc. (USEPA, 2023a). There are 1,685 facilities in the region that are (or have been) regulated by the USEPA, as shown in the map below.



REGION 2 PDC HAZARD MITIGATION PLAN

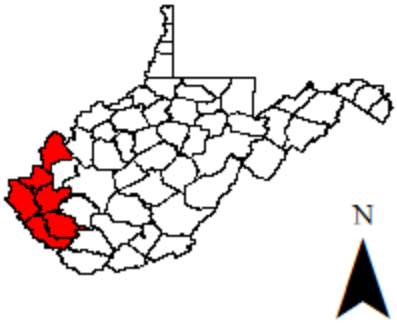
USEPA-Permitted Facilities

Data Source(s):
USEPA ECHO Database

ECHO Facilities

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



Impacts and Vulnerability

The effects of a hazardous material release on the environment can be devastating. On land or in bodies of water, animals and plants in affected areas can die or experience reproductive complications (USEPA, 2022). Certain hazardous materials have the potential to explode or cause a fire, threatening all organisms close to the incident.

Hazardous materials vary significantly in the health risks they pose to humans. According to the USEPA, hazardous substances may irritate the skin or eyes, make breathing difficult, cause headaches or nausea, or cause other illnesses (USEPA, 2022). Additional health risks include thermal harm, radiological harm, asphyxiation, chemical harm, biological harm, or mechanical harm.

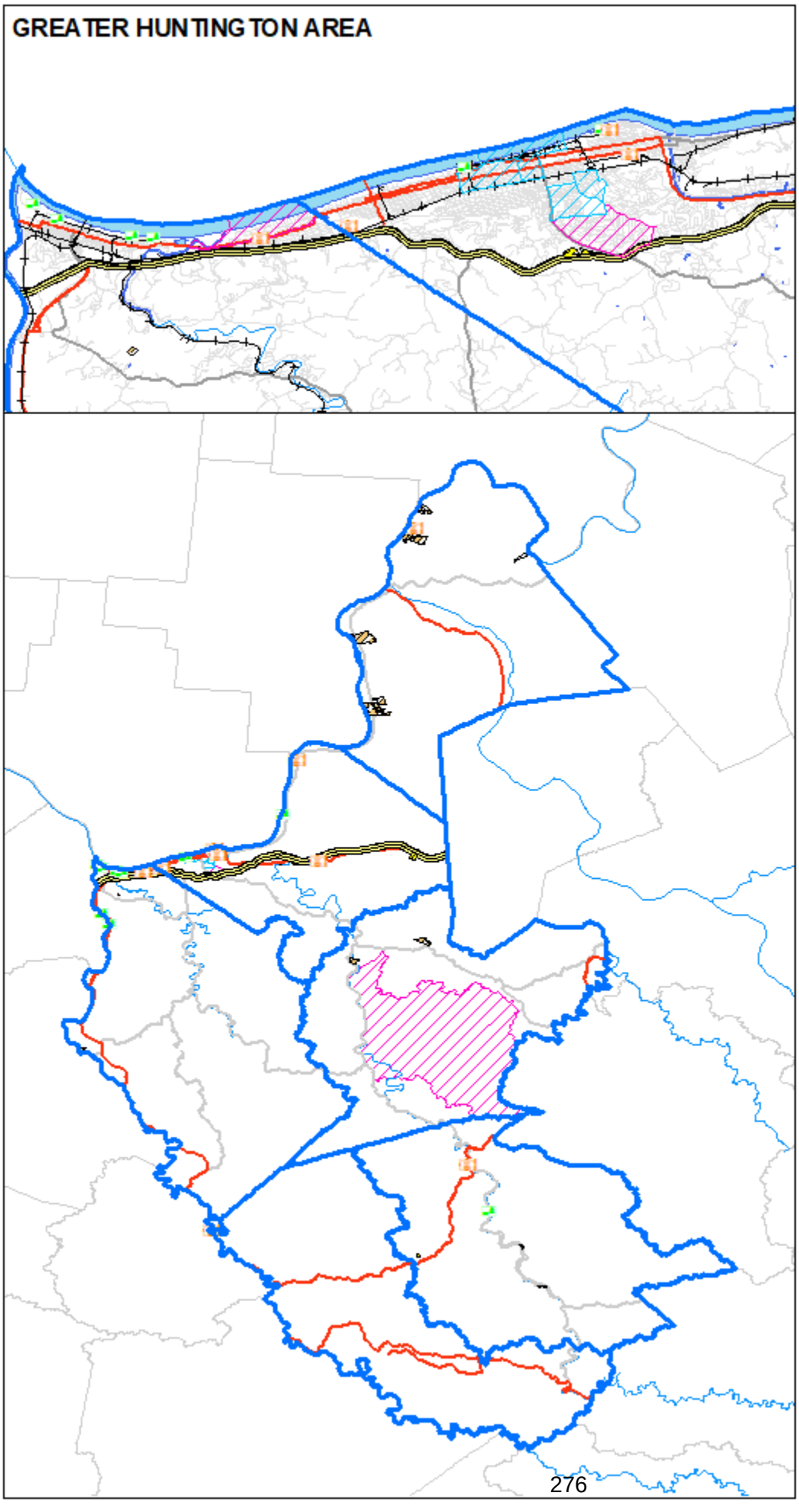
- Thermal Harm: Thermal harm results from exposure to temperature extremes. Thermal injuries can be external (from contact or proximity to a fire or heat source) or internal (from inhaling fumes or heated air). Thermal injuries can also include frostbite from contact with low-temperature hazardous materials.
- Radiological Harm: Radiological harm results from exposure to radioactive materials. Different types of radiation have different energy levels, and not all are dangerous. The radiation that threatens humans is ionizing radiation, which can damage living cells and DNA. Examples of sources of ionizing radiation are medical isotopes used for diagnostic and therapeutic purposes, X-rays, and some survey equipment.
- Asphyxiation: Asphyxiation results from exposure to materials that reduce oxygen levels that may cause suffocation. Asphyxiation can occur in confined spaces or with highly concentrated chemical asphyxiants, such as carbon dioxide and methane. Asphyxiants are generally odorless and tasteless and displace so much oxygen from the atmosphere that the lungs cannot deliver enough oxygen to tissues, and the victim slowly suffocates.
- Chemical Harm: Chemical harm results from chemical exposure, including poisons and corrosives. Injuries and illnesses vary by material.
- Biological Harm: Biological harm results from exposure to biological materials, including bacteria, viruses, and toxins. Symptoms of biological harm are often delayed because the pathogens require time to multiply sufficiently and cause illness in the person carrying the pathogen.
- Mechanical Harm: Mechanical harm results from exposure to, or contact with, fragmentation or debris scattered because of a pressure release, explosion, or boiling liquid expanding vapor explosion (BLEVE) event. Predictable reactions occur during and immediately following an explosion, which routinely injures or kills anyone nearby. The

degree of harm closely relates to the size of the blast and proximity to the device. Sources of injury include fragmentation and flying debris, blast overpressure, and secondary blast injuries.

Social Vulnerability Considerations

Social vulnerability concerns with respect to hazardous materials are nuanced. Persons with a lower proficiency in English may not understand regular public outreach from facilities, warnings, or evacuation/shelter-in-place instructions. Households without a vehicle may experience difficulty evacuating.

Understanding other issues, though, requires a longer historical consideration. Numerous studies have shown linkages between higher occupancy of zip codes and communities near landfills, hazardous waste sites, and high numbers of chemical and manufacturing facilities by low-income and minority populations (Abel, 2008; Allen, 2001; Benjamin & Lee, 1987; Chakraborty & Armstrong, 1997; Daniels & Friedman, 1999; Goldman & Fitton, 1994; Kershaw, Gower, Rinner, & Campbell, 2013; Pastor, Morello-Frosch, & Sadd, 2005). Some of these authors posit that a de-gentrification occurs, whereby families of means leave those areas over time. Each of the region's counties have industrial parts that may be home to large commercial facilities and some light manufacturing. The following map overlays the locations of the industrial parks on Census tracts with the largest numbers of persons with lower English proficiency and no vehicle in the region.



REGION 2 PDC HAZARD MITIGATION PLAN

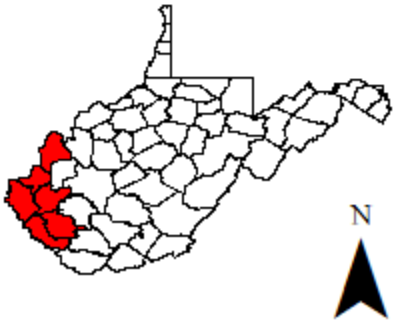
SVI Considerations: Industrial Areas with Key Variables

Data Source(s):
CDC SVI Index (2020)

- Industrial Buildings
- Industrial Sites
- Industrial Parks
- Intermodal Terminal Facilities
- 25% or More w/ No Vehicle Access
- 1% or More w/ Limited Eng. Proficiency

0 3 6 12 18 24 Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



Previous Occurrences

The Pipeline and Hazardous Materials Safety Administration (PHMSA) maintains data on the frequency of hazardous materials incidents during rail, air, and highway transport. PHMSA reports 79 incidents in the region between 1990 and 2023 (PHMSA, 2023a). These incidents appear in the table below.

HAZARDOUS MATERIAL INCIDENTS, 1990-2023							
Carrier Reporter Name	*Community*	*Date*	*Commodity Name*	*Hazardous Class*	*Hazmat Fatalities*	*Total Damages*	*Mode of Transportation*
Norfolk & Western Railway Co.	Kenova	3/6/1990	Acetone	3	0	$0	Rail
Roadway Express, Inc.	Kenova	4/5/1990	Flammable liquids, n.o.s.	3	0	$25	Highway
Norfolk & Western Railway Co.	Kenova	11/18/1990	Ammonia anhydrous	2	0	$0	Rail
Holland Motor Express, Inc.	Kenova	5/1/1991	Paint	3	0	$0	Highway
Norfolk & Western Railway Co.	Kenova	5/24/1991	Hazardous substance, liquid or solid, n.o.s.	9	0	$0	Rail
Norfolk & Western Railway Co.	Kenova	6/4/1991	Ammonia anhydrous	2	0	$0	Rail
Exxon	Kenova	6/18/1991	Gasoline	3	0	$105	Highway
Williamson Oil Company	Crum	2/4/1992	Gasoline	3	0	$93,500	Highway
Norfolk & Western Railway Co.	Kenova	3/9/1992	Acetone	3	0	$0	Rail
Norfolk & Western Railway Co.	Kenova	5/27/1992	Ammonia anhydrous	2	0	$0	Rail
Holland Motor Express, Inc.	Kenova	6/5/1992	Corrosive liquids, n.o.s.	8	0	$0	Highway
CSX Transportation	Glenwood	6/8/1992	Hydrogen chloride	2	0	$0	Rail
Norfolk & Western Railway Co.	Kenova	9/15/1992	Hazardous substance, liquid or solid, n.o.s.	9	0	$0	Rail
Norfolk Southern Railroad	Kenova	9/2/1993	Hazardous substance, liquid or solid	9	0	$0	Rail
Norfolk Southern Railroad	Kenova	10/7/1993	Ammonia anhydrous	2	0	$0	Rail
Rogers Petroleum Service, Inc.	Dunlow	5/16/1994	Fuel oil, no. 1, 2, 4, 5, or 6	2	0	$5,413	Highway
CSX Transportation	Point Pleasant	12/31/1994	Hydrochloric acid, solution	8	0	$0	Rail
CSX Transportation	Gallipolis Ferry	1/13/1995	Hydrochloric acid, solution	8	0	$0	Rail
Norfolk Southern Railroad	Kenova	6/1/1995	Other regulated substances, liquid, n.o.s.	9	0	$0	Rail
Norfolk Southern Railroad	Kenova	6/28/1995	Denatured alcohol	3	0	$0	Rail
CSX Transportation	Mason	5/19/1996	Hydrochloric acid, solution	8	0	$21,200	Rail
Norfolk Southern Railroad	Kenova	3/7/1998	Other regulated substances, liquid, n.o.s.	9	0	$0	Rail
CSX Transportation	Henderson	11/5/1998	Hydrochloric acid, solution	8	0	$434,800	Rail
CSX Transportation	Point Pleasant	9/2/1999	Other regulated substances, liquid, n.o.s.	9	0	$0	Rail
Federal Express Corporation	Huntington	8/19/2000	Paint	3	0	$0	Air

HAZARDOUS MATERIAL INCIDENTS, 1990-2023							
Carrier Reporter Name	*Community*	*Date*	*Commodity Name*	*Hazardous Class*	*Hazmat Fatalities*	*Total Damages*	*Mode of Transportation*
Federal Express Corporation	Huntington	9/4/2000	Paint	3	0	$0	Air
CSX Transportation	Mason (Town)	10/2/2000	Hydrochloric acid, solution	8	0	$0	Rail
American Freightways Company, Inc.	Kenova	1/26/2001	Corrosive liquid, basic, inorganic, n.o.s.	8	0	$180	Highway
Federal Express Corporation	Huntington	3/13/2001	Methyl ethyl ketone	3	0	$0	Air
Reagent Chemical & Research	Henderson	5/1/2001	Hydrochloric acid, solution	8	0	$1,200	Highway
Federal Express Corporation	Huntington	6/25/2001	Environmentally hazardous substances, liquid, n.o.s.	9	0	$0	Air
FedEx Freight, Inc.	Kenova	8/27/2002	Paint	3	0	$300	Highway
Federal Express Corporation	Huntington	8/29/2002	Air, compressed	2	0	$0	Air
Quality Carriers, Inc.	Prichard	9/5/2002	Isopropanol or isopropyl alcohol	3	0	$0	Highway
Norfolk Southern Railroad	Kenova	1/29/2003	Petroleum gases	2	0	$0	Rail
Rogers Petroleum Service, Inc.	Fort Gay	6/6/2003	Fuel oil, no. 1, 2, 4, 5, or 6	2	0	$30,000	Highway
Quality Carriers, Inc.	Gallipolis Ferry	1/17/2004	Environmentally hazardous substances, liquid, n.o.s.	9	0	$0	Highway
FedEx Freight, Inc.	Kenova	5/26/2004	Xylenes	3	0	$90	Highway
Federal Express Corporation	Huntington	8/26/2004	Nitrogen, refrigerated liquid	2	0	$0	Air
Federal Express Corporation	Huntington	9/1/2004	Gas oil	3	0	$0	Air
Federal Express Corporation	Huntington	8/1/2005	Air, compressed	2	0	$0	Air
Jevic Transportation, Inc.	Prichard	12/27/2005	Printing ink,	3	0	$0	Highway
Federal Express Corporation	Huntington	3/31/2006	Diesel fuel	3	0	$0	Air
Fedex Freight East, Inc.	Kenova	12/5/2006	Paint	3	0	$0	Highway
FedEx Freight East, Inc.	Kenova	3/27/2007	Paint	3	0	$0	Highway
Federal Express Corporation	Huntington	10/5/2009	Sodium hydroxide, solution	8	0	$0	Air
Federal Express Corporation	Huntington	11/27/2009	Phosphoric acid solution	8	0	$0	Air
Disttech	Kenova	3/9/2010	Maleic anhydride	8	0	$8,000	Highway
Norfolk Southern Railway Company	Arbuckle	5/20/2010	Ammonium nitrate	5	0	$0	Rail
Quality Carriers, Inc.	Gallipolis Ferry	6/1/2010	Phenol solutions	6	0	$0	Highway
Federal Express Corporation	Huntington	2/2/2012	Engines internal combustion	9	0	$0	Air

HAZARDOUS MATERIAL INCIDENTS, 1990-2023							
Carrier Reporter Name	*Community*	*Date*	*Commodity Name*	*Hazardous Class*	*Hazmat Fatalities*	*Total Damages*	*Mode of Transportation*
Norfolk Southern Railway Co	Kenova	7/5/2017	Liquefied petroleum gas	2	0	$0	Rail
R+L Paramount Transportation Systems, Inc.	Gallipolis Ferry	5/3/2018	Corrosive liquid, acidic, inorganic, n.o.s.	8	0	$2,500	Highway
R+L Paramount Transportation Systems, Inc.	Gallipolis Ferry	5/9/2018	Sodium nitrite	5	0	$3,000	Highway
R+L Paramount Transportation Systems, Inc.	Gallipolis Ferry	5/25/2018	Batteries	8	0	$2,000	Highway
Greenwood Motor Lines, Inc.	Gallipolis Ferry	12/3/2018	Printing ink	3	0	$0	Highway
Greenwood Motor Lines, Inc.	Gallipolis Ferry	12/4/2018	Paint	3	0	$0	Highway
FedEx Freight, Inc.	Kenova	12/20/2018	Paint related material	3	0	$0	Highway
R&L Carriers Shared Services, LLC	Gallipolis Ferry	6/20/2019	Hydrochloric acid	8	0	$6,800	Highway
Greenwood Motor Lines, Inc.	Gallipolis Ferry	7/17/2019	Paint	3	0	$0	Highway
R&L Carriers Shared Services, LLC	Gallipolis Ferry	9/26/2019	Storage battery, wet	8	0	$4,500	Highway
Federal Express Corporation	Huntington	11/15/2019	Petroleum distillates, n.o.s.	3	0	$0	Air
FedEx Freight, Inc.	Kenova	3/3/2020	Paint related material	3	0	$0	Highway
R&L Carriers Shared Services, LLC	Gallipolis Ferry	3/17/2020	Corrosive liquids, toxic, n.o.s.	8	0	$3,750	Highway
R&L Carriers Shared Services, LLC	Gallipolis Ferry	3/26/2020	Corrosive liquids, flammable, n.o.s.	8	0	$5,500	Highway
Quality Carriers, Inc.	Kenova	6/15/2020	Maleic anhydride, molten	8	0	$0	Highway
Norfolk Southern Corporation	Kenova	8/14/2020	LPG	2	0	$0	Rail
FedEx Freight, Inc.	Kenova	12/22/2020	Ethyl mercaptan	3	0	$0	Highway
Fedex Freight, Inc.	Kenova	3/10/2021	Paint related material	3	0	$0	Highway
Greenwood Motor Lines, Inc.	Gallipolis Ferry	3/30/2021	Paint	3	0	$0	Highway
Greenwood Motor Lines, Inc.	Gallipolis Ferry	6/4/2021	Paint	3	0	$0	Highway
Greenwood Motor Lines, Inc.	Gallipolis Ferry	7/29/2021	Sodium hydroxide, solution	8	0	$0	Highway
Greenwood Motor Lines, Inc.	Gallipolis Ferry	10/4/2021	Paint	3	0	$0	Highway
Greenwood Motor Lines, Inc.	Gallipolis Ferry	10/29/2021	Paint	3	0	$0	Highway
R&L Carriers Shared Services, LLC	Gallipolis Ferry	2/15/2022	Sulfuric acid	8	0	3$,750	Highway
R&L Carriers Shared Services, LLC	Gallipolis Ferry	4/19/2022	Corrosive liquid, basic, inorganic, n.o.s.	8	0	$5,000	Highway

HAZARDOUS MATERIAL INCIDENTS, 1990-2023							
Carrier Reporter Name	*Community*	*Date*	*Commodity Name*	*Hazardous Class*	*Hazmat Fatalities*	*Total Damages*	*Mode of Transportation*
FedEx Freight, Inc.	Kenova	6/17/2022	Flammable liquids, n.o.s.	3	0	$0	Highway
FedEx Freight, Inc.	Kenova	9/21/2022	Xylenes	3	0	$0	Highway
R&L Carriers Shared Services, LLC	Gallipolis Ferry	9/1/2023	Paint	3	0	$0	Highway
				Totals	**0**	**$1,066,413**	

Loss and Damages

Hazardous material incidents can occur anywhere chemicals are stored or transported. Hazardous material incidents have resulted in $1,006,413 in damages and cleanup throughout the region in the past 33 years (PHMSA, 2023a). Using the total damage divided by the number of events (i.e., $1,006,413/79), participating jurisdictions can expect damages of approximately $12,739 per event. Data further indicates the region experiences 2.39 incidents per year.

Data is also available nationally regarding loading/unloading incidents at fixed facilities. According to a report prepared for the Federal Motor Carrier Safety Administration, the average non-explosion loading/unloading incident results in losses of $5,000 (Battelle, 2001). Though it is difficult to extrapolate that figure to an annualized loss estimate, it provides a site-specific point of reference for future planning.

Future Occurrences[1]

Hazardous material incidents are difficult to predict. While it is safe to assume that incidents will occur in the region, it is impossible to predict when or where they may happen. The property damage, loss of life, or environmental damage of future occurrences depends on the location, the material, and the quantity released.

As noted above, a large number of transportation-based hazardous material incidents occur on roadways, which makes the primary thoroughfares and surrounding areas the most likely to experience a future hazardous material incident. Nationally, Class 3 flammable liquids comprise, by far, the most hazmat shipments (USDOT BTS, 2017, p. 75) and are involved in most incidents (PHMSA, 2024a).

Risk Assessment

This section summarizes the vulnerability of the region to hazardous material incidents. The planning and development council conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding hazardous material incidents.

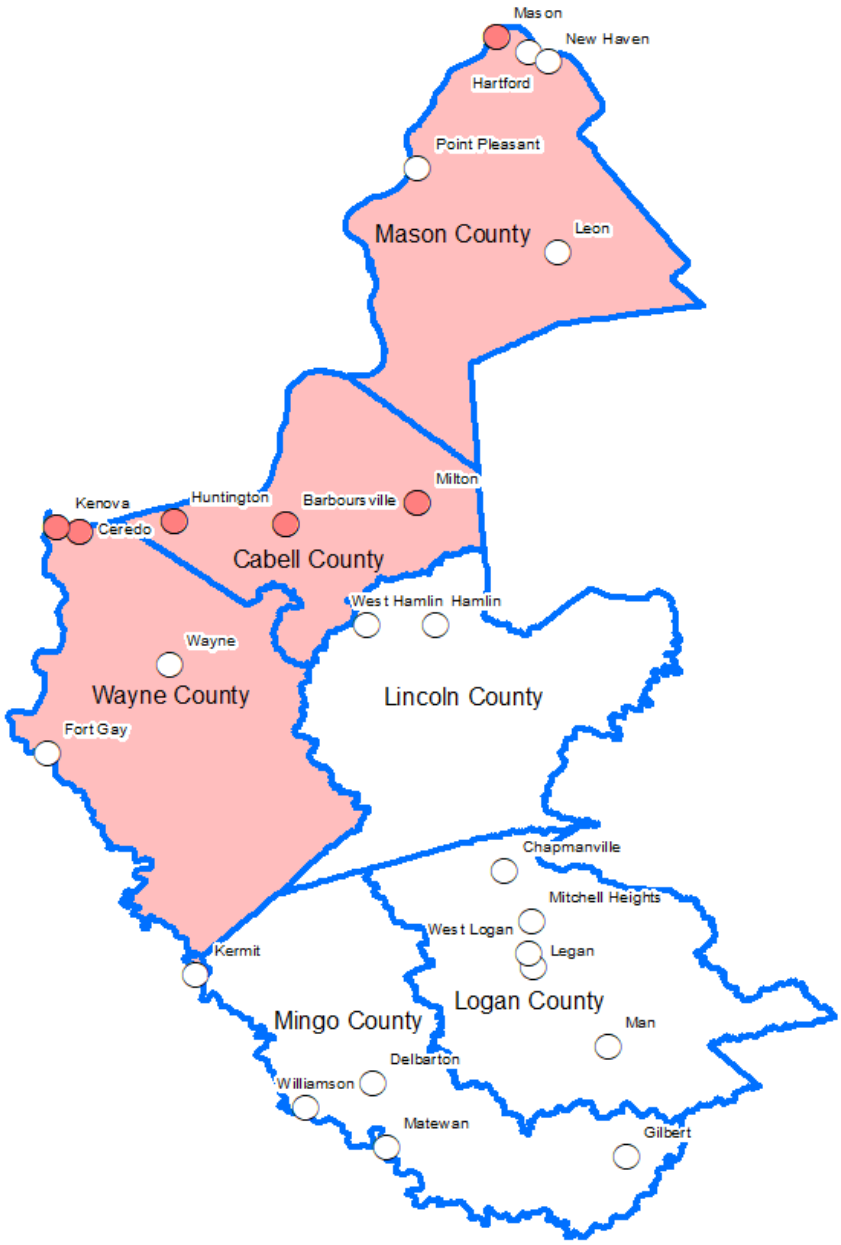
[1] Future climate considerations are not included because hazardous materials incidents are technological hazards.

PUBLIC SENTIMENT, HAZARDOUS MATERIAL INCIDENTS					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Hazardous Material Incident	8 (20.00%)	20 (50.00%)	11 (27.50%)	1 (2.50%)	40
In the past ten years, do you remember this hazard occurring in your community?				7 (17.50%)	40
Have you noticed an increase in the occurrences or intensity of this hazard?				4 (10.00%)	40
Have you noticed a decrease in the occurrences or intensity of this hazard?				4 (10.00%)	40

The following table assigns point totals based on the methodology identified in Section 2.2: Describe Hazards above.

HAZARDOUS MATERIAL INCIDENTS RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	5	Excessive (Will occur during a year)	Using previous data, hazardous material incidents affect the region 2.39 times per annum
Response	2	One day	Most hazardous material incidents are cleared within one day.
Onset	4	Less than 6 hours	There is usually no warning before a hazardous material incident.
Magnitude	1	Localized (less than 10% of land area affected)	Hazardous material incidents are localized and typically effect the immediate surrounding area.
Business	1	Less than 24 hours	Most hazardous material incidents will not affect the economy of the region.
Human	2	Low (some injuries)	There is historic precedent for injuries resulting from hazardous material incidents in the region.
Property	1	Less than 10% of property affected	Hazardous material incidents are localized events.
Totals	**16**	**Medium**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks are more or less prevalent as compared to the rest of the planning area. The following map identifies those multi-jurisdictional risks with respect to hazardous material incidents. Those labels not underlaid by a shaded drop shadow are not more or less at risk of hazardous material incidents. Those with red drop shadows are more at risk; those with green are less at risk. Planners made determinations based on the number of industries in the jurisdiction and its proximity to I-64, which sees extensive hazardous material transport.


Mason
New Haven
Hartford
Point Pleasant
Mason County
Leon
Milton
Kenova
Huntington
Barboursville
Ceredo
Cabell County
West Hamlin
Hamlin
Wayne
Wayne County
Lincoln County
Fort Gay
Chapmanville
Mitchell Heights
West Logan
Kermit
Logan
Logan County
Mingo County
Man
Delbarton
Williamson
Matewan
Gilbert

2.2.10 Landslide & Land Subsidence

<table>
<tr><td colspan="4">Landslides occur when dry rock, soil, or debris move down a slope; they can be small or massive in size. Land subsidence refers to the sinking of the group, often caused by the removal of water, oil, gas, or mineral resources from the ground.</td></tr>
<tr><td rowspan="4">Risk
 
</td><td>Period of Occurrence:</td><td>At any time. Increased following heavy rain, or construction activity. Increased subsidence where karst terrain, mining & groundwater extraction occur.</td><td>Risk Ranking: Medium</td></tr>
<tr><td>Warning Time:</td><td>Ranges from no warning to months</td><td>Type of Hazard: Natural</td></tr>
<tr><td>Probability:</td><td>Frequent (Will occur annually)</td><td>Impact: Minor (Less than 10% of land area affected)</td></tr>
<tr><td>Disaster Declarations:</td><td colspan="2">EM-3052-WV (1977)
DR-1132-WV (1996)
DR-1168-WV (1997)
DR-1319-WV (2000)
DR-1378-WV (2001)
DR-1410-WV (2002)
DR-1455-WV (2003)
DR-1474-WV (2003)
DR-1500-WV (2004)
DR-1522-WV (2004)
DR-1536-WV (2004)
DR-1558-WV (2004)
DR-1669-WV (2007)
DR-1838-WV (2009)
WV-00012 (SBA) (2009)
DR-1918-WV (2010)
WV-00020 (SBA) (2010)
DR-4059-WV (2012)
DR-4061-WV (2012)
WV-00023 (SBA) (2012)
WV-00027 (SBA) (2012)
DR-4210-WV (2015)
DR-4219-WV (2015)
DR-4221-WV (2015)
DR-4236-WV (2015)
S3934 (USDA FSA) (2015)
DR-4273-WV (2016)
DR-4359-WV (2018)
S5322 (USDA FSA) (2022)
KY-00091 (SBA) (2022)</td></tr>
</table>

Hazard Overview

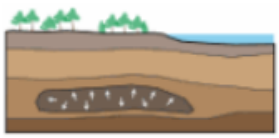
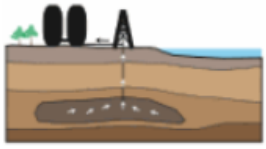
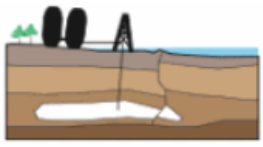
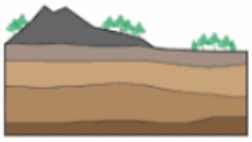
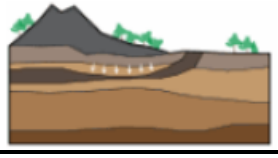
Landslides involve the movement of debris sliding uncontrollably down a slope. Landslides may be localized, or massive in size, and can move at high rates of speed. In West Virginia, landslides are common after heavy rainfall or a snow melt event, and when heavy equipment operates at the top edge of a steep slope. Landslides can involve debris flows, rockfalls, and toppling effects (see below). The signs of areas susceptible to landslides include leaning and bent trees or utility poles, seeps and sag ponds (i.e., water-filled depressions), and old or recent landslides where horizontal and vertical movement has occurred. The conditions in the region that contribute to the frequency of landslides include the mountainous terrain and a high average annual precipitation.

- **Rotational landslides** occur when areas of relatively dry rock, soil, or debris move uncontrollably down a slope.

- **Mudflows** are water-saturated rivers of earth, rock, and debris. Mudflows develop when water rapidly accumulates in the material, such as during heavy rainfall or rapid snowmelt. Mudflows can develop and move quickly, giving little to no warning.
- **Rock falls or toppling** occur when rocks or other materials detach from a slope or cliff and descend in a freefall, rolling, or bouncing manner. Rock falls can occur naturally, through faults and seismic activity, or as a product of human activity, such as blasting.

Land subsidence is the motion of the Earth's surface as it shifts downward relative to a benchmark (often sea level) of the surrounding terrain. Land subsidence causes damage and loss of life through several processes. Land subsidence includes pushing, crushing, or burying objects in their path and the damming of rivers and waterways (Haddow, Bullock, & Coppola, 2011, pg. 46)

Subsidence events can range in size from a large, regional lowering to severe localized collapses such as sinkholes. The primary cause of land subsidence is human activity (e.g., mining, the extraction of groundwater or petroleum, etc.).

EFFECTS OF LAND SUBSIDENCE			
Type	*Existing Condition*	*Disturbance*	*Effect*
Oil / Gas Extraction			
Mining			

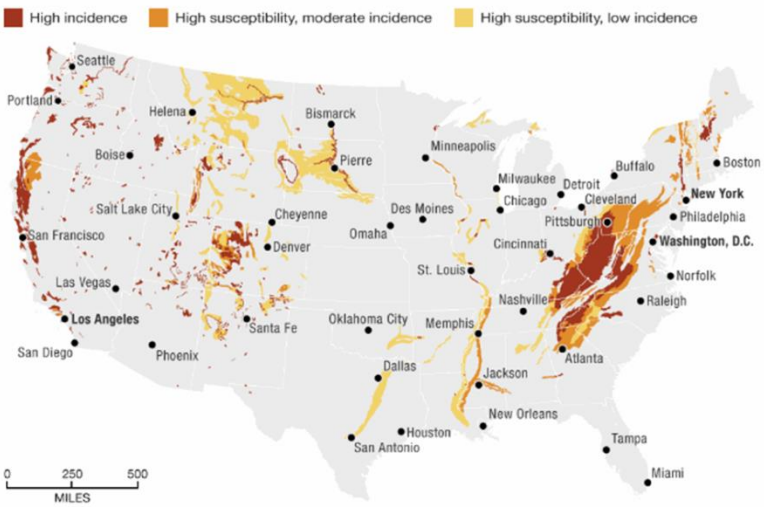
Human activity like natural resource extraction is not the *only* cause of subsidence, though. There are several other potential causes, such as the dissolving of limestone, earthquakes, and other human actions like unplanned commercial, residential, or industrial developments. In West Virginia, the two leading causes are abandoned underground mines (AUMs) and karst topography. Underground coal mining began in the early 1800s and continues today. In the 1900s, underground salt, limestone, and gypsum mining began. All mining activities create voids under the Earth's surface. Several factors determining the potential for these voids to collapse include depth, mining technique used, type of rock and/or soils, and development on the ground surface.

According to the West Virginia Geological and Economic Survey (WVGES), karst is a little-known, but unique and important landform found primarily on the eastern side of the Appalachian Mountain range in West Virginia (2019). Karst terrain is generally underlain by limestone or dolomite, in which the dissolving of rock influences the topography. Karst areas often see sinkholes, sinking streams, closed depressions, subterranean drainage, and caves.

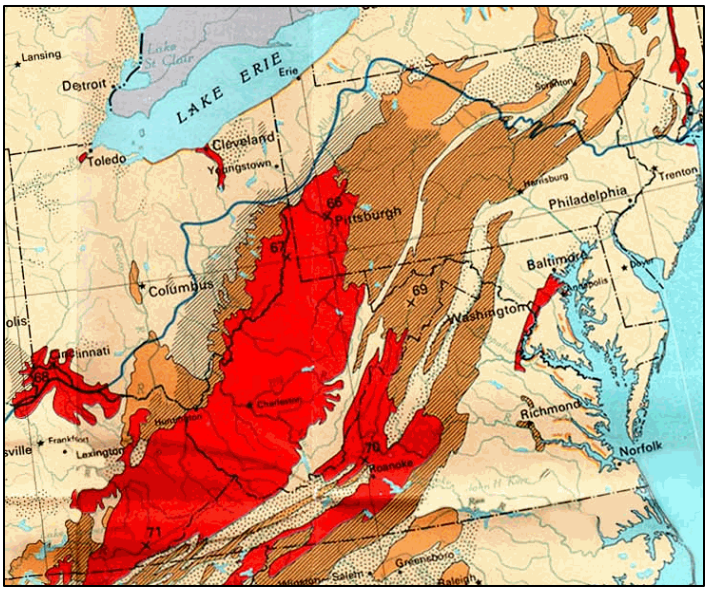
West Virginia also experiences subsidence from expansive soils, which are soils or soft rocks that dramatically expand or swell when wet and shrink or contract when dry. This swelling and shrinking can cause extensive damage to transportation routes, such as highways and rail lines, and structures that are built over these areas, as the soils can shift significantly.

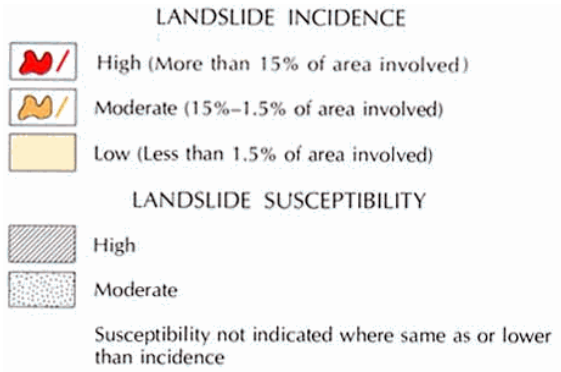
Location and Extent

According to the U. S. Geological Survey (USGS), the majority of West Virginia (i.e., 75%) is within a high landslide incidence area (i.e., more than 15% of an area involved); no other state has greater than 25% (Radbruch-Hall, Colton, Davies, Lucchitta, Skipp, & Varnes, 2016). The following graphics depict these incidence areas.



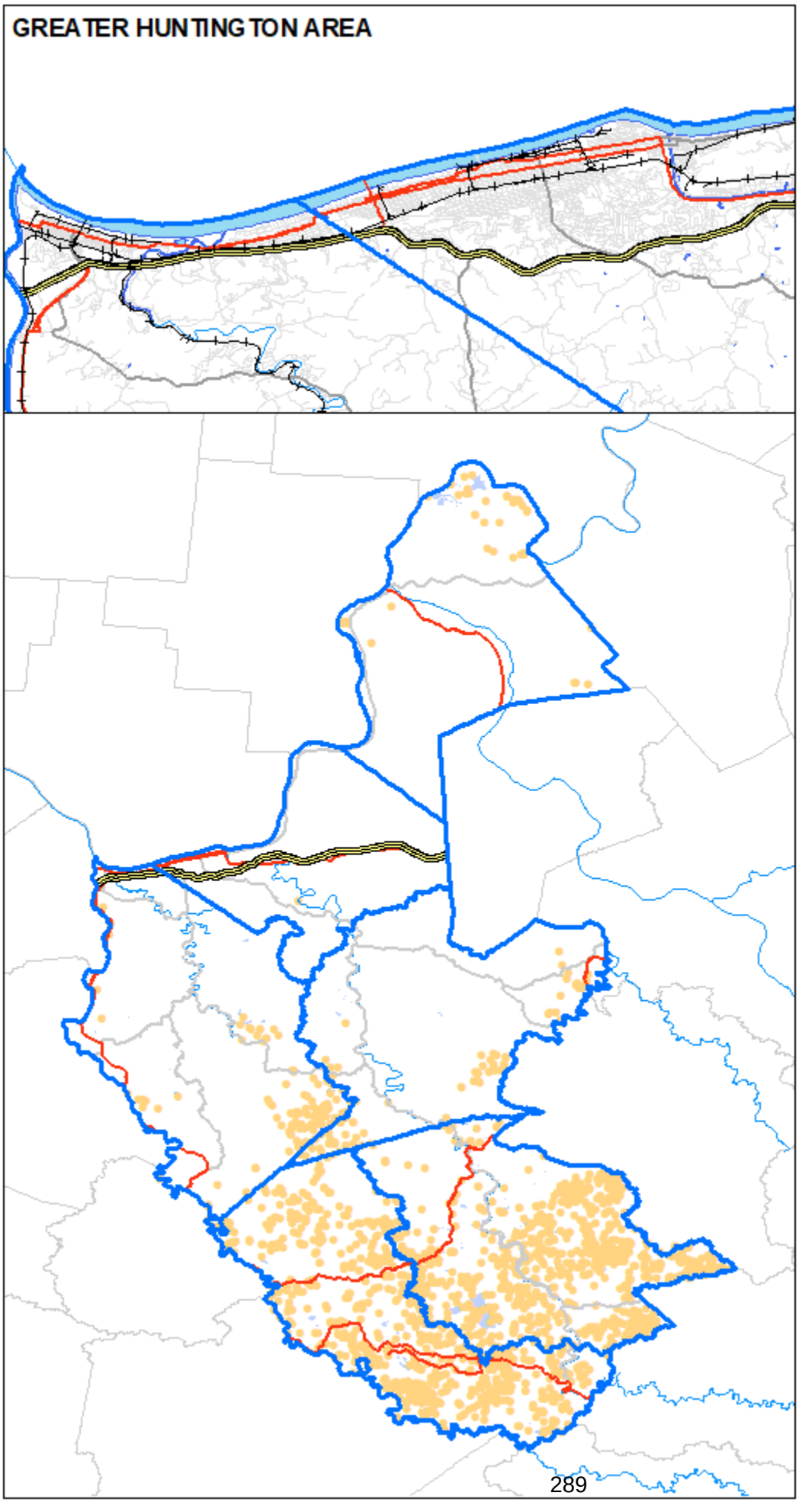
Source: U.S. Geological Survey





As illustrated, much of the region is within a high area with regard to landslide incidence. (portions of Cabell and Mason Counties are moderate). According to FEMA, “landslide” is the second-highest ranked natural hazard in the state. West Virginia accounted for approximately 11.2% of all landslide damage across 48 states from 1973 through 1983 (Brabb, 1985).

A large portion of the region is also at risk of land subsidence related to underground mining activity, as there are mines located beneath Lincoln, Logan, Mason, Mingo, and Wayne Counties. The most prevalent areas of underground mining in the region are Logan and Mingo Counties (WVGES, 2024a).



REGION 2 PDC HAZARD MITIGATION PLAN

Mining Activity

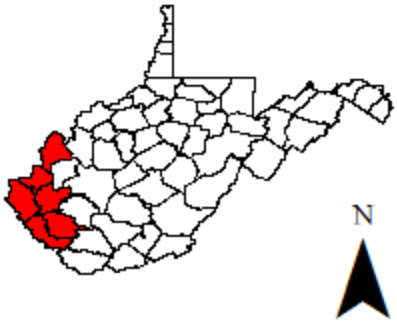
Data Source(s):
WVDEP, WVGISTC

WVDEP Permit Points

Abandoned Mines

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

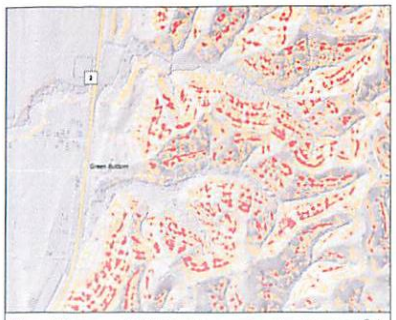


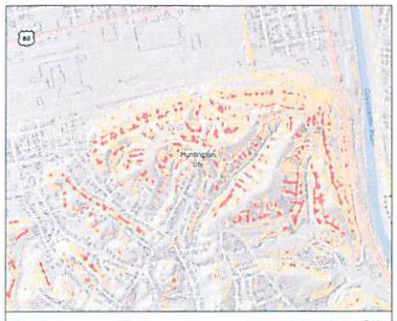
Mine subsidence events will most likely occur with little to no warning, especially if involving an unmapped and unregistered abandoned mine site. While the area of the subsidence will most likely be small, damage to roads and structures located within or adjacent to the event can be significant. Roadways that sustain damage from subsidence often-times require significant repairs to include the reinforcement of the roadbed. Detours of major travel routes will have significant economic impacts.

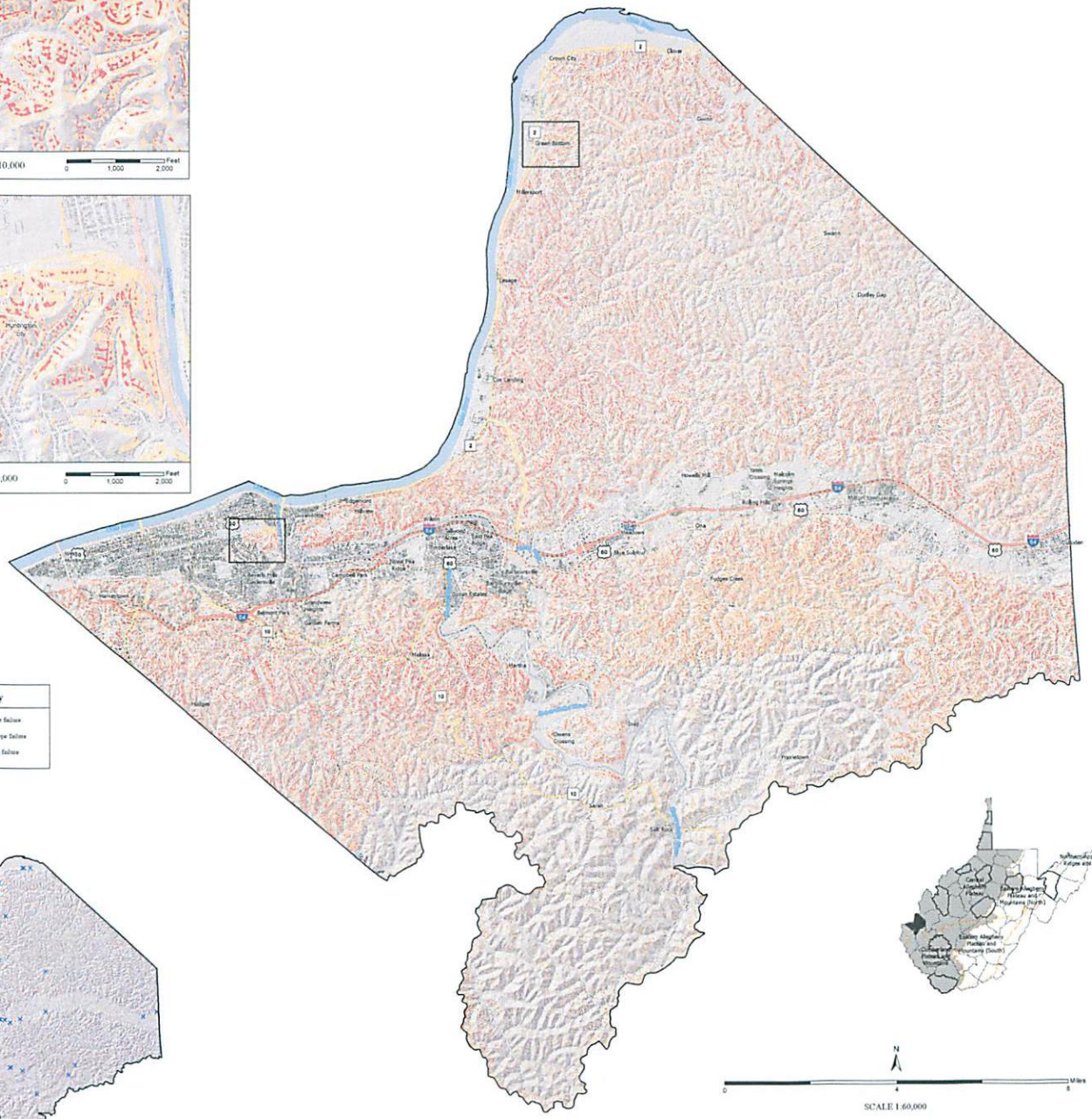
The West Virginia Emergency Management Division (WVEMD) and Federal Emergency Management Agency (FEMA), in partnership with the West Virginia GIS Technical Center, have facilitated landslide susceptibility studies and community-based risk assessments in support of local and state hazard mitigation plans. Landslide susceptibility was modeled using a random forest machine learning method. The model used LiDAR-identified landslide locations, topography, soil type, and proximity to roads and streams among many input variables to produce landslide susceptibility grids.

Overall, 23,404 landslide points were identified using LiDAR in the region. The maps that follow, one for each county in the region, are from the Total Exposure Area Landslide (TEAL) study.

Landslide Susceptibility Map: Cabell County, West Virginia







ABOUT THIS PUBLICATION

The complex geologic history of West Virginia created physiographic conditions that render much of the state highly susceptible to landslides, which are one of the most dangerous natural hazards in West Virginia. The U.S. Geological Survey's national landslide overview map (Radbruch-Hall et al., 1978) shows high landslide incidence in 70% of the Mountain State, which is more than double the percentage of second-place Colorado. Data compiled by Brabb (1984) suggests that West Virginia had the highest per capita cost related to landslide damages in the nation between 1973-1983.

This map is part of a multi-year, 55 county effort by the West Virginia GIS Technical Center, West Division of Emergency Management and FEMA to better understand landslide occurrence and assess landslide risk throughout the state. This project was funded by the FEMA Hazard Mitigation Grant Program and the West Virginia Division of Emergency Management.

The purpose of this map and the accompanying report is to identify areas susceptible to landslides and the facilities at risk of landslide-related damages within the County. This map is intended to provide a county-scale overview of landslide susceptibility and should not be used to assess risk or make decisions for specific locations or individual properties.

METHOD OVERVIEW

Landslide locations were mapped throughout West Virginia using light detection and ranging (LiDAR) data products, including slope, hillshade and slopeshade.

Site characteristic and terrain variables, such as slope, lithology, soils, and distance to roads and streams were extracted from DEM, gSSURGO soils, roads and 24K NHD streams. A random forest machine learning model was used to identify the variables that were most important for predicting landslide occurrence and to calculate a probabilistic landslide susceptibility grid based on the presence of those variables in the modeled area. The resulting model was classified into low, medium, and high susceptibility zones using professional judgement and model statistics. Low risk grid cells are defined as areas with a 0-30% probability of slope failure; medium cells have a 30-70% probability of slope failure and high cells have a 70-100% probability of slope failure. On average, over 95% of known landslide locations were found to occur within the modeled high susceptibility areas (Maxwell et al., 2020).

Landslide susceptibility was modeled by Major Land Resource Area (MLRA). Models were generated for each MLRA in West Virginia to take advantage of similarities in physiographic conditions that may influence landslide susceptibility. Most of Cabell County lies within the Central Allegheny Plateau and Cumberland Plateau and Mountains MLRA. In this area, the most important predictors of landslide susceptibility include topographic variables such as slope angle, slope curvature, and topographic roughness.

LIMITATIONS

This map illustrates general landslide susceptibility within Cabell County, West Virginia. Landslide susceptibility classifications are based on physical characteristics associated with landslide locations mapped using LiDAR data. The nature of the West Virginia landscape and the LiDAR imagery limited mapping to landslides at least 33 feet wide. This approach undercounts small, shallow landslides and slope failures that may have been mitigated or removed by human agents. LiDAR-mapped landslide locations and landslide susceptibility maps derived from this data are inherently biased against these areas. Additionally, it is not feasible to completely verify the accuracy of each dataset used for mapping and modeling, although every effort has been made to ensure the integrity of this data.

Landslide risk is complex and continually changing. Future mitigation projects or alterations to topography, land use, and climate may render these results inaccurate. Other models, maps, and reports and future site-specific analyses may provide results that differ from those included here.

