



**Regional
Intergovernmental
Council**

Region 3 Hazard Mitigation Plan

Regional Intergovernmental Council
South Charleston, West Virginia

Released 2022

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REGION 3
HAZARD MITIGATION PLAN

RELEASED 2022
FOR THE REGIONAL INTERGOVERNMENTAL COUNCIL AND THE COUNTIES AND
MUNICIPALITIES THEREIN

REGION 3 HAZARD MITIGATION PLAN EXECUTIVE SUMMARY

The Region 3 Hazard Mitigation Plan of 2022 is an update to the 2017 plan. The Regional Intergovernmental Council updated the plan utilizing a planning committee with representatives from local government and non-governmental organizations (NGO). The first version of the regional plan is from 2012.

Region 3 consists of four counties (Boone, Clay, Kanawha, and Putnam), eight cities, and 17 towns. Region 3 has a total population of 268,045, and covers 2,108 square miles. The City of Charleston, which is the county seat of Kanawha County, is also the state capitol. This plan considers all jurisdictions, with the exception of the Town of Glasgow which opted to not participate in the process, and is therefore considered a multi-jurisdictional plan. The plan has been prepared in accordance with federal requirements outlined in Disaster Mitigation Act of 2000 (DMA, 2K) which requires local governments to formulate a hazard mitigation plan in order to be eligible for mitigation funds made available by the Federal Emergency Management Agency (FEMA).

For this update of the hazard mitigation plan, the committee selected 13 hazards to profile. These hazards include:

- Dam and Levee Failure
- Drought
- Earthquake
- Epidemic & Pandemic
- Extreme Temperatures
- Flooding
- Forest Fires
- Hazardous Materials Incidents
- Landslides & Land Subsidence
- Severe Storms
- Tornadoes
- Utility Interruptions
- Winter Storms

The committee added two new hazards, epidemic & pandemic, and utility disruptions, and separated winter storms from severe storms. The committee also elected to change mass movements to landslides and land subsidence and wildfires to forest fires. These changes were made to more accurately represent the risks within Region 3.

The addition of the epidemic & pandemic hazard came about as a result of the Coronavirus disease 2019 (COVID-19) pandemic. At the time this plan was submitted, there had 535 million confirmed cases and 6.3 million deaths reported worldwide from COVID-19 overwhelming the healthcare system, locally, nationally, and internationally. The committee selected to also add utility interruptions due to the aging infrastructure in the region and the frequent disruptions experienced by the residents. The utilities included in this profile are gas, electric, water, and wastewater. Although very few utilities are owned and operated by jurisdictions in Region 3, the committee was mindful that the local governing bodies can regulate how utilities are provided and maintained in their jurisdiction. Additionally, the committee selected to move winter storms out of the severe storm profile to allow for a more in depth analysis of both winter and summer type storm events.

The committee developed mitigation 10 goals for the region. These goals are comprehensive and support the regions mitigation strategy. The goals are as follows:

- Remove abandoned buildings from high-risk and other known-impact areas.
- Increase water flow capacities throughout the region.
- Increase stormwater management capabilities throughout the region.
- Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts.
- Protect Boone, Clay Kanawha and Putnam Counties from a catastrophic release or failure of a dam or coal waste slurry impoundment,
- Increase public awareness, understanding, support, and demand for hazard mitigation activities and future strategies or projects.
- Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and man-made hazards.
- Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties.
- Reduce the potential impact of natural and man-made disasters on Boone, Clay, Kanawha, and Putnam Counties historic structures and landmarks.
- Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties.

To accomplish these goals, the plan includes 321 mitigation projects. The plan includes five types of mitigation projects.

- Local plans and regulations
- Structure and infrastructure projects

- Natural systems protection
- Education programs
- Preparedness and response activities.

Local plans and regulations include such actions as enforcing floodplain regulations and developing a policy on issuing countywide burning bans during dry weather. Structure and infrastructure projects include such actions as acquisitions and demolition, elevation, relocation, and mitigation reconstruction, and purchasing generators for lift stations. Natural systems protection projects include planting trees to prevent soil erosion and performing channel modifications to increase flow capacities of rivers and streams. Education programs include partnering with local media to provide information on hazards, providing evacuation maps to the public, and informing the public to contact their insurance agency to verify coverage from all hazards. Preparedness and response activities include conducting evacuation drills to familiarize the general public on routes, and partnering with NGOs to provide emergency shelters.

Each project is aligned with at least one goal. As the goals address a variety of identified issues that face the region due to hazards, each jurisdictional project completed moves the region to a higher level of overall resiliency.

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1.0 INTRODUCTION

Purpose

The purpose of the Region 3 mitigation plan is to identify risks and vulnerabilities from hazards that affect Region 3. With these risks and vulnerabilities identified, local officials can reduce losses of life, injuries, and limit future damages by developing methods to mitigate or eliminate damages.

Scope

The *Region 3 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.

Plan Authority

The *Region 3 Hazard Mitigation Plan* is “multi-jurisdictional,” meaning that it includes several jurisdictions. Region 3 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). Section 322 of the Robert T. Stafford Act requires that local jurisdictions develop and submit plans meeting the criteria outlined in 44 CFR Parts 201.6.

When the content of this plan corresponds to a requirement of 44 CFR 201.6, it will include a description of the relevant guidance. The following table lists the requirements of 44 CFR 201.6 and identifies the sections of the plan fulfilling the guidance.

44 CFR 201.6 REQUIREMENTS IN THIS PLAN		
<i>Section</i>	<i>Description</i>	<i>Section in Plan</i>
§ 201.6	Local Mitigation Plans. The local mitigation plan is the representation of the jurisdiction's commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to reducing 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.	Section 1.0 Introduction
§ 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 The Planning Process

44 CFR 201.6 REQUIREMENTS IN THIS PLAN		
Section	Description	Section in Plan
§ 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 The Planning Process Section 4.3 Continued Public Involvement
§ 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 The Planning Process
§ 201.6(b)(3)	Review and incorporate, if appropriate, existing plans, studies, reports, and technical information	Section 1.3 Capabilities Section 1.4 Trends & Predictions Section 4.2 Implementation through Existing Programs
§ 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 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 on the probability of future hazard events.	Section 2.1 Hazards Identification Section 2.3 Hazard Profiles
§ 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 2.3 Hazard Profiles Section 2.4 Hazard Rankings Section 2.2.6 Flooding Profile
§ 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 2.3 Hazard Profiles
§ 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 2.3 Hazard Profiles
§ 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 1.4 Trends and Predictions
§ 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 2.3 Hazard Profiles
§ 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

44 CFR 201.6 REQUIREMENTS IN THIS PLAN		
<i>Section</i>	<i>Description</i>	<i>Section in Plan</i>
§ 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 and 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 6
§ 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 6
§ 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 Section 3.2 Mitigation Actions Section 5.0 Appendix 2

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.
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The communities served by West Virginia Region 3 Planning and Development Council, through the direction of the Region Intergovernmental Council began the process to update this plan in November of 2021; Region 3 contracted the services of JH Consulting, LLC, of West Virginia, (the consultant) to aid in the process. The consultants met with Region 3 staff to layout the process, timeline for the update, and determine the agency, department, organization, and jurisdictional representatives who would serve as committee members.

1.1.1 Planning Committee

The following table outlines the committee members that actively participated in the update of this plan. Region 3 utilized a “core planning committee,” and Region 3, its consultant, and committee members interfaced with the individual participating jurisdictions without representation on the committee separately. The committee approach allowed for more interaction between committee members and enabled more strategic discussions regarding implementing hazard mitigation and risk reduction in Region 3.

PLANNING COMMITTEE		
Affiliation	Name	Title
Regional Intergovernmental Council	Colt Sandoro	Executive Director
Regional Intergovernmental Council	Kelsey Tucker	Transportation Planning Manager
Regional Intergovernmental Council	Emily Hammond	Economic Resiliency Coordinator
Regional Intergovernmental Council	Sam Richardson	Transportation Planner
City of Charleston	Dan Vriendt	Planning Director
City of Madison	Steve Byus	Emergency Management Director
Boone County Emergency Management Agency	Michael Mayhorn	Director
West Virginia Conservation Agency	Judith Lyons	Watershed Program Manager
Charleston Area Alliance	Susan Salisbury	Vice-President
Kanawha County Homeland Security and Emergency Management	C.W. Sigman	Director
West Virginia Office of the Insurance Commission	Charles Grishaber	NFIP Coordinator
Putnam County Emergency Management	Mikyle White	Director

PLANNING COMMITTEE		
Affiliation	Name	Title
Clay County	Connie Kinder	Commissioner
Boone County Community and Economic Development Corporation	Kris Mitchell	Director
Kanawha County Planning and Community Development	Stephanie Petruso	Administrative Assistant
Federal Emergency Management Agency	Casey Garnett	Hazard Mitigation Community Planner

The committee came together eight times throughout the process, as described below. See Appendix 1 for agendas, meeting minutes, etc.

Committee Meeting 1

November 15, 2021 (In-person, Regional Intergovernmental Council)

The first committee meeting gave members the opportunity to familiarize themselves with each other and with the plan. The consultant provided a “Hazard Mitigation 101” overview to the committee. Following the overview the committee discussed goals for the plan update. It was noted that flooding is a high priority goal for Region 3. The committee was given “homework” assignments and had the opportunity to ask general questions before the meeting was adjourned.

Committee Meeting 2

January 10, 2022 (Virtual, GoToMeeting)

The second meeting was held virtually via the GoToMeeting platform. Following introductions, the committee re-visited the draft goal from meeting one. Several changes were made to the goals before they were finalized. Next, the committee discussed hazards to be included in the current update. The committee renamed “Mass Movements” to “Landslides and Land Subsidence,” “Wildfire” was changed to “Forest Fires,” and added “Utility Interruption” and “Epidemic/Pandemic” to the list of hazards included in the plan update.

Committee Meeting 3

October 13, 2021 (In-person, Regional Intergovernmental Council)

The third committee meeting was held at the Regional Intergovernmental Council office in South Charleston, West Virginia, with a virtual attendance option via the GoToMeeting platform. The committee discussed the ongoing jurisdictional outreach. County representatives on the committee discussed reaching out to their local counterparts to provide assistance.

The committee then discussed the public survey. Committee members reviewed the survey and added additional questions on flooding. The committee agreed once the survey was changed it was ready to be pushed out to the public. The committee also discussed jurisdictional assets and agreed that assets such as economic assets will be different depending on the size of the jurisdiction and the impact it has on the jurisdiction.

The next topic discussed was the project list. The consultant explained the designation of each existing project as they would need to be updated. The committee also discussed adding regional projects to this update. The final topic discussed was the use of TEIF & TEAL data for flooding and landslides.

Committee Meeting 4

February 14, 2022 (Virtual, GoToMeeting)

The fourth committee meeting was virtually via the GoToMeeting platform. This meeting focused on project prioritization. The committee decided to use the STAPLEE Evaluation Criteria. Using this method each project will be scored on a scale of 1-5, with five being the best outcome for each of the categories which include social, technical, administrative, political, legal, economic, and environmental factors. The committee also decided that projects that mitigate the flood hazard should be weighted for a higher priority. The Regional Intergovernmental Council also updated the committee on their capabilities to provide assistance to watershed groups.

Committee Meeting 5

March 14, 2022 (In-person, Regional Intergovernmental Council)

The fifth committee meeting was held at the Regional Intergovernmental Council office in South Charleston, West Virginia, with a virtual attendance option via the GoToMeeting platform. The committee received an update on the public survey responses. As of the date of the meeting, the survey had 87 respondents. The committee was provided and overview of some of the responses thus far.

Next the committee discussed new projects for this update. This was followed by a review of the jurisdictional capability survey. This survey will be used by the consultant during jurisdictional outreach. Jurisdictional outreach also included discussing TEIF & TEAL data and current and new projects. The final item was a request for the committee members to provide screenshots and other proof of distribution of the public survey.

Committee Meeting 6

April 11, 2021 (In-person, Regional Intergovernmental Council)

The sixth committee meeting was held at the Regional Intergovernmental Council office in South Charleston, West Virginia, with a virtual attendance option via the GoToMeeting platform. The primary agenda items were discussing the public survey, public meetings, prioritizing the regional projects and discussing jurisdictional participation.

As of the sixth meeting, 173 respondents had taken the public survey. The committee reviewed some of the answers and decided that the survey should be closed after the public meeting to be held on April 20, 2022, in Kanawha and Putnam Counties. The committee discussed the information that would be available at the public meetings. As both counties and the City of Charleston are Community Rating System (CRS) communities, the meetings will focus on the flooding hazard. The committee reviewed the handouts and also discussed the use of the WV Flood Tool Map at the meetings.

Next, committee member's prioritized the regional projects. Prioritization sheets were sent to those committee members who were unable to attend. The final item discussed was jurisdictional participation. Additional contact information was provided to the consultant to continue outreach to the jurisdictional representatives.

Committee Meeting 7

(In-person, Regional Intergovernmental Council)

The seventh committee meeting was held at the Regional Intergovernmental Council Office in South Charleston, West Virginia, with a virtual attendance option via the GoToMeeting platform. The primary agenda item was to review some of the draft hazard profiles. Committee members were provided copies prior to the meeting date for review. The committee also discussed ongoing jurisdictional participation. The consultant reported that several jurisdictions were not responsive after several emails and phone calls. Staff from the Regional Intergovernmental Council indicated that they would also attempt to make contact with these jurisdictions.

Committee Meeting 8

(In-person, Regional Intergovernmental Council)

The eighth committee meeting was held at the Regional Intergovernmental Council Office in South Charleston, West Virginia, with a virtual attendance option via the GoToMeeting platform. The primary agenda item was to discuss a draft of the plan update. Committee members were given two weeks to review the draft document prior to the meeting and were asked to provide any corrections or changes. The committee requested three changes to the document and approved it for submittal to the state. The consultant explained the next steps including submitting the plan to the state and FEMA, and jurisdictional adoption through resolution.

1.1.2 Jurisdictional Involvement

Between January 10, and May 25, 2022, Planning Development Council and contractor staff contacted all participating municipalities directly by phone, office visits, and web conferences. All of the jurisdictions within Region 3 participated in this update with the exception of the Town of Glasgow in Kanawha County. All cities, towns, and counties had the opportunity to provide input for the plan in the following ways.

- Attending meetings
- Completing the capabilities survey
- Updating their mitigation project lists (which could include updating status of existing projects or adding new projects)
- Providing information for the plan to the Regional Intergovernmental Council or the consultant via phone, in-person, or email

The following table identifies what activities jurisdictions completed.

REGION 3 HAZARD MITIGATION PLAN (2022 UPDATE) JURISDICTIONAL TASKS								
Community		Attended Planning Meetings	Capability	Projects Update	Added New Projects	Provided Info to R3 or Consult.	Promoted Public Involve.	Overall Participation Assessment
Boone	County	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clay	County	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kanawha	County	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Putnam	County	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Charleston	County	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dunbar	City	No	Yes	Yes	No	Yes	No	Yes
Hurricane	City	No	Yes	Yes	No	Yes	No	Yes
Madison	City	Yes	Yes	Yes	Yes	Yes	No	Yes
Marmet	No	Yes	Yes	No	Yes	No	Yes	Yes
Nitro	City	No	Yes	Yes	No	Yes	No	Yes
South Charleston	City	No	Yes	Yes	No	Yes	No	Yes
St. Albans	City	No	Yes	Yes	No	Yes	No	Yes
Bancroft	Town	No	Yes	Yes	Yes	Yes	No	Yes
Belle	Town	No	Yes	Yes	No	Yes	No	Yes
Buffalo	Town	No	Yes	Yes	No	Yes	No	Yes
Cedar Grove	Town	No	Yes	Yes	No	Yes	No	Yes
Chesapeake	Town	No	Yes	Yes	No	Yes	No	Yes
Clay	Town	No	Yes	Yes	No	Yes	No	Yes
Clendenin	Town	No	Yes	Yes	No	Yes	No	Yes
Danville	Town	No	Yes	Yes	No	Yes	No	Yes
Eastbank	Town	No	Yes	Yes	No	Yes	No	Yes
Eleanor	Town	No	Yes	Yes	No	Yes	No	Yes
Glasgow	Town	No	No	No	No	No	No	No
Handley	Town	No	Yes	Yes	No	Yes	No	Yes
Poca	Town	No	Yes	Yes	No	Yes	No	Yes
Pratt	Town	No	Yes	Yes	No	Yes	No	Yes
Sylvester	Town	No	Yes	Yes	No	Yes	No	Yes
Whitesville	Town	No	Yes	Yes	No	Yes	No	Yes
Winfield	Town	No	Yes	Yes	No	Yes	No	Yes

1.1.3 Additional Stakeholders

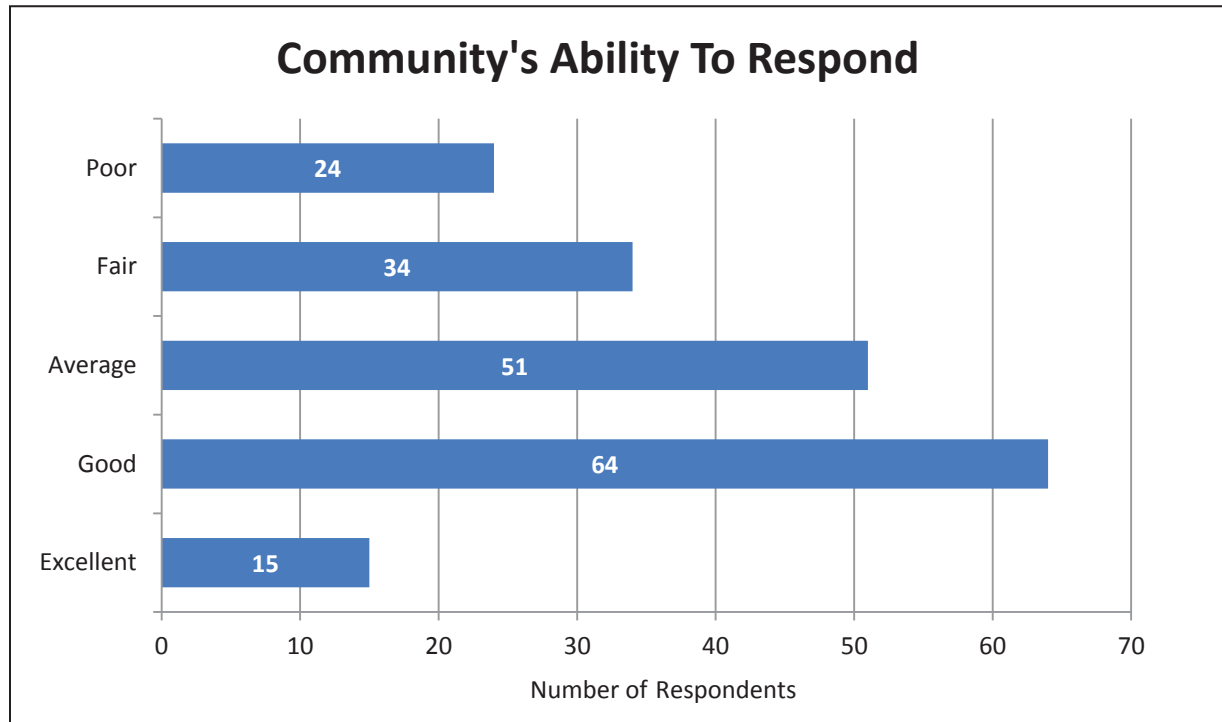
The Regional Intergovernmental Council sought to include input from extended stakeholders. This was accomplished by including partners from the West Virginia Office of the Insurance Commissioner, the West Virginia Emergency Management Agency, the West Virginia Conservation Agency, and the Charleston Area Alliance on the committee. The Regional Intergovernmental Council also submitted email requests to its neighboring regional planning and development councils to ask for input on risks originating in neighboring areas that could impact Region 3. Conversely, the Regional Intergovernmental Council asked if those PDCs had concerns about risks originating in Region 3 for which they could provide information.

1.1.4 Public Involvement

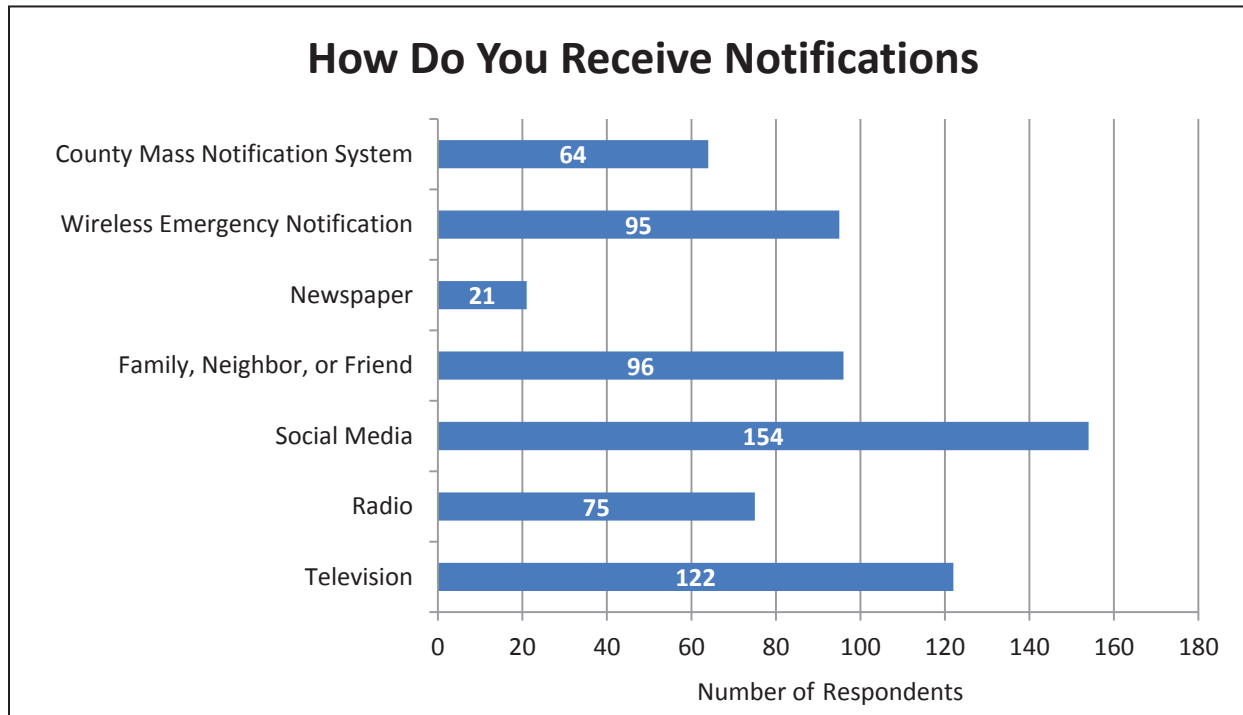
Region 3 involved the public using public meetings and an online survey. On May 20, 2022, public meetings were held at Kanawha County Courthouse and the Putnam County Courthouse. Representatives from Region 3 PDC, committee members, and other local representatives attended the meetings and presented information on the WV Flood Tool, protecting your property from flooding, and clearing debris from streams on or near your property. Attendees engaged in discussion with the committee members and other local representatives about hazards directly affecting their homes, businesses, and neighborhoods. Attendees were also provided the link to the online survey and contact information for their local emergency managers and floodplain coordinators.

Online, partners promoted a survey that asked residents about their views on hazards, their support for various mitigation actions, and their level of personal preparedness. Region 3 PDC posted the survey on their website on March 3, 2022, and committee members, jurisdictions within Region 3, and other stakeholders such as police and fire departments, were asked to post the link on their websites or social media accounts. On March 21, 2022, local news (WCHS) ran a story on the mitigation plan and public survey and provided the link on their website. The survey was closed on May 2, 2022. In total, 188 individuals completed the survey. The public felt most concerned about utility disruption incidents (137 respondents reported feeling either “concerned” or “very concerned”). Residents also reported concern over severe storm events, with 127 selecting “concerned” or “very concerned,” while 123 respondents selected those options for flooding. Residents were the least concerned about earthquakes, dam failures, droughts, and tornadoes. References to the results of the survey appear in subsequent sections below, as applicable to the topic of discussion.

Respondents were also asked to think back to a recent occurrence of any of the hazards and rate their community's ability to respond.

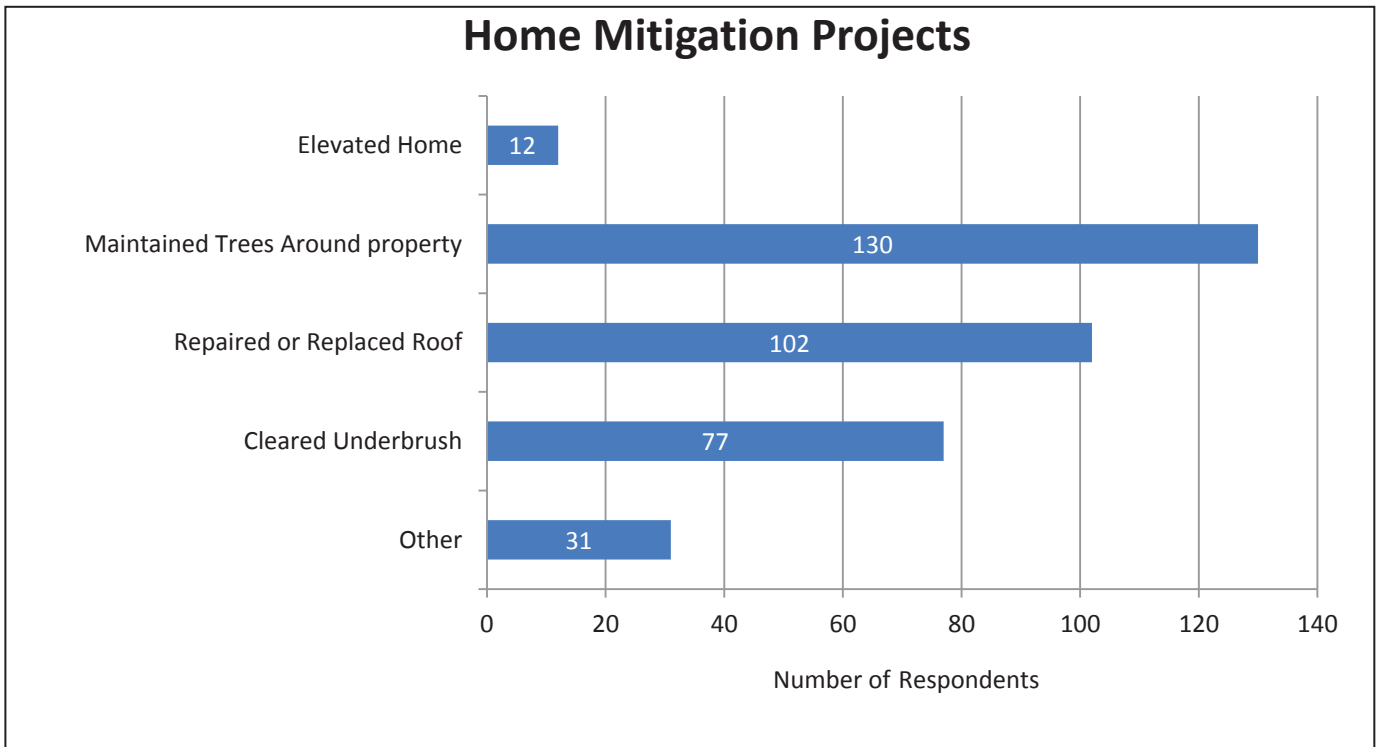


Next respondents were asked to identify how they receive information about hazards in their community. Participants selected all options that applied to them. The information is shown in the table below.

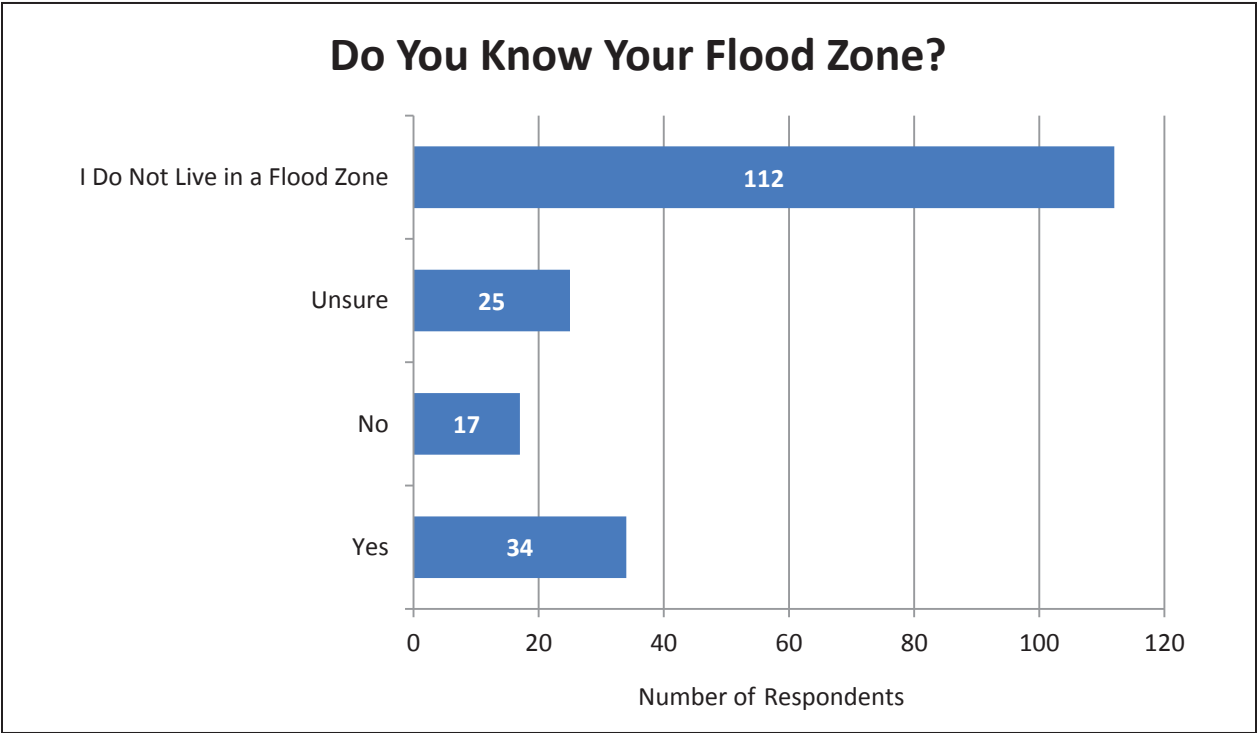
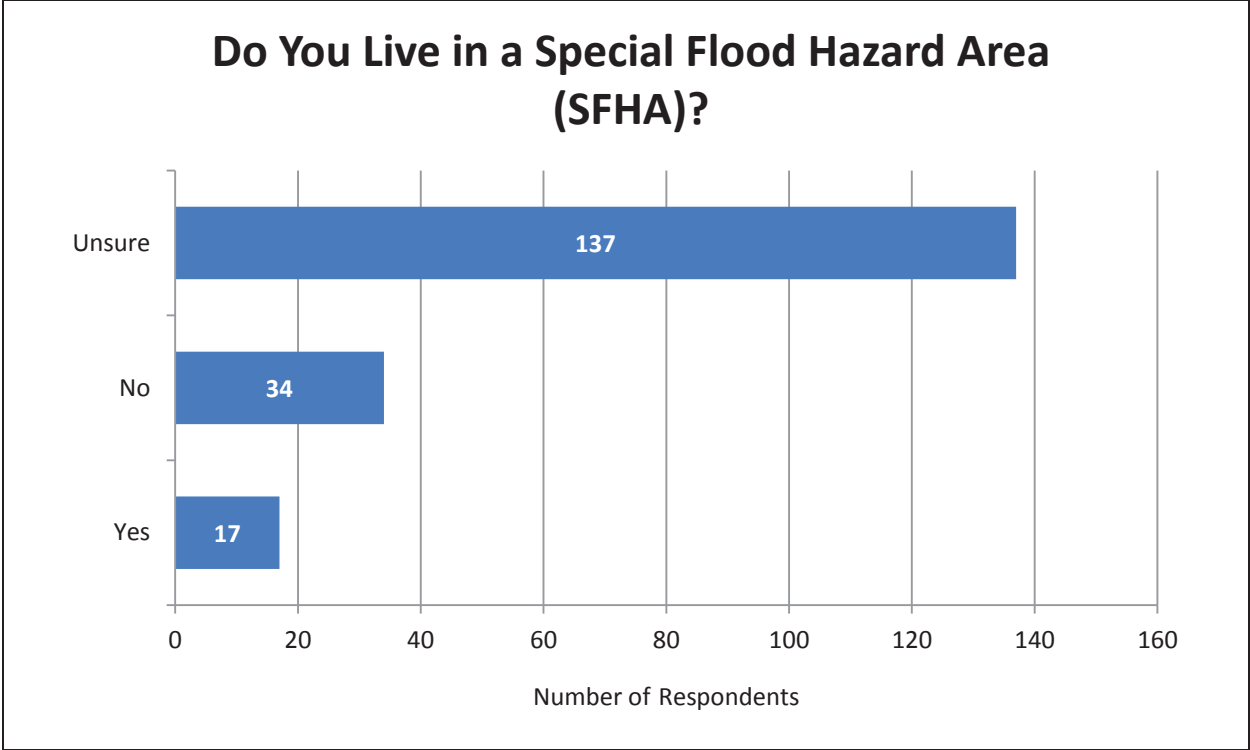


This question was followed up by asking if the information they received is accurate and effective, and allows the respondent to make appropriate decisions. 72% selected “Yes”; 22% selected “No”, while nine percent selected “Not Applicable.”

Respondents were asked about mitigation projects they have completed at their home or business. The participants were provided with five selections to choose from with the fifth being “Other” (information in graph below) If “Other” was selected, the respondent was provided space to write in their response. Some of the projects respondents listed as “Other” included: clearing streams around on the property, purchasing a backup generator, removing underbrush around property, installing sump pumps, and creating emergency plans and kits.