This map is for informational purposes regarding landslide susceptibility at the county scale. It may not be used to identify susceptibility and site specific locations. **To address landslide susceptibility at a sub county scale, geotechnical evaluations should be performed by professional engineers or geologists. This map is not intended for regulatory use and is NOT the final authoritative source of all landslide risk data in the community. It should be used in conjunction with other data sources to provide a comprehensive picture of general landslide risk.**

REFERENCES

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Landslide Susceptibility Map

Cabell County and Incorporated Areas, WV

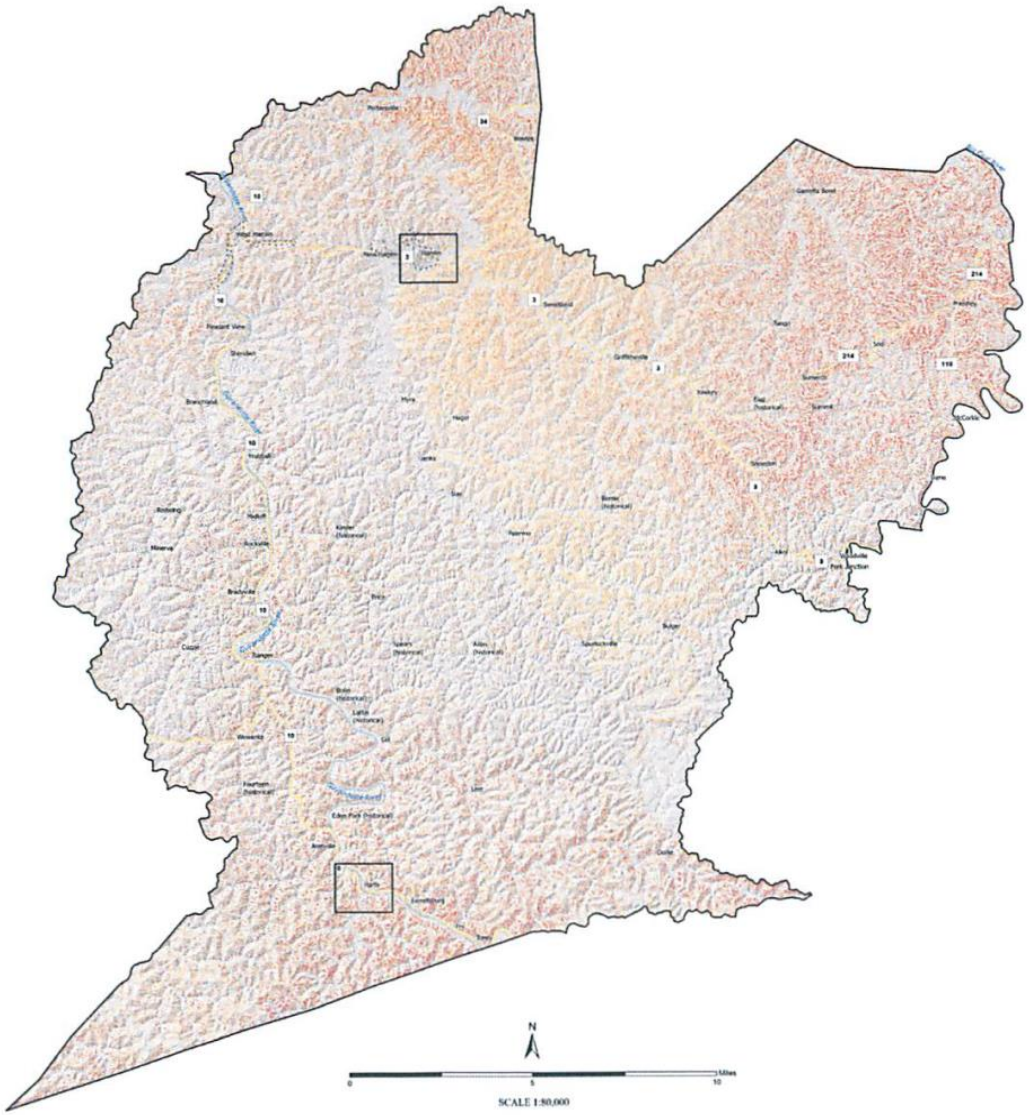
FEMA

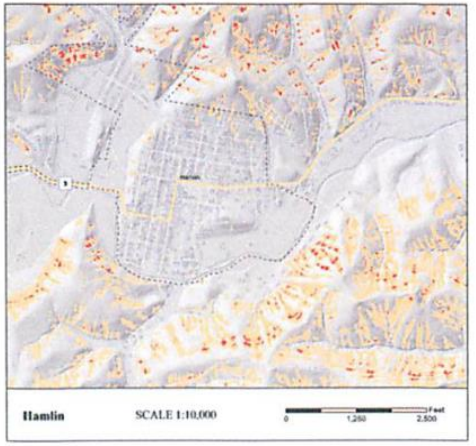
This Landslide Susceptibility Map has been prepared in conjunction with the Landslide Report and Landslide Risk Database for Cabell County, WV. Base Maps: 1-3m Statewide DEM Hillshade with sun azimuth at 315° and altitude at 45°. Projection: Transverse Mercator, NAD 1983 UTM Zone 17N

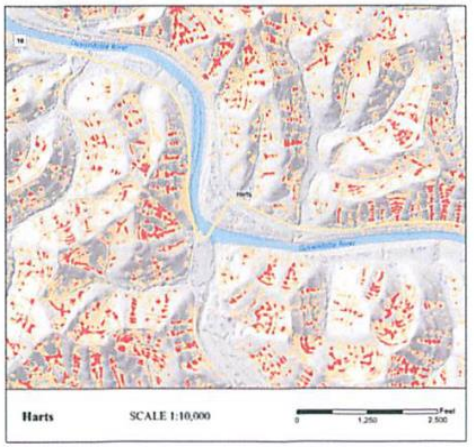
Refer to WV landslide tool: http://www.mapwv.gov/landslide

Map Date: 11/08/2021

Landslide Susceptibility Map: Lincoln County, West Virginia







Landslide Susceptibility

- Areas with highest probability of slope failure
- Areas with moderate probability of slope failure
- Areas with lowest probability of slope failure

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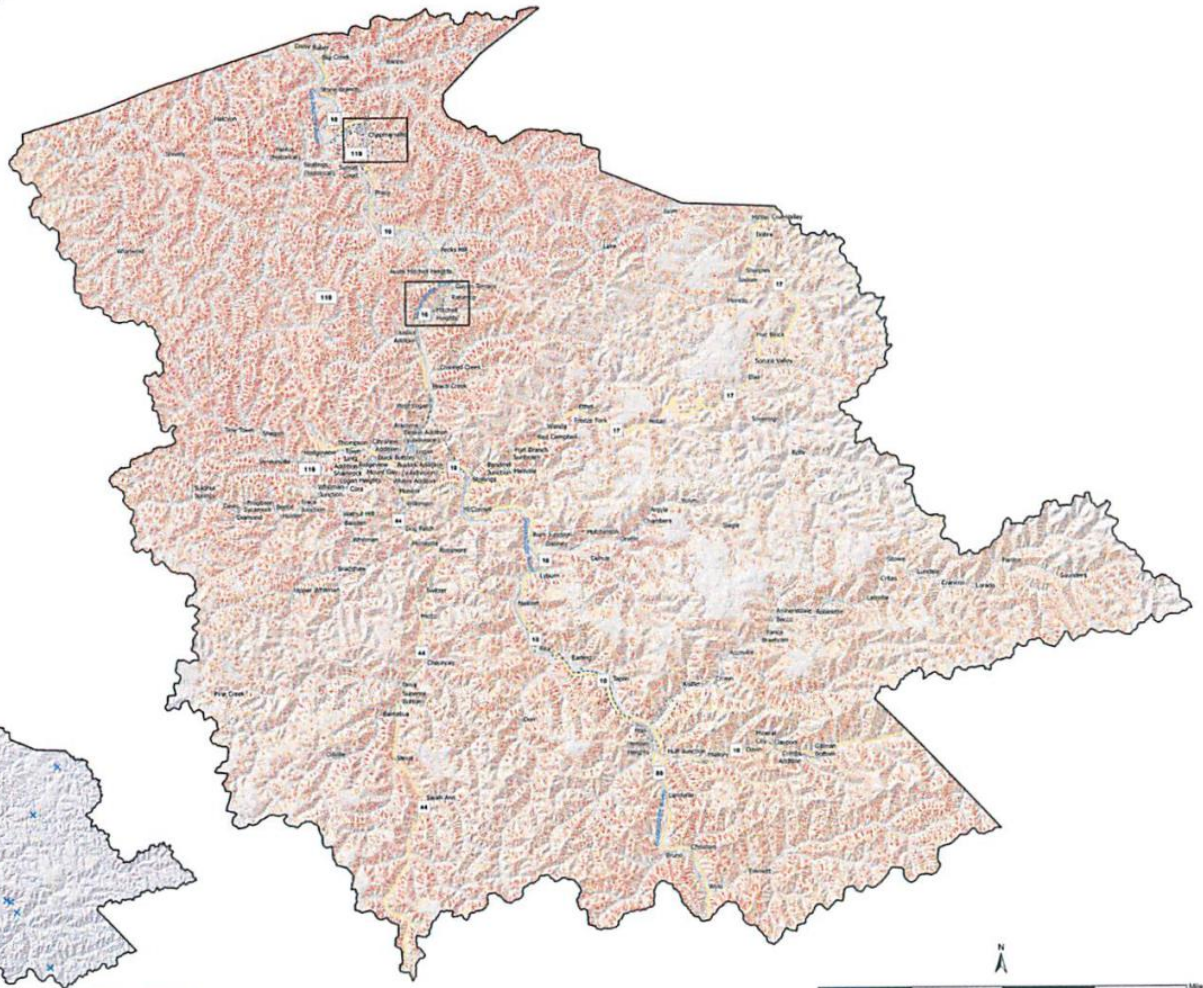
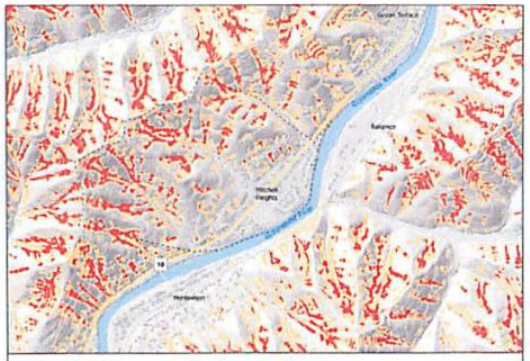
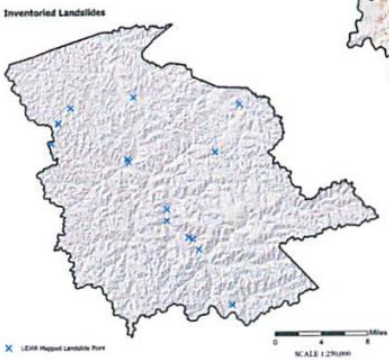
Map Date

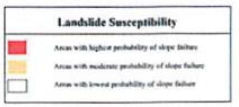
11/08/2021

Landslide Susceptibility Map: Logan County, West Virginia









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This map illustrates general landslide susceptibility within Logan County, West Virginia. Landslide susceptibility classifications are based on physical characteristics associated with landslide locations mapped using LiDAR data. The nature of the West Virginia landscape and the LiDAR imagery limited mapping to landslides at least 33 feet wide. This approach undercounts small, shallow landslides and slope failures that may have been mitigated or removed by human agents. LiDAR-mapped landslide locations and landslide susceptibility maps derived from this data are inherently biased against these areas. Additionally, it is not feasible to completely verify the accuracy of each dataset used for mapping and modeling, although every effort has been made to ensure the integrity of this data.

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This map is for informational purposes regarding landslide susceptibility at the county scale. It may not be used to identify susceptibility and site specific locations. **To address landslide susceptibility at a sub county scale, geotechnical evaluations should be performed by professional engineers or geologists. This map is not intended for regulatory use and is NOT the final authoritative source of all landslide risk data in the community. It should be used in conjunction with other data sources to provide a comprehensive picture of general landslide risk.**

REFERENCES

Brabb, Earl, E., 1984, Minimum landslide damage in the United States, 1973-1983, U.S. Geological Survey Open File Report 84-486, 4 p.

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Landslide Susceptibility Map

Logan County and Incorporated Areas, WV

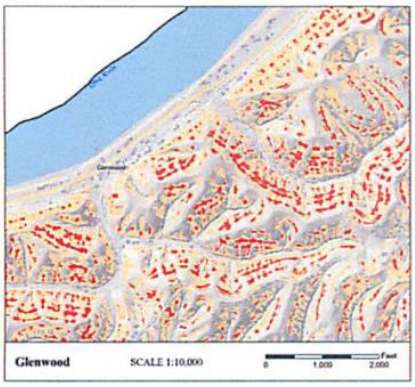
FEMA

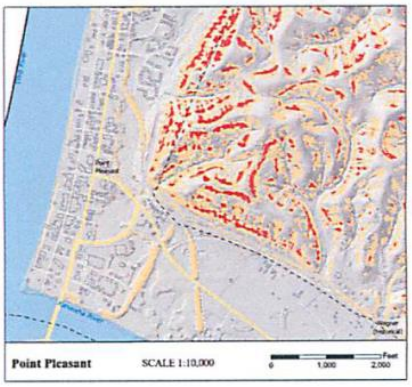
This Landslide Susceptibility Map has been prepared in conjunction with the Landslide Report and Landslide Risk Database for Logan County, WV. Base Maps: 1:24k Statewide DEM Hillshade with sun azimuth at 315° and altitude at 45°. Projection: Transverse Mercator, NAD 1983 UTM Zone 17N

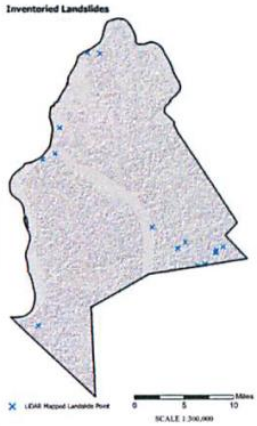
Refer to WV landslide tool:
http://www.mapwv.gov/landslide

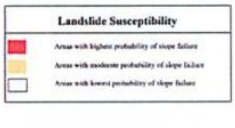
Map Date
11/08/2021

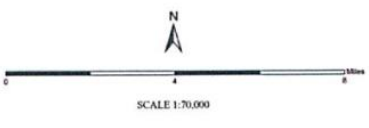
Landslide Susceptibility Map: Mason County, West Virginia











ABOUT THIS PUBLICATION

The complex geologic history of West Virginia created physiographic conditions that render much of the state highly susceptible to landslides, which are one of the most dangerous natural hazards in West Virginia. The U.S. Geological Survey's national landslide overview map (Radbruch-Hall et al., 1978) shows high landslide incidence in 70% of the Mountain State, which is more than double the percentage of second-place Colorado. Data compiled by Bubb (1984) suggests that West Virginia had the highest per capita cost related to landslide damages in the nation between 1973–1982.

This map is part of a multi-year, 33 county effort by the West Virginia GIS Technical Center, West Virginia Emergency Management Division and FEMA to better understand landslide occurrence and assess landslide risk throughout the state. This project was funded by the FEMA Hazard Mitigation Grant Program and the West Virginia Emergency Management Division.

The purpose of this map and the accompanying report is to identify areas susceptible to landslides and the facilities at risk of landslide-related damages within the County. This map is intended to provide a county-scale overview of landslide susceptibility and should not be used to assess risk or make decisions for specific locations or individual properties.

METHOD OVERVIEW

Landslide locations were mapped throughout West Virginia using light detection and ranging (LiDAR) data products, including slope, hillshade and slopeshade.

Site characteristic and terrain variables, such as slope, lithology, soils, and distance to roads and streams, were extracted from DEM, gSSURGO soils, roads and 24K NHD streams. A random forest machine learning model was used to identify the variables that were most important for predicting landslide occurrence and to calculate a probabilistic landslide susceptibility grid based on the presence of those variables in the modeled area. The resulting model was classified into low, moderate, and high susceptibility zones using professional judgement and model statistics. Low risk grid cells are defined as areas with a 0-30% probability of slope failure, medium cells have a 30-70% probability of slope failure and high cells have a 70-100% probability of slope failure. On average, over 95% of known landslide locations were found to occur within the modeled high susceptibility areas (Maxwell et al., 2020).

Landslide susceptibility was modeled by Major Land Resource Area (MLRA). Models were generated for each MLRA in West Virginia to take advantage of similarities in physiographic conditions that may influence landslide susceptibility. Most of Mason County lies within the Central Allegheny Plateau MLRA. In this area, the most important predictors of landslide susceptibility include topographic variables such as slope angle, slope curvature, and topographic roughness.

LIMITATIONS

This map illustrates general landslide susceptibility within Mason County, West Virginia. Landslide susceptibility classifications are based on physical characteristics associated with landslide locations mapped using LiDAR data. The nature of the West Virginia landscape and the LiDAR imagery limited mapping to landslides at least 33 feet wide. This approach understates small, shallow landslides and slope failures that may have been mitigated or removed by human agents. LiDAR-mapped landslide locations and landslide susceptibility maps derived from this data are inherently biased against these areas. Additionally, it is not feasible to completely verify the accuracy of each dataset used for mapping and modeling, although every effort has been made to ensure the integrity of this data.

Landslide risk is complex and continually changing. Future mitigation projects or alterations to topography, land use, and climate may render these results inaccurate. Other models, maps, and reports and future site-specific analyses may provide results that differ from those included here.

This map is for informational purposes regarding landslide susceptibility at the county scale. It may not be used to identify non-proximity and site-specific locations. **To address landslide susceptibility at a sub county scale, geotechnical evaluations should be performed by professional engineers or geologists. This map is not intended for regulatory use and is NOT the final authoritative source of all landslide risk data in the community. It should be used in conjunction with other data sources to provide a comprehensive picture of general landslide risk.**

REFERENCES

Bubb, Carl, Jr., 1984, Monetary landslide damage in the United States: 1973-1982, U.S. Geological Survey Open-File Report 84-496, 4 p.

Maxwell, A.E., Sharma, M., Kite, J.S., Donaldson, K.A., Thompson, J.A., Bell, M.L., Maynard, S.M., 2020, Slope Failure Prediction Using Random Forest Machine Learning and LiDAR in an Eroded Folded Mountain Belt. Remote Sens. 2020, 12, 486.

Radbruch-Hall, D.H., Colton, R.B., Davies, W.E., Lucchitta, I., Skipp, B.A., and Varnes, D.J., 1978, Landslide overview map of the Conterminous United States: United States Geological Survey Professional Paper 1183, 25 p. and 1 plate https://pubs.usgs.gov/pp/1183/

Landslide Susceptibility Map

Mason County and Incorporated Areas, WV

FEMA

This Landslide Susceptibility Map has been prepared in conjunction with the Landslide Report and Landslide Risk Database for Mason County, WV. Data Maps: 1-3sp Statewide DEM Hillshade with sun azimuth at 315° and altitude at 45°. Projection: Transverse Mercator, NAD 1983 UTM Zone 17N

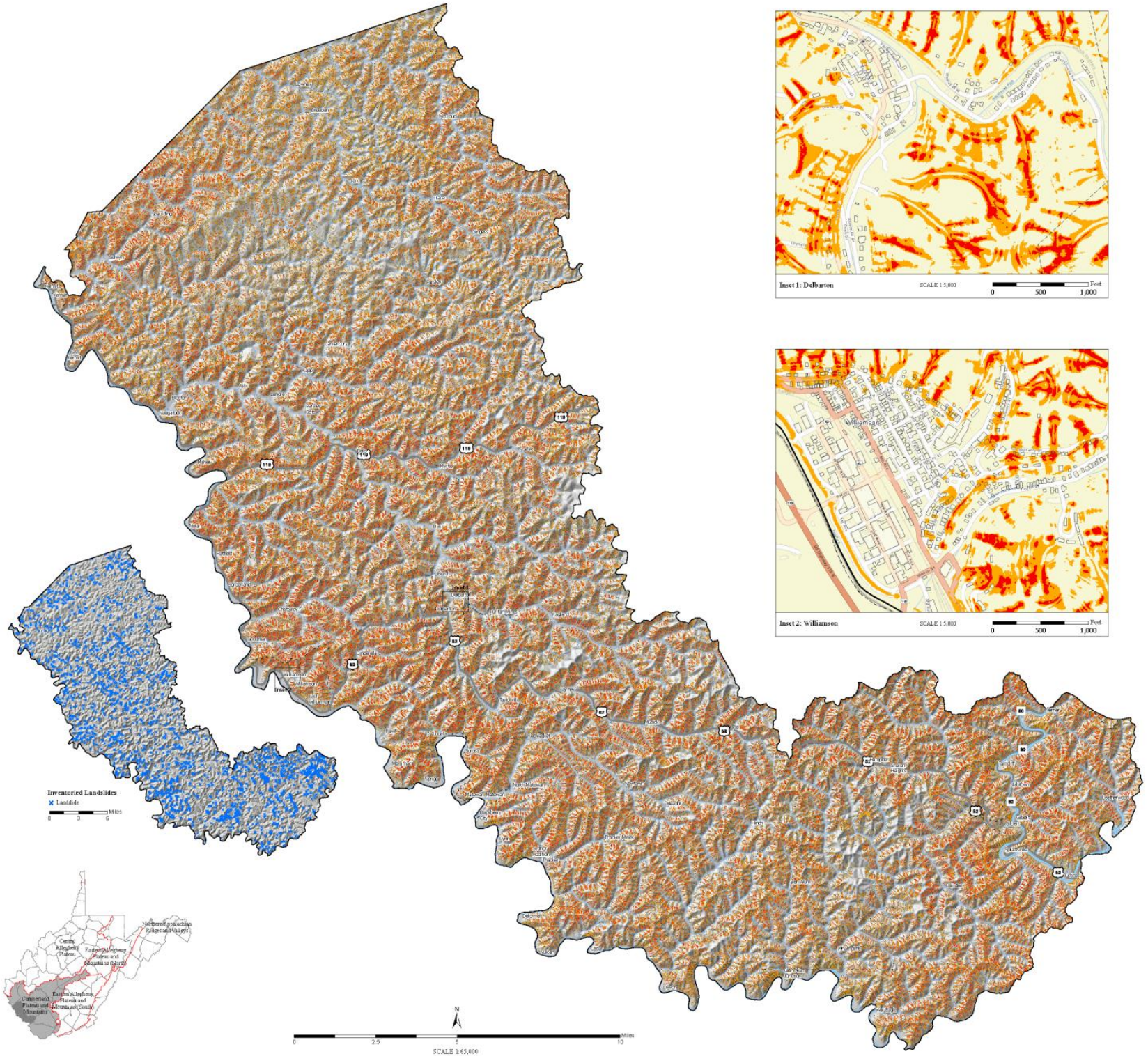
Refer to WV landslide Intl.

http://www.mapwv.gov/landslide

Map Date

11/08/2021

Landslide Susceptibility Map: Mingo County, West Virginia



Landslide Susceptibility

- Area with highest probability for slope failure
- Area with medium probability for slope failure
- Area with lowest probability for slope failure

ABOUT THIS PUBLICATION

The complex geologic history of West Virginia created physiographic conditions that render much of the state highly susceptible to landslides, which are one of the most dangerous natural hazards in West Virginia. The U.S. Geological Survey's national landslide overview map (Radbruch-Hall et al., 1978) shows high landslide incidence in 78% of the Mountain State, which is more than double the percentage of second-place Colorado. Data compiled by Brabb (1984) suggests that West Virginia had the highest per capita cost related to landslide damages in the nation between 1973-1983.

This map is part of a multi-year, 55 county effort by the West Virginia GIS Technical Center, West Virginia Emergency Management Division and FEMA to better understand landslide occurrence and assess landslide risk throughout the state. This project was funded by the FEMA Hazard Mitigation Grant Program and the West Virginia Emergency Management Division.

The purpose of this map and the accompanying report is to identify areas susceptible to landslides and the facilities at risk of landslide-related damages within the County. This map is intended to provide a county-scale overview of landslide susceptibility and should not be used to assess risk or make decisions for specific locations or individual properties.

METHOD OVERVIEW

Landslide locations were mapped throughout West Virginia using light detection and ranging (LiDAR) data products, including slope, hillshade and slope/shade.

Site characteristic and terrain variables, such as slope, lithology, soils, and distance to roads and streams, were extracted from DEM, gSSURGO soils, roads and 24K NHD streams. A random forest machine learning model was used to identify the variables that were most important for predicting landslide occurrence and to calculate a probabilistic landslide susceptibility grid based on the presence of those variables in the modeled area. The resulting model was classified into low, medium, and high susceptibility zones using professional judgement and model statistics. Low-risk grid cells are defined as areas with a 0-30% probability of slope failure, medium cells have a 30-70% probability of slope failure and high cells have a 70-100% probability of slope failure. On average, over 95% of known landslide locations were found to occur within the modeled high susceptibility areas (Maxwell et al., 2020).

Landslide susceptibility was modeled by Major Land Resource Area (MLRA). Models were generated for each MLRA in West Virginia to take advantage of similarities in physiographic conditions that may influence landslide susceptibility. Most of Mingo County lies within the Central Allegheny Plateau MLRA. In this area, the most important predictors of landslide susceptibility include topographic variables such as slope angle, slope curvature, and topographic roughness.

LIMITATIONS

This map illustrates general landslide susceptibility within Mingo County, West Virginia. Landslide susceptibility classifications are based on physical characteristics associated with landslide locations mapped using LiDAR data. The nature of the West Virginia landscape and the LiDAR imagery limited mapping to landslides at least 33 feet wide. This approach underscores small, shallow landslides and slope failures that may have been mitigated or removed by human agents. LiDAR-mapped landslide locations and landslide susceptibility maps derived from this data are inherently biased against these areas. Additionally, it is not feasible to completely verify the accuracy of each dataset used for mapping and modeling, although every effort has been made to ensure the integrity of this data.

Landslide risk is complex and continually changing. Future mitigation projects or alterations to topography, land use, and climate may render these results inaccurate. Other models, maps, and reports and future site-specific analyses may provide results that differ from those included here.

This map is for informational purposes regarding landslide susceptibility at the county scale. It may not be used to identify susceptibility and site specific locations. **To address landslide susceptibility at a sub county scale, geotechnical evaluations should be performed by professional engineers or geologists. This map is not intended for regulatory use and is NOT the final authoritative source of all landslide risk data in the community. It should be used in conjunction with other data sources to provide a comprehensive picture of general landslide risk.**

REFERENCES

Brabb, Earl, E., 1984, Museum landslide damage in the United States, 1973-1983, U.S. Geological Survey Open File Report 84-406, 6p.

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Radbruch-Hall, D.H., Colton, R.B., Davies, W.E., Lucchitta, I., Skipp, B.A., and Varnes, D.J., 1978, Landslide overview map of the Conterminous United States: United States Geological Survey Professional Paper 1183, 25 p. and 1 plate. https://pubs.usgs.gov/pp/p1183/

Landslide Susceptibility Map

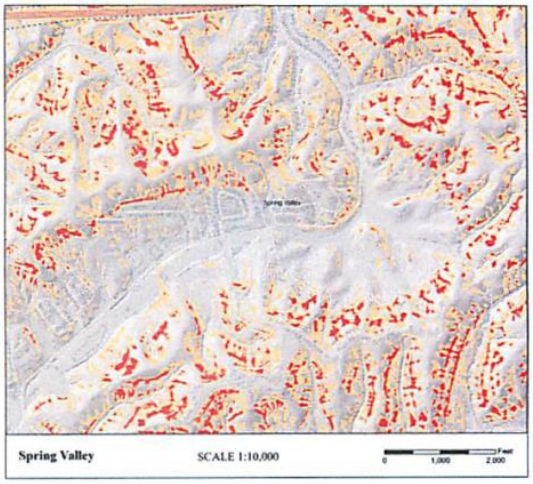
Mingo County and Incorporated Areas, WV

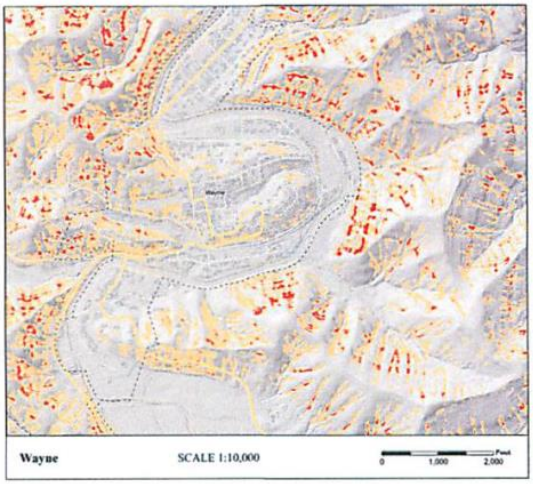
This Landslide Susceptibility Map has been prepared in conjunction with the Landslide Report and Landslide Risk Database for Mingo County, WV. Base Map: 1-3m Statewide DEM Hillshade with sun azimuth at 315° and altitude at 45°. Projection: Transverse Mercator, NAD 1983 UTM Zone 17N

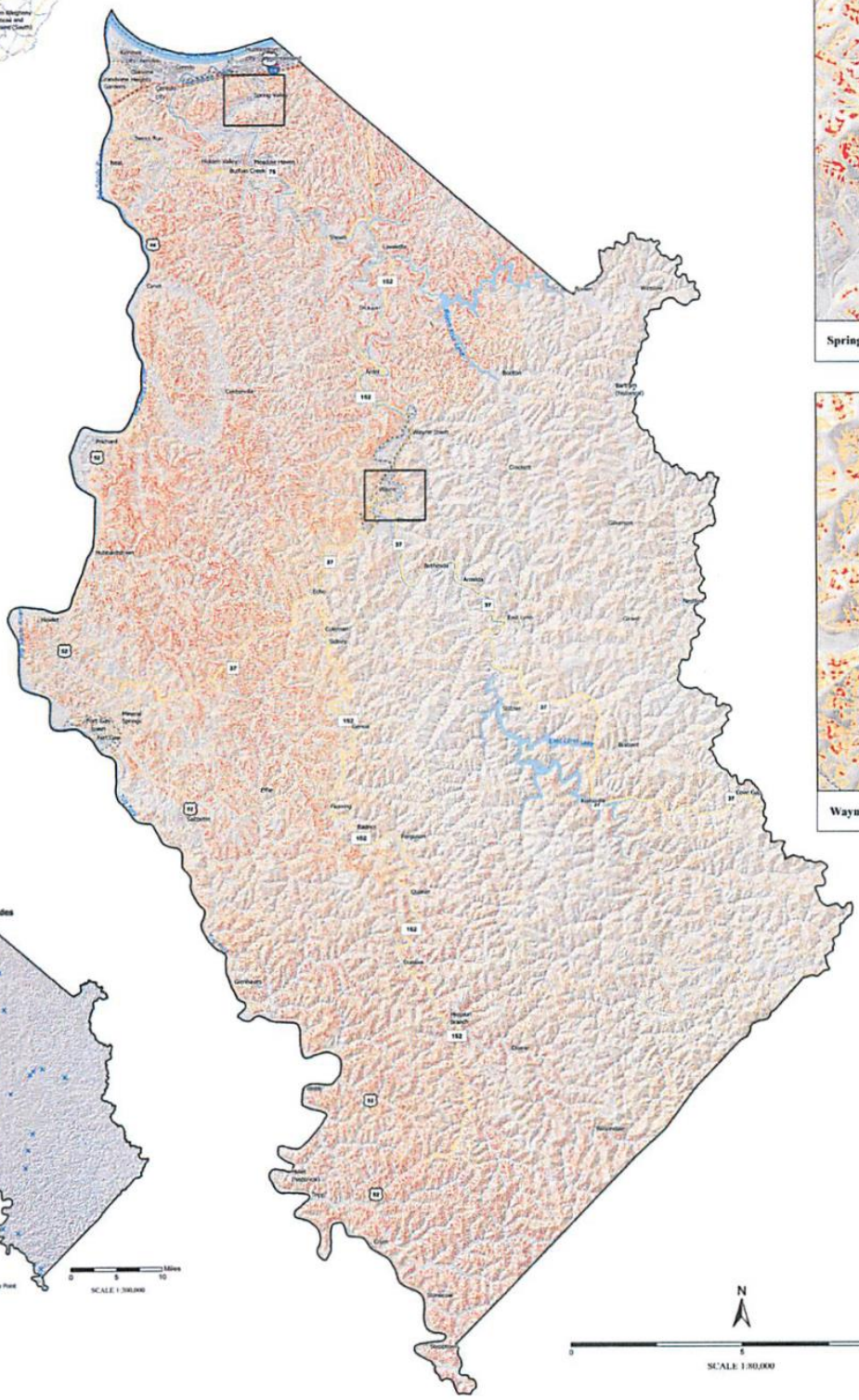
Refer to WV landslide tool:
http://www.mapwv.gov/landslide

Map Date
3/11/2021

Landslide Susceptibility Map: Wayne County, West Virginia



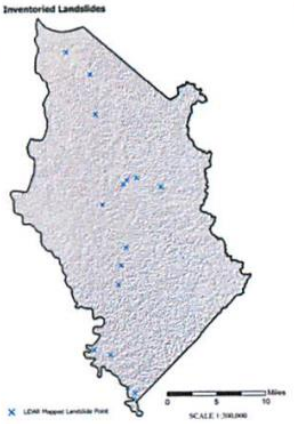




Landslide Susceptibility

- Areas with highest probability of slope failure
- Areas with moderate probability of slope failure
- Areas with lowest probability of slope failure

Inventoried Landslides



LiDAR Mapped Landslide Point

ABOUT THIS PUBLICATION

The complex geologic history of West Virginia created physiographic conditions that render much of the state highly susceptible to landslides, which are one of the most dangerous natural hazards in West Virginia. The U.S. Geological Survey's national landslide overview map (Radbruch-Hall et al., 1978) shows high landslide incidence in 70% of the Mountain State, which is more than double the percentage of second-place Colorado. Data compiled by Brabb (1984) suggests that West Virginia had the highest per capita cost related to landslide damages in the nation between 1973-1983.

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METHOD OVERVIEW

Landslide locations were mapped throughout West Virginia using light detection and ranging (LiDAR) data products, including slope, hillshade and shapefiles.

Site characteristic and terrain variables, such as slope, lithology, soils, and distance to roads and streams, were extracted from DEM, gSSURGO soils, roads and 24K NHD streams. A random forest machine learning model was used to identify the variables that were most important for predicting landslide occurrence and to calculate a probabilistic landslide susceptibility grid based on the presence of those variables in the modeled area. The resulting model was classified into low, medium, and high susceptibility zones using professional judgement and model statistics. Low risk grid cells are defined as areas with a 0-20% probability of slope failure; medium cells have a 30-70% probability of slope failure and high cells have a 70-100% probability of slope failure. On average, over 95% of known landslide locations were found to occur within the modeled high susceptibility areas (Maxwell et al., 2020).

Landslide susceptibility was modeled by Major Land Resource Area (MLRA). Models were generated for each MLRA in West Virginia to take advantage of similarities in physiographic conditions that may influence landslide susceptibility. Most of Wayne County lies within the Central Allegheny Plateau and Cumberland Plateau and Mountains MLRA. In this area, the most important predictors of landslide susceptibility include topographic variables such as slope angle, slope curvature, and topographic roughness.

LIMITATIONS

This map illustrates general landslide susceptibility within Wayne County, West Virginia. Landslide susceptibility classifications are based on physical characteristics associated with landslide locations mapped using LiDAR data. The nature of the West Virginian landscape and the LiDAR imagery limited mapping to landslides at least 25 feet wide. This approach underscores small, shallow landslides and slope failures that may have been mitigated or removed by human agents. LiDAR-mapped landslide locations and landslide susceptibility maps derived from this data are inherently biased against these areas. Additionally, it is not feasible to completely verify the accuracy of each dataset used for mapping and modeling, although every effort has been made to ensure the integrity of this data.

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REFERENCES

Brabb, Earl, E., 1984, Montane landslide damage in the United States, 1973–1983, U.S. Geological Survey Open File Report 84-644, 14 p.

Maxwell, A.E., Sharma, M., Kite, J.S., Donaldson, K.A., Maynard, S.M., Miller C.M. Assessing the Generalization of Machine Learning-Based Slope Failure Prediction in New Geographic Extents. ISPRS Int. J. Geo-Inf. 2021, 10, 793

Maxwell, A.E., Sharma, M., Kite, J.S., Donaldson, K.A., Thompson, J.A., Bell, M.L., Maynard, S.M. Slope Failure Prediction Using Random Forest Machine Learning and LiDAR in an Eroded Folded Mountain Belt. Remote Sens. 2020, 12, 486.

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Landslide Susceptibility Map

Wayne County and Incorporated Areas, WV

FEMA

This Landslide Susceptibility Map has been prepared in conjunction with the Landslide Report and Landslide Risk Database for Wayne County, WV. Base Maps: 1-3m Statewide DEM Hillshade with sun azimuth at 315° and altitude at 45°. Projection: Transverse Mercator, NAD 1983 UTM Zone 17N

Refer to WV landslide tool:
http://www.mapwv.gov/landslide

Map Date
11/08/2021

Impacts and Vulnerability

Land subsidence is not random, but it is also not totally predictable. Certain inherent geologic conditions are a prerequisite and one or more of the following conditions can serve as an alert to potential land subsidence issues.

- Joined rocks,
- Fine-grained, permeable rock or sediment,
- Areas of abandoned underground mines,
- Areas with large, buried pipelines.

Land subsidence has the capability of damaging and destroying homes, businesses, utilities, and highways, resulting in annual costs of millions of dollars. Land subsidence events typically affect residential areas and roadways. Subsidence clean-up and restoration projects can range in cost from $10,000 to $6,000,000. Mine subsidence can cause foundation damage to structures, disrupt underground utilities, and be a potential risk to human life.

Large-scale or catastrophic landslide events can result in fatalities, numerous injuries, and trauma stemming from suffocation and entrapment. Depending on the location of an event, landslides can damage or destroy critical infrastructure and facilities, and isolate entire communities. Rapid slide or flow movement usually happens without warning, breaking apart house walls, tilting floors, and pulling apart buried water, gas, and sewer lines. Houses are often pushed off their foundations and are occasionally even buried by debris.

The TEAL landslide study referenced above indicates that the City of Huntington falls in the top ten for the highest numbers of road miles at risk of landslide at number nine. Most of the at-risk roads are in the unincorporated areas of each county (see table below). Of the state's 55 counties, the counties in Region 2 rank as follows.

- Cabell: 38
- Lincoln: 34
- Logan: 48
- Mason: 35
- Mingo: 44
- Wayne: 17

ROAD TYPES AND LENGTHS SUSCEPTIBLE TO HIGH/MEDIUM LANDSLIDE RISK						
			High/Medium Risk Road Miles by Type			
Community Name	*Total Road Miles*	*Total High/Medium Risk Road Miles*	*Interstates*	*US Routes*	*State Routes*	*Other Roads*
Barboursville	44.2	1.1	0.3	0.3	0	0.5
Cabell County*	620.5	43.2	0.4	1.9	1.8	39.1
Huntington**	98.7	3.4	0.6	0.6	0.3	1.8
Milton	18.8	1.1	0.1	0.9	0	0.1
	782.2	**48.8**	**1.4**	**3.7**	**2.1**	**41.5**
Hamlin	9.9	0	0	0	0	0
Lincoln County*	690.1	62.7	0	0.3	4.4	58
West Hamlin	6.2	0.1	0	0	0.1	0
	706.2	**62.8**	**0**	**0.3**	**4.5**	**58**
Chapmanville	11.1	0.1	0	0	0	0.1
Logan	4.3	0	0	0	0	0
Logan County*	529.7	25.1	0	0.4	6.9	17.7
Man	14.1	0.7	0	0	0.6	0.1
Mitchell Heights	2.1	0.1	0	0	0	0.1
West Logan	2.3	0	0	0	0	0
	563.6	**26**	**0**	**0.4**	**7.5**	**18**
Hartford	3.3	0.6	0	0	0.6	0
Henderson	5.1	0.2	0	0.2	0	0
Leon	2.6	0.8	0	0	0.5	0.3
Mason	2.7	0	0	0	0	0
Mason County*	820.4	53.2	0	9.1	3	41.2
New Haven	3.9	0.1	0	0	0.1	0
Point Pleasant	8.8	0	0	0	0	0
	846.8	**54.9**	**0**	**9.3**	**4.2**	**41.5**
Delbarton	8.9	0.7	0	0.6	0.1	0
Gilbert	10.2	0.3	0	0	0	0.3
Kermit	6.1	0.8	0	0.4	0	0.4
Matewan	6.8	0.5	0	0	0.1	0.4
Mingo County*	516.6	38.3	0	14.9	3.6	19.9
Williamson	24.3	2.7	0	0.7	0	2
	572.9	**43.3**	**0**	**16.6**	**3.8**	**23**
Ceredo	16.2	0.8	0.2	0	0	0.6
Fort Gay	4.7	0.4	0	0.3	0	0.1
Huntington**	9.1	0.3	0.3	0	0	0
Kenova	11.2	0.5	0.4	0.1	0	0
Wayne	11.6	0.8	0	0	0.3	0.4
Wayne County*	946.5	101	0	20.1	5	75.7
	999.3	**103.8**	**0.9**	**20.5**	**5.3**	**76.8**

Source: WVEMD, DHS, FEMA – West Virginia Landslide Risk Assessment – Region 2 PDC

A structure/parcel analysis was also a part of the TEAL study. Counties were ranked by the total count of primary structures located in high/medium landslide risk areas (see table below). Regarding the total count of at-risk structures, Region 2 counties ranked as follows.

STRUCTURES SUSCEPTIBLE TO HIGH/MEDIUM LANDSLIDE RISK		
Community Name	*Total Structures*	*Ranking (Count)*
Barboursville	13	81
Cabell County*	476	11
Huntington**	280	8**
Milton	3	151
	772	**8**
Hamlin	0	195
Lincoln County*	382	16
West Hamlin	1	178
	383	**22**
Chapmanville	3	151
Logan	123	16
Logan County*	322	20
Man	0	195
Mitchell Heights	8	111
West Logan	4	139
	460	**16**
Hartford	4	139
Henderson	6	123
Leon	3	151
Mason	0	195
Mason County*	238	29
New Haven	3	151
Point Pleasant	6	123
	260	**39**
Delbarton	20	57
Gilbert	9	104
Kermit	8	111
Matewan	4	139
Mingo County*	325	19
Williamson	161	14
	527	**14**
Ceredo	25	52
Fort Gay	16	73
Huntington**	4	8**
Kenova	0	195
Wayne	29	49
Wayne County*	654	5
	728	**10**

Social Vulnerability Considerations

Authors such as Nam, Choi, Copeland, and Kim (2023) have noted a lack of research specifically on how the negative effects of geohazards (like earthquakes, sinkholes, land subsidence, landslides, etc.) impact vulnerable and marginalized groups. In the region, there are no apparent trends suggesting the population and housing distribution avoids areas prone to subsidence. Other hazard considerations note how those with a lower proficiency in English may not readily understand preparedness messages and warnings, and the same may be true regarding descriptors of the risks associated with subsidence. Low-income populations may not be able to afford structural alterations and retrofits if subsidence impacts their homes.

Previous Occurrences

According to GIS data from the U.S. Geological Survey (USGS), there were 36 landslide occurrences between 2009 and 2018. Comprehensive records of specific landslide occurrences or instances of subsidence are not maintained, which supports the steering committee's anecdotal observations that the 36 cited occurrences above are low. Despite the questions regarding the data, the following table presents the USGS data.

LANDSLIDES IN REGION 2 (NON-EXHAUSTIVE)				
County	*Date*	*Narrative*	*Fatalities*	*Confidence*
Cabell	05/18/2011	Landslide; small; unknown. 1200 block of Enslow Boulevard, Huntington.	0	2
Cabell	05/18/2011	Landslide; small; unknown. 1600 block of Holderby Road, Huntington.	0	2
Cabell	05/18/2011	Landslide; small; unknown. Before last house on Belmont Road, near Johnstown Road, Harveytown.	0	2
Cabell	05/18/2011	Landslide; small; unknown. Many locations in Huntington.	0	2
Cabell	05/18/2011	Landslide; small; unknown. Between Giger Street and Belmont Drive, Huntington.	0	2
Cabell	04/03/2015	Mudslide; small. A mudslide Friday night is blocking part of W.Va. 2 in the Lesage area, police say (caused by downpour).	0	2
Lincoln	05/30/2009	Mudslide; small; unknown. Drivers reported standing water across State Route (SR) 10 in several places, but staff with the Department of Highways was addressing the problem late Saturday.	0	2
Lincoln	03/02/2012	Mudslide; small; unknown. County 911 officials say a mudslide is blocking part of SR 10 in Harts Creek between Toney Curve and the Logan County line.	0	2

LANDSLIDES IN REGION 2 (NON-EXHAUSTIVE)				
County	*Date*	*Narrative*	*Fatalities*	*Confidence*
Lincoln	12/06/2013	Landslide; medium, unknown. A perfect storm of issues has now led the West Virginia Department of Transportation to shut down Little Coal River Road near the Lincoln-Kanawha County line.	0	2
Logan	06/13/2010	Mudslide; medium; unknown; Taplin Freewill Baptist Church, Taplin.	0	2
Logan	07/11/2013	Landslide; medium; unknown. Lyburn Area, Logan County. A mudslide has left people with no way out of their neighborhood for the second time in just over a week.	0	2
Logan	07/24/2013	Landslide; medium; unknown. SR 10 In Logan County. Road crews were on their second day trying to clear a massive slide on SR 10 in Logan County.	0	1
Logan	12/06/2013	Mudslide; medium; unknown. Madison Creek Road, Logan County.	0	2
Logan	12/07/2013	Mudslide; medium; unknown. Madison Creek Road, Logan County. People woke up to a muddy mess in the Madison Creek area of Logan County Saturday morning.	0	2
Logan	12/10/2013	Mudslide; medium; unknown. Madison Creek Road, Logan County. In Logan County, mudslides have been plaguing the Madison Creek area since Friday; a second mud slide on Monday trapped 110 people in their homes.	0	2
Logan	03/04/2015	Mudslide; medium; unknown. Logan County.	0	1
Logan	09/01/2016	Rock fall; small; above road. SR 10 north of Chapmanville. The road was closed much of the day because large rocks had to be removed from the road.	0	2
Logan	12/19/2018	Landslide; medium; above road. Rockslide in northern Lyburn on Old SR 10.	0	2
Mingo	N/A	N/A	0	3
Mingo	07/09/2008	Landslide; small; unknown. Moore Street, Ethel Street, Williamson. Heavy rains resulted in a mudslide in East Williamson yesterday that rendered two streets impassable.	0	2
Mingo	03/04/2015	Mudslide; medium; above road. County Route (CR) 6 at Mate Creek. Another (mudslide) has closed both lanes of CR 6 at Mate Creek.	0	2
Mingo	03/04/2015	Mudslide; medium; above river. Browning Fork Road, Gilbert.	0	2
Mingo	03/04/2015	Mudslide; small; above road. US 52 near east Kermit. One slide closed one lane of US 52 near east Kermit.	0	2
Mingo	03/04/2015	Mudslide; small; above road. Route 80 near Tamcliffe.	0	2
Mingo	03/04/2015	Mudslide; medium; natural slope. Little Egypt Road, Gilbert. One home in Gilbert was knocked off its foundation and a woman had to be taken to the hospital.	0	5
Mingo	03/05/2015	Mudslide; medium; above road. Big Splint Hollow Road off of US Route 119 near Williamson. The slide has affected at least 20 homes and 50 residents that live behind the road where the mudslide occurred.	0	2

LANDSLIDES IN REGION 2 (NON-EXHAUSTIVE)				
County	*Date*	*Narrative*	*Fatalities*	*Confidence*
Mingo	03/11/2015	Mudslide; small; natural slope. Mulberry Street, Williamson. John Dillard had reported a small mudslide on the hill behind his house on Mulberry Street earlier in the week.	0	2
Mingo	03/11/2015	Rock fall; small; above road. Mulberry Street, Williamson. Up the street from the slide at the Dillard residence, a much smaller rockslide took place about the same time as Dillard's. Luckily, no one was injured.	0	2
Mingo	05/02/2016	Landslide; medium; above road. Train tracks in Borderland. The railroad says the rockslide was reported at 2:45 a.m. Monday in the town of Borderland, north of Williamson.	0	2
Mingo	04/24/2017	Landslide; small; above road. Old US 52, Williamson. Landslide near Chattaroy Park and Ride. Landslide covers both lanes of road and railroad track.	0	2
Mingo	11/25/2018	Mudslide; small; natural slope. 67 Zando Street, Williamson. A 50-yard mudslide has occurred on an empty lot between Mulberry Street and Vinson Street in Williamson.	0	2
Wayne	04/12/2014	Mudslide; small; above road. Wayne County. Crews are on the scene of a mudslide that has caused two lanes to be shut down in Wayne County.	0	2
Wayne	07/07/2015	Creep; small; natural slope. Spring Valley Drive. Adkins believes it's because of a faulty drain line above her property. She said ever since the winter, the rain has not drained properly, spilling into her front yard.	0	2
Wayne	01/28/2016	Landslide; small; above road. 5th Street. Traffic was backed up Monday along 5th Street in Huntington, as crews with the West Virginia Division of Highways worked to clean up debris left from a rockslide.	0	2
Wayne	05/04/2018	Rock fall; small; above road. Exit ramp, I-64, Kenova. A rockslide has been reported at the westbound exit ramp on I-64 at Kenova. It happened around 3:30 a.m. Friday.	0	2
Wayne	05/07/2018	Rock fall; small; above road. Marrowbone Creek Road and US Route 52. A rockslide blocked one lane of traffic along Route 52 in Wayne County. The rockslide happened at the mouth of Marrowbone Creek Road and Route 52.	0	2

While working on this update, a high-profile landslide impacted the Target store in Barboursville. A corner of the store sunk considerably thanks to a hillside slip on February 2, 2024 (Williams, 2024). Additional local media reporting cited a study that suggested the hill behind the target had a 70-100% probability of slope failure (Burbank, 2024).

Damage to the Target store and its parking lot, February 2024.

Loss and Damages

Landslides and subsidence can result in significant damage to highways, buildings, homes, and other structures that support a wide range of economic activities. A 1976 WVGES report on landslide and slide-prone areas estimated annual costs exceeding $10 million, not including unreported damage to homes, land, and property (Lessing, Kulander, Wilson, Dean, & Woodring, 1976). The expansion of urban development contributes to a greater risk of damage from landslides and subsidence. The USGS recognizes six major impacts caused by landslides.

- Damage in all 50 states, Puerto Rico, and the U.S. Virginia Islands
- Costs of $3.5 billion per year (2005 dollars), in damage repair
- Between 25 and 50 fatalities in the U.S. annually
- Reduction in real estate values and tourism revenue
- Losses in industrial, agricultural, and forest productivity
- Damages sustained to the natural environment

The West Virginia statewide Total Exposure Area Landslide (TEAL) data estimates potential losses resulting from landslides. The table below shows susceptibility by occupancy type and value for each jurisdiction.

LANDSLIDE SUSCEPTIBILITY BY OCCUPANCY TYPE						
Community Name	High/Medium Susceptibility					
	Residential Occupancy		Commercial Occupancy		Other Occupancy	
	Count	Value	Count	Value	Count	Value
Barboursville	11	$3,060,800	1	$17,900	1	$0
Cabell County*	410	$25,733,588	12	$679,253	54	$501,408
Huntington**	265	$23,945,654	1	$180,600	14	$34,300
Milton	2	$98,400	0	$0	1	$28,550
Cabell County	**688**	**$52,838,441**	**14**	**$877,753**	**70**	**$564,258**
Hamlin	0	$0	0	$0	0	$0
Lincoln County*	299	$5,619,939	4	$124,100	79	$298,356
West Hamlin	1	$11,333	0	$0	0	$0
Lincoln County	**300**	**$5,631,272**	**4**	**$124,100**	**79**	**$298,356**
Chapmanville	2	$52,600	0	$0	1	$0
Logan	101	$1,771,333	2	$279,040	20	$4,100
Logan County*	226	$4,404,130	17	$1,020,394	79	$12,857
Man	0	$0	0	$0	0	$0
Mitchell Heights	8	$474,200	0	$0	0	$0
West Logan	3	$72,800	1	$5,800	0	$0
Logan County	**340**	**$6,775,064**	**20**	**$1,305,234**	**100**	**$16,957**
Hartford	4	$50,750	0	$0	0	$0
Henderson	3	$0	0	$0	3	$17,100
Leon	3	$43,400	0	$0	0	$0
Mason	0	$0	0	$0	0	$0
Mason County*	118	$2,689,573	2	$9,900	118	$2,642,640
New Haven	2	$29,300	0	$0	1	$1,250
Point Pleasant	4	$86,000	1	$14,150	1	$0
Mason County	**134**	**$2,899,023**	**3**	**$24,050**	**123**	**$2,660,990**
Delbarton	12	$39,210	0	$0	8	$0
Gilbert	7	$107,300	0	$0	2	$0
Kermit	6	$139,700	0	$0	2	$0
Matewan	2	$0	0	$0	2	$0
Mingo County*	198	$1,402,640	11	$3,045	116	$57,880
Williamson	123	$1,665,817	2	$446,200	36	$13,500
Mingo County	**348**	**$3,354,667**	**13**	**$449,245**	**166**	**$71,380**
Ceredo	19	$620,000	1	$265,200	5	$1,500
Fort Gay	12	$96,250	0	$0	4	$0
Huntington**	3	$105,700	1	$21,400	0	$0
Kenova	0	$0	0	$0	0	$0
Wayne	25	$665,033	1	$46,900	3	$0
Wayne County*	492	$15,378,783	13	$205,867	149	$535,308
Wayne County	**551**	**$16,865,767**	**16**	**$539,367**	**161**	**$536,808**

Future Occurrences

Slides and slumps tend to develop when soil moisture and pore pressure are problematic after long wet seasons. Late winter and early spring soil becomes saturated and ground-water tables are high throughout the region slides and slumps can be problematic. These slides and slumps can become debris flows that run considerable distances downslope. Intense summer and spring storms are frequent causes of debris flows. The region is also at risk of future land subsidence issues resulting from underground mining. The areas of greatest concern regarding underground mining include Logan and Mingo Counties.

Future Climate Considerations

Long-term climate change may increase precipitation, precipitation intensity, ground saturation, and a rise in groundwater level, reducing the shear strength and increasing the weight of soils (USGCRP, 2018). An increase in erosion may remove the toe and lateral support of certain areas, triggering potential landslides.

Risk Assessment

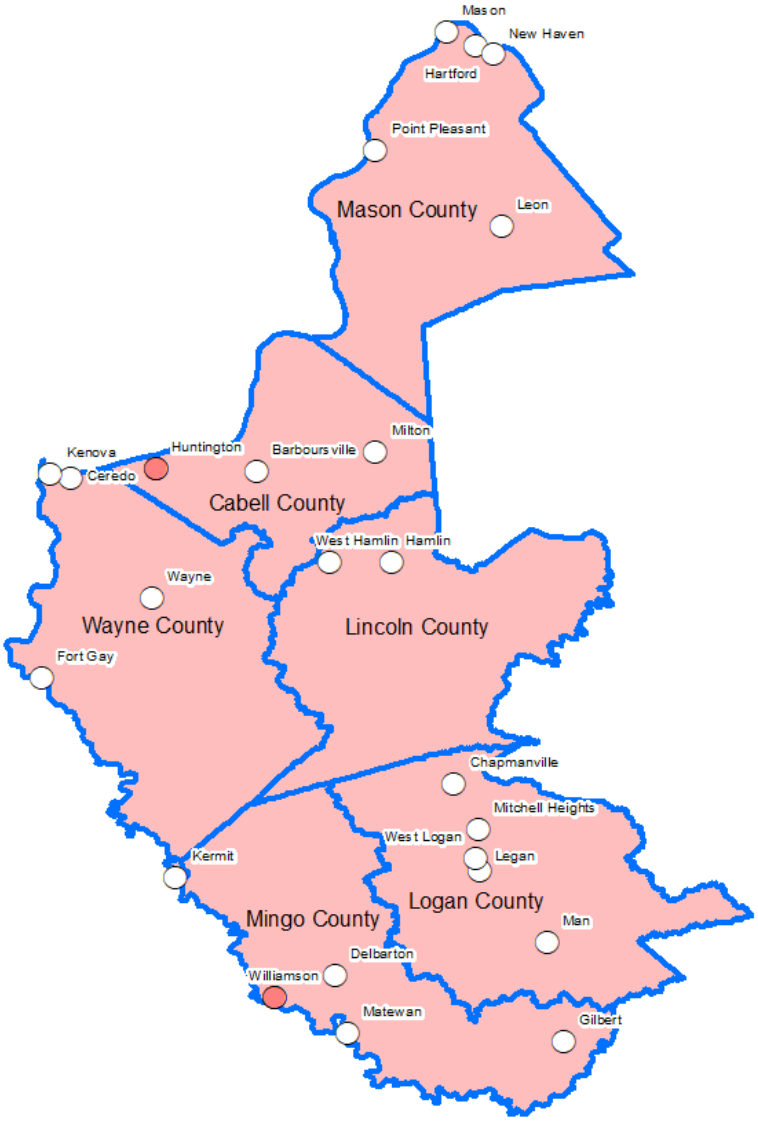
This section summarizes the vulnerability of the region to landslides and land subsidence. The planning and development council conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding landslides and land subsidence.

PUBLIC SENTIMENT, LANDSLIDE AND LAND SUBSIDENCE					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Landslides & Land Subsidence	10 (25.00%)	14 (35.00%)	13 (32.50%)	3 (7.50%)	40
In the past ten years, do you remember this hazard occurring in your community?				16 (40.00%)	40
Have you noticed an increase in the occurrences or intensity of this hazard?				11 (27.50%)	40
Have you noticed a decrease in the occurrences or intensity of this hazard?				2 (5.00%)	40

The following table assigns point totals based on the methodology identified in Section 2.2: Describe Hazards above.

LANDSLIDE AND LAND SUBSIDENCE RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	5	Excessive (Will occur during a year)	According to the USGS, the majority of the region is a "high incidence" area. Several areas of the region have been undermined.
Response	4	One month	Large landslides and subsidence areas can take a month or more to clean up and repair. Since several occurrences are small and require less time, planners considered a rough average for this estimate.
Onset	4	Less than 6 hours	Some landslides and instances of subsidence can occur with no warning at all.
Magnitude	1	Localized (Less than 10% of land area affected)	All landslide and land subsidence events are site-specific, and they do not affect vast areas.
Business	3	At least two weeks	Businesses located in an affected area of a landslide or subsidence event may be impacted for two weeks or more. Again, planners used an average for this estimate since many slow-developing subsidence events may not interrupt business operations as the subsidence is addressed.
Human	2	Low (Some minor injuries)	Historically, landslides and subsidence have only resulted in property damage. The greatest chance of personal injury would be to motorists.
Property	1	Less than 10% of property affected	All landslide and land subsidence events are site-specific, and they do not affect vast areas. Though their impacts are typically property damage, a heavily damaged small number of properties still would not account for more than 10% of the total property within the region.
Totals	**20**	**Medium**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks are more or less prevalent as compared to the rest of the planning area. The following map identifies those multi-jurisdictional risks with respect to landslides and land subsidence. Those labels not underlaid by a shaded drop shadow are not more or less at risk of landslides and land subsidence. Those with red drop shadows are more at risk; those with green are less at risk. The counties marked as higher have more road miles in unincorporated areas that are susceptible (as well as mined areas in Logan and Mingo Counties), while Huntington and Williamson have a higher number of structures susceptible.


Mason
New Haven
Hartford
Point Pleasant
Mason County
Leon
Milton
Kenova
Huntington
Barboursville
Ceredo
Cabell County
West Hamlin
Hamlin
Wayne
Wayne County
Lincoln County
Fort Gay
Chapmanville
Mitchell Heights
West Logan
Logan
Kermit
Logan County
Mingo County
Man
Delbarton
Williamson
Matewan
Gilbert

2.2.11 Substance Use Crisis

Substance abuse crisis refers to the public health crisis stemming from the rapid increase in the use of and deaths from prescription and non-prescription opioid drugs.				
Risk HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	At any time	**Risk Ranking:**	High
	Warning Time:	Less than 6 hours	**Type of Hazard:**	Human-caused
	Probability:	High (Likely to occur in a year)	**Impact:**	Localized (less than 10% of land area affected)
	Disaster Declarations:	None		

Hazard Overview

In the United States, what is commonly referred to as the opioid epidemic, not for being a contagious or infectious disease, but by acting like one, has grown to alarming proportions. In 2019 alone, 10.1 million people misused prescription opioids. Opioids are drugs primarily used for pain relief; they include legal and illegal substances. Legally prescribed opioids include oxycodone, hydrocodone, and morphine. Illicit drugs include substances such as heroin and fentanyl. According to the U.S. Department of Health and Human Services (USDHHS), 1.6 million people misused prescription opioids for the first time, and 70,630 people died from overdosing on opioids in 2019. Of these deaths, 14,480 were attributed to overdosing on commonly prescribed opioids. Around 745,000 people used heroin, 50,000 for the first time, and about 63,000 deaths were attributed to overdoses of synthetic opioids or heroin, again in 2019 (USDHHS, 2022).

Location and Extent

The opioid epidemic has, in some way, reached into the lives of nearly every person in the U.S. This disease does not have a preference for age, class, economic status, or even gender. It is difficult to pinpoint a specific location of this epidemic. However, the CDC maintains data on states' and counties' dispensing rates. The table below shows a comparison between West Virginia and the Region 2 counties (CDC, 2023b).

OPIOID DISPENSING RATE PER 100 PERSONS							
Year	*West Virginia*	*Cabell County*	*Lincoln County*	*Logan County*	*Mason County*	*Mingo County*	*Wayne County*
2022	48	113.6	24.0	60.7	52.5	61.0	10.4
2021	52.3	120.8	25.3	76.2	58.1	67.4	10.9
2020	53.7	121.2	26.5	83.0	58.3	66.6	11.0
2019	59.6	130.5	25.7	93.9	57.1	69.2	12.4

The Secretary of Health and Human Services issued a Determination of a Public Health Emergency on October 26, 2017, that has been renewed annually (by subsequent HHS secretaries). Along with overdose fatalities, medical professionals and researchers have linked opioid abuse to increases in other medical conditions, including Hepatitis C, HIV, and neonatal abstinence syndrome. Although the use of prescription opioids under physician's care has made it possible for some individuals with injuries to return to work, opioids have lowered labor force participation. Federal and state budgets have also been affected by the opioid epidemic as costs for subsidized health insurance, rehabilitation, preventative programs, and child welfare programs have increased (CBO, 2022).

This crisis is a problem that is affecting every state in the nation. In 2018 West Virginia passed the Opioid Reduction Act that codified and centralized several opioid-related efforts including providing education on opioid use and alternatives (i.e., physical therapy, etc.), limiting the amount of opioids prescribed in an emergency or urgent care setting, limiting the amount of opioids prescribed to minors, and several other initiatives.

Impacts and Vulnerability

The impacts of the opioid crisis are numerous, and they range from individual to community levels. Losing loved ones, having children taken away and placed in foster care, worsening financial hardships, turning to prostitution, theft, etc. to pay for drugs, etc., are some of the individual impacts. Strains on local economies and threats to local emergency services and medical officials constitute some of the community effects.

OPIOID EPIDEMIC CONSEQUENCE ANALYSIS	
Type of Impact	*Description*
Public /Responder Health and Safety	This hazard manifests within the general population. Residents should be aware of higher crime and how to manage and handle people who exhibit addictive behavior. Having a loved one addicted to opioids may cause financial, physical, and emotional stress. First responders can be in danger when responding to overdose incidents due to the nature of unknown drugs and their side effects.
Continuity of Operations (incl. Delivery of services)	Businesses whose employees suffer from addiction may see reduced productivity, possibly leading to a deficit of available human resources.
Property, Facilities, And Infrastructure	An increase in crime may cause some property damage.
Economic Condition	The opioid epidemic is becoming more and more costly to residents and governments. Costs include first-response activities, hospital care, treatment, etc.
Environmental	The environmental impacts of the opioid epidemic are minimal.

Social Vulnerability Considerations

One could compellingly argue that the opioid epidemic creates a socially vulnerable population, as it erodes health, impacts finances and pushes households into poverty, impacts an individual's ability to work productively (and to find employment), etc. (Paris, Rowley, & Frank, 2023). The opioid crisis has not discriminated in its impacts, as those from low-income and wealthier backgrounds have become victims. The crisis is not bound by geography. Many groups have tried to identify risk factors associated with opioid effects, though consensus has been elusive. Older adults (i.e., 65+) or teenagers, those with respiratory conditions (e.g., sleep apnea, asthma, or COPD), those with a previous history of substance abuse, untreated psychological disorders, and those with a social or family environment that encourages misuse have been noted (Judd, King, & Galke, 2023; USDOL, n.d.).

Previous Occurrences

The West Virginia Department of Health and Human Resources Bureau for Public Health maintains a record of drug-related deaths in the state. The table below shows the statistics for Region 2 counties from 2018 through 2023. Of the 1,528 drug-related deaths in the region, 1,359 (88.94%) were opioid related.

DRUG OVERDOSE DEATHS OCCURRING IN REGION 2								
County	*Cause of Death*	*2023*	*2022*	*2021*	*2020*	*2019*	*2018*	*Totals*
Cabell	All Drug	133	161	168	159	113	151	**885**
	Opioid	116	146	143	141	100	136	**782**
Lincoln	All Drug	13	19	18	10	7	8	**75**
	Opioid	12	15	16	19	6	5	**73**
Logan	All Drug	30	44	62	55	26	14	**231**
	Opioid	26	39	57	51	22	10	**205**
Mason	All Drug	11	16	31	13	10	9	**90**
	Opioid	10	11	28	11	8	9	**77**
Mingo	All Drug	15	22	22	10	9	6	**84**
	Opioid	12	21	19	9	6	4	**71**
Wayne	All Drug	20	25	33	37	24	24	**163**
	Opioid	18	25	27	35	23	23	**151**

Loss and Damages

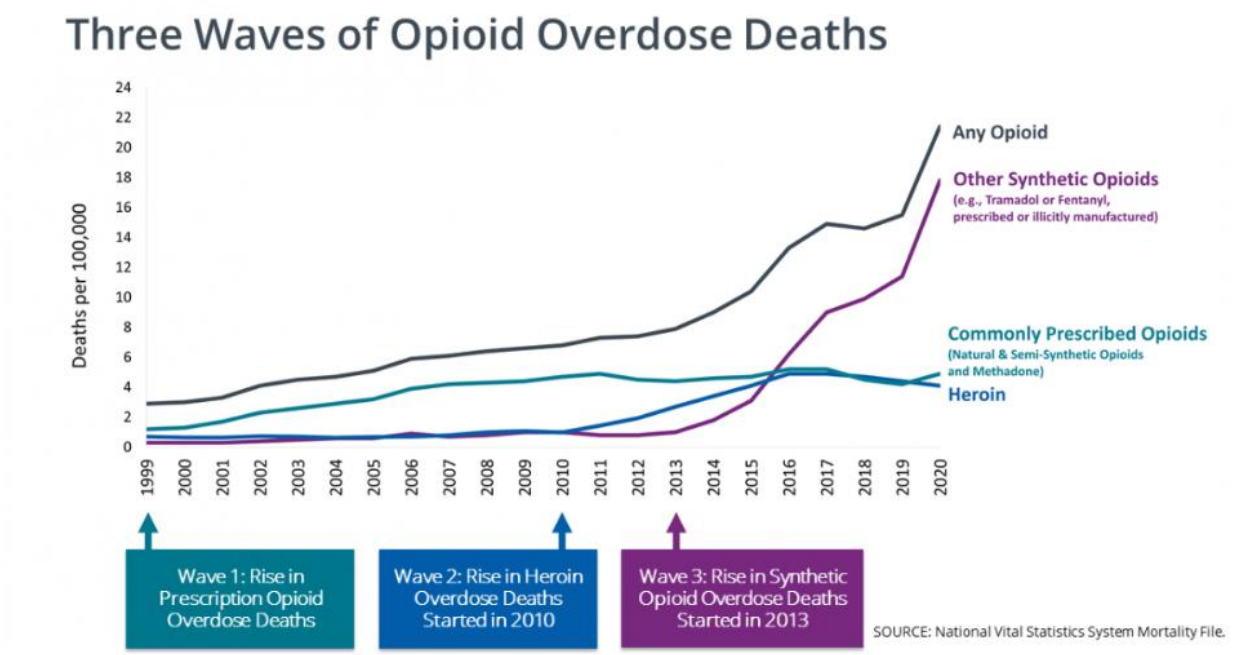
In addition to the over 70,000 fatalities in 2021, the healthcare cost for opioid overdoses exceeds $35 billion in the United States annually. Opioid use is associated with another $14.8 billion in criminal justice costs and an estimated $92 billion in lost productivity (Florence, Luo, & Rice, 2021).

The CDC published the case counts and costs of opioid use disorder and fatal opioid overdose per capita cost by state (2017). West Virginia had an estimated 16,000 cases of opioid use disorder costing $3.5 billion. The 833 opioid related fatalities cost an additional $9.6 billion.

Future Occurrences[1]

As seen in the graphic below, the number of prescription opioid deaths that quickly rose in the early 2000s has remained relatively consistent due to laws and policies put in place by the federal and state governments. However, as oversight on dispensing opioids has become more stringent, fatalities from synthetic opioids have increased substantially. The CDC has identified three waves of opioid overdose deaths that correspond with the passing and enforcing of legislation to combat prescription opioid abuse (CDC, 2024).

[1] Future climate considerations are not included because the opioid epidemic is a human-caused hazard.



The number of opioid-related deaths will likely continue to rise due to the manufacturing of synthetic opioids. Individuals who had been prescribed medication for injuries or acute pain in the past can substitute these synthetic opioids to feel the same relief or high they felt before. To combat the manufacturing and distribution of these synthetic drugs, Congress passed the Combat Methamphetamine Epidemic Act in 2005, requiring pharmacies to log all purchases of pseudoephedrine, the main ingredient used in methamphetamine. However, most methamphetamines used in the United States are manufactured in Mexico and shipped into the U.S. (NIH, 2019).

Risk Assessment

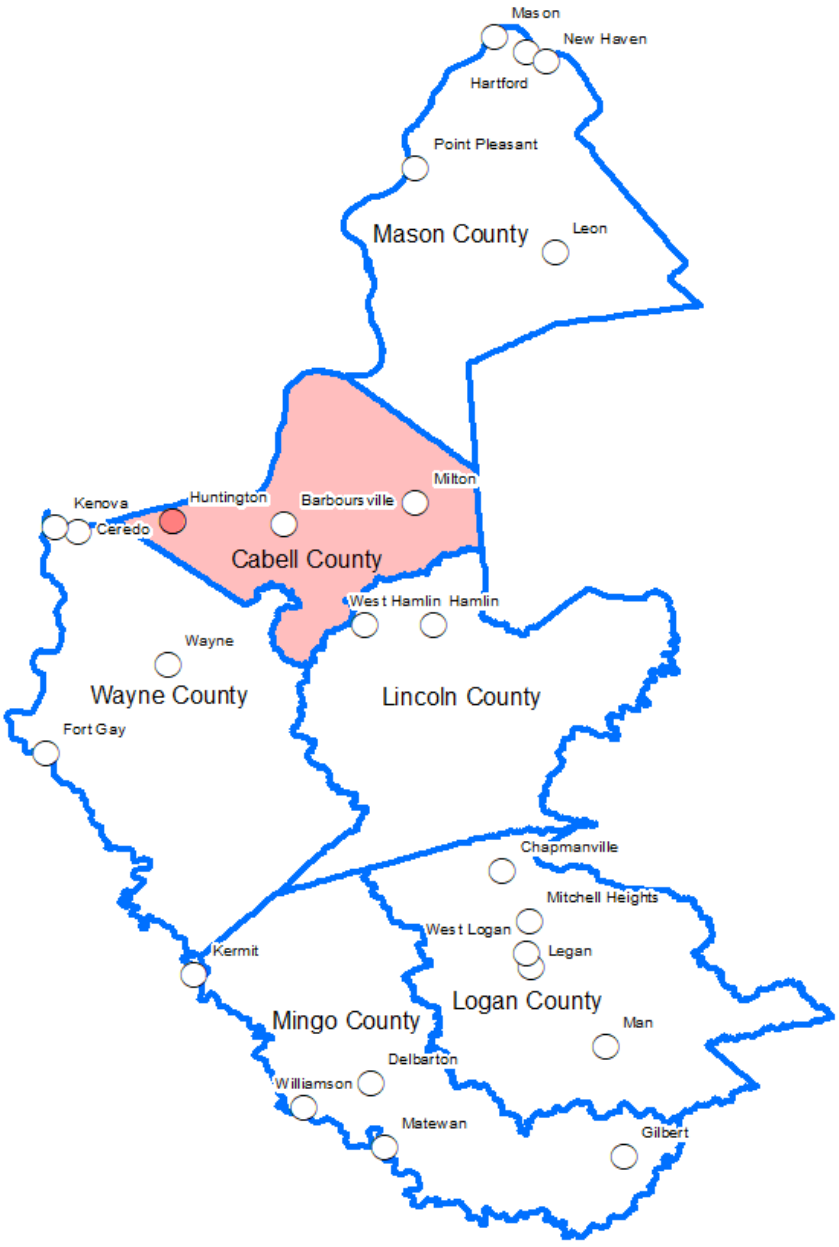
This section summarizes the vulnerability of the region to substance use crisis. The planning and development council conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding substance use crisis.

PUBLIC SENTIMENT, SUBSTANCE USE CRISIS					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Substance Use Crisis	2 (5.00%)	3 (7.50%)	14 (35.00%)	21 (52.50%)	40
In the past ten years, do you remember this hazard occurring in your community?				30 (75.00%)	40
Have you noticed an increase in the occurrences or intensity of this hazard?				26 (65.00%)	40
Have you noticed a decrease in the occurrences or intensity of this hazard?				6 (15.00%)	40

The following table assigns point totals based on the methodology identified in Section 2.2: Describe Hazards above.

SUBSTANCE USE CRISIS RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	5	Excessive	The number of opioid-related deaths in Region 2 averages 226.5 per year
Response	5	More than one month	The fight to combat opioid misuse has been ongoing for decades.
Onset	4	Less than 6 hours	Opioid-related deaths can occur at any time without warning.
Magnitude	4	Catastrophic (more than 50% of land area affected)	The opioid epidemic is nationwide, affecting all communities.
Business	1	Less than 24 hours	The opioid epidemic does not usually affect businesses in Region 2.
Human	4	High (multiple deaths)	Region 2 averages 226.5 deaths per year from opioid use.
Property	1	Less than 10% of property affected	The opioid epidemic has minimal effect on property.
Totals	**24**	**High**	

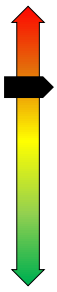
FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks are more or less prevalent as compared to the rest of the planning area. The following map identifies those multi-jurisdictional risks with respect to substance use crisis. Those labels not underlaid by a shaded drop shadow are not more or less at risk of substance use crisis. Those with red drop shadows are more at risk; those with green are less at risk.


Mason
New Haven
Hartford
Point Pleasant
Mason County
Leon
Milton
Kenova
Huntington
Barboursville
Ceredo
Cabell County
West Hamlin
Hamlin
Wayne
Wayne County
Lincoln County
Fort Gay
Chapmanville
Mitchell Heights
West Logan
Kermit
Logan
Logan County
Mingo County
Man
Delbarton
Williamson
Matewan
Gilbert

2.2.12 Severe Summer Weather

A severe thunderstorm produces a tornado, winds in excess of 58 miles per hour, or hail of one inch in diameter or larger. These storms are accompanied by lightning. Straight-line winds (Derechos), downbursts, macrobursts, microbursts, and gust fronts are all part of severe wind events

Risk



Period of Occurrence:	Thunderstorms, typically occur during late spring and summer	**Risk Ranking:**	High
Warning Time:	6-12 hours	**Type of Hazard:**	Natural
Probability:	Excessive (Will occur during a year)	**Impact:**	Catastrophic (More than 50% of land area affected)

Disaster Declarations:

DR-323-WV (1972)
DR-349-WV (1972)
DR-416-WV (1974)
DR-531-WV (1977)
EM-3052-WV (1977)
DR-569-WV (1979)
DR-706-WV (1984)
DR-1115-WV (1996)
DR-1132-WV (1996)
DR-1168-WV (1997)
DR-1229-WV (1998)
DR-1319-WV (2000)
DR-1378-WV (2001)
WV-L0080 (SBA) (2001)
DR-1410-WV (2002)
WV-L0082 (SBA) (2002)
WV-L0083 (SBA) (2002)
DR-1455-WV (2003)
DR-1474-WV (2003)
WV-L0094 (SBA) (2003)
DR-1500-WV (2004)
DR-1522-WV (2004)
DR-1536-WV (2004)
DR-1558-WV (2004)
DR-1696-WV (2007)
DR-1838-WV (2009)
WV-00012 (SBA) (2009)
DR-1918-WV (2010)
WV-00020 (SBA) (2010)
DR-4059-WV (2012)
DR-4061-WV (2012)
DR-4071-WV (2012)
EM-3345-WV (2012)
S3386 (USDA FSA) (2012)
WV-00023 (SBA) (2012)
WV-00027 (SBA) (2012)
WV-00029 (SBA) (2012)
DR-4132-WV (2013)
DR-4219-WV (2015)
DR-4221-WV (2015)
DR-4236-WV (2015)
S3934 (USDA FSA) (2015)
DR-4273-WV (2016)
DR-4359-WV (2018)
S4444 (USDA FSA) (2018)
S4480 (USDA FSA) (2018)
S4532 (USDA FSA) (2019)
S4734 (USDA FSA) (2020)
S4735 (USDA FSA) (2020)
DR-4605-WV (2021)
WV-00053 (SBA) (2021)
S5322 (USDA FSA) (2022)
KY-00091 (SBA) (2022)
WV-00057 (SBA) (2022)

Hazard Overview

Thunderstorms are local storms accompanied by lightning and thunder that are capable of producing strong winds, tornadoes, hail, and flash flooding. A thunderstorm is “severe” when it produces a tornado, winds of at least 58 mph, or hail at least one inch in diameter. Hazards associated with severe thunderstorms include lightning, hail, damaging wind, heavy rain, flash

flooding, and tornadoes. Thunderstorms are a seasonal hazard and can be expected to occur every year. According to the National Weather Service, the most active thunderstorm season in West Virginia is late spring and early summer. There are five types of thunderstorms, each described in detail in the table below.

TYPES OF THUNDERSTORMS				
Type	*Description*	*Duration*	*Wind Speeds*	*Hazards*
Single Cell	Uncommon	20-30 minutes	N/A	• Non-damaging hail • Microbursts • Weak tornadoes
Multi-Cell	Common, organized cluster of two or more single cells	Approx. 20 minutes per cell	Downbursts up to 80 mph	• Heavy rainfall • Downbursts • Hail • Weak tornadoes
Mesoscale Convective System	A well-organized system of thunderstorms	Up to 12 hours or more	55 mph or more	• Torrential rainfall • Derechos • Tornadoes
Squall Line	May extend over 250-500 miles, 10-20 miles wide	30-60 minutes for each cell	N/A	• Significant rainfall • Derechos
Super Cell	Most dangerous, visible with Doppler radars	1-6 hours	Updrafts & downdrafts greater than 100 mph	• Tornadoes • Hail

A hailstorm is an atmospheric disturbance manifested in strong winds and accompanied by precipitation. Hail is a form of precipitation that occurs when updrafts from a thunderstorm carry raindrops into colder temperatures. The drops of water freeze together in the cold upper regions of the thunderstorm clouds. Hailstones grow by colliding with super-cooled water droplets. The stronger the updraft of the storm, the longer the drops of water can freeze together; thus, the larger the hailstone. When a hailstone becomes too heavy for the updraft to support it, or the updraft weakens, the stone falls to the ground.

Hailstones less than one inch in diameter typically fall to the ground at nine to 25 mph. Hailstones associated with severe thunderstorms (i.e., 1” to 1 3/4” in diameter) can fall to the ground at 40 mph. The TORRO Hailstorm Intensity Scale (Voss Law Firm, 2023) measures hail, H0 – H10, based on diameter.

TORRO HAILSTORM INTENSITY SCALE			
TORRO Intensity	*Intensity Category*	*Diameter (mm)*	*Reference Objects*
H0	Hard Hail	5	Pea
H1	Potentially Damaging	5-15	Mothball
H2	Significant	10-20	Marble, Grape
H3	Severe	20-30	Walnut
H4	Severe	25-40	Pigeon's egg > Squash ball
H5	Destructive	30-50	Golf ball > Pullet's egg
H6	Destructive	40-60	Hen's egg
H7	Destructive	50-75	Tennis ball > Cricket ball
H8	Destructive	60-90	Large orange > Softball
H9	Super Hailstorm	75-100	Grapefruit
H10	Super Hailstorm	> 100	Melon

Lightning is a naturally occurring giant spark of electricity in the air between clouds, the air, or the ground. Air acts as an insulator between the cloud and the ground, but when the charge difference becomes great enough, this insulating capacity breaks down, allowing the rapid discharge of electricity. This electrical discharge is known as lightning. Lighting can reach a significant distance from a storm, up to 25 miles, according to the National Severe Storms Library (NSSL). While lightning is a common occurrence and can be seen in most thunderstorms, only about 20% of the lighting observed in a storm will strike the ground. Lightning strikes occur with no warning and kills between 75 to 100 Americans each year (Haddow, Bullock, & Coppola, 2011)

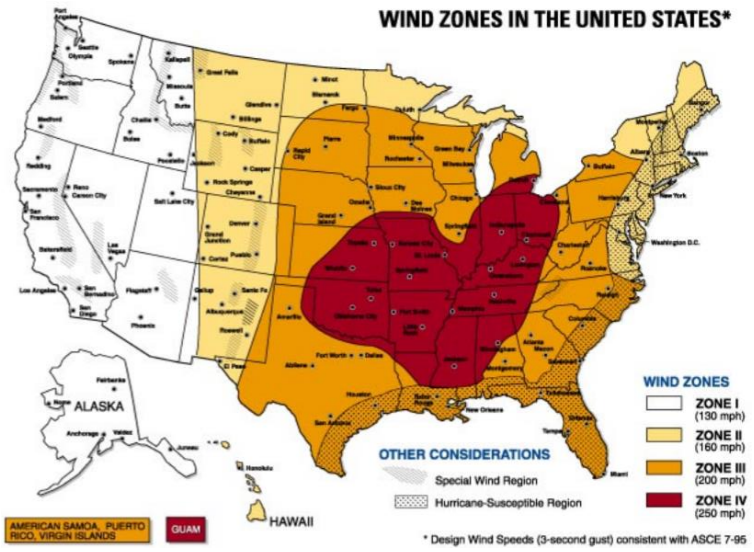
Severe wind includes non-tornadic winds from thunderstorms. There are six types of severe wind: straight-line wind, downbursts, macrobursts, microbursts, gust fronts, and derechos.

- Straight-line Wind: Straight-line wind is a term used to define any thunderstorm wind not associated with rotation, used mainly to differentiate from tornadic winds.
- Downburst: Downburst is the general term for all localized strong wind events caused by a strong downdraft within a thunderstorm.
- Macroburst: An outward burst of strong winds at or near the surface with a diameter larger than 2.5 miles that occurs when a strong downdraft reaches the surface.
- Microburst: A small, concentrated downburst that produces an outward burst of strong winds near the surface. Microbursts are small and short-lived, with a diameter of less than 2.5 miles and lasting only 5-10 minutes.

- Gust Front: The leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. It is characterized by a wind shift, temperature drop, and gusty winds ahead of a thunderstorm.
- Derecho: A widespread, long-lived windstorm associated with a band of rapidly moving showers or thunderstorms. A typical derecho consists of numerous microbursts and downbursts. An event with wind speeds of at least 58mph and a diameter of 240 miles is a derecho.
- Tornadoes: Violently rotating columns of air that touch the ground and are usually attached to the base of an intense thunderstorm. (See Section 2.2.14: Tornado.)

Location and Extent

Severe thunderstorms and associated hail and lightning can affect all areas of the region. These events can last a few seconds (i.e., lightning), minutes (tornadoes), hours (thunderstorms and hailstorms), or days (high winds). The wind is a commonplace phenomenon across the globe. Wind events can impact several jurisdictions at the same time, with varying duration and severity. Again, the entire region is at an equal risk of experiencing severe wind. FEMA's wind zone map classifies wind zones in the United States. All seven counties are in Zone III. Buildings located in a Zone III area should be constructed to withstand three-second wind gusts of up to 200 mph.



The Beaufort Wind Scale measures wind. It characterizes wind using a 0-12 metric based on observation rather than exact measurements. The table below outlines the scale in detail.

BEAUFORT WIND SCALE					
	Wind Speed			*Appearance of Wind Effects*	
Force	*Knots*	*MPH*	*Description*	*On Water*	*On Land*
0	>1	>1	Calm	Sea surface smooth and mirror-like	Calm, smoke rises vertically
1	1-3	1-3	Light Air	Scaly ripples, no foam crests	Smoke drift indicates wind direction, still wind vanes
2	4-6	4-7	Light Breeze	Small wavelets, crests glassy, no breaking	Wind felt on face, leaves rustle, vanes begin to move
3	7-10	8-12	Gentle Breeze	Large wavelets, crests begin to break, scattered whitecaps	Leaves and small twigs constantly moving, light flags extended
4	11-16	13-18	Moderate Breeze	Small waves 1-4ft becoming longer, numerous whitecaps	Dust, leaves, and loose paper lifted, small tree branches move
5	17-21	19-24	Fresh Breeze	Moderate waves 4-8ft taking longer form, many whitecaps, some spray	Small trees with leaves begin to sway
6	22-27	25-31	Strong Breeze	Larger waves 8-13ft, whitecaps common, more spray	Larger tree branches moving, whistling in wires
7	28-33	32-38	Near Gale	Sea heaps up, waves 13-19ft, white foam streaks off breakers	Whole trees moving, resistance felt walking against the wind
8	34-40	39-46	Gale	Moderately high 18-25ft waves or greater length, edges of crests begin to break into spindrift, foam blown in streaks	Twigs breaking off trees, wind generally impedes progress
9	41-47	47-54	Strong Gale	High waves 23-32ft, sea begins to roll, dense streaks of foam, spray may reduce visibility	Slight structural damage occurs, slate blows off roofs
10	48-55	55-63	Storm	Very high waves 29-41ft with overhanging crests, sea white with densely blown foam, heavy rolling, lowered visibility	Seldom experienced on land, trees broken or uprooted, “considerable structural damage”
11	56-63	64-72	Violent Storm	Exceptionally high waves 37-52ft, foam patches cover sea, visibility more reduced	N/A
12	64+	72+	Hurricane	Air filled with foam, waves over 45ft, sea completely white with driving spray, visibility greatly reduced	N/A

Impacts and Vulnerability

The impacts of severe summer storms can include widespread property damage, injuries, and even fatalities. Hailstones can be the most damaging part of a severe thunderstorm, inflicting injuries and destroying crops like a giant pummeling machine. Hailstones often damage automobiles and crops; however, structural damage is a possibility in the form of broken windows, damaged gutters, HVAC systems, and siding.

In some cases, lightning has ignited fires in structures and open land or forests. A bolt of lightning reaches a temperature of 50,000 degrees Fahrenheit in a split second. West Virginia averages less than one death (i.e., 0.47) per year as a result of lightning (NWS, 2023). Individual lightning strikes occur with no warning and kill between 75 and 100 Americans every year (Haddow, Bullock, & Coppola, 2011, pg.51.)

Severe wind can cause a variety of secondary and tertiary hazards. In addition to damaging roofs and other home finishings, wind can cause damage to trees that may interrupt power service or block roadways. Such damage could be widespread and severe, potentially overwhelming the capacity of local responders to address the situation. Specifically, severe summer weather can impact critical infrastructure assets in the following ways. These impacts are shared by all participating jurisdictions.

- Communications: High winds can down trees and communications (e.g., telephone) lines. Winds can also impact communications equipment on towers and the towers themselves (which includes both emergency radio and cellular equipment on towers). Heavy rains (or the cloud cover associated with storm systems) can impact satellite systems, including communications, internet, television, etc.
- Electricity: High winds can similarly impact power lines (or, often, down trees which take down power lines as they fall). Additionally, high winds can damage power poles and transmission towers, as occurred during the 2012 Mid-Atlantic super derecho.

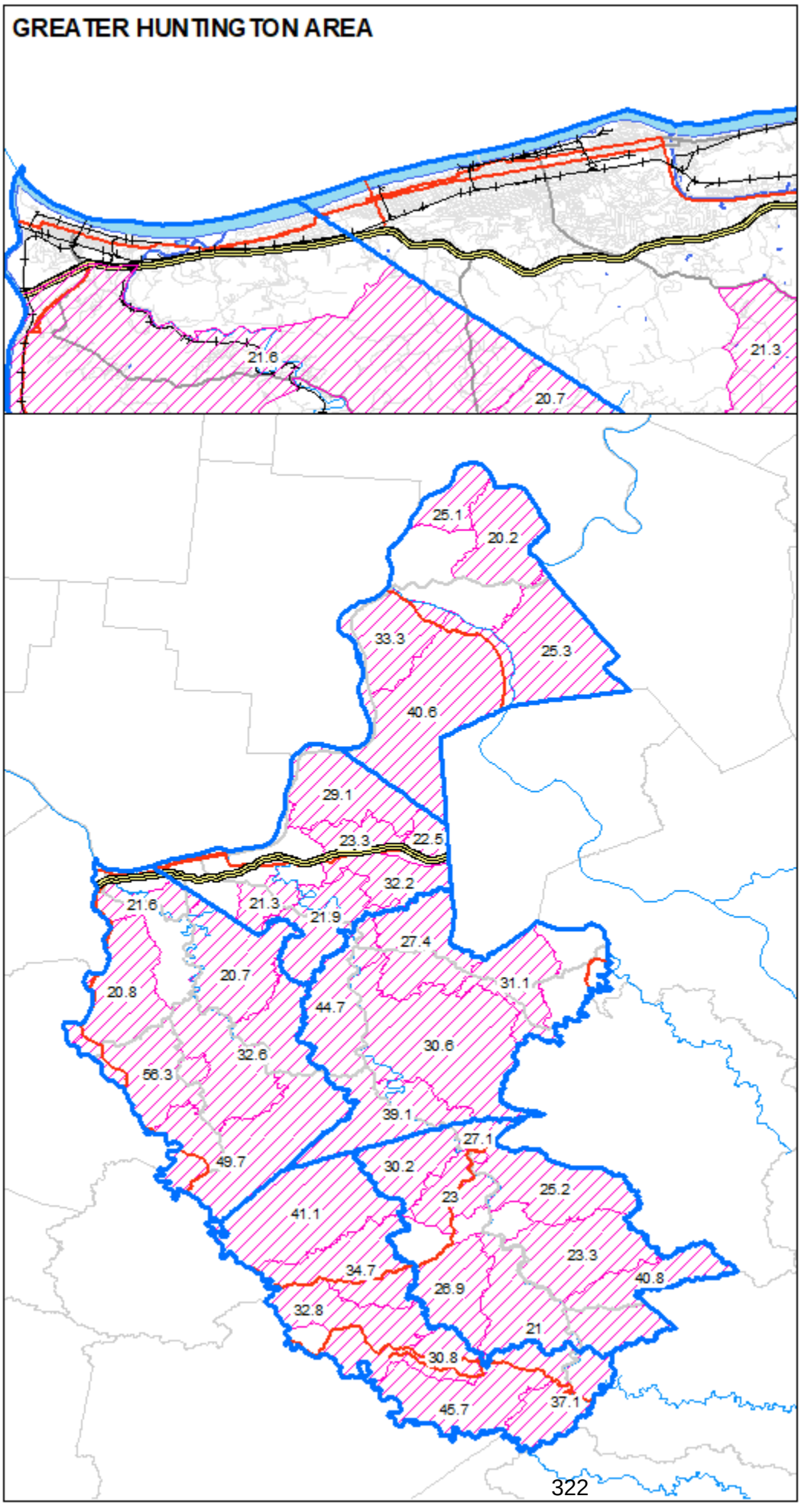
Indirectly, severe summer weather can impact critical infrastructure that is reliant on electricity, such as health and medical facilities, water and sewer systems, etc. These facilities may have auxiliary power, though if not, prolonged outages could take services offline. Heavy rains can pool water on roadways, which could impact the transportation infrastructure (though not substantially damage it). Rushing water may also wash out fills under or alongside roadways or railways, and these impacts could be more damaging.

Heavy rains and winds can damage agricultural areas and other natural assets like parks and recreational forest areas. Impacts can include downed trees, over-saturated grounds, washouts, etc. Whereas the impacts on critical infrastructure are typically short-lived, some summer storms can damage and ruin crop yields for an entire growing season. Though severe summer storms can damage historic and cultural assets, damages are typically minor enough that they can be fixed.

Social Vulnerability Considerations

Severe summer weather does not discriminate amongst the geographies that it impacts, nor does it select or spare certain populations. Risk, then, is fairly universal. The way the impacts of severe summer weather manifest is where communities will see variance with respect to social vulnerability variables. Populations residing in mobile home parks and campgrounds should take particular care to seek adequate shelter with approaching severe weather. There are several mobile home parks and campgrounds located throughout the region. The first of the maps that follow shows the Census tracts by percentage of mobile homes.

The homeless population is at risk as notification methods used for other populations such as radio, television, and service providers, may not be applicable. They also face a lack of transportation and the inability to evacuate an area without assistance (Edgington, 2009). Finally, households below the poverty line are often un- or under-insured. Low-income areas may see a higher concentration of structures built before 1970 when code adoption and enforcement became more common because those older structures are often more affordable. The second of the following maps shows the tracts with higher percentages of residents living below the poverty line.



REGION 2 PDC HAZARD MITIGATION PLAN

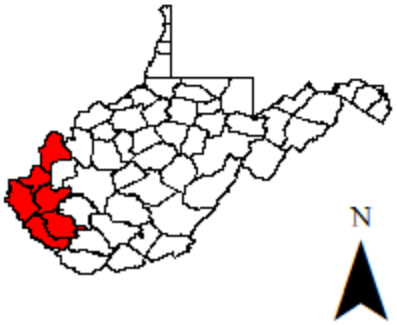
SVI Considerations: Tracts by Housing Stock

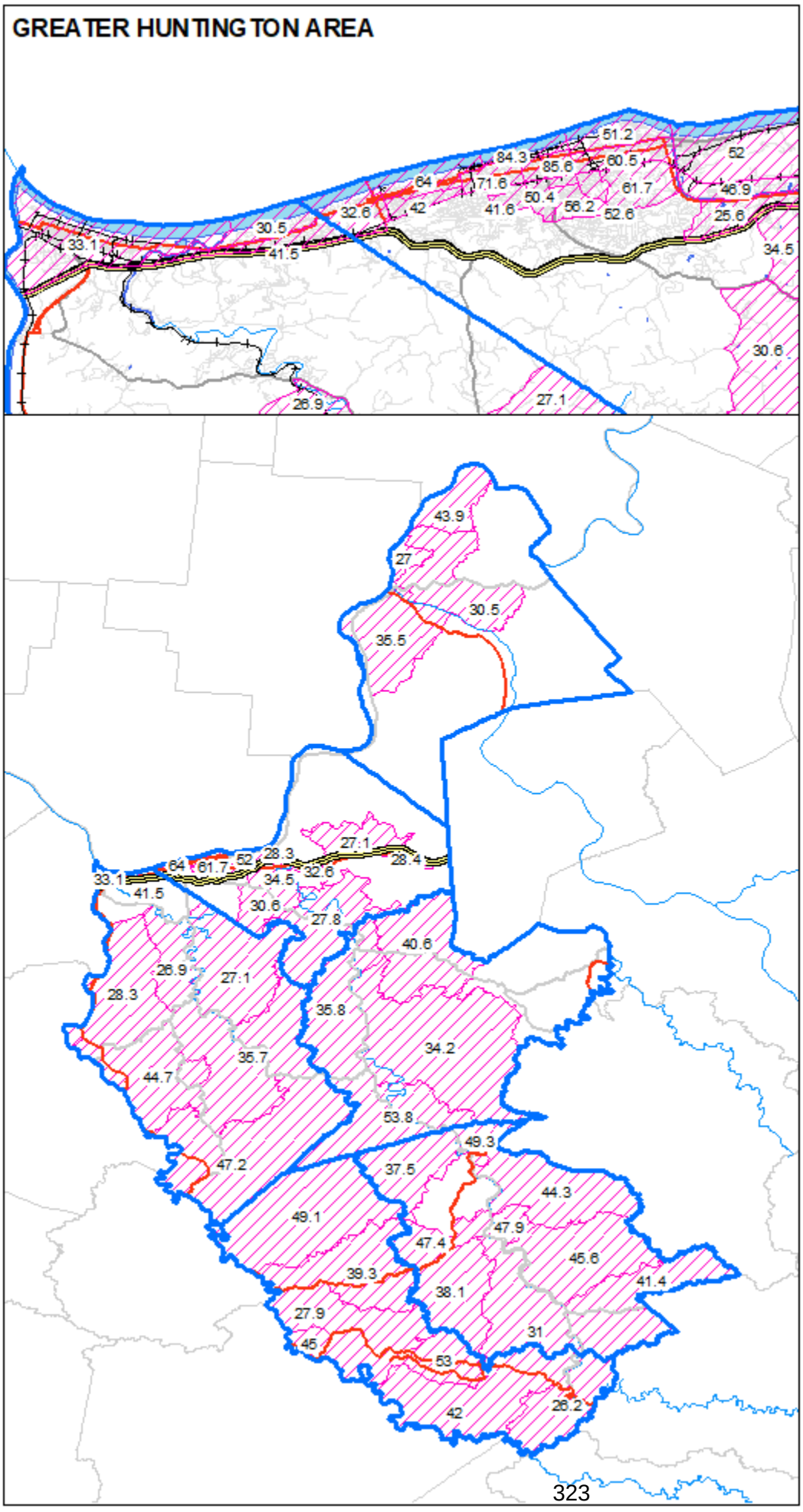
Data Source(s):
CDC SVI Index (2020)

20% or More, Mobile Homes

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.





REGION 2 PDC HAZARD MITIGATION PLAN

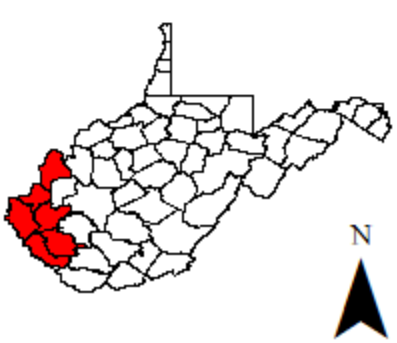
SVI Considerations: Tracts by Poverty Level

Data Source(s):
CDC SVI Index (2020)

25% or More, Below Poverty Est.

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



Other profiles identify difficulties with understanding preparedness and other warning information, and those discussions are valid with respect to severe summer weather. Persons relying on durable medical equipment (e.g., oxygen concentrators) can be disadvantaged by cascading impacts like power outages, downed trees that slow the arrival of emergency services, etc.

Previous Occurrences

The region has experienced 381 days with severe summer storm events since 1954 according to data obtained from NOAA's National Centers for Environmental Information (NCEI) (NOAA NCEI, 2024). The table below illustrates the number of severe summer storm events reported for each county. Of the 381 reported events, 66% were classified as thunderstorms. Approximately 50% of the total reported events involved property damage.

SEVERE SUMMER STORM EVENTS BY COUNTY						
	Cabell	*Lincoln*	*Logan*	*Mason*	*Mingo*	*Wayne*
Hail	79	52	65	64	77	71
Lightning	4	1	1	2	1	1
Thunderstorm	172	116	91	147	91	145
Totals	**255**	**169**	**157**	**213**	**169**	**217**

These 848 events have occurred since 1954, yielding a rate of 12.11 severe summer storm events per annum. The events appear by category in the table below. Thunderstorms accounted for 65% of the total summer storm events throughout the region and accounted for the most property damage at nearly $10 million.

Loss and Damages

Severe summer storms can impact all areas and jurisdictions of the region and are typically widespread events. Severe summer storm events have resulted in approximately $13.85 million in property damage throughout the region over the past 68 years, creating an annual average damage estimate of $203,700. These likely underestimate damages caused to infrastructure and power lines.

Previous occurrences included property damage loss estimates for severe summer storms. By dividing the total losses of each by the number of reported historic occurrences, general property loss estimates for each of the events comprising "severe summer storms" are as follows:

- Thunderstorms: $31,000, per event (based on 311 total events)
- Hailstorms: $54,600 per event (based on 72 total events)
- Lightning: $47,000 per event (based on six events)

Future Occurrences

Severe summer storms may impact infrastructure systems like the power grid and stormwater management features. High winds can affect electricity distribution systems, and as those systems age, they may be more prone to the effects of said weather. Thus, future summer storms may be accompanied by more frequent (and longer-duration) power outages. These changes may disproportionately impact residents relying on durable medical equipment (and, thus, electricity).

Interestingly, the National Institutes of Health suggests that the number and percentage of the population aged 65 and older is occurring more rapidly in rural areas than in urban areas (Cohen & Greaney, 2023). Whether this trend holds over time is not yet known, as an anecdotal contributing variable is the tendency for younger populations (i.e., Millennials and Generation Z) to prefer more urban areas as they launch their careers and families. The influx of younger individuals into these areas lowers the percentage of those who are aging in those areas. Will Millennials and Generation Z choose to relocate to more rural communities in retirement? Or will future generations grow to prefer those rural areas at the start of their adult lives? These demographic trends will intersect in interesting ways with the hazards impacting the region.

More intense precipitation compounded by the rapid gathering of increased runoff may strain the ability of aging dams to perform as designed. Further, changes in land use and development may impact the ways future severe summer storms manifest in the region's communities. Currently, many stormwater management systems are outdated and can be overwhelmed. Future development should use caution with which communities allow large swaths of land to be paved as this may contribute to fewer runoff-related impacts. The outlying rural areas better manage rainfall and excess water though, of course, the more densely developed municipal areas would still need to manage the rainfall falling directly in their footprints.

Future Climate Considerations

Data on the impacts of climate change suggests that severe summer weather may increase in intensity in the coming years (USGCRP, 2018), rendering loss estimates based on previous occurrences obsolete. As yet, there is no collectively agreed-upon manner of adjusting

historical losses to forecast future damages accurately. Significantly, this data-supported conclusion aligns with the lived experience of local officials. Steering committee representatives frequently noted the impacts of summer weather as having changed over the past decade. Forecasts have noted heavy precipitation, but local officials have noted much higher totals in small areas of their jurisdictions.

Risk Assessment

This section summarizes the vulnerability of the region to severe summer weather. The planning and development council conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding severe summer weather.

PUBLIC SENTIMENT, SEVERE SUMMER WEATHER					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Severe Summer Weather	8 (20.00%)	13 (32.50%)	12 (30.00%)	7 (17.50%)	40
In the past ten years, do you remember this hazard occurring in your community?				19 (47.50%)	40
Have you noticed an increase in the occurrences or intensity of this hazard?				16 (40.00%)	40
Have you noticed a decrease in the occurrences or intensity of this hazard?				1 (2.50%)	40

The following table assigns point totals based on the methodology identified in Section 2.2: Describe Hazards above.

SEVERE SUMMER WEATHER RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	5	Excessive (Will occur during a year)	There have been 848 severe summer storms in the region since 1954. The region can expect an average of 12.11 severe summer storms per year.
Response	3	One week	The response to severe summer storms typically occurs over the course of one day; however, it can take several days to respond to moderate tornado damage.
Onset	3	6-12 hours	All types of severe summer weather can be predicted up to 12 hours in advance, though for tornadoes, only conditions can be predicted.
Magnitude	4	Catastrophic (More than 50% of land area affected)	Severe summer storm events affect large portions of the region simultaneously.
Business	2	One week	Businesses would not typically close for a severe summer storm event. Damages from a significant storm may cause a short (one-week) disruption of services.
Human	2	Low (Some injuries)	There have been 23 injuries reported due to severe summer storms over the past 68 years.
Property	2	10-25% of property affected	Though impacting large land areas, severe summer storm events often result in minimal property damage throughout the entire region.
Totals	**21**	**High**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks are more or less prevalent as compared to the rest of the planning area. With a hazard like severe summer weather, the entire region is equally at risk of experiencing a storm. As such, there is no graphic depicting variance between jurisdictions.

2.2.13 Severe Winter Weather

Winter storms include blizzards, heavy snowfall, blowing snow, ice storms, and dangerous wind chills that could threaten life or property.				
Risk HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	Winter storms typically occur from November through March	**Risk Ranking:**	High
	Warning Time:	12-24 hours	**Type of Hazard:**	Natural
	Probability:	Excessive (Will occur during a year)	**Impact:**	Catastrophic (More than 50% of land area affected)
	Disaster Declarations:	EM-3109-WV (1993) DR-1084-WV (1996) DR-1455-WV (2003) WV-L0091 (SBA) (2003) DR-1881-WV (2010) EM-3358-WV (2013) DR-4210-WV (2015) WV-00036 (SBA) (2015) DR-4603-WV (2021) WV-00054 (SBA) (2021)		

Hazard Overview

Winter storms "occur when extremely cold atmospheric conditions coincide with high airborne moisture content, resulting in rapid and heavy precipitation of snow and/or ice." (Haddow, Bullock, & Coppola, 2011). During winter, there are multiple instances of cold weather, snow, and storms. This profile includes only those winter weather events that are damaging enough to be considered "severe." These include NOAA-labeled winter storms, heavy snow, blizzards, and ice storms.

- **Winter Storm** is an event that has more than one significant hazard (i.e., heavy snow and blowing snow, snow and ice, snow and sleet, sleet and ice; or snow, sleet, and ice) and meets or exceeds regionally defined 12- or 24-hour warning criteria for at least one of the precipitation elements on a widespread or localized basis.
- **Heavy Snow** refers to snowfall accumulating to 4" or more in 12 hours or less, or snowfall accumulating to 6" or more in 24 hours or less.
- **Blizzards** are dangerous winter storms that are a combination of blowing snow and wind and result in very low visibility. A blizzard is a winter storm that produces the following conditions for three hours or longer on a widespread or localized basis: (a) sustained winds or frequent gusts 30 knots (35 mph) or greater, and (b) falling or blowing snow reduces visibility frequently to less than ¼ mile. Heavy snowfall and severe cold usually accompany blizzards, but not always. Sometimes strong winds can pick up fallen snow, creating a ground blizzard.

- **Ice Storms** are storms that result in the accretion of at least 0.25'' of ice on exposed surfaces. It can create hazardous driving and walking conditions, and tree branches and power lines can easily snap under the weight of the ice. The Sperry-Piltz Ice Accumulation (shown below) describes ice storm damage and potential impacts (SPIA Index, n.d.).

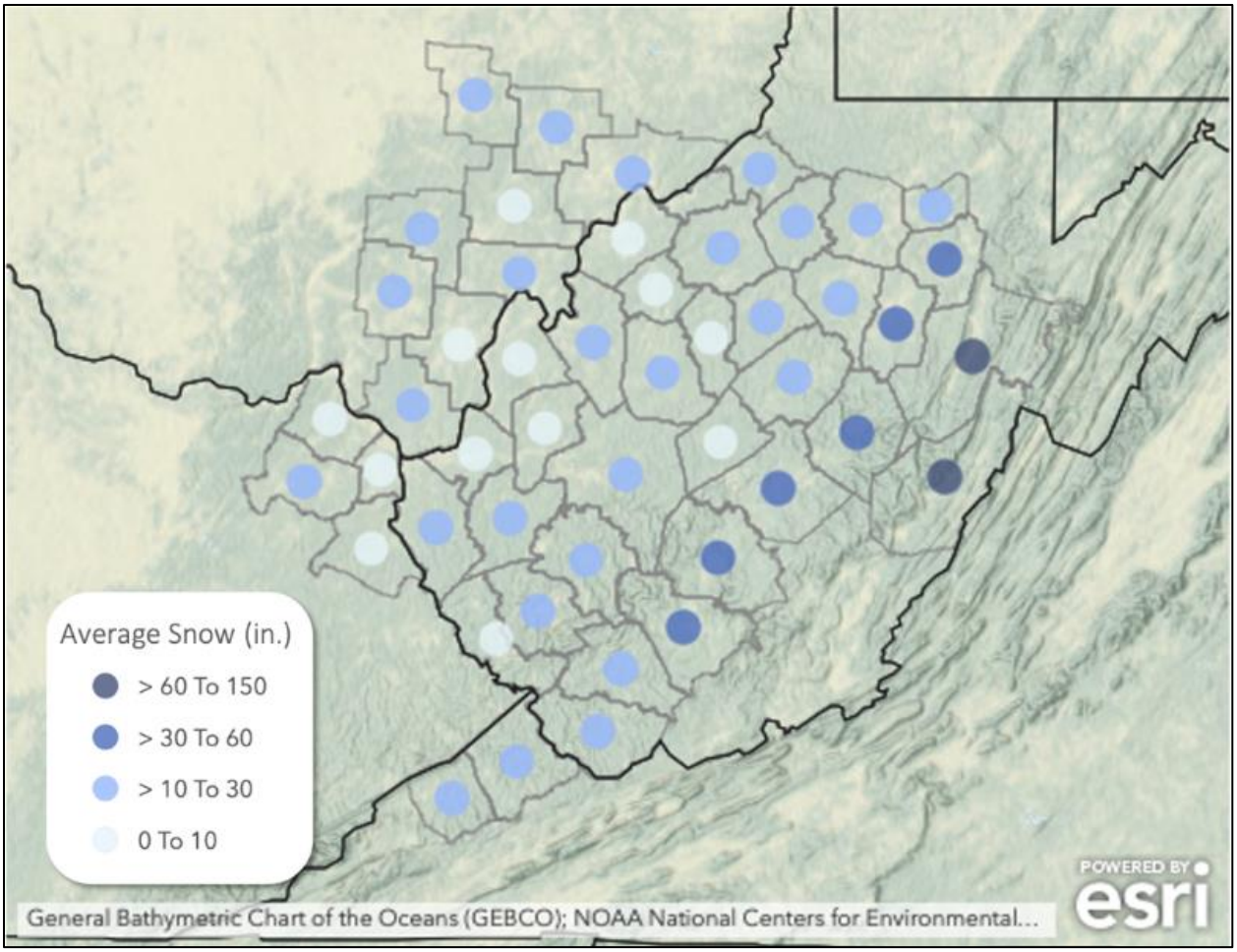
SPERRY-PILTZ ICE ACCUMULATION INDEX	
Ice Damage Index	*Damage and Impact Descriptions*
0	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews; few outages.
1	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
2	Scattered utility interruptions are expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
3	Numerous utility interruptions with some damage to main feeder lines and equipment are expected. Tree limb damage is excessive. Outages lasting one to five days.
4	Prolonged and widespread utility interruptions with extensive damage to main distribution feeder lines and some high voltage transmission lines/structures. Outages lasting five to 10 days.
5	Catastrophic damage to the entire exposed utility system, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.

As with other storms, the right combination of ingredients is necessary for a winter storm to develop. The three key components of a winter storm are cold air, lift, and moisture.

Location and Extent

Winter storms are an annual, common occurrence throughout the region. According to the National Weather Service (NWS) Charleston (WV) forecasting office, snowfall varies widely across its area of responsibility due to varied terrain and elevation (NOAA NWS Charleston, n.d.). Snowfall typically occurs between November and March; however, while less common, it is not unusual for snow to occur outside of the winter season beginning as early as October and ending as late as April or May.

The figure below depicts the average annual snowfall distribution by county from 1990 to 2019 (localized amounts may be greater or less than the amounts shown in the figure). Yearly average snowfall across the region can span anywhere from zero inches up to 30 inches per year.



As illustrated in the figure above (NOAA NWS Charleston, n.d.), Cabell, Mason, and Mingo Counties receive approximately 10 to 30 inches of snowfall annually, and Lincoln, Logan, and Wane Counties receive approximately 30 and 60 inches annually. A severe winter storm could affect many, most, or all areas of the region simultaneously. Winter storms can create a difficult emergency response effort; adverse road conditions can impede or prohibit all vehicular movement, including emergency response vehicles

There is no widely used scale to classify snowstorms, but Paul Kocin and Louis Uccellini from the National Weather Service developed the Northeast Snowfall Impact Scale (NESIS). The NESIS characterizes and ranks high-impact Northeastern snowstorms from “notable” to “extreme” (NOAA NCEI, n.d.) Significantly, the NESIS does not predict the impacts of a forecasted storm; instead, it is a mechanism for rating impacts after a storm occurs (see table below).

NORTHEAST SNOWFALL IMPACT SCALE		
Category	*NESIS Value*	*Description*
1	1.0 – 2.499	Notable
2	2.5 – 3.99	Significant
3	4.0 – 5.99	Major
4	6.0 – 9.99	Crippling
5	10.0+	Extreme

Impacts and Vulnerability

Severe winter storms create treacherous driving conditions. According to a *FEMA Winter Storm Fact Sheet*, the leading cause of fatalities during winter storms is from automobile or other transportation accidents (FEMA, n.d.). The National Severe Storms Laboratory (NSSL) notes that most deaths from winter storms are not from the storms themselves (NOAA NSSL, n.d.). People die from traffic accidents on icy roads, heart attacks while shoveling snow, and hypothermia from prolonged exposure to cold. During winter storms, everyone is potentially at risk, particularly those stranded in their vehicle or outside during the storm. Recent data shows that 70% of injuries related to ice and snow occur in automobiles, and 25% are people caught out in the storm. Most victims are males over 40 years old (NOAA NSSL, n.d.).

Heavy snow can result in property damage from roof collapses, and extremely cold temperatures can cause water lines to freeze and bust. Ice accumulation can topple power lines, utility poles, and communication towers, causing electrical power to be lost. For many, a loss of electricity means a loss of a critical home heating source. The most vulnerable structures to roof collapse include those with large-span roofs and those that are poorly built or dilapidated. The resultant disruption in communication and utility services can last several days. Even minimal ice accumulation can pose a serious threat to motorists and pedestrians. Bridges and overpasses are particularly dangerous, as they freeze before other surfaces.

Health hazards generated from severe winter storms include frostbite and hypothermia. Frostbite is a severe reaction to cold exposure that can permanently damage its victims. A loss of feeling and a white or pale appearance in the victim's fingers, toes, nose, and ear lobes are symptoms of frostbite. Hypothermia is a condition brought on when the body temperature drops to less than 55 degrees Fahrenheit. Symptoms of hypothermia include uncontrollable shivering, slow speech, memory lapses, frequent stumbling, drowsiness, and exhaustion. Carbon monoxide poisoning is also a concern. Whether due to a power failure or a heating system being inadequate to warm a structure, the need to use a generator or fireplace increases the risk of carbon monoxide poisoning and structure fires (CDC, 2018).

Social Vulnerability Considerations

Infants and the elderly are the most susceptible to the cold and wet conditions of a winter storm. Conditions that may be uncomfortable or inconvenient to the general population can easily become life-threatening to them. The homeless have a much higher risk than the general population of developing exposure-related conditions (National Coalition for the Homeless, 2023). The inability to provide adequate, dry clothing, shelter, and heat accompanied by malnutrition, decreased body fat, underlying infection, lack of fitness, and fatigue make homeless individuals much more vulnerable to winter storms. Low-income individuals are more vulnerable as they are more likely to live in poorly insulated homes and may be unable to afford sufficient heating. These individuals may need to make tradeoffs between proper nutrition, medication, and proper heating expenditures (USGCRP, 2018).