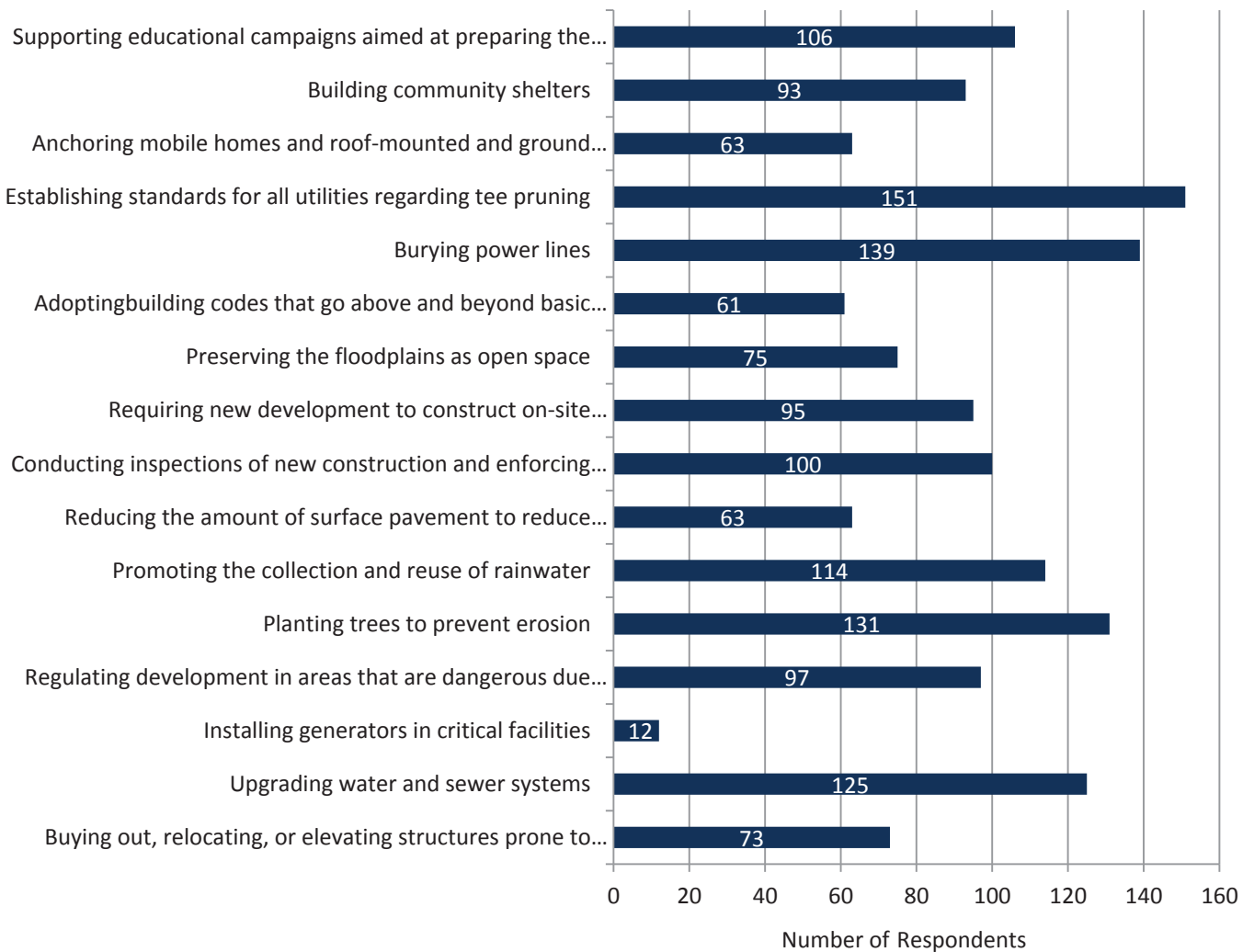
The next section of questions was based on flooding and the NFIP. Respondents were asked if they live in a special flood hazard area (SFHA) and if so, do they know which flood zone they live in (answers presented in the graphs below). This was followed by asking the respondent to list the flood zone they live in if applicable. This question also provided a link to the WV Flood Tool (<https://www.mapwv.gov/flood/map/>) that would allow the respondents to research the flood zone their property was in.

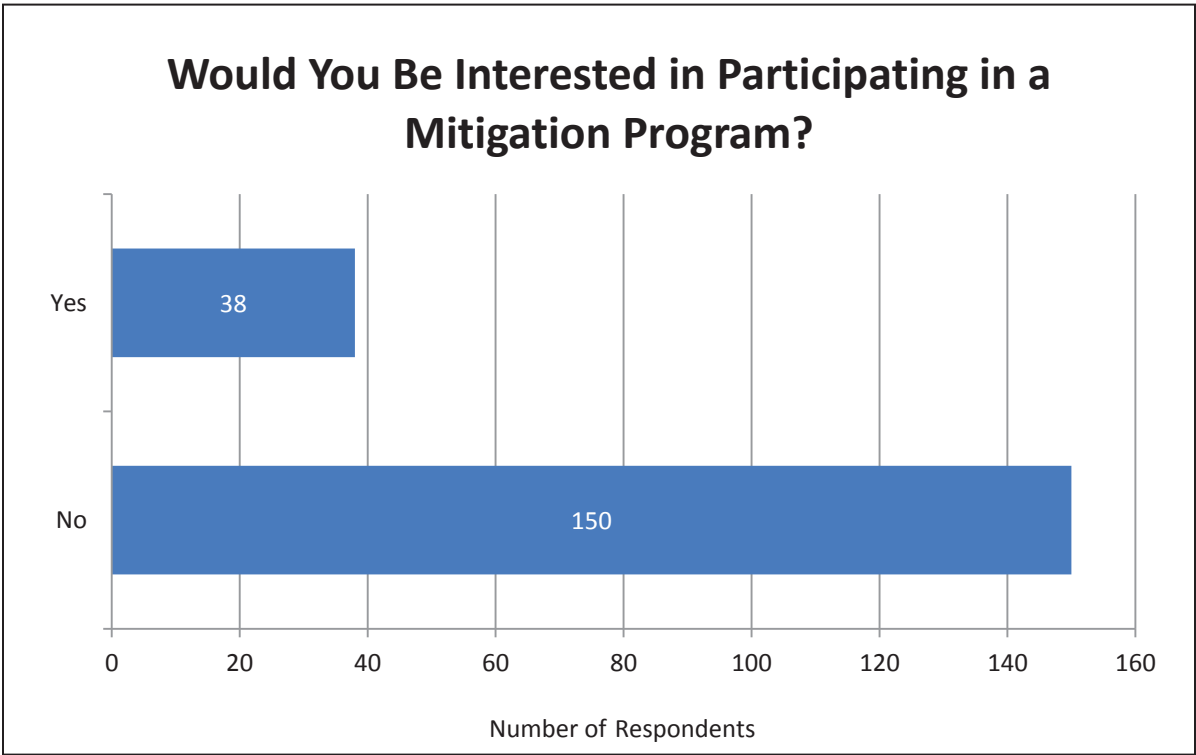


The final question regarding flooding asked if the respondent was insured through the National Flood Insurance Program (NFIP). 150 (79.8%) of the respondents answered “No” and 38 (20.2%) answered “Yes.”

Respondents were also asked about the type of mitigation actions they would support, and if they would be interested in participating in a mitigation program. The results are presented in the graphs below.

Types of Mitigation Actions You Would Support





Other questions in the survey focused on the county and zip codes respondents live in as well as basic demographic information. Raw data from the public survey can be found in Appendix 2 of this plan.

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.

1.2.1 Region 3

The Regional Intergovernmental Council (RIC) alternatively known as the Region 3 Planning and Development Council (PDC) is comprised of four counties located in southwest and central West Virginia. The counties contained within Region 3 include Boone, Clay, Kanawha, and Putnam. Region 3 also consists of eight cities and 17 towns. The region covers 2,108 square miles, of which 2,092 square miles are land, and 17.6 square miles are water.

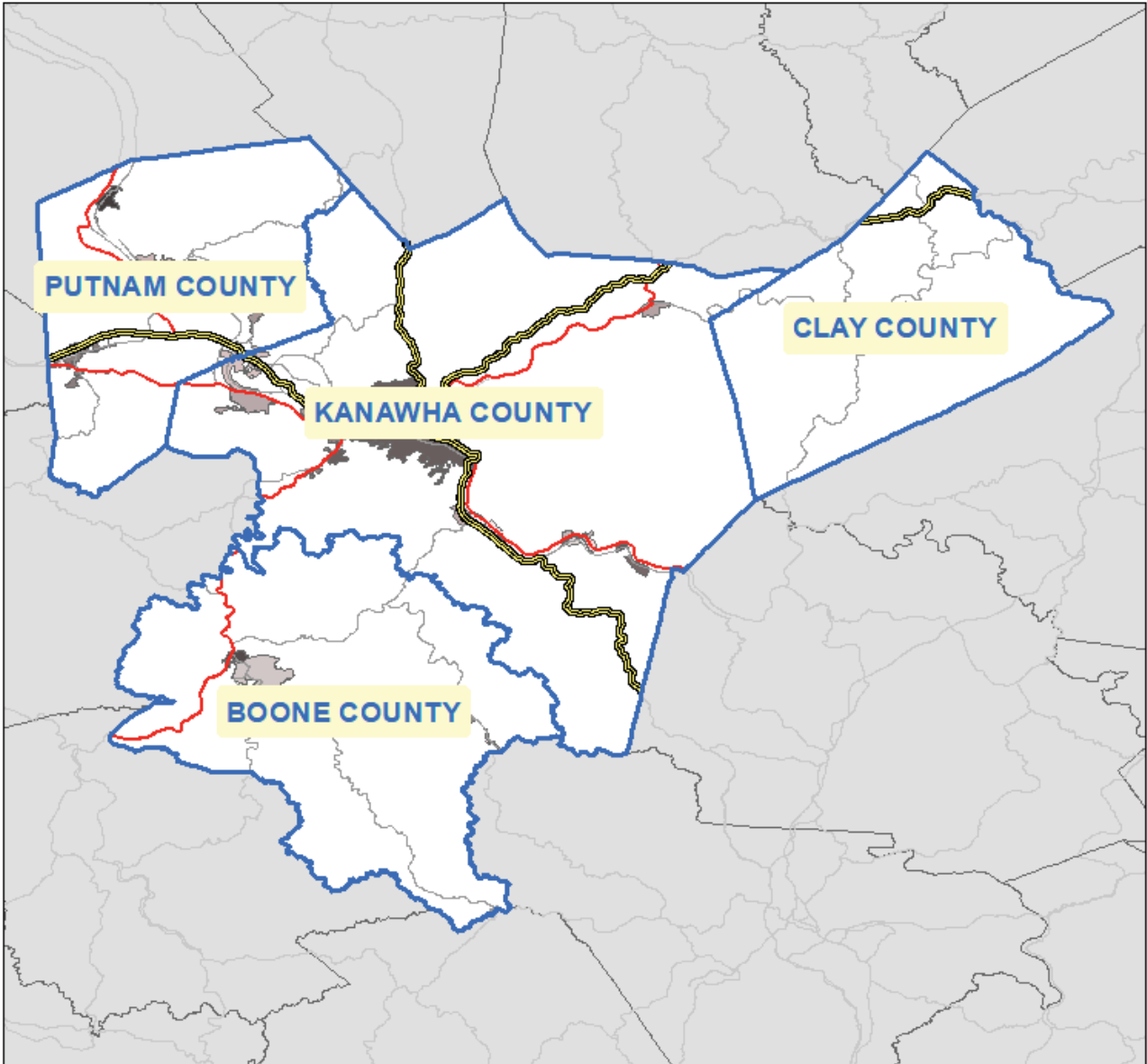
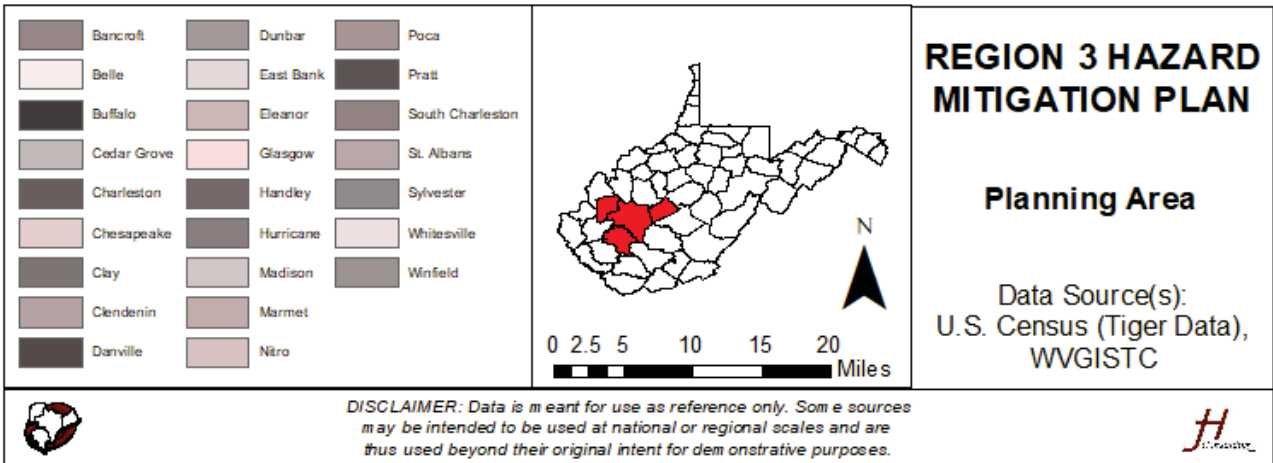
Region 3 is bordered by a number of counties and other regional PDCs. These councils consist of Regions 1, 2, 4, 5, and 7. The counties that border the region include Raleigh, Wyoming, Logan, Lincoln, Cabell, Mason, Fayette, Jackson, Roan, Calhoun, and Braxton.

Boone County is the southernmost county in Region 3; the county covers 503 square miles, of which 502 square miles are land, and 1.7 square miles are water. Boone County contains four municipalities: The City of Madison which is the county seat, and the towns of Danville, Sylvester, and Whitesville.

Clay County is the northernmost county in Region 3; the county is comprised of 344 square miles of which 342 square miles are land, and 1.9 square miles is water. The Town of Clay is the county seat as well as the only incorporated area in the county.

Kanawha County is located in the center of Region 3 and is the largest county in the region, both in terms of land area and population. The county covers 911 square miles, of which 902 square miles are land, and 9.3 square miles are water. The City of Charleston is both the county seat and the capital of West Virginia. Kanawha County contains 13 other incorporated areas: the cities of Dunbar, Marmet, Nitro, South Charleston, and St. Albans, and the towns of Belle, Cedar Grove, Chesapeake, Clendenin, East Bank, Glasgow, Handley, and Pratt.

Putnam County is the westernmost county in Region 3. The county is comprised of 350.7 square miles, of which 346 square miles are land, and 4.7 square miles are water. Putnam County contains six municipalities: The city of Hurricane and the towns of Bancroft, Buffalo, Eleanor, Poca, and Winfield, the county seat.



Demographics

The following table presents general demographics for Region 3 and the jurisdictions therein.

REGION 3 DEMOGRAPHICS							
	Population	White	Black or African American	American Indian and Alaskan Native	Asian	Native Hawaiian or Pacific Islander	Two or More Races
Boone County	21,809	20,780	135	46	36	2	734
Clay County	8,051	7,730	13	29	16	0	321
Kanawha County	180,745	153,637	13,592	402	2,149	51	9,565
Putnam County	57,440	53,364	656	96	577	7	2,235
Charleston, City	46,864	36,501	7,220	123	1,263	23	2,988
Dunbar, City	7,480	5,727	1,016	21	105	4	557
Hurricane, City	6,961	6,409	85	11	55	4	335
Madison, City	2,913	2,712	69	3	25	0	99
Marmet, City	1,504	1,412	16	1	5	1	58
Nitro, City	6,624	5,850	234	34	27	1	375
South Charleston, City	13,647	10,182	937	65	406	0	760
St. Albans, City	10,861	9,587	510	27	69	1	606
Bancroft, Town	387	371	3	1	2	0	8
Belle, Town	1,169	1,073	20	4	5	0	60
Buffalo, Town	1,211	1,148	5	3	1	0	48
Cedar Grove, Town	718	668	9	1	1	1	33
Chesapeake, Town	1,335	1,158	105	7	1	0	59
Clay, Town	396	369	0	0	4	0	23
Clendenin, Town	854	809	2	4	3	1	33
Danville, Town	672	634	1	5	65	0	31
East Bank, Town	822	782	1	2	0	0	37
Eleanor, Town	1,542	1,473	2	3	11	0	51
Glasgow, Town	703	667	3	1	1	0	22
Handley, Town	223	190	11	1	0	1	18
Poca, Town	874	847	5	2	0	0	16
Pratt, Town	483	447	4	1	1	0	27
Sylvester, Town	171	163	2	2	1	0	3
Whitesville, Town	361	356	0	0	0	0	5
Winfield, Town	2,393	2,222	32	2	21	0	97



Region 3 Hazard Mitigation Plan
1.0 Introduction

	Hispanic or Latino	Veterans	Foreign Born Persons	Housing Units	Median Household Income	Persons In Poverty	Persons Per Square Mile
Boone County	133	1,308	58	10,132	\$45,297	4,053	43
Clay County	52	554	4	3,907	\$35,154	2,393	24
Kanawha County	2,720	11,240	3,258	90,294	\$47,122	30,529	200
Putnam County	811	3,670	713	24,795	\$63,954	6,032	166
Charleston, City	969	2,316	1,957	25,766	\$49,769	9,031	1,435
Dunbar, City	138	770	84	4,057	\$39,688	961	2,662
Hurricane, City	122	215	135	2,967	\$62,308	450	1,842
Madison, City	13	325	27	1,395	\$40,938	411	413
Marmet, City	25	120	3	748	\$41,875	213	1,067
Nitro, City	150	301	0	3,277	\$43,564	1,249	1,138
South Charleston, City	252	792	324	7,145	\$51,021	2,198	1,432
St. Albans, City	183	874	74	5,485	N/A	1,703	2,943
Bancroft, Town	4	31	0	197	\$59,750	47	2,580
Belle, Town	17	183	0	631	\$50,972	161	1,498
Buffalo, Town	9	75	0	578	\$50,568	128	734
Cedar Grove, Town	2	45	5	369	\$52,313	99	997
Chesapeake, Town	16	136	7	734	\$40,650	384	2,085
Clay, Town	5	36	4	218	\$17,708	251	639
Clendenin, Town	9	65	0	421	\$42,778	106	562
Danville, Town	7	31	0	330	\$43,125	233	622
East Bank, Town	1	69	10	382	\$64,645	161	1,713
Eleanor, Town	16	73	23	690	\$64,625	112	724
Glasgow, Town	0	35	1	304	\$49,412	85	1,495
Handley, Town	3	6	0	87	\$45,923	26	229
Poca, Town	6	74	3	696	\$59,167	116	1,165
Pratt, Town	1	53	0	217	\$54,722	62	1,665
Sylvester, Town	1	14	0	80	\$56,000	42	658
Whitesville, Town	4	23	0	204	\$20,313	197	1,094
Winfield, Town	33	144	111	1,002	\$69,432	337	985

N/A = Data not available through U.S. Census



Collectively, Region 3 has a population of 268,045 according to the 2020 Census. This is a decrease of 5.14% from the 2010 census. Region 3 had a larger decrease in population than the state, which decreased 3.20% between decennial censuses. The largest population is in Kanawha County, with a population of 180,745 (67.43% of the regional population).










The region is overwhelmingly Caucasian, representing 87.86% of the population. The second largest population group is Black/African American representing 5.37% of the population. Hispanics account for 1.39% of the region with individuals of two or more races representing 4.76% of the population.

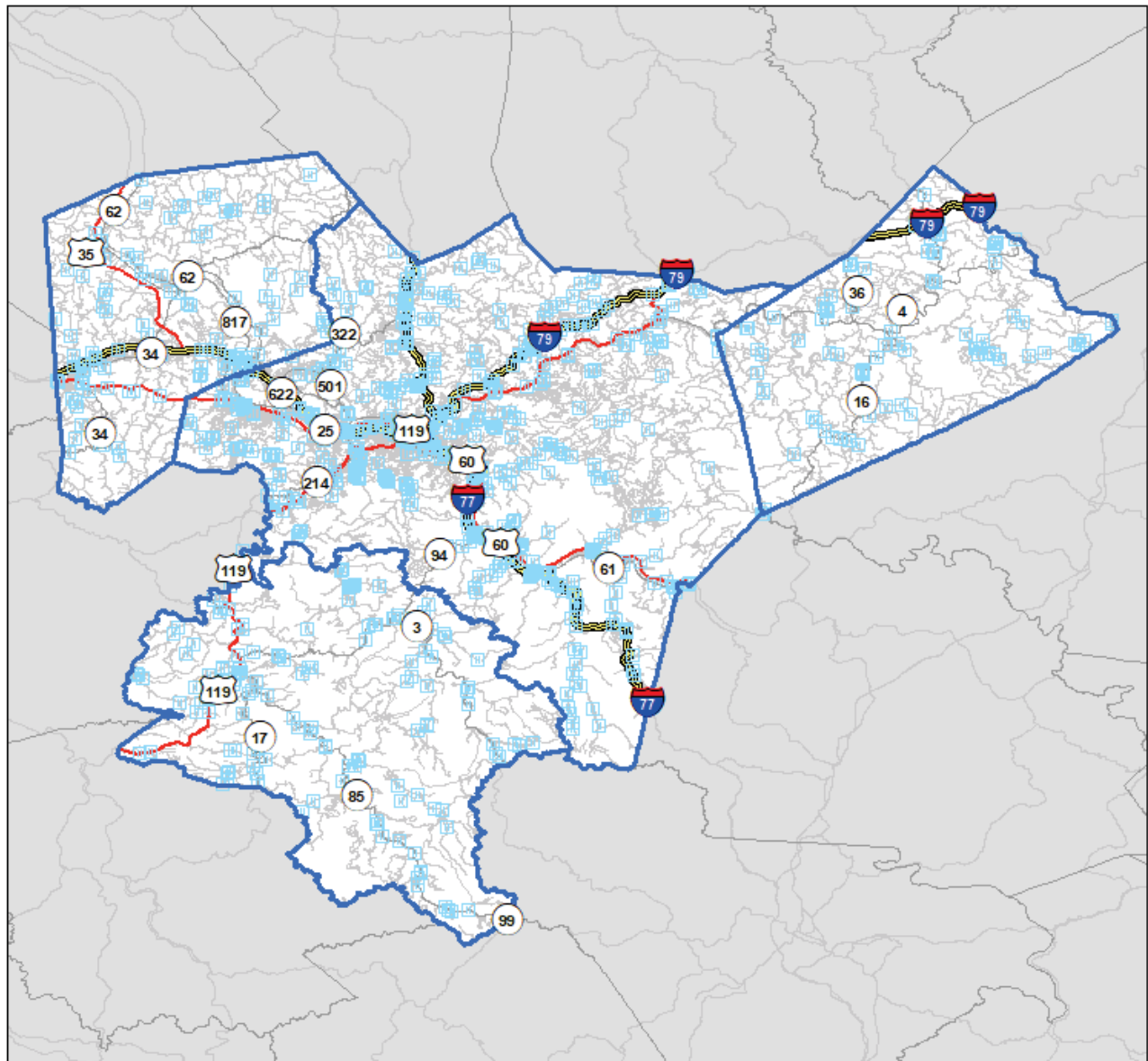
Transportation

Due to the location of the region, and the dense industrial district in Kanawha Valley, the transportation network is particularly robust. All four of the major transportation methods (road, rail, water, and air) are present in the region.

Roadway

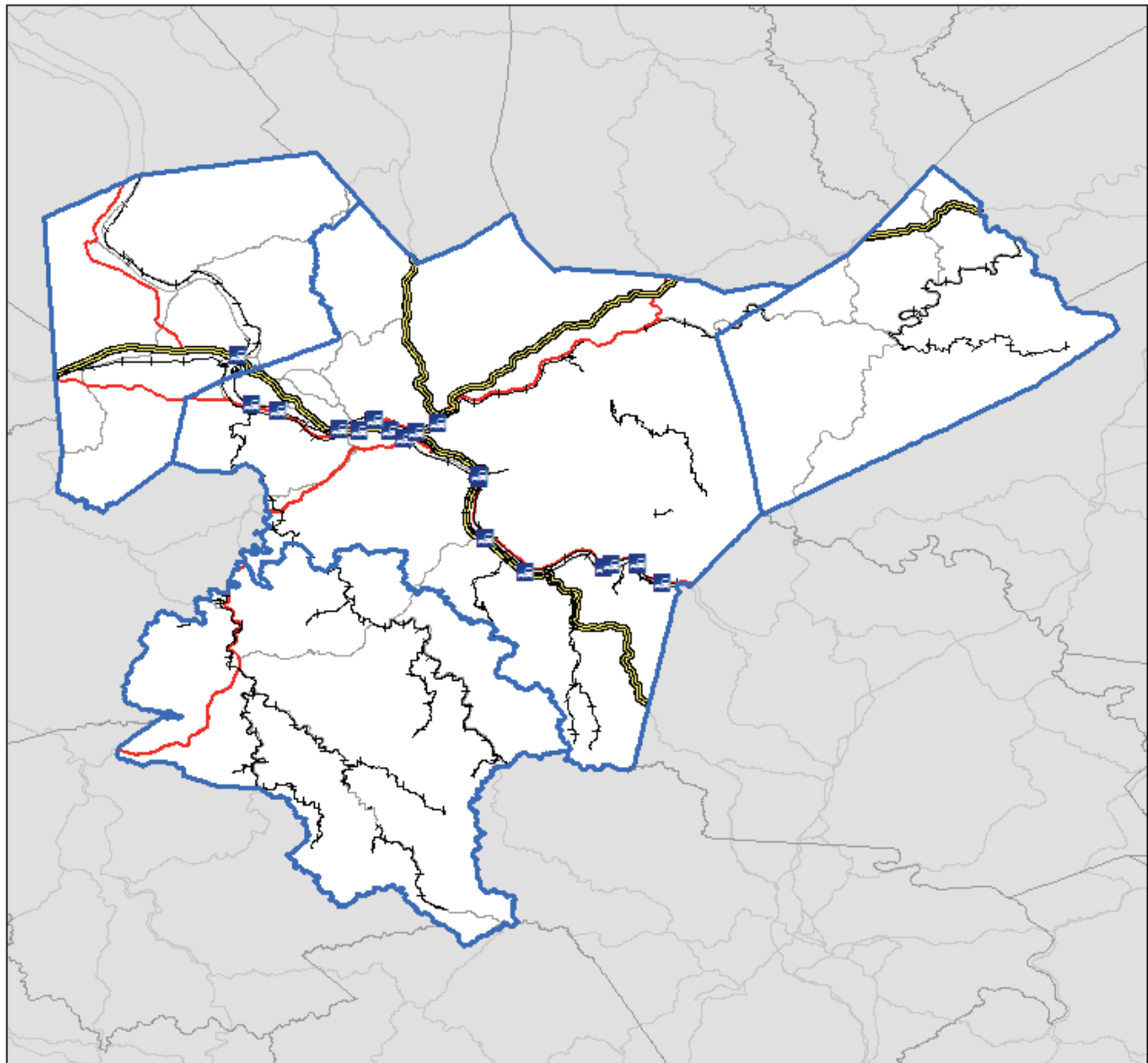
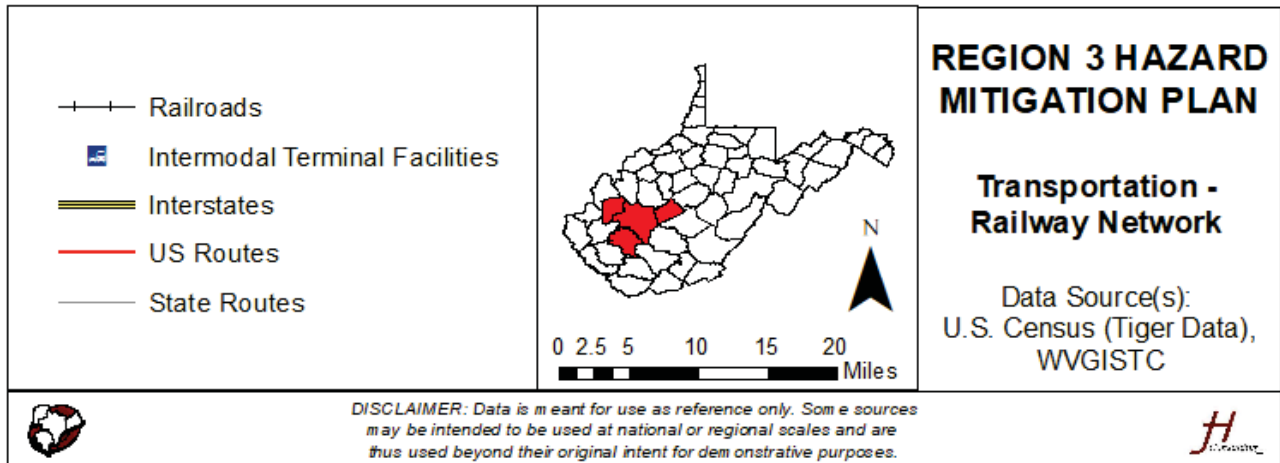
There are three interstates found in Region 3, two that transverse the area and one that terminates/begins in Charleston. Interstates 77 and 64 run concurrently from the Kanawha-Fayette County border to the City of Charleston, where Interstate 64 continues east-west and Interstate 77 continues north-south. Interstate 79 is a north-south route that terminates/begins in Charleston. In addition to the interstates, three U.S. highways run through the region. US 60 runs east-west through Kanawha and Putnam Counties; US 119 is a north-south route that runs through Kanawha and Boone Counties; and US 35 runs north-south from its origin-termination in western Kanawha County through Putnam County. There are also a large number of state highways that run through all four counties that make up Region 3.

<ul style="list-style-type: none">  Interstates  US Routes  State Routes  Miscellaneous Roadways  Bridges (>20' in Length) 	 <p style="text-align: center;">N</p>  <p style="text-align: center;">0 2.5 5 10 15 20 Miles</p>	<p>REGION 3 HAZARD MITIGATION PLAN</p> <p>Transportation - Highway Network</p> <p>Data Source(s): U.S. Census (Tiger Data)</p>
<p> <i>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.</i> </p>		



Railway

Railroads have played an important role in the development of many West Virginia communities and this remains true for the Kanawha Valley and Region 3. Major rail transport companies, CSXT, Norfolk-Southern, and Conrail, operate rail lines within Region 3. Amtrak also runs services through the Kanawha Valley. The Cardinal Route runs from New York to Chicago, through Washington D.C., making a stop in Charleston.



Airway

There is one international airport in Region 3, the West Virginia International Yeager Airport (CRW), located three miles east of downtown Charleston. On April 19, 2022 CRW opened the U.S. Customs and Border Protection Facility and received the airport's first international flight arrival from Ontario, Canada on April 20, 2022. The airport is served by American Airlines, Delta, Spirit, and United, offering non-stop flights to major hubs including Charlotte, Washington D.C., Chicago, Atlanta, and Orlando.

There are also two private airfields in Kanawha County, Island Airport, and Mallory Airport. Mallory is located in western Kanawha County while Island Airport is located on Scott's Island in the Kanawha River between Belle and Chesapeake.

Waterway

According to the Waterways Council Inc. (WCI), there are five commercially navigable river systems in West Virginia. One of these rivers is the Kanawha River, which is the largest river in Region 3. The Kanawha River is formed by the confluence of the New and Gauley Rivers in Gauley Bridge, WV and is itself a tributary of the Ohio River. The Kanawha is also fed by the Elk River, converging in Charleston. According to the WCI, the entire Kanawha River (91 miles) is navigable. The canalization of the Kanawha was completed in 1898, after which commodities such as coal, salt, timber, and chemicals were transported. By the 1920s coal became the dominant commodity moving via the Kanawha River system. The lock and dam system was replaced by the Army Corps of Engineers in the 1930s.

Economy

The region has a highly diverse economy, ranging from industrial/technological firms located primarily along the Kanawha River, to natural resource driven industry in the more rural areas. The median household income throughout the region is \$50,221.

TOP TEN EMPLOYERS BY COUNTY			
BOONE	CLAY	KANAWHA	PUTNAM
Boone County Board of Education	Clay County Board of Education	CAMC Health System	Toyota Motor Manufacturing, WV, Inc.
Boone Memorial Hospital	Clay Senior and Community Services, Inc.	Kanawha County Board of Education	Putnam County Board of Education
Rockwell Mining, LLC	Clay Health Care Center, LLC	WV Department of Health & Human Resources	Coast Personnel Services
Hillcrest Health Care Center, LLC	Community Care of West Virginia	Thomas Health System, Inc.	CAMC Health System
Loved Ones in Home Care, LLC	Clay County Commission	Walmart	Walmart
Kroger	Clay County Services Unlimited, LLC	WV Division of Highways	American Electric Power Corp.
Panhandle Support Services, Inc.	Employers Innovative Network, LLC	U.S. Postal Service	Appalachian Power Company
Glancy Surface Mining, LLC	WV Division of Highways	Kroger	Triton Construction, Inc.
Little General Store, Inc.	Advantage Homes Care, LLC	City of Charleston	Putnam County Commission
Pro Careers, Inc.	Goulds Electric Motor Repair, Inc.	WV Department of Administration	Diamond Electric Manufacturing Corp.

Source: Workforce West Virginia, 2021

Healthcare

Region 3 is served by seven general care hospitals (hospitals not listed as specialty or psychiatric). Five of the facilities are located in Kanawha County, one in Boone County, and one in Putnam County. Clay County does not have a hospital within its borders. Region 3 is also served by numerous rural health clinics and federally qualified health centers that can provide family care and non-acute emergency services.