Other social vulnerability concerns are similar for winter storms and severe summer weather. Households below the poverty line are often un- or underinsured, which makes repairing winter weather-related damage more difficult, as well as limits options for purchasing supplies and equipment like generators. Lower-income populations may live in pre-1970 housing because it can be older and more affordable (and pre-code housing may be more susceptible to winter weather phenomena like snow weight). As noted frequently in other profiles, those with lower English proficiencies may not readily understand preparedness information and warnings.

Dugan, Byles, and Mohagheghi (2023) studied social vulnerability with respect to power outages, using a case study in Colorado. This study identified increased health risks, varying (often less) power outage preparedness, and variance in the willingness and means to evacuate amongst an array of socially vulnerable populations. The authors concluded that there is a need to identify these socially vulnerable groups for more targeted information, assistance, and resource delivery. These findings are particularly relevant to severe winter weather since power outages are common cascading effects of winter storms, and sustained harsh winter weather conditions can make the work that restores power dangerous and difficult.

Previous Occurrences

The region has experienced 267 winter storm events since 1994 according to data obtained from the NOAA's National Centers for Environmental Information (NCEI) (NOAA NCEI, 2024). The table below illustrates the number of winter weather events reported for each county. Note that adding the sums for counties yields a higher number; during analysis, planners calculated the number of unique events by date (84), as many events impacted multiple areas

of the region. Of the 267 reported events, 49% were heavy snow events. Approximately 15% of the total reported events resulted in property damage. There has been one reported fatality that occurred during an ice storm in Cabell County.

WINTER STORM EVENTS BY COUNTY						
Event Type	*Cabell*	*Lincoln*	*Logan*	*Mason*	*Mingo*	*Wayne*
Heavy Snow	20	23	24	17	24	22
Ice Storm	2	2	0	2	0	2
Winter Storm	8	6	6	5	6	10
Winter Weather	13	14	18	13	17	13
Total Events	**43**	**45**	**48**	**37**	**47**	**47**
Events with Property Damage	7	8	6	4	6	10

The total winter storm events yield a rate of 9.21 winter storm events per year. The breakdown of event types is in the table below.

PREVIOUS SEVERE WINTER WEATHER							
HEAVY SNOW							
Total Events	*Areas Affected*	*Area w/ Most Events*	*Avg. Events/Year*	*Injuries*	*Fatalities*	*Damages*	
						Property	*Crop*
39	All	Logan Mingo	1.34	0	0	$2,795,000	$0
ICE STORM							
Total Events	*Areas Affected*	*Area w/ Most Events*	*Avg. Events/Year*	*Injuries*	*Fatalities*	*Damages*	
						Property	*Crop*
3	Cabell Lincoln Mason Wayne	Cabell Lincoln Mason Wayne	0.10	0	1	$1,150,000	$0
WINTER STORM							
Total Events	*Areas Affected*	*Area w/ Most Events*	*Avg. Events/Year*	*Injuries*	*Fatalities*	*Damages*	
						Property	*Crop*
11	All	Wayne	0.38	0	0	$1,285,000	$0
WINTER WEATHER							
Total Events	*Areas Affected*	*Area w/ Most Events*	*Avg. Events/Year*	*Injuries*	*Fatalities*	*Damages*	
						Property	*Crop*
31	All	Logan Mingo	1.07	0	0	$130,000	$0
84	**All**	**Logan Mingo Wayne**	**2.90**	**0**	**1**	**$5,360,000**	**$0**

Heavy Snow, March, 2015

A warm front lifted north through West Virginia on the 3rd of March with a half inch to an inch of rain over the central mountain counties. Less rain fell elsewhere. Late afternoon and evening temperatures rose into the 50s and lower 60s over the lowlands. Winds and dew points also increased.

The rain maximum by early on the 4th was over the southern coal fields including the headwaters of the Guyandotte and Tug Fork Rivers. The Guyandotte River at Man even surged above flood stage early in the morning on the 4th. Small stream flooding, rock and mud slides were common during the day on the 4th as a steady rain fell. The most common problem was roads closures. Several roads were undermined by runoff channels or adjacent swollen streams. Culverts under roads were damaged. Damage to structures was limited. Rain rates were mostly 1 to 2 tenths of an inch per hour. Total rainfall of 1.5 to 2 inches became common by that evening.

A total snow accumulation of 10 to 13 inches was common from northern Wayne County on up the Ohio Valley Counties to Wood, Pleasants, and Tyler Counties. For example, the snowfall at Huntington was 12.8 inches with a measured accumulation of 1 foot. After transitioning from rain to snow, the wet snow accumulated on trees, especially evergreen trees. Prolonged power outages were common.

This was the highest water level in 15 years there. The Tug Fork River crested just under 40 feet at Williamson midday on the 5th. This was the 9th highest crest on record at Williamson. The city water plant was flooded. However, a flood wall protects most of the town. Further down the river, the estimated crest was 45.2 feet at Kermit, more than 6 feet over the 38 foot flood stage. This crest was the highest level at Kermit since the flood back in February of 2003. The Guyandotte crested around 34.6 feet at Branchland during the evening of the 5th. Flood stage is 30 feet. This Lincoln County crest was also the highest since the flood back February of 2003. The crest on the Big Coal River at Ashford was 23.6 feet on the 5th. Bank full is around 17 feet. The Coal River crested at 28.45 feet late in the afternoon on the 5th in the community of Tornado. These water levels were the highest on the lower Coal River in nearly 8 years. The Lincoln County water plant was damaged along the Big Coal River. Even rivers that did not reach flood stage were high enough to cause minor backwater flooding. Eventually, even the Ohio River had minor flooding from Point Pleasant on down through Huntington, Ceredo, and Kenova. Point Pleasant crested near 44.5 feet on the 6th. The crest at Huntington was about 1.5 feet above flood stage on Saturday the 7th.

To dampen the crest further down the Ohio River, the Corps of Engineers held back water at their projects on the Guyandotte River and Twelvepole Creek. As a result, the stored water raised the lake elevation about 102 feet in the vertical at R.D. Bailey Lake on the Guyandotte River. This set a new record pool elevation there. Mud and rock slides continued during the snow storm. In Mingo County, one slide near Gilbert pushed a house off its foundation, and jolted a woman out of her bed. Another slide near Nolan in Splint Hollow damaged at least 3 mobile homes.

Ice Storm, February 2003 (DR-1455-WV)

Freezing rain accumulated on power lines and trees broken limbs and thousands of trees with snapped tops. Trees were also uprooted blocking roads. There were widespread power outages with reports of power not being restored for up to three days. The storm cost an estimated $1,000,000 in property damages.

Loss and Damages

Severe winter weather impacts all areas and jurisdictions within the region as they are typically widespread events. Loss estimates can be derived using historical data. Severe winter weather has resulted in over $5,360,000 million in property damages throughout the region over the past 29 years, creating an annual average damage estimate of approximately $184,827. This estimate likely underestimates damages to infrastructure and power lines.

Future Occurrences

Changes to the winter season have become apparent. Winters are generally shorter, and the most significant impacts are occurring (recently) between January and March, rather than December and February as in the past. A shift in time changes vulnerability very little, but it may take time for the general population to adjust.

Future Climate Considerations

According to the *Fourth National Climate Assessment (NCA4)*, seasons are changing in length and timing in the Mid-Atlantic region, including West Virginia, with earlier springs, delayed falls, and shorter winters (USGCRP, 2018). While a more extended frost-free period can benefit some crops or allow for double cropping, it can also limit plant diversity, encourage invasive species, and threaten human and ecosystem health. For example, milder winters help more ticks and mosquitos survive the winter.

Earlier springs may also cause trees and flowers to bloom earlier, leading to an extended allergy season. During a “false spring”, warm weather in late winter or early spring can cause crops and plants to grow too early, exposing them to frost. Reduced snow cover from warm winters and longer summers increases the risk of drought and may impact tourism as stream flows may be significantly reduced in popular trout streams throughout the region.

Severe winter weather is another general label referring to weather phenomena, similar to the Intergovernmental Panel on Climate Change's (IPCC) term "extreme precipitation" (IPCC, n.d.). Winter precipitation events could thus become more extreme, though they would likely impact the same areas of the region. Recent polar vortex events have yielded discussion that winter weather will include more cold snaps versus precipitation.

The severity of winter storms may change in the future. For instance, heavy winter precipitation and blizzard conditions can impact power distribution utilities, and as those systems age, weather-related impacts may become more frequent in the form of power outages. The National Climate Assessment identifies a shortened snow season in the Northeast U.S., of which its report considers West Virginia to be a part. The report cites an increase in the amount of winter precipitation that falls as rain, resulting from a likely northward shift in the rain-snow transition zone (UCGCRP, 2018).

Risk Assessment

This section summarizes the vulnerability of the region to severe winter weather. The planning and development council conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding severe winter weather.

PUBLIC SENTIMENT, SEVERE WINTER WEATHER					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Severe Winter Weather	5 (12.5%)	11 (27.5%)	17 (42.5%)	7 (17.5%)	40
In the past ten years, do you remember this hazard occurring in your community?				26 (65.0%)	40
Have you noticed an increase in the occurrences or intensity of this hazard?				15 (37.5%)	40
Have you noticed a decrease in the occurrences or intensity of this hazard?				1 (2.5%)	40

The following table assigns point totals based on the methodology identified in Section 2.2: Describe Hazards above.

SEVERE WINTER WEATHER RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	5	Excessive (Will occur during a year)	Region 2 has experienced 84 severe winter weather events over the past 29 years. The region can expect an average of 2.90 severe winter weather events per year.
Response	3	One week	The response to most severe winter storm events typically occurs over one day; however, few do require a minimum of one week
Onset	2	12-24 hours	All types of winter storms can be predicted up to 12 hours in advance.
Magnitude	4	More than 50% of land area affected	Winter storms typically impact large portions of the region at varying degrees simultaneously.
Business	2	One week	Businesses may be required to close for up to one week due to poor road conditions and prolonged power outages.
Human	3	Medium (Multiple severe injuries)	Several people could be injured or killed in vehicle accidents, suffer heart attacks while shoveling snow, suffer from frostbite and hypothermia, or succumb to carbon monoxide poisoning from improper venting of fuel-powered generators.
Property	2	10-25% of property affected	Winter storms impact large areas; however, often result in minimal property damage.
Totals	**21**	**High**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks are more or less prevalent as compared to the rest of the planning area. With a hazard like severe winter weather, the entire region is equally at risk of experiencing an event; therefore, there is no graphic showing jurisdictional variance.

2.2.14 Tornado

A tornado is a violently rotating column of air that extends from the base of a thunderstorm to the ground.				
Risk  HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	They can occur at any time but are most likely to occur during thunderstorms from March to September	**Risk Ranking:**	Medium
	Warning Time:	Less than 6 hours	**Type of Hazard:**	Natural
	Probability:	Low (unlikely to occur in a year)	**Impact:**	Localized (less than 10% of land area affected)
	Disaster Declarations:	DR-4059-WV (2012) WV-00023 (SBA) (2012) KY-00091 (SBA) (2022)		

Hazard Overview

Tornadoes form when warm, humid air collides with cold, dry air. Tornadoes can also occur along a "dryline," which separates very warm, moist air to the east from hot, dry air to the west. Another way that tornadoes can be created is when warm moist air flows upslope. Under the right temperature and moisture conditions, intense thunderstorms can produce tornadoes in higher terrain. They are vertical funnels of rapidly spinning air that extend from a thunderstorm cloud to the ground. In order for a vortex to be classified as a tornado, it must be in contact with the ground and extend to or from the cloud base.

Tornadoes can have wind speeds up to and exceeding 250 miles per hour and a width of approximately 660 yards. While the majority of tornadoes are clearly visible, some are rain-wrapped and obscured by rain and low-hanging clouds. They occur in the U.S. more than anywhere else in the world and can occur in every state, although the mid-west states have the greatest potential for tornadoes by far. Tornadoes originate from rotating thunderstorms called "supercells" or quasi-linear convective systems (QLCS).

Tornadoes are historically very difficult to predict. The storms that may produce a tornado can be forecasted, but not every storm with that potential will spawn a tornado and predicting where and when that will happen is incredibly difficult.

Location and Extent

Region 2 is vulnerable to the impacts of tornado events. Tornadoes are a site-specific hazard, but communities cannot readily identify specific geographic features that allow them to anticipate where tornadoes may occur. Historical trends show that some areas of the country, such as the Midwest and plain states commonly referred to as tornado alley, have a higher probability of tornado occurrences; however, they can and have struck in many other areas. The nature of tornadoes is that they strike at random. While it is known that some areas of the country experience tornadoes more than others, predicting exactly what parts of Region 2 have a greater chance of being struck by a tornado is difficult. The best predictor of future tornadoes is the occurrence of previous tornadoes. For planning purposes, it is less important to map the tornado risk than it is to identify it. This is because it is so difficult to predict the path of future tornadoes.

Officials utilize the Enhanced Fujita (EF) Scale to classify tornadoes. This scale uses a rating system based on wind speeds and related damages. The EF scale was adapted from the original Fujita Scale, designed by Dr. Theodore Fujita, to estimate wind and storm damage better. The table below describes the EF Scale.

ENHANCED FUJITA (EF) TORNADO SCALE		
EF Rating	*3-Second Gust Speed (MPH)*	*Possible Damage*
0	**65-85**	**Light Damage.** Some damage to chimneys; break branches off trees; push over shallow-rooted trees; damage to signboards.
1	**86-110**	**Moderate Damage.** Surface peeled off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off roads.
2	**111-135**	**Considerable Damage.** Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
3	**136-165**	**Severe Damage.** Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; cars lifted off the ground and thrown.
4	**166-200**	**Devastating Damage.** Well-constructed houses leveled; structures with weak foundations blow off some distance; cars thrown and large missiles generated.
5	**201+**	**Incredible Damage.** Strong frame houses lifted off foundations and carried considerable distance to disintegrate; automobile sized missiles fly through the air more than 100-yards; trees debarked; incredible phenomena will occur.

The original Fujita Scale is provided below as the majority of documented tornadoes that have occurred in Region 2 were measured utilizing this scale.

FUJITA TORNADO SCALE		
Scale	*Wind Estimate (MPH)*	*Typical Damage*
F0	< 73	**Light Damage**. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73 – 112	**Moderate Damage**. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113 – 157	**Considerable Damage**. Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-objects missiles generated; cares lifted off ground.
F3	158 – 206	**Severe Damage**. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off ground and thrown.
F4	207 – 260	**Devastating Damage**. Wall-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	261 – 318	**Incredible Damage**. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 109 yards; trees debarked; incredible phenomena will occur.

Impacts and Vulnerability

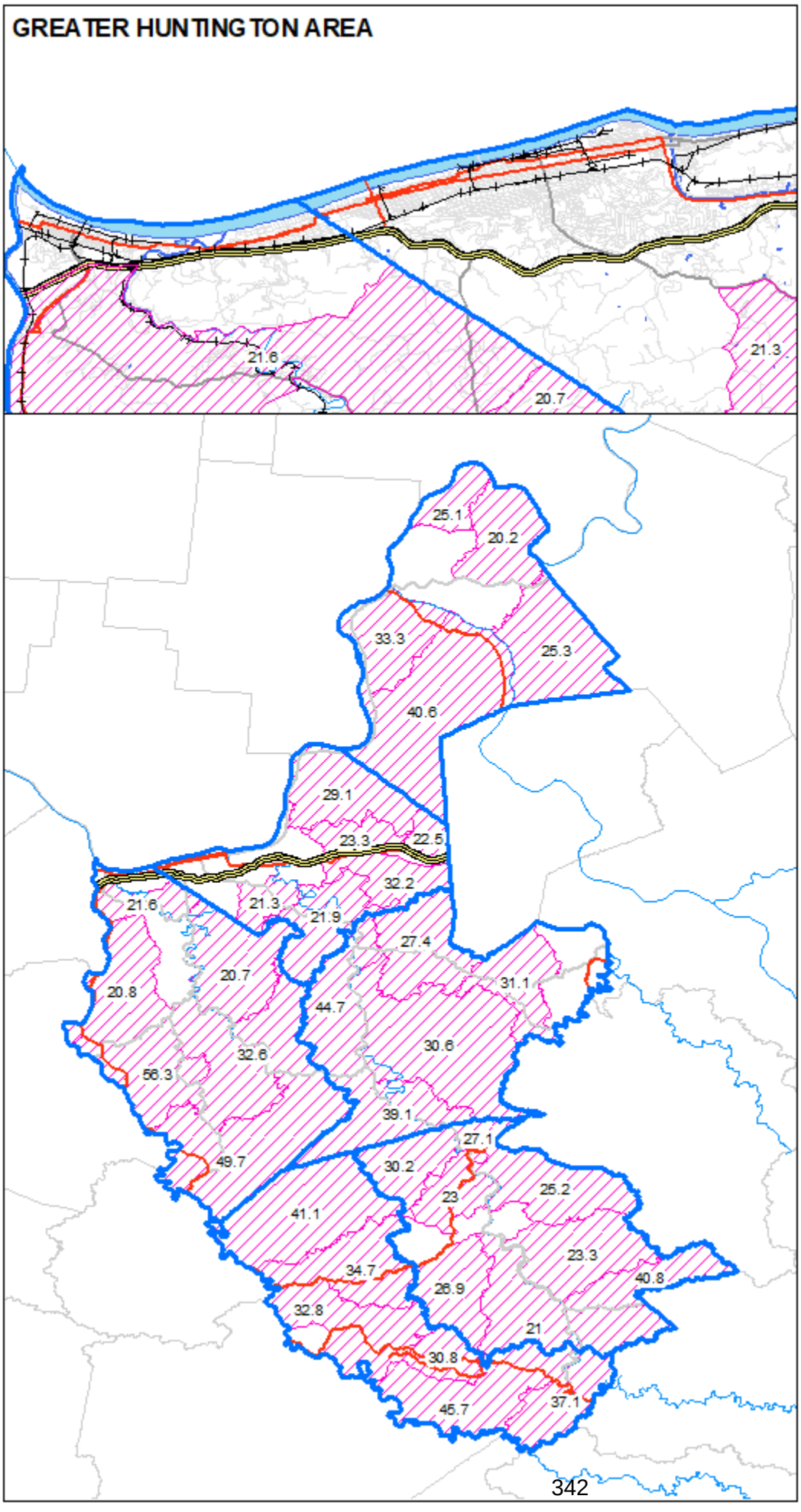
While tornadoes are typically short-lived, they are intensely focused and destructive. Tornadoes are the most violent of all atmospheric storms. Damage from tornadoes comes from the strong winds they contain. Wind speed in tornadoes can reach 300 miles per hour; winds of that speed can destroy homes, uproot trees, cause automobiles to become airborne, and turn glass and debris into high-velocity projectiles. The damage paths of tornadoes may be up to one mile wide and 50 miles long. Secondary and tertiary impacts from tornadoes include damage to roofs and other home finishings. Additionally, fallen trees can interrupt power service or block transportation access.

Most injuries and fatalities resulting from tornadoes occur due to the victim being struck by solid objects that become airborne, or from a structure collapse. The most common injuries include lacerations, fractures, blunt trauma and head injuries. Most fatalities occur at the scene and result from trauma such as head, spine, and crushing injuries (Wier, 2000). Many injuries can occur during cleanup efforts following the storm, inexperienced people using equipment such as chainsaws or electrical tools in standing water.

Social Vulnerability Considerations

Social vulnerability variables that must be considered with regards to tornadoes include the ability of individuals to comprehend warnings, and their ability to evacuate. A factor somewhat related to income and housing is the presence of mobile homes. Mobile homes are

affordable options for many residents, not only for those with lower incomes, but also for the elderly. While the quality of mobile home construction has improved in recent decades, data from numerous disasters (e.g., hurricanes, tornadoes, wildfires, and high-winds generally) suggests that they do not hold up as well to the elements as traditional stick-built homes. The National Weather Service (NWS) suggests that mobile home residents are 15 to 20 times more likely to be killed by a tornado that strikes the home in comparison to those in stick-built structures. “On average, a total of 72 percent of all tornado-related fatalities are in homes and 54 percent of those fatalities are in mobile homes” (NWS, n.d.). EF-1 tornadoes (as well as high-end severe thunderstorm winds) can severely damage or destroy mobile homes. The map below depicts the distribution of mobile homes by Census tract.



REGION 2 PDC HAZARD MITIGATION PLAN

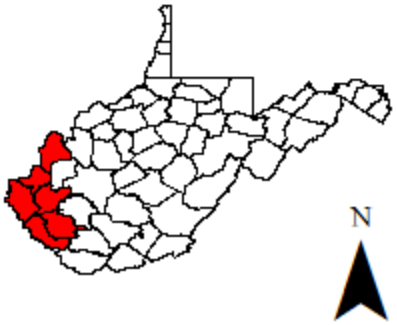
SVI Considerations: Tracts by Housing Stock

Data Source(s):
CDC SVI Index (2020)

20% or More, Mobile Homes

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



By examining those areas with high concentrations of mobile homes, local officials can strategically consider the placement of designated tornado shelters, the selection of facilities to serve as weather shelters, etc. Though there is a need for adequate sheltering options in all areas of the region, those areas with higher number of mobile homes may need those options more.

Individuals who lack shelter during a tornado or wind event are highly vulnerable. The homeless population and those who may be traveling by vehicle or on foot when an event occurs are at greater risk for injury or death. Those in vehicles are at risk of flying debris, other vehicles being pushed into lanes of traffic, falling trees and utility poles. Vehicles such as SUV's, and vehicles pulling trailers are at a high risk of being pushed or flipped over by winds (defensivedriving.com, 2014). The homeless population are at risk as notification methods used for other populations such as, radio, television, and service providers, may not be applicable. They also face a lack of transportation and the inability to evacuate an area without assistance (Edgington, 2009).

Previous Occurrences

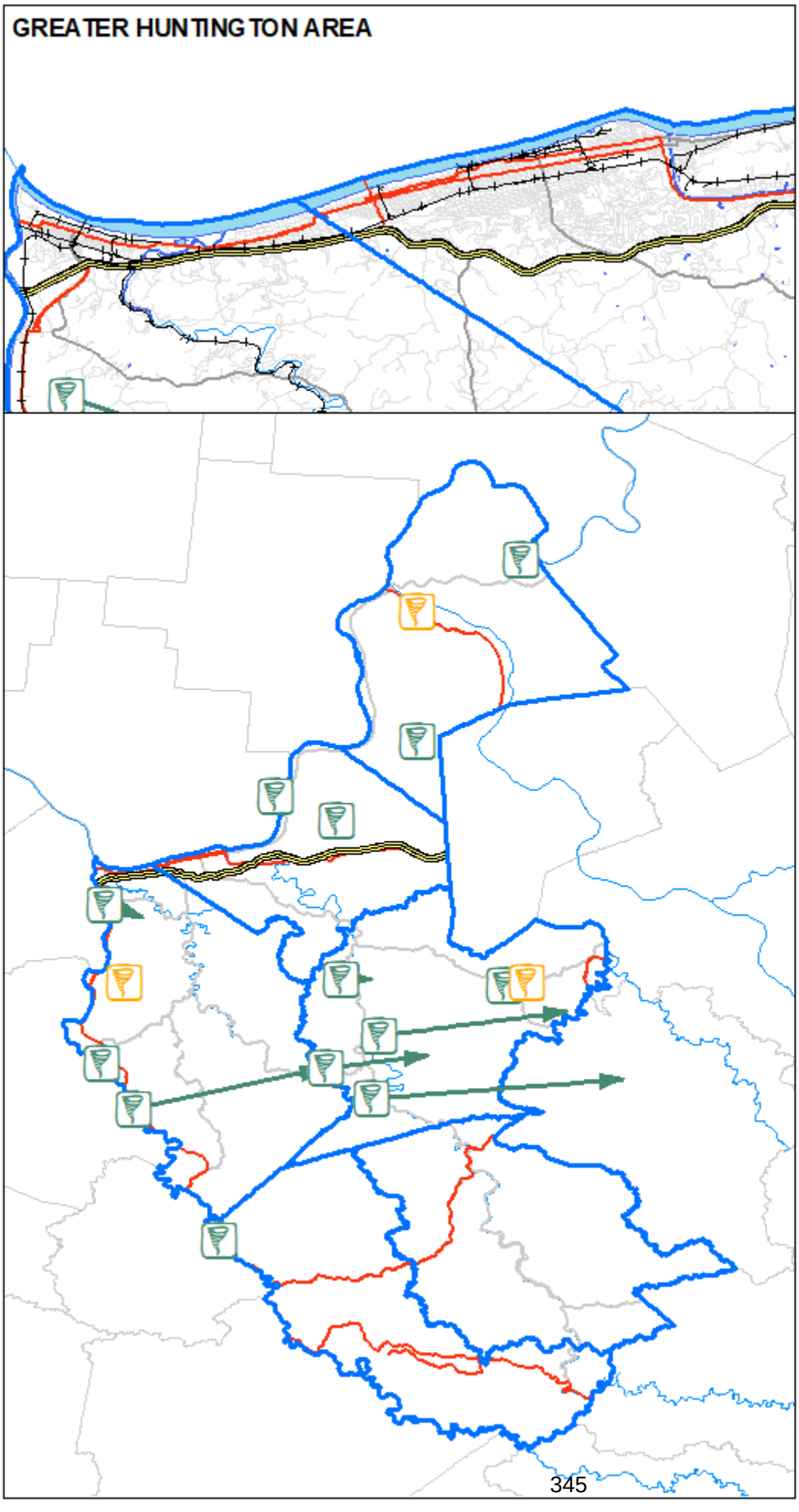
The NOAA National Centers for Environmental Information (NCEI) Storm Events Database (2023c) lists 17 tornadoes touching down in Region 2 since 1954. These tornadoes have resulted in 4 injuries, no fatalities, and approximately $3,219,500 in property damages. The highest magnitude tornado to touchdown in the region is an F3, the widest tornado was 100 yards wide, and the longest track tornado was on the ground for approximately 17 miles.

HISTORIC TORNADOES

Location	*Date*	*Mag. EF Scale*	*Width (yards)*	*Length (Miles)*	*Injuries*	*Deaths*	*Property Damage*
Wayne County	4/8/1965	F3	220	3.6	3	0	$250,000
Mason County	4/24/1970	F0	33	0.3	0	0	$2,500
Lincoln County	9/29/1972	F1	70	20.9	0	0	$2,500
Wayne County	6/5/1973	F0	33	0	0	0	$0
Lincoln County	8/8/1979	F0	33	0	0	0	$2,500
Mason County	6/2/1998	F1	40	0.7	1	0	$75,000
Cabell County	8/9/2000	F1	75	0.5	0	0	$275,000
Lincoln County	8/9/2000	F1	100	1.5	0	0	$200,000
Mason County	6/27/2007	EF1	50	1.16	0	0	$8,000
Wayne County	3/2/2012	EF3	1,000	16.61	0	0	$1,900,000
Lincoln County	3/2/2012	EF1	200	8.88	0	0	$200,000
Lincoln County	3/2/2012	EF1	300	16.02	0	0	$150,000
Mingo County	3/2/2012	EF2	250	1.2	0	0	$90,000

HISTORIC TORNADOES							
Location	*Date*	*Mag. EF Scale*	*Width (yards)*	*Length (Miles)*	*Injuries*	*Deaths*	*Property Damage*
Cabell County	6/4/2014	EF1	400	0.51	0	0	$30,000
Wayne County	7/4/2016	EF0	20	0.25	0	0	$1,000
Lincoln County	4/4/2016	EF0	50	0.23	0	0	$30,000
Wayne County	8/7/2023	EF1	250	3.68	0	0	$3,000
				Totals	**4**	**0**	**$3,219,500**

The following map illustrates the touchdown points and, if applicable, paths of the tornadoes that impacted the region. (NOTE: Some paths are short and effectively “covered” by the symbol used to mark the touchdown.)



REGION 2 PDC HAZARD MITIGATION PLAN

Historic Tornadoes

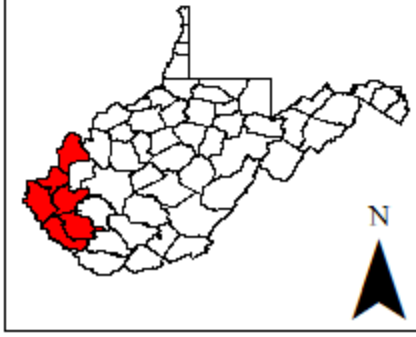
Data Source(s):
NOAA NCEI Database

Tornado (Touchdown Only)

Tornadoes (w/ Paths)

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

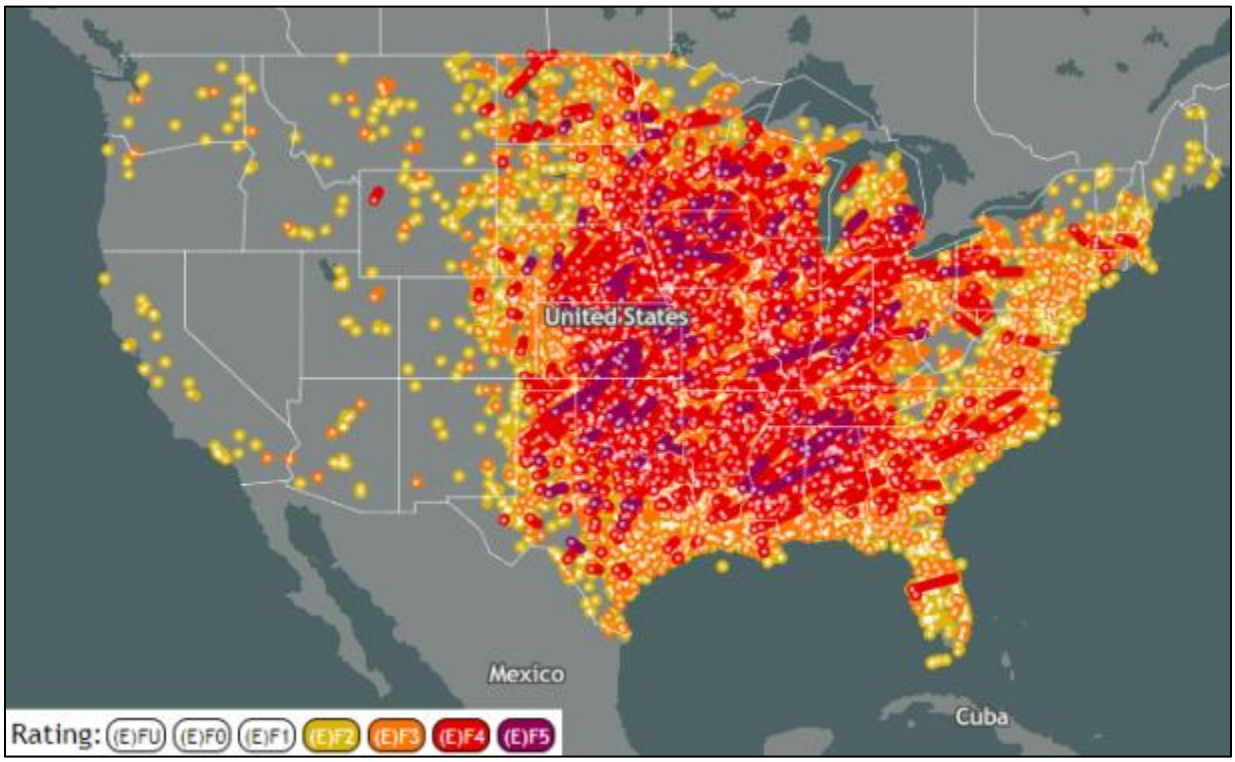


Loss and Damages

Planners generated loss estimates associated with tornadoes based on historical data. There has been an average of 0.29 incidents annually, accounting for an average of $189,382 in property damage. The largest loss associated with a tornado was in 2012 ($1,900,000).

Future Occurrences

Traditionally, tornadoes impacted areas in the Midwest known as “Tornado Alley” in states like Iowa, Kansas, Missouri, Nebraska, Oklahoma, and northern Texas. While those areas still see frequent tornadoes, southern areas in Alabama, Arkansas, Georgia, Kentucky, and Mississippi are seeing them. (Reference the incredibly destructive tornadoes to strike Tuscaloosa, Alabama in 2011 as well as Mayfield, Kentucky in 2022). Tornadoes have been regular occurrences in Indiana and Ohio, but even events in those states appear to be gaining strength. Put simply, tornado alley appears to be shifting to the east (Gensini & Brooks, 2018). The following graphic shows the eastward movement of EF-2 through EF-5 events in the United States from 1880 through 2019.



Further, in states like Maryland, Pennsylvania, and West Virginia, there was a common notion that mountainous terrain “broke up” tornadoes before they could do damage after

touching down. Many damage assessments would label wind impacts as “straight line winds,” “downbursts,” or “macrobursts,” with seemingly little consideration of tornadic activity. Recently, though, those reports have been classifying events as tornadic in those states.

Local officials will need to monitor tornado occurrences carefully along with any shifts in design wind speed resources. If tornadoes increase measurably across longer time periods, it may be necessary to update building codes to account for the increased risk. Until that point, and after that point for existing structures, buildings not built to withstand tornadic activity may be at extra risk. Unfortunately, socio-economically disadvantaged populations are often not able to afford to finance and occupy new structures (including newer, more resilient apartments thanks to higher rents). These populations will continue to be more vulnerable to hazards like tornadoes.

Future Climate Considerations

Finding consensus on the level to which a changing climate is impacting tornadoes has been elusive. A hotter atmosphere can hold more moisture, which increases atmospheric instability (which is necessary for storm systems that form tornadoes). Other elements, like wind shear, appear to decrease as a result of said instability. This push-and-pull factor within the data makes it difficult to accurately assess climate changes with respect to tornadoes (National Geographic, n.d.). Further, tornadoes are too geographically small to be well-simulated by climate models (C2ES, n.d.B). Put very generally, evidence suggests there will be a more favorable environment overall to severe weather (i.e., there will be more severe weather, including tornadoes) (Berardelli, 2023).

Risk Assessment

This section summarizes the vulnerability of the region to tornadoes. The planning and development council conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding tornadoes.

PUBLIC SENTIMENT, TORNADOES					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Tornadoes	14 (35.0%)	17 (42.5%)	7 (17.5%)	2 (5.0%)	40
In the past ten years, do you remember this hazard occurring in your community?				3 (7.5%)	40
Have you noticed an increase in the occurrences or intensity of this hazard?				2 (5.0%)	40
Have you noticed a decrease in the occurrences or intensity of this hazard?				6 (15.0%)	40

The following table assigns point totals based on the methodology identified in Section 2.2: Describe Hazards above.

TORNADOES RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	2	Low (Unlikely to occur in a year)	The NCEI reports 17 tornadoes over a 59-year period, for an average of 0.29 events per annum.
Response	3	One week	Most events necessitate approximately one day of response activities, but more significant events may require much longer. As such, planners selected a week for estimation purposes.
Onset	4	Less than 6 hours	Though weather conditions may suggest the formation of a tornado is possible, the time between spotting a tornado and it touching down is often very short.
Magnitude	1	Localized (less than 10% of land area affected)	Tornadoes are very destructive, but in comparison to the total land area of the region, they affect a small area (as evidenced by the path map graphic above).
Business	3	At least two weeks	If an F2 tornado impacted a business, for example, that business might be closed for an undetermined period; however, community-wide business closures would be minimal.
Human	3	Medium (multiple severe injuries)	Though casualty numbers have been low, the potential for multiple casualties during tornadoes exists.
Property	3	25-50% of property affected	The historical tornadoes in the region have averaged six figures in property damage. If a tornado was to touch down in a densely constructed area, that figure could be much higher.
Totals	**19**	**Medium**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks are more or less prevalent as compared to the rest of the planning area. As noted earlier in the profile, the presence of past tornadoes suggests the potential occurrence of future tornadoes, though determining *where* they may occur is difficult. Thus, the entire region is at risk of tornadic activity.

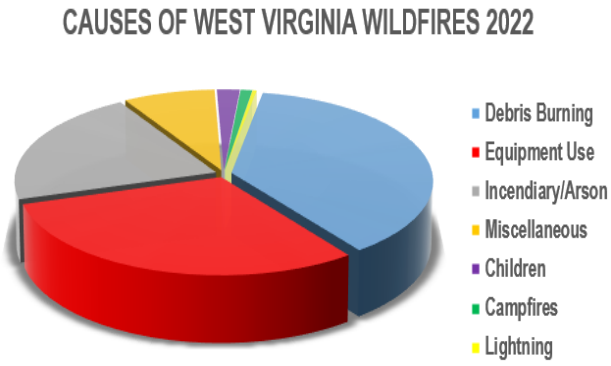
2.2.15 Wildfire

Wildfires are uncontrolled fires that spread rapidly through vegetative fuels (i.e., forests, grasslands, and prairies), exposing and possibly consuming structures. These dangerous fires can devastate not only wildlife and natural areas but also communities.				
Risk HIGHEST HIGH MEDIUM LOW LOWEST	**Period of Occurrence:**	Most common in spring and fall	**Risk Ranking:**	Medium
	Warning Time:	Sudden. Less than 6 hours	**Type of Hazard:**	Natural
	Probability:	High (Likely to occur in a year)	**Impact:**	Localized (Less than 10% of land area affected)
	Disaster Declarations:	FM-2391-WV (2002)		

Hazard Overview

A wildfire is an unplanned, uncontrolled, fire that spreads rapidly through vegetative fuels (i.e., forests, grasslands, and prairies), exposing and possibly consuming structures. For this analysis, the term "wildfire" includes forest fires as well as brush fires, which are common in the region. Wildfires often begin unnoticed and can spread quickly, creating dense smoke that is visible for miles. Any small fire in a wooded area, if not quickly detected and suppressed, can get out of control.

Human carelessness, negligence, and ignorance cause most wildfires (i.e., debris burning, equipment use, arson, etc.). In some instances, lightning and downed powerlines can spur combustion. Causes of wildfires are broken into nine categories, and the West Virginia Division of Forestry recorded the wildfires that it suppressed in 2022 are illustrated by cause (see the figure at right).



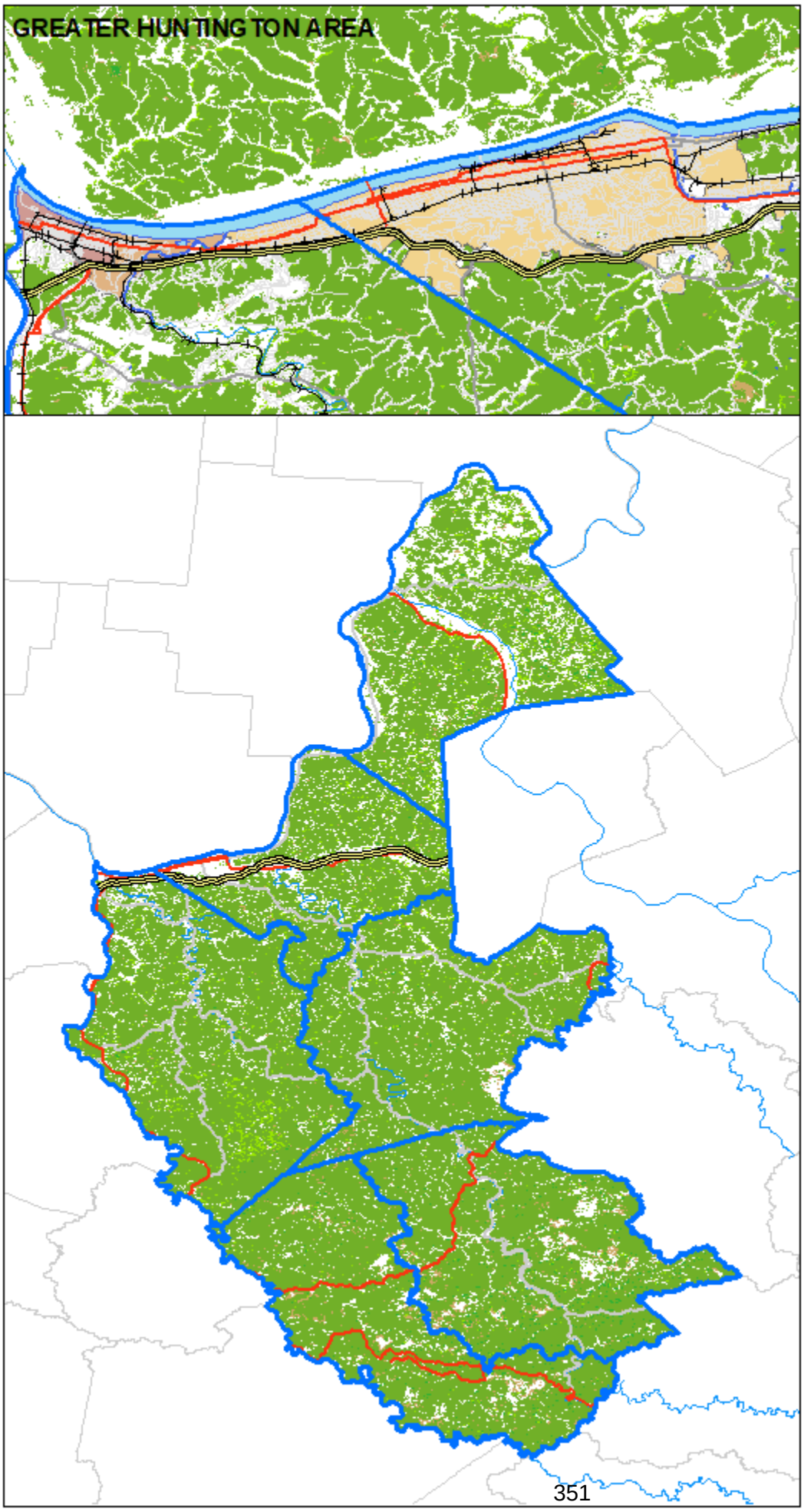
West Virginia's wildfire seasons occur primarily in the spring (i.e., March, April, and May) before vegetation has matured and greened, and in the fall (i.e., October, and November) when leaf drop occurs. During these times (and especially when weather conditions are warm, windy, and with low humidity) vegetation is

particularly susceptible to burning. During the two fire seasons, state laws regulate outdoor burning between 4:00 p.m. to 7:00 a.m.

Location and Extent

"Wildfires are among West Virginia's major environmental problems, damaging thousands of acres of timber each year and causing soil erosion and air and water pollution" (Beanblossom, 2019). Though many of the fires in the state impact the Southern Coalfields, the northern portions of the state are susceptible as well. According to the West Virginia Division of Forestry, each year in West Virginia, an average of 1,100 wildfires burns an average of 38,000 acres of forest and grassland within the state's unglaciated hill country, which includes areas of the region.

Areas with higher vulnerability to wildfires would be agricultural and open urban areas with recreational opportunities and other attractions in designated areas throughout the region, such as state and national forests and large campgrounds. Campfires, coupled with large numbers of visitors and a large proportion of trees, make wildfires a potential hazard common to all counties in the region. Moreover, the topography in some areas of the region has more variety, with numerous ridges and hollows which contributes to more complex wildfire behavior as winds tend to circulate up hollows providing an easy path for wildfires. The map below illustrates the areas within Region 2 that could be susceptible to wildfire conditions. The map displays areas with potential fuels (i.e., deciduous forests, evergreen forests, herbaceous wetlands, urban/recreational grasses, and woody wetlands).



REGION 2 PDC HAZARD MITIGATION PLAN

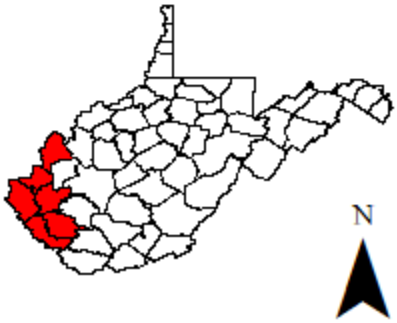
Areas with Potential Wildfire Fuels

Data Source(s):
USGS NLCD (2021)

Woody Wetlands
Shrub/Scrub
Mixed Forest
Evergreen Forest
Deciduous Forest

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



The region experiences several small fires each year, most of which are easily controlled by local fire departments and do not reach the threshold for inclusion as a “wildfire” (i.e., uncontrolled and spreading rapidly). A major cause for many of these fires is debris burning, which typically start small but spread by wind to dead grass and dried leaves bordering woodlands. Like all other fires, wildfires require four conditions to start: an available fuel source (including dried leaves or grass), dry conditions (including low relative humidity), an ignition source, and a chemical reaction to sustain combustion. The first two conditions typically occur in West Virginia in the spring and fall, when trees are bare, and sunlight can warm the ground and dry surface fuels.

The National Fire Danger Rating System is a system that allows fire officials to estimate current fire danger for a given area based on available fuels, weather conditions, topography, and risks.

- Low: When the fire danger is "low," fuels do not ignite easily, and a more intense heat source is needed to start fires. Dry grasslands may burn quickly, but wood fires will spread slowly, and control of these fires is typically not difficult.
- Moderate: When the fire danger is “moderate,” fires can start from accidental causes, but the number of fires that start is generally low. If a fire does start on open, dry grassland, it can spread quickly on windy days. Most wood fires spread slowly or moderately. The average fire intensity will be moderate, except in heavy concentrations of fuel. Fires are still not likely to become severe and are typically easy to control.
- High: When the fire danger is “high,” fires can start easily from most fuel sources. Unattended campfires and brush fires are likely to escape and can spread quickly. Fires can become serious and difficult to control unless extinguished when they are still small.
- Extreme: When the fire danger reaches “extreme,” fires of all types can start quickly and burn intensely. All fires are potentially dangerous and can spread rapidly with intense burning. Small fires become larger much faster than at the “very high” level. Long-distance fire spotting is likely. These fires can become dangerous and often last for several days.

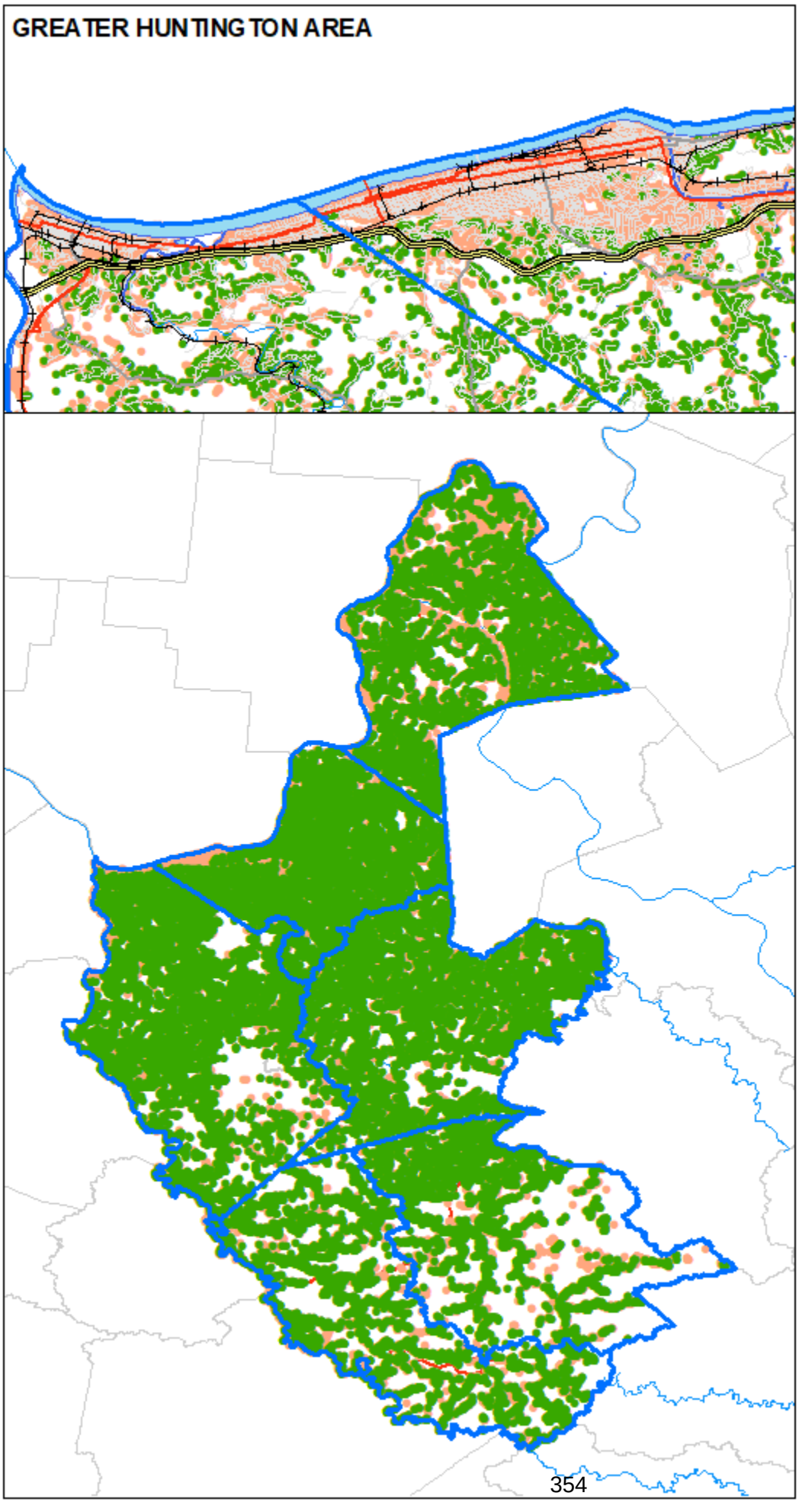
Impacts and Vulnerability

The number and severity of wildfires depend on external factors such as drought, human activity, wind activity, and the amount of available fuel. Wildfires can burn less than one acre up to thousands of acres of land in a short period. These fires can destroy recreational areas, community infrastructure, cultural and economic resources, timber, forage, wildlife habitats,

scenic vistas, and watersheds. Secondary effects of wildfires include erosion, increased landslide potential, the introduction of invasive species, and changes in air and water quality.

The demographic effects of a wildfire can be high depending on the location of the fire. Scholars refer to an area called the "wildland-urban interface," or WUI when discussing wildfire risk. Radeloff and colleagues (2005) defined the WUI as "…the area where houses meet or intermingle with undeveloped wildland vegetation" (citing the USDA and USDI, 2001, p. 800). Critically, the WUI does not recognize an area where wildfires are more or less prone to occur. Instead, it identifies areas that can expect higher wildfire-related damages should an incident occur. It is difficult to understand that the WUI is not a place, per se, but conditions that exist. Thus, the WUI can be a rural subdivision in a wooded or vegetative area or three to four homes on an open range (USFA, 2022).

Radeloff and colleagues' research further asserts that structures within 2.4 kilometers (1.49129 miles) of a woodland fuel source be considered "in the WUI area." According to geographic information system (GIS) data from the West Virginia GIS Technical Center (WVGISTC), there are 170,043 structures in the region. All of the structures are located either within a wooded area containing potential fuel (as mapped above) or within the 2.4-kilometer buffer. The orange dots on the map below represent structures *not* within wooded areas with potential fuel, but solely within 2.4 kilometers of these areas. The map illustrates Radeloff et al.'s assertion that the WUI is a set of conditions rather than a place.



REGION 2 PDC HAZARD MITIGATION PLAN

Wildland-Urban Interface (Est.)

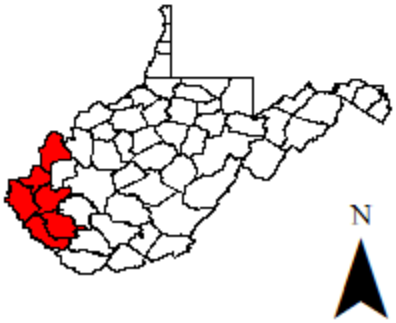
Data Source(s):
WVGISTC

Structures in WUI Only

Structures in Fuel-Laden Areas

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



Related to the discussion of the WUI, the risk that large, out-of-control brush fires (i.e., wildfires) pose continues to grow annually as development continues to encroach into previously undeveloped areas, increasing the potential for major fires to occur. “Protecting those structures located in or near the WUI poses unique problems and stretches firefighting resources beyond what is generally available locally” (Haddow, Bullock, & Coppola, 2011).

Aside from the obvious effects on humans such as burns and injuries, the smoke from fires is of great concern. Wildfire smoke can cause irritation to eyes and can constrain breathing (Liu et al., 2022). The smoke effect can cover great distances, as evidenced by the impacts in the Northeastern United States from wildfires in western Canada during the summer of 2023. The fiscal effects can be due to the disruption of infrastructure (i.e., roads, rails, and bridges) or the loss of commercial and industrial facilities. A wildfire could also have a devastating effect on the timber and forest product industries. Other impacts, like erosion and degradation of the water quality in an area can occur when wildfires consume the vegetation of a watershed" (Keller & DeVecchio, 2015).

Social Vulnerability Considerations

Wigtil and colleagues (2016) studied the intersection of wildfire potential and social vulnerability in the coterminous United States. Their study identified several variables that could be relevant, such as owner-occupied vs. renter-occupied homes, poverty, unemployment, etc. Other social variables, such as land use trends, housing development, vegetative management practices, etc., factored into the overall discussion surrounding wildfires. Ultimately the variables they used to create a custom social vulnerability index included the following.

- Median gross rent
- Median house value
- Median age
- Per capita income
- People per unit
- Percentage of population under 5 and over 65
- Percentage of various minority statuses
- Percentage civilian unemployment
- Percentage of population age 25+
- Percentage females in labor force
- Percentage female-headed households
- Percentage mobile homes
- Percentage of housing units w/ no cars
- Percentage of congregate populations
- Percentage poverty
- Percentage renters
- Percentage of households earning $200,000+ annually

with less than 12th-grade education
- Percentage with English as a second language
- Percentage employment in extraction industries
- Percentage female
- Percentage employment in service industry
- Percentage of households receiving Social Security
- Percentage unoccupied housing units

Their analysis led to the creation of the following two graphics. The first graphic shows a social vulnerability score (p. 901).

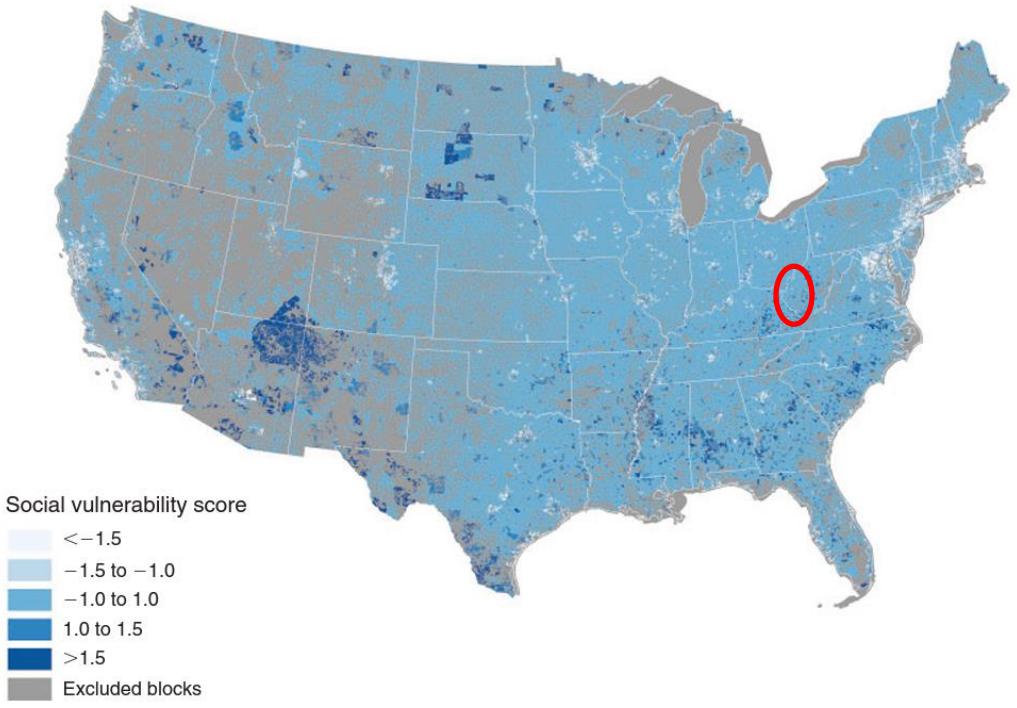


Fig. 1. Social vulnerability scores for the coterminous US.

The second graphic integrated the social vulnerability and wildfire potential data (p. 903). Though it is difficult to see, when zooming into the image, there are portions of the map in the area of the region with a slightly brighter pink color, indicating “Moderate” in both wildfire potential and social vulnerability. Unfortunately, though, there are also several areas of the region in gray, which indicates “excluded blocks.”

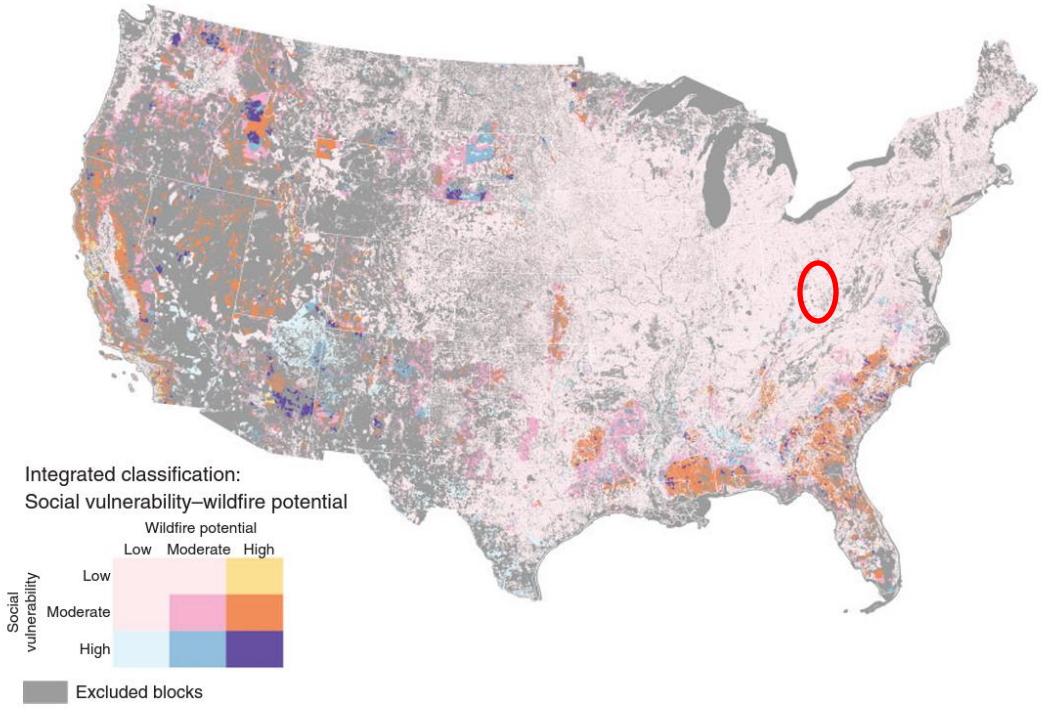


Fig. 4. Intersection of social vulnerability and wildfire potential.

Previous Occurrences

Weather is a crucial factor contributing to the severity of fall and spring wildfire seasons in West Virginia. Drought, combined with windy days, create red flag, or extremely high fire danger, conditions. According to the West Virginia Division of Forestry, the 2022 fire season was very active, keeping foresters, investigators, and wardens extremely busy with 890 fires taking place and 20,395 acres burned.

Additionally, "the dry years of 1987 and 1991 were especially bad when 429,000 acres and 346,000 acres burned, respectively. After the establishment of organized forest protection, the worst year was 1952 when 586,000 acres of forestland burned during the fall fire season and a total of 638,000 acres during the year as a whole" (Beanblossom, 2019).

WILDFIRE OCCURRENCES, 2023		
County	*Number of Fires*	*Acres Burned*
Cabell	33	53.09
Lincoln	43	1,301.73
Logan	35	2,609.71
Mason	20	256.35
Mingo	51	7,946.68
Wayne	42	1,069.46
Totals	**224**	**13,237.02**

The West Virginia Division of Forestry maintains a database that provides information on wildfires and brushfires that have occurred throughout the state. Officials reported 224 fires that had burned approximately 13,237.02 acres within the region in 2023. Among the region's counties, Mingo County experienced the most fires with 51 and sustained the most acres burned at approximately 7,947 (see the table above).

Loss and Damages

Estimating monetary losses resulting from wildfires is difficult, as the vast majority of wildfires in West Virginia are not recorded. This lack of data may result in inconsistencies if an analysis is done based on reported monetary loss. However, the West Virginia Emergency Management Division (WVEMD), the West Virginia FEMA Integration Team (WVFIT), and the West Virginia Division of Forestry (WVDOF) are working together to develop additional recording of wildfires. Currently, The WVDOF maintains the Daily Fire Report for loss data, which primarily shows acres burned. See https://wvdof.maps.arcgis.com/apps/dashboards/1dda32d94f9940098fc351e346202db8 for more details. From an exposure assumption, the greater the number of people and property in an area, and the greater the variables for wildfire severity of that area, the greater the potential loss.

Federal firefighting costs from the National Fire Information Council (NIFC) can contribute to a planning estimate (USDOI NIFC, n.d.). Although the region (and West Virginia as a whole) have not seen wildfires like those experienced in other parts of the county, the NFIC estimates that the cost of suppressing wildfires by the Forest Service and U. S. Department of Interior has averaged around $390 per acre burned from 2018 to 2022.

The total number of acres burned during 2023 in West Virginia was 43,463; as per the federal cost data, the total average annual cost in West Virginia to suppress wildfires would be around $17,000,000. The number of recorded wildfires throughout West Virginia in 2023 was

1,124, which creates an average of 39 acres burned per wildfire, this would create a cost of approximately $15,210 per wildfire. The table above records 13,237.02 acres burned in the region in 2023. Again, using the federal cost data, these fires would be expected to have yielded approximately $5,162,437.

Future Occurrences

Though regional officials are working to develop their communities, current development trends are not likely to substantially impact the wildland-urban interface (WUI). Local officials should remain mindful of the WUI and the potential impacts wildfire may pose for new development. Future development of Interstates 73 and 74 through Logan, Mingo, and Wayne Counties could increase traffic in these areas. Though heavier traffic is not related to wildfire occurrence; however, increased development in these areas may increase risk steadily over time.

Future Climate Considerations

Seasons are changing in length and timing in Region 2, with earlier springs, delayed falls, and shorter winters (USGCRP, 2018). This seasonal shift could lengthen the fire season. Warmer temperatures mean higher evaporation rates, and, thus, things dry out more quickly. Drier vegetation is more likely to burn if something sparks a flame. In many cases, the spark is accidental, but stronger storm events (often attributed to a changing climate) may include more lightning. As such, a changing climate may impact two variables of the fire risk (i.e., drier fuel and potential spark) rather than directly causing fires. Weather conditions, including extreme heat and drought, can increase the likelihood of wildland fires quickly escalating. Any fire left unattended or mismanaged has the potential to become a wildfire; however, the likelihood of a fire attaining a significant size and intensity is unpredictable and varies based on environmental conditions.

Risk Assessment

This section summarizes the vulnerability of the region to wildfire. The planning and development council conducted an online survey for the public to share its thoughts on the hazards listed in this plan. The following table presents the results of that survey, specifically regarding wildfire.

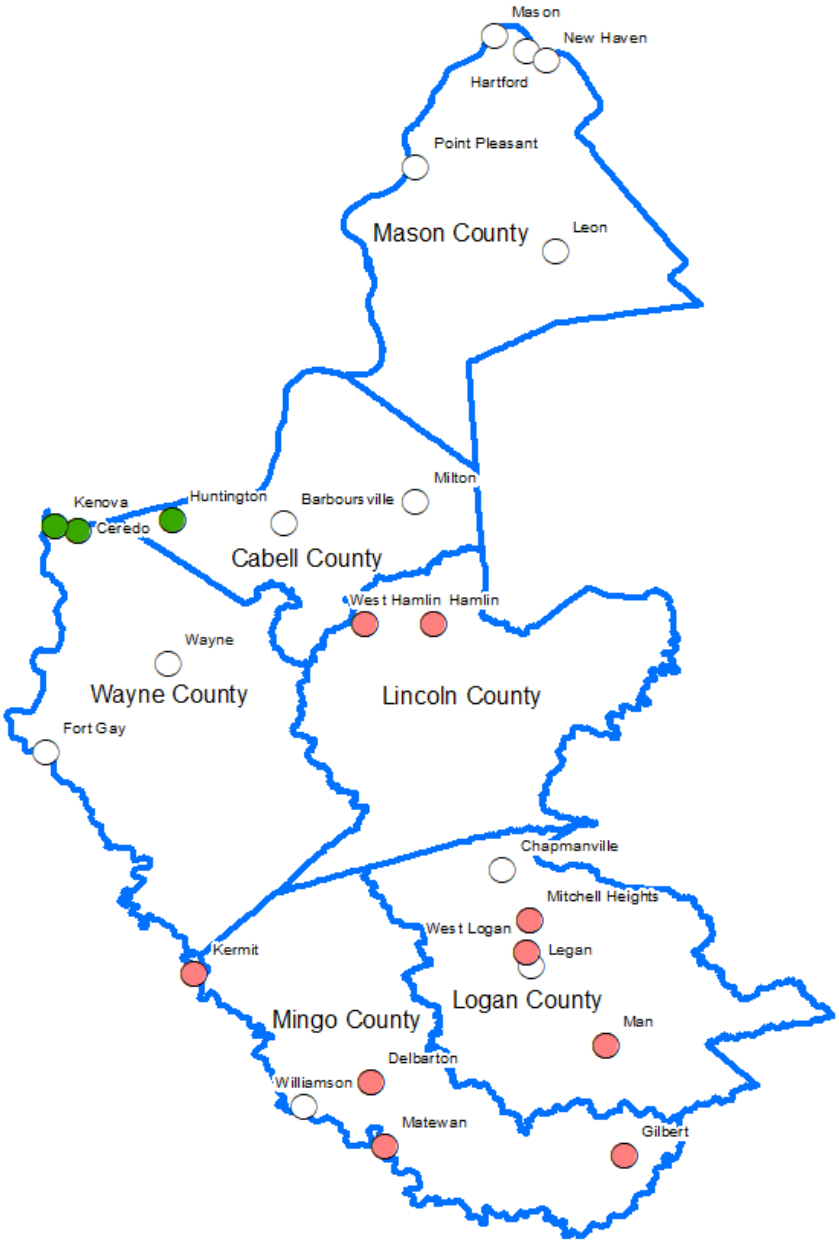
PUBLIC SENTIMENT, WILDFIRE					
Hazard	*Level of Concern*				*Total Responses*
	Not at All	*Somewhat*	*Concerned*	*Very*	
Wildfire	11 (27.50%)	15 (37.50%)	10 (25.00%)	4 (10.00%)	40
In the past ten years, do you remember this hazard occurring in your community?				13 (32.50%)	40
Have you noticed an increase in the occurrences or intensity of this hazard?				7 (17.50%)	40
Have you noticed a decrease in the occurrences or intensity of this hazard?				3 (7.50%)	40

The following table assigns point totals based on the methodology identified in Section 2.2: Describe Hazards above.

WILDFIRE RISK RANKING			
Category	*Points*	*Description*	*Notes*
Frequency	4	High (Likely to occur in a year)	Several small- to moderate-sized brush fires occur each year throughout the region. The region experienced 224 fires in 2023.
Response	3	One week	Wildfires are typically small and easily contained; however, they may still require a small-scale response for up to a week (i.e., initial attack and monitoring for rekindles).
Onset	4	Less than 6 hours	Officials can predict wildfire conditions, but fires themselves occur with no advanced notice.
Magnitude	1	Localized (Less than 10% of land area affected)	The average wildfire in West Virginia burns 23 acres, which is substantially less than 10% of the total land area of the region.
Business	2	One week	As noted, most wildfires in the region are small; however, there is the possibility of some businesses being impacted for up to one week.
Human	2	Low (Some injuries)	Generally, the risk of injury or death due to wildfire is low. First responders may experience injuries and adverse health effects.
Property	1	Less than 10% of property affected	The average wildfire in the region would burn less than 10% of the region's land area. By proxy, wildfires would impact less than 10% of the property in the region.
Totals	**17**	**Medium**	

FEMA's *Local Mitigation Planning Handbook* (2023c) directs entities compiling multi-jurisdictional plans to identify any jurisdictions within the planning area for which the identified risks are more or less prevalent as compared to the rest of the planning area. The following map identifies those multi-jurisdictional risks with respect to wildfire. Those labels not underlaid by a

shaded drop shadow are not more or less at risk of wildfire. Those with red drop shadows are more at risk; those with green are less at risk. The more rural municipalities in the region appear here as more susceptible because even though all structures in the region are in the wildland-urban interface, the rural municipalities are in more rugged areas and more difficult to access. Huntington, Ceredo, and Kenova appear as less because these are the areas of the region with most non-fuel laden areas within a fire department's first due response area.



2.0 RISK ASSESSMENT

2.3 Analyze Impacts

This section of the risk assessment serves to connect the dots drawn throughout the identification and description of the hazards impacting the region to form a better understanding of the potential impacts of those hazards.

Revisiting Development and Other Trends

Local officials must realize that while the profiles in Section 2.2 present an in-depth overview of the hazard in question *at this moment in time*, the region's participating jurisdictions have evolved over the past five years (i.e., since the adoption of the previous version of this plan). To guide this discussion, Region 2 utilized the definitions of "changes in development" from FEMA's *Local Mitigation Planning Policy Guide* (2022c, p. 31).

- Recent Development (RD): For example, construction completed since the plan was last approved.
- Potential Development (PD): For example, development planned or under consideration by the jurisdiction.
- General Trends (GT): Conditions that may affect the risks and vulnerabilities of the jurisdiction (for example, climate change, declining populations or projected increases in population, foreclosures, etc.).
- Social Vulnerability (SV): Shifts in the needs of underserved communities or gaps in social equity. This category can also include changes in local policies, standards, codes, regulations, land use regulations, and other conditions.

The key to the tables summarizing this discussion are as follows, and the results appear below.

- Changes have resulted in an **Increase** in vulnerability for the jurisdiction (↑)
- Changes have resulted in **No Change** in vulnerability for the jurisdiction (↔)
- Changes have resulted in a **Decrease** in vulnerability for the jurisdiction (↓)

Hazard-Specific Considerations

The following sections consider how the definitions listed above impact (or are impacted by) the 15 hazards described in Section 2.2.

ACTS OF VIOLENCE

No recent of potential development in the region may directly contribute to acts of violence. The impacts of other hazards, such as the substance use crisis, may influence violent occurrences. More generally, entities such as the United Nations warned that resource scarcity, brought on by a changing climate, geopolitical aggression, etc., can be a "threat multiplier" (United Nations, n.d.) for violent acts. Those without resources may become violent, while those in positions of power may hoard or resort to violence to obtain resources. The following table presents and discusses other trends

TREND IMPACTS: ACTS OF VIOLENCE					
County	*RD*	*PD*	*GT*	*SV*	*Notes*
Cabell	↔	↔	↔	↑	Cabell County and surrounding entities continue to work to address the opioid crisis and other substance use issues. The problem is multi-faceted, and while not directly related to acts of violence, local officials are still maintaining vigilance.
Municipal Considerations: Barboursville and Milton are adequately represented by the county rankings. Huntington may see minor acts of violence more than other jurisdictions because it is the county seat and it has the highest concentration of assets in the region.					
Lincoln	↔	↔	↔	↔	No impacts beyond those in the paragraph preceding the table.
Municipal Considerations: Hamlin may see minor acts of violence more than West Hamlin because it is the county seat.					
Logan	↔	↔	↔	↔	No impacts beyond those in the paragraph preceding the table.
Municipal Considerations: Logan may see minor acts of violence more than the other jurisdictions because it is the county seat.					
Mason	↑	↔	↔	↔	The construction surrounding the Nucor location sees non-local workers come into the area. A direct connection to an increase in violence is not likely, though.
Municipal Considerations: Point Pleasant may see minor acts of violence more than the other municipalities because it is the county seat.					
Mingo	↔	↔	↔	↔	No impacts beyond those in the paragraph preceding the table.
Municipal Considerations: Williamson may see minor acts of violence more than the other jurisdictions because it is the county seat.					
Wayne	↔	↔	↔	↔	No impacts beyond those in the paragraph preceding the table.
Municipal Considerations: Wayne may see minor acts of violence more than the other jurisdictions because it is the county seat. Ceredo and Kenova may also see acts of violence similarly to how Huntington experiences them.					

CYBER INCIDENTS

The steering committee added cyber incidents to the profile list for the 2023/2024 update precisely because recent development (worldwide) has accelerated regarding digital connectivity. Other, general trends include an apparent uptick in widely-publicized cyber attacks on healthcare, education, etc., facilities (of which there are many in the region).

DAM & LEVEE FAILURE

The increase in risk of dam and levee failure has to do with a lack of data. For instance, the U.S. Army Corps of Engineers' National Inventory of Dams (NID) shows many fewer dams now than it did in 2018. Other impacts appear below.

TREND IMPACTS: DAM & LEVEE FAILURE					
County	*RD*	*PD*	*GT*	*SV*	*Notes*
Cabell	↑	↔	↔	↔	The WVDEP recently noted that the Hatfield Lake Dam in Cabell County is both deficient and a Class 1 downstream hazard.
Municipal Considerations: Areas of Huntington are at greater risk of levee failure solely because there are areas of the city that are protected by the levee. Barboursville and Milton are accurately represented by the county rankings.					
Lincoln	↔	↔	↔	↔	No impacts beyond those in the paragraph preceding the table.
Municipal Considerations: Hamlin and West Hamlin are accurately represented by the county rankings.					
Logan	↔	↔	↔	↔	No impacts beyond those in the paragraph preceding the table.
Municipal Considerations: All municipalities are accurately represented by the county rankings.					
Mason	↑	↔	↔	↔	The WVDEP recently noted that the Huffman Dam in Mason County is both deficient and a Class 1 downstream hazard.
Municipal Considerations: Point Pleasant has a floodwall, but it recently completed upgrades to the structure, thereby decreasing its risk. All other municipalities are accurately reflected by the county rankings.					
Mingo	↑	↔	↔	↔	The WVDEP recently noted that the Laurel Lake Dam in Mingo County is both deficient and a Class 1 downstream hazard.
Municipal Considerations: Williamson and Matewan have downtown areas protected by a levee; as such, they are more at risk of a levee failure. All other municipalities are accurately reflected by the county rankings.					
Wayne	↔	↔	↔	↔	No impacts beyond those in the paragraph preceding the table.
Municipal Considerations: Portions of the Huntington floodwall extend into Ceredo. All other municipalities are accurately reflected by the county rankings.					

DROUGHT

Neither recent nor potential developments in any of the participating jurisdictions have caused increases or decreases in vulnerability to drought. Generally, as the region's communities seek to stabilize or grow their populations, they should remain cognizant of the use of groundwater resources.

EARTHQUAKE

Neither recent nor potential developments in any of the participating jurisdictions have caused increases or decreases in vulnerability to earthquakes.

EPIDEMIC/PANDEMIC

All participating jurisdictions are seeing an aging population that may be at risk of communicable disease outbreaks. As such, trends in social vulnerability are generally increasing the vulnerability to future epidemics and pandemics.

EXTREME TEMPERATURES

Outside of Huntington, there is little consideration throughout the region for including social vulnerability variables in preparedness planning (though steering committee members gravitated toward integrating these discussions during the 2023/2024 update). Underserved populations may suffer disproportionately from extreme temperature effects as participating jurisdictions both learn how to better meet the needs of those individuals and identify the resources to do so. Other impacts appear below.

TREND IMPACTS: EXTREME TEMPERATURES					
County	*RD*	*PD*	*GT*	*SV*	*Notes*
Cabell	↔	↔	↔	↔	N/A
Municipal Considerations: Huntington typically contains the largest area susceptible to the urban heat island effect in the region. Barboursville and Milton are accurately represented by the county rankings.					
Lincoln	↔	↔	↔	↔	N/A
Municipal Considerations: Hamlin and West Hamlin are accurately represented by the county rankings.					
Logan	↔	↔	↔	↔	N/A
Municipal Considerations: All municipalities are accurately represented by the county rankings.					
Mason	↔	↔	↔	↔	N/A
Municipal Considerations: All municipalities are accurately represented by the county rankings.					
Mingo	↔	↔	↔	↔	N/A
Municipal Considerations: All municipalities are accurately represented by the county rankings.					

TREND IMPACTS: EXTREME TEMPERATURES					
County	*RD*	*PD*	*GT*	*SV*	*Notes*
Wayne	↔	↔	↔	↔	N/A
Municipal Considerations: Ceredo and Kenova, being part of the greater Huntington metropolitan area, may see more urban heat island effects that other areas of Wayne County. Fort Gay and Wayne are accurately represented by the county rankings.					

FLOOD

Like in many areas of West Virginia, despite flooding's status as one of the most disruptive and interrupting hazards for participating jurisdictions, neither recent nor potential developments have significantly changed vulnerability. The impacts of severe summer weather (i.e., heavy rain over hyper-localized areas) may represent general trends that are increasing risk. As such, there is a growing recognition of the impacts of run-off related flooding, and as a result, many communities are looking to enhance stormwater management capabilities. Huntington is also exploring low-impact development (i.e., green infrastructure) options to support responsible stormwater management. Cabell, Lincoln, Logan, Mingo, and Wayne Counties have been active with mitigation projects, as has Huntington. As such, these general trends are decreasing risk to flooding.

HAZARDOUS MATERIALS

The presence of Interstate 64, Corridor G, freight rail operations, waterborne hazardous materials commerce, and a robust industrial base (particularly in the northern parts of the region) general sustain the risk of hazardous materials incidents. More specific impacts appear below.

TREND IMPACTS: HAZARDOUS MATERIALS					
County	*RD*	*PD*	*GT*	*SV*	*Notes*
Cabell	↔	↔	↔	↔	N/A
Municipal Considerations: Barboursville, Huntington, and Milton are all located along I-64, meaning they could be subject to a hazardous materials incident with chemicals not used or stored in the region.					
Lincoln	↔	↔	↔	↔	N/A
Municipal Considerations: Hamlin and West Hamlin are accurately represented by the county rankings.					
Logan	↔	↔	↔	↔	N/A
Municipal Considerations: All municipalities are accurately represented by the county rankings.					
Mason	↑	↔	↔	↔	The development of the Nucor site is boosting the economy, and it will likely participate in the local emergency planning committee to accurately account for hazardous materials eventually used on-site.
Municipal Considerations: All municipalities are accurately represented by the county rankings.					

TREND IMPACTS: HAZARDOUS MATERIALS					
County	*RD*	*PD*	*GT*	*SV*	*Notes*
Mingo	↔	↔	↔	↔	N/A
Municipal Considerations: All municipalities are accurately represented by the county rankings.					
Wayne	↔	↔	↔	↔	N/A
Municipal Considerations: All municipalities are accurately represented by the county rankings.					

LANDSLIDES & LAND SUBSIDENCE

Though landslides and land subsidence are significant concerns throughout the region, there has been minimal recent development that have impact risk levels. Even areas with larger construction projects (e.g., Nucor in Mason County), the changes are known risks, and the completed construction will not fundamentally change the landslide or subsidence risk. As a more general trend, the decline of mining operations in the region, particularly in Logan and Mingo Counties, may lead to the presence of abandoned mines with less monitoring (and, potentially, less proactive abatement of subsidence).

SUBSTANCE USE CRISIS

Though Huntington has received media attention for both the magnitude of the opioid crisis and its handling of it, all areas of the region are experiencing the challenges associated with it. Further, as revealed during the 2023/2024 update, usage and addiction issues extend beyond just opiates (e.g., methamphetamine). In fact, rather than being subject to an increase or decrease thanks to developmental trends, the substance use crisis *is a general trend* that is exacerbating the impacts of other hazards profiled in this plan.

SEVERE SUMMER WEATHER

Steering committee and jurisdiction participants all acknowledged the general trend of the seemingly more intense storms to impact the area. These storms dump large amounts of precipitation over small areas, such that one area may be flooding severely while another area, just a few miles away, is not getting any rain. This trend is apparent throughout the region.

SEVERE WINTER WEATHER

Neither recent nor potential developments in any of the participating jurisdictions have caused increases or decreases in vulnerability to winter storms. However, the communities in the region are aware of areas that may be isolated during winter storms and the potential impacts on those living in those areas.

TORNADO

Neither recent nor potential developments in any of the participating jurisdictions have caused increases or decreases in vulnerability to tornadoes. However, it appears as though confirmed tornado occurrences are on the rise in West Virginia and surrounding states. This uptick in hazard occurrences (though they have occurred sporadically for years) suggests that existing structures *and existing codes guiding construction* may be predicated on outdated assumptions about the probability of the hazard. During the 2023/2024 update, the steering committee acknowledged a greater need to consider the impact that codes can have on overall resilience; potentially-increasing tornado risk serves as a reason driving that consideration.

WILDFIRE

Climate change may alter the dry periods of the year, which may impact the availability of fuel for wildfires. The unincorporated areas of the county as well as the remote municipalities may see a slight increase in risk.

TREND IMPACTS: WILDFIRE					
County	*RD*	*PD*	*GT*	*SV*	*Notes*
Cabell	↔	↔	↔	↔	N/A
Municipal Considerations: Barboursville and Milton are accurately represented by the county rankings. Huntington may be slightly less vulnerable to wildfire because it represents the largest area in the region that does not contain a heavy fuel load.					
Lincoln	↔	↔	↔	↔	N/A
Municipal Considerations: Hamlin and West Hamlin are accurately represented by the county rankings, though they are small towns in somewhat remote areas.					
Logan	↔	↔	↔	↔	N/A
Municipal Considerations: All municipalities are accurately represented by the county rankings.					
Mason	↔	↔	↔	↔	N/A
Municipal Considerations: Logan and Chapmanville are accurately represented by the county rankings. Man, Mitchell Heights, and West Logan are someone more remote than Logan and Chapmanville and have more constrained primary emergency services available.					
Mingo	↔	↔	↔	↔	N/A
Municipal Considerations: Williamson is accurately represented by the county rankings. Delbarton, Gilbert, Kermit, and Matewan are all remote municipalities that may be at slightly higher risk.					
Wayne	↔	↔	↔	↔	N/A
Municipal Considerations: Fort Gay and Wayne are accurately represented by the county rankings. Ceredo and Kenova may be at slightly less risk because they are in a more densely-developed area (with fewer quantities of available fuel). Further, the areas across the Ohio River from Ceredo and Kenova are similarly comprised, further lowering the amount of closely-available fuel.					

Community and Economic Development Trends

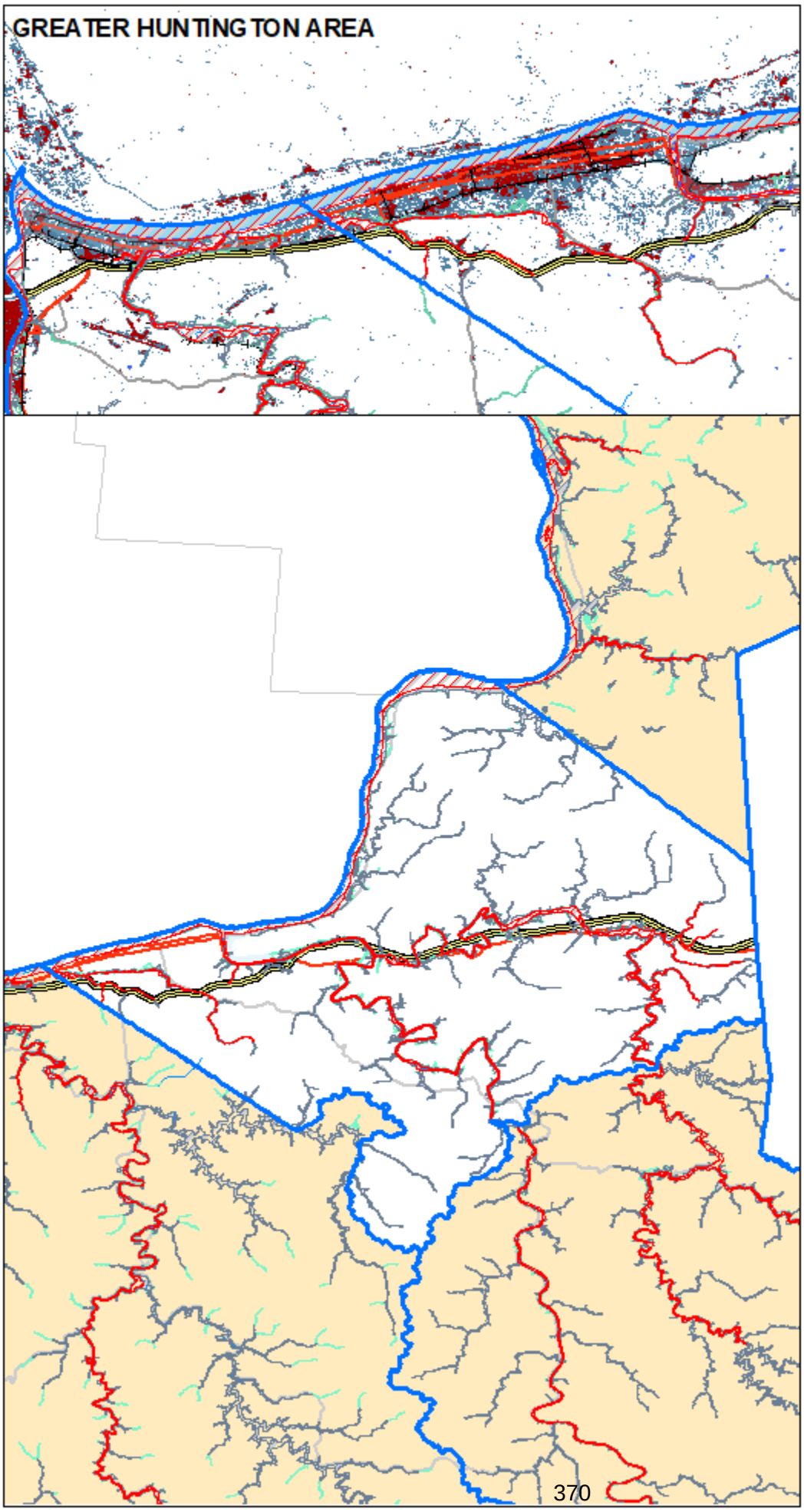
§201.6(c)(2)(ii)(C)	[The plan should describe vulnerability in terms of] providing a general discussion of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

Section 1.2 above presents information about development trends in the region. This section revisits those trends and applies lessons learned from the hazard profiling activity (i.e., Section 2.2).

Proactive mitigation considerations for growth (generally) will be necessary throughout the region. Development can change natural drainage paths and create or increase flood risks. Industrial companies may impound water for their operations, causing land disturbances. Timbering processes may also natural drainage paths or change the vegetation available to absorb rainwater. Changes to wetlands and erosion are the other land disturbances that impact the permeability of areas (and all of these changes can impact flooding).

Flash floods from heavy precipitation events may be a concern as areas of the region develop. (The Intergovernmental Panel on Climate Change [IPCC] suggests that areas in the Northeast [including West Virginia] could see an increased risk of extreme participation and flooding.) New commercial and industrial developments, and even some larger residential developments, may pave substantial land areas with impervious surfaces. Buildings, parking lots, and roads (i.e., impervious surfaces) mean less land to absorb excess precipitation, forcing water into places it previously could not reach. The evolving built environment interacts with these changing weather patterns to yield potentially destructive flooding.

The following maps identify the areas of the region's counties listed as "Developed, High Intensity," with greater than 80% of the land area consisting of impervious surfaces, as well as "Developed, Medium Intensity," which have between 50 and 79% of land areas covered with impervious surfaces. The intersections of these areas with special flood hazard areas (SFHAs) may provide local leaders with insights as to where to concentrate hazard mitigation efforts related to stormwater management and flash flooding. The maps that follow also overlay the SFHAs to show these intersections. Not surprisingly, the maps below show the highest concentrations of impervious surfaces in and around Huntington. In recent years, Huntington has been proactive in requiring developers to manage a certain percentage of generated stormwater onsite. These practices may serve as a model for other communities in the region and West Virginia.



REGION 2 PDC HAZARD MITIGATION PLAN

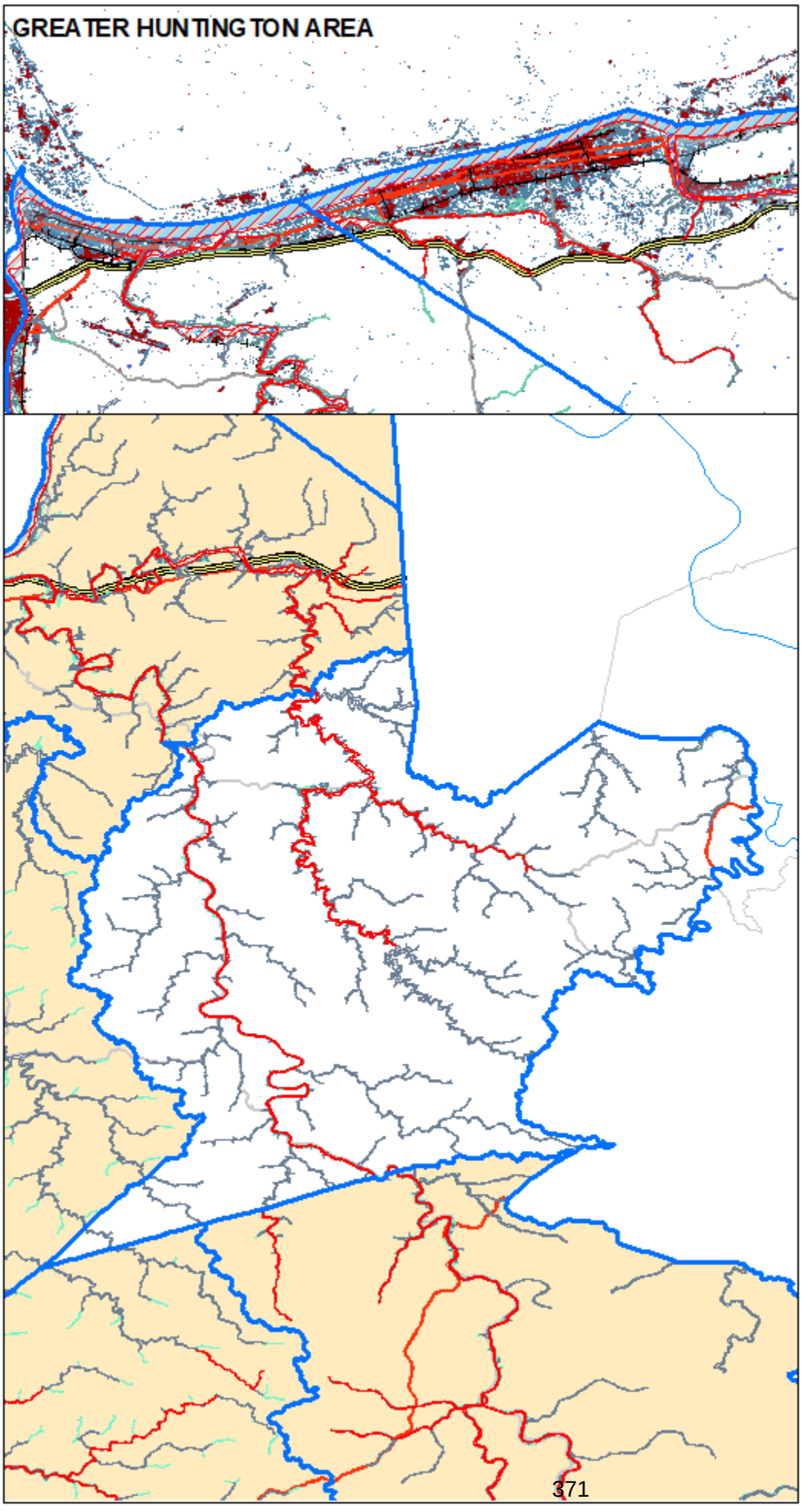
Impervious Surfaces & SFHAs (Cabell County)

Data Source(s):
FEMA DFIRM,
USGS NLCD (2021)

- Areas w/ Reduced Risk: Levee
- Floodway
- 1% Annual Chance
- 0.2% Annual Chance
- Developed, Medium Intensity
- Developed, High Intensity

0 1.25 2.5 5 7.5 10 Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



REGION 2 PDC HAZARD MITIGATION PLAN

Impervious Surfaces & SFHAs (Lincoln County)

Data Source(s):
FEMA DFIRM,
USGS NLCD (2021)

- Areas w/ Reduced Risk: Levee
- Floodway
- 1% Annual Chance
- 0.2% Annual Chance
- Developed, Medium Intensity
- Developed, High Intensity

0 1.25 2.5 5 7.5 10 Miles

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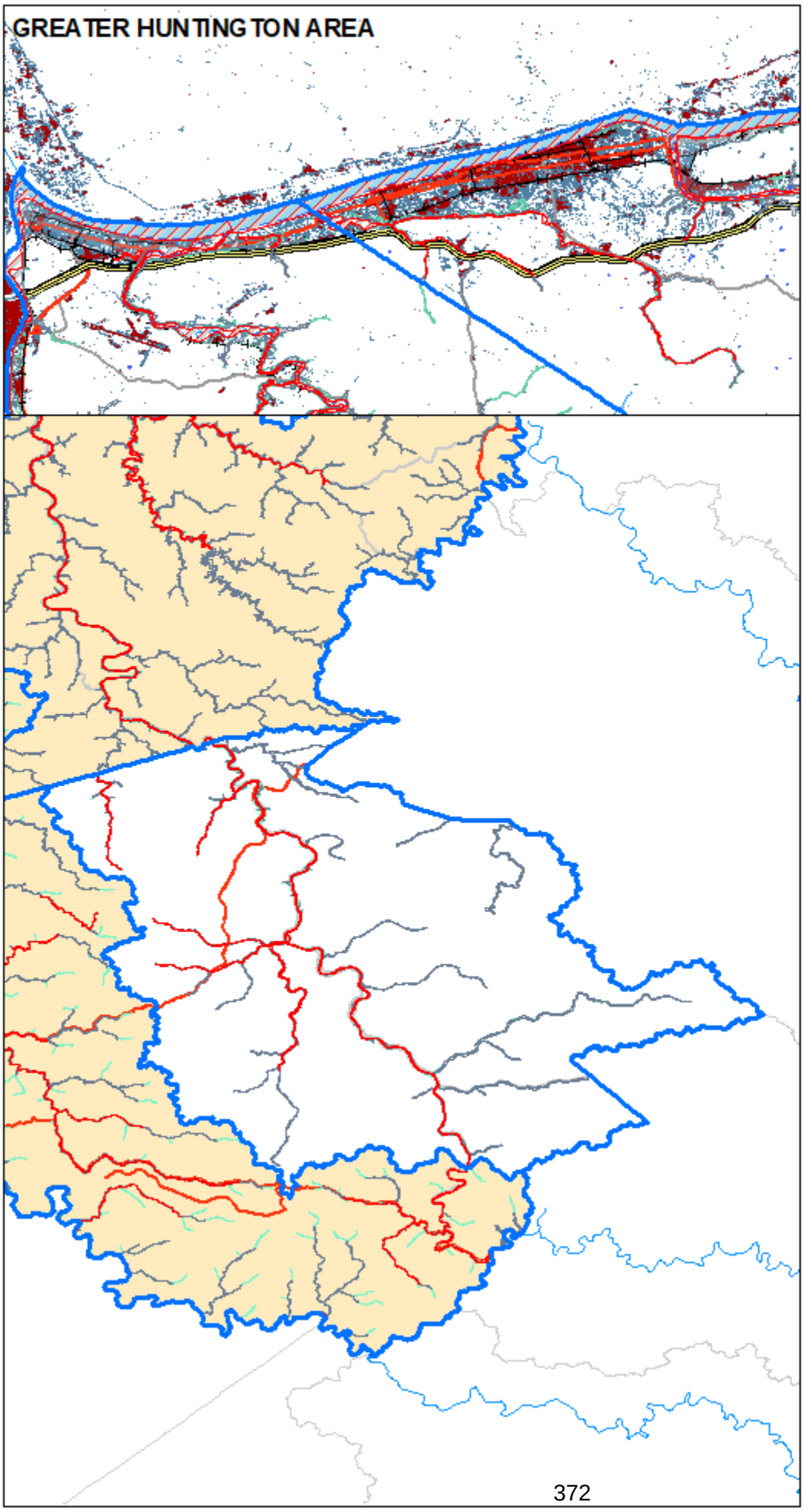

REGION 2 PDC HAZARD MITIGATION PLAN

Impervious Surfaces & SFHAs (Logan County)

Data Source(s):
FEMA DFIRM,
USGS NLCD (2021)

- Areas w/ Reduced Risk: Levee
- Floodway
- 1% Annual Chance
- 0.2% Annual Chance
- Developed, Medium Intensity
- Developed, High Intensity

0 1.5 3 6 9 12
Miles

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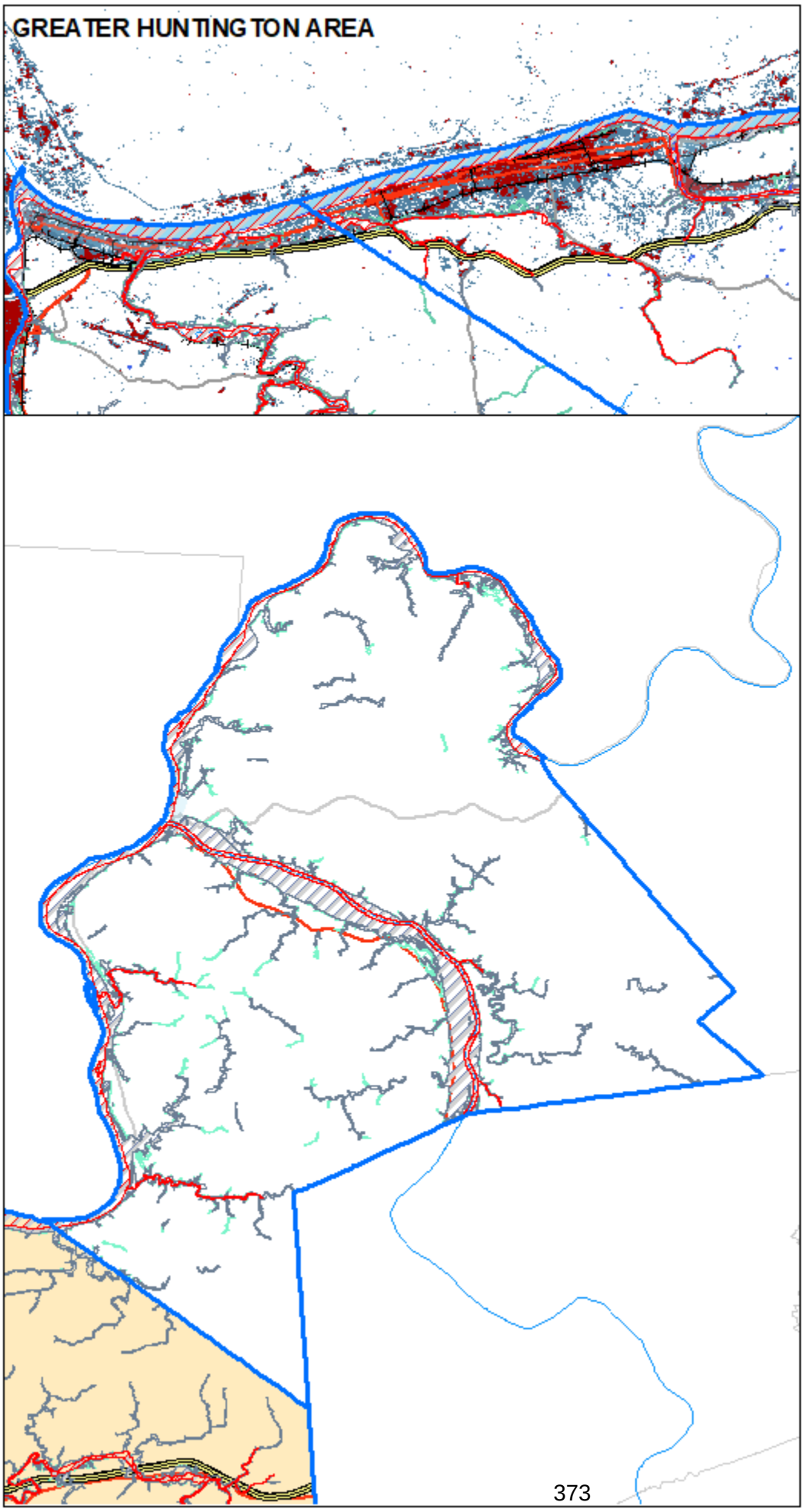

REGION 2 PDC HAZARD MITIGATION PLAN

Impervious Surfaces & SFHAs (Mason County)

Data Source(s):
FEMA DFIRM,
USGS NLCD (2021)

- Areas w/ Reduced Risk: Levee
- Floodway
- 1% Annual Chance
- 0.2% Annual Chance
- Developed, Medium Intensity
- Developed, High Intensity

0 1.25 2.5 5 7.5 10 Miles

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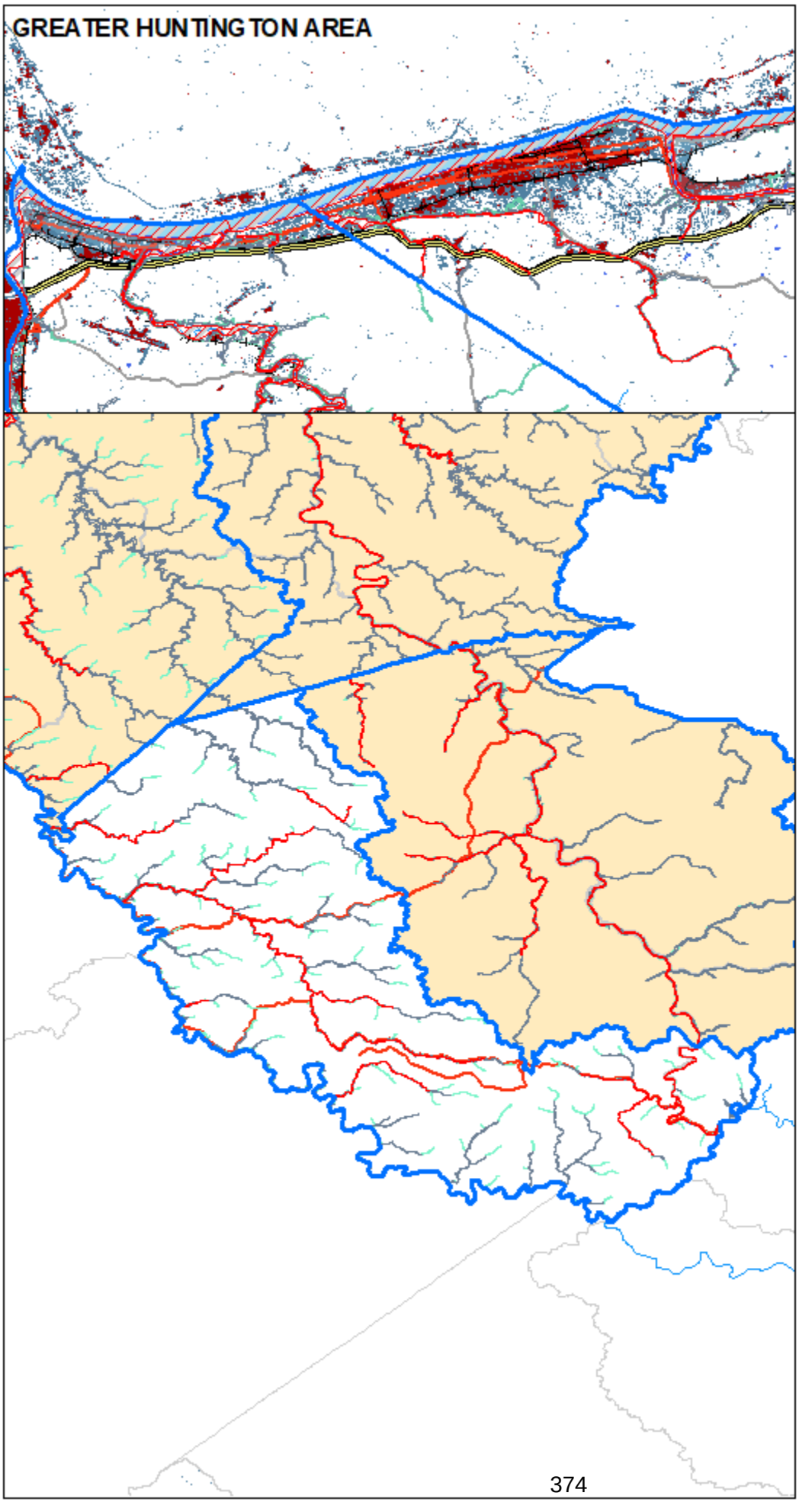

REGION 2 PDC HAZARD MITIGATION PLAN

Impervious Surfaces & SFHAs (Mingo County)

Data Source(s):
FEMA DFIRM,
USGS NLCD (2021)

- Areas w/ Reduced Risk: Levee
- Floodway
- 1% Annual Chance
- 0.2% Annual Chance
- Developed, Medium Intensity
- Developed, High Intensity

0 1.753.5 7 10.5 14
Miles

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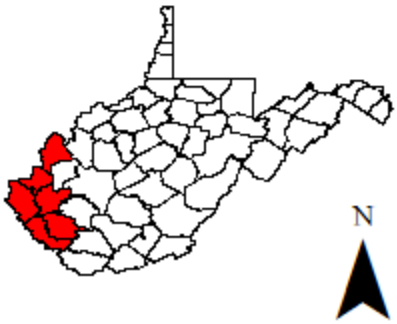

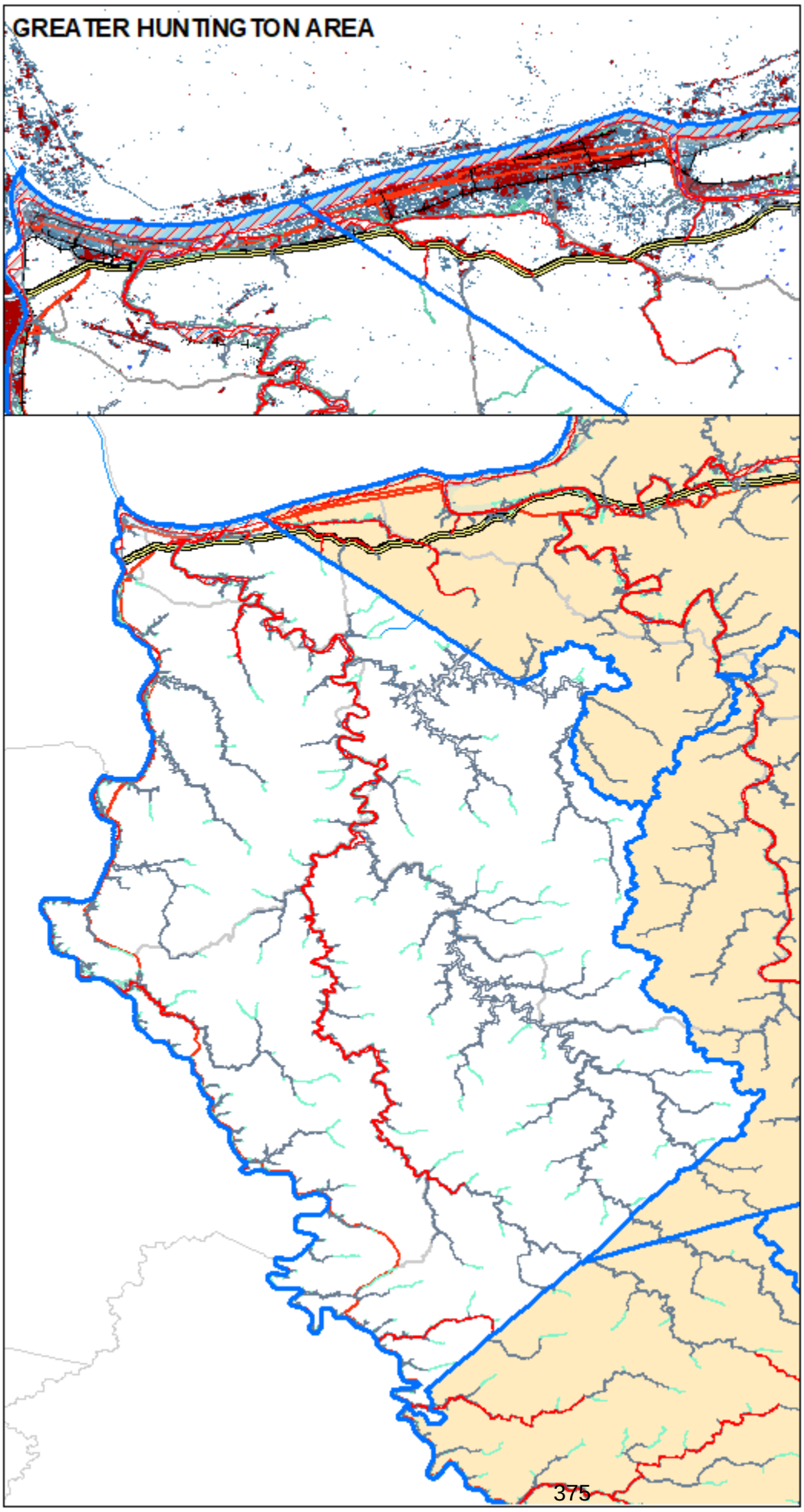

REGION 2 PDC HAZARD MITIGATION PLAN

Impervious Surfaces & SFHAs (Wayne County)

Data Source(s):
FEMA DFIRM,
USGS NLCD (2021)

Areas w/ Reduced Risk: Levee

Floodway

1% Annual Chance

0.2% Annual Chance

Developed, Medium Intensity

Developed, High Intensity

0 1.25 2.5 5 7.5 10
Miles

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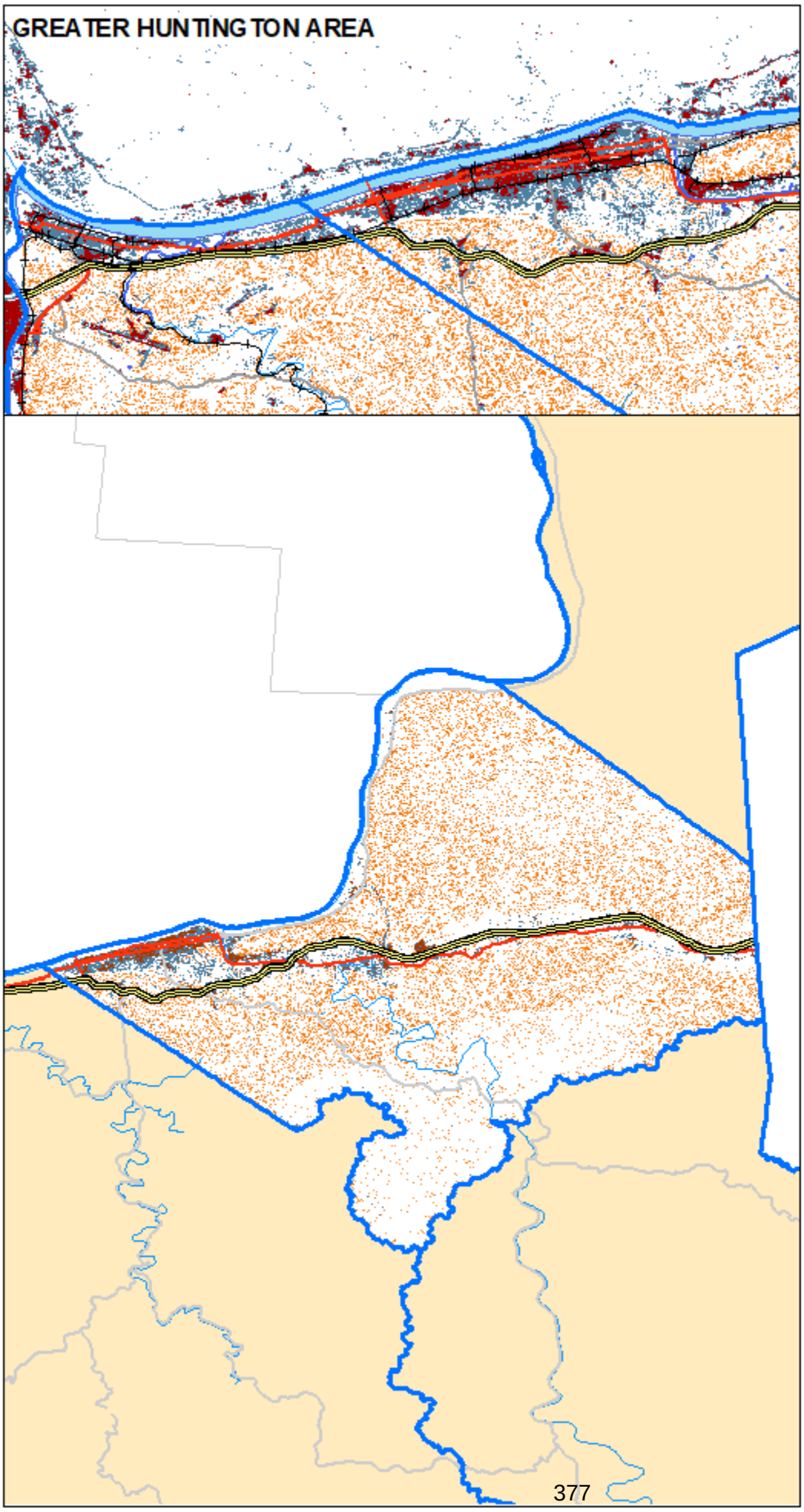
To date, there has been permitted development in *some* SFHAs, but it has not been significant. Region 2's communities are active in floodplain management, and as such, there is minimal evidence that this development has made significant changes to water flow patterns. Put simply, the permitting and regulation process has worked exactly as designed. The answer is not always to limit development, and success in floodplain management (though an argument for extended regulation and enforcement in repetitively-impacted areas) is a primary reason why this plan does not advocate for restricting development.