Climate

West Virginia generally has a humid subtropical climate, except at higher elevations, such as those found in the eastern portion of the state. Region 3 is located in the humid subtropical climate with warm hot summers, significant summer humidity, and chilly winters. Charleston, located near the center of the region, has an annual average temperature of 55.7 degrees Fahrenheit, average rainfall of 44.03 inches, and average snowfall of 36 inches, according to U.S. Climate Data (2022).

Social Vulnerability Indicators

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 (2015). 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 2016 and 2020.

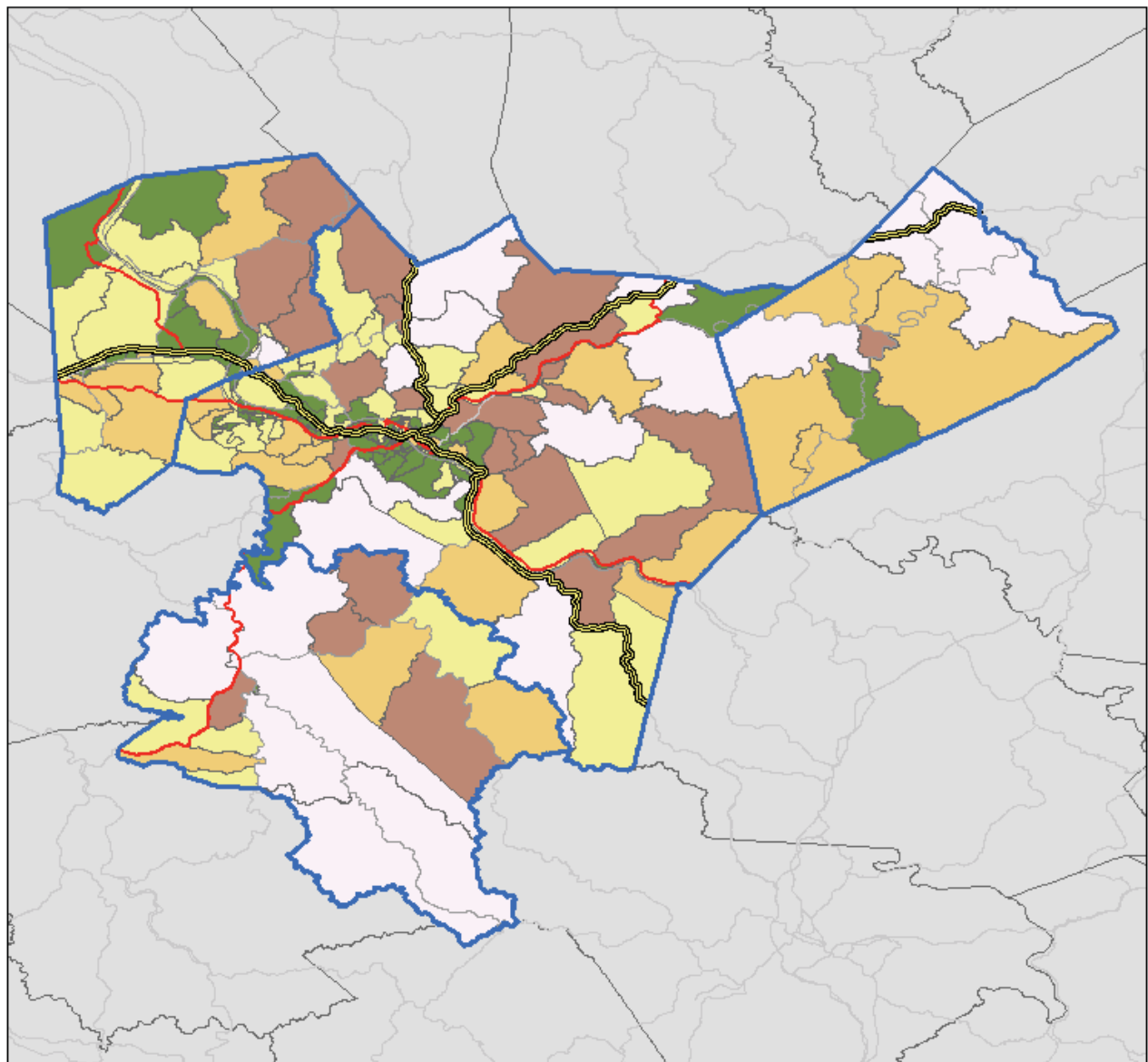
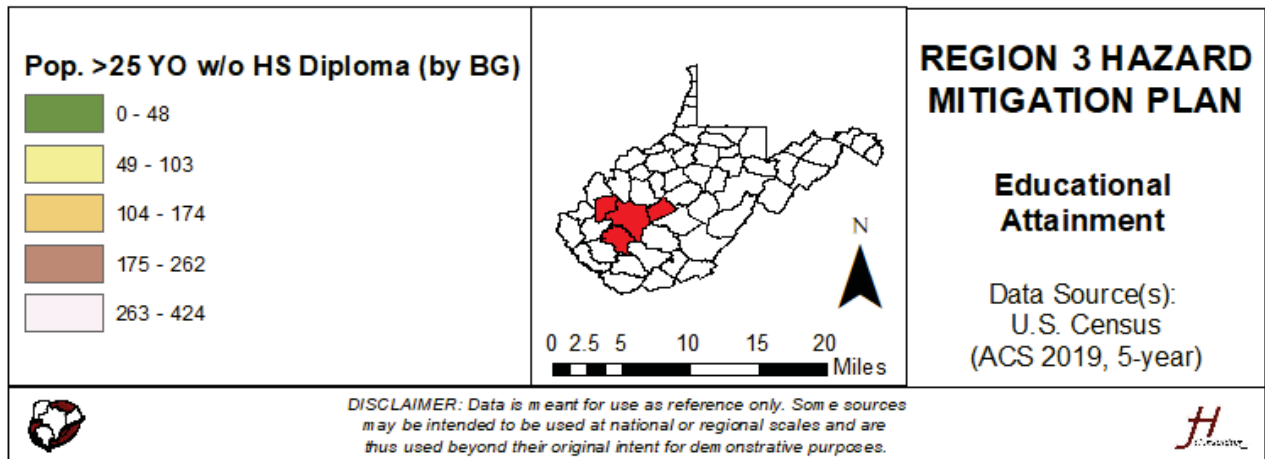
There are four groups of variables which include socioeconomic, household composition, minority status/language, and housing/transportation variables. To better describe the planning area and explore the unique hazards to its population, this section discusses 11 of the variables from the SVI.

Socioeconomic Variables

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, 2011).

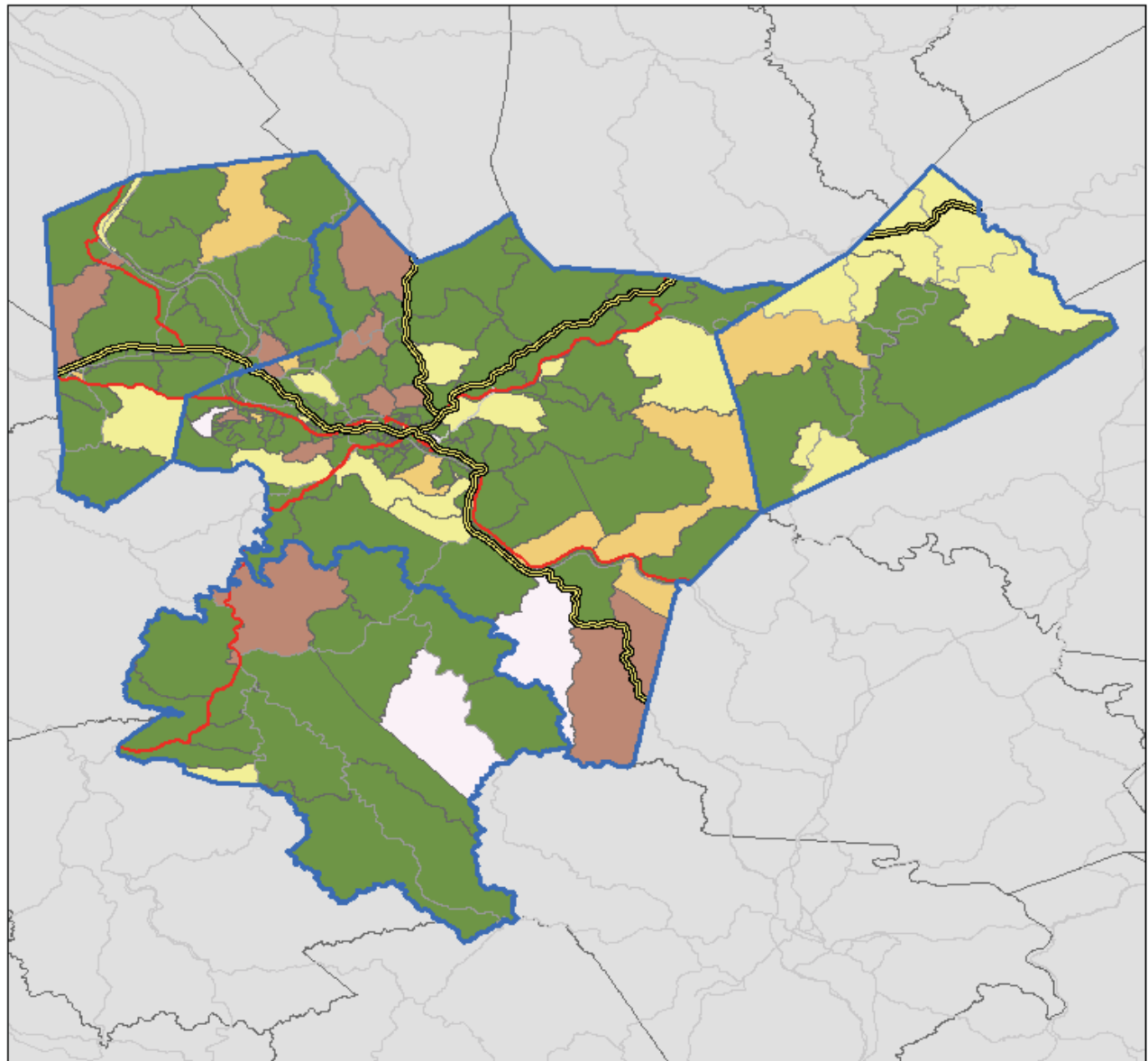
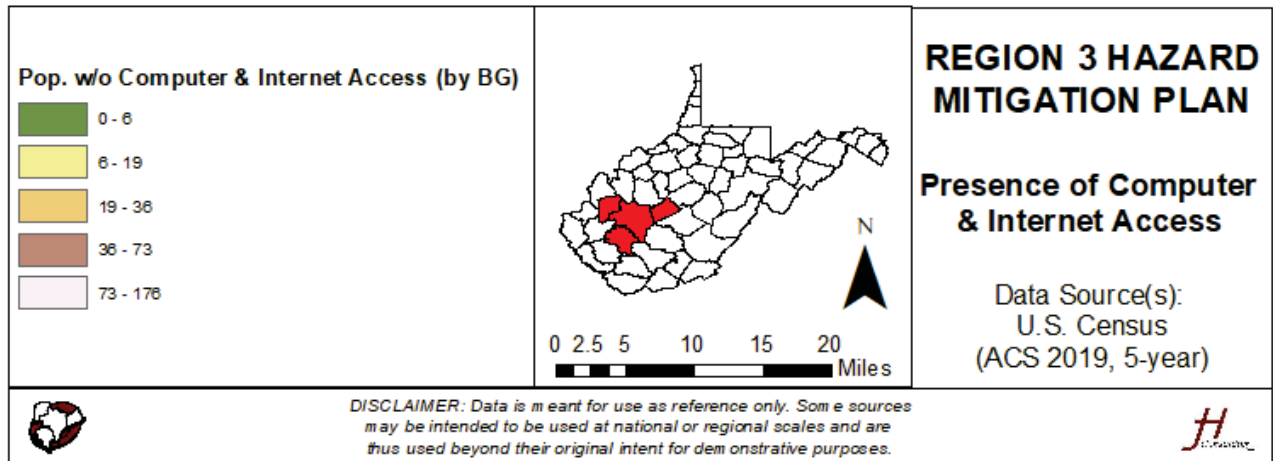
The poor are less likely to have the income or assets needed to properly prepare for a possible disaster, or to recover after a disaster occurs (Cutter, 2003). These areas will need significant support during recovery activities, and could greatly benefit from targeted mitigation. Closely associated with the poverty level is the unemployment rate.

Education is included as a socioeconomic variable, though the relationship between education and vulnerability is not absolutely understood (Flanagan, 2011). Education is; however, associated with both income and poverty. Many people without a high school diploma will struggle to find steady, well-paying jobs. This is especially true within the boom and bust cycles associated with natural resource industries. During boom times, these residents can earn decent wages, but when the industry enters a bust cycle there is little to fall back on. Applying for federal aid and other recovery activities requires the proper completion of complex paperwork. For people with less education, the practical and bureaucratic hurdles to cope with and recover from disaster prove increasingly difficult to surmount (Morrow, 1999).



Access to Internet

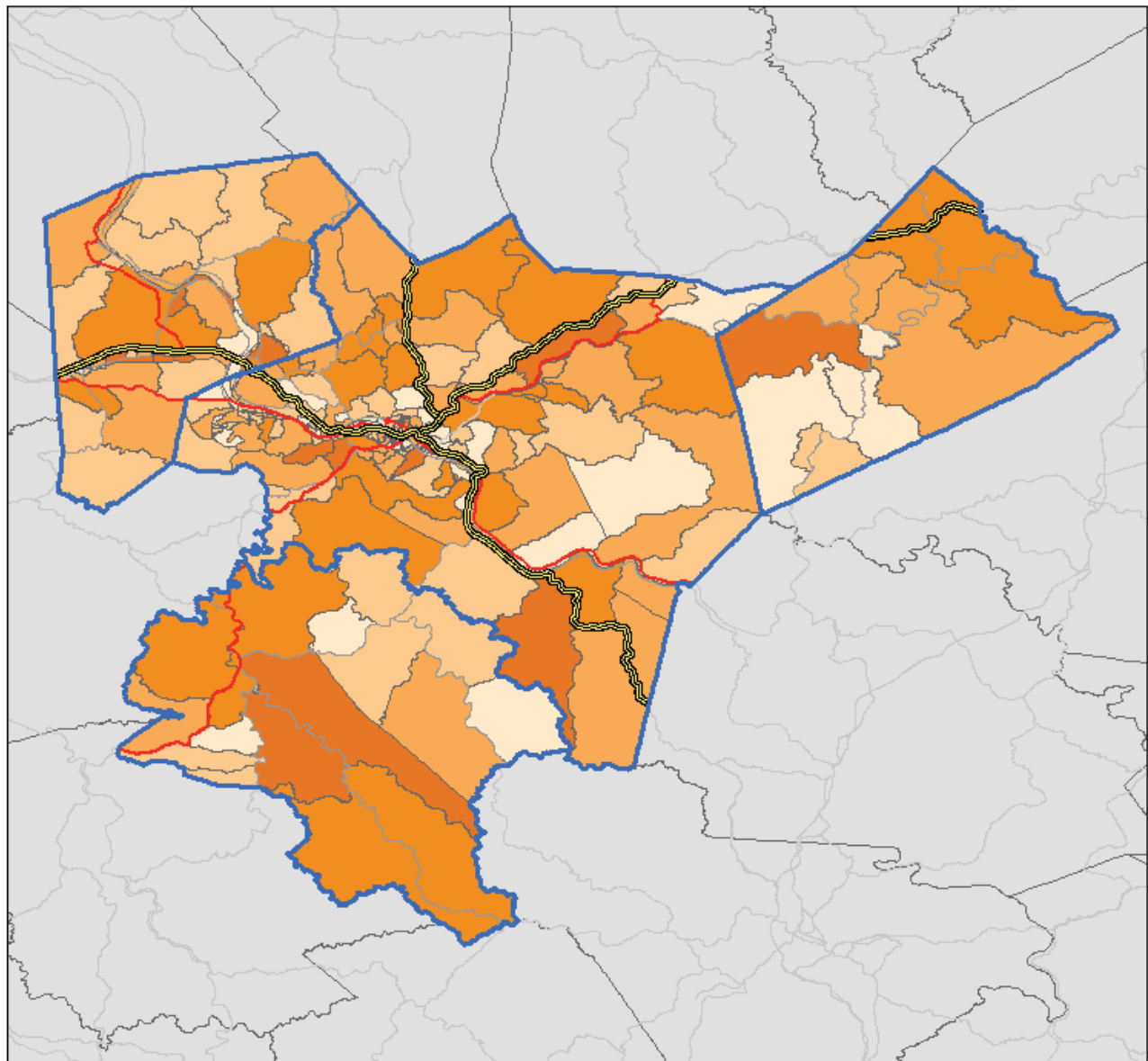
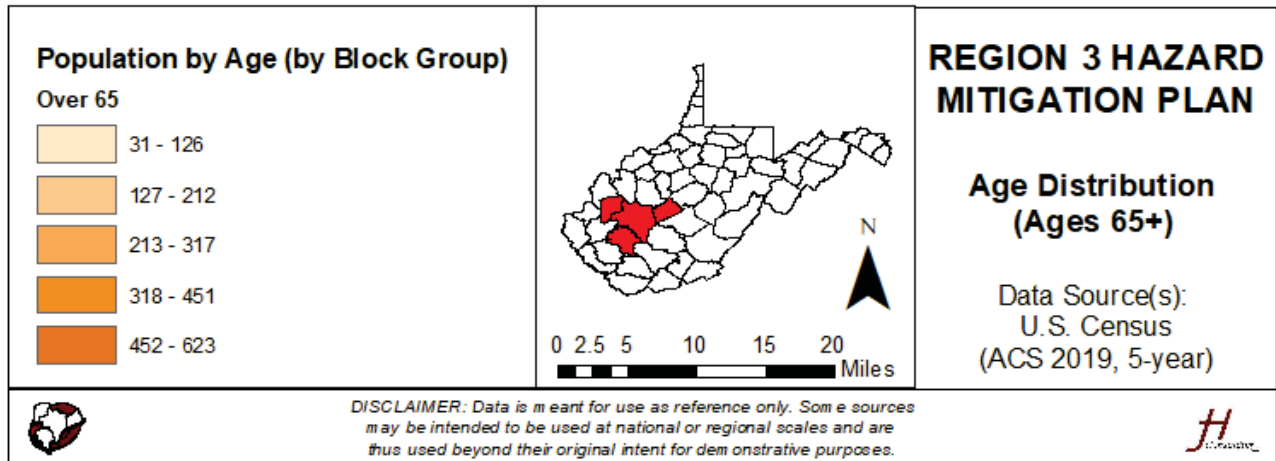
During the COVID-19 Pandemic, the internet was keeping many connected to work, school, family and friends. However, a Gallup analysis shows “more than half a billion of the world’s most-vulnerable people, who were struggling to meet even their basic food and shelter needs and didn’t have anyone to help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



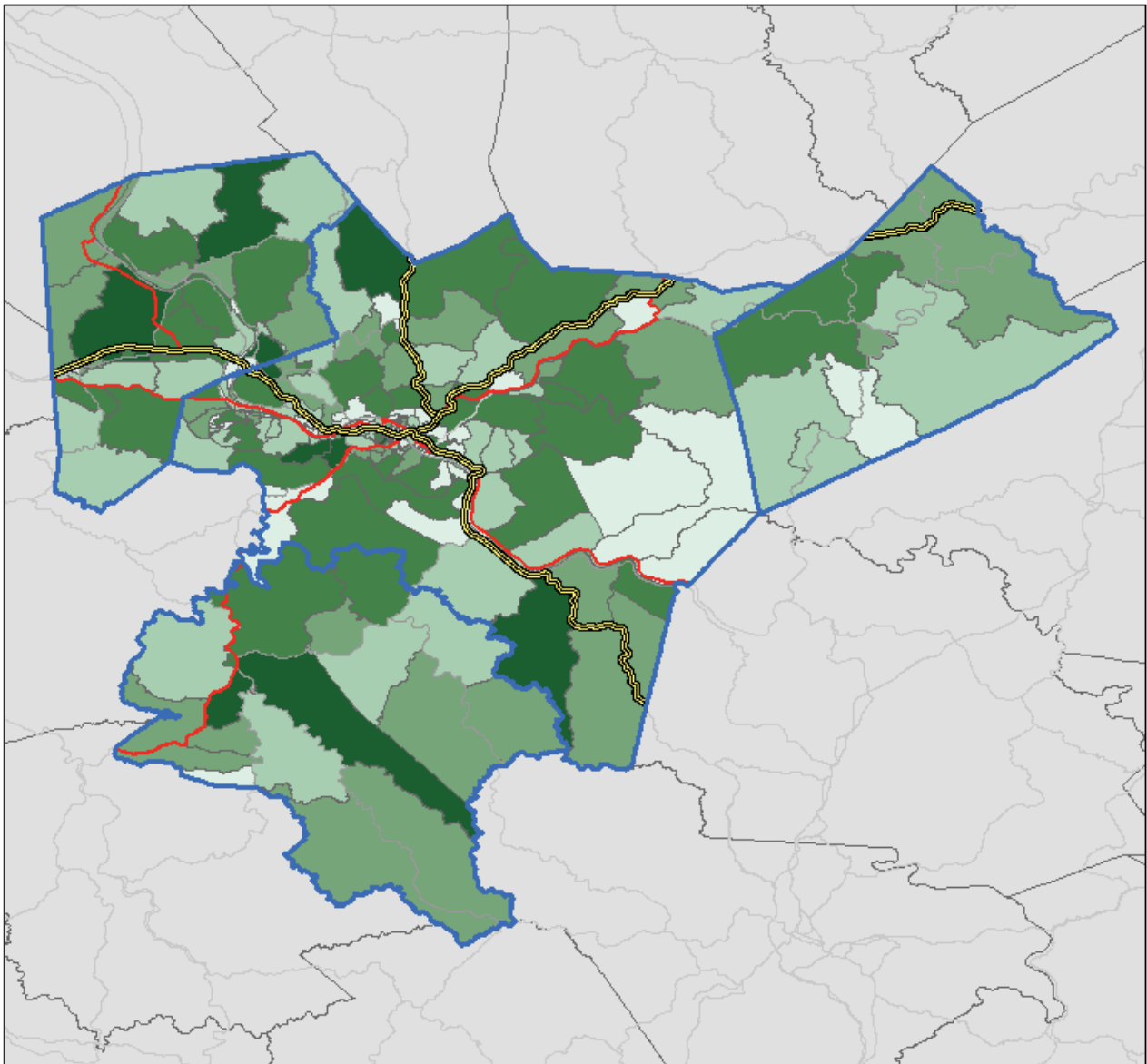
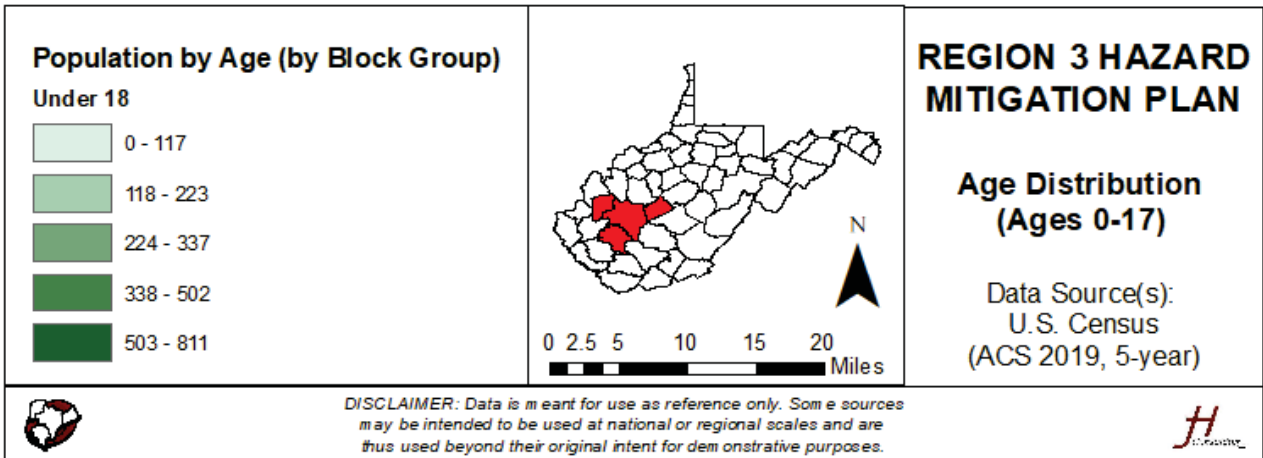
Household Composition

The household composition section of the SVI includes variables measuring vulnerable ages and vulnerable households (single parent households with children under 18). 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, 2011). Nearly 75% of the victims of Hurricane Katrina were elderly (Phillips, 2010).

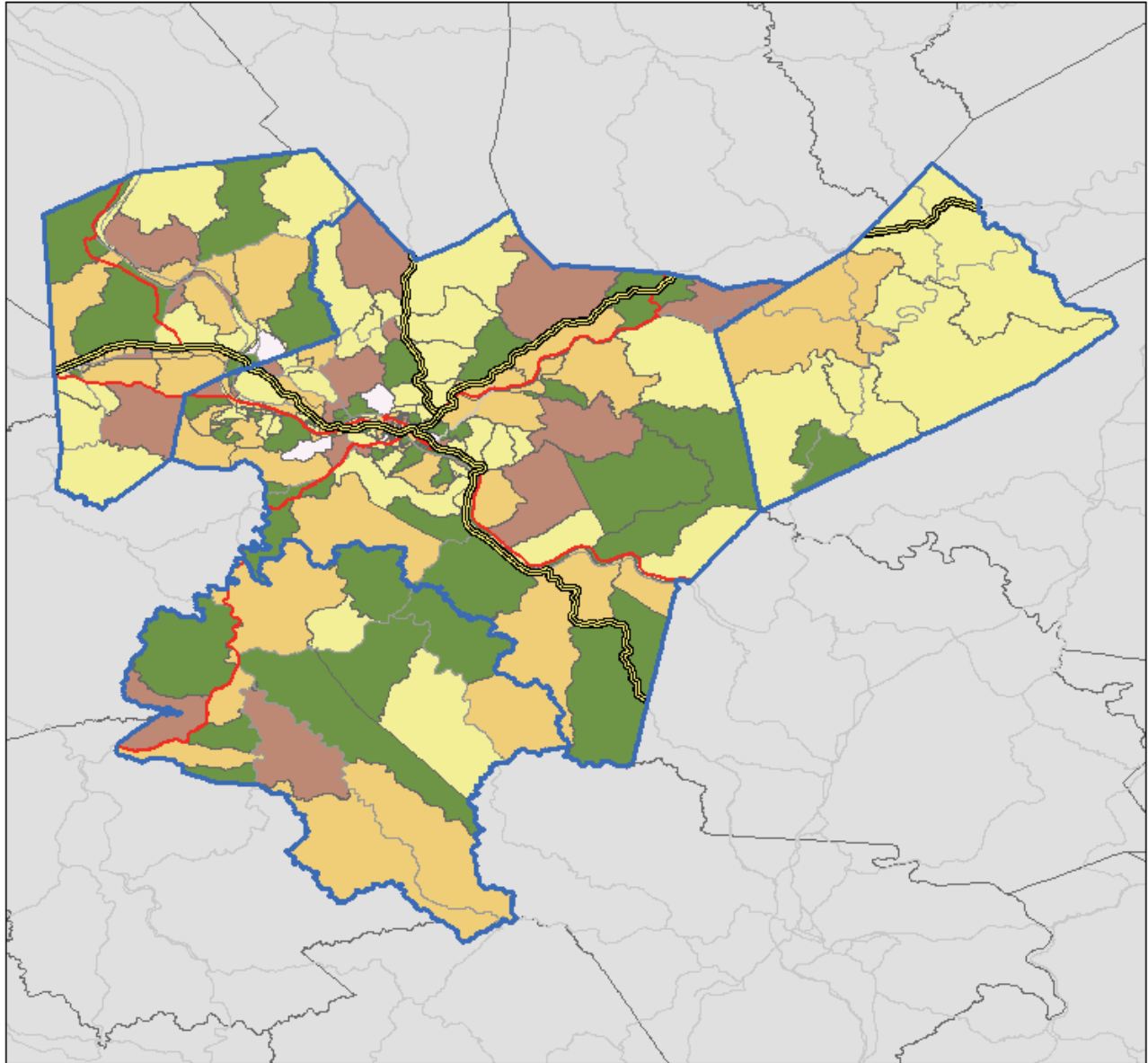
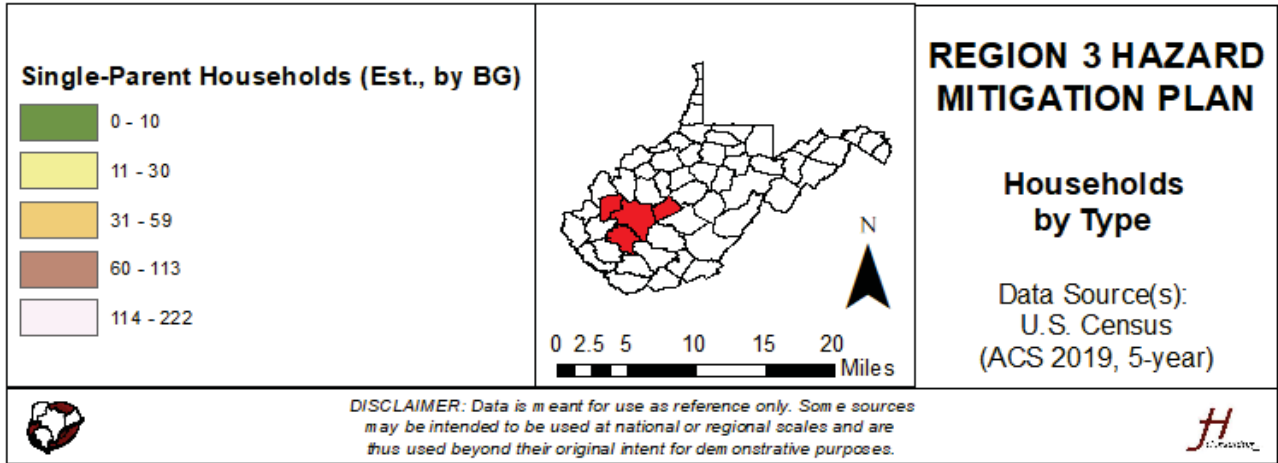
Many elderly citizens have disabilities that require the assistance of either machines (oxygen concentrators, for example) or others (difficulty walking for example). The family members or neighbors who can typically be counted on to assist elderly persons may be either overwhelmed by the disaster, or be physically unable to gain access to elderly persons (Flanagan, 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, 2006). By not including this population in the planning process, responders are not adequately prepared or equipped to deal with children.

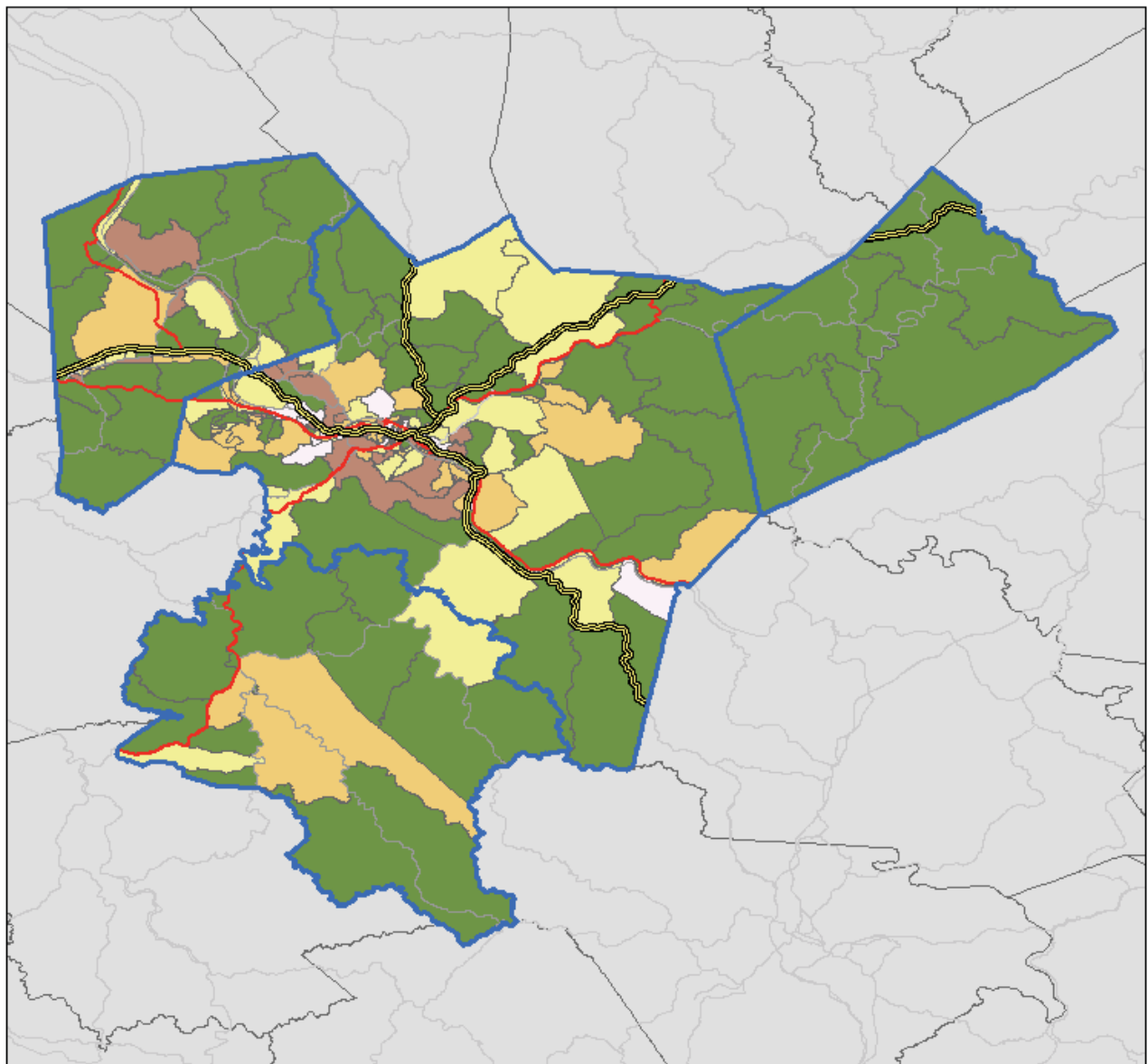
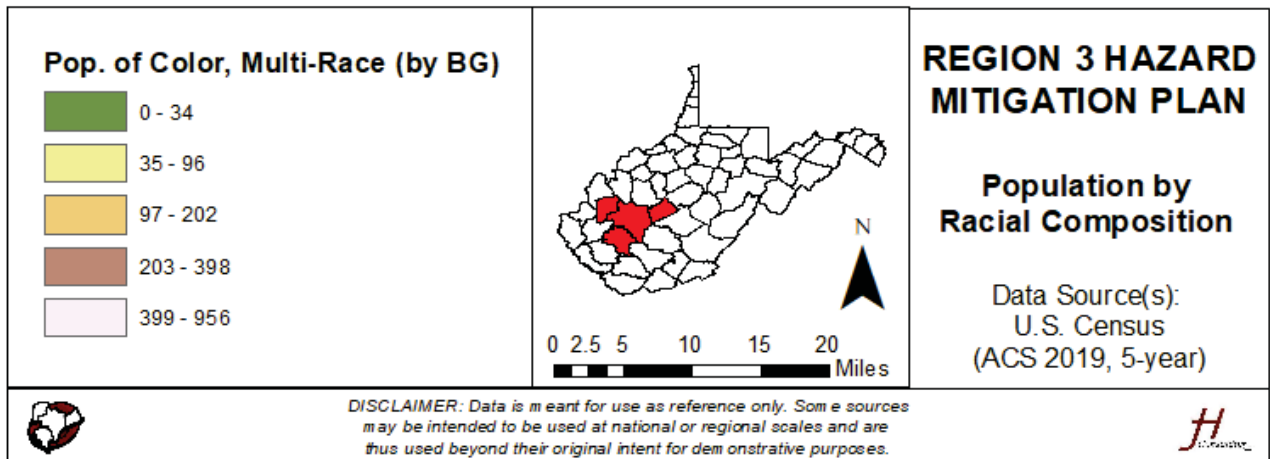


The final variable among the housing composition grouping is the percent of households that are single-parent households with children who are under the age of 18, similarly to the previous variables; children are among the most vulnerable of populations while single-parent households are among the lower 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, 2011).

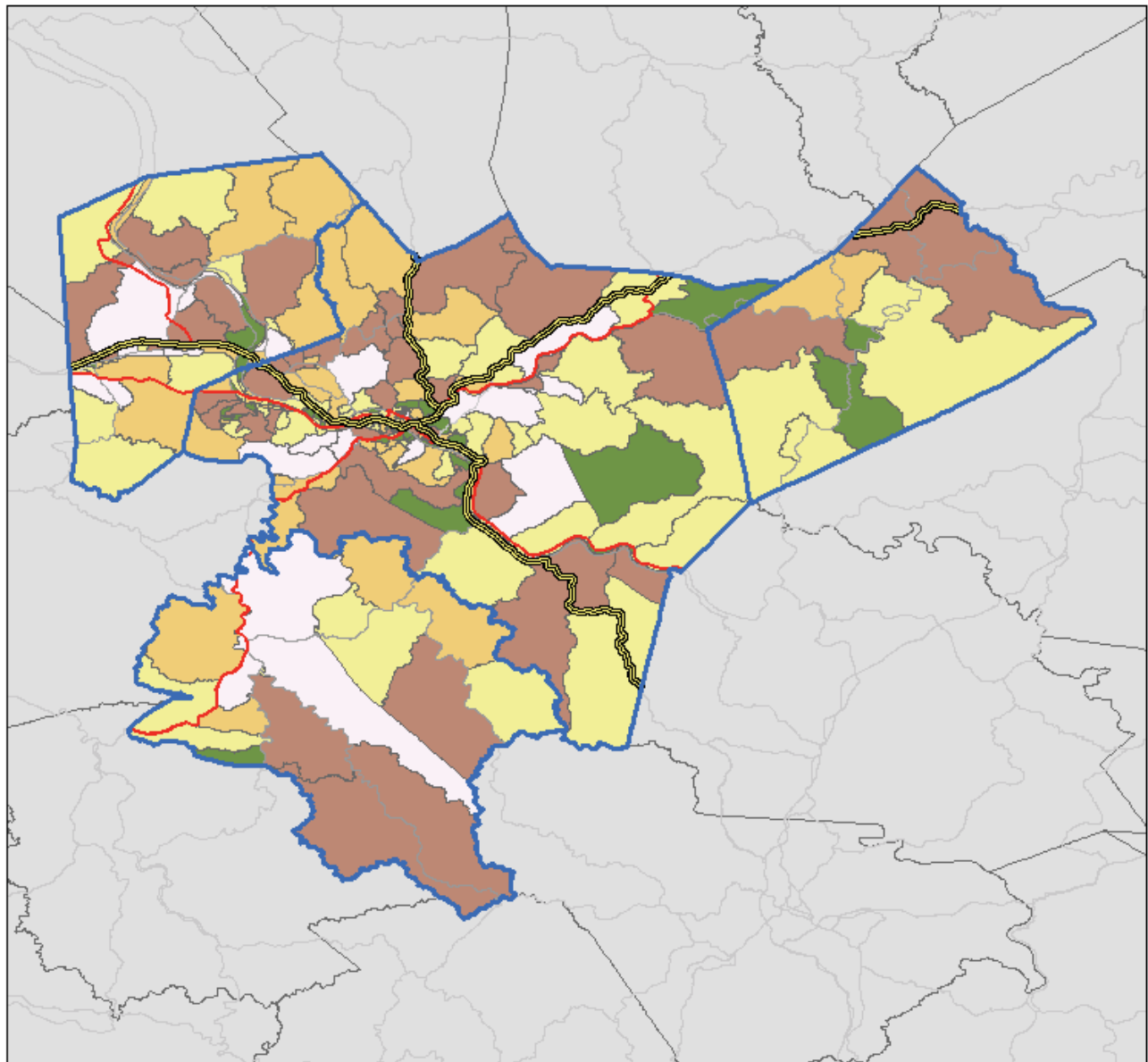
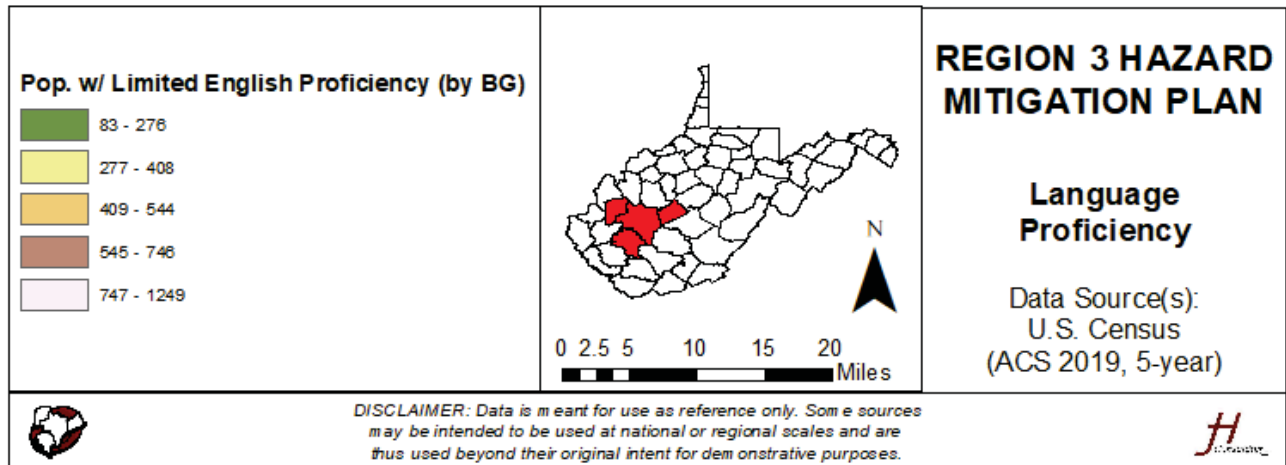


Minority Status/Language

A number of 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, 2011). Specifically, studies have shown that populations of African American, Native Americans, Asian, Pacific Islander and Hispanic origin are correlated with higher vulnerability rate (Flanagan, 2011).



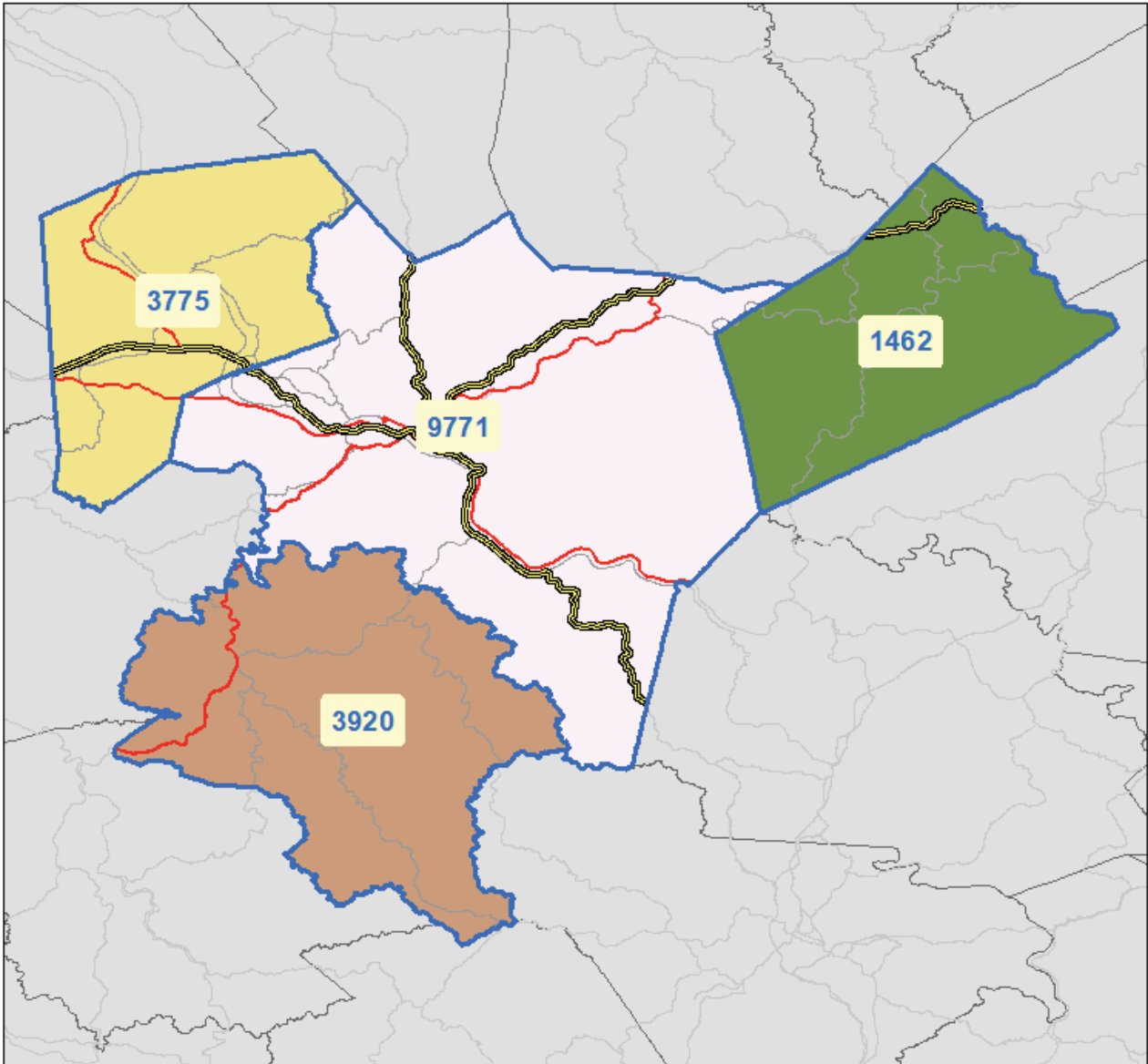
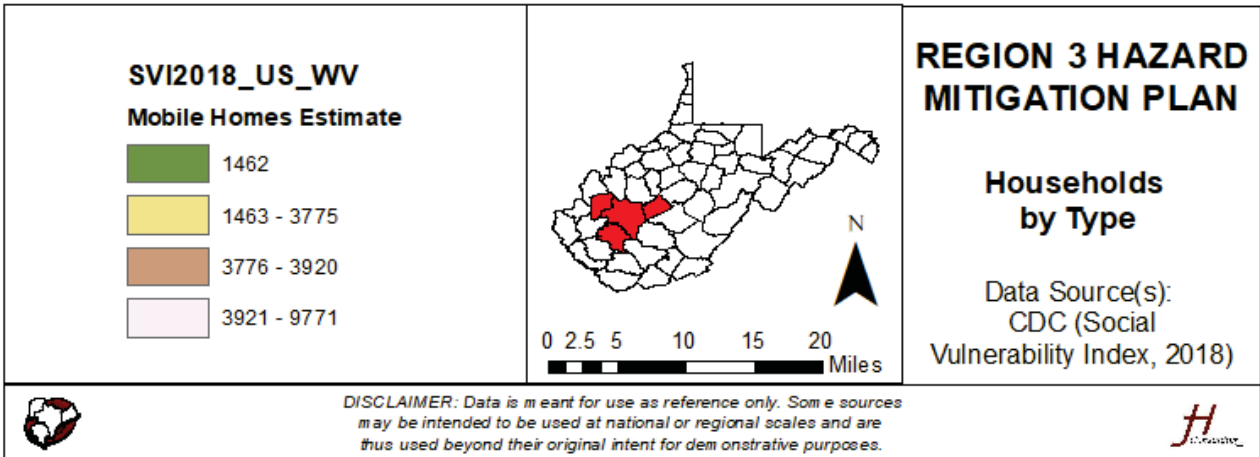
A specific trait among minorities that can greatly increase their vulnerability during a disaster is an inability to speak or read English well, or at all. While small in comparison to the overall population of the region, this population is exceedingly vulnerable. Without accurate translations, these populations 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, 2011).



Housing/Transportation

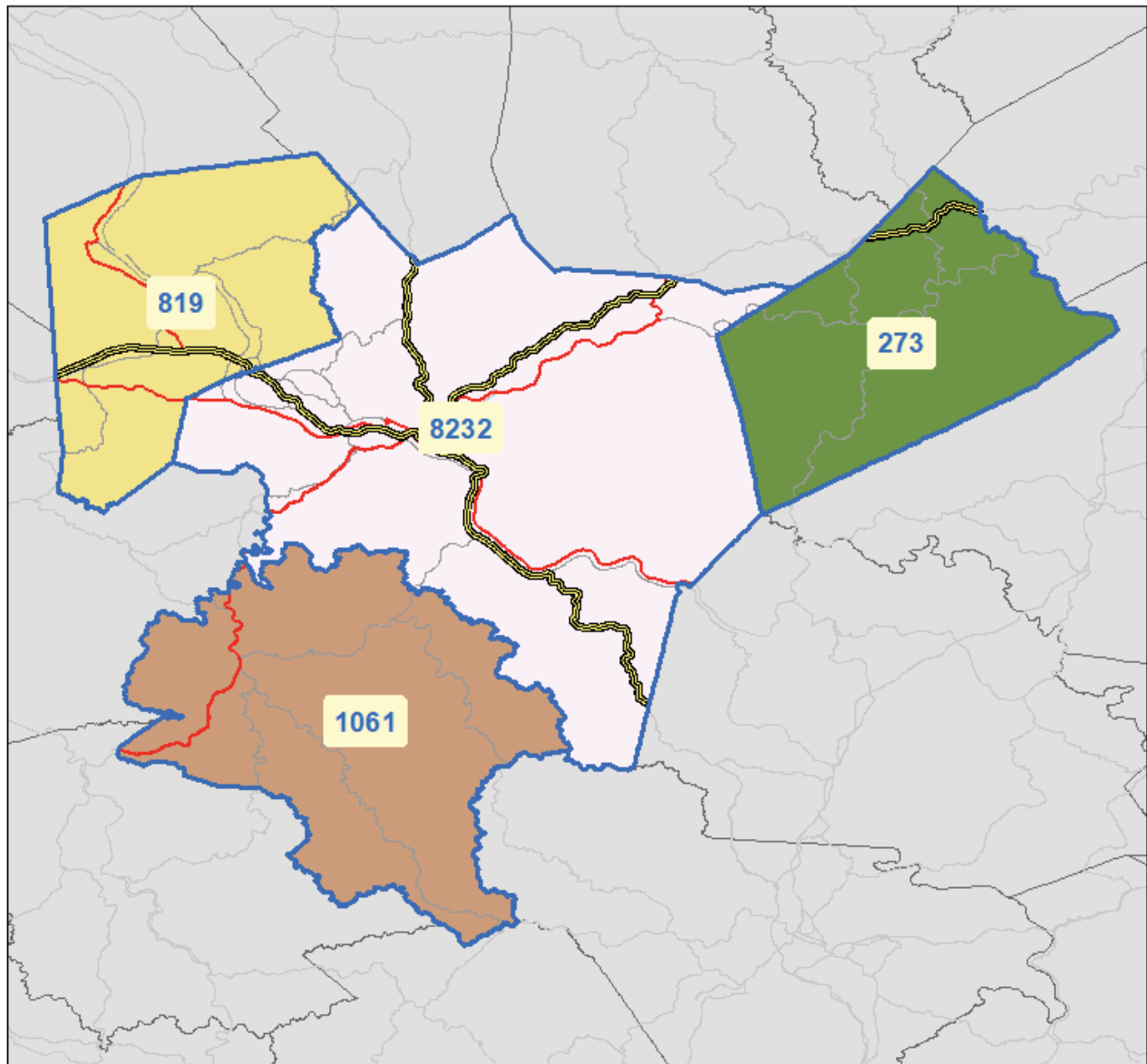
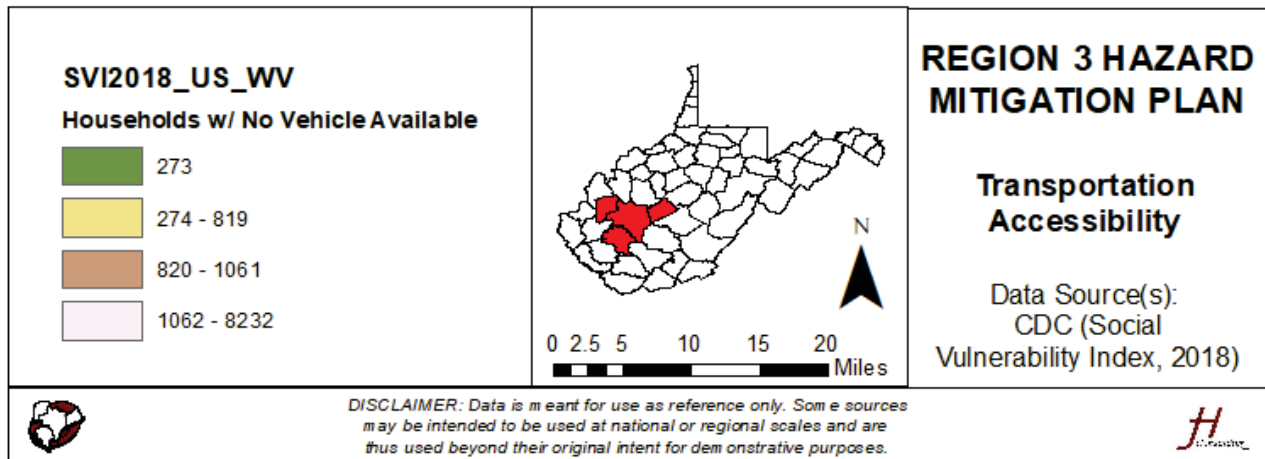
The SVI includes a number of variables that describe housing and transportation. Three variables will be explored: mobile homes, vehicle ownership/access, and institutionalized housing. Housing quality is an important factor in evaluating vulnerability and is closely tied with socioeconomic status and personal wealth (Flanagan, 2011). Mobile homes, which typically are inhabited by those of lower socioeconomic status, are not designed to withstand severe weather events and flooding.

Mobile homes are frequently found outside of metropolitan areas, making access difficult in regular conditions and more so during, and immediately after, a disaster (Flanagan, 2011). Mobile homes are often clustered in communities, which increases the overall vulnerability of mobile homes (Flanagan, 2011).

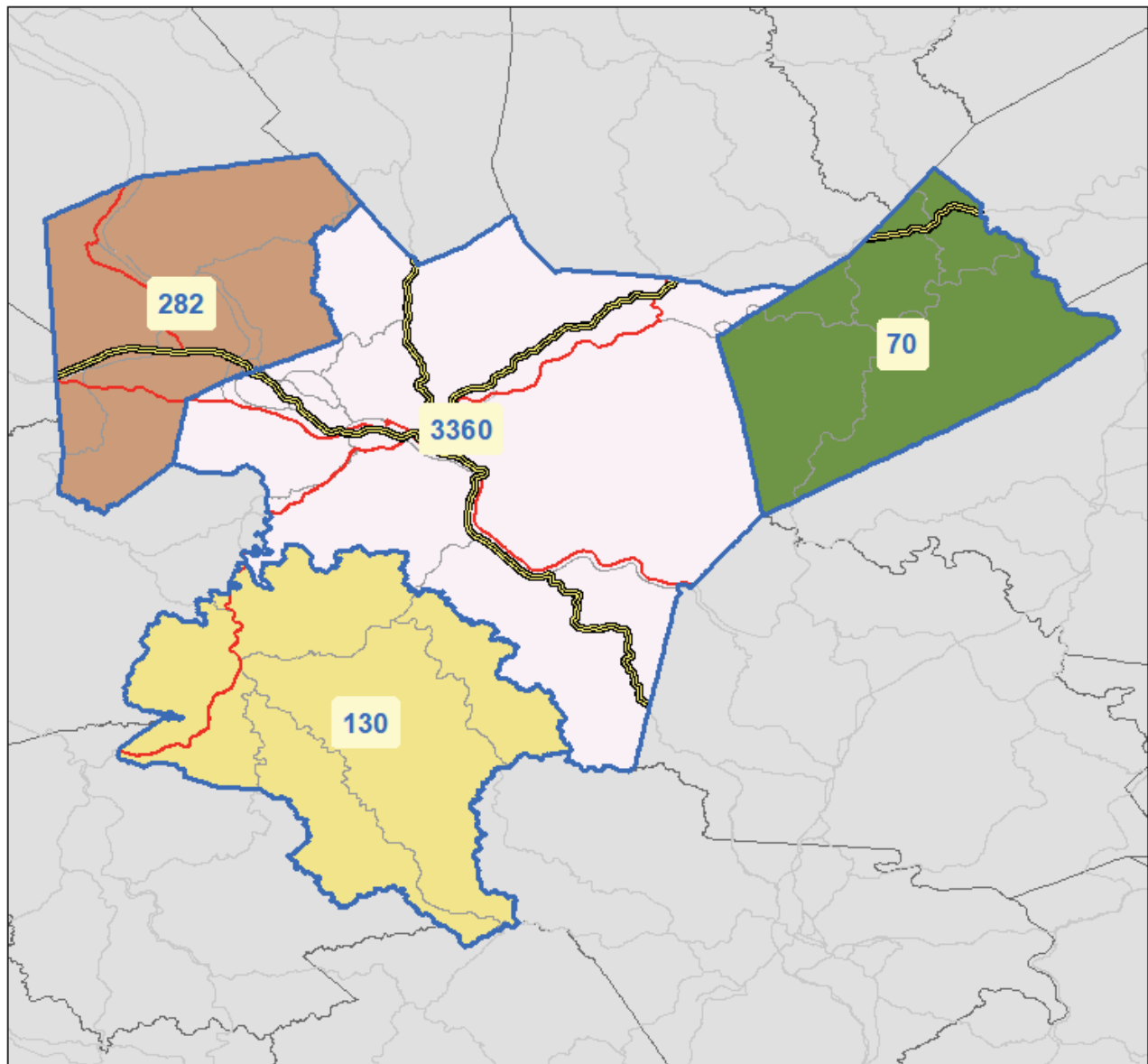
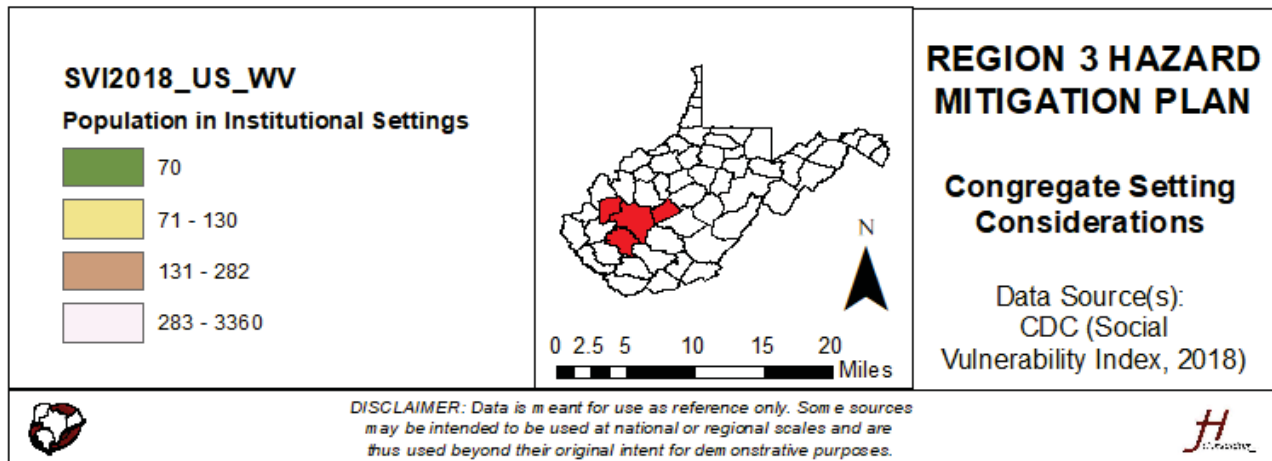


Vehicle ownership or access is crucial to being prepared as well as evacuating, when needed. Those who do not possess, or have access to a vehicle will have difficulty going to stores in order to obtain preparedness supplies and will have less capacity to bring those supplies back to their home. This is even more pronounced in rural areas, which typically lack robust public transportation networks. As discussed in the planning area description, two of the counties in the region have general public transportation infrastructure. Kanawha County has a robust public transit capability within the region, with a county wide municipal service, while Boone County is served by the Tri River Transit Authority.

There are taxi services and other by-appointment services in the region, including those that offer specialized service such as wheelchair vans, which would likely be overwhelmed prior to an impending disaster such as a snow storm, and would likely not operate immediately following an event.



The final housing vulnerability variable to discuss is those who live in institutional settings. These include college dorms, farm worker's dormitories, health institutions, and prisons, which present special concerns for evacuations (Flanagan, 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, 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 there are 15 licensed nursing homes in Region 3.



1.2.3 Asset Inventory

This plan identifies potentially vulnerable community assets such as critical facilities, critical infrastructure, historic properties, commercial/industrial facilities, etc. “Assets” contribute directly to the quality of life of the community as well as ensure its continued operation.

Methodology

This plan categorizes “assets” under the following headings (FEMA, 2013).

- **People:** Areas of great population density and populations with unique vulnerabilities or diminished response and recovery capabilities. Examples include areas of concentrated populations, areas catering to visiting populations, facilities housing or serving functional or access needs populations, and facilities that provide health or social services.
- **Economy:** Important economic drivers to the community. Examples include major employers and commercial centers.
- **Built Environment:** Existing structures, infrastructure systems, critical facilities, and cultural resources. The following table includes examples of built environment categories.

BUILT ENVIRONMENT ASSETS			
<i>Existing Structures</i>	<i>Infrastructure</i>	<i>Critical Facilities</i>	<i>Cultural Resources</i>
<ul style="list-style-type: none"> • Commercial Buildings • Industrial buildings • Single & multi-family residential buildings 	<ul style="list-style-type: none"> • Water & wastewater • Power utilities • Transportation (roads, railways, waterways) • Communication systems/centers • Energy pipelines and storage 	<ul style="list-style-type: none"> • Hospitals and medical facilities • Police and fire stations • Emergency operations centers • Evacuation shelters • Schools • Airport/heliports <p>HIGH POTENTIAL LOSS FACILITIES</p> <ul style="list-style-type: none"> • Nuclear power plants • Dams • Military & civil defense installations • Locations housing hazardous materials 	<ul style="list-style-type: none"> • Historical assets • Museums • Unique geologic sites • Concert halls • Parks • Stadia

- **Natural Environment:** Resources that are important to community identity and quality of life, as well as those that support the local economy through agriculture, tourism, and recreation. Examples include areas that can provide protective functions that reduce the magnitude of hazard events and critical habitat areas and other important environmental features.

Asset Inventory

The following table lists the assets considered by Region 3's planning committee throughout this plan.