Future development will also need to be mindful of landslide and land subsidence susceptibility. West Virginia has been active in identifying and mapping landslide and land subsidence risks in the past five years, and this initiative has been timely based on the lived experiences of the steering committee and participating municipalities.

So-called expansive soils are well-known hazards for residential homes, sometimes causing extensive foundation problems (Tabassum & Bulut, 2023). Additionally, many homeowners' insurance policies do not cover damage from expansive soils (King, n.d.). The following maps show, by county, the overlap of landslide susceptibility areas with the developed/impervious areas used in the flood mapping above. These impervious areas represent those areas of the region that are the most extensively built out and, as such, serve as a proxy for areas where infrastructure and access support similar future development. In these maps, the darker the orange, the more susceptible the area to landslides.



REGION 2 PDC HAZARD MITIGATION PLAN

Landslide Suscept. & Dev. (Cabell County)

Data Source(s): USGS NLCD (2021), WVEMD TEAL

Developed, Medium Intensity

Developed, High Intensity

Landslide Susceptibility

-0.072231866 - 0.094570955

0.094570955 - 0.256865592

0.256865592 - 0.446209335

0.446209335 - 0.667110369

0.667110369 - 1.077355146

0 1.25 2.5 5 7.5 10 Miles

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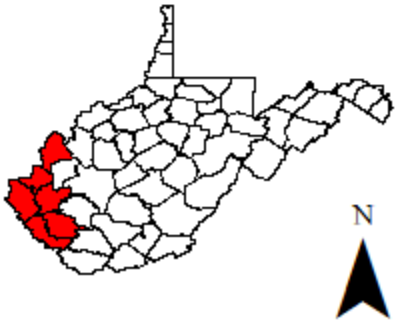

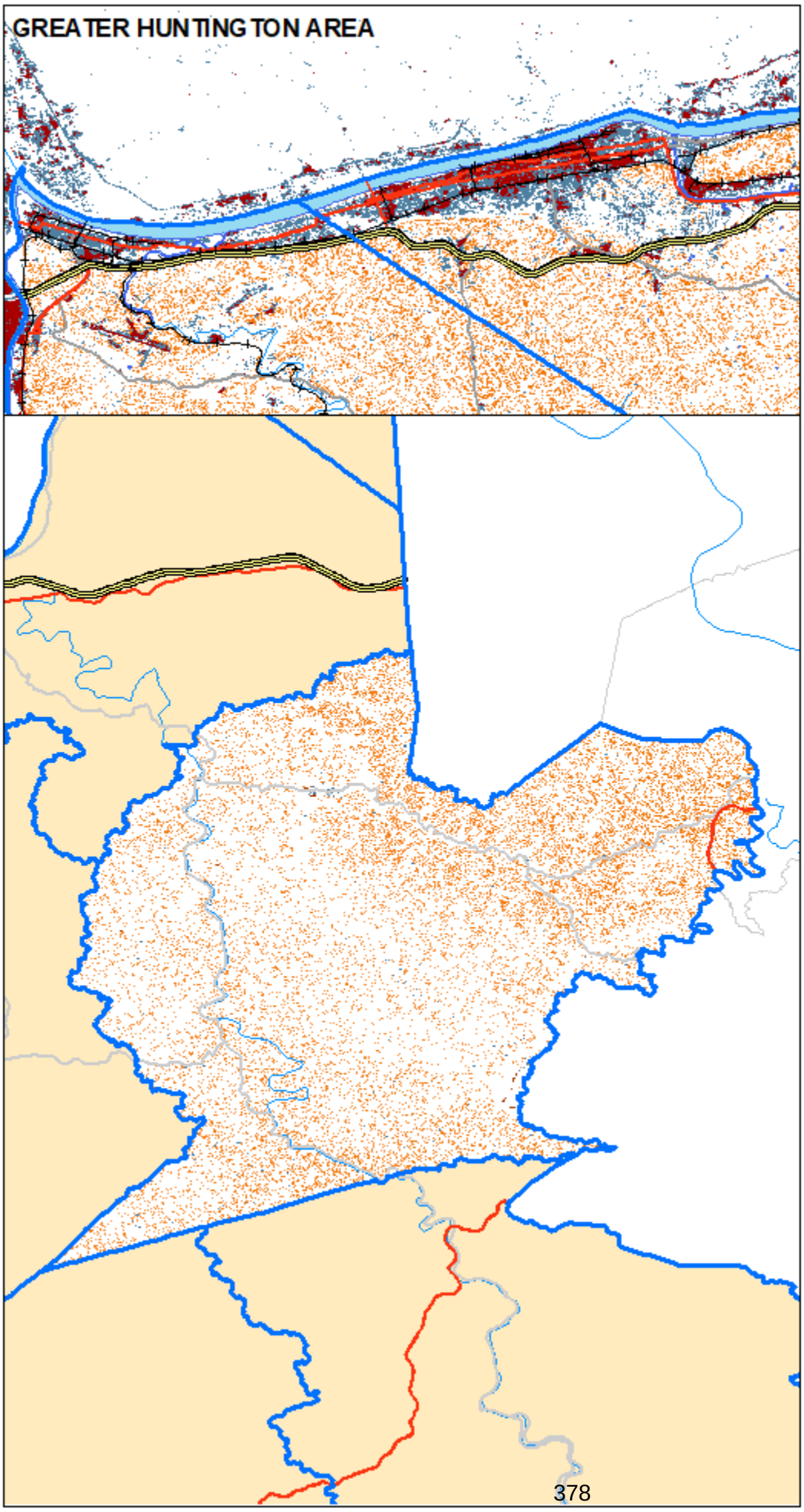

REGION 2 PDC HAZARD MITIGATION PLAN

Landslide Suscept. & Dev. (Lincoln County)

Data Source(s): USGS NLCD (2021), WVEMD TEAL

Developed, Medium Intensity

Developed, High Intensity

Landslide Susceptibility

-0.072231866 - 0.094570955

0.094570955 - 0.256865592

0.256865592 - 0.446209335

0.446209335 - 0.667110369

0.667110369 - 1.077355146

0 1.25 2.5 5 7.5 10 Miles

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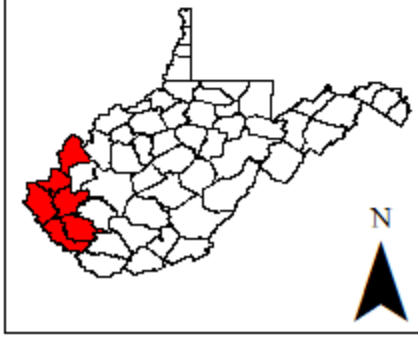

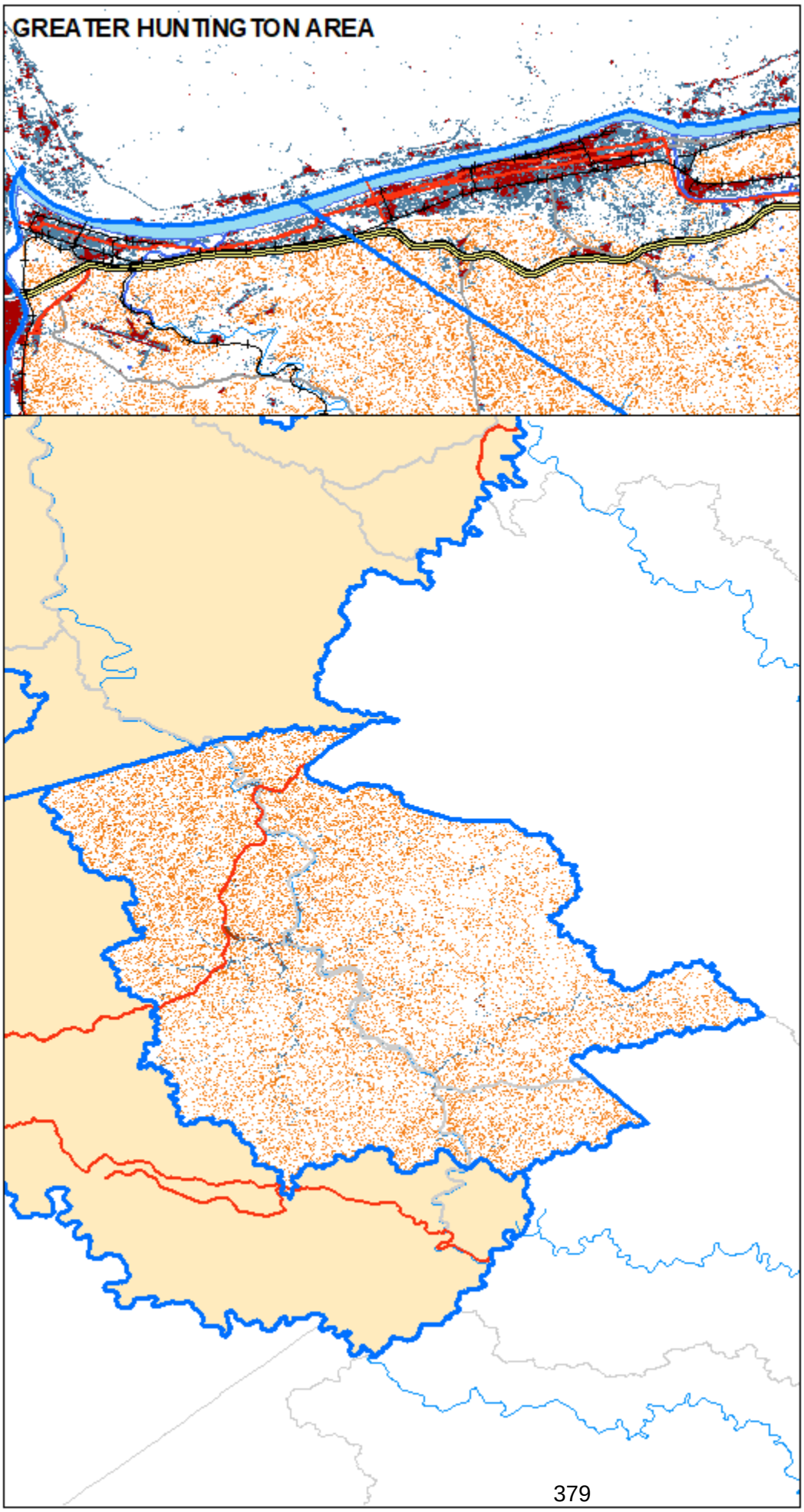

REGION 2 PDC HAZARD MITIGATION PLAN

Landslide Suscept. & Dev. (Logan County)

Data Source(s): USGS NLCD (2021), WVEMD TEAL

Developed, Medium Intensity

Developed, High Intensity

Landslide Susceptibility

-0.072231866 - 0.094570955

0.094570955 - 0.256865592

0.256865592 - 0.446209335

0.446209335 - 0.667110369

0.667110369 - 1.077355146

0 1.5 3 6 9 12 Miles

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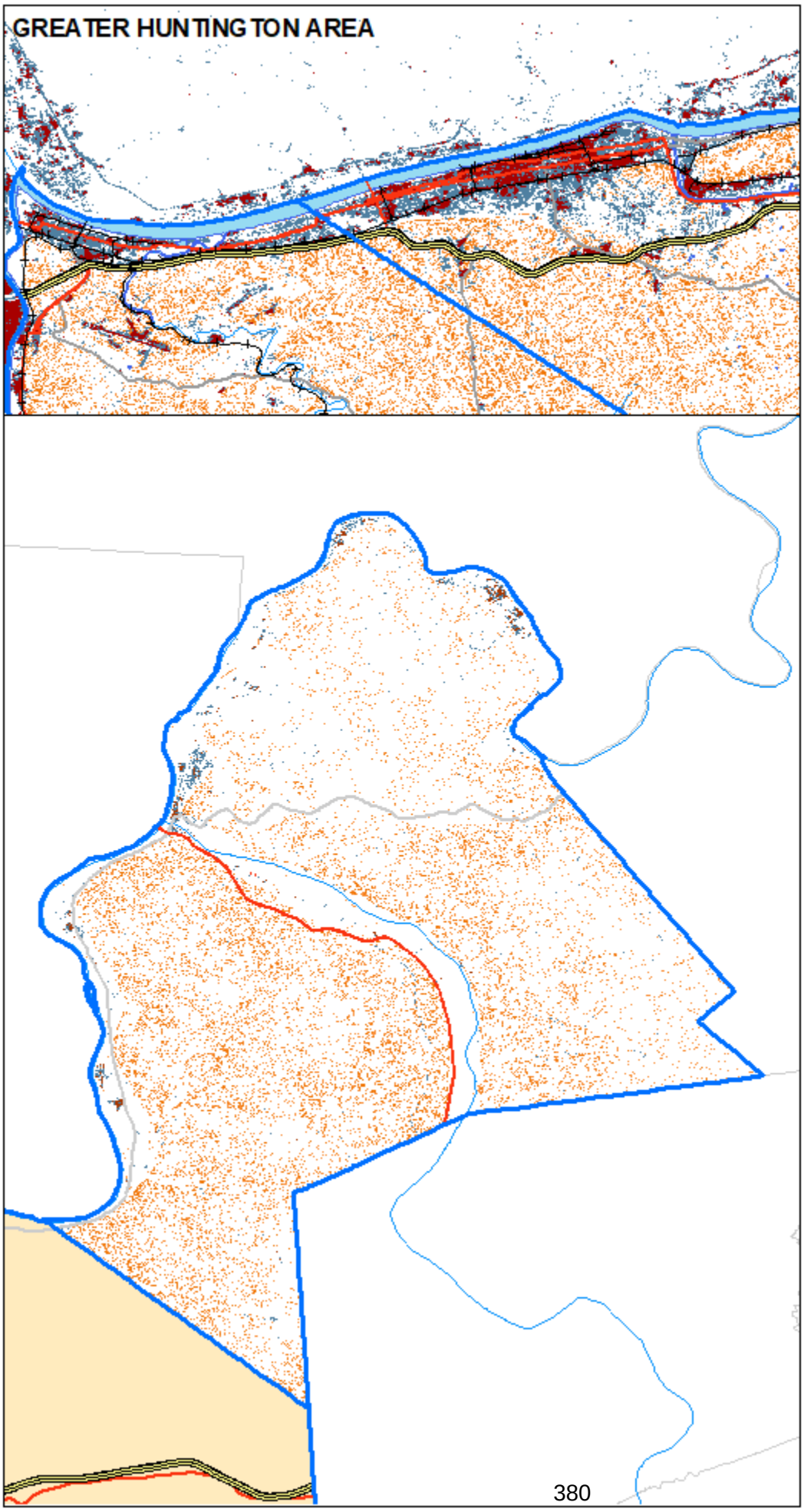
N



REGION 2 PDC HAZARD MITIGATION PLAN

Landslide Suscept. & Dev. (Mason County)

Data Source(s): USGS NLCD (2021), WVEMD TEAL

Developed, Medium Intensity

Developed, High Intensity

Landslide Susceptibility

-0.072231866 - 0.094570955

0.094570955 - 0.256865592

0.256865592 - 0.446209335

0.446209335 - 0.667110369

0.667110369 - 1.077355146

0 1.25 2.5 5 7.5 10 Miles

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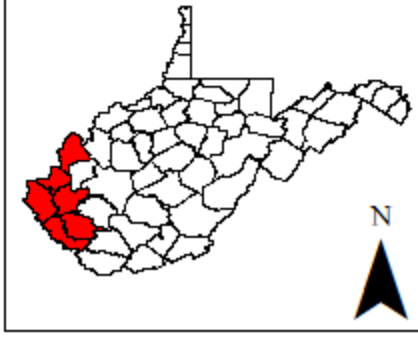

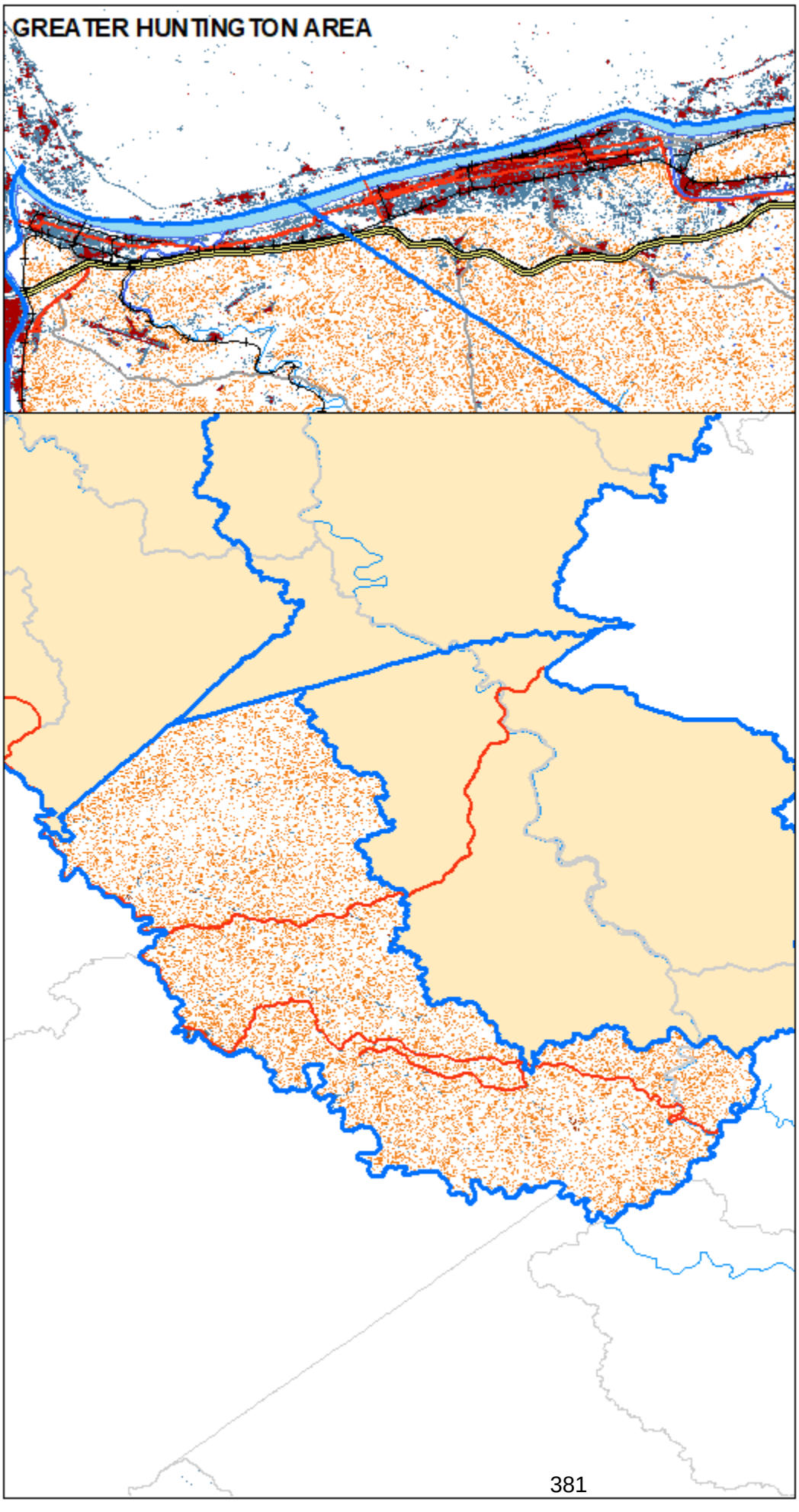

REGION 2 PDC HAZARD MITIGATION PLAN

Landslide Suscept. & Dev. (Mingo County)

Data Source(s): USGS NLCD (2021), WVEMD TEAL

Developed, Medium Intensity

Developed, High Intensity

Landslide Susceptibility

-0.072231866 - 0.094570955

0.094570955 - 0.256865592

0.256865592 - 0.446209335

0.446209335 - 0.667110369

0.667110369 - 1.077355146

0 1.753.5 7 10.5 14 Miles

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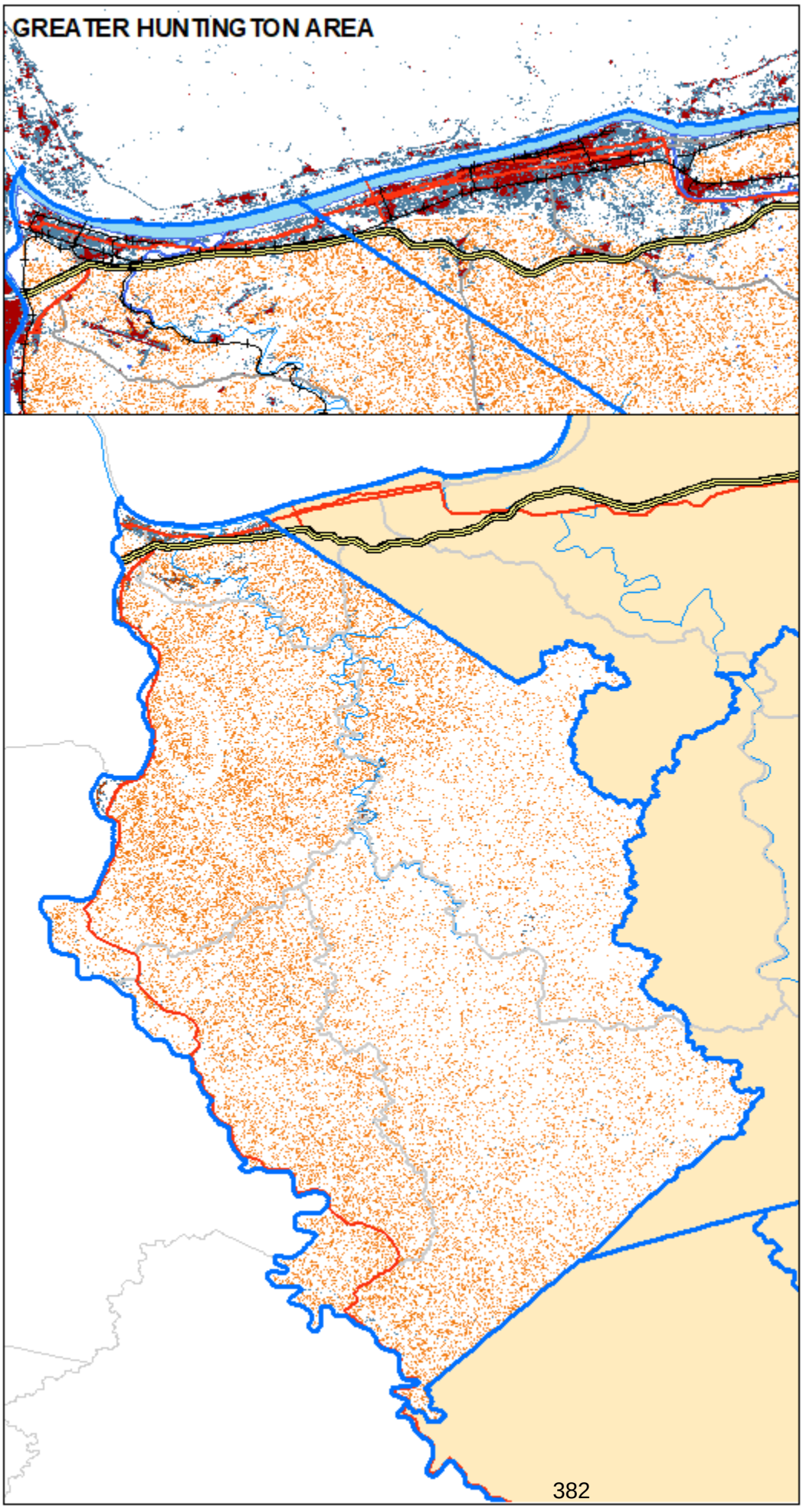
N



REGION 2 PDC HAZARD MITIGATION PLAN

Landslide Suscept. & Dev. (Wayne County)

Data Source(s): USGS NLCD (2021), WVEMD TEAL

Developed, Medium Intensity

Developed, High Intensity

Landslide Susceptibility

-0.072231866 - 0.094570955

0.094570955 - 0.256865592

0.256865592 - 0.446209335

0.446209335 - 0.667110369

0.667110369 - 1.077355146

0 1.25 2.5 5 7.5 10 Miles

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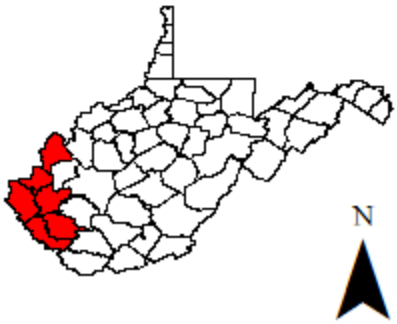
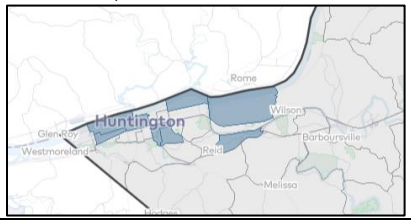
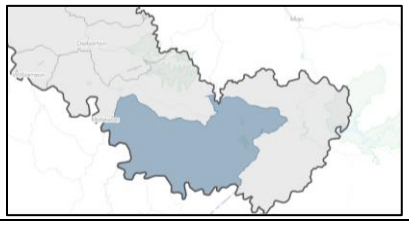


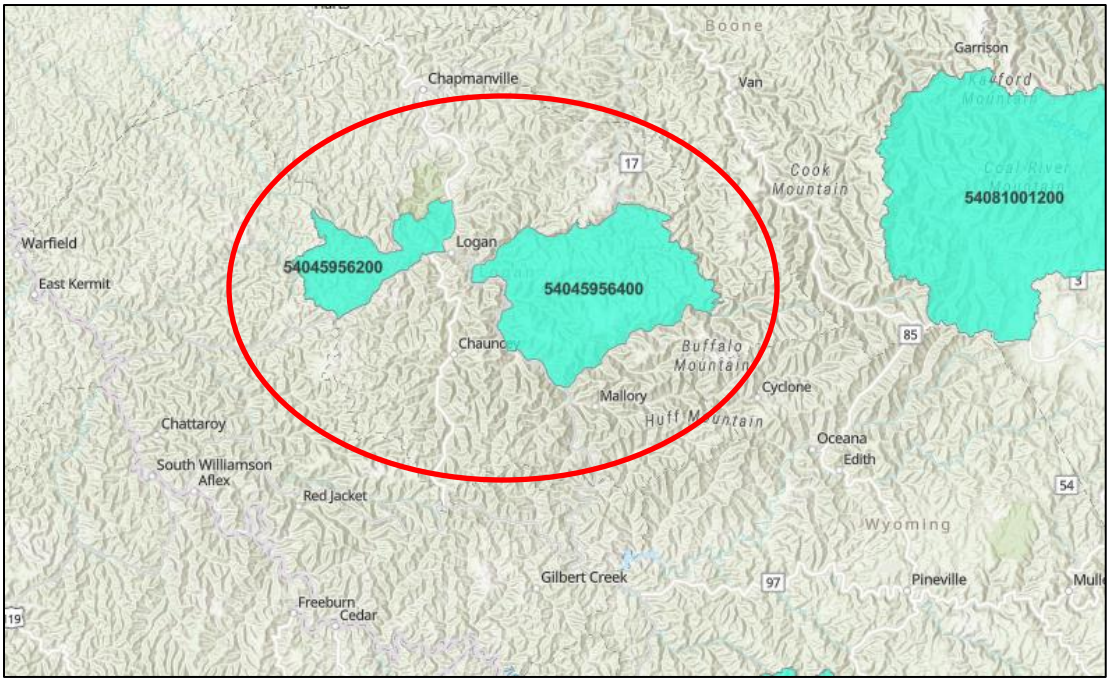
Direct, measurable consequences of disasters can include fatalities, injuries, and damages to humans, animals, or property. Disasters do not end there; there are several indirect effects, tangible and intangible, associated with them. Some examples of these include loss of livelihood and income, loss of community and population, mental and psychological impacts, costs of rebuilding, repair or replacement, loss of inventory, wages and tax revenue, etc. (Bullock, Haddow, & Coppola, 2017). All of these also have a cost associated with them. Still, it is much more challenging to assign a specific dollar value and quantify them accurately. Often, disasters exacerbate risks already in a community (Comfort et al., 1999; Raker, Arcaya, Lowe, Zacher, Rhodes, & Waters, 2020). For instance, in areas where poverty is a concern, a disaster makes the challenges faced by those living in poverty much more difficult. In areas where access to public services is a concern, disasters may highlight how segments of the population cannot access assistance. Local leaders in areas where public trust in governmental systems is low may have difficulty rallying residents to follow the community's response strategy.

Throughout the region, Census tracts with socially vulnerable populations (e.g., persons below 150% of the poverty rate, persons with no high school diploma, single-parent households, persons speaking English "less than well," households with no vehicle available, etc.) exist; all counties and most participating jurisdictions have them. Local officials should remain mindful of the challenges these populations face regarding access to information and resources as well as in participating in community initiatives. Ensuring their ability to participate in decision-making about risk reduction will be crucial to keeping the community inclusive, responsive, and resilient.

FEMA's Resilience Analysis and Planning Tool (RAPT) utilizes Community Resilience Challenges Index (CRCI) scores at the Census tract level (FEMA, 2023d). The scores provide granular data across 22 indicators. The RAPT also assigns a CRCI percentile to counties (labeled as "X out of 100"). Regarding climate change, the hazard profiles in Section 2.2 contain a narrative that identifies future climate considerations for all of the natural hazards considered by this risk assessment. Those sections are hazard-specific, but they serve as contextual extensions of the conversation. Climate change appears here as a sort of summary discussion. Further, the profiles discuss social vulnerability variables. Social vulnerability and climate change impacts often intersect. For example, as part of The Climate Explorer (NEMAC, n.d.) "Neighborhoods at Risk" project identifies Census tracts where "vulnerabilities to climate change exceed the county median." The findings for the counties in the region are as follows (reported as tracts that meet the criteria). The table below presents the region's CRCI county percentiles and the vulnerable tracts per the Neighborhoods at Risk project.

RESILIENCE SCORES PER FEMA TOOLS (FOR REFERENCE)			
	CRCI	*The Climate Explorer Neighborhoods at Risk Project*	
County	*Percentile*	*# of Tracts*	*General Location*
Cabell	74	8	Combined population of 16,346 located in and around Huntington 
Lincoln	91	1	Southwestern area of the county
Logan	97	1	Southwestern portion of the county, from just below Logan south toward and through Sarah Ann, Pine Creek, and toward Scarlet and Myrtle in Mingo County
Mason	71	1	Western portion of the county below the Kanawha River
Mingo	99	1	Ranging from Matewan to the east 
Wayne	83	4	The southern portions of the county, roughly corresponding to the areas below Wayne

Another new and highly publicized FEMA tool for assessing resilience is the Community Disaster Resilience Zone (CDRZ) concept. There are two areas in Logan County that appear on the CDRZ list because the composite National Risk Index score ranks in the top 50 nationally or in the top 1% within West Virginia. The tracts are: (a) 54045956200 and (b) 54045956400 (as shown below).



Countless instances of the hazards identified in Section 2.2 could disrupt critical infrastructure systems throughout the county. Loosely related variables, often considered *cascading hazards*, can complicate some events. For example, high winds may cause sporadic damage but usually do not become a significant countywide concern until a large number of residents are without power. In addition to weather-related power outages, cascading hazards in the region could include (but not be limited to) the following.

- Damage to infrastructure (i.e., roads, bridges, pipelines, utility poles, etc.) and residences following flooding
- Flooding of downstream or protected areas in the event of a dam or a levee failure
- Drinking water supply shortages and contamination following severe and prolonged drought conditions or floods
- Power outages, ruptured gas lines, etc. following severe weather
- Public health concerns following flooding conditions
- Permanent or temporary population displacement before, during, or after an event

2.0 RISK ASSESSMENT

2.4 Summarize Vulnerability

Section 2.2: Describe Hazards outlines a means for describing the probability and severity of the hazard effects on the region. The individual profiles in Section 2.2 calculate the probability and severity of the hazards in question. The following table summarizes that data and presents a ranked list of anticipated hazard impacts. (Note: In the event of tie scores, planners first alphabetized natural hazards and then alphabetized technological and human-caused hazards.)

SUMMARY OF RISK RANKINGS									
Hazard	*Risk Ranking*	***Total***	*Frequency*	*Response*	*Onset*	*Magnitude*	*Business*	*Human*	*Property*
Substance Use Crisis	High	**24**	5	5	4	4	1	4	1
Cyber Incidents	High	**22**	3	5	4	2	4	2	2
Severe Summer Weather	High	**21**	5	3	3	4	2	2	2
Severe Winter Weather	High	**21**	5	3	2	4	2	3	2
Landslides & Land Subsidence	Medium	**20**	5	4	4	1	3	2	1
Flood	Medium	**19**	5	3	3	1	2	3	2
Tornado	Medium	**19**	2	3	4	1	3	3	3
Epidemic & Pandemic	Medium	**18**	2	5	1	4	1	4	1
Acts of Violence	Medium	**17**	4	3	4	1	1	3	1
Wildfire	Medium	**17**	4	3	4	1	2	2	1
Hazardous Material Incidents	Medium	**16**	5	2	4	1	1	2	1
Drought	Low	**15**	2	4	1	3	2	1	2
Extreme Temperatures	Low	**15**	5	2	1	4	1	1	1
Dam Failure	Low	**14**	2	2	3	1	4	1	1
Earthquake	Low	**12**	2	2	4	1	1	1	1

The Federal Emergency Management Agency (FEMA) created the National Risk Index (NRI) in 2021 to illustrate risk in the communities of the United States from a dataset of 18 natural hazards. The tool is an interactive online map ranking risk variables such as expected annual loss, social vulnerability, and community resilience (which produce an aggregated risk score). For the hazards that appear in both this plan and the NRI, a comparison with the rankings in the preceding table can validate the findings of this risk assessment. The hazards in both the NRI and this plan are as follows.

- Cold wave (as "extreme temperatures")
- Drought
- Earthquake
- Hail (as "severe summer storms")
- Heat wave (as "extreme temperatures")
- Ice storm (as "winter storms")
- Landslide (as "land subsidence & landslides")
- Lightning (as "severe summer storms")
- Riverine flooding (as "flooding")
- Strong wind (as "severe summer storms")
- Tornado
- Wildfire
- Winter weather (as "winter storms")

The following table presents the region's six counties with their NRI scores for overall risk, expected annual loss, social vulnerability, and community resilience. Scoring is on a scale of 0 to 100. Per the NRI, lower risk is driven by lower loss, lower social vulnerability, and higher community resilience.

REGION 2 RISK INDEX SCORES BY COUNTY

County	*Risk Index*	*Expected Annual Loss*	*Social Vulnerability*	*Community Resilience*
Cabell County	40.12 (Very Low)	40.11 (Very Low)	71.30 (Relatively High)	66.60 (Relatively High)
Lincoln County	29.62 (Very Low)	30.27 (Very Low)	39 .00 (Relatively Low)	13.30 (Relatively Low)
Logan County	64.30 (Relatively Low)	57.97 (Relatively Low)	68.10 (Relatively High)	10.70 (Very Low)
Mason County	12.22 (Very Low)	13.46 (Very Low)	24.90 (Relatively Low)	37.30 (Relatively Low)
Mingo County	50.3 (Relatively Low)	43.27 (Very Low)	67.50 (Relatively High	1.20 (Very Low)
Wayne County	35.00 (Very Low)	34.14 (Very Low)	36.30 (Relatively Low)	21.40 (Relatively Low)

The following table compares the risk index scores[1] for the hazards in this plan and the NRI and ranks them from lowest to highest. The far-right column describes the variance from the overall hazard rankings table above (derived from the hazard profiles).

[1] To ensure that hazard categories aligned, for this table, planners averaged the NRI scores, first by county (to create a regional figure), and then for "cold wave" (34.95) and "heat wave" (37.11) into a composite score for "extreme temperatures" (36.03). Planners also averaged the scores for "hail" (43.84), "lightning" (38.76), and "strong wind"

NRI AND HAZARD PROFILE RANKINGS COMPARISON					
Hazard	*Risk Index (Average of Scores)*	*Absolutely NRI Ranking*	*Hazard Profile Risk Ranking*	*Absolute Hazard Profile Risk Ranking*	*Change (from Hazard Profile Absolute Ranking Placement)*
Land Subsidence	81.40	1	Medium (20)	5	↑ 4
Wildfire	77.04	2	Medium (17)	T-9	↑ 7
Flooding	73.75	3	Medium (19)	T-6	↑ 3
Severe Winter Storm	47.68	4	High (21)	T-3	↓ 1
Earthquake	46.26	5	Low (12)	15	↑ 10
Severe Summer Storm	41.43	6	High (21)	T-3	↓ 3
Extreme Temperatures	36.03	7	Low (15)	T-12	↑ 5
Tornado	21.62	8	Medium (19)	T-6	↓ 2
Drought[2]	21.11	9	Low (15)	T-12	↑ 3

When comparing these data, the first acknowledgment should be that the mitigation plan and the NRI considered different variables. For example, this document analyzed extreme cold and heat side-by-side, whereas the NRI considered them separately. The two calculations also considered variables in various combinations. Thus, comparisons are for planning purposes only. The second acknowledgment should be that the NRI includes only natural hazards, while technological and human-caused hazards appear in the profiles. As such, the absolute hazard profile risk ranking would change if the technological and human-caused hazards were removed from consideration for this analysis. When removing them, the variance from the risk index comes into clearer focus.

- Land Subsidence & Landslides: 3rd ranked natural hazard
- Wildfire: 7th ranked natural hazard by profile risk ranking
- Flooding: Tied for 4th ranked natural hazard by profile risk ranking
- Severe Winter Storms: Tied for 1st ranked natural hazard by profile risk ranking
- Earthquake: 10th ranked natural hazard by profile risk ranking
- Severe Summer Storms: Tied for 1st ranked natural hazard by profile risk ranking
- Extreme Temperatures: Tied for 8th ranked natural hazard by profile risk ranking

(41.67) into a score for "severe summer weather" (41.25) as well as the scores for "ice storm" (45.24) and "winter weather" (50.12) into a "winter storms" category (47.68).
[2] Logan County listed as "No Rating" with a score of zero.

- Tornado: Tied for 4th ranked natural hazard by profile risk ranking
- Drought: Tied for 8th ranked natural hazard by profile risk ranking.

The differences become “up two” for land subsidence, “up five” for wildfire, “up one” for flooding, “down three” for severe winter storms, “up five” for earthquake, “up one” for extreme temperatures, “down four” for tornado, and “down one” for drought.

The differences between extreme temperatures, wildfire, and tornado were sizable. For earthquakes, committee members likely leaned on their lived experience with the hazard, which was minimal. The NRI does not account for perception, and as such, pure data (e.g., exposures and potential losses) may paint a different picture devoid of context. The difference in wildfire may again be based on committee members’ perception. Committee members from more urban areas such as Huntington do not see the effects of this hazard directly in their community. Tornadoes received a higher ranking in the hazard profile risk ranking due to committee members focusing on their destructive nature. Though they are site-specific hazards, they are highly destructive to anything in their path.

3.0 MITIGATION STRATEGY

§ 201.6(c)(3)	A mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.

According to FEMA, “The heart of the mitigation plan is the mitigation strategy” (2023c, p. 93). This section contains the three required elements of the mitigation strategy for Region 2: goals, actions, and the action plan. It describes the updated goals and objectives for this mitigation plan, it outlines the action items (or projects) for each participating jurisdiction within the Region 2 area, and each project identifies the agency responsible for completing the project as well as a general timeline for completion.

3.0 MITIGATION STRATEGY

3.1 Mitigation Goals & Objectives

Region 2's previous hazard mitigation plan included one broad goal targeting resilience along with five objectives to guide action toward that goal. During the steering committee's first meeting, attendees discussed the goal and objectives at length, with most of the discussion spent revising the objectives. Committee members felt there was a significant overlap in the objectives. As such, they reduced the number of objectives from five to four through consolidation, refining definitions and intents, etc. See Appendix 1 for meeting minutes that outlines the details of the discussion.

The steering committee agreed that a single goal targeting community resilience remains a good fit for the region, and it is easily communicated to participating counties and municipalities. Additionally, "resilience" comes about through risk reduction and preparedness for remaining risks. It is an overarching concept that can tie mitigation planning to other regional preparedness efforts. Thus, the mitigation goal guiding the action plan is as follows.

GOAL: Maximize resilience by lessening the loss of life and property from the impacts of all hazards in Cabell, Lincoln, Logan, Mason, Mingo, and Wayne Counties and the jurisdictions therein.

This plan includes four objectives to enable participating communities to progress toward the mitigation goal. The first objective addresses the small staffs and resource constraints experienced by many communities in the region. For many communities, developing and adopting ordinances is straightforward and relatively simple; yet, enforcing the rules (which is the step where regulations contribute to risk reduction) is beyond the capabilities of available staffing because those code enforcement officials wear multiple hats. Thus, the first objective is as follows.

O1: Increase the number of resources available for creating and enforcing codes, rules, regulations, ordinances, and programs for reducing hazard risk.

The second objective also looks at the implementation aspect of standard programs supporting mitigation. Many communities realize the benefit of undertaking mitigation projects. Region 2's communities know that investments in resilience and risk reduction now save money in the future. However, many programs require matching dollars or services from sponsor

agencies, and it is crucial to be aware of these requirements before exploring programmatic support. Doing so sets projects up for success as local officials can simultaneously explore their options for meeting the match while developing the project. As such, the second objective is as follows.

O2: Educate and train 25% of the local officials and 10% of the public in the region on the present hazard risks and measures they can take to reduce risks from those hazards (as measured by the number of individuals or households outreach initiatives reach).

The third objective realizes the gains made in risk reduction in recent years, thanks to the tireless efforts of several regional stakeholders. It would be a disservice to those stakeholders not to recognize and sustain what works in encouraging communities to mitigate known hazard vulnerabilities. The third objective is, thus, as follows.

O3: Sustain 100% of the existing, ongoing preparedness activities, partnerships, and programs supporting mitigation, response, and recovery in the region.

Finally, the fourth objective appears here to ensure eligibility for high-hazard potential dam (HHPD) program funding. Rehabilitating deficient and high-hazard dams is a growing need throughout the region.

O4: Decrease the number of deficient high-hazard potential dams in the region.

These objectives are consistent with, and in many ways, related to one another. For instance, as participating communities build out the resource support necessary to enforce risk reduction ordinances, it becomes easier to sustain 100% of the existing ordinances. Similarly, as communities undertake mitigation projects, the burden on the enforcement of codes lessens, thereby making it easier to identify suitable quantities of resources for said enforcement. With this in mind, these four objectives contribute to regional resilience and complement efforts to prepare for the response to emergencies. The steering committee also believes the objectives are broad, giving participating communities an organizing framework to think about a wide range of specific projects.

3.0 MITIGATION STRATEGY

3.2 Mitigation Actions

§ 201.6(c)(3)	A mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.
§ 201.6(c)(3)(ii)	[The mitigation strategy shall include] a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.
§ 201.6(c)(3)(iii)	[The mitigation strategy shall include] an action plan describing how the actions identified in paragraph (c)(3)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost-benefit review of the proposed projects and their associated costs.

This section serves as a mitigation action plan to reduce the losses and other impacts the region may suffer from the hazards included in Section 2.0. “A mitigation action is a measure, project, plan or activity proposed to reduce or eliminate current and future vulnerabilities described in the risk assessment” (FEMA, 2023c, p. 96).

Types of Mitigation Actions

Four primary types of mitigation actions can reduce long-term vulnerability: local plans and regulations, structure and infrastructure projects, natural systems protection, and education and outreach activities (FEMA, 2023c, pp. 97-99).

- Local Plans and Regulations: Actions that include government authorities, policies, or codes that influence the way land and buildings are developed and built. Examples include the following.
  - Comprehensive plans
  - Land use ordinances
  - Subdivision regulations
  - Development review
  - Building codes and enforcement

  - National Flood Insurance Program (NFIP) and the Community Rating System (CRS)
  - Capital improvement programs
  - Open space preservation
  - Stormwater management regulations and master plans

- Structure and Infrastructure Projects: These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. These projects could apply to public or private structures as well as critical facilities and infrastructure. Examples include the following.
  - Acquisitions and elevations of structures in flood-prone areas
  - Utility undergrounding
  - Structural retrofits
  - Floodwalls and retaining walls
  - Detention and retention structures
  - Culverts
  - Safe rooms

- Natural Systems Protection and Nature-Based Solutions: These actions can include green infrastructure and low impact development, nature-based solutions, engineering with nature, and bioengineering to incorporate natural features or processes into the built environment. Examples include the following.
  - Sediment and erosion control
  - Stream corridor restoration
  - Forest management
  - Conservation easements
  - Wetland restoration and preservation
  - Land conservation
  - Greenways
  - Rain gardens
  - Living shorelines

- Education and Outreach Activities: These actions keep residents informed about potential natural (or human-caused) disasters. Many of these types of actions are eligible for

funding through FEMA hazard mitigation assistance programs. Examples include the following.

- Radio, or television spots
- Social media outreach
- Websites with maps and information
- Real estate disclosure
- Presentations to school groups or neighborhood organizations
- Mailings to residents in hazard-prone areas.
- Targeted outreach to under-served communities and socially vulnerable populations
- Outreach materials in languages other than English

These mitigation techniques have pros and cons, and some work better for specific hazards than others. The following table suggests project types for each of the hazards included in Section 2.0 above.

MITIGATION ACTION TYPES SUITABLE FOR PROFILED HAZARDS				
Hazard	*Local Plans & Regulations*	*Structure & Infrastructure Projects*	*Natural Systems Protection / Nature-Based Solutions*	*Education & Outreach Activities*
Acts of Violence				X
Cyber Incidents				X
Dam & Levee Failure	X	X		X
Drought	X	X	X	X
Earthquake	X			X
Epidemic/Pandemic	X			X
Extreme Temperatures			X	X
Flood	X	X	X	X
Hazardous Materials Incident	X	X		X
Landslide & Land Subsidence	X	X	X	X
Substance Use Crisis	X			X
Severe Summer Weather	X	X	X	X
Severe Winter Weather	X	X		X
Tornado	X	X		X
Wildfire	X		X	X

Project Prioritization

Prioritizing projects helps to define the types of action that local leaders should pursue first. There is a recognition, however, that communities may implement projects out of a prioritized order based on the availability of funding. Steering committee members largely elected to keep the project prioritization methodology the same in 2023/2024 as was used in 2018. The primary difference is the addition of a bonus category to provide extra points to those projects mitigating repetitive loss properties.

Scoring for each of the following categories was a one-to-five scale, where a "5" represented a better score. The RL category provided an opportunity for a project to receive five bonus points after all other categories had been tallied. Higher summed scores resulted in higher priorities.

- Ease of Implementation: Do local policies and capabilities currently allow for the implementation of the project? Are programs available to assist in funding the implementation of the project?
- Cost Effectiveness: Is sufficient funding available to implement the project at a cost manageable by the local government? If not, is funding available? Will the costs of implementing the project be significantly less than the cumulative future costs potentially incurred by an un-corrected situation?
- Social Impacts: Will the public perceive the project as positively lessening hazard-related losses? Will implementing the project adversely affect any segment of the population?
- Political Impacts: Will implementing the project create negative political issues?
- Economic Impacts: Is the cost/benefit ratio of implementing the project acceptable? Will implementing the project adversely affect the local economy?
- Overall Positive Impact: Do local leaders generally agree that implementing the project will be beneficial to the community?

Project → / ↓ Criteria	P1	P2	P3	P4	P5
Ease of Implementation	5	2	3	4	2
Cost Effectiveness	1	3	3	2	4
Social Impact	3	2	2	5	2
Political Impact	5	4	3	3	1
Economic Impact	1	3	5	4	2
Overall Positive Impact	3	5	2	3	3
TOTAL	**18**	**19**	**18**	**21**	**14**
RL Bonus	5	5	0	0	0
REVISED TOTAL	**23**	**24**	**18**	**21**	**14**
PRIORITY	**2**	**1**	**4**	**3**	**5**

The steering committee allowed for tie prioritization scores. In the event of a tie, projects appear in the lists below with the same priority. However, the next project per the scoring does not receive a consecutive priority designation;

planners assigned a priority number by skipping a number equal to the number of projects with the tied score. The table above serves as an example.

Updated Jurisdictional Project Lists

The following tables list the active hazard mitigation projects for the Region 2 PDC and the participating jurisdictions. There is a unique table for each participating jurisdiction. In addition to the action itself, the tables identify, to the extent possible, the following information.

- Project Number: An identifier to enable quick referencing; planners re-numbered projects for the 2023/2024 update
- Action Type: The associated mitigation technique category (i.e., local plans and regulations, structure and infrastructure projects, natural systems protection/nature-based solutions, education and outreach projects)
- Implementation Schedule: An approximate timeframe for completion, if known
- Estimated Cost: An informal cost estimate or credible source from which to develop a cost estimate
- Potential Funding Source(s): The program(s) or agencies/entities that could fund the action
- Lead Agency or Department: The coordinating agency (along with, in some cases, support agencies)
- Hazard(s) Addressed: Hazards whose risks may be mitigated by the action
- Objective Alignment: An identification of the objectives (from Section 3.1) that the action supports
- Priority: The prioritization calculation for the action, based on the methodology noted above
- Status: As applicable, the status of the action (particularly if it appeared in the previous version of the plan)

Participating jurisdictions focused attention on the projects that appeared in the previous version of the plan; however, all of them considered a comprehensive range of mitigation actions relative to the hazards they may face. It is particularly noteworthy that while all participating jurisdictions did their best to consider a “comprehensive range of actions,” several jurisdictions in Region 2 have minimal capability to undertake extensive hazard mitigation. (See Section 1.3.) The PDC is a resource to all 30 member governments in the region, and regarding emergency management, the six county emergency management agencies are resources to the

municipalities in their counties. To ensure a comprehensive, yet practical range of actions is in place for the jurisdictions, these multi-jurisdictional resources often coordinate actions that apply to other participating jurisdictions. The following table is a snapshot that confirms all participants have at least mitigation action for hazards impacting their jurisdictions.

The participating jurisdictions completed several mitigation actions. In other instances, participating jurisdictions deferred or deleted projects that had been in the plan for many years (but had not gained traction). Lists of these projects along with statements as to why/how they were completed, deferred, or deleted appear in Appendix 3: Inactive Projects.