Boone County									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Arch Coal Inc.	44 Pine Grove Rd	Wharton	WV	25208			X		
Ashford Rumble Elementary School	1649 Ashford Nellis Rd	Ashford	WV	25009		X			
Bias Branch Community Center	18044 Spruce river Rd	Jeffrey	WV	25114					X
Boone Career & Technical Center	3505 Daniel Boone Pkwy	Foster	WV	25081		X			
Boone County 911 Center	12367 Smoot Ave	Danville	WV	25053	X				
Boone County Ambulance	1 EMS Circle	Racine	WV	25165	X				
Boone County Health Department	213 Kenmoore Dr	Danville	WV	25053	X				
Boone County Sheriff Department	206 Court St	Madison	WV	25130	X				
Boone County Sheriff Department - Racine Office	John Slack Memorial Park	Racine	WV	25165	X				

Boone County									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Boone Nursing and Rehab Center	462 Kenmoore Dr	Danville	WV	25053		X			
Briar Creek Coal	1313 Bull Creek Rd	Ashford	WV				X		
Brookview Elementary School	1 Learning Way	Foster	WV	25081		X			
Christian Faith Academy	18972 Pond Fork Rd	Van	WV	25206		X			
Foster Community Center	435 Foster Rd	Foster	WV	25081					X
Health & Human Services Department	156 Resource Ln	Foster	WV	25081	X				
J.M. Protan Community Center	22654 Coal River Rd	Orgas	WV	25148					X
Jeffrey Spencer Elementary School	3277 Hewett Creek Rd	Hewett	WV	25108		X			
Jupiter Coal Co Inc	98 Bob White	Van	WV	25206			X		
Jupiter Coal Co Inc	822 Brandy Green Br	Gordon	WV				X		
Medic Station 20	610 Kenmoore Dr	Danville	WV	25053	X				
Medic Station 60	453 Chap Rd	Van	WV	25206	X				
Nellis Elementary School	1 School Way	Nellis	WV	25142		X			
Peabody Coal Co	54912 Pond Fork Rd	Wharton	WV				X		
Pine Ridge Coal	308 School House Rd	Seth	WV	25181			X		
Prestera Center for Mental Health	376 Kenmore Dr	Danville	WV	25053	X				
Progress Coal Co	1478 Robinson Creek Rd	Uneeda	WV	25205			X		
Racine Community Center	446 John Slack Circle	Racine	WV	25165					X
Raleigh Boone Medical Center	37456 Coal River Rd	Whitesville	WV	25209	X				

Boone County									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Ramage Elementary School	15908 Spruce River Rd	Jeffrey	WV	25114		X			
Salamy Building	38117 Coal River Rd	Whitesville	WV	25209					X
Sherman Elementary School	7487 Coal River Rd	Comfort	WV	25049		X			
Sherman high School	2008 Coal River Rd	Seth	WV	25181		X			
Sherman Junior High School	9846 Coal River Rd	Seth	WV	25181		X			
Southern WV Community and Tech College	3505 Daniel Boone Pkwy	Foster	WV	25081		X			
Spruce River Volunteer Fire Department	663 Hewett Rd	Jeffrey	WV	25114	X				
Van Community Center	443 Chap Rd	Van	WV	25206					X
Van Elementary School	338 Van High School Rd	Van	WV	25206		X			
Van Jr/Sr High School	913 Van High School Rd	Van	WV	25206		X			
Van Volunteer Fire Department	45 Sidney St	Van	WV	25206	X				
Water Ways Water Park	628 Waterway Rd	Julian	WV	25529			X		
Wharton Barrett Community Center	178 Bennett Dr	Wharton	WV	25208					X
Wharton Barrett Volunteer Fire Department	35279 Pond Fork Rd	Wharton	WV	25208	X				
Wharton Medical Center	WV 85	Wharton	WV	25208	X				
Whitesville Elementary School	37949 Coal River Rd	Whitesville	WV	25209		X			

Boone County									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Whitesville Volunteer Fire Department	1103 Raleigh St	Whitesville	WV	25209	X				
WV State Police, Troop 5, Madison	347 Kenmoore Dr	Danville	WV	25053	X				

Danville									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Boone Memorial Home Care	260 Mall Rd	Danville	WV	25053		X			
BB&T Bank	1447 Smoot Ave	Danville	WV	25053			X		
Byrnside Hardware	107 4th St	Danville	WV	25053			X		
CSX	311 3rd Ave	Danville	WV	25053	X				
Danville Fire Department	220 Park Ave	Danville	WV	25053	X				
Danville Police Department	731 Hopkins Ave	Danville	WV	25053	X				
Danville Town Hall	500 Hopkins Ave	Danville	WV	25053	X				
Exxon	Smoot Ave & 3rd St	Danville	WV	25053					X
Go Mart	117 Smoot Ave	Danville	WV	25053					X
Kroger	Rt 85 & Delta Rd	Danville	WV	25053			X		
Madison Danville Community Center	Lick Creek Rd	Danville	WV	25053					X

Madison									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
BMH Clinic	701 Madison Ave	Madison	WV	25130	X				
Boone County Adult Learning Center	333 1st St W	Madison	WV	25130		X			
Boone County Ambulance Authority	261 Washington Ave	Madison	WV	25130	X				
Boone County Annex	206 Court St	Madison	WV	25130	X				
Boone County Board of Education	69 Avenue B	Madison	WV	25130		X			
Boone County Coal Museum	347 Main St	Madison	WV	25130					X
Boone County Courthouse	200 State St	Madison	WV	25130	X				
Boone County Day Report	327 State St	Madison	WV	25130	X				
Boone County Economic Development	1 Avenue C	Madison	WV	25130	X				
Boone County Heritage and Arts	345 Main St	Madison	WV	25130					X
Boone County Maintenance Garage	36 Avenue B	Madison	WV	25130	X				
Boone County School	404 Riverside Dr	Madison	WV	25130		X			
Boone Memorial Hospital	701 Madison Ave	Madison	WV	25130	X				
Faith Bible Church	514 Riverside Dr	Madison	WV	25130		X			
Freedom Baptist Fellowship Church	269 Jackson Ave	Madison	WV	25130		X			
Gospel Center Tabernacle	224 Riverside Dr	Madison	WV	25130		X			
Harvest Jubilee Revival	331 State St	Madison	WV	25130		X			

Madison									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Kroger	3256 Smoot Ave	Madison	WV	25130			X		
Madison United Methodist Church	367 State St	Madison	WV	25130		X			
Madison Animal Hospital	178 State St	Madison	WV	25130					X
Madison Baptist Church	426 2nd St	Madison	WV	25130		X			
Madison Christian Center	790 Old River Rd	Madison	WV	25130		X			
Madison Church of Christ	108 Ruckers St	Madison	WV	25130		X			
Madison City Hall	255 Washington Ave	Madison	WV	25130	X				
Madison Civic Center	261 Washington Ave	Madison	WV	25130		X			
Madison Elementary School	150 Josephine Ave	Madison	WV	25130		X			
Madison Medical PLLC	471 Main St	Madison	WV	25130		X			
Madison Middle School	404 Riverside Dr	Madison	WV	25130		X			
Madison Volunteer Fire Department	1 Firehouse Square	Madison	WV	25130	X				
Main Street Baptist Church	335 Main St	Madison	WV	25130		X			
Maranthan Bible Missionary Baptist Church	504 King Ave	Madison	WV	25130		X			
McDonalds	WV 85	Madison	WV	25130			X		
New Harvest Church of Nazarene	309 State St	Madison	WV	25130		X			
Rescare Inc	330 Jackson Ave	Madison	WV	25130		X			
Revolution Mines	6909 Jacks Branch Rd	Madison	WV	25130			X		

Madison									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Rural Health Clinic BMH	173 State St	Madison	WV	25130	X				
Scott High School	1 Skyhawk Pl	Madison	WV	25130		X			
St. Mary Catholic Church	55 Madison Ave	Madison	WV	25130		X			
U.S. Post Office	650 Spruce River Rd	Madison	WV	25130					X
Veterans Memorial Building	269 Washington Ave	Madison	WV	25130					X
West Madison Baptist Church	401 4th St	Madison	WV	25130		X			
Woman Care DBA Family Care	5515 Main ST	Madison	WV	25130		X			
Zion Baptist Church	382 3rd St	Madison	WV	25130		X			

Sylvester									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Sylvester Community Center	32 Coal River Rd	Sylvester	WV	25193					X
Sylvester Town Hall	32 Coal River Rd	Sylvester	WV	25193	X				
U.S. Post Office	32832 Coal River Rd	Sylvester	WV	25193					X

Whitesville									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
CSX Transportation	1 Lewis St	Whitesville	WV	25209	X				
Marfolk Coal Co	Marfolk Rd & Rt 3	Whitesville	WV	25209		X			
Whitesville Town Hall	39140 Coal River Rd	Whitesville	WV	25209	X				
Daniel Chevrolet	39553 Coal River Rd	Whitesville	WV	25209			X		

Clay County									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Big Otter Clinic	797 Clinic Dr	Ivydale	WV	25113	X				
Big Otter Elementary School	59 Ossia Rd	Duck	WV	25063		X			
Bog Otter Fire Department	5462 Big Otter Hwy	Ivydale	WV	25113	X				
Clay Christian Academy	1594 Triplett Ridge Rd	Clay	WV	25043		X			
Clay County Ambulance	255-259 Main St	Clay	WV	25043	X				
Clay County Courthouse	245 Main St	Clay	WV	25043	X				
Clay Health Care Center	1053 Clinic Dr	Ivydale	WV	25113	X				
Clay Primary Care Clinic	122 Center St	Clay	WV	25043	X				
Clay Public Service District	247 Main St	Clay	WV	25043	X				
Cranberry Pipeline Corp	WV 16	Clay	WV	25043			X		
H.E. White Elementary School	501 Bomont Rd	Bomont	WV	25030		X			
Lizemore Elementary School	100 Lizemore Lion Rd	Lizemore	WV	25125		X			
Clay Roane Public Service District	1100 Elkhurst Rd	Procious	WV	25164	X				

Clay									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Clay County Development Corp	PO Box 455	Clay	WV	25043		X			
Clay City Hall	956 Main St	Clay	WV	25043	X				
Clay County Elementary School	168 Church St	Clay	WV	25043		X			
Clay County High School	1 Panther Dr	Clay	WV	25043		X			
Clay County Middle School	419 Church St	Clay	WV	25043		X			
Clay Fire Department	171 Church St	Clay	WV	25043	X				
U.S. Post Office	54 Main St	Clay	WV	25043					X

Kanawha County									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
130th Airlift Wing Fire Department	1679 Coonskin Dr	Charleston	WV	25311	X				
Alum Creek Elementary School	Rt 7 Box 279A	South Charleston	WV	25309		X			
Amherst Madison	2 Port Amherst Dr	Charleston	WV	25306		X			
Andrew Heights Elementary School	7776 Coal River Rd	Tornado	WV	25202		X			
Bayer Crop Science	WV 25	Institute	WV	25112			X		
Belle's Residential Board and Care	2619 Roosevelt Ave	St. Albans	WV	25177		X			
Bible Baptist Christian School	7020 Sissonville Dr	Charleston	WV	25320		X			
Bonham Elementary School	Rt 1 Box 425A	Charleston	WV	25312		X			
Bridge Elementary School	5120 Elk River Rd N	Elkview	WV	25071		X			
Cabin Creek Volunteer Fire Department	10217 Cabin Creek Rd	Eskdale	WV	25075	X				
Carver Career Center	4799 Midland Rd	Charleston	WV	25306		X			
Catenary Coal Co	5914 Cabin Creek Rd	Daws	WV	25306			X		
Cedar Ridge Health and Rehab	302 Cedar Ridge Rd	Sissonville	WV	25320		X			
Chamberlain Elementary School	4901 Venable Ave SE	Charleston	WV	25304		X			
Christian Family Academy	5345 Big Tyler Rd	Charleston	WV	25313		X			
Coal River Energy LLC	123 Long Shoals Bch	Alum Creek	WV	25003			X		
Communication Test Design Inc	418 Goff Mountain Rd	Charleston	WV	25313			X		

Kanawha County									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Cross Lanes Christian School	5330 Floradale Dr	Cross Lanes	WV	25313			X		
Cross Lanes Elementary School	5525 Big Tyler Rd	Charleston	WV	25313		X			
Davis Creek / Ruthdale Volunteer Fire Department	RR 8 Box 401	South Charleston	WV	25309	X				
Dunbar Intermediate School	1330 Myers Ave	Dunbar	WV	25064		X			
Dupont Middle School	301 W 34th St	Belle	WV	25015		X			
Elk Center Community Education	3320 Pennsylvania Ave	Chas	WV	25302		X			
Elk Elementary School	3320 Pennsylvania Ave	Chas	WV	25302		X			
Elk Valley Christian School	58 Mount Pleasant Dr	Elkview	WV	25071		X			
Elkview Middle School	301 W 34th St	Belle	WV	25015		X			
Finn Elementary School	2006 McClure Pkwy	Charleston	WV	25312		X			
Frame Volunteer Fire Department	115 Poca Fork Rd	Elkview	WV	25071	X				
Institute Volunteer Fire Department	301 Dubois St	Institute	WV	25112	X				
Jacobs Engineering Group	5000 Oak River Rd S	Elkview	WV	25071			X		
Kanawha County Courthouse	409 Virginia St E	Charleston	WV	25301	X				
Lakewood Volunteer Fire Department	2627 Shadyside Rd	St. Albans	WV	25177	X				
Loudendale Volunteer Fire Department	51 Selbe Ln	Loudendale	WV	25314	X				

Kanawha County									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Malden Elementary School	4001 Salines Dr	Charleston	WV	25306		X			
Malden Volunteer Fire Department	3924 Malden Dr	Charleston	WV	25306	X				
Mary Ingles Elementary School	Campbells Creek Dr	Tad	WV	25201		X			
NGK	1 NGK Dr	Sissonville	WV	25320			X		
Piedmont Elementary School	203 Bradford St	Charleston	WV	25301		X			
Pinch Elementary School	300 S Pinch Rd	Elkview	WV	25071		X			
Pinch Volunteer Fire Department St. 1	231 N Pinch Rd	Elkview	WV	25071	X				
Pinch Volunteer Fire Department St. 2	19 Pennsylvania Ave	Charleston	WV	25302	X				
Point Harmony Elementary School	5312 Big Tyler Rd	Cross Lanes	WV	25313		X			
Rand Volunteer Fire Department	5308 Church Dr	Charleston	WV	25306	X				
Riverside High School	1 Warrior Way	Belle	WV	25015		X			
Sharon Dawes Elementary School	149 Cabin Creek Rd	Miami	WV	25314		X			
Sissonville Elementary School	8324 Sissonville Dr	Sissonville	WV	25320		X			
Sissonville high School	6100 Sissonville Dr	Charleston	WV	25312		X			
Sissonville Middle School	100 Middle School Ln	Charleston	WV	25312		X			
Sissonville Volunteer Fire Department Goff Station	8405 Sissonville Dr	Sissonville	WV	25312	X				

Kanawha County									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Sissonville Volunteer Fire Department Hutton Station	10 Middle School Ln	Charleston	WV	25312	X				
Sissonville Volunteer Fire Department Johnson Station	383 Call Rd	Charleston	WV	25312	X				
Sissonville Volunteer Fire Department Loftis Station	626 Edens Fork Rd	Charleston	WV	25312	X				
Smith's Foodfair	10 Elk Plaza	Elkview	WV	25071			X		
Speed Mining Inc	903 Dawes Hollow Rd	Dawes	WV	25054			X		
Terraquip Equipment Rental	600 New Goff Mountain Rd	Cross Lanes	WV	25313			X		
Tyler Mountain Volunteer Fire Department	5380 Big Tyler Rd	Cross Lanes	WV	25313	X				
Universal School	1 Valley Dr	Charleston	WV	25303		X			
Vineyards Care Home	2603 Knox Ave	St. Albans	WV	25177		X			
West Side Volunteer Fire Department	256 W Main St	St	WV	25177	X				

Belle									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Midland Trail Elementary School	200 Ferry St	Diamond	WV	25015		X			
Belle Elementary School	401 E 6th St	Belle	WV	25015		X			
Belle Police Department	1100 E Dupont Ave	Belle	WV	25015	X				
Belle Town Hall	1100 E Dupont Ave	Belle	WV	25015	X				
Walker Machinery	1400 E Dupont Ave	Belle	WV	25015			X		
U.S. Post Office	814 E Dupont Ave	Belle	WV	25015					X
Perry's Animal Hospital	112 E Dupont Ave	Belle	WV	25015					X
Huntington Bank	300 E Dupont Ave	Belle	WV	25015			X		

Cedar Grove									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Cedar Grove Elementary School	200 John St	Cedar Grove	WV	25039		X			
Cedar Grove Middle School	200 John St	Cedar Grove	WV	25039		X			
Cedar Grove Police Department	302 Alexander St	Cedar Grove	WV	25039	X				
Cedar Grove Town Hall	302 Alexander St	Cedar Grove	WV	25039	X				
Cedar Grove Fire Department	311 William St	Cedar Grove	WV	25039	X				
Mammoth Coal	Kelly's Creek Rd	Cedar Grove	WV	25039			X		
U.S. Post Office	401 S George St	Cedar Grove	WV	25039					X

Charleston									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
130th Airlift Wing Fire Department	1679 Coonskin Drive	Charleston	WV	25311	X				
Alum Creek VFD	17 John Fouts Drive	Alum Creek	WV	25003	X				
American Chemical Services	11201 MacCorkle Avenue	Marmet	WV						
Amherst Madison	2 Port Amherst Drive	Charleston	WV				X		
Andrew Jackson Middle School	5445 Big Tyler Road	Cross Lanes	WV	25313		X			
Andrews Heights Elementary School	7776 Coal River Rd	Tornado	WV	25202		X			
Anne Bailey Elementary School	405 Winfield Road	St. Albans	WV	25177		X			
Baker Oil	2076 Stephen Street	Hugheston	WV	25110			X		
Bible Baptist Christian School	7020 Sissonville Drive	Sissonville	WV	25320		X			
Brentagg	319 First Street North	St. Albans	WV	25177			X		
Bridge Elementary School	5120 Elk River Road N	Elkview	WV	25071		X			
Cabin Creek VFD	10217 Cabin Creek Road	Eskdale	WV	25075	X				
Carver Career Center	4799 Midland Drive	Charleston	WV	25306		X			
Cedar Ridge Center	302 Cedar Ridge Rd	Sissonville	WV	25320		X			
Chesapeake VFD - Fields Creek Substation	17 Old Glory Lane	Chesapeake	WV	25315	X				
Coal River Energy LLC	123 Long Shoals Beach	Alum Creek	WV	25003			X		
Cross Lanes Branch Library	5449 Big Tyler Road	Cross Lanes	WV	25313					X
Cross Lanes Christian School	5330 Floradale Drive	Charleston	WV	25313		X			
Cross Lanes Elementary School	5525 Big Tyler Road	Cross Lanes	WV	25313		X			
Davis Creek/Ruthdale VFD	1970 Oakhurst Drive	South Charleston	WV	25309	X				

Charleston									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
DuPont Middle School	1 Panther Way	Belle	WV	25015		X			
Elk Elementary Center	3320 Pennsylvania Avenue	Charleston	WV	25302		X			
Elk Valley Branch Library	313 The Crossing Mall	Elkview	WV	25071					X
Elk Valley Christian School	58 Mount Pleasant Drive	Elkview	WV	25071		X			
Elkview Middle School	5090 Elk River Road N	Elkview	WV	25071		X			
Flinn Elementary School	2006 McClure Parkway	Charleston	WV	25312		X			
Frame VFD	1177 Poca Fork	Elkview	WV	25071	X				
Heater Oil Company/Go-Mart	1 Terminal Road	St. Albans	WV	25177			X		
Herbert Hoover High School	5096 Elk River Road N	Elkview	WV	25071		X			
Institute VFD	301 Dubois Street	Institute	WV	25064	X				
Jefferson VFD	6313 MacCorkle Avenue	St. Albans	WV	25177	X				
Kanawha County Courthouse	409 Virginia Street East	Charleston	WV	25301		X		X	
Kanawha Home Health, Inc.	3324 Pennsylvania Avenue	Charleston	WV	25302		X			
Kureha PGA LLC	901 West Dupont Avenue	Belle	WV	25015			X		
Loudendale VFD	51 Selbe Lane	Charleston	WV	25314	X				
Malden Elementary School	4001 Salinas Drive	Charleston	WV	25306		X			
Malden VFD	3924 Malden Drive	Charleston	WV	25306	X				
Mary Ingles Elementary School	559 Big Bottom Hollow Rd	Tad	WV	25201		X			
Maxam Energy	225 Six Mile Hollow Road	Hernshaw	WV	25107			X		
Maxam Energy - Buff Lick Compressor Station	Rt 81 Kelleys Creek Rd	Cedar Grove	WV	25039			X		

Charleston									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Meadowbrook Acres	2149 Greenbrier Street	Charleston	WV	25311		X			
Midland Trail Elementary School	200 Ferry Street	Diamond	WV	25015		X			
NGK	1 NGK Drive	Sissonville	WV	25320			X		
Petroleum Products LLC	500 River East Drive	Belle	WV	25015			X		
Pinch Elementary School	300 South Pinch Road	Elkview	WV	25071		X			
Pinch VFD	231 North Pinch Road	Pinch	WV	25071	X				
Pinch VFD - Big Chimney Station	19 Baxter Drive	Big Chimney	WV	25302	X				
Point Harmony Elementary School	5312 Big Tyler Road	Cross Lanes	WV	25313		X			
Praxair Inc.	10637 McCorkle Ave	Marmet	WV	25315			X		
Quincy Coal	224 Quincy Hollow Rd	Belle	WV	25015			X		
Rand VFD	5308 Church Drive	Rand	WV	25306	X				
River Point LLC	11201 McCorkle Ave	Charleston	WV	25315			X		
Riverside Health and Rehabilitation	6500 MacCorkle Ave SW	St. Albans	WV	25177		X			
Riverside High School	1 Warrior Way	Belle	WV	25015		X			
Riverside Public Library	1 Warrior Way, Suite 104	Belle	WV	25015					X
Sharon Dawes Elementary School	5118 Cabin Creek Rd	Miami	WV	25134		X			
Shawnee Sports Complex	1 Salango Way	Dunbar	WV	25064		X			
Shoals Elementary School	100 Dutch Road	Charleston	WV	25302		X			
Sissonville Branch Library	1 Tinney Lane	Sissonville	WV	25312					X
Sissonville Elementary School	8324 Sissonville Drive	Sissonville	WV	25320		X			

Charleston									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Sissonville High School	6100 Sissonville Drive	Sissonville	WV	25312		X			
Sissonville Middle School	100 Middle School Lane	Sissonville	WV	25312		X			
Sissonville VFD	515 Edens Fork Road	Charleston	WV	25312	X				
Sissonville VFD - Goff Station	8405 Sissonville Drive	Sissonville	WV	25320	X				
Sissonville VFD - Houston Station	10 Middle School Lane	Sissonville	WV	25312	X				
Sissonville VFD - Johnson Station	383 Call Road	Sissonville	WV	25312	X				
TC Energy - Coco Compressor Station	1982 Coco Road	Elkview	WV	25071			X		
TC Energy - Lanhem Compressor Station	9 Kellys Creek Road	Charleston	WV	25312			X		
Tornado VFD	7826 Coal River Road	Tornado	WV	25202	X				
Tyler Mountain VFD	5380 Big Tyler Road	Cross Lanes	WV	25313	X				
West Side VFD	256 W. Main Street	St. Albans	WV	25177	X				
West Virginia State University	Fairlawn Avenue	Institute	WV	25112		X			

Chesapeake									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Chesapeake Elementary School	13620 MacCorkle Ave	Chesapeake	WV	25315		X			
Chesapeake Town Hall	12404 MacCorkle Ave	Cheseapeake	WV	25315	X				
Upper Kanawha Valley Christian School	12721 MacCorkle Ave	Cheseapeake	WV	25315		X			

Clendenin									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Clendenin Branch Library	1 Cardinal St	Clendenin	WV	25045					X
Clendenin Elementary School	533 Maywood Ave E	Clendenin	WV	25045		X			
Clendenin Fire Department	109 Maywood Ave E	Clendenin	WV	25045	X				
Herbert Hoover High School	5856 Elk River Rd N	Clendenin	WV	25045		X			
U.S. Post Office	Cardinal St	Clendenin	WV	25045					X

Dunbar									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Americare Dunbar Nursing Home and Rehab	501 Caldwell Ln	Dunbar	WV	25064		X			
Ben Franklin Career Center	500 28th St	Dunbar	WV	25064		X			
Dunbar Branch Library	301 12th St	Dunbar	WV	25064					X
Dunbar City Hall	210 12th St	Dunbar	WV	25064	X				
Dunbar Fire Department	907 Dunbar Ave	Dunbar	WV	25064	X				
Dunbar Police Department	1227 Leone Ln	Dunbar	WV	25064	X				
Regional Education Service Agencies 3	501 22nd St	Dunbar	WV	25064		X			
West Virginia State Agency for Surplus Property	2700 Charles Ave	Dunbar	WV	25064	X				

Marmet									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Genesis Health Center	1 Sutphin Dr	Marmet	WV	25315		X			
Living Faith Christian Church	9203 Ohio Ave	Marmet	WV	25315		X			
Marmet Elementary School	408 94th St	Marmet	WV	25315		X			
Marmet Fire Department	9403 MaCorkle Ave	Marmet	WV	25315	X				
Marmet Police Department	9403 MaCorkle Ave	Marmet	WV	25315	X				
Marmet Town Hall	9403 MaCorkle Ave	Marmet	WV	25315	X				
U.S. Post Office	9303 MacCorkle Ave	Marmet	WV	25315					X

Nitro									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Freedom Christian Academy	302 21st St #207	Nitro	WV	25143		X			
Lowes home Improvement	1000 Nitro Market Pl	Cross Lanes	WV	25313			X		
Mardi Gras Casino and Resort	1 Greyhound Dr	Cross Lanes	WV	25313			X		
Nitro City Hall	2009 20th St	Nitro	WV	25143	X				
Nitro Elementary School	1921 19th St	Nitro	WV	25143		X			
Nitro Police Department	2002 2nd Ave	Nitro	WV	25143	X				
Nitro Public Library	1700 Park Ave	Nitro	WV	25143					X
Twin City Christian Academy	100 1st Ave	Nitro	WV	25143		X			
U.S. Post Office	311 21st St	Nitro	WV	25143					X
Wal-Mart Super Center	100 Nitro Market Pl	Cross Lanes	WV	25313			X		

South Charleston									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Bible Center Christian School	100 Bible Center Dr	South Charleston	WV	25309		X			
Bridge Valley Community and Technical College	2001 Union Carbide Dr	South Charleston	WV	25309		X			
Bridgeview Elementary School	5100 Ohio St	South Charleston	WV	25309		X			
Dow Chemical	437 MacCorkle Ave SW	South Charleston	WV	25309			X		
Dutch Miller Kia of South Charleston	339 MacCorkle Ave SW	South Charleston	WV	25309			X		
Gestamp	3100 MacCorkle Ave SW	South Charleston	WV	25309			X		
Herbert J Thomas Memorial Hospital	4605 MacCorkle Ave SW	South Charleston	WV	25309	X				
Joe Holland Chevrolet	210 MacCorkle Ave SW	South Charleston	WV	25309			X		
Lester Raines Honda	5102 MacCorkle Ave SW	South Charleston	WV	25303			X		
Marshall University South Charleston Campus	100 Angus E Peyton Dr	South Charleston	WV	25303		X			
Montrose Elementary School	631 Montrose Dr	South Charleston	WV	25309		X			
Office and Commercial Cleaning	117 1st Ave	South Charleston	WV	25309			X		
Quaker Steak and Lube	2931 Mountaineer Blvd	South Charleston	WV	25309			X		
Richmond Elementary School	4620 Spring Hill Ave	South Charleston	WV	25309		X			

South Charleston									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Ruthlawn Elementary School	Rt 8 Box 428	South Charleston	WV	25309		X			
South Charleston Fire Department St 4	10 Camp Way	South Charleston	WV	25309	X				
South Charleston Fire Department St. 1	315 4th Ave	South Charleston	WV	25309	X				
South Charleston Fire Department St. 3	1112 Weberwood Dr	South Charleston	WV	25309	X				
South Charleston High School	1 Eagle Way	South Charleston	WV	25309		X			
South Charleston Library	312 4th Ave	South Charleston	WV	25309					X
South Charleston Police Department	235 4th Ave	South Charleston	WV	25309	X				
South Charleston Public Works	1103 Jefferson Rd	South Charleston	WV	25309	X				
South Charleston Fire Department St. 2	4911 McClung St	South Charleston	WV	25309	X				
U.S. Post Office	2470 Mountaineer Blvd	South Charleston	WV	25309					X
Valley Health Village	1000 Lincoln Dr	South Charleston	WV	25309		X			
Weberwood Elementary School	732 Gordon Dr	South Charleston	WV	25309		X			

St. Albans									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
A Caring Heart and Home	2615 Knox Ave	St. Albans	WV	25177		X			
Alban Elementary School	2030 Harrison Ave	St. Albans	WV	25177		X			
Anne Bailey Elementary School	405 Winfield Rd	St. Albans	WV	25177		X			
Central Elementary School	900 Helene St	St. Albans	WV	25177		X			
George C. Weimer Elementary School	3040 Kanawha Terrace	St. Albans	WV	25177		X			
Hayes Middle School	830 Strawberry Rd	St. Albans	WV	25177		X			
Lakewood Elementary School	2089 Lakewood Dr	St. Albans	WV	25177		X			
McKinley Middle School	3000 Kanawha Terrace	St. Albans	WV	25177		X			
Riverside Nursing Home	6500 MacCorkle Ave SW	St. Albans	WV	25177		X			
St. Albans City Hall	1499 MacCorkle Ave	St. Albans	WV	25177	X				
St. Albans Department of Public Works	5th Ave & 8th St	St. Albans	WV	25177	X				
St. Albans Fire Department, Central Station	6th Ave	St. Albans	WV	25177	X				
St. Albans Fire Department, Highlawn Station	Walnut St	St. Albans	WV	25177	X				
St. Albans Police Department	6th Ave	St. Albans	WV	25177	X				

Putnam County									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Calvary Baptist Academy	3655 Teays Valley Rd	Hurricane	WV	25526		X			
Coca-Cola Bottling Co	1850 Winfield Rd	St. Albans	WV	25177			X		
Confidence Elementary School	8786 McLane Pike	Liberty	WV	25124		X			
Conner St Elementary School	445 Conner St	Hurricane	WV	25526		X			
Eastbrook Elementary School	2092 Bills Creek Rd	Winfield	WV	25213		X			
George Washington Middle School	402 Roosevelt Blvd	Eleanor	WV	25070		X			
Hometown Elementary School	107 School Ln	Hometown	WV	25109		X			
Lakeside Elementary School	2550 US 60	Hurricane	WV	25526		X			
Lighthouse Baptist Academy	2440 US 60	Hurricane	WV	25526		X			
Pepsi Bottling Group	100 Indepent Way	Nitro	WV	25143			X		
Putnam Career Technical Center	300 Roosevelt Blvd	Eleanor	WV	25070		X			
Putnam County Courthouse	12093 Winfield Rd	Winfield	WV	25177	X				
Putnam County Development Authority	5664 State Rt 34	Winfield	WV	25177	X				
Putnam General Hospital	1400 Hospital Dr	Hurricane	WV	25526	X				
Rock Branch Elementary School	4616 1st Ave	Nitro	WV	25143		X			

Putnam County									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Scott Teays Elementary School	6153 Teays Valley Rd	Scott Depot	WV	25560		X			
Sun Bridge Care and Rehab	300 Seville Dr	Hurricane	WV	25526		X			
Teays Valley Center	590 N Poplar Fork Rd	Hurricane	WV	25526		X			
Teays Valley Christian School	4373 Teays Valley Rd	Scott Depot	WV	25560		X			
Trinity Coal Corp	4978 Teays Valley Rd	Scott Depot	WV	25560			X		
Truth and Liberty Bible College	328 2nd St	Hurricane	WV	25526		X			
West Teays Elementary School	3676 Teays Valley Rd	Hurricane	WV	25526		X			

Bancroft									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Bancroft Town Hall	14-B Main St	Bancroft	WV	25011	X				
Bancroft Volunteer Fire Department	449 Washington St	Bancroft	WV	25011	X				
U.S. Post Office	14 Main St	Bancroft	WV	25011					X










Buffalo									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Buffalo Elementary School	19366 Buffalo Rd	Buffalo	WV	25033		X			
Buffalo High School	3680 Buffalo Rd	Buffalo	WV	25033		X			
Buffalo Town Hall	PO Box 307	Buffalo	WV	25033	X				
Buffalo Volunteer Fire Department	3522 Buffalo Rd	Buffalo	WV	25033	X				
Toyota Mfg	1 Sugar Maple Ln	Buffalo	WV	25033			X		
U.S. Post Office	2062 Buffalo Rd	Buffalo	WV	25033					X

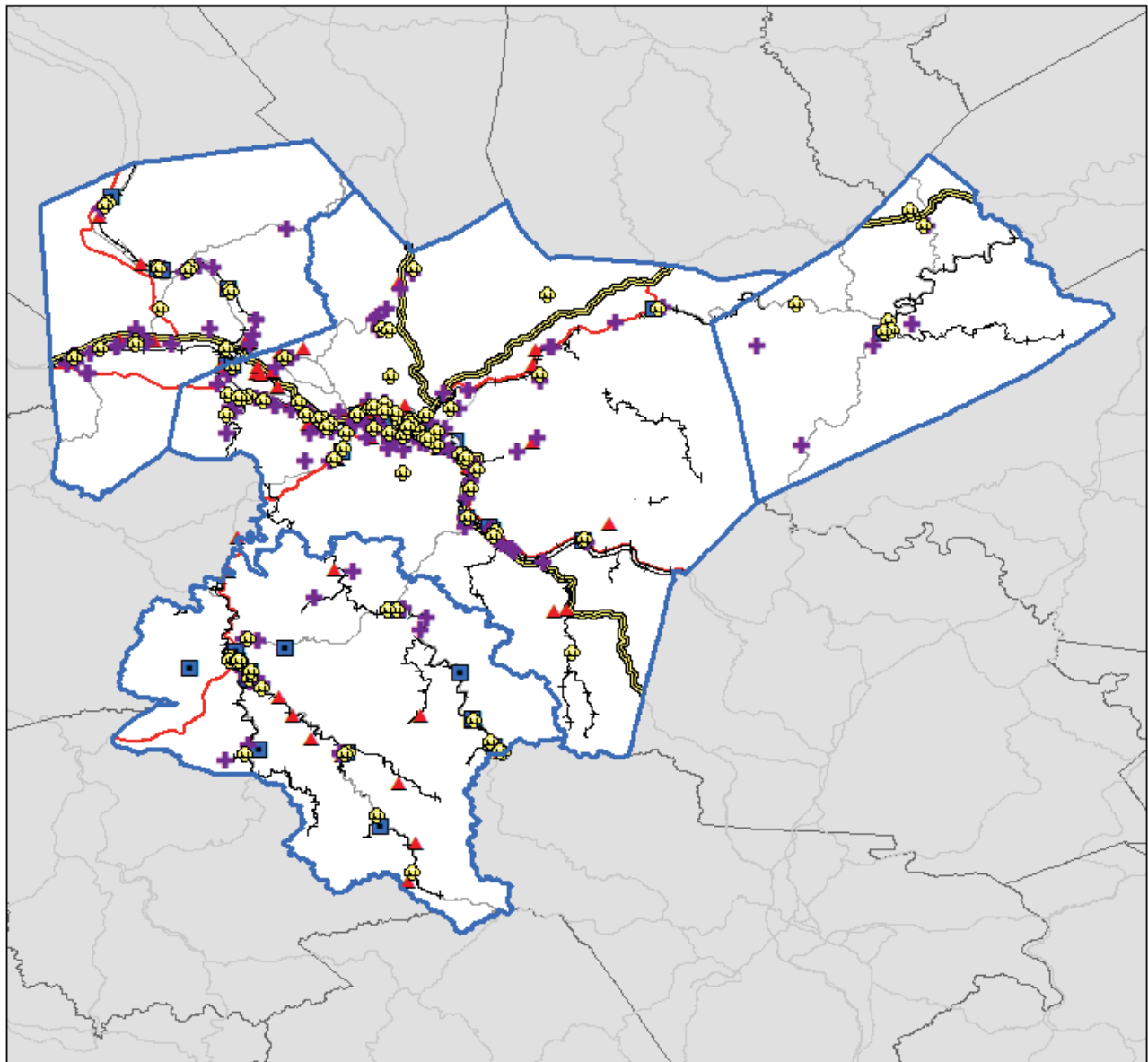
Eleanor									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Diamond Electric Mfg	207 Eleanor Industrial Park Dr	Eleanor	WV	25070			X		
Eleanor Branch Library	401 Roosevelt Blvd	Eleanor	WV	25070					X
Eleanor Fire Department	600 Roosevelt Blvd	Eleanor	WV	25070	X				
Eleanor Police Department	201 Ash Circle	Eleanor	WV	25070	X				
Eleanor Town Hall	401 Roosevelt Blvd	Eleanor	WV	25070	X				
U.S. Post Office	103 Roosevelt Blvd	Eleanor	WV	25070					X

Hurricane									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
CAMC Teays Valley Hospital	1400 Hospital Dr	Hurricane	WV	25526	X				
Capital Medical Inc	3857 Teays Valley Rd	Hurricane	WV	25526	X				
Genesis Healthcare	66 Teays Center Dr	Hurricane	WV	25526		X			
Hurricane City Hall	2801 Virginia Ave	Hurricane	WV	25526	X				
Hurricane Fire Department	2716 Main St	Hurricane	WV	25526	X				
Hurricane High School	3350 Teays Valley Rd	Hurricane	WV	25526		X			
Hurricane Middle School	629 Midland Trail	Hurricane	WV	25526		X			
Hurricane Town Elementary School	300 Harbour Lane	Hurricane	WV	25526		X			
Putnam Care and Rehab	300 Seville Circle	Hurricane	WV	25526		X			
Putnam County Parks	1 Valley Park Rd	Hurricane	WV	25526	X				
Sleepy Hollow Golf Course	3780 Sleepy Hollow Dr	Hurricane	WV	25526			X		
US Foods	2575 Virginia Ave	Hurricane	WV	25526			X		

Poca									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Kanawha Scales & Systems Inc	222 Jaconson Dr	Poca	WV	25159			X		
Poca Elementary School	2884 Charleston Rd	Poca	WV	25159		X			
Poca High School	1 Dot ay	Poca	WV	25159		X			
Poca Middle School	2884 Charleston Rd	Poca	WV	25159		X			
Rite Aid Customer Support	360 Jaconson Dr	Poca	WV	25159			X		
Tri State Roofing & Sheet Metal	321 Harris Dr	Poca	WV	25159			X		
Tyler Mountain Water & Coffee	159 Harris Dr	Poca	WV	25159			X		

Winfield									
Name/Description	Street Address	City	State	Zip Code	Critical	Vulnerable	Economic	Historical	Special Consideration
Putnam County Commission	3389 Winfield Rd	Winfield	WV	25213	X				
Putnam County Judicial Building	12093 Winfield Rd	Winfield	WV	25213	X				
Putnam County Sheriff's Department	236 Courthouse Dr	Winfield	WV	25213	X				
U.S. Post Office	3278 Winfield Rd	Winfield	WV	25213	X				
Winfield Elementary School	75 Wall St	Winfield	WV	25213		X			
Winfield High School	11268 Winfield Rd	Winfield	WV	25213		X			
Winfield Middle School	11883 Winfield Rd	Winfield	WV	25213		X			
Winfield Town Hall	1 Main St	Winfield	WV	25213	X				
WV State Police Troop 1, Winfield Detachment	3389 Winfield Rd	Winfield	WV	25213	X				

<ul style="list-style-type: none"> Critical Facilities Vulnerable Populations Economic Assets Historical Assets Special Considerations	 <p style="text-align: right;">N</p>  <p style="text-align: center;">0 2.5 5 10 15 20 Miles</p>	<h2 style="text-align: center;">REGION 3 HAZARD MITIGATION PLAN</h2> <h3 style="text-align: center;">Asset Inventory</h3> <p style="text-align: center;">Data Source(s): Region 3 Steering Committee</p>
<p style="text-align: center;"><small>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.</small></p> <div style="display: flex; justify-content: space-between;"></div>		



1.0 INTRODUCTION

1.3 Capabilities

§201.6(b)(3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

This section examines the existing capabilities of Region 3 and the participating jurisdictions. Specifically, this section looks at those capabilities that can support the implementation of hazard mitigation efforts. All jurisdictions in the region had an opportunity to complete a “capability self-assessment” via an online survey. Representative members from all jurisdictions completed a self-assessment for their jurisdiction.

<i>Jurisdiction</i>	Comprehensive Plan	Building Codes	Zoning Ordinance	Participates in the NFIP	Capital Budget Funds for Mitigation Projects	Public Works Budget for Mitigation projects
Boone County	No	Yes	No	Yes	No	No
Clay County	No	Yes	No	Yes	No	No
Kanawha County	No	Yes	No	Yes	No	No
Putnam County	Yes	Yes	No	Yes	No	No
Charleston, City of	Yes	No	No	Yes	No	No
Dunbar, City of	No	Yes	Yes	Yes	No	No
Hurricane, City of	No	Yes	Yes	Yes	No	No
Madison, City of	No	Yes	No	Yes	No	No
Marmet, City of	Yes	No	No	Yes	No	No
Nitro, City of	Yes	No	No	Yes	No	No
South Charleston, City of	No	Yes	No	Yes	No	No
St. Albans, City of	Yes	Yes	Yes	Yes	No	No
Bancroft, Town of	No	No	No	Yes	No	No
Belle, Town of	No	Yes	Yes	Yes	No	No
Buffalo, Town of	No	No	No	Yes	No	No
Cedar Grove, Town of	Yes	No	No	Yes	No	No
Chesapeake, Town of	No	No	No	Yes	No	No
Clay, Town of	No	No	No	Yes	No	No
Clendenin, Town of	No	No	No	Yes	No	No
Danville, Town of	No	No	No	Yes	No	No
East Bank, Town of	Yes	Yes	Unknown	Yes	No	No
Eleanor, Town of	No	No	No	Yes	No	No
Glasgow, Town of	-	-	-	-	-	-
Handley, Town of	Unknown	Yes	Yes	Yes	No	No
Poca, Town of	Yes	Yes	Unknown	Yes	No	Unknown
Pratt, Town of	No	Yes	No	Yes	No	No

<i>Jurisdiction</i>	Comprehensive Plan	Building Codes	Zoning Ordinance	Participates in the NFIP	Capital Budget Funds for Mitigation Projects	Public Works Budget for Mitigation projects
Sylvester, Town of	No	Unknown	No	Yes	No	No
Whitesville, Town of	Unknown	Yes	No	Yes	No	No
Winfield, Town of	No	Yes	Yes	Yes	No	No

1.3.1 Existing Plans and Ordinances

The counties and municipalities that make up Region 3 have many capabilities that can support mitigation efforts, including comprehensive plans, building codes, zoning ordinances, and floodplain regulations. In summary, Region 3 jurisdictions appear to have a “moderate” planning and regulatory capability.

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 basic decision-making and review processes on zoning matters, subdivision and land development, land uses, public facilities, and housing needs over time.

Several jurisdictions in Region 3 maintain comprehensive plans of their own, while some are covered by a regional or otherwise multi-jurisdictional document.

Building Codes

Building codes regulate construction standards for new construction and substantially renovated buildings. Standards can require resistant or resilient building design practices to address hazard impacts common to a given community. Building codes can contribute substantially to hazard mitigation, even if a jurisdiction only adopts codes to the level of the recommended International Building Code (IBC).

Zoning Ordinances

Zoning ordinances allow for 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.

National Flood Insurance Program (NFIP) Participation and Floodplain Management

Through the administration of floodplain ordinances, local governments can ensure that all new construction or substantial improvements to existing structures located in the floodplain are floodproofed, dry-floodproofed, or built above anticipated flood elevations. Floodplain ordinances may also prohibit development in certain areas altogether. The NFIP establishes minimum ordinance requirements in order for that community to participate in the program. However, a community is permitted and encouraged to adopt standards that exceed NFIP requirements. The following paragraphs present generalized information as to floodplain management in the region (i.e., elements common to all communities) as well as a small sampling of more specific sample activities.

FEMA's *Community Status Book* indicates that all jurisdictions in Region 3 participate in the NFIP. Websites, whether the local community's page or a state government page, serve as the primary means of identifying floodplain managers serving the communities in the region. All communities have a designated floodplain coordinator, but in some municipalities, the county representative serves as the municipal coordinator as well (Bancroft, Buffalo, and Poca in Putnam County are examples). These floodplain coordinators serve as the principal points of contact for residents with floodplain development questions. These local representatives typically obtain Base Flood Elevation (BFE) data and maintain records of Letters of Map Amendments (LOMA) and Letters of Map Revision-Based on Fill (LOMR-F). The floodplain coordinators for each of the region's four counties often provide technical assistance and support to their municipal counterparts. Interestingly, though the floodplain coordinators support technical assistance requests and determinations of location with respect to the SFHA, monitoring for compliance at the municipal levels typically falls to building and zoning officers.

Similarly, the floodplain coordinator may not be the individual to issue permits for floodplain development. Boone County's emergency manager serves as the floodplain coordinator, and the emergency management office coordinates the permitting process. In Kanawha County, the county planning and development department issues permits. The Putnam County Office of Planning and Infrastructure is the public point of contact for floodplain information for the unincorporated areas of Putnam County (as well as the municipal areas of Bancroft, Buffalo, and Poca). The office provides determinations of whether a property is in or out of a SFHA, additional flood insurance data for a site (e.g., FIRM zone, BFE or depth),

information on the flood insurance purchase requirement, and copies of FEMA elevation certificates. The Putnam County Planning Commission is the entity that grants floodplain development permits. At the municipal level, Charleston's planning department coordinates floodplain management, and the city's floodplain manager reviews building permit applications to ensure proposed construction or remodeling complies with the city's floodplain ordinance. The Town of Winfield's building inspector is the floodplain administrator and issues floodplain development permits. The floodplain administrator for the Town of Eleanor is the mayor. Nitro's floodplain management, including permitting, falls to the building codes official. South Charleston's city engineer serves as the floodplain administrator, with the building inspector and mayor designated as back-ups. Madison's municipal emergency manager serves as the floodplain administrator.

Floodplain regulations throughout the region contain many common elements, including guidelines for utilizing the floodplain area, criteria for building and site plan approvals, design and construction standards, and various elevation certificate requirements and instructions. In fact, the language in the majority of the ordinances is the same. In Kanawha County, the intent is to preserve the floodplain to the greatest extent possible, which includes restricting new development in the presence of reasonable alternatives or, when no alternatives are available, only encroaching on the floodway to the minimum amount necessary to accomplish the project. Kanawha County requires permits for all new construction or substantial improvements located in an identified floodplain, floodway, or other flood hazard area, and include design and construction considerations to minimize flood damage. The Boone County ordinance requires minimal obstruction of the flow of floodwaters for development in flood hazard areas, a provision for adequate drainage to reduce exposure to flood hazards, and encourages anchoring. Putnam County's ordinance requires anchoring as well as guidelines on the storage of buoyant, flammable, and explosive materials below the BFE. Its ordinance requirements utility systems to minimize infiltration of floodwaters and construction/location in areas that minimize flood damage.

Communities throughout the region provide a range of materials to their residents to educate them on floodplain management, flood insurance (and its relation to homeowners insurance), natural and beneficial floodplain functions, etc. These materials are available at municipal halls and courthouses and in the offices of floodplain administrators, though they are most readily available via websites. The images below are examples from Putnam County (left) the City of Charleston (right).

Office of Planning & Infrastructure

- Home Page
- Planning Commission
- Board of Zoning Appeals
- Board of Code Appeals
- Disappointed & Abandoned
- Enforcement Agency
- Meeting Schedules
- Meeting Agendas and Minutes
- Contact Information

Floodplain Management

PRINTABLE APPLICATIONS for development permits zoning permits, 911 Addressing, subdivisions, etc. (in PDF format). [CLICK HERE](#)
OR A PRINTABLE CITIZEN'S GUIDE FOR DEVELOPERS - CLICK HERE
 Putnam County Floodplain Management Program Ordinance

As a public service upon request, the Putnam County Office of Planning and Infrastructure will provide you with the following information for properties located in the unincorporated areas of Putnam County and the municipalities of Buffalo, Bancroft and Poca:

- Whether or not the property is located in or out of the Special Flood Hazard Area (SFHA) as shown on the current Flood Insurance Rate Maps (FIRM).
- Additional flood insurance data for a site, such as the FIRM zone and the base flood elevation.
- Whether the property is in a Flood Insurance Rate Map (FIRM) zone.
- Whether the property is in a Flood Insurance Rate Map (FIRM) zone.
- Whether the property is in a Flood Insurance Rate Map (FIRM) zone.
- Copies of completed FEMA Elevation Certificates for certain buildings located in the floodplain.

To make an inquiry, we may need the following information:

- Tax Map and Parcel Number
- Address, including Zip Code, Section and Lot Number
- Street Address
- Name of the owner who built/placed the structure
- Year in which the structure was built/placed

You may contact us via telephone, email, fax, or visit our office located in the Putnam County Courthouse. Our office hours are 8:00 a.m. – 4:00 p.m. Monday – Friday. There is no charge for this service. National Floodplain Insurance Program (NFIP) Information:

- Mandatory Purchase of Flood Insurance Requirement
- Homeowners Insurance
- NFIP Increased Cost of Compliance Coverage
- FEMA Technical Bulletins and FEMA Brochures:
- Homeowners Insurance
- Flood Preparation and Safety
- Preferred Risk Policy
- NFIP Increased Cost of Compliance Coverage
- NFIP Flood Insurance
- Natural & Statistical Floodplain Functions
- Homeowner Flood Insurance Affordability Act
- LOIUC Fundamentals, May 2014

County Links

- Animal Shelter
- Animal Services
- Circuit Court
- Convention & Visitor's Bureau
- County Commission
- County Library
- Development Authority
- Emergency Medical Services
- Family Court
- Fire Services
- Health Department
- Magistrate Court
- Parks & Recreation
- Planning Commission
- Prosecutor's Office
- Schools
- Sheriff's Office
- Solid Waste Authority
- WVU Extension Office

Internet Links

- Federal Emergency Management Agency (FEMA) <http://www.fema.gov/>
- Coastal & Atmospheric Administration (NOAA) at: <http://www.noaa.gov/>

Source: <http://putnamco.wv.gov/planning/floodplain-management/>

PLANNING DEPARTMENT

Charleston, WV Government / City Departments / Planning / Floodplain Management

Floodplain Management

It is the goal of the City of Charleston to reduce the threat of property damage, injury, and loss of life that can be associated with flooding.

Flooding is a major risk to nearly any community, and particularly to communities near bodies of water. The City of Charleston, with its proximity and access to the Kanawha River and other smaller tributaries, has seen 13 floods greater than the 1% Annual Chance flood. The last was in 1934, but significant damage and even loss of property has occurred in Charleston during smaller flood events.

Low lying areas can experience flooding any time during rain or severe storms, or when stream and river conditions change. Even relatively small flood events can cause catastrophic damage to property and threaten the lives of residents. That's why it's important to know the risk to your property and to be prepared for a flood event. Our staff can help.

Permit Reviews

The Floodplain Manager reviews building permit applications to ensure that proposed construction or remodeling are in compliance with the Floodplain Ordinance of the City of Charleston.

Floodplain Determinations

Prior to the issuance of any building permit or upon request (link to Request a Determination page), the Floodplain Manager will determine if your property is located in a Special Flood Hazard Area.

A structure located in the Special Flood Hazard Area is at higher risk of damage by flood than structures located outside of the Special Flood Hazard Area. Typically, property owners are required to purchase flood insurance through the National Flood Insurance Program to insure against the much higher likelihood of damage by flood.

If the Floodplain Manager determines that the property is close to a flood hazard area, it may be recommended or required that the owner obtain an Elevation Certificate. An Elevation Certificate must be completed by a licensed surveyor or registered professional

Planning Pages

- Boards & Commissions
- Code Enforcement
- Floodplain Management
- Floodplain Determinations
- Flood Preparedness
- Historic Preservation
- Neighborhood Planning
- Start Directory
- Main page

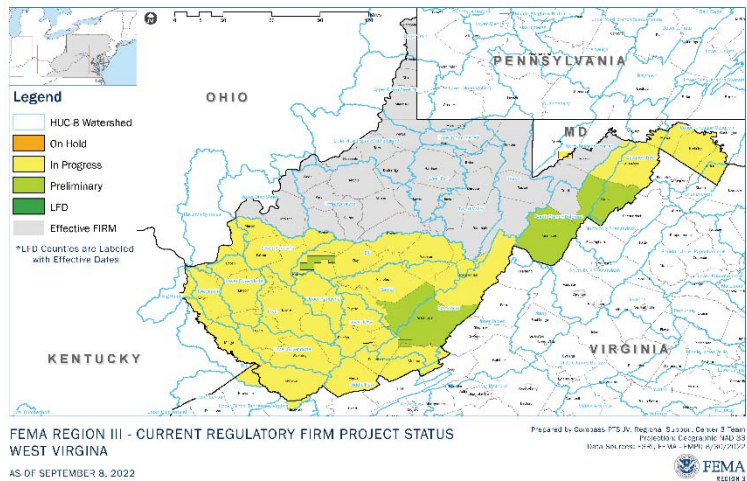
Flood Resources

- Federal Emergency Management Agency
- Flood Forecast in Real-time
- National Flood Insurance Program
- WV Division of Homeland Security & Emergency Management
- WV Flood Hazard Determination Tool

Source: <https://www.charlestonwv.gov/government/city-departments/planning/floodplain-management>



The following table presents the effective date of the most recent DFIRM/FIRM for Region 3’s communities. At the time of this plan update, FEMA was in the process of conducting updated flood studies and revising DFIRM/FIRM mapping. The northern portions of Clay County (in the Upper West Fork, Little Kanawha River watershed) are not under study, and a small portion of north central Kanawha County (and the tip of west Clay County) are in “preliminary” status. As can be seen in the image at right, the yellow areas are those currently in progress.



<i>Date of Current DFIRM/FIRM by Community</i>			
<i>Community</i>	<i>Date</i>	<i>Community</i>	<i>Date</i>
Boone County	05/16/2013	Kanawha County	02/06/2008
Danville, Town of	05/16/2013	Belle, Town of	02/06/2008
Madison, City of	05/16/2013	Cedar Grove, Town of	02/06/2008
Sylvester, Town of	05/16/2013	Charleston, City of	02/06/2008
Whitesville, Town of	05/16/2013	Clendenin, Town of	02/06/2008
		Dunbar, City of	02/06/2008
Clay County	02/06/2013	East Bank, Town of	02/06/2008
Clay, Town of	02/06/2013	Glasgow, Town of	02/06/2008
		Handley, Town of	02/06/2008
Putnam County	02/02/2012	Marmet, City of	02/06/2008
Bancroft, Town of	02/02/2012	Nitro, City of	02/06/2008
Buffalo, Town of	02/02/2012	Pratt, Town of	02/06/2008
Eleanor, Town of	02/02/2012	South Charleston, City of	02/06/2008
Hurricane, City of	02/02/2012	St. Albans, City of	02/06/2008
Poca, Town of	02/02/2012		
Winfield, Town of	02/02/2012		

The communities in Region 3, like all communities in West Virginia, take advantage of the *West Virginia Flood Tool* at <https://www.mapwv.gov>. This online resource is a great tool for quickly determining a working determination of a property’s relationship with the Special Flood Hazard Area (SFHA). The map shows SFHAs across a variety of base maps, to include aerial photography that depicts structures. Other reference layers include address labels, parcel lines, and building footprints. Though floodplain managers throughout the region regularly remind

residents, developers, etc. to check with local representatives to obtain an official determination, the flood tool is a quick, easy way to make SFHA information available to the public.

Three communities in Region 3 participate in the Community Rating System (CRS): Charleston, Kanawha County, and Putnam County. Charleston has participated in the program since 2011; Kanawha County has participated since 2018; and Putnam County has participated since 2016. All three are Class 9 CRS communities with a 5% discount on flood insurance premiums both in, and outside of the SFHA.

When compiling the information for this update, the region's floodplain coordinators, regional council staff, and consultant support staff identified instances of recent and frequent turnover amongst the floodplain coordinators in Region 3. Further, keeping the "Floodplain Managers Contact List" current on the West Virginia Emergency Management website is a challenge. This uncertainty speaks to a need for education not only of the region's residents, but also information sharing amongst units of local government.

1.3.2 Fiscal Capability

The decision and capacity to implement mitigation-related activities is often strongly dependent on the presence of local financial resources. While some mitigation actions are less costly than others, it is important that money is 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. Federal programs which may provide financial support for mitigation activities include, but are not limited to:

- Building Resilient Infrastructure and Communities (BRIC)
- Community Development Block Grant (CDBG),
- Disaster Housing Program,
- Emergency Conservation Program,
- Emergency Management Performance Grants (EMPG),
- Emergency Watershed Protection Program,
- Flood Mitigation Assistance Program,
- Hazard Mitigation Grant Program (HMGP),
- Non-Insured Crop Disaster Assistance Program,
- Pre-Disaster Mitigation Program,
- Repetitive Flood Claims Program (RFC),
- Section 108 Loan Guarantee Programs,
- Severe Repetitive Loss (SRL) Program, and
- Weatherization Assistance Program.

1.3.3 Studies, Reports, and Technical Information

The research conducted for the development of this plan included data from federal, state, and higher education studies, reports, and technical information. Specific sources relative to individual hazards appear in Appendix 5: Citations. Region 3’s consultant reviewed a number of existing plans and reports to; (a) identify any obvious inconsistencies between other development and mitigation efforts, (b) as baseline information for such sections as trends and predictions, and (c) to support discussions surrounding mitigation projects. Those documents included the following.

REFERENCED DOCUMENTS		
<i>Document Type</i>	<i>Document Citation</i>	<i>How Incorporated into Plan</i>
Technical Information	USDHS FEMA. (2005). <i>Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning</i> . Federal Government: Washington, DC.	Used as general guidance for incorporating historical property and cultural protection.
Technical Information	USDHS FEMA. (2010). <i>Flood insurance study: Trumbull County Ohio and unincorporated areas</i> . Federal Government: Washington, DC.	Used as a resource for identifying flood-prone areas in the flooding profile.
Technical Information	USDHS FEMA. (2013). <i>Integrating Hazard Mitigation Into Local Planning</i> . Federal Government: Washington, DC.	Used as general guidance on existing plan integration for hazard mitigation
Technical Information	USDHS FEMA. (2013). <i>Local mitigation planning handbook</i> . Federal Government: Washington, DC.	Used as general guidance on revised mitigation planning process
Technical Information	USDHS FEMA. (2013) <i>Mitigation Ideas</i> . Federal Government: Washington, DC.	Used as general guidance for stakeholders and jurisdictions on mitigation ideas
Technical Information	USDHS FEMA. (2016). <i>National Mitigation Framework</i> . Federal Government: Washington, DC.	Used as general guidance on mitigation planning.
Technical Information	USEPA. (2018). <i>Storm smart cities: Integrating green infrastructure into local hazard mitigation plans</i> . Federal Government: Philadelphia, PA.	Outlines ways low-impact development and green infrastructure can support mitigation planning.
Plan	State of West Virginia (2019). <i>Hazard mitigation plan</i> . State Government: Charleston, WV.	Used as general guidance on existing plan integration for hazard mitigation
Plan	Regional Intergovernmental Council. (2019). Region 3 Coordinated Public Transit-Human Services Transportation Plan. South Charleston, WV.	Used as a resource for the description of the planning area.
Plan	Regional Intergovernmental Council. (2019). The Comprehensive Economic Development Plan. South Charleston, WV.	Used as general guidance on integrating projects between plans.

2.0 RISK ASSESSMENT

A risk assessment analyzes, “the potential for damage, loss, or other impacts created by the interaction of hazards with community assets” (FEMA, 2013). This risk assessment section contains information on identified hazards that threaten Region 3 and the vulnerability of the area as it relates to the region’s assets.

2.1 Hazard Identification

§201.6(c)(2)(i) [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 notes the hazards that are included in Region 3’s hazard mitigation plan. Several methods of research were utilized to identify hazards to which Region 3’s local governments are susceptible. Said research has led to the inclusion of the following hazards:

- Dam Failure,
- Drought,
- Earthquake,
- Epidemic & Pandemic,
- Extreme Temperatures,
- Flooding,
- Forest Fires,
- Hazardous Materials,
- Landslides & Land Subsidence,
- Severe Storms,
- Tornadoes,
- Utility Disruption, and
- Winter Storms.

The following chart illustrates the hazards to which the region and its local governments are not susceptible. The intent of this chart is to justify the exclusion of these hazards from the plan.

<i>Hazard</i>	<i>Research Sources</i>	<i>Rationale</i>
Avalanche	<ul style="list-style-type: none"> • United States Geological Survey (USGS) Topographic Maps • NOAA 	<ul style="list-style-type: none"> • Although Region 3 contains elevated terrain and receives significant amounts of snowfall annually, the general elevation is not high enough to cause snow to cap hills year-round. • The general topography of the region is not suitable for avalanches.
Hurricane	<ul style="list-style-type: none"> • See also “Severe Weather” 	<ul style="list-style-type: none"> • While Region 3 sometimes receives precipitation as hurricanes hit eastern and southern coastal states, the region does not experience intense hurricane conditions.
Volcano	<ul style="list-style-type: none"> • USGS 	<ul style="list-style-type: none"> • No volcanoes exist on the east coast.

2.2 PROFILE HAZARDS

§201.6(c)(2)(i)	[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.
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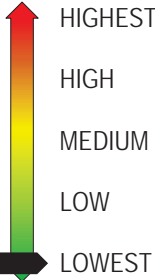
2.2.1 Section Overview

Several hazards affect Region 3 and the jurisdictions within, as noted in the Section 2.1 above. Those hazards, however, may not affect the region in ways that residents and planners may typically think. Additionally, while a hazard may occur frequently, it may cause little damage or disruption; conversely, a hazard that rarely occurs may cause significant damage and disruption.

As such, this section contains a profile of each hazard considered by the plan, which provides details on how the hazard impacts the area. Additionally, this section discusses a number of complicating variables that could either result in emergencies on their own or add to the complexity of the profiled hazards. Finally, this section includes a comparison of hazard severity and hazard vulnerability.

2.0 RISK ASSESSMENT

2.2.1 Dam Failure

A dam is a barrier built across a waterway to control the flow or raise the water level. A dam failure occurs when the barrier constructed does not obstruct or restrain water as designed, which can rapidly result in a large area of completely inundated land.					
	Vulnerability	Period of Occurrence:	At any time, typically after a period of prolonged precipitation causing damages or a prolonged period of drought causing erosion	Hazard Index Ranking:	Lowest
	Warning Time:	Over 24 hours	State Risk Ranking:	Low	
	Probability:	Remote (unlikely to occur on an annual basis)	Severity:	Limited	
	Type of Hazard:	Technological	Disaster Declarations:	None	

Hazard Overview

The three main causes of dam failure in the U.S. 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 account 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.

Dam failures can be “sunny day” or “rainy day” failures. Sunny day failures occur during non-flooding situations when reservoirs are at normal levels. Rainy day failures occur during periods of excessive rainfall or flooding and can exacerbate inadequate spillway capacity. Sunny day failures are generally more hazardous due to their unexpected nature and little warning time for evacuation.

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, 2009). The WVDEP does not maintain a list of dams on its website; however, the website does state that the agency contributes information to the National Inventory of Dams.

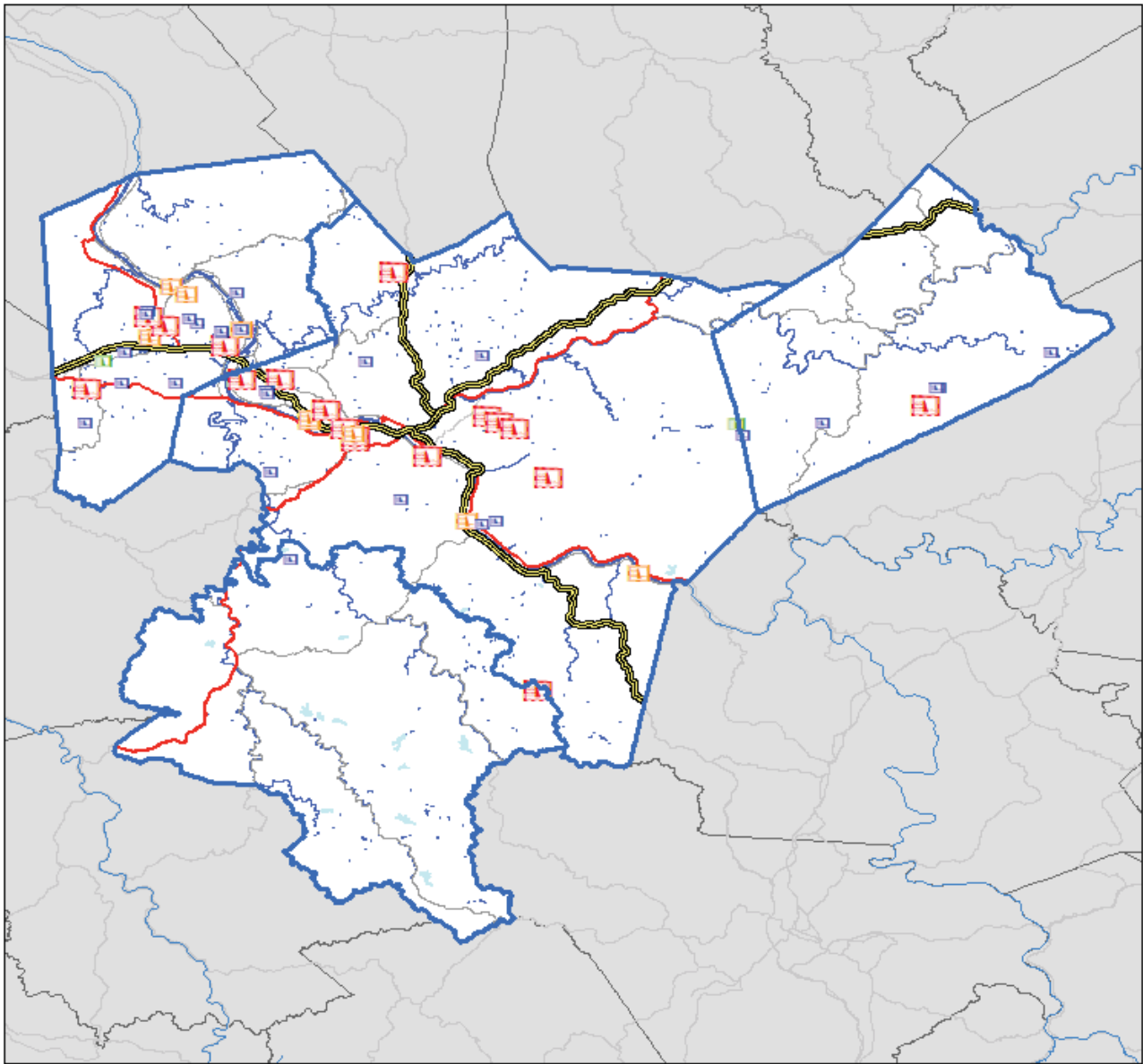
The U.S. Army Corps of Engineers (UCACE) National Inventory of Dams (NID) lists 39 high risk dams and nine significant risk dams in Region 3. There are 18 high risk dams in Boone County; one high risk dam in Clay County; 15 high risk and five significant risk dams in Kanawha County; and five high risk and four significant risk dams in Putnam County.

LIST OF HIGH AND SIGNIFICANT CLASS DAMS IN REGION 3					
Dam Name	County	Classification	Owner Type	EAP (Y/N)	State Regulated
Abbotts Hollow Dam	Kanawha	High	Private	No	Yes
Anderson Dam	Kanawha	High	Local Government	Yes	Yes
Bean Hollow Slurry Impoundment	Boone	High	Private	Yes	No
Big Branch Coal Refuse Facility	Clay	High	Private	No	Yes
Black Pond Dam	Putnam	High	Private	Yes	Yes
Blake's Creek Site No.7	Kanawha	High	Local Government	Yes	Yes
Bragg Fork Slurry Impoundment	Boone	High	Private	Yes	No
Brown's Branch Cr Dam	Boone	High	Private	No	Yes
Cherry Tree Hollow Refuse Facility	Boone	High	Private	Yes	No
Chess Refuse Disposal Area No. 1	Boone	High	Private	Yes	No
Crooked Run (Indian Creek) Dam	Boone	High	Private	No	Yes
Don White Dam	Kanawha	High	Private	Yes	Yes
Dunn Hollow Cr Dam	Kanawha	High	Private	No	Yes
Elisa Fork Dam	Boone	High	Private	No	Yes
Elk Run Cr Facility	Boone	High	Private	No	Yes
Elk Two Mile #14 Dam	Kanawha	High	Local Government	Yes	Yes
Elk-Two Mile No.12	Kanawha	High	Local Government	Yes	Yes
Elk-Two Mile No.13	Kanawha	High	Local Government	Yes	Yes
Fly Ash Settling Basin Dam	Kanawha	High	Private	Yes	Yes
Freshwater Dam	Boone	High	Private	No	Yes
Graff/Lane Sw Dam	Kanawha	High	Private	No	No
Holz Dam	Kanawha	High	Private	Yes	Yes

LIST OF HIGH AND SIGNIFICANT CLASS DAMS IN REGION 3					
Dam Name	County	Classification	Owner Type	EAP (Y/N)	State Regulated
Jacks Branch Slurry Impoundment	Boone	High	Private	Yes	No
Jake Gore Slurry Impoundment	Boone	High	Private	Yes	No
Jarrells Branch Slurry Impoundment	Boone	High	Private	Yes	No
John Amos Flyash Dam	Putnam	High	Public Utility	Yes	Yes
Lake Chaweva Dam	Kanawha	High	Private	Yes	Yes
Lake Dickenson Dam	Putnam	High	Private	Yes	Yes
Lake Washington	Putnam	High	Private	No	Yes
Long Branch Reservoir	Putnam	High	Local Government	Yes	Yes
Lotts Branch #1	Boone	High	Private	No	No
Lotts Branch Slurry Impoundment	Boone	High	Private	Yes	No
Moccasin Hollow Impoundment	Boone	High	Private	No	No
New West Hollow Refuse Dam	Kanawha	High	Private	No	Yes
Rocklick Slurry Impoundment	Boone	High	Private	Yes	No
Scott's Run Cinder Barrier	Kanawha	High	Private	Yes	Yes
Slippery Gut Branch Cr Dam	Boone	High	Private	No	Yes
Trace Branch Slurry Impoundment	Boone	High	Private	No	Yes
Ward Impoundment (Upper) Dam	Kanawha	High	Private	Yes	Yes
Bottom Ash Ponds 1a	Putnam	Significant	Public Utility	Yes	Yes
Cunningham Flyash Pond	Kanawha	Significant	Private	No	Yes
Finney Branch Embankment	Kanawha	Significant	Private	No	Yes
London Locks and Dam	Kanawha	Significant	Federal	Yes	No
Marmet Locks and Dam	Kanawha	Significant	Federal	Yes	No
Poplar Fork Dam	Putnam	Significant	Local Government	Yes	Yes
Ward Impoundment (Lower) Dam	Kanawha	Significant	Private	Yes	Yes
Winfield Locks and Dam	Putnam	Significant	Federal	Yes	No
Winfield Water Supply Dam	Putnam	Significant	Private	No	Yes

The following graphic shows the locations of all of the regulated dams in Region 3.