HAZARDS ADDRESSED BY JURISDICTIONAL PROJECTS															
Jurisdiction	*Acts of Violence*	*Cyber Incidents*	*Dam & Levee Failure*	*Drought*	*Earthquake*	*Epidemic/ Pandemic*	*Extreme Temperatures*	*Flood*	*Hazmat Incidents*	*Landslide & Land Subsidence*	*Substance Use Crisis*	*Severe Summer Weather*	*Severe Winter Weather*	*Tornado*	*Wildfire*
Cabell County	R2-4	CAB-6	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7, CAB-4a, CAB-4b, CAB-5	R2-2a, R2-2b, R2-4, CAB-5	R2-2a, R2-2b, R2-4, CAB-5	R2-4	R2-1, R2-4, CAB-5	R2-2a, R2-2b, R2-3, R2-4, R2-7, CAB-1, CAB-2, CAB-5	R2-2a, R2-2b, R2-4 CAB-5	R2-2a, R2-2b, R2-3, R2-4, R2-7, CAB-5, CAB-7a, CAB-7b	R2-4, CAB-3a, CAB-3b	R2-1, R2-2a, R2-2b, R2-4, R2-7, CAB-5	R2-1, R2-2a, R2-2b, R2-4, CAB-5	R2-1, R2-2a, R2-2b, R2-4, R2-7, CAB-5	R2-2a, R2-2b, R2-4, R2-7, CAB-5
Barboursville	R2-4	CAB-6	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, BAR-1, BAR-3	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, BAR-2	R2-4, CAB-3a	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7
Huntington	R2-4	CAB-6	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7, HUN-2a, HUN-2b, HUN-2c, HUN-2d, HUN-3	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, HUN-1, HUN-4, HUN-5, HUN-7	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, HUN-6a, HUN-6b	R2-4, CAB-3a	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7
Huntington Sanitary Board								HSB-1, HSB-2							
Considered a "special district" (FEMA, 2023c, p. 10); as a component of Huntington's government, all projects indirectly apply to the sanitary board. As such, this denotation identifies mitigation actions specific to the sanitary board (i.e., that the board would coordinate).															
Milton	R2-4	CAB-6	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, MIL-1, MIL-2, MIL-3	R2-2a, R2-2b, R2-4, MIL-2	R2-2a, R2-2b, R2-3, R2-4, R2-7, MIL-2, MIL-4	R2-4, CAB-3a	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7
Lincoln County	R2-4		R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7, LIN-1	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, LIN-1, LIN-3, LIN-4, LIN-5	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, LIN-6	R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7
Hamlin	R2-4		R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, HAM-1, HAM-2, HAM-3	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7	R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7

HAZARDS ADDRESSED BY JURISDICTIONAL PROJECTS															
Jurisdiction	*Acts of Violence*	*Cyber Incidents*	*Dam & Levee Failure*	*Drought*	*Earthquake*	*Epidemic/ Pandemic*	*Extreme Temperatures*	*Flood*	*Hazmat Incidents*	*Landslide & Land Subsidence*	*Substance Use Crisis*	*Severe Summer Weather*	*Severe Winter Weather*	*Tornado*	*Wildfire*
West Hamlin	R2-4		R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, WH-1, WH-2	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, WH-3	R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7
Logan County	R2-4	LC-6	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7, LC-2, LC-4, LC-5	R2-2a, R2-2b, R2-4, LC-5	R2-2a, R2-2b, R2-4, LC-5	R2-4	R2-1, R2-4, LC-5	R2-2a, R2-2b, R2-3, R2-4, R2-7, LC-1, LC-2, LC-5	R2-2a, R2-2b, R2-4, LC-5	R2-2a, R2-2b, R2-3, R2-4, R2-7, LC-2, LC-5, LC-7a, LC-7b	R2-4, LC-3	R2-1, R2-2a, R2-2b, R2-4, R2-7, LC-5	R2-1, R2-2a, R2-2b, R2-4, LC-5	R2-1, R2-2a, R2-2b, R2-4, R2-7, LC-5	R2-2a, R2-2b, R2-4, R2-7, LC-5
Chapmanville	R2-4	LC-6	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, CHA-1, CHA-2	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, CHA-3	R2-4, LC-3	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7
Logan	R2-4	LC-6	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7, LOG-1	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, LOG-2, LOG-3	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, LOG-4a, LOG-4b	R2-4, LC-3	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7
Logan Sanitary Board								LSB-1							
Considered a "special district" (FEMA, 2023c, p. 10); as a component of Logan's government, all projects indirectly apply to the sanitary board. As such, this denotation identifies mitigation actions specific to the sanitary board (i.e., that the board would coordinate).															
Man	R2-4	LC-6	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7, MAN-1	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, MAN-2, MAN-3, MAN-4	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7	R2-4, LC-3	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7
Man Sanitary Board								MSB-1							
Considered a "special district" (FEMA, 2023c, p. 10); as a component of Man's government, all projects indirectly apply to the sanitary board. As such, this denotation identifies mitigation actions specific to the sanitary board (i.e., that the board would coordinate).															
Mitchell Heights	R2-4	LC-6	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, MH-1, MH-2, MH-3	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, MH-4	R2-4, LC-3	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7

HAZARDS ADDRESSED BY JURISDICTIONAL PROJECTS															
Jurisdiction	*Acts of Violence*	*Cyber Incidents*	*Dam & Levee Failure*	*Drought*	*Earthquake*	*Epidemic/ Pandemic*	*Extreme Temperatures*	*Flood*	*Hazmat Incidents*	*Landslide & Land Subsidence*	*Substance Use Crisis*	*Severe Summer Weather*	*Severe Winter Weather*	*Tornado*	*Wildfire*
West Logan	R2-4	LC-6	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7, WL-1	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, WL-2, WL-3, WL-4	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, WL-5	R2-4, LC-3	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7
Mason County	R2-4, MC-3	MC-9	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7, MC-1, MC-2, MC-3, MC-7a, MC-7b, MC-8	R2-2a, R2-2b, R2-4, MC-8	R2-2a, R2-2b, R2-4, MC-3, MC-8	R2-4	R2-1, R2-4, MC-3, MC-8	R2-2a, R2-2b, R2-3, R2-4, R2-7, MC-2, MC-3, MC-4, MC-5, MC-8	R2-2a, R2-2b, R2-4, MC-3, MC-6, MC-8	R2-2a, R2-2b, R2-3, R2-4, R2-7, MC-8, MC-10a, MC-10b	R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7, MC-2, MC-3, MC-8	R2-1, R2-2a, R2-2b, R2-4, MC-2, MC-3, MC-9	R2-1, R2-2a, R2-2b, R2-4, R2-7, MC-2, MC-3, MC-8	R2-2a, R2-2b, R2-4, R2-7, MC-3, MC-8
Hartford	R2-4	MC-9	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, HAR-1, HAR-3	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, HAR-2	R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7
Leon	R2-4	MC-9	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, LEO-1, LEO-3	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, LEO-2	R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7
Mason	R2-4	MC-9	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, MAS-1, MAS-2, MAS-3	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7	R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7
New Haven	R2-4	MC-9	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, NH-1, NH-3	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, NH-2	R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7
Point Pleasant	R2-4	MC-9	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, PP-1, PP-2, PP-3	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, PP-4	R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7
Mingo County	R2-4, MIN-5	MIN-9	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7, MIN-8a, MIN-8b	R2-2a, R2-2b, R2-4, MIN-3	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, MIN-1, MIN-2, MIN-6	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, MIN-2, MIN-10a, MIN-10b	R2-4, MIN-7	R2-1, R2-2a, R2-2b, R2-4, R2-7, MIN-4	R2-1, R2-2a, R2-2b, R2-4, MIN-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7

HAZARDS ADDRESSED BY JURISDICTIONAL PROJECTS															
Jurisdiction	*Acts of Violence*	*Cyber Incidents*	*Dam & Levee Failure*	*Drought*	*Earthquake*	*Epidemic/ Pandemic*	*Extreme Temperatures*	*Flood*	*Hazmat Incidents*	*Landslide & Land Subsidence*	*Substance Use Crisis*	*Severe Summer Weather*	*Severe Winter Weather*	*Tornado*	*Wildfire*
Delbarton	R2-4	MIN-9	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, DEL-1, DEL-2, DEL-3	R2-2a, R2-2b, R2-4, DEL-2	R2-2a, R2-2b, R2-3, R2-4, R2-7, DEL-2, DEL-4	R2-4, MIN-7	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7
Gilbert	R2-4	MIN-9	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, GIL-1, GIL-2, GIL-3	R2-2a, R2-2b, R2-4, GIL-2	R2-2a, R2-2b, R2-3, R2-4, R2-7, GIL-2, GIL-4	R2-4, MIN-7	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7
Kermit	R2-4	MIN-9	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, KER-1, KER-2	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, KER-3	R2-4, MIN-7	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7
Matewan	R2-4	MIN-9	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, MAT-1, MAT-2, MAT-3	R2-2a, R2-2b, R2-4, MAT-2	R2-2a, R2-2b, R2-3, R2-4, R2-7, MAT-2	R2-4, MIN-7	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7
Williamson	R2-4	MIN-9	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, WIL-2, WIL-3	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, WIL-1, WIL-4a, WIL-4b	R2-4, MIN-7	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7
Wayne County	R2-4	WC-8	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7, WC-2, WC-3, WC-4a, WC-4b	R2-2a, R2-2b, R2-4, WC-1	R2-2a, R2-2b, R2-4, WC-2, WC-3	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, WC-2, WC-3, WC-5, WC-6	R2-2a, R2-2b, R2-4, WC-2, WC-3	R2-2a, R2-2b, R2-3, R2-4, R2-7, WC-9a, WC-9b	R2-4, WC-7	R2-1, R2-2a, R2-2b, R2-4, R2-7, WC-2, WC-3	R2-1, R2-2a, R2-2b, R2-4, WC-2, WC-3	R2-1, R2-2a, R2-2b, R2-4, R2-7, WC-2, WC-3	R2-2a, R2-2b, R2-4, R2-7, WC-2, WC-3
Ceredo	R2-4	WC-8	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, CER-1, CER-2, CER-3	R2-2a, R2-2b, R2-4, CER-2	R2-2a, R2-2b, R2-3, R2-4, R2-7, CER-2 CER-4	R2-4, WC-7	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7
Fort Gay	R2-4	WC-8	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, FG-1, FG-2	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, FG-3	R2-4, WC-7	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7

HAZARDS ADDRESSED BY JURISDICTIONAL PROJECTS															
Jurisdiction	*Acts of Violence*	*Cyber Incidents*	*Dam & Levee Failure*	*Drought*	*Earthquake*	*Epidemic/ Pandemic*	*Extreme Temperatures*	*Flood*	*Hazmat Incidents*	*Landslide & Land Subsidence*	*Substance Use Crisis*	*Severe Summer Weather*	*Severe Winter Weather*	*Tornado*	*Wildfire*
Kenova	R2-4	WC-8	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, KEN-1, KEN-2, KEN-3	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7	R2-4, WC-7	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7
Wayne	R2-4	WC-8	R2-2a, R2-2b, R2-4, R2-5, R2-6, R2-7	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-4	R2-4	R2-1, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, WAY-1, WAY-2	R2-2a, R2-2b, R2-4	R2-2a, R2-2b, R2-3, R2-4, R2-7, WAY-3	R2-4, WC-7	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-1, R2-2a, R2-2b, R2-4	R2-1, R2-2a, R2-2b, R2-4, R2-7	R2-2a, R2-2b, R2-4, R2-7

The 2024 update marked the first time this plan had been reviewed following the U.S. Department of Homeland Security/FEMA's release of the "community lifelines" (FEMA, 2023a) as a tool for framing preparedness and response. The eight community lifelines are as follows.

- Safety & Security: This lifeline covers responder and survivor safety, continuity of government, and community safety (including basic services, firefighting, and law enforcement).
- Food, Hydration, Shelter: This lifeline covers not only traditional feeding and hydration services, which are routinely paired with sheltering, but it also includes agricultural infrastructure.
- Health & Medical: This lifeline covers all aspects of medical services required during an incident, including survivor care, fatality management, public health, and the medical chain.
- Energy: This lifeline is focused on electricity and fuel as well as natural gas, which can be essential to a response operation.
- Communications: This lifeline covers all types of communications necessary to effectively respond to various incidents to help survivors, in addition to banking and electronic payment needs.
- Transportation: This lifeline covers all forms of transportation of people and resources to and from incidents.
- Hazardous Material: This lifeline covers the management (including containment and removal) of all hazardous materials.
- Water Systems: This lifeline focuses on potable water infrastructure and wastewater management.

Though not *mitigation* in the strictest sense, considering how an action supports resilience for community lifelines is helpful to link this plan with other preparedness efforts. The following tables identify the community lifeline with which each action best aligns.

The 2024 update also marked the first update completed with Total Exposure in Floodplain (TEIF) and Total Exposure Area Landslide (TEAL) data available from the West Virginia GIS Technical Center. This data enabled participating jurisdictions with special flood hazard areas to generate "problem statements" to link the projects in this section with the risks identified in Section 2.0 (FEMA, 2023c, pp. 101-104). The Region 2 PDC also generated problem statements to contextualize each of its mitigation actions. Finally, several participating jurisdictions also used problem statements to contextualize projects.

Region 2 Planning & Development Council

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
R2-1	Problem Statement: Severe summer weather and severe winter weather were the two high-ranked natural hazards in the risk assessment. Support counties and municipalities in becoming Storm Ready through the National Weather Service (NWS).	Local Plans & Regulations	5 years	Storm Ready participation builds on existing efforts; necessary funding should be minimal	Local funding	Region 2 PDC	Safety & Security
	Hazard(s) Addressed: Extreme Temperatures, Severe Summer Weather, Severe Winter Weather, Tornado Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action appeared in the 2018 plan, but the PDC did not have the opportunity to pursue it. Given the high rank of weather hazards, the PDC decided to re-list it.						
R2-2a	Problem Statement: The jurisdictional asset lists in this plan do not list a baseline of the region's critical infrastructure. Support jurisdictional efforts to identify critical infrastructure; update the asset list accordingly.	Local Plans & Regulations	5 years	This effort could be addressed during annual HMP updates	Local funding	Region 2 PDC	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure, Drought, Earthquake, Flood, Hazardous Materials Incidents, Landslides & Land Subsidence, Severe Summer Weather, Severe Winter Weather, Tornado, Wildfire Objective Alignment: 3 Priority: 3 Status: NEW. The PDC added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
R2-2b	Problem Statement: The jurisdictional asset lists in this plan do not list a baseline of the region's critical infrastructure. Support funding requests for auxiliary power at community assets.	Structure & Infrastructure Projects	5 years	TBD – Providing support requires little to no additional funding	BRIC, HMGP, Local funding	Region 2 PDC	Energy
	Hazard(s) Addressed: Dam & Levee Failure, Drought, Earthquake, Flood, Hazardous Materials Incidents, Landslides & Land Subsidence, Severe Summer Weather, Severe Winter Weather, Tornado, Wildfire Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action remains important, though funding opportunities were not available during the 2018-2024 planning cycle to complete it.						
R2-3	Problem Statement: West Virginia made TEIF and TEAL data available to planning and development councils in 2021. The dataset is extensive, and local communities (who lack GIS capabilities) are not aware of all that is available. Coordinate with the West Virginia GIS Technical Center to learn about the datasets, and then compile jurisdiction-specific reports for member governments.	Local Plans & Regulations	3 years	The data is available to PDCs at no charge and PDC staff support member governments as part of their regular roles	Local funding	Region 2 PDC	Safety & Security
	Hazard(s) Addressed: Flood, Landslide & Land Subsidence Objective Alignment: 2 Priority: 7 Status: ON-GOING. The 2018 version of the plan included an action to educate and train jurisdictional leaders about opportunities for integrating mitigation into other planning efforts. The PDC revised that project (i.e., Regional 5) into this project because the TEIF and TEAL data felt like a more actionable way to accomplish that goal.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
R2-4	Problem Statement: All participating jurisdictions are home to socially-vulnerable populations who may be impacted by hazards in different ways or have varying capabilities to recover from hazard occurrences. Compile jurisdiction-specific reports of social vulnerability data and provide them to member governments.	Local Plans & Regulations	3 years	The data is available to PDCs at no charge and PDC staff support member governments as part of their regular roles	Local funding	Region 2 PDC	Safety & Security
	Hazard(s) Addressed: Acts of Violence, Dam & Levee Failure, Drought, Earthquake, Epidemic/Pandemic, Extreme Temperatures, Flood, Hazardous Materials Incidents, Landslides & Land Subsidence, Substance Use Crisis, Severe Summer Weather, Severe Winter Weather, Tornado, Wildfire Objective Alignment: 2 Priority: 6 Status: NEW. The PDC added this action as part of the 2024 update.						
R2-5	Problem Statement: There is conflicting data surrounding the dams that are in the region (per the NID) and the WVDEP indicates that it is in the process of compiling a statewide deficient dams list. Coordinate with the USACE and the WVDEP to compile an accurate list of dams in the region.	Local Plans & Regulations	5 years	Coordination should require little to no additional funding	Local funding	Region 2 PDC	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure Objective Alignment: 4 Priority: 4 Status: NEW. The PDC added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
R2-6	Problem Statement: There are deficient dams in the region and the HHPD program is, to date, an under-used resource for the state and region. Coordinate with member governments and the WVDEP to support HHPD funding requests for deficient dams.	Structure & Infrastructure Projects	5 years	This type of funding application and administration support mirrors the PDC's regular services	Local funding	Region 2 PDC	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure Objective Alignment: 4 Priority: 4 Status: NEW. The PDC added this action as part of the 2024 update.						
R2-7	Problem Statement: Code enforcement staffs for most of the municipalities in the region are small and under-resourced. Serve as a conduit for discussions (per the steering committee) about how to generate a regional support network/MOU for code enforcement.	Local Plans & Regulations	5 years	Serving as a vehicle for the discussion should require little to no additional funding	Local funding	Region 2 PDC	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure, Flood, Landslides & Land Subsidence, Severe Summer Weather, Tornado, Wildfire Objective Alignment: 1 Priority: 8 Status: NEW. The PDC added this action as part of the 2024 update.						

Cabell County

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
CAB-1	Problem Statement: Cabell County has 1,930 structures in high-risk effective and advisory floodplains (per TEIF data), 55 of which could have damage exceeding 50%.[1] Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$144,200 per structure (median value of owner-occupied housing units, Cabell County)	BRIC, FMA, HMGP	Cabell County FP Coordinator Support: Cabell County OES	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 2 Status: ON-GOING. This action appeared in the 2018 plan, though as several individual projects. Thus, it is a consolidation of the following actions: Cabell County 3, Cabell County 12, and Cabell County 17. Local officials will continue to consider these efforts as funding is available.						
CAB-2	Continue to enforce and update, as appropriate, the county's floodplain ordinance.	Local Plans & Regulations	On-going	NFIP administration is already in the county's budget	Local funding	Cabell County FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 4 Status: ON-GOING. This action is an on-going (and effective) effort; therefore, it remains in the plan. It is a consolidation of the following actions from the 2018 plan: Cabell County 5 and Cabell County 6.						

[1] Planners used 50% because it is the threshold for substantial damage (SubD) in the NFIP. If no structures had an estimate of 50% or greater, planners either (a) used a percentage dictated by the jurisdiction or (b) selected the highest figure(s).

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
CAB-3a	Problem Statement: Cabell County averaged 147.5 drug-related deaths per year between 2018 and 2023. Endeavor to open more drug rehabilitation centers to address the on-going substance use crisis.	Education & Outreach Activities	5 years	Up to $5,000,000 for an in-patient facility; up to $30,000 per 30-day treatment program	N/A	CHHD Support: Hospitals, clinics, social services programs	Health & Medical
	Hazard(s) Addressed: Substance Use Crisis Objective Alignment: 3 Priority: 9 Status: ON-GOING. This action remains in the plan as the community continues to address the issue. It appeared as action "Cabell County 1" in the 2018 plan.						
CAB-3b	Problem Statement: Cabell County averaged 147.5 drug-related deaths per year between 2018 and 2023. Continue to coordinate with public health, medical, and social services entities to support efforts to address substance abuse issues.	Education & Outreach Activities	On-going	Coordination should require little to no additional funding	Local funding	CHHD	Health & Medical
	Hazard(s) Addressed: Substance Use Crisis Objective Alignment: 3 Priority: 2 Status: NEW. Cabell County added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
CAB-4a	Problem Statement: There are deficient, high-hazard potential dams in the county. Coordinate with WVDEP Dam Safety to identify dams classified (by WVDEP) as "deficient," and work, as appropriate, with dam owners and other stakeholders to correct the deficiency.	Local Plans & Regulations	5 years	Coordination should require little to no additional funding	Local funding	Cabell County OES	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure Objective Alignment: 4 Priority: 6 Status: NEW. Cabell County added this action as part of the 2024 update.						
CAB-4b	Problem Statement: There are deficient, high-hazard potential dams in the county. Correct the deficiency(ies) at the Hatfield Lake Dam.	Structure & Infrastructure Projects	5 years	Up to $1,000,000 if construction is needed (though some deficiencies may be as simple as a missing EAP)	HHPD	WVDEP Dam Safety Support: Cyrus Family (Owner), Cabell County OES	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure Objective Alignment: 4 Priority: 1 Status: NEW. Cabell County added this action as part of the 2024 update after consultation between WVDEP Dam Safety and the PDC.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
CAB-5	Problem Statement: Comprehensive planning and mitigation planning efforts are not aligned. Include hazard risk areas in the next update to the county's comprehensive plan.	Local Plans & Regulations	5 years	The comprehensive planning process is an established process; adding a discussion to that process should require little to no additional funding	Local funding	Cabell County Planning Commission Support: Cabell County OES	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure, Drought, Earthquake, Extreme Temperatures, Flood, Hazardous Materials Incident, Landslide & Land Subsidence, Severe Summer Weather, Severe Winter Weather, Tornado, Wildfire Objective Alignment: 2 Priority: 6 Status: NEW. Cabell County added this action as part of the 2024 update.						
CAB-6	Problem Statement: Cyberattacks on critical assets (e.g., hospitals, schools, utilities, etc.) are seemingly on the rise. Identify fusion liaison officers (FLO) in Cabell County that can share information related to credible threats of cyberattacks, increased malicious cyber activity, etc.	Education & Outreach Activities	5 years	Emergency services personnel can participate in the FLO program at no cost	Local funding	Cabell County OES	Safety & Security
	Hazard(s) Addressed: Cyber Incidents Objective Alignment: 2 Priority: 5 Status: NEW. Cabell County added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
CAB-7a	Problem Statement: In Cabell County, there are 476 structures with an aggregated value of $26,914,249 with medium or high susceptibility to landslides (per TEAL data). Educate property owners as to their risk to support individual decision-making.	Education & Outreach Activities	5 years	$1,500 (general estimate to compile and distribute information)	Local funding	Cabell County OES	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 2 Priority: 8 Status: NEW. Cabell County added this action as part of the 2024 update.						
CAB-7b	Problem Statement: In Cabell County, there are 476 structures with an aggregated value of $26,914,249 with medium or high susceptibility to landslides (per TEAL data). If and as funding is available, mitigate properties damaged by or at risk of landslide damage.	Structure & Infrastructure Projects	5 years	$144,200 per structure (median value of owner-occupied housing units, Cabell County)	BRIC, HMGP	Cabell County Commission Support: Cabell County FP Coordinator, Cabell County OES	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 1 Priority: 10 Status: NEW. Cabell County added this action as part of the 2024 update.						

Barboursville, Village of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
BAR-1	Problem Statement: Barboursville has 49 structures in high-risk effective and advisory floodplains (per TEIF data), nine of which could have damage exceeding 10%. Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$144,200 per structure (median value of owner-occupied housing units, Cabell County)	BRIC, FMA, HMGP	Barboursville FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action appeared in the 2018 plan as "Barboursville 1." The village continues to consider mitigating properties as and if funding is available.						
BAR-2	Problem Statement: In Barboursville, there are 13 structures with an aggregated value of $3,078,700 with medium or high susceptibility to landslides (per TEAL data). Educate property owners as to their risk to support individual decision-making.	Education & Outreach Activities	5 years	$1,500 (general estimate to compile and distribute information)	Local funding	Village Council Support: Cabell County OES	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 2 Priority: 3 Status: NEW. Barboursville added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
BAR-3	Continue to enforce and update, as appropriate, the village's floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the village's budget	Local funding	Barboursville FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 2 Status: NEW. Barboursville added this action as part of the 2024 update.						

Huntington, City of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
HUN-1	Problem Statement: Huntington has 1,004 structures in high-risk effective and advisory floodplains (per TEIF data), five of which could have damage exceeding 50%. Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$144,200 per structure (median value of owner-occupied housing units, Cabell County)	BRIC, FMA, HMPG	Huntington Planning	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 6 Status: ON-GOING. This action appeared in the 2018 plan as "Huntington 3." The city continues to consider mitigating properties as and if funding is available. Of note, an additional 13 structures could have damage that exceed 25% (but less than the 50% noted in the action). Also of note, there are an additional 234 structures in the portion of the city that is in Wayne County. Of these, none would likely experience 50% damage, while six would fall in the 25-49% range.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
HUN-2a	Problem Statement: The Huntington Floodwall is a key piece of infrastructure mitigating potential flood damage in downtown and greater Huntington. The levee is now 80+ years old and in need of upgrades to continue serving the community. Upgrade electrical substations, transformers, incoming electric service, internal electrical components, ventilation, and switchgear of Huntington's 17 floodwall pumping stations. Upgrade to current technology and standards that will meet safety and electrical codes.	Structure & Infrastructure Projects	5 years	TBD	BRIC, CDBG, EDA, Local funding	Huntington Stormwater Utility	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action appeared, in part, in the 2018 plan as "Huntington 5." The floodwall continues to need attention given its age and importance to protecting city infrastructure.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
HUN-2b	Problem Statement: The Huntington Floodwall is a key piece of infrastructure mitigating potential flood damage in downtown and greater Huntington. The levee is now 80+ years old and in need of upgrades to continue serving the community. Upgrade, refurbish, and rehabilitate gate openings, gate sills, and stop log sheds.	Structure & Infrastructure Projects	5 years	TBD	BRIC, CDBG, EDA, Local funding	Huntington Stormwater Utility	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure Objective Alignment: 3 Priority: 1 Status: NEW. Huntington added this action as part of the 2024 update.						
HUN-2c	Problem Statement: The Huntington Floodwall is a key piece of infrastructure mitigating potential flood damage in downtown and greater Huntington. The levee is now 80+ years old and in need of upgrades to continue serving the community. Upgrade the outdated (i.e., 80+ years old) crane at the Fourpole pump station with a modern crane system that meets current safety and electrical codes.	Structure & Infrastructure Projects	5 years	$300,000	BRIC, CDBG, EDA, Local funding	Huntington Stormwater Utility	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure Objective Alignment: 3 Priority: 1 Status: NEW. Huntington added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
HUN-2d	Problem Statement: The Huntington Floodwall is a key piece of infrastructure mitigating potential flood damage in downtown and greater Huntington. The levee is now 80+ years old and in need of upgrades to continue serving the community. Replace roofs on 14 pump stations.	Structure & Infrastructure Projects	5 years	TBD	BRIC, CDBG, EDA, Local funding	Huntington Stormwater Utility	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure Objective Alignment: 3 Priority: 1 Status: NEW. Huntington added this action as part of the 2024 update.						
HUN-3	Problem Statement: The current means of protecting employees and critical equipment at pump stations along the floodwall are ineffective. Upgrade 17 pump stations and log storage sheds with security systems and doors that meet current safety codes. The action includes 44 doors for the pump stations and 49 doors on the log storage sheds.	Structure & Infrastructure Projects	5 years	TBD	BRIC, CDBG, EDA, Local funding	Huntington Stormwater Utility	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure Objective Alignment: 3 Priority: 1 Status: NEW. Huntington added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
HUN-4	Problem Statement: The Fourpole Creek areas of the city frequently flood, and there have been studies examining the causes of the flooding. Work to scope projects that might address known issues contributing to flooding in these areas.	Structure & Infrastructure Projects	5 years	TBD	BRIC, CDBG, EDA, FMA, HMGP	Huntington Planning	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 8 Status: ON-GOING. This action appeared as "Huntington 1" in the 2018 plan, but as an engineering study. In updating the plan for 2024, city officials recognized a need to move beyond studies and work to scope ideas to address the known issues.						
HUN-5	Problem Statement: There are many areas around the city that flood due to overload in the stormwater management system. Mitigate problem areas.	Structure & Infrastructure Projects	5 years	TBD (contingent on area targeted)	TBD	Huntington Stormwater Utility	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 10 Status: NEW. Huntington added this action as part of the 2024 update.						
HUN-6a	Problem Statement: In Huntington, there are 280 structures with an aggregated value of $24,160,554 with medium or high susceptibility to landslides (per TEAL data). Educate property owners as to their risk to support individual decision-making.	Education & Outreach Activities	5 years	$1,500 (general estimate to compile and distribute information)	Local funding	Huntington Planning	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 2 Priority: 8 Status: NEW. Huntington added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
HUN-6b	Problem Statement: In Huntington, there are 280 structures with an aggregated value of $24,160,554 with medium or high susceptibility to landslides (per TEAL data). If and as funding is available, mitigate properties damaged by or at risk of landslide damage.	Structure & Infrastructure Projects	5 years	$144,200 per structure (median value of owner-occupied housing units, Cabell County)	BRIC, HMGP	Huntington Planning	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 1 Priority: 11 Status: NEW. Huntington added this action as part of the 2024 update.						
HUN-7	Continue to enforce and update, as appropriate, the city's floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the city's budget	Local funding	Huntington Planning	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 7 Status: NEW. Huntington added this action as part of the 2024 update.						

Huntington Sanitary Board (Special District)

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
HSB-1	Problem Statement: Sanitary board personnel have noted numerous instances of reverse flow of wastewater. Install backflow prevention valves, as available and where appropriate.	Structure & Infrastructure Projects	On-going	$350,000 per valve	BRIC, FMA, HMPG	Sanitary Board Director	Water Systems
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 2 Status: NEW. This action is new as of the 2024 update; this update marks the first for which the Huntington Sanitary Board is a "special district."						
HSB-2	Problem Statement: Sanitary board personnel have noted numerous instances of reverse flow of wastewater. Implement the Huntington Sanitary Board backflow prevention valves project (LPDM-PJ-03-WV-2023-011).	Structure & Infrastructure Projects	3 years	$8,478,178	Legislative PDM (75%), Non-federal funding (25%)	Sanitary Board Director	Water Systems
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: NEW. This action is new as of the 2024 update; this update marks the first for which the Huntington Sanitary Board is a "special district."						

Milton, City of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
MIL-1	Problem Statement: Milton has 419 structures in high-risk effective and advisory floodplains (per TEIF data), 42 of which could have damage exceeding 50%. Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$144,200 per structure (median value of owner-occupied housing units, Cabell County)	BRIC, FMA, HMPG	Milton FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action appeared in the 2018 plan as "Milton 1." The city continues to consider mitigating properties as and if funding is available.						
MIL-2	Identify specific areas within the jurisdiction that are susceptible to the impacts of any hazards (e.g., site-specific flood from stormwater backup) to develop future mitigation strategies.	Local Plans & Regulations	On-going	Identifying and prioritizing areas for consideration should require minimal funding	Local funding	City Council Support: Milton FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood, Hazardous Materials Incident, Landslide & Land Subsidence Objective Alignment: 3 Priority: 4 Status: ON-GOING. This action appeared in the 2018 plan as "Milton 2." It had not been completed but remains as a means of guiding future mitigation efforts.						
MIL-3	Continue to enforce and update, as appropriate, the city's floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the city's budget	Local funding	Milton FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 2 Status: NEW. Milton added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
MIL-4	Problem Statement: In Milton, there are three structures with an aggregated value of $126,950 with medium or high susceptibility to landslides (per TEAL data). Educate property owners as to their risk to support individual decision-making.	Education & Outreach Activities	5 years	$500 (general estimate to compile and distribute information)	Local funding	City Council	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 2 Priority: 3 Status: NEW. Milton added this action as part of the 2024 update.						

Lincoln County

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
LIN-1	Develop a partnership with appropriate parties that are stakeholders in the monitoring and general condition of the R.D. Bailey Dam; participate in preparedness activities as they are scheduled.	Local Plans & Regulations	On-going	Coordination should require little to no additional funding	Local funding	Lincoln County EM	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure Objective Alignment: 4 Priority: 5 Status: ON-GOING. Lincoln County participated in an exercise with Mingo and Wyoming Counties to examine an overtopping event that necessitates use of emergency spillways. Per the exercise, there could be impacts in areas of Lincoln County. (This action appeared in the 2018 plan as "Lincoln County 9.")						
LIN-2	Continue to regulate development in special flood hazard areas, to include educating the public as to the permitting process and promoting the purchase of flood insurance.	Education & Outreach Activities	On-going	NFIP administration is already in the county's budget	Local funding	Lincoln County FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 2 Status: ON-GOING. This action is an on-going (and effective) effort; therefore, it remains in the plan. It is a consolidation of the following actions from 2018: Lincoln County 1, Lincoln County 4, and Lincoln County 6.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
LIN-3	Problem Statement: When it floods, residents who access their homes via a small private water crossing across a creek can become isolated or unable to access their home when the crossing washes out. Upgrade and replace deficient private water crossings.	Structure & Infrastructure Projects	On-going	Up to $25,000 per structure (for materials and, at times, labor)	HMGP	Lincoln County FP Coordinator Support: Lincoln County EM	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 2 Status: ON-GOING. The county has completed approximately 25 crossings. This project remains active, though the county is not as involved as it was in 2018.						
LIN-4	Partner with government agencies on the need for permitting for buildings related to flooding.	Education & Outreach Activities	On-going	NFIP administration is already in the county's budget	Local funding	Lincoln County FP Coordinator Support: Lincoln County EM	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 4 Status: ON-GOING. The FP coordinator and EM representatives have been sharing a monthly list with local government entities regarding new construction; partners include the county commission, Hamlin, West Hamlin, the assessor, and the health department.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
LIN-5	Problem Statement: Lincoln County has 2,545 structures in high-risk effective and advisory floodplains (per TEIF data), 119 of which could have damage exceeding 50%. Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$119,500 per structure (median value of owner-occupied housing units, Lincoln County, plus $25k EM request)	BRIC, FMA, HMGP	Lincoln County EM Support: Lincoln County FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. Lincoln County recently finished an acquisition project and is currently assisting Wayne County with a similar project. The county will continue to explore opportunities for mitigation as and if funding is available.						
LIN-6	Problem Statement: In Lincoln County, there are 382 structures with an aggregated value of $6,042,394 with medium or high susceptibility to landslides (per TEAL data). Educate property owners as to their risk to support individual decision-making.	Education & Outreach Activities	5 years	$1,500 (general estimate to compile and distribute information)	Local funding	Lincoln County EM	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 2 Priority: 6 Status: NEW. Lincoln County added this action as part of the 2024 update.						

Hamlin, Town of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
HAM-1	Update the plan to monitor and clean storm water drainage systems within municipalities.	Structure & Infrastructure Projects	On-going	N/A	Local funding	Hamlin FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 3 Status: ON-GOING. This action appeared in the 2018 plan as "Hamlin 1." The town's FP coordinator elected to re-list it because the town does seek to clean-out drains as they back-up.						
HAM-2	Problem Statement: Hamlin has 116 structures in high-risk effective and advisory floodplains (per TEIF data), three of which could have damage exceeding 50%. Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$119,500 per structure (median value of owner-occupied housing units, Lincoln County, plus $25k EM request)	BRIC, FMA, HMGP	Hamlin FP Coordinator Support: Lincoln County EM	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action appeared in the 2018 plan as "Hamlin 2." The town continues to consider mitigating properties as and if funding is available.						
HAM-3	Continue to enforce and update, as appropriate, the town's floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the town's budget	Local funding	Hamlin FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 2 Status: NEW. Hamlin added this action as part of the 2024 update.						

West Hamlin, Town of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
WH-1	Problem Statement: West Hamlin has 44 structures in high-risk effective and advisory floodplains (per TEIF data), two of which could have damage exceeding 25%. Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$119,500 per structure (median value of owner-occupied housing units, Lincoln County, plus $25k EM request)	BRIC, FMA, HMGP	West Hamlin FP Coordinator Support: Lincoln County EM	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: Status: ON-GOING. This action appeared in the 2018 plan as "West Hamlin 2." The town continues to consider mitigation options as and if funding is available.						
WH-2	Continue to enforce and update, as appropriate, the town's floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the town's budget	Local funding	West Hamlin FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: Status: NEW. West Hamlin added this action as part of the 2024 update.						
WH-3	Problem Statement: In West Hamlin, there is one property valued at $11,333 with medium or high susceptibility to landslides. Work with this property owner to consider mitigation of the structure.	Structure & Infrastructure Projects	5 years	$11,333	BRIC, HMGP	West Hamlin Town Council Support: West Hamlin FP Coordinator	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 2 Priority: 2 Status: NEW. West Hamlin added this action as part of the 2024 update.						

Logan County

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
LC-1	Problem Statement: Logan County has 5,220 structures in high-risk effective and advisory floodplains (per TEIF data), 297 of which could have damage exceeding 50%. Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$101,200 per structure (median value of owner-occupied housing units, Logan County)	BRIC, FMA, HMGP	Logan County Code Enforcement	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. Logan County has been active in past mitigation projects. During the 2018-2024 planning cycle, the county undertook three projects (that appeared as "Logan County 8" in the 2018 plan). This action is a consolidation of the following actions from the 2018 plan: Logan County 8 and Logan County 16.						
LC-2	Enforce countywide building codes and other general planning regulations (including land use planning), which will regulate the number of buildings and the materials used in construction.	Local Plans & Regulations	On-going	Code enforcement is already budgeted at the county level	Local funding	Logan County Code Enforcement	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure, Flood, Landslide & Land Subsidence Objective Alignment: 1 Priority: 3 Status: ON-GOING. The county is active in its enforcement efforts; therefore, this action remains in the plan. It appeared in the 2018 plan as "Logan County 12."						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
LC-3	Problem Statement: Logan County averaged 38.5 drug-related deaths per year between 2018 and 2023. Continue to coordinate with public health, medical, and social services entities to support efforts to address substance abuse issues.	Education & Outreach Activities	On-going	Coordination should require little to no additional funding	Local funding	Logan County Health Dept.	Health & Medical
	Hazard(s) Addressed: Substance Use Crisis Objective Alignment: 3 Priority: 1 Status: NEW. Logan County added this action as part of the 2024 update.						
LC-4	Problem Statement: There are deficient, high-hazard potential dams in the county. Coordinate with WVDEP Dam Safety to identified dams classified (by WVDEP) as "deficient," and work, as appropriate, with dam owners and other stakeholders to correct the deficiency.	Local Plans & Regulations	5 years	Coordination should require little to no additional funding	Local funding	Logan County EM	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure Objective Alignment: 4 Priority: 5 Status: NEW. Logan County added this action as part of the 2024 update. The action is targeting potential funding through HHPD, but it is also responsive to the discrepancy in data appearing in the NID in 2018 versus 2024.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
LC-5	Problem Statement: Comprehensive planning and mitigation planning efforts are not aligned. Include hazard risk areas in the next update to the county's comprehensive plan.	Local Plans & Regulations	5 years	The comprehensive planning process is an established process; adding a discussion to that process should require little to no additional funding	Local funding	Logan County EDA Support: Logan County EM	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure, Drought, Earthquake, Extreme Temperatures, Flood, Hazardous Materials Incident, Landslide & Land Subsidence, Severe Summer Weather, Severe Winter Weather, Tornado, Wildfire Objective Alignment: 2 Priority: 5 Status: NEW. Logan County added this action as part of the 2024 update.						
LC-6	Problem Statement: Cyberattacks on critical assets (e.g., hospitals, schools, utilities, etc.) are seemingly on the rise. Identify fusion center liaisons (FLOs) in Logan County that can share information related to credible threats of cyberattacks, increased malicious cyber activity, etc.	Education & Outreach Activities	5 years	Emergency services personnel can participate in the FLO program at no cost	Local funding	Logan County EM	Safety & Security
	Hazard(s) Addressed: Cyber Incidents Objective Alignment: 2 Priority: 4 Status: NEW. Logan County added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
LC-7a	Problem Statement: In Logan County, there are 322 structures with an aggregated value of $5,437,382 with medium or high susceptibility to landslides (per TEAL data). Educate property owners as to their risk to support individual decision-making.	Education & Outreach Activities	5 years	$1,500 (general estimate to compile and distribute information)	Local funding	Logan County EM	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 2 Priority: 7 Status: NEW. Logan County added this action as part of the 2024 update.						
LC-7b	Problem Statement: In Logan County, there are 322 structures with an aggregated value of $5,437,382 with medium or high susceptibility to landslides (per TEAL data). If and as funding is available, mitigate properties damaged by or at risk of landslide damage.	Structure & Infrastructure Projects	5 years	$101,200 per structure (median value of owner-occupied housing units, Logan County)	BRIC, HMGP	Logan County Commission Support: Logan County Code Enforcement	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 1 Priority: 8 Status: NEW. Logan County added this action as part of the 2024 update.						

Chapmanville, Town of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
CHA-1	Problem Statement: Chapmanville has 70 structures in high-risk effective and advisory floodplains (per TEIF data), two of which could have damage exceeding 50% and three of which that could have damage between 25 and 49%. Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$101,200 per structure (median value of owner-occupied housing units, Logan County)	BRIC, FMA, HMGP	Chapmanville FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action appeared in the 2018 plan as "Chapmanville 3." The town continues to consider mitigating properties as and if funding is available.						
CHA-2	Continue to enforce and update, as appropriate, the town's floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the town's budget	Local funding	Chapmanville FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 2 Status: NEW. Chapmanville added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
CHA-3	Problem Statement: In Chapmanville, there are three structures with an aggregated value of $52,600 with medium or high susceptibility to landslides (per TEAL data). Educate property owners as to their risk to support individual decision-making.	Education & Outreach Activities	5 years	$500 (general estimate to compile and distribute information)	Local funding	Town Council Support: Logan County EM	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 2 Priority: 3 Status: NEW. Chapmanville added this action as part of the 2024 update.						

Logan, City of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
LOG-1	Monitor dam facilities in the area and share information with appropriate officials.	Education & Outreach Activities	On-going	Monitoring and information sharing requires little to no additional funding	Local funding	City Council Support: Logan County EM	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure Objective Alignment: 4 Priority: 2 Status: ON-GOING. This action appeared as "Logan 1" in the 2018 plan; the city continues to monitor dams upstream of the city.						
LOG-2	Problem Statement: Logan has five structures in high-risk effective and advisory floodplains (per TEIF data). Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$101,200 per structure (median value of owner-occupied housing units, Logan County)	BRIC, FMA, HMGP	Logan FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action appeared in the 2018 plan as "Logan 4." The city will continue to consider mitigating properties as and if funding is available.						
LOG-3	Continue to enforce and update, as appropriate, the city's floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the city's budget	Local funding	Logan FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 3 Status: NEW. Logan added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
LOG-4a	Problem Statement: In Logan, there are 123 structures with an aggregated value of $2,054,473 with medium or high susceptibility to landslides. Educate property owners as to their risk to support individual decision-making.	Education & Outreach Activities	5 years	$500 (general estimate to compile and distribute information)	Local funding	City Council Support: Logan County EM	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 2 Priority: 4 Status: NEW. Logan added this action as part of the 2024 update.						
LOG-4b	Problem Statement: In Logan, there are 123 structures with an aggregated value of $2,054,473 with medium or high susceptibility to landslides. If and as funding is available, mitigate properties damaged by or at risk of landslide damage.	Structure & Infrastructure Projects	5 years	$101,200 per structure (median value of owner-occupied housing units, Logan County)	BRIC, HMGP	City Council Support: Logan County Code Enforcement	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 1 Priority: 5 Status: NEW. Logan added this action as part of the 2024 update.						

Logan Sanitary Board (Special District)

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
LSB-1	Problem Statement: Stormwater enters sewer pipes through cracks, leaky seals, and faulty connections throughout Logan's system. Complete the Stollings-McConnell wastewater extension project and inflow and infiltration (I&I) study.	Structure & Infrastructure Projects	5 years	$5,000,000	WV Clean Water SRF	Sanitary Board Director	Water Systems
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: NEW. This action is new as of the 2024 update; this update marks the first for which the Logan Sanitary Board is a "special district."						

Man, Town of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
MAN-1	Monitor dam facilities in the area and share information with appropriate officials.	Education & Outreach Activities	On-going	Monitoring and information sharing requires little to no additional funding	Local funding	Town Council Support: Logan County EM	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure Objective Alignment: 4 Priority: 2 Status: ON-GOING. This action appeared as "Man 1" in the 2018 plan; the town continues to monitor dams upstream of the town.						
MAN-2	Identify stormwater backup areas and determine costs to correct those problems.	Structure & Infrastructure Projects	On-going	Identification of areas and coordination should require minimal funding	Local funding	Man FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 4 Status: ON-GOING. The town re-listed this project as changing trends with precipitation make runoff-related flooding a regular issue.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
MAN-3	Problem Statement: Man has 164 structures in high-risk effective and advisory floodplains (per TEIF data), seven of which could have damage exceeding 50%. Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$101,200 per structure (median value of owner-occupied housing units, Logan County)	BRIC, FMA, HMGP	Man FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action appeared in the 2018 plan as "Man 5." The town will continue to consider mitigating properties as and if funding is available.						
MAN-4	Continue to enforce and update, as appropriate, the town's floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the town's budget	Local funding	Man FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 3 Status: NEW. Man added this action as part of the 2024 update.						

Man Sanitary Board (Special District)

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
MSB-1	Problem Statement: The treatment plan for the town's (and surrounding public service district's) sewage is antiquated. Support the Buffalo Creek Public Service District's wastewater treatment plant upgrade.	Structure & Infrastructure Projects	5 years	$5,000,000	CDBG, WVIJDC	Man Sanitary Board	Safety & Security
	Hazard(s) Addressed: Epidemic/Pandemic Objective Alignment: 1 Priority: 1 Status: NEW. This action is new as of the 2024 update; this update marks the first for which the Man Sanitary Board is a "special district."						

Mitchell Heights, Town of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
MH-1	Identify stormwater backup areas and determine costs to correct those problems.	Structure & Infrastructure Projects	On-going	Identification of areas and coordination should require minimal funding	Local funding	Mitchell Heights FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 3 Status: ON-GOING. The town re-listed this project as changing trends with precipitation make runoff-related flooding a regular issue.						
MH-2	Problem Statement: Mitchell Heights has 30 structures in high-risk effective and advisory floodplains (per TEIF data). Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$101,200 per structure (median value of owner-occupied housing units, Logan County)	BRIC, FMA, HMGP	Mitchell Heights FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action appeared in the 2018 plan as “Mitchell Heights 4.” The town will continue to consider mitigating properties as and if funding is available.						
MH-3	Continue to enforce and update, as appropriate, the town’s floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the town’s budget	Local funding	Mitchell Heights FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 2 Status: NEW. Mitchell Heights added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
MH-4	Problem Statement: In Mitchell Heights, there are eight structures with an aggregated value of $474,200 with medium or high susceptibility to landslides. Educate property owners as to their risk to support individual decision-making.	Education & Outreach Activities	5 years	$500 (general estimate to compile and distribute information)	Local funding	Town Council	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 2 Priority: 4 Status: NEW. Mitchell Heights added this action as part of the 2024 update.						

West Logan, Town of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
WL-1	Monitor dam facilities in the area and share information with appropriate officials.	Education & Outreach Activities	On-going	Monitoring and information sharing requires little to no additional funding	Local funding	Town Council Support: Logan County EM	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure Objective Alignment: 4 Priority: 2 Status: ON-GOING. This action appeared as "West Logan 1" in the 2018 plan; the town continues to monitor dams upstream of the town.						
WL-2	Identify stormwater backup areas and determine costs to correct those problems.	Structure & Infrastructure Projects	On-going	Identification of areas and coordination should require minimal funding	Local funding	West Logan FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 4 Status: ON-GOING. The town re-listed this project as changing trends with precipitation make runoff-related flooding a regular issue.						
WL-3	Problem Statement: West Logan has 18 structures in high-risk effective and advisory floodplains (per TEIF data). Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$101,200 per structure (median value of owner-occupied housing units, Logan County)	BRIC, FMA, HMGP	West Logan FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action appeared in the 2018 plan as "West Logan 5." The town will continue to consider mitigating properties as and if funding is available.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
WL-4	Continue to enforce and update, as appropriate, the town's floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the town's budget	Local funding	West Logan FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 3 Status: NEW. West Logan added this action as part of the 2024 update.						
WL-5	Problem Statement: In West Logan, there are four structures with an aggregated value of $78,600 with medium or high susceptibility to landslides (per TEAL data). Educate property owners as to their risk and support individual decision-making.	Education & Outreach Activities	5 years	$500 (general estimate to compile and distribute information)	Local funding	Town Council	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 2 Priority: 5 Status: NEW. West Logan added this action as part of the 2024 update.						

Mason County

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
MC-1	Work with the U.S. Army Corps of Engineers to ensure continue preparedness for events associated with locks/dams along the Ohio River.	Education & Outreach Activities	On-going	Coordination should require little to no additional funding	Local funding	Mason County OES	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure Objective Alignment: 3 Priority: 10 Status: ON-GOING. This project appeared as "Mason County 1" in the 2018 plan and targeted inspection. That typically occurs, as does ongoing communication and partnership for general preparedness.						
MC-2	Coordinate with the local chapter of the American Red Cross to maintain updated lists of potential shelters in Mason County.	Local Plans & Regulations	On-going	Coordination should require little to no additional funding	Local funding	Mason County OES	Food, Hydration, Shelter
	Hazard(s) Addressed: Dam & Levee Failure, Flood, Severe Summer Weather, Severe Winter Weather, Tornado Objective Alignment: 3 Priority: 11 Status: ON-GOING. The Mason County OES and other emergency services agencies periodically work with the Red Cross to make sure existing shelter lists are adequate.						
MC-3	Continue to develop partnerships with local amateur radio operators to create a backup communications capability for local response operations.	Local Plans & Regulations	On-going	Developing partnerships requires little to no additional funding	Local funding	Mason County OES Support: First response organizations	Communications
	Hazard(s) Addressed: Acts of Violence, Dam & Levee Failure, Earthquake, Extreme Temperatures, Flood, Hazardous Materials Incidents, Severe Summer Weather, Severe Winter Weather, Tornado, Wildfire Objective Alignment: 3 Priority: 7 Status: ON-GOING. Though not "mitigation" per se, Mason County has an active effort underway to support communications capabilities with amateur radio operators.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
MC-4	Continue to enforce and update, as appropriate, the county's floodplain ordinance.	Local Plans & Regulations	On-going	NFIP administration is already in the county's budget	Local funding	Mason County FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 3 Status: ON-GOING. This action is an on-going (and effective) effort; therefore, it remains in the plan. It appeared in the 2018 version as "Mason County 2."						
MC-5	Problem Statement: Mason County has 924 structures in high-risk effective and advisory floodplains (per TEIF data), 241 of which could have damage exceeding 50%. Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$118,100 per structure (median value of owner-occupied housing units, Mason County)	BRIC, FMA, HMGP	Mason County FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 2 Status: ON-GOING. This action appeared in the 2018 plan as "Mason County 20." The county will continue to consider acquisition and elevation projects as and if funding is available. Of note, there are also 131 structures in the former Town of Henderson that are now the county's responsibility, of which 69 could experience damage exceeding 50%.						
MC-6	Compile a rail and river commodity flow study to determine what materials are flowing through Mason County.	Local Plans & Regulations	On-going	Up to $10,000 (if a consultant is used to collect data)	HMEP, Local funding	Mason County LEPC	Hazardous Materials
	Hazard(s) Addressed: Hazardous Materials Incident Objective Alignment: 3 Priority: 7 Status: ON-GOING. LEPC representatives and emergency services providers periodically count hazmat truck traffic; further, the LEPC periodically commissions an update to the county's full study.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
MC-7a	Problem Statement: There are deficient, high-hazard potential dams in the county. Coordinate with WVDEP Dam Safety to identify dams classified (by WVDEP) as "deficient," and work, as appropriate, with dam owners and other stakeholders to correct the deficiency.	Local Plans & Regulations	5 years	Coordination should require little to no additional funding	Local funding	Mason County OES	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure Objective Alignment: 4 Priority: 5 Status: NEW. Mason County added this action as part of the 2024 update.						
MC-7b	Problem Statement: There are deficient, high-hazard potential dams in the county. Correct the deficiencies at the Huffman Dam.	Structure & Infrastructure Projects	5 years	Up to $1,000,000 if construction is needed (though some deficiencies may be as simple as a missing EAP)	HHPD	WVDEP Dam Safety Support: Hoffman Family (Owner), Mason County OES	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure Objective Alignment: 4 Priority: 2 Status: NEW. Mason County added this action as part of the 2024 update after consultation between WVDEP Dam Safety and the PDC.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
MC-8	Problem Statement: Comprehensive planning and mitigation planning efforts are not aligned. Include hazard risk areas in the next update to the county's comprehensive plan.	Local Plans & Regulations	5 years	The comprehensive planning process is an established process; adding a discussion to that process should require little to no additional funding	Local funding	Mason County EDA Support: Mason County OES	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure, Drought, Earthquake, Extreme Temperatures, Flood, Hazardous Materials Incident, Landslide & Land Subsidence, Severe Summer Weather, Severe Winter Weather, Tornado, Wildfire Objective Alignment: 2 Priority: 5 Status: NEW. Mason County added this action as part of the 2024 update.						
MC-9	Problem Statement: Cyberattacks on critical assets (e.g., hospitals, schools, utilities, etc.) are seemingly on the rise. Identify fusion center liaisons (FLOs) in Mason County that can share information related to credible threats of cyberattacks, increased malicious cyber activity, etc.	Education & Outreach Activities	5 years	Emergency services personnel can participate in the FLO program at no cost	Local funding	Mason County OES	Safety & Security
	Hazard(s) Addressed: Cyber Incidents Objective Alignment: 2 Priority: 4 Status: NEW. Mason County added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
MC-10a	Problem Statement: In Mason County, there are 238 structures with an aggregated value of $5,342,114 with medium or high susceptibility to landslides (per TEAL data). Educate property owners as to their risk to support individual decision-making.	Education & Outreach Activities	5 years	$1,500 (general estimate to compile and distribute information)	Local funding	Mason County OES	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 2 Priority: 7 Status: NEW. Mason County added this action as part of the 2024 update.						
MC-10b	Problem Statement: In Mason County, there are 238 structures with an aggregated value of $5,342,114 with medium or high susceptibility to landslides (per TEAL data). If and as funding is available, mitigate properties damaged by or at risk of landslide damage.	Structure & Infrastructure Projects	5 years	$118,100 per structure (median value of owner-occupied housing units, Mason County)	BRIC, HMGP	Mason County Commission Support: Mason County OES	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 1 Priority: 12 Status: NEW. Mason County added this action as part of the 2024 update.						

Hartford, Town of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
HAR-1	Problem Statement: Hartford has 208 structures in high-risk effective and advisory floodplains (per TEIF data), 29 of which could have damage exceeding 50%. Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$118,100 per structure (median value of owner-occupied housing units, Mason County)	BRIC, FMA, HMGP	Hartford FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action appeared in the 2018 plan as "Hartford 2." The town will consider mitigating properties as and if funding is available.						
HAR-2	Problem Statement: In Hartford, there are four structures with an aggregated value of $50,750 with medium or high susceptibility to landslides (per TEAL data). Educate property owners as to their risk to support individual decision-making.	Education & Outreach Activities	5 years	$500 (general estimate to compile and distribute information)	Local funding	Town Council	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 2 Priority: 3 Status: NEW. Hartford added this action as part of the 2024 update.						
HAR-3	Continue to enforce and update, as appropriate, the town's floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the town's budget	Local funding	Hartford FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 2 Status: NEW. Hartford added this action as part of the 2024 update.						