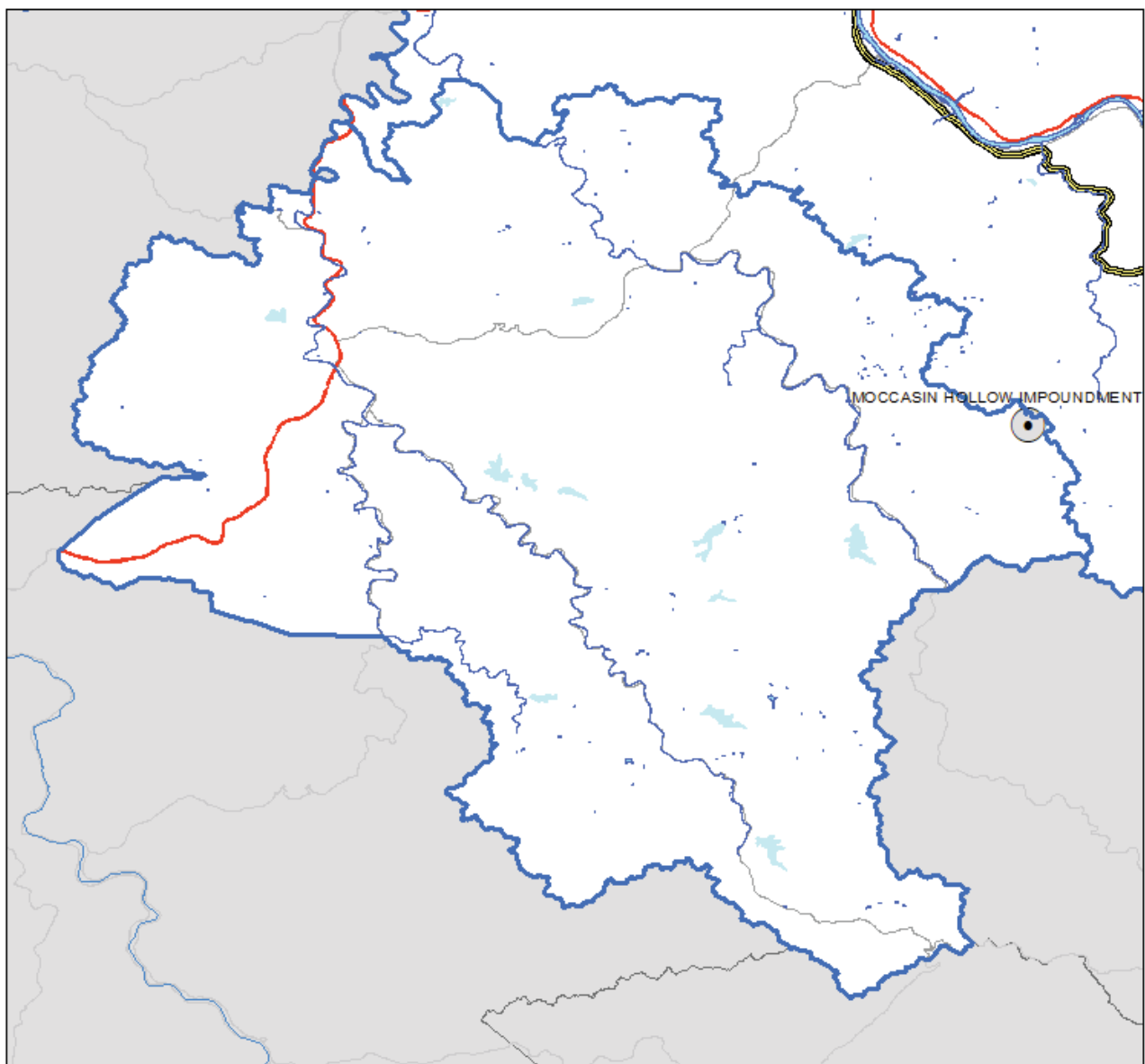
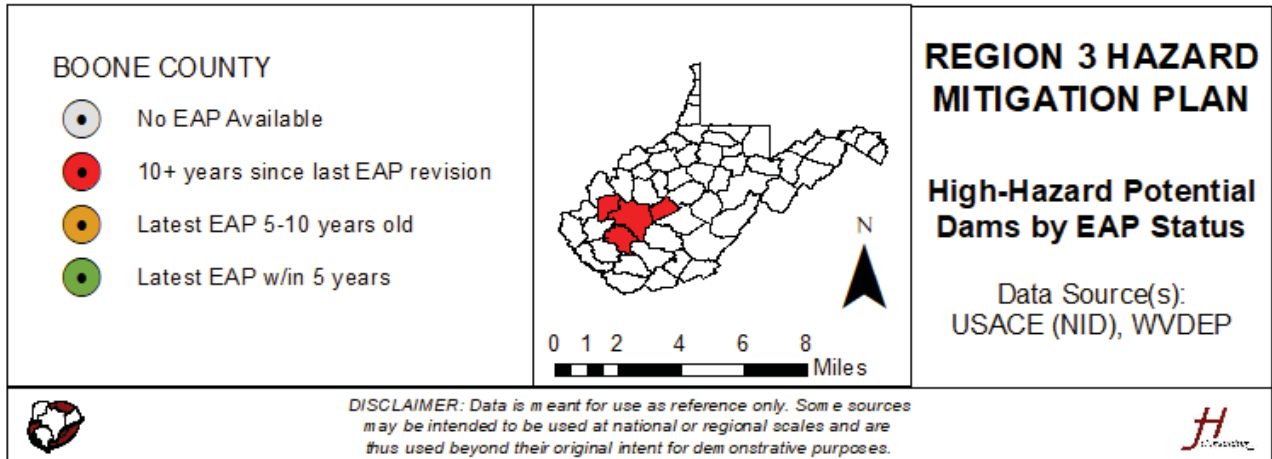
<p>USACE NID & WVDEP Aggregated</p> <ul style="list-style-type: none"> High Hazard Significant Hazard Low Hazard Unspecified Rivers & Streams	 <p style="text-align: right;">N</p>  <p>0 2.5 5 10 15 20 Miles</p> 	<p>REGION 3 HAZARD MITIGATION PLAN</p> <p>Dam & Levee Failure Risk Map</p> <p>Data Source(s): USACE, WVDEP, WVGISTC</p>
<p> <i>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.</i> </p>		










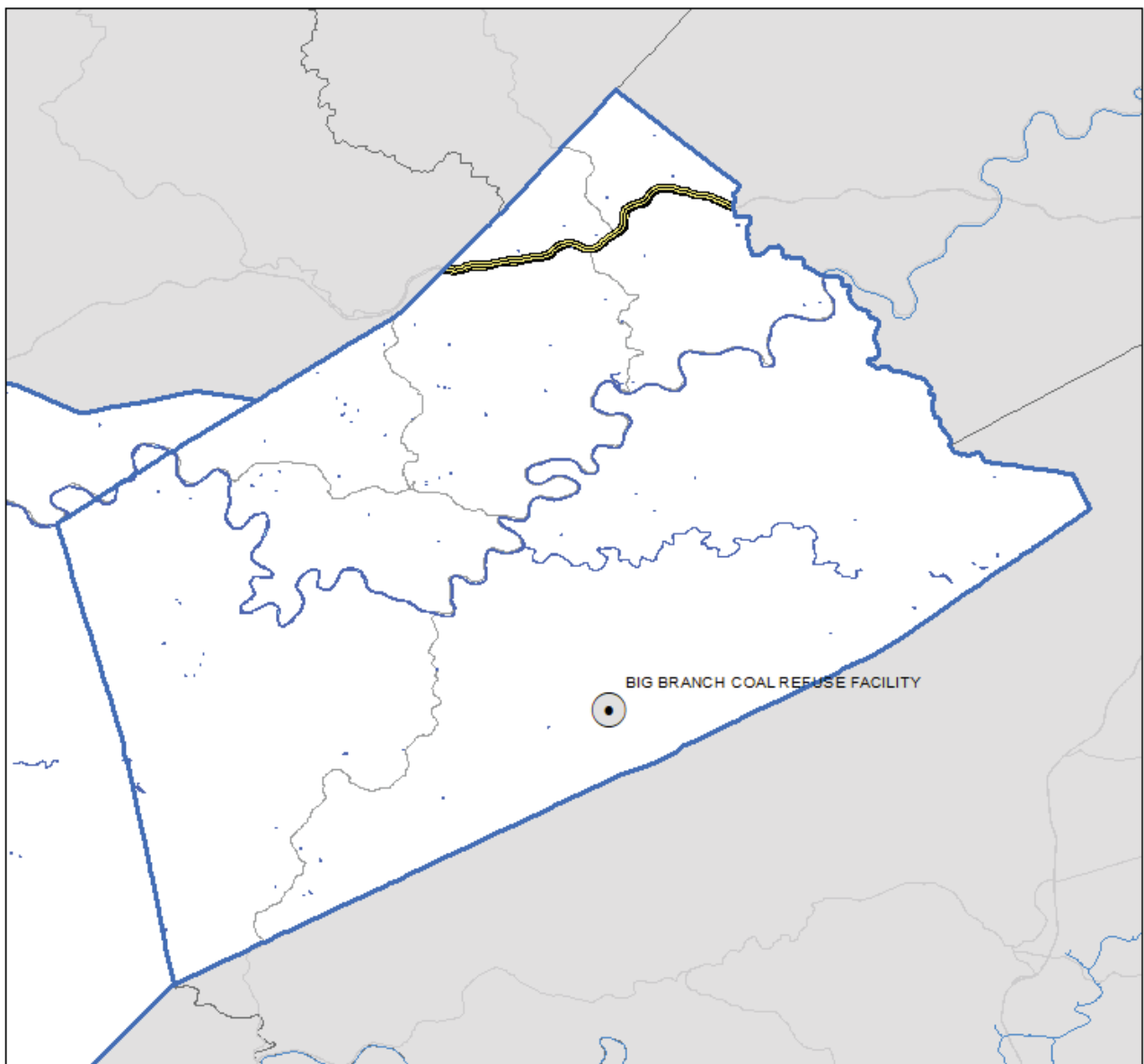
The following maps, each at the county level, show only the high hazard dams in the region. These maps address the status of the emergency action plans (EAPs) for the high-hazard dams. A gray-colored icon represents a high-hazard dam for which there is no EAP on file. Red icons identify instances where an EAP is on file, but it has been 10 or more years since the latest update. Orange icons identify high-hazard dams with EAPs updated between five and 10 years ago, and green icons identify “current” EAPs, i.e., those updated within the last five years. The data source for the latest EAP date was the National Inventory of Dams.

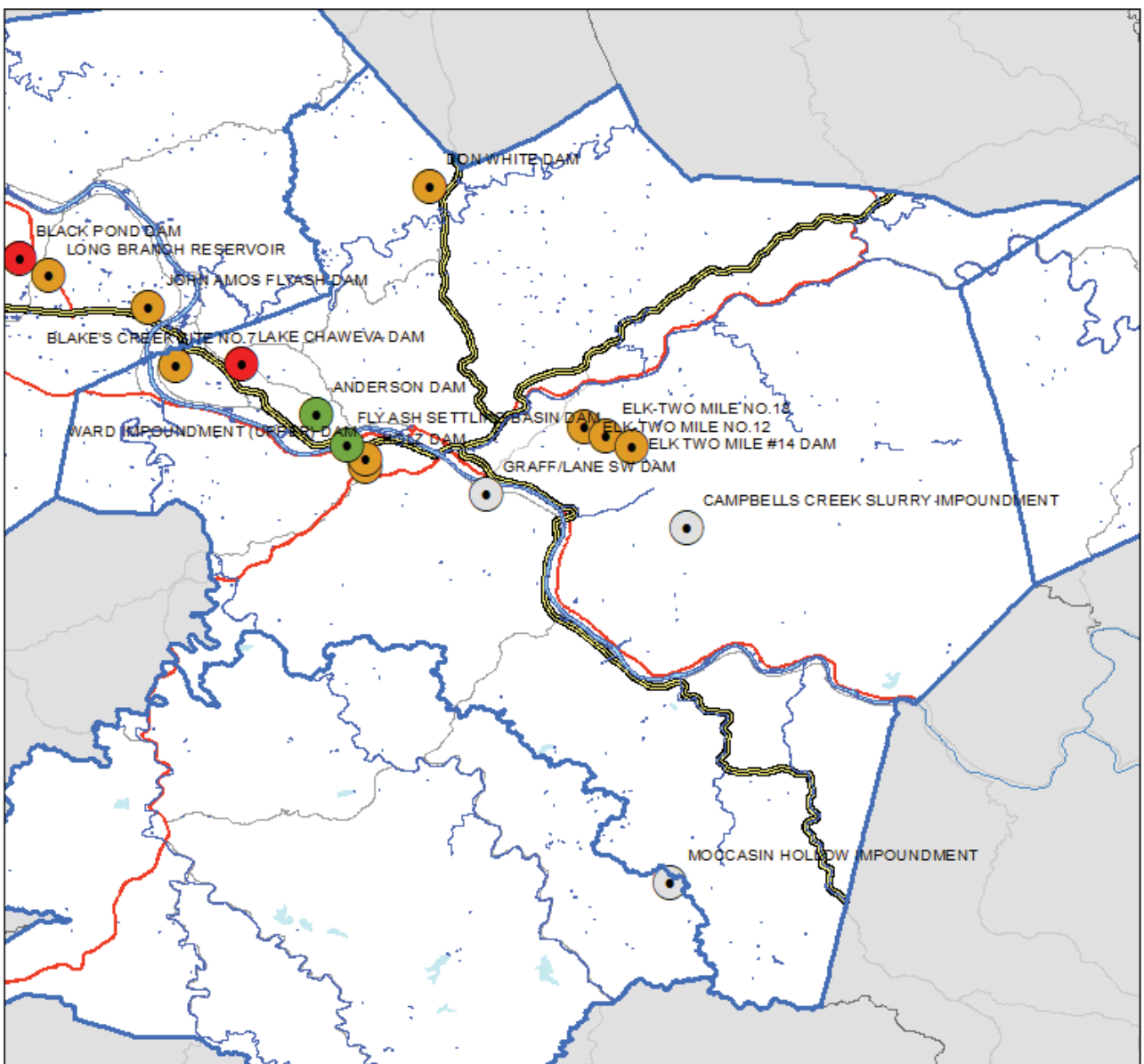
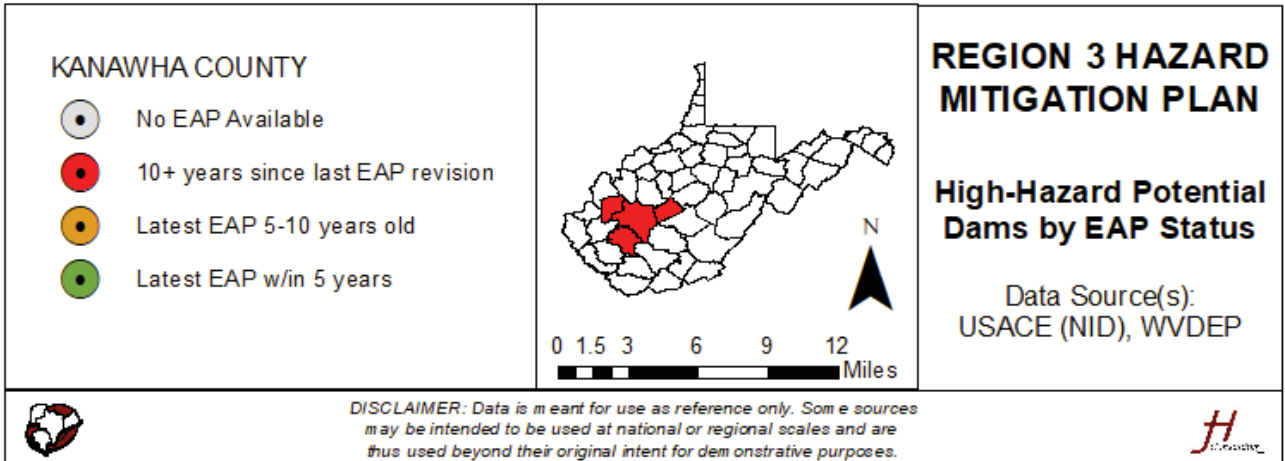
As per West Virginia Code, the WV Department of Environmental Protection’s Division (DEP) of Water and Waste Management oversees the dam safety program. Ultimately, dam owners are liable for losses should a dam failure occur. As such, owners of High Hazard Dams are required to develop an EAP and provide it to the dam safety program. Part of the EAP discusses how dam owners will notify emergency response personnel and warn those downstream from the dam. During EAP preparation, the dam owner coordinates with local authorities to determine the capabilities and limitations of the emergency response agencies. To ensure communication continues between the dam owner, the local community, and the DEP, issues certificates of approval that require annual renewal which includes an approved EAP, up-to-date inspections, an approved maintenance plan, and no outstanding safety violations.

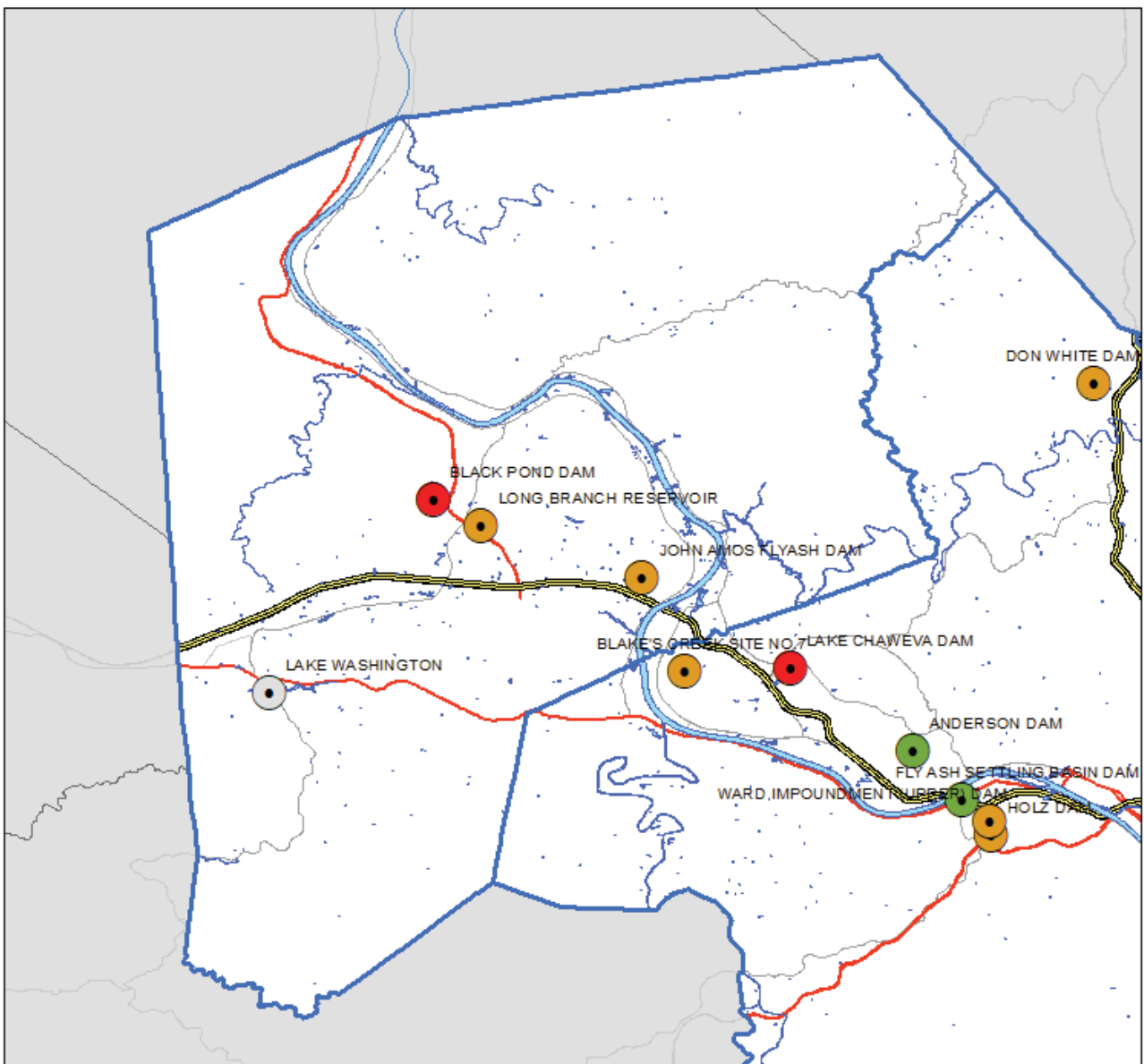
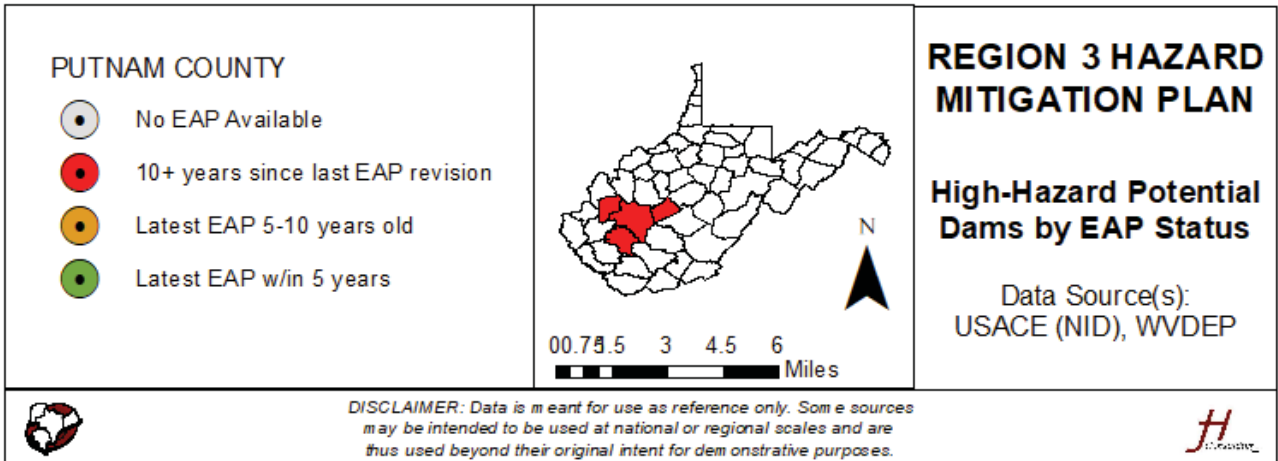
The EAPs are important to mitigating risk for two primary reasons. First, and most obviously, the plans outline the emergency response guidelines should an incident occur. Secondly, EAPs for high-hazard dams identify a potential inundation area which allows for responders to work directly with potentially-impacted communities and facilities. Current and accurate inundation areas also identify areas in which property owners can consider mitigation actions.



<p>CLAY COUNTY</p> <ul style="list-style-type: none">  No EAP Available  10+ years since last EAP revision  Latest EAP 5-10 years old  Latest EAP w/in 5 years 	 <p style="text-align: right;">N</p> <p style="text-align: center;">0 0.75 1.5 3 4.5 6 Miles</p>	<p>REGION 3 HAZARD MITIGATION PLAN</p> <p>High-Hazard Potential Dams by EAP Status</p> <p>Data Source(s): USACE (NID), WVDEP</p>
<p> <i>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.</i> </p>		





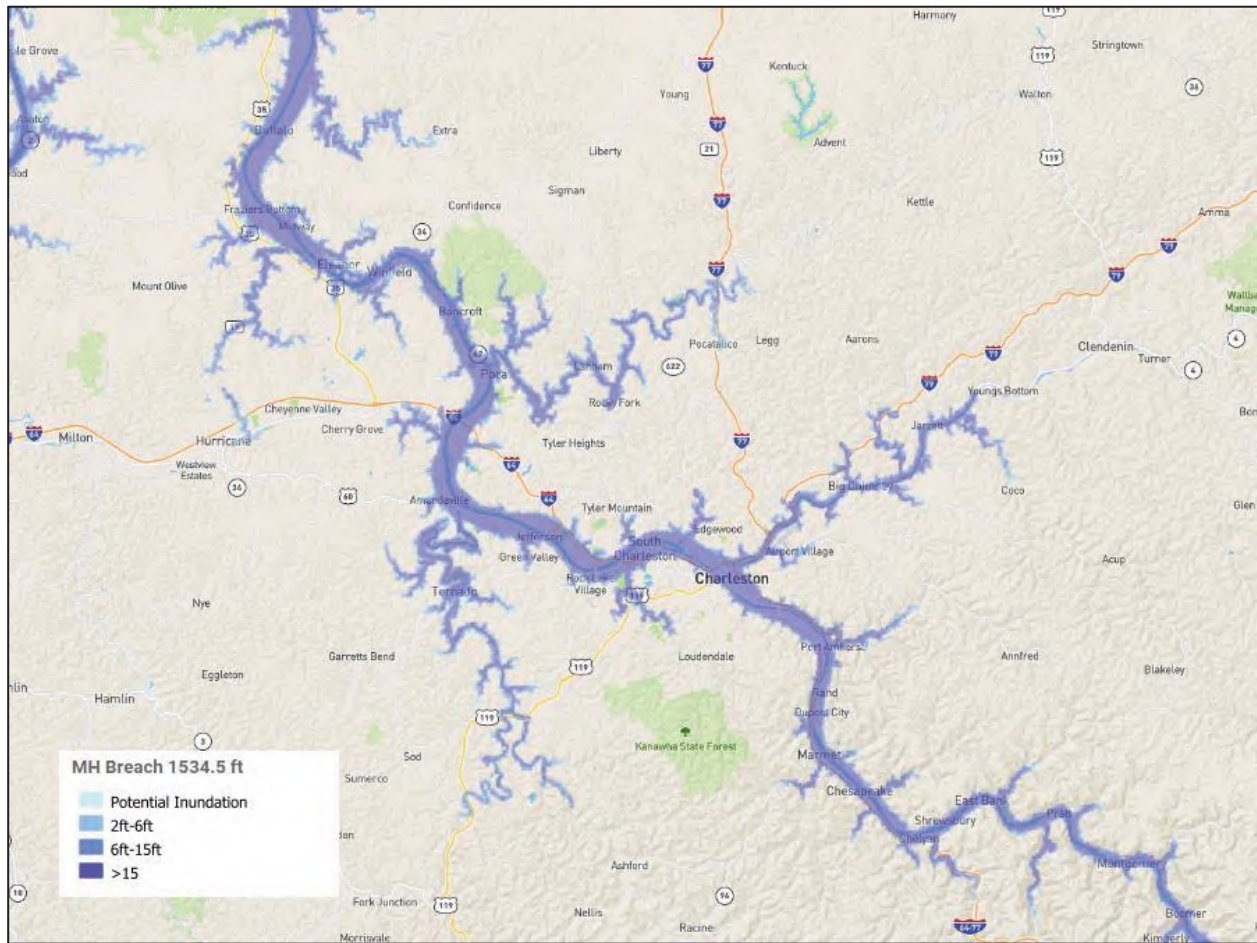


Additionally, the potential impact of dams outside the boundaries of Region 3 must also be taken into consideration. Uncontrolled releases of water from dams upstream can cause cascading effects on dams within Region 3, leading to failures. This can also potentially happen with heavy upstream rain events. The *Kanawha County-City of Charleston Evacuation Plan* references these dams, stating that “The Kanawha Valley is protected by three flood-control dams: Bluestone, Summersville, and Sutton. A failure of any one of these three facilities could affect Kanawha County. Together these three facilities control 57% of the total water drainage in the Kanawha Valley” (2011). The Bluestone Dam is located along the New River, in Summers County. According to the USACE, water released as a result of a failure at the Bluestone Dam could reach Charleston in as little as 24 hours. The Sutton Dam is built along the Elk River which flows through northern Kanawha County on its way to its confluence with the Kanawha River in Charleston. The USACE states that the Summerville Dam, constructed along the Gauley River, provides flood protection for the heavily-industrialized Kanawha Valley.

The Bluestone Dam helps to reduce flood risks in the New and Kanawha River Valley through Charleston to Point Pleasant. To reduce the flood risk, the storm water runoff from heavy rains is stored in the reservoir until the stream and rivers below the dam can recede and are capable of handling the stored water without damage to lives, property, or environment. Based on a 2016 assessment, the United States Army Corps of Engineers (USACE) considers the Bluestone a “high risk” dam because of the instability of the spillway monoliths. The USACE has implemented risk reduction measures and has worked to increase the stability of the dam. This work is scheduled to continue into the 2040s.

The primary areas impacted in Region 3, should the Bluestone Dam breach with a full reservoir, appear in the map below. Inundation waters would be expected to arrive in Charleston in approximately six and a half hours following a breach. The potential for loss of life is highest within a few miles of the dam with the concerns decreasing substantially beyond 60 miles downstream. At risk from a breach of the dam are approximately 160,000 people, 85,000 structures, and \$8,500,000,000 in land and property.

BLUESTONE DAM INUNDATION MAP – REGION 3



Source: <https://nid.sec.usace.army.mil/viewer/>

Impacts and Vulnerability

The hazard classification of a dam corresponds to the potential for downstream flooding, not the structural integrity of the dam. The table below describes the downstream effects of dam failure.

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)

There are generally three types of risks associated with dams: incremental risk, non-breach risk, and residual risk.

- **Incremental Risk:** The risk (likelihood and consequences) to the pool area and downstream floodplain occupants that can be attributed to the presence of the dam should the dam breach prior or subsequent to 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 loss of the pool can result in significant consequences 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 exceed channel capacity) or ‘overtopping of the dam without breaching’ scenarios.
- **Residual Risk:** The risk that remains after all mitigation actions and risk reduction actions have been completed. With respect to dams, FEMA defines residual risk as “risk remaining at any time” (FEMA, 2015). 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 a condition that was judged to not be a credible dam safety issue.

Past Mitigation Efforts: Dam & Levee Failure

- Evaluated the locks on the Kanawha River to ensure necessary warning systems are in place.

Historical Occurrences

The National Performance of Dams Program (NPDP) at Stanford University maintains records on all modifications, repairs, incidents and their consequences, and inspections for dams in the U.S. and worldwide. According the NPDP, since 1996, there have been three incidents in Region 3.

Ranch Lake Estates Dam, Putnam County, January 1996

A reported incident occurred at the Ranch Lake Estates Dam on January 29, 1996. The earthen dam located on the Little Hurricane Creek northeast of Teays Valley, Putnam County, suffered a piping incident. There was no uncontrolled release and no damage reported.

Lake Chaweva Dam, Kanawha County, February 1997

On February 21, 1997, an incident occurred at the Lake Chaweva Dam located in the census designated place of Cross Lanes, Kanawha County. The earth rock fill type dam suffered a seepage/piping incident. There was no uncontrolled release and no damage reported.

Lake Washington Dam, Putnam County, March 1997

On March 3, 1997, an incident occurred at the Lake Washington Dam located on the Hurricane Creek, south of the City of Hurricane, Putnam County. The concrete buttress dam suffered an inflow flood hydrologic event. There was no uncontrolled release and no damage reported.

Loss and Damages

The owners of 27 of the 39 dams classified as “high” in Region 3 submitted emergency action plans (EAPs). With no historical property loss data, estimating losses for a dam failure is difficult. These events can range from the failure of a small local dam that does not threaten anything more than fields or forests, to dams that can cause significant loss of life and property damage.

Vulnerability Assessment

This section summarizes the vulnerability to Region 3 from dam failures. Region 3 conducted an online survey for the public to share its thoughts on hazard vulnerabilities. The following table presents the results of that survey regarding dam and levee failure.

PUBLIC SENTIMENT, DAM & LEVEE FAILURE – REGION 3					
Hazard	Level of Concern				Total Responses
	Not at All	Somewhat	Concerned	Very	
Dam Failure	94 (50.00%)	69 (36.70%)	20 (10.64%)	5 (2.66%)	188
In the past ten years, do you remember this hazard occurring in your community?				1 (0.05%)	187
Have you noticed an increase in the occurrences or intensity of this hazard?				0 (0.00%)	187
Have you noticed a decrease in the occurrences or intensity of this hazard?				5 (2.65%)	187

Regarding future vulnerability, the state of dam infrastructure in the region (and all of West Virginia) is a concern. As dams age, they become susceptible to issues related to that age


(with respect to the life span of materials used in construction). The communities around dams, particularly upstream along the waterways they impound, also change. While some changes, such as declining population in areas upstream of a facility, 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 2021 grade for West Virginia’s dams is a “D.” The ASCE notes that 75% of the state’s dams are classified as high-hazard potential. West Virginia fares slightly better than the rest of the nation regarding the condition of state-regulated high-hazard dams, with 89% being in fair or satisfactory condition (compared to 71% nationwide). The ASCE notes funding needs of more than \$900 million for the operation, maintenance, and repair of the state’s dam facilities.

The following table assigns point totals based on the research presented in this profile.

DAM AND LEVEE VULNERABILITY SUMMARY			
<i>Category</i>	<i>Points</i>	<i>Description</i>	<i>Notes</i>
Frequency	2	Low	There have been three dam incidents in Region 3 since 1992 (for an average of 0.1 incidents per annum).
Response	2	One day	Due to frequent inspections of dams in Region 3 and minimal recorded historical damage downstream, the response to an event would be expected to be minimal.
Onset	1	Over 24 hours	Because officials frequently inspect dams and their inundation can be predicted based on weather, warning of a critical failure is expected.
Magnitude	1	Localized (Less than 10% of land area affected)	Most dams are in rural areas.
Business	1	Less than 24 hours	Most dams are in rural areas. The region’s economy should not be disrupted by either failure.
Human	1	Minimum (minor injuries)	Most dams in the region are Class IV or unclassified. Failure would not cause significant human harm.
Property	1	Less than 10% of property affected	Most dams in the region are Class IV or unclassified, suggesting that property loss would be primarily from the loss of the dam itself and the owner’s property.
Total	9	Lowest	

2.0 RISK ASSESSMENT

2.2.2 Drought

A drought is a period of abnormally dry weather that persists long enough to produce a severe hydrological imbalance.			
 <p>Vulnerability</p> <p>HIGHEST</p> <p>HIGH</p> <p>MEDIUM</p> <p>LOW</p> <p>LOWEST</p>	Period of Occurrence:	At any time, typically after a period of prolonged absence of precipitation	Hazard Index Ranking: Lowest
	Warning Time:	Over 24 hours	State Risk Ranking: Medium
	Probability:	Remote (unlikely to occur on an annual basis)	Severity: Limited
	Type of Hazard:	Natural	Disaster Declarations: N/A

Hazard Overview

“Drought” is a period of abnormally dry weather, which persists long enough to produce a severe 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. Droughts develop slowly; typically, they are already underway when officially identified. There are several types of droughts (Sears, 2017).