Leon, Town of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
LEO-1	Problem Statement: Leon has 32 structures in high-risk effective and advisory floodplains (per TEIF data), five of which could have damage exceeding 50%. Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$118,100 per structure (median value of owner-occupied housing units, Mason County)	BRIC, FMA, HMGP	Leon FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action appeared in the 2018 plan as "Leon 2." The town will consider mitigating properties as and if funding is available.						
LEO-2	Problem Statement: In Leon, there are three structures with an aggregated value of $43,400 with medium or high susceptibility to landslides (per TEAL data). Educate property owners as to their risk to support individual decision-making.	Education & Outreach Activities	5 years	$500 (general estimate to compile and distribute information)	Local funding	Town Council	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 2 Priority: 3 Status: NEW. Leon added this action as part of the 2024 update.						
LEO-3	Continue to enforce and update, as appropriate, the town's floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the town's budget	Local funding	Leon FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 2 Status: NEW. Leon added this action as part of the 2024 update.						

Mason, Town of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
MAS-1	Identify areas in which stormwater backs up and determine the costs of corrective actions.	Structure & Infrastructure Projects	On-going	TBD	TBD	Mason FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 3 Status: ON-GOING. This action appeared in the 2018 plan as "Mason 1." The town continues to monitor issues related to runoff as it develops.						
MAS-2	Problem Statement: Mason has 115 structures in high-risk effective and advisory floodplains (per TEIF data), 19 of which could have damage exceeding 50%. Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$118,100 per structure (median value of owner-occupied housing units, Mason County)	BRIC, FMA, HMGP	Mason FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action appeared in the 2018 plan as "Mason 2." The town will consider mitigating properties as and if funding is available.						
MAS-3	Continue to enforce and update, as appropriate, the town's floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the town's budget	Local funding	Mason FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 2 Status: NEW. Mason added this action as part of the 2024 update.						

New Haven, Town of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
NH-1	Problem Statement: New Haven has 81 structures in high-risk effective and advisory floodplains (per TEIF data), two of which could have damage exceeding 50%. Six other structures could have damage between 25 and 49%. Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$118,100 per structure (median value of owner-occupied housing units, Mason County)	BRIC, FMA, HMGP	New Haven FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action appeared in the 2018 plan as "New Haven 2." The town will consider mitigating properties as and if funding is available.						
NH-2	Problem Statement: In New Haven, there are three structures with an aggregated value of $30,550 with medium or high susceptibility to landslides (per TEAL data). Educate property owners as to their risk to support individual decision-making.	Education & Outreach Activities	5 years	$500 (general estimate to compile and distribute information)	Local funding	Town Council	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 2 Priority: 3 Status: NEW. New Haven added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
NH-3	Continue to enforce and update, as appropriate, the town's floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the town's budget	Local funding	New Haven FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 2 Status: NEW. New Haven added this action as part of the 2024 update.						

Point Pleasant, City of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
PP-1	Identify areas in which stormwater backs up and determine the costs of corrective actions.	Structure & Infrastructure Projects	On-going	TBD	TBD	Point Pleasant FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 4 Status: ON-GOING. This action appeared in the 2018 plan as "Point Pleasant 1." The city continues to monitor issues related to runoff as it develops.						
PP-2	Problem Statement: Point Pleasant has 82 structures in high-risk effective and advisory floodplains (per TEIF data), 37 of which could have damage exceeding 50%. Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$118,100 per structure (median value of owner-occupied housing units, Mason County)	BRIC, FMA, HMGP	Point Pleasant FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action appeared in the 2018 plan as "Point Pleasant 2." The city will consider mitigating properties as and if funding is available.						
PP-3	Continue to enforce and update, as appropriate, the city's floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the city's budget	Local funding	Point Pleasant FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 2 Status: NEW. Point Pleasant added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
PP-4	Problem Statement: In Point Pleasant, there are six structures with an aggregated value of $100,150 with medium or high susceptibility to landslides (per TEAL data). Educate property owners as to their risk to support individual decision-making.	Education & Outreach Activities	5 years	$500 (general estimate to compile and distribute information)	Local funding	City Council	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 2 Priority: 3 Status: NEW. Point Pleasant added this action as part of the 2024 update.						

Mingo County

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
MIN-1	Problem Statement: Mingo County has 3,382 structures in high-risk effective and advisory floodplains (per TEIF data), 189 of which could have damage exceeding 50%. Acquire/relocated or elevation structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$89,700 per structure (median value of owner-occupied housing units, Mingo County)	BRIC, FMA, HMGP	Mingo County FP Coordinator Support: Mingo County EM	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 2 Status: ON-GOING. This action appeared in the 2018 plan as "Mingo County 20" and "Mingo County 21." Local officials will continue to consider these efforts as funding is available.						
MIN-2	Problem Statement: Erosion along streambanks can cause trees to fall into streams, often creating impediments to water flow or catching debris. Conduct streambank stabilization and restoration.	Natural Systems Protection	On-going	$30-$120 per foot of restored streambank	WVCA, WVDEP	Mingo County Commission	Safety & Security
	Hazard(s) Addressed: Flood, Landslides & Land Subsidence Objective Alignment: 3 Priority: 10 Status: ON-GOING. The noted problem remains, and thus, this action remains as an element to address problem areas when the need arises. It appeared in the 2018 plan as "Mingo County 1."						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
MIN-3	Problem Statement: The are areas in the county that do not yet have public service available. Continue to support expansions and upgrades of water systems to enable more customer access to those systems in unincorporated areas.	Structure & Infrastructure Projects	On-going	$7,876,000 (average of water project costs appearing in '20-'24 R2 CEDS for Mingo County)	CDBG, WVIJDC, Local funding	Mingo County Commission Support: PSDs, Region 2 PDC	Water Systems
	Hazard(s) Addressed: Drought Objective Alignment: 3 Priority: 9 Status: ON-GOING. This project appeared in the 2018 plan as "Mingo County 12." It remains in the plan to show alignment between development, generally, and risk reduction, particularly to drought.						
MIN-4	Cut tree branches away from power lines to prevent them from falling on the lines and causing power outages.	Structure & Infrastructure Projects	On-going	Unknown	State funding	WVDOH	Energy
	Hazard(s) Addressed: Severe Summer Weather, Severe Winter Weather Objective Alignment: 3 Priority: 4 Status: ON-GOING. This action appeared in the 2018 plan as "Mingo County 3." It remains in the plan because power outages during severe weather events continue to be an issue. The county, though, recognizes its role in this action as one of information sharing, notifying the WVDOH of problem areas.						
MIN-5	Conduct outreach to faith-based organizations to promote training to prepare for active assailant incidents at churches.	Education & Outreach Activities	On-going	$3,500 per event (though some entities provide training free of charge)	NSGP	Mingo County EM	Safety & Security
	Hazard(s) Addressed: Acts of Violence Objective Alignment: 3 Priority: 7 Status: ON-GOING. This action appeared in the 2018 plan as "Mingo County 4." It remains in the plan as supportive of churches or other non-profits who would like to pursue security projects.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
MIN-6	Continue to enforce and update, as appropriate, the county's floodplain ordinance.	Local Plans & Regulations	On-going	NFIP administration is already in the county's budget	Local funding	Mingo County FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 4 Status: ON-GOING. This action is an on-going (and effective) effort; therefore, it remains in the plan. It appeared in the 2018 plan as "Mingo County 5."						
MIN-7	Problem Statement: Mingo County averaged 14 drug-related deaths per year between 2018 and 2023. Continue to coordinate with public health, medical, and social services entities to support efforts to address substance abuse issues.	Education & Outreach Activities	On-going	Coordination should require little to no additional funding	Local funding	MCHD Support: Williamson Health & Wellness Center	Health & Medical
	Hazard(s) Addressed: Substance Use Crisis Objective Alignment: 3 Priority: 2 Status: NEW. Mingo County added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
MIN-8a	Problem Statement: There are deficient, high-hazard potential dams in the county. Coordinate with WVDEP Dam Safety to identify dams classified (by WVDEP) as "deficient," and work, as appropriate, with dam owners and other stakeholders to correct the deficiency.	Local Plans & Regulations	5 years	Coordination should require little to no additional funding	Local funding	Mingo County EM	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure Objective Alignment: 4 Priority: 7 Status: NEW. Mingo County added this action as part of the 2024 update, though it may be considered an update to "Mingo County 17" from the 2018 plan. Further, this action seeks to clarify why the information from the National Inventory of Dams in 2018 was so different than what was available in 2024.						
MIN-8b	Problem Statement: There are deficient, high-hazard potential dams in the county. Correct the deficiency(ies) at the Laurel Lake Dam.	Structure & Infrastructure Projects	5 years	Up to $1,000,000 if construction is needed (though some deficiencies may be as simple as a missing EAP)	HHPD	WVDEP Dam Safety Support: WVDNR (Owner), Mingo County EM	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure Objective Alignment: 4 Priority: 1 Status: NEW. Mingo County added this action as part of the 2024 update after consultation between WVDEP Dam Safety and the PDC.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
MIN-9	Problem Statement: Cyberattacks on critical assets (e.g., hospitals, schools, utilities, etc.) are seemingly on the rise. Identify fusion liaison officers (FLO) in Mingo County that can share information related to credible threats of cyberattacks, increased malicious cyber activity, etc.	Education & Outreach Activities	5 years	Emergency services personnel can participate in the FLO program at no cost	Local funding	Mingo County EM	Safety & Security
	Hazard(s) Addressed: Cyber Incidents Objective Alignment: 2 Priority: 6 Status: NEW. Mingo County added this action as part of the 2024 update.						
MIN-10a	Problem Statement: In Mingo County, there are 325 structures with an aggregated value of $1,463,565 with medium or high susceptibility to landslides (per TEAL data). Educate property owners as to their risk to support individual decision-making.	Education & Outreach Activities	5 years	$1,500 (general estimate to compile and distribute information)	Local funding	Mingo County EM	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 2 Priority: 11 Status: NEW. Mingo County added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
MIN-10b	Problem Statement: In Mingo County, there are 325 structures with an aggregated value of $1,463,565 with medium or high susceptibility to landslides (per TEAL data). If and as funding is available, mitigate properties damaged by or at risk of landslide damage.	Structure & Infrastructure Projects	5 years	$89,700 per structure (medial value of owner-occupied housing units, Mingo County)	BRIC, HMGP	Mingo County Commission Support: Mingo County EM	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 1 Priority: 12 Status: NEW. Mingo County added this action as part of the 2024 update.						

Delbarton, Town of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
DEL-1	Problem Statement: Delbarton has 131 structures in high-risk effective and advisory floodplains (per TEIF data), two of which could have damage exceeding 50% and 18 of which could have damage between 25 and 49%. Acquire/relocated or elevation structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$89,700 per structure (median value of owner-occupied housing units, Mingo County)	BRIC, FMA, HMGP	Mingo County FP Coordinator Support: Town Council	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action appeared as "Delbarton 1" in the 2018 plan; the town will consider mitigating properties as and if funding is available.						
DEL-2	Identify specific areas within the jurisdiction that are susceptible to the impacts of any hazards (e.g., site-specific flood from stormwater backup) to develop future mitigation strategies.	Local Plans & Regulations	On-going	Identifying and prioritizing areas for consideration should require minimal funding	Local funding	Town Council Support: Mingo County FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood, Hazardous Materials Incident, Landslide & Land Subsidence Objective Alignment: 3 Priority: 3 Status: ON-GOING. This action appeared in the 2018 plan as "Delbarton 2." It had not been completed but remains as a means of guiding future mitigation efforts.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
DEL-3	Continue to enforce and update, as appropriate, the town's floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the town's budget	Local funding	Mingo County FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 2 Status: NEW. Delbarton added this action as part of the 2024 update.						
DEL-4	Problem Statement: In Delbarton, there are 20 structures with an aggregated value of $39,210 with medium or high susceptibility to landslides (per TEAL data). Educate property owners as to their risk to support individual decision-making.	Education & Outreach Activities	5 years	$1,500 (general estimate to compile and distribute information)	Local funding	Town Council	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 2 Priority: 3 Status: NEW. Delbarton added this action as part of the 2024 update.						

Gilbert, Town of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
GIL-1	Problem Statement: Gilbert has 79 structures in high-risk effective and advisory floodplains (per TEIF data), 10 of which could have damage exceeding 25%. Acquire/relocated or elevation structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$89,700 per structure (median value of owner-occupied housing units, Mingo County)	BRIC, FMA, HMGP	Mingo County FP Coordinator Support: Town Council	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action appeared as "Gilbert 1" in the 2018 plan; the town will consider mitigating properties as and if funding is available.						
GIL-2	Identify specific areas within the jurisdiction that are susceptible to the impacts of any hazards (e.g., site-specific flood from stormwater backup) to develop future mitigation strategies.	Local Plans & Regulations	On-going	Identifying and prioritizing areas for consideration should require minimal funding	Local funding	Town Council Support: Mingo County FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood, Hazardous Materials Incident, Landslide & Land Subsidence Objective Alignment: 3 Priority: 3 Status: ON-GOING. This action appeared in the 2018 plan as "Gilbert 2." It had not been completed but remains as a means of guiding future mitigation efforts.						
GIL-3	Continue to enforce and update, as appropriate, the town's floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the town's budget	Local funding	Mingo County FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 2 Status: NEW. Gilbert added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
GIL-4	Problem Statement: In Gilbert, there are nine structures with an aggregated value of $107,300 with medium or high susceptibility to landslides (per TEAL data). Educate property owners as to their risk to support individual decision-making.	Education & Outreach Activities	5 years	$1,500 (general estimate to compile and distribute information)	Local funding	Town Council	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 2 Priority: 3 Status: NEW. Gilbert added this action as part of the 2024 update.						

Kermit, Town of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
KER-1	Problem Statement: Kermit has 80 structures in high-risk effective and advisory floodplains (per TEIF data), 14 of which could have damage exceeding 25%. Acquire/relocated or elevation structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$89,700 per structure (median value of owner-occupied housing units, Mingo County)	BRIC, FMA, HMGP	Mingo County FP Coordinator Support: Town Council	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action appeared as "Kermit 2" in the 2018 plan; the town will consider mitigating properties as and if funding is available.						
KER-2	Continue to enforce and update, as appropriate, the town's floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the town's budget	Local funding	Mingo County FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 2 Status: NEW. Kermit added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
KER-3	Problem Statement: In Kermit, there are eight structures with an aggregated value of $139,700 with medium or high susceptibility to landslides (per TEAL data). Educate property owners as to their risk to support individual decision-making.	Education & Outreach Activities	5 years	$1,500 (general estimate to compile and distribute information)	Local funding	Town Council	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 2 Priority: 3 Status: NEW. Kermit added this action as part of the 2024 update.						

Matewan, Town of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
MAT-1	Problem Statement: Matewan has 53 structures in high-risk effective and advisory floodplains (per TEIF data), three of which could have damage exceeding 10%. Acquire/relocated or elevation structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$89,700 per structure (median value of owner-occupied housing units, Mingo County)	BRIC, FMA, HMGP	Mingo County FP Coordinator Support: Town Council	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action appeared as "Matewan 1" in the 2018 plan; the town will consider mitigating properties as and if funding is available.						
MAT-2	Identify specific areas within the jurisdiction that are susceptible to the impacts of any hazards (e.g., site-specific flood from stormwater backup) to develop future mitigation strategies.	Local Plans & Regulations	On-going	Identifying and prioritizing areas for consideration should require minimal funding	Local funding	Town Council Support: Mingo County FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood, Hazardous Materials Incident, Landslide & Land Subsidence Objective Alignment: 3 Priority: 3 Status: ON-GOING. This action appeared in the 2018 plan as "Matewan 2." It had not been completed but remains as a means of guiding future mitigation efforts.						
MAT-3	Continue to enforce and update, as appropriate, the town's floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the town's budget	Local funding	Mingo County FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 2 Status: NEW. Matewan added this action as part of the 2024 update.						

Williamson, City of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
WIL-1	Prioritize replacement or reinforcement of at-risk structures, such as retaining walls, within the city.	Structure & Infrastructure Projects	On-going	TBD	TBD	City Council	Safety & Security
	Hazard(s) Addressed: Landslide & Land Subsidence Objective Alignment: 3 Priority: 4 Status: ON-GOING. Since this action occurs as opportunities arise to fix structures, the city opted to re-list it.						
WIL-2	Problem Statement: Williamson has 42 structures in high-risk effective and advisory floodplains (per TEIF data), one of which could have damage exceeding 50%. Two other structures could have damage between 25 and 49%. Acquire/relocated or elevation structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$89,700 per structure (median value of owner-occupied housing units, Mingo County)	BRIC, FMA, HMGP	Mingo County FP Coordinator Support: City Council	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action appeared as "Williamson 3" in the 2018 plan; the city will consider mitigating properties as and if funding is available.						
WIL-3	Continue to enforce and update, as appropriate, the city's floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the city's budget	Local funding	Mingo County FP Coordinator Support: City Council	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 2 Status: NEW. Williamson added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
WIL-4a	Problem Statement: In Williamson, there are 161 structures with an aggregated value of $2,125,517 with medium or high susceptibility to landslides (per TEAL data). Educate property owners as to their risk to support individual decision-making.	Education & Outreach Activities	5 years	$1,500 (general estimate to compile and distribute information)	Local funding	City Council	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 2 Priority: 3 Status: NEW. Williamson added this action as part of the 2024 update.						
WIL-4b	Problem Statement: In Williamson, there are 161 structures with an aggregated value of $2,125,517 with medium or high susceptibility to landslides (per TEAL data). If and as funding is available, mitigate properties damaged by or at risk of landslide damage.	Structure & Infrastructure Projects	5 years	$89,700 per structure (median value of owner-occupied housing units, Mingo County)	BRIC, HMGP	City Council Support: Mingo County EM	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 1 Priority: 5 Status: NEW. Williamson added this action as part of the 2024 update.						

Wayne County

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
WC-1	Continue expansion of public service district (PSD)-supplied water in unincorporated areas of the county.	Structure & Infrastructure Projects	On-going	$1,075,000 (average of water project costs appearing in '20-'24 R2 CEDS for Wayne County)	CDBG, WVIJDC	Wayne County Commission	Water Systems
	Hazard(s) Addressed: Drought Objective Alignment: 3 Priority: 5 Status: ON-GOING. This action appeared in the 2018 plan as "Wayne County 16." It remains in the plan because it is an active effort. Recently, the commission used ARPA funds to support infrastructure extensions, and at the time of the 2024 update, the commission had recently let a contract in the East Lynn area on Big Lynn Road.						
WC-2	Continue to train HAM operators for emergency communications support.	Local Plans & Regulations	On-going	Coordination and training require little to no additional funding	Local funding	Wayne County EM	Communications
	Hazard(s) Addressed: Dam & Levee Failure, Earthquake, Flood, Hazardous Materials Incident, Severe Summer Weather, Severe Winter Weather, Tornado, Wildfire Objective Alignment: 3 Priority: 9 Status: ON-GOING. This action appeared in the 2018 plan as "Wayne County 18." Though it is a response-centric effort, it remains in this plan for integration and alignment purposes. The Huntington amateur radio club recently put a pocket repeater in Wayne County's tower, and they have plans to soon put a voice repeater in.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
WC-3	Problem Statement: Cellular coverage is spotty in the southern portions of Wayne County. Support the installation of cellular towers in the county.	Structure & Infrastructure Projects	5 years	Support for efforts requires no funding, but there will be a time commitment lobbying for Wayne County locations	Private investment	Wayne County 911 Support: Wayne County Commission	Communications
	Hazard(s) Addressed: Dam & Levee Failure, Earthquake, Flood, Hazardous Materials Incident, Severe Summer Weather, Severe Winter Weather, Tornado, Wildfire Objective Alignment: 3 Priority: 3 Status: ON-GOING. This action was combined with the amateur radio action in the 2018 plan; Wayne County opted to separate it into its own action for this update to better highlight the need that it serves (and to address what is, in effect, an entirely separate problem).						
WC-4a	Problem Statement: There are deficient, high-hazard potential dams in the county. Coordinate with WVDEP Dam Safety to identify dams classified (by WVDEP) as "deficient," and work, as appropriate, with dam owners and other stakeholders to correct the deficiency.	Local Plans & Regulations	5 years	Coordination should require little to no additional funding	Local funding	Wayne County EM	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure Objective Alignment: 4 Priority: 7 Status: ON-GOING. This action represents a revision of "Wayne County 19" from the 2018 plan. Wayne County EM works closely with dam owners to maintain copies of EAPs for dams in the county. Recently, Wayne County EM attended a tabletop exercise at the Beech Fork facility.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
WC-4b	Problem Statement: There are deficient, high-hazard potential dams in the county. Implement operation maintenance of dam structures and floodways.	Structure & Infrastructure Projects	5 years	Unknown	Unknown	Wayne County EM Support: Fort Gay, USACE	Safety & Security
	Hazard(s) Addressed: Dam & Levee Failure Objective Alignment: 4 Priority: 10 Status: ON-GOING. There is an old lock near Fort Gay on the Big Sandy River over which water freely flows. There is consideration about whether to remove this structure. This action appeared in the 2018 plan as "Wayne County 8," and it remains here because these considerations are on-going.						
WC-5	Continue to enforce and update, as appropriate, the county's floodplain ordinance.	Local Plans & Regulations	On-going	NFIP administration is already in the county's budget	Local funding	Wayne County FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 3 Status: ON-GOING. This action is an on-going (and effective) effort; therefore, it remains in the plan. It appeared in the 2018 plan as "Wayne County 2."						
WC-6	Problem Statement: Wayne County has 2,208 structures in high-risk effective and advisory floodplains (per TEIF data), 274 of which could have damage exceeding 50%. Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$114,200 per structure (median value of owner-occupied housing units, Wayne County)	BRIC, FMA, HMGP	Wayne County EM Support: Lincoln County EM	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. At the time of the 2024 update, the county had begun an FMA project to mitigate some repetitive loss properties. The county continues to consider these options as and if funding is available. The action appeared in the 2018 plan as "Wayne County 20."						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
WC-7	Problem Statement: Wayne County averaged 27.2 drug-related deaths per year between 2018 and 2023. Continue to coordinate with public health, medical, and social services entities to support efforts to address substance abuse issues.	Education & Outreach Activities	On-going	Coordination should require little to no additional funding	Local funding	WCHD	Health & Medical
	Hazard(s) Addressed: Substance Use Crisis Objective Alignment: 3 Priority: 1 Status: NEW. Wayne County added this action as part of the 2024 update.						
WC-8	Problem Statement: Cyberattacks on critical assets (e.g., hospitals, schools, utilities, etc.) are seemingly on the rise. Identify fusion liaison officers (FLO) in Wayne County that can share information related to credible threats of cyberattacks, increased malicious cyber activity, etc.	Education & Outreach Activities	5 years	Emergency services personnel can participate in the FLO program at no cost	Local funding	Wayne County EM	Safety & Security
	Hazard(s) Addressed: Cyber Incidents Objective Alignment: 2 Priority: 5 Status: NEW. Wayne County added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
WC-9a	Problem Statement: In Wayne County, there are 654 structures with aggregated value of $16,119,958 with medium or high susceptibility to landslides (per TEAL data). Educate property owners as to their risk to support individual decision-making.	Education & Outreach Activities	5 years	$1,500 (general estimate to compile and distribute information)	Local funding	Wayne County EM	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 2 Priority: 8 Status: NEW. Wayne County added this action as part of the 2024 update.						
WC-9b	Problem Statement: In Wayne County, there are 654 structures with aggregated value of $16,119,958 with medium or high susceptibility to landslides (per TEAL data). If and as funding is available, mitigate properties damaged by or at risk of landslide damage.	Structure & Infrastructure Projects	5 years	$114,200 per structure (median value of owner-occupied housing units, Wayne County)	BRIC, HMGP	Wayne County Commission Support: Wayne County EM	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 1 Priority: 10 Status: NEW. Wayne County added this action as part of the 2024 update.						

Ceredo, Town of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
CER-1	Problem Statement: Ceredo has 83 structures in high-risk effective and advisory floodplains (per TEIF data), 36 of which could have damage exceeding 50%. Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$114,200 per structure (median value of owner-occupied housing units, Wayne County)	BRIC, FMA, HMGP	Ceredo FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action appeared in the 2018 plan as "Ceredo 1." The town continues to consider this action as and if funding is available.						
CER-2	Identify specific areas within the jurisdiction that are susceptible to the impacts of any hazards (e.g., site-specific flood from stormwater backup) to develop future mitigation strategies.	Local Plans & Regulations	On-going	Identifying and prioritizing areas for consideration should require minimal funding	Local funding	Town Council Support: Wayne County FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood, Hazardous Materials Incident, Landslide & Land Subsidence Objective Alignment: 3 Priority: 4 Status: ON-GOING. This action appeared in the 2018 plan as "Ceredo 2." It had not been completed but remains as a means of guiding future mitigation efforts.						
CER-3	Continue to enforce and update, as appropriate, the town's floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the town's budget	Local funding	Ceredo FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 2 Status: NEW. Ceredo added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
CER-4	Problem Statement: In Ceredo, there are 25 structures with an aggregated value of $886,700 with medium or high susceptibility to landslides (per TEAL data). Educate property owners as to their risk to support individual decision-making.	Education & Outreach Activities	5 years	$1,500 (general estimate to compile and distribute information)	Local funding	Town Council	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 1 Priority: 3 Status: NEW. Ceredo added this action as part of the 2024 update.						

Fort Gay, Town of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
FG-1	Problem Statement: Fort Gay has 82 structures in high-risk effective and advisory floodplains (per TEIF data), 10 of which could have damage exceeded 50%. Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$114,200 per structure (median value of owner-occupied housing units, Wayne County)	BRIC, FMA, HMGP	Fort Gay FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action appeared in the 2018 plan as "Fort Gay 1." The town will consider it as and if funding is available.						
FG-2	Continue to enforce and update, as appropriate, the town's floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the town's budget	Local funding	Fort Gay FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 2 Status: NEW. Fort Gay added this action as part of the 2024 update.						
FG-3	Problem Statement: In Fort Gay, there are 16 structures with an aggregated value of $96,250 with medium or high susceptibility to landslides (per TEAL data). Educate property owners as to their risk to support individual decision-making.	Education & Outreach Activities	5 years	$1,500 (general estimate to compile and distribute information)	Local funding	Town Council	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 1 Priority: 3 Status: NEW. Fort Gay added this action as part of the 2024 update.						

Kenova, City of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
KEN-1	Continue coordinating with the WVDOH to conduct culvert inspections/cleaning through the city. Protect bridges and roadways from flooding hazards.	Structure & Infrastructure Projects	On-going	Coordination should require little to no additional funding	Local funding	WVDOH Support: City Council	Transportation
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 2 Status: ON-GOING. The city elected to keep this action in the 2024 plan; city officials regularly coordinate with WVDOH when there are roadway issues.						
KEN-2	Problem Statement: Kenova has 88 structures in high-risk effective and advisor floodplains (per TEIF data), one of which could have damage exceeding 50% and 15 which could have damage between 25 and 49%. Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$114,200 per structure (median value of owner-occupied housing units, Wayne County)	BRIC, FMA, HMGP	Kenova FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: 1 Status: ON-GOING. This action appeared in the 2018 plan as "Kenova 2." The city will consider it as and if funding is available.						
KEN-3	Continue to enforce and update, as appropriate, the city's floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the city's budget	Local funding	Kenova FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 2 Status: NEW. Kenova added this action as part of the 2024 update.						

Wayne, Town of

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
WAY-1	Problem Statement: Wayne has 202 structures in high-risk effective and advisory floodplains (per TEIF data), one of which could have damage exceeding 50% and six of which could have damage between 25 and 49%. Acquire/relocate or elevate structures with a high risk of flooding.	Structure & Infrastructure Projects	5 years	$114,200 per structure (median value of owner-occupied housing units, Wayne County)	BRIC, FMA, HMGP	Wayne FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 3 Priority: Status: ON-GOING. This action appeared in the 2018 plan as "Wayne 1." The town will consider it as and if funding is available.						
WAY-2	Continue to enforce and update, as appropriate, the town's floodplain ordinance.	Loal Plans & Regulations	On-going	NFIP administration is already in the town's budget	Local funding	Wayne FP Coordinator	Safety & Security
	Hazard(s) Addressed: Flood Objective Alignment: 1 Priority: 2 Status: NEW. Wayne added this action as part of the 2024 update.						

Project Number	Action	Action Type	Imp. Schedule	Est. Cost	Potential Funding	Lead Agency	Community Lifeline
WAY-3	Problem Statement: In Wayne, there are 29 structures with an aggregated value of $711,933 with medium or high susceptibility to landslides. Educate property owners as to their risk to support individual decision-making.	Education & Outreach Activities	5 years	$1,500 (general estimate to compile and distribute information)	Local funding	Town Council	Safety & Security
	Hazard(s) Addressed: Landslides & Land Subsidence Objective Alignment: 1 Priority: 3 Status: NEW. Wayne added this action as part of the 2024 update.						

4.0 PLAN MAINTENANCE AND INTEGRATION

Monitoring, evaluating, and updating this plan is critical to maintaining its value and success in the region's hazard mitigation efforts. Ensuring effective implementation of mitigation activities paves the way for continued momentum in the planning process and gives direction for future value. This section explains who will be responsible for maintenance activities and what those responsibilities entail. It also provides a methodology and schedule of maintenance activities, including a description of how the public will have the opportunity to participate regularly.

4.0 PLAN MAINTENANCE AND INTEGRATION

4.1 Monitoring, Evaluating, and Updating the Plan

§201.6(c)(4)(i)	[The plan maintenance process shall include a] section describing the method and schedule of the monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

Region 2's steering committee made minimal changes to the plan maintenance process from the 2017 version of the plan. That process added an annual meeting schedule, and despite the presence of the COVID-19 pandemic, the steering committee met each year during the planning cycle. As such, much of what was outlined in 2017 will remain in place. The changes that do appear in this section centered on using resources available in the latest version of FEMA's *Local Mitigation Planning Handbook* (USDHS FEMA, 2023c).

For the 2024-2029 planning cycle, **the Region 2 Planning and Development Council (PDC) will continue to be the custodial agency for the region's mitigation plan**. In this role, the PDC will be responsible for maintaining the document, including making it available to member governments and the public as well as coordinating with the steering committee and convening annual meetings in Years 2, 3, and 4. (In Year 1, the focus will be on supporting the PDC's 30 member governments with plan adoption.) In Year 3, the PDC will work with the West Virginia Emergency Management Division (WVEMD) to initiate the next update, and once funding is secured, convene the steering committee for the more intensive, formal updating process. The monitoring, evaluating, and updating process will generally follow FEMA's "mitigation planning wheel" (see image at right). **Years 2, 3, and 4 provide opportunities to track the progress/status of the mitigation actions identified in Section 3.0 and to evaluate the overall effectiveness of the plan.**

The goal will be for annual meetings to be in-person, though the PDC recognizes the value of hybrid meeting options. The PDC will target the second or third quarter of the year for meetings.

The PDC will request steering committee members to be engaged in the following activities before and after the annual meetings.

TASKS ASSOCIATED WITH THE ANNUAL MEETING		
Before the Meeting	*During the Meeting*	*After the Meeting*
• If associated with a participating jurisdiction, implement jurisdictional projects and track their status • Maintain records of changes in the jurisdiction (e.g., community or economic development) that may affect the risks faced by the community • Keep updated records of assets	• See questions below	• Continue to implement mitigation projects • Continue to maintain records of changes in the jurisdiction that may affect risks and vulnerability • Continue to keep updated records of assets

The agendas for the annual meetings will be flexible, but the PDC will structure the agendas around the questions posed in Worksheet #10 (USDHS FEMA, 2023c, pp. 227-229), which will ensure the steering committee is considering not only things like project status **but also evaluating the plan for its effectiveness**. Those questions include the following.

Planning Process

- How have communities and agencies helped to carry out mitigation actions?
- Could anything from the initial planning process be done more efficiently?
- Have there been any changes in public support or priorities about hazard mitigation?
- Is there anything else, process-wise, we should be considering?

Public Involvement

- Has the public been actively involved in the plan's implementation?
- How can public participation improve?

Risk Assessment

- Have there been any recent disaster events? If so, how did they impact the region?
- Should the list of hazards addressed in the plan be updated? How so?
- Have there been any new issues with hazards in areas of the region?
- Are any new data sources available (e.g., studies, reports, maps, etc.)?
- Do any new critical facilities or infrastructure need to be added to the asset lists?

- Have any changes in development occurred that could create additional risks?
- Does any new development reduce risk?

Mitigation Strategy

- Have jurisdictions adopted new policies, plans, regulations, or reports that could support the plan?
- Are there different or new education and outreach programs and resources available for mitigation activities?
- Has NFIP participation changed in any participating jurisdictions?
- Is the mitigation strategy being carried out as expected? What types of issues have communities encountered?
- Are there new projects to consider?
- Should existing mitigation actions be revised or removed from the plan?
- Are there new funding sources to consider?
- Have parts of the plan been worked into other planning mechanisms?

In particular, the PDC understands that the WVEMD, the West Virginia State Resiliency Office, and other partners are actively working to enhance resilience throughout the state, which includes reducing risk where appropriate and able. When scheduling the annual meeting, the PDC will contact the WVEMD to determine whether any new initiatives would warrant inclusion on the annual meeting's agenda.

As noted in the table above, the PDC will request that steering committee members track the status of projects associated with their jurisdictions. **Worksheet #9 from the *Local Mitigation Planning Handbook* (2023, pp. 225-226, reproduced here) can be useful for tracking the progress and status of mitigation actions**.

PROJECT STATUS/EVALUATION WORKSHEET	
Category	*Notes*
Progress Report Period:	
Describe the action or project.	
Who is responsible for the action?	
Project status:	□ Complete □ In progress, anticipated completion date: _____ □ Not started □ Cancelled
Has there been any progress with this project so far?	
Are there any obstacles or challenges with this action so far?	
What steps do you need to take to complete this project?	
Other comments:	

For Region 2, the PDC opted for a steering committee approach to guiding the direction of the plan, and it is the steering committee that meets annually during the five-year planning cycle. Not all participating jurisdictions sit on the steering committee. The PDC will contact those participants directly. This outreach will capture any notes the jurisdiction would like to add regarding risk and vulnerability, ask for status updates on projects, and determine whether any development in or around the jurisdiction may have implications for overall risk.

4.0 PLAN MAINTENANCE AND INTEGRATION

4.2 Implementation through Existing Programs

§201.6(c)(4)(ii)	[The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

The jurisdictions participating in this planning process have used a variety of funding to complete mitigation projects in the past, including the Hazard Mitigation Grant Program (HMGP), Homeland Security Grant Program (HSGP), Emergency Management Performance Grant (EMPG), Community Development Block Grant (CDBG), and local funding. Recently, communities have explored the Building Resilient Infrastructure in Communities (BRIC) and High-Hazard Potential Dams (HHPD) programs. Local government policies and programs have supported the use of this funding and, thus, the implementation of mitigation projects. Further, to date, participating jurisdictions have demonstrated a capability to successfully implement and administer mitigation projects.

As a FEMA-centric effort, many local leaders look at the mitigation planning process as an emergency management effort, and indeed many emergency managers in the region have participated in successful projects using the above sources of funding. The synergies with emergency management, though, ensure a consideration of risk reduction through preparedness initiatives. Preparing for a more efficient response *can* reduce hazard-related losses like property damage (by more quickly stabilizing an incident), injuries and deaths (through quicker responses and by responders being better trained to assess and identify problems), etc. As such, the region's emergency managers can assist other stakeholders in integrating elements of this mitigation strategy into emergency operations and business continuity planning mechanisms.

<table>
<tr><th colspan="3">IMPLEMENTATION THROUGH EXISTING PROGRAMS: EMERGENCY PREPAREDNESS PLANNING</th></tr>
<tr><th>Planning Initiative</th><th>Objective Alignment
(see Section 3.1)</th><th>Relevance</th></tr>
<tr><td>Emergency Operations Planning</td><td>O3: Sustain 100% of the existing, ongoing preparedness activities, partnerships, and programs supporting mitigation, response, and recovery in the region.</td><td>• Identify and plan for operations in hazard areas
• Hazard mapping informs high-risk areas</td></tr>
<tr><td colspan="3"><u>Specific Integration Action(s)</u>
When sponsoring updates to emergency operations plans, add brainstorming for risk reduction along with designing response measures.
APPLICABLE JURISDICTIONS: Cabell Co., Lincoln Co., Logan Co., Mason Co., Mingo Co., Wayne Co. (through each county's emergency manager [as well as the Cabell-Wayne Local Emergency Planning Committee])

Bring information relevant to other preparedness phase discussions (e.g., Tier II filings for hazardous materials, prime/auxiliary power surveys, function and access needs registries) to discussions about implementing this plan.
APPLICABLE JURISDICTIONS: Cabell Co., Lincoln Co., Logan Co., Mason Co., Mingo Co., Wayne Co. (through each county's emergency manager [as well as the Cabell-Wayne Local Emergency Planning Committee])</td></tr>
<tr><td>Business Continuity Planning</td><td>O2: Educate and train 25% of the local officials and 10% of the public in the region on the present hazard risks and measures they can take to reduce risks from those hazards.</td><td>• Sustain local government, critical infrastructure, and key economic operations during significant events</td></tr>
<tr><td colspan="3"><u>Specific Integration Action(s)</u>
Compile (or update) a continuity of operations (COOP) and continuity of government (COG) plan.
APPLICABLE JURISDICTIONS: Cabell Co., Barboursville, Huntington, Milton, Lincoln Co., Hamlin, West Hamlin, Logan Co., Chapmanville, Logan, Man, Mitchell Heights, West Logan, Mason Co., Hartford, Leon, Mason, New Haven, Point Pleasant, Mingo Co., Delbarton, Gilbert, Kermit, Matewan, Williamson, Wayne Co., Ceredo, Fort Gay, Kenova, Wayne

Share information from Section 2.0 with county-level economic development agencies and encourage them to make the information available, as appropriate, to prospective developers and businesses. This information may enable data-driven decisions about property development, continuity measures, etc.
APPLICABLE JURISDICTIONS: Cabell Co., Lincoln Co., Logan Co., Mason Co., Mingo Co., Wayne Co. (through each county's economic development agency)</td></tr>
</table>

Looking at hazard mitigation as *only* an emergency management initiative, though, omits many possible synergies. For instance, the Region 2 Planning and Development Council (PDC) serves as a clearinghouse for various development projects in the region. By vetting those projects, PDC personnel can (a) keep records on development projects that may increase or

reduce risks in participating communities, and (b) potentially offer ideas on how project sponsors might make their projects more resilient (by making them aware of potential risks in their project areas, etc.). The PDC creates and maintains a regional economic development strategy with its member governments (i.e., the Community Economic Development Strategy, or "CEDS" document). This effort recurs annually and is an opportunity for local officials to consider the hazards identified in this risk assessment (see Section 2.0: Risk Assessment above) and the hazard areas it identifies as decisions regarding economic development are made. The PDC compiles the CEDS per guidance from the U.S. Economic Development Administration (USEDA) (USEDA, n.d.), and recent updates to that guidance have recommended the inclusion of "economic resilience" and "climate resilience" chapters to further reinforce the need to consider mitigation and preparedness alongside development.

IMPLEMENTATION THROUGH EXISTING PROGRAMS: COMPREHENSIVE ECONOMIC DEVELOPMENT STRATEGY		
Planning Initiative	*Objective Alignment (see Section 3.1)*	*Relevance*
Comprehensive Economic Development Strategy (CEDS)	O2: Educate and train 25% of the local officials and 10% of the public in the region on the present hazard risks and measures they can take to reduce risks from those hazards.	• Economic and climate resilience chapters prompt examination of potential future impacts • Integrates the efforts of the private sector into mitigation
Specific Integration Action(s) When updating the CEDS, hold a separate planning workshop for economic and climate resilience. Note ideas generated through that process and present them at an annual steering committee meeting. APPLICABLE JURISDICTIONS: Region 2 PDC Consider co-scheduling the workshop noted in the integration action above with the annual steering committee meeting. APPLICABLE JURISDICTIONS: Region 2 PDC		

The CEDS document, though, is not the only program that advocates for community and economic development.

IMPLEMENTATION THROUGH EXISTING PROGRAMS: COMMUNITY & ECONOMIC DEVELOPMENT PLANNING		
Planning Initiative	*Objective Alignment (see Section 3.1)*	*Relevance*
Comprehensive Planning	O2: Educate and train 25% of the local officials and 10% of the public in the region on the present hazard risks and measures they can take to reduce risks from those hazards.	• Hazard mapping contextualizes decisions concerning areas targeted for development • Provides for alignment with development and green infrastructure or low-impact development techniques • Identifies potential future assets of concern

Specific Integration Action(s)

Compile lists of goals and objectives from existing comprehensive plans and share them during annual steering committee meetings (these goals could inform answers to the following questions listed in Section 4.1 above: "Have jurisdictions adopted new policies, plans, regulations, or reports that could support the [mitigation] plan?" and "Are there different or new education and outreach programs and resources available for mitigation activities?")

APPLICABLE JURISDICTIONS: Region 2 PDC, KYOVA Interstate Planning Commission, Cabell Co., Huntington, Lincoln Col, Logan Co., Logan, Mason Co., Mingo Co., Williamson, Wayne Co.

Create a regional geographic information system (GIS) mapping layer to identify areas targeted for residential, commercial, recreational, industrial, etc., development by existing comprehensive plans.

APPLICABLE JURISDICTIONS: Region 2 PDC, KYOVA Interstate Planning Commission, Cabell Co., Huntington, Lincoln Col, Logan Co., Logan, Mason Co., Mingo Co., Williamson, Wayne Co.

Invite jurisdictional emergency managers to attend meetings associated with future comprehensive plan updates. (The emergency managers can provide insight into responder capabilities, risk areas, etc.)

APPLICABLE JURISDICTIONS: Region 2 PDC, KYOVA Interstate Planning Commission, Cabell Co., Huntington, Lincoln Col, Logan Co., Logan, Mason Co., Mingo Co., Williamson, Wayne Co.

Infrastructure Development	O2: Educate and train 25% of the local officials and 10% of the public in the region on the present hazard risks and measures they can take to reduce risks from those hazards.	• Ensures the protection of natural features when undertaking infrastructure projects • Support resilience by extending or improving public utility service to residents

Specific Integration Action(s)

Map areas *not* currently served by water or sewer (as well as those with spotty communications coverage). Use these maps when discussing potential mitigation actions, special populations, etc., as this plan is implemented.

APPLICABLE JURISDICTIONS: Cabell Co., Barboursville, Huntington, Milton, Lincoln Co., Hamlin, West Hamlin, Logan Co., Chapmanville, Logan, Man, Mitchell Heights, West Logan, Mason Co., Hartford, Leon, Mason, New Haven, Point Pleasant, Mingo Co., Delbarton, Gilbert, Kermit, Matewan, Williamson, Wayne Co., Ceredo, Fort Gay, Kenova, Wayne

IMPLEMENTATION THROUGH EXISTING PROGRAMS: COMMUNITY & ECONOMIC DEVELOPMENT PLANNING		
Planning Initiative	*Objective Alignment (see Section 3.1)*	*Relevance*
Economic Development	O2: Educate and train 25% of the local officials and 10% of the public in the region on the present hazard risks and measures they can take to reduce risks from those hazards.	• Justifies resilient construction measures • Establishes transparency with prospective developers
Specific Integration Action(s) Share information from Section 2.0 with county-level economic development agencies and encourage them to make the information available, as appropriate, to prospective developers and businesses. This information may enable data-driven decisions about property development, continuity measures, etc. APPLICABLE JURISDICTIONS: Cabell Co., Lincoln Co., Logan Co., Mason Co., Mingo Co., Wayne Co. (through each county's economic development agency)		
Social Services Integration	O1: Increase the number of resources available for creating and enforcing codes, rules, regulations, ordinances, and programs for reducing risk.	• Identifies under-served populations (and their potential needs) • Identifies additional partners for the implementation of this plan
Specific Integration Action(s) Compile lists of service providers for function and access needs populations in each of the region's counties. APPLICABLE JURISDICTIONS: Cabell Co., Lincoln Co., Logan Co., Mason Co., Mingo Co., Wayne Co. (through each county's emergency manager [as well as the Cabell-Wayne Local Emergency Planning Committee]) Coordinate with service providers (identified in the previous integration action) to create and distribute a survey to clients that gauges the primary concerns of under-represented populations. APPLICABLE JURISDICTIONS: Cabell Co., Lincoln Co., Logan Co., Mason Co., Mingo Co., Wayne Co. (through each county's emergency manager [as well as the Cabell-Wayne Local Emergency Planning Committee]) During the 2024 update, various entities providing or supporting social services participated effectively in the planning process (e.g., Williamson Health and Wellness Center); consider inviting a sampling of those agencies to participate as steering committee members. APPLICABLE JURISDICTIONS: Region 2 PDC		

Section 1.3: Capabilities suggests that zoning represents an opportunity for risk reduction. In the most basic sense, though, zoning codes separate land use into various zones that describe what can be built and where (Planetizen, n.d.). Rather than restrict all construction on certain parcels, participating jurisdictions may use fundamental zoning concepts to identify the types of development that may be suitable for certain tracts of land. For instance, counties may identify areas as industrial-only, which allows for a concentration of certain types of risks (e.g., hazardous materials) in smaller areas. Though not "eliminating" the entire risk for the community, it could

decrease the number of properties exposed to the risk. This concept is achieved in practice throughout the region through the designation of industrial or business parks. Designating these park areas was convenient and practical as communities looked to ensure water, sewer, etc., utility coverage for these areas. Extending the framing of why it is beneficial to co-locate industrial (for example) land uses to include risk reduction may be a socially acceptable way to decrease future losses.

IMPLEMENTATION THROUGH EXISTING PROGRAMS: ZONING		
Planning Initiative	*Objective Alignment (see Section 3.1)*	*Relevance*
Zoning Codes	O1: Increase the number of resources available for creating and enforcing codes, rules, regulations, ordinances, and programs for reducing risk.	• Communicates potential risk areas • Suggests implications of being located within risk areas

Specific Integration Action(s)

Consider whether a basic land classification process would yield a benefit by communicating risks, risk areas, etc.

APPLICABLE JURISDICTIONS: Cabell Co., Barboursville, Huntington, Milton, Lincoln Co., Hamlin, West Hamlin, Logan Co., Chapmanville, Logan, Man, Mitchell Heights, West Logan, Mason Co., Hartford, Leon, Mason, New Haven, Point Pleasant, Mingo Co., Delbarton, Gilbert, Kermit, Matewan, Williamson, Wayne Co., Ceredo, Fort Gay, Kenova, Wayne

Building codes can also reduce risk by advocating for more resilient construction techniques. Steering committee members frequently recognized the potential inherent in building codes during its meetings in 2023, noting that it has been a topic of discussion in recent meetings with the WVEMD, the West Virginia State Resiliency Office, and FEMA Region III. Consequently, though there has been lukewarm interest in years past regarding adopting or strengthening building codes, the availability of dollars to support risk reduction projects *contingent on certain code-related measures being in place* may encourage more widespread adoption or updates.

IMPLEMENTATION THROUGH EXISTING PROGRAMS: BUILDING CODES		
Planning Initiative	*Objective Alignment (see Section 3.1)*	*Relevance*
Building Codes	O1: Increase the number of resources available for creating and enforcing codes, rules, regulations, ordinances, and programs for reducing risk.	• Provides parameters for and tangible examples of "resilient construction • Justified the need for and benefit of resilient construction
Specific Integration Action(s) Review opportunities to address high-potential impact hazards. APPLICABLE JURISDICTIONS: Cabell Co., Barboursville, Huntington, Milton, Lincoln Co., Hamlin, West Hamlin, Logan Co., Chapmanville, Logan, Man, Mitchell Heights, West Logan, Mason Co., Hartford, Leon, Mason, New Haven, Point Pleasant, Mingo Co., Delbarton, Gilbert, Kermit, Matewan, Williamson, Wayne Co., Ceredo, Fort Gay, Kenova, Wayne		

Finally, the Region 2 Planning and Development Council shares office space, staffing, and mission areas with the KYOVA Interstate Planning Commission. KYOVA serves as the metropolitan planning commission for the tri-state area of West Virginia, Kentucky, and Ohio; thus, it is a transportation planning agency and a forum for regional transportation discussions (KYOVA, n.d.). Similar to how the PDC can ensure consideration of resilience, risk reduction, etc., in general community and economic development projects, KYOVA can support a similar initiative for transportation projects in Cabell and Wayne Counites (as well as Putnam County, West Virginia, Lawrence County, Ohio, and Boyd and Greenup Counties in Kentucky).

IMPLEMENTATION THROUGH EXISTING PROGRAMS: TRANSPORTATION PLANNING		
Planning Initiative	*Objective Alignment (see Section 3.1)*	*Relevance*
Transportation Planning (General)	O2: Educate and train 25% of the local officials and 10% of the public in the region on the present hazard risks and measures they can take to reduce risks from those hazards.	• Use the hazard data from Section 2.0 above as a resource in transportation-related plans • Note the impacts of the projects identified by KYOVA plans as either increasing or reducing risk

Specific Integration Action(s)

Identify variables associated with transportation-centric projects that could be relevant to risk and vulnerability discussions (e.g., runoff generated by construction, etc.).

APPLICABLE JURISDICTIONS: KYOVA Interstate Planning Commission, Cabell Co., Barboursville, Huntington, Milton, Wayne Co., Ceredo, Fort Gay, Kenova, Wayne

Consider how the hazards identified in Section 2.0 above could impact the projects in transportation plans.

APPLICABLE JURISDICTIONS: KYOVA Interstate Planning Commission, Cabell Co., Barboursville, Huntington, Milton, Wayne Co., Ceredo, Fort Gay, Kenova, Wayne

4.0 PLAN MAINTENANCE AND INTEGRATION

4.3 Continued Public Involvement

§201.6(c)(4)(iii)	[The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.

The one aspect of the 2018-2023 planning cycle that did not go according to the previously identified plan maintenance process was continued public involvement. The COVID-19 pandemic and the responses that were underway to address it contributed to the issue. Additionally, soliciting public participation for the 2024 update was very difficult (see Section 1.1: Documentation of the Planning Process for additional discussion), and the online survey that garnered over 400 responses during the 2018 update yielded only 40 responses in 2023/2024. Steering committee members identified several under-represented populations during its meetings in support of the 2024 update, and a recurring theme within those discussions was outreach to the various social services providers in the region.

Public perspectives on risks, vulnerabilities, and the relevance of risk reduction efforts remain important, despite the challenges to obtaining the data. Between 2024 and 2029, the continued public involvement effort will be anchored on two initiatives: simplicity and availability. The PDC will post the following brief, simple survey on its website and leave the survey open for the entire planning cycle (i.e., 2024-2029). As such, steering committee members and participating jurisdictions can drive traffic to the survey *when it is convenient for them*, rather than at a single time of year. Online surveying tools capture the date and time of submissions, which will enable a temporal consideration of the data that is received.

The PDC will also have paper copies of the survey available, so steering committee members, PDC personnel, and participating jurisdictions can collect completed copies from participants in workshops, meetings, etc., associated with other, complementary projects (e.g., public meetings for development projects, health and wellness outreach efforts, etc.). Similarly, the PDC can provide the link and source survey document (i.e., a PDF of the paper copy) to social services providers for distribution to clientele, where appropriate. PDC staff can input responses received via paper into the online format. Offering and collecting paper copies, distributing the survey through partner agencies and participating jurisdictions, and maintaining an open digital survey increases access for those who may wish to participate.

Regarding simplicity, the online surveys from 2017 and 2023 were detailed and relevant. Responses would be helpful for mitigation (and preparedness generally). However, though not

significant, there was a time cost incurred by responding to those surveys. Being mindful of what data would be most useful in the near term *could* shorten the survey, decrease the time cost, and increase the number of respondents. Thus, the following call-out box contains a simplified survey, based on information identified as helpful or desired during 2023 steering committee discussions, that can serve as the basis of the 2024-2029 public survey.

REGION 2 PLANNING & DEVELOPMENT COUNCIL HAZARD MITIGATION PLAN
ANNUAL PUBLIC SURVEY

Please indicate how concerned you are about the following hazards where you live.

Hazard	Not At All Concerned	Somewhat Concerned	Concerned	Very Concerned
Acts of Violence	□	□	□	□
Cyber Incidents	□	□	□	□
Dam & Levee Failure	□	□	□	□
Drought	□	□	□	□
Earthquake	□	□	□	□
Epidemic/Pandemic	□	□	□	□
Extreme Temperatures	□	□	□	□
Flood	□	□	□	□
Hazardous Materials Incident	□	□	□	□
Landslides & Land Subsidence	□	□	□	□
Substance Use Crisis	□	□	□	□
Severe Summer Weather	□	□	□	□
Severe Winter Weather	□	□	□	□
Tornado	□	□	□	□
Wildfire	□	□	□	□

Of these hazards, which one concerns you the most? _____

Why does this hazard concern you the most? _____
_____
_____
_____

If community agencies had to share urgent information with you about a hazard, by which methods would you prefer to receive it? (Check all that apply.)

Television announcements or the news	□
Radio	□
Social media (X, Facebook, etc.)	□
A family member, neighbor, friend, or acquaintance	□
In the newspaper	□
Via wireless emergency notifications (text message)	□
Via county mass notification system	□
Via signage (electronic billboards)	□

As evidenced by the questions informing the agenda of the annual steering committee meeting in Section 4.1 above, the committee will consider public involvement at each of its annual meetings. When scheduling the annual meeting, the PDC will release the following press release via local media in the region (and via online and social media channels) in an attempt to boost public participation.

FOR IMMEDIATE RELEASE

Region 2 Planning & Development Council Looking for Input on Reducing Hazard Risks throughout the Region

The Region 2 Planning and Development Council, which is compiling annual updates to the region's hazard mitigation plan, wants residents to know that their voice matters when it comes to risk reduction. That's why the council is hosting a survey to find out what hazards concern the public the most.

The hazard mitigation plan outlines projects that governmental jurisdictions in Cabell, Lincoln, Logan, Mason, Mingo, and Wayne Counties can undertake to reduce or eliminate the losses that the community could face should a hazard occur. Losses could be structural, like damages to homes or businesses, or they could include severe injuries. But before regional officials can identify projects, they must know what hazards could be most damaging.

The council's existing plan contains a risk assessment that lays out potential impacts from 15 distinct hazards (most of which are naturally occurring). Even though this assessment outlines how frequently these hazards occur and how much damage they've caused in the past, knowing which ones *also significantly concern the public* helps to prioritize the selection and implementation of projects, particularly when funding is limited.

USE THIS SPACE TO ADD ANYTHING RELEVANT TO THE PROCESS AND SPECIFIC TO THE YEAR THIS IS RELEASED.

Residents may take the survey online at http://www.region2pdc.org. For those residents who do not have reliable internet access or would like to request additional accommodations, please call 304-529-3357 or visit the council's office at 400 Third Avenue in Huntington. Residents may also view the existing hazard mitigation plan on Region 2's website at http://www.region2pdc.org/hazard-mitigation-plan/.