- **Meteorological Drought:** Differences from the streamflow precipitation amounts. Because not every area receives the same amount of rainfall, a drought in one place might not be considered a drought in another.
- **Agricultural Drought:** Moisture deficiency seriously harmful to crops, livestock, or other agricultural commodities. Parched plants may wither and die. Pastures may become insufficient to support livestock. The effects of agricultural droughts are difficult to measure because many variables may impact production during the same growing season.
- **Hydrological Drought:** Reduction in groundwater, 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.

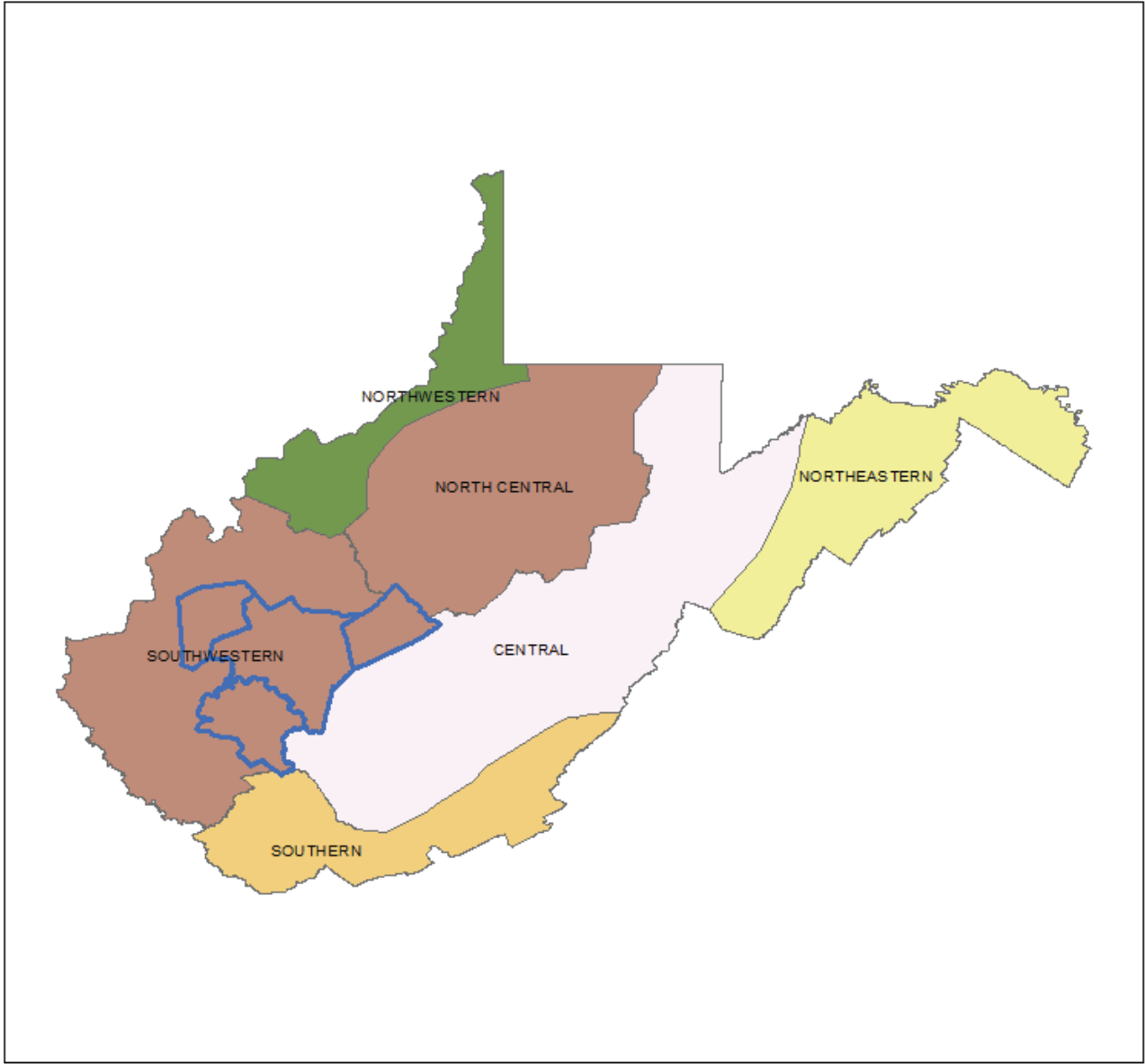
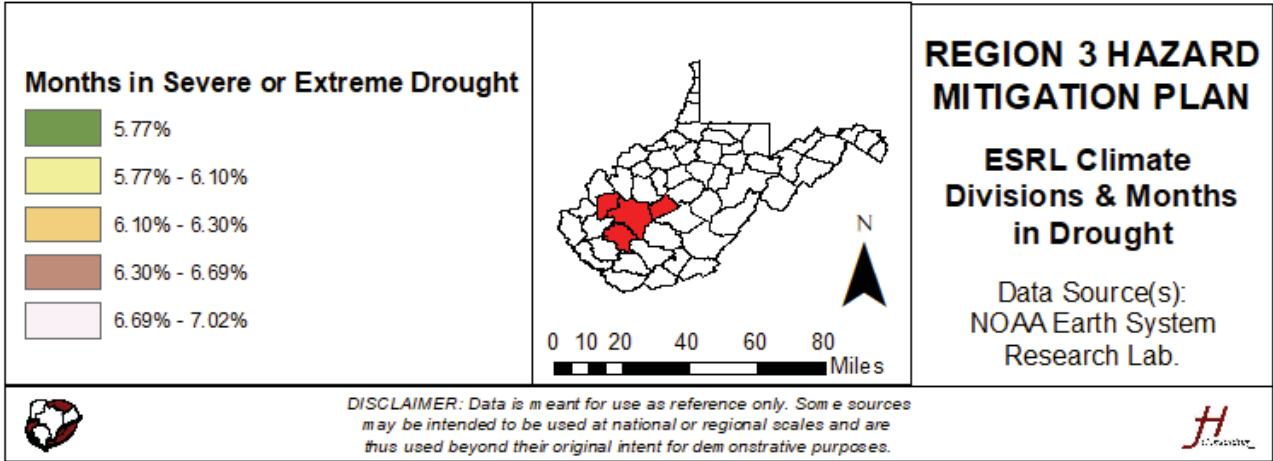
Precipitation falls in uneven patterns across the country; the amount of precipitation at a particular location varies from year to year, but over the years, the average amount is reasonably constant. The amount of rain and snow also varies with the seasons. Even if the total amount of rainfall for a 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 rain 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, 2021).

Location and Extent

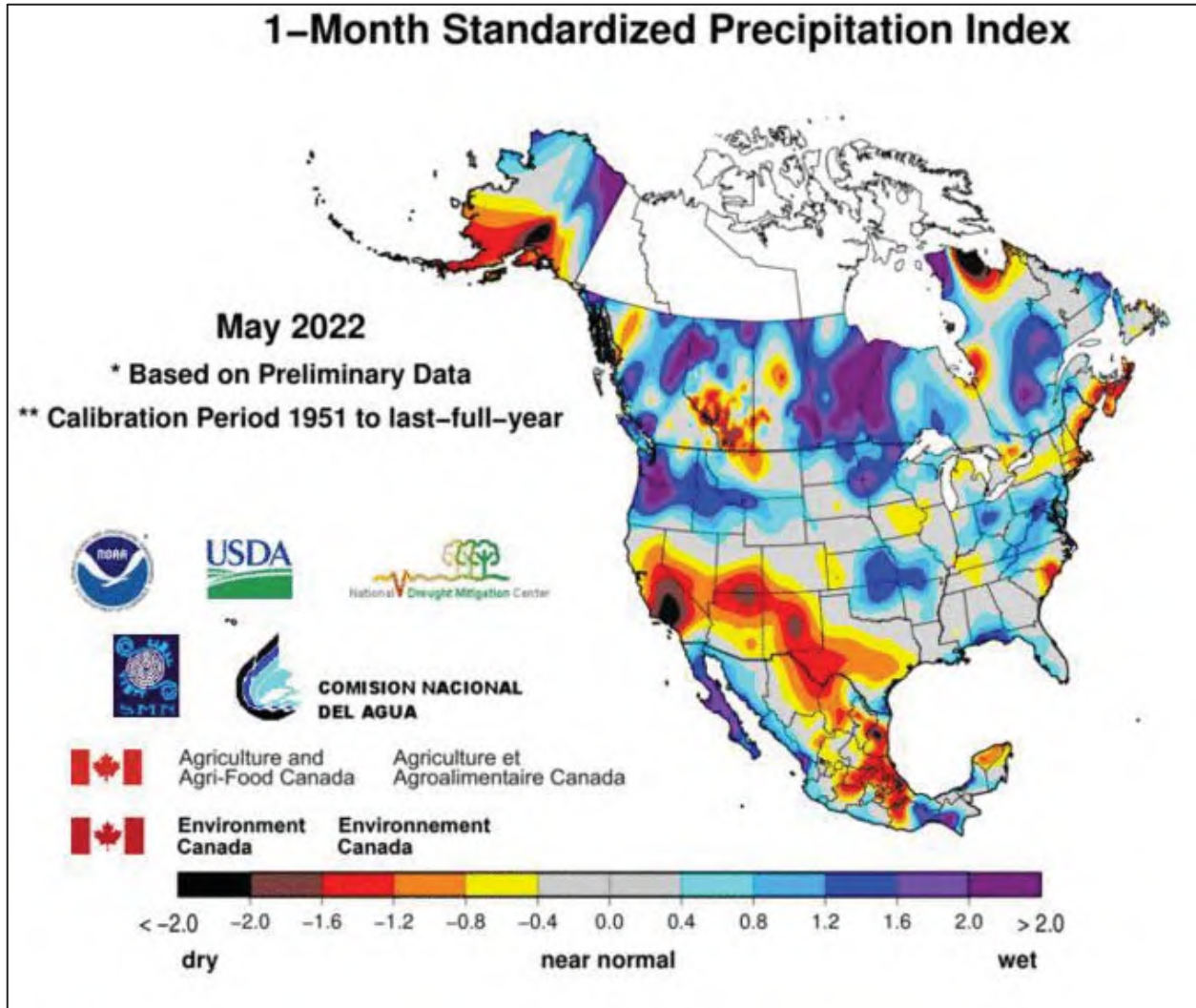
Droughts are region-wide hazards that can affect all areas and jurisdictions within a region. Droughts are widespread events that may extend to several states in varying degrees of severity. Within Region 3, the extent of drought would be equal or very similar in all four counties given the region’s geography and environmental qualities. A drought can vary in severity throughout the year; what starts as a mild drought can reach severe or extreme drought status and then return to a mild drought. This process could take weeks or even months, and the effects could be felt even months after the drought conditions are over.

The Palmer Drought Severity Index (PDSI) is a measure of drought 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 the normal or near-normal conditions. In the United States, the USDA, National Drought Mitigation Center at the University of Nebraska-Lincoln, U.S. Department of Commerce, and NOAA developed another measurement of droughts named the U.S. Drought Monitor (USDM). The table above shows the two scales and how they compare. The map below shows the months spent in drought from 1895-2021 for Region 3.

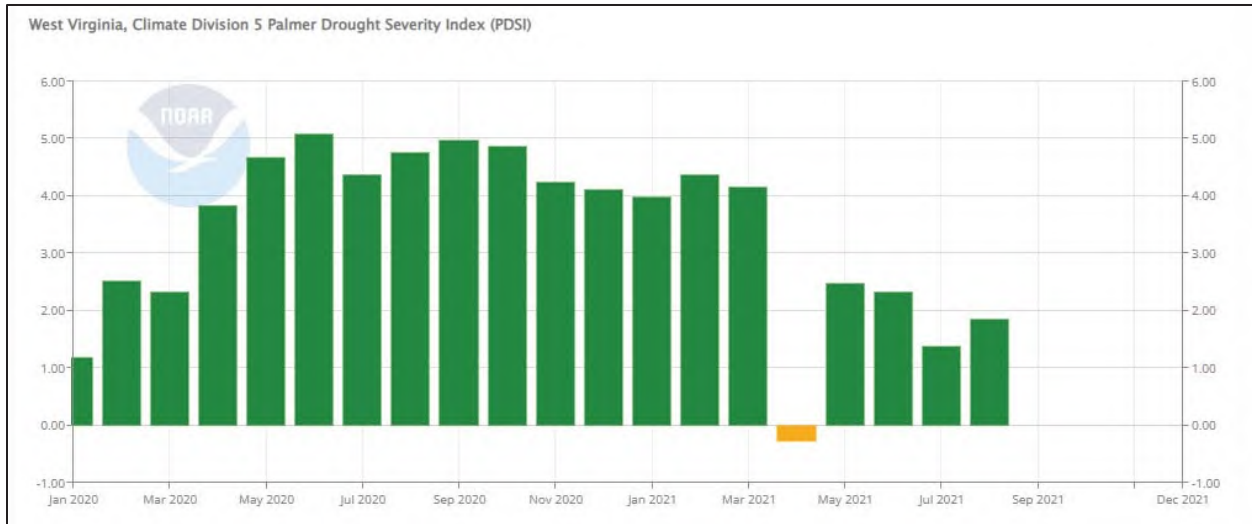
USDM AND PDSI COMPARISON			
U.S. Drought Monitor		Palmer Drought Severity Index	
N/A		> 4.0	Extreme moist spell
		3.0 to 3.99	Very moist spell
		2.0 to 2.99	Unusual moist spell
		1.0 to 1.99	Moist spell
		0.50 to 0.99	Incipient moist spell
		-0.49 to 0.49	Near normal
		-0.5 to -0.99	Incipient dry spell
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	



Generally, West Virginia does not see wide spread drought conditions on a regular basis. The map from the National Oceanic and Atmospheric Administration (NOAA) shows the PDSI for the month of May 2022. All of West Virginia is seen as slightly wetter than average.



The 24-Month Standardized Precipitation Index, from NOAA shows a similar pattern over a longer term. All of West Virginia is shown as being wetter than average.



Impacts and Vulnerability

Droughts can impact drinking water both in terms of availability and demand. According to the U.S. Environmental Protection Agency (EPA), 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. According to the U.S. Drought Monitor, the possible impacts from each level of drought appear in the graphic below.

D0 Abnormally Dry	<p><i>Going into drought:</i></p> <ul style="list-style-type: none"> • short-term dryness slowing planting, growth of crops or pastures <p><i>Coming out of drought:</i></p> <ul style="list-style-type: none"> • some lingering water deficits • pastures or crops not fully recovered
D1 Moderate Drought	<ul style="list-style-type: none"> • Some damage to crops, pastures streams, reservoirs, or wells low, some water shortages developing or imminent • Voluntary water-use restrictions requested
D2 Severe Drought	<ul style="list-style-type: none"> • Crop or pasture losses likely • Water shortages common • Water restrictions imposed
D3 Extreme Drought	<ul style="list-style-type: none"> • Major crop/pasture losses • Widespread water shortages or restrictions
D4 Exceptional Drought	<ul style="list-style-type: none"> • Exceptional and widespread crop/pasture losses • Shortages of water in reservoirs, streams, and wells creating water emergencies

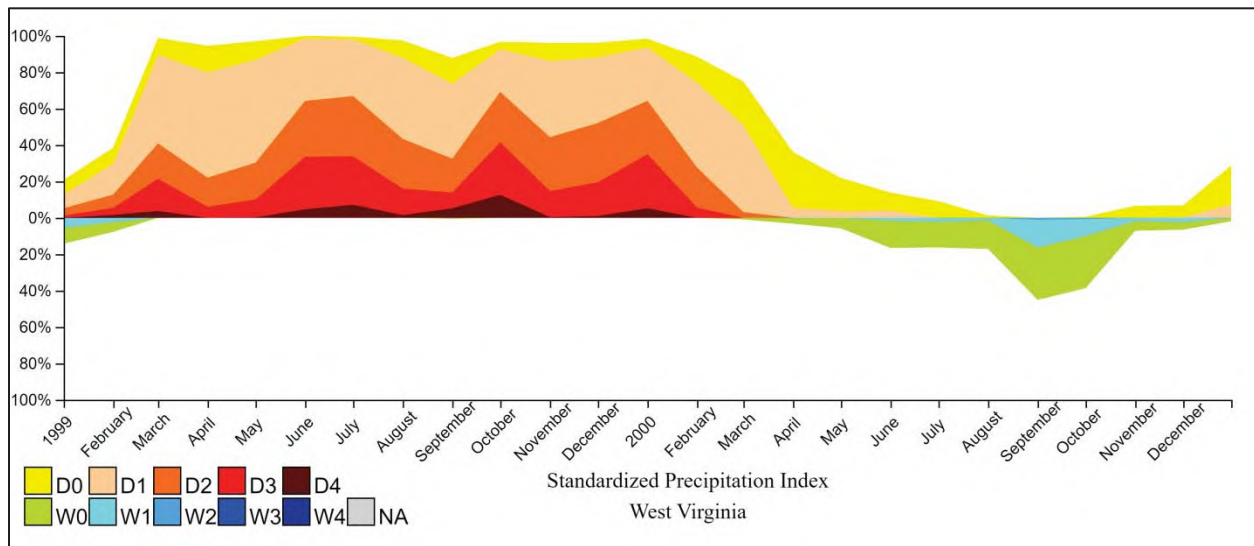
Past Mitigation Efforts: Drought

- Consistent vigilance of forecasted conditions, like the prevalence of rainfall, the development and distribution of public awareness materials concerning natural hazard risks, displaying drought information at public events, etc.

Historical Occurrences

Region 3, West Virginia

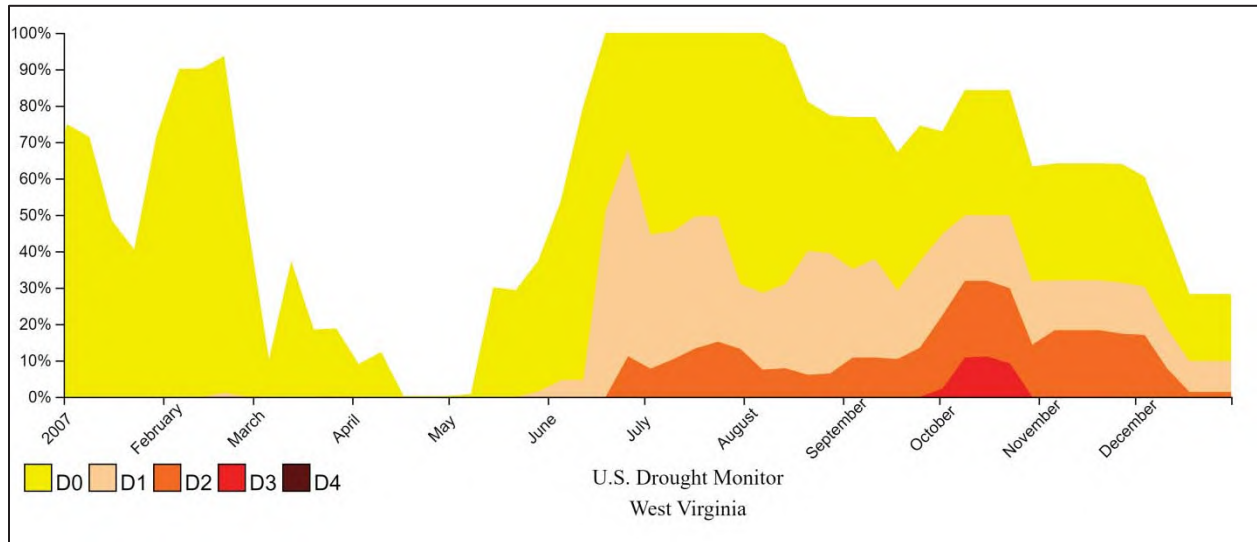
In 1999, drought conditions were present across much of the Mid-Atlantic region including the four counties in Region 3. The Standard Precipitation Index from January 1999 through December 2000 shows the magnitude of the drought event. All of West Virginia was classified as “Extremely Dry” during this time period. In addition to the lack of rain, which was reported to be only 1-2 inches according to the NCEI Event Record, the area saw a heat wave of temperatures in the 90s for eight consecutive days in June 1999 (NCEI, 2021).



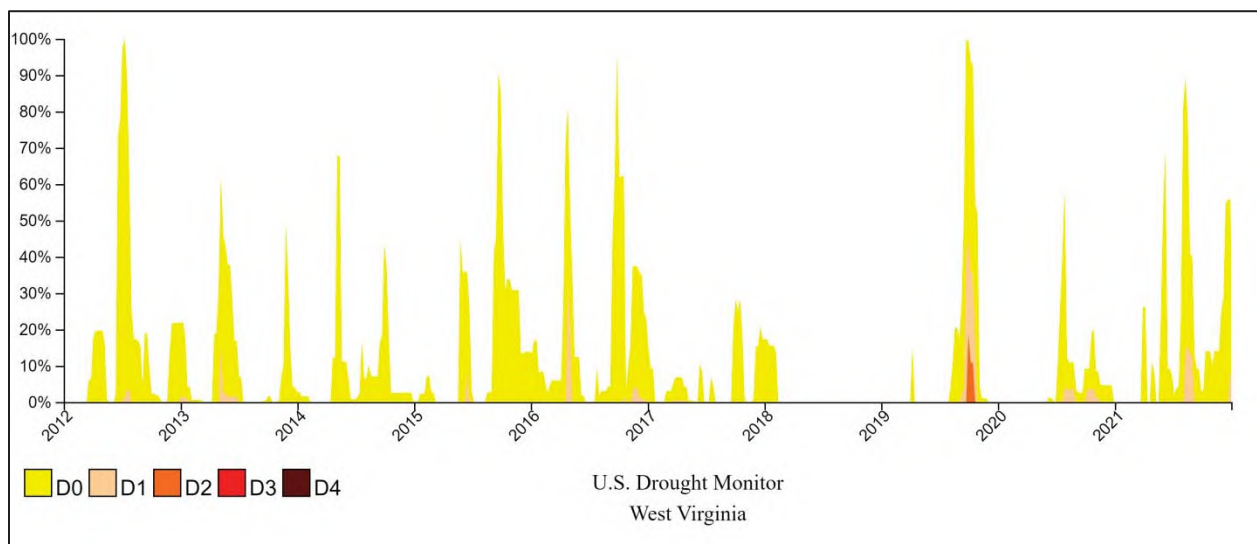
Region 3, West Virginia

In 2007, the four counties that make up Region 3 were in drought conditions for much of the latter half of the year according to National Centers for Environmental Information (NCEI) records. The region was on the northern fringe of a significant drought affecting the southeast region of the country, as the Palmer Index from August, 2007 (below) shows. According to the NCEI records, by September small streams, ponds and small impoundments were being depleted while the area saw only 1-2 inches of rain during the month. The drought peaked in early October with an off-season heat wave, where Charleston saw five consecutive days of

temperatures in the 90s. By late October/early November the drought conditions had eased considerably (NCEI, 2021).



The U.S. Drought Monitor, kept by the University of Nebraska-Lincoln, provides more detailed information about drought since 2000. The illustration below is a graphical representation of the time and severity of droughts presented in Region 3 between 2002 and 2021.



Loss and Damages

The USDA maintains data about agricultural activities through five-year censuses. The following table is from the 2017 efforts. It represents potential economic loss exposure.

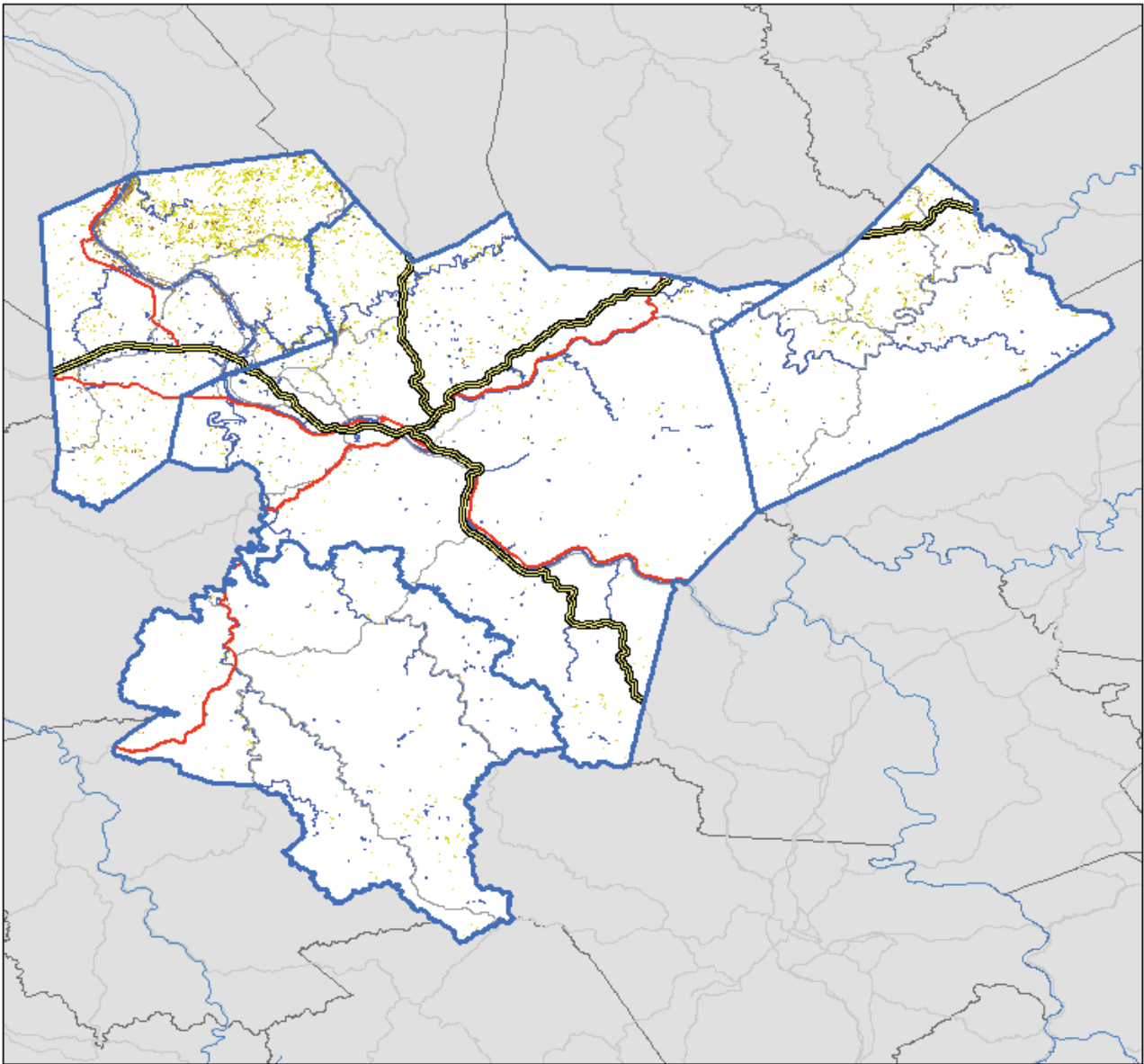
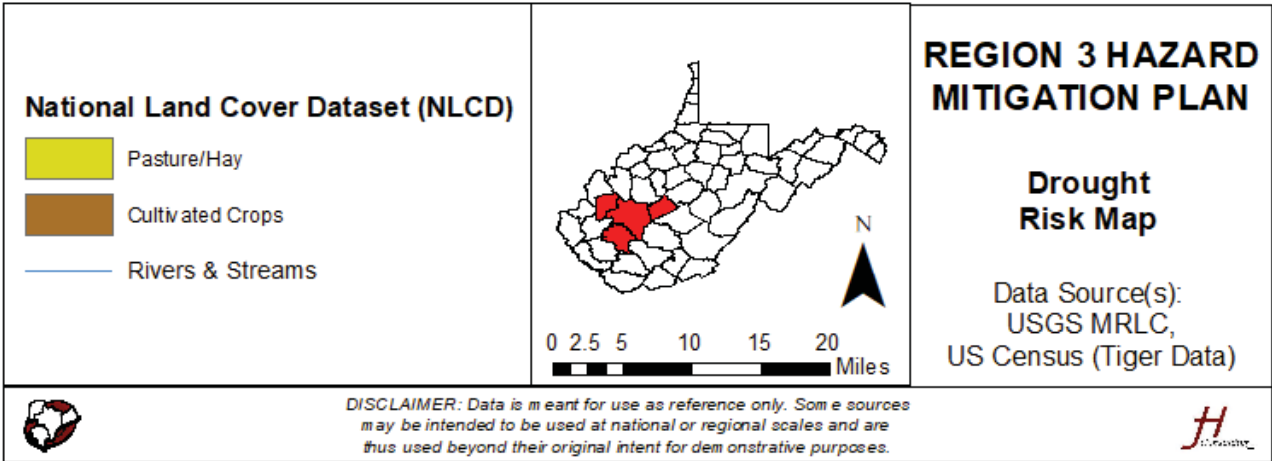
USDA CENSUS OF AGRICULTURE DATA – REGION 3					
<i>County</i>	<i>Farms</i>	<i>Land in Farms (acres)</i>	<i>Total Cropland (acres)</i>	<i>Harvested Cropland (acres)</i>	<i>Market Value of Agricultural Products Sold</i>
Boone	35	3,609	506	362	\$144,000
Clay	131	21,276	3,167	2,181	\$574,000
Kanawha	214	23,675	4,143	2,922	\$1,008,000
Putnam	514	51,682	13,737	10,240	\$14,239,000

Vulnerability Assessment

This section summarizes the vulnerability to Region 3 from drought. Region 3 conducted an online survey for the public to share its thoughts on hazard vulnerabilities. The following table presents the results of that survey regarding drought.

PUBLIC SENTIMENT, DROUGHT – REGION 3					
<i>Hazard</i>	<i>Level of Concern</i>				<i>Total Responses</i>
	<i>Not at All</i>	<i>Somewhat</i>	<i>Concerned</i>	<i>Very</i>	
Drought	88 (46.81%)	74 (39.36%)	24 (12.77%)	2 (1.06%)	188
In the past ten years, do you remember this hazard occurring in your community?				35 (18.62%)	188
Have you noticed an increase in the occurrences or intensity of this hazard?				35 (18.62%)	188
Have you noticed a decrease in the occurrences or intensity of this hazard?				7 (37.23%)	188

The following map image graphically depicts potential risk areas in Region 3. Risk areas correspond to those with land uses of “crop” and “pasture.”

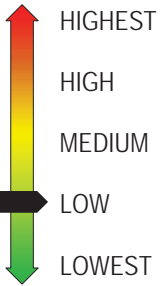


The following table assigns point totals based on the research presented in this profile for each category.

DROUGHT VULNERABILITY SUMMARY			
<i>Category</i>	<i>Points</i>	<i>Description</i>	<i>Notes</i>
Frequency	1	Low	There are no drought events listed in NCEI since 2012 (20 years). However, there are four events since 2000.
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 conditions.
Magnitude	1	Localized (less than 10% of land area affected)	Region 3 has a land area of 2,091 mi ² (Census 2020). Region 3 has approximately 157 mi ² (US Census of Agriculture, 2017). Approximately 7.51% of the region's land area is agriculture.
Business	1	Less than 24 hours	Drought is not likely to necessitate business closure.
Human	1	Minimum (minor injuries)	Drought is not likely to result in injuries.
Property	1	Less than 10% of property affected	Though a significant amount of the land area could be impacted, drought conditions do not affect personal property as severely.
Total	10	Lowest	

2.0 RISK ASSESSMENT

2.2.3 Earthquake

An earthquake is the movement or shaking of the Earth's tectonic plates.			
 <p>Vulnerability</p> <p>HIGHEST</p> <p>HIGH</p> <p>MEDIUM</p> <p>LOW</p> <p>LOWEST</p>	Period of Occurrence:	At any time	Hazard Index Ranking: Low
	Warning Time:	Little to none	State Risk Ranking: Low
	Probability:	Remote (unlikely to occur on an annual basis)	Severity: Limited
	Type of Hazard:	Natural	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.

Location and Extent

Earthquake intensity ranges from “too small to feel” to violent incidents that cause significant damage. The U.S. Geological Survey (USGS) uses the Modified Mercalli Intensity (MMI) scale to measure the intensity of earthquakes. The MMI scale characterizes the intensity of an earthquake by the severity of ground shaking at a given location and the effects of the shaking on people, human-made structures, and the landscape. Two other common ways to measure earthquakes include the Richter scale and peak ground acceleration (PGA).

- **Richter Scale:** The Richter scale, developed in 1935, measures the severity of an earthquake. The magnitude of an earthquake can range between 0 and 10. The effects of an earthquake can extend far beyond the site of its occurrence.
- **Peak Ground Acceleration (PGA):** PGA is “the maximum ground acceleration that occurred during earthquake shaking at a location. PGA is equal to the amplitude of the

largest absolute acceleration recorded on an accelerogram at a site during a particular earthquake” (Douglas, 2003).

The graphic below outlines the MMI scale and compares it to the Richter (magnitude) scale.

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

The area of most considerable 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 108 earthquakes with epicenters in West Virginia have occurred since 1824, with some causing “minor to moderate” damage. Generally, the number of earthquakes in the central U.S. has increased over the past decade (USGS, n.d.). From 1973 to 2008, there were approximately 25 earthquakes per year of magnitude three or larger. Since 2009, that number has increased to 362 per year.

Regulators and researchers have documented earthquakes induced by human activity in the United States, Japan, and Canada (USGS, 2020). The cause of these human-caused earthquakes was the injection of fluids into deep wells for waste disposal and secondary recovery of oil and filling 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, 2015).

Impacts and Vulnerability

The direct effects of earthquakes include ground movement and ground failure. Cascading effects can include structural damage and utility and communication system outages. The risk of fire also increases after an earthquake due to potentially-damaged gas pipelines and electrical lines. The most significant human risk during an earthquake is structure movement and collapse. Contents within structures may fall or fail and injure or kill the people inside.

Past Mitigation Efforts: Earthquake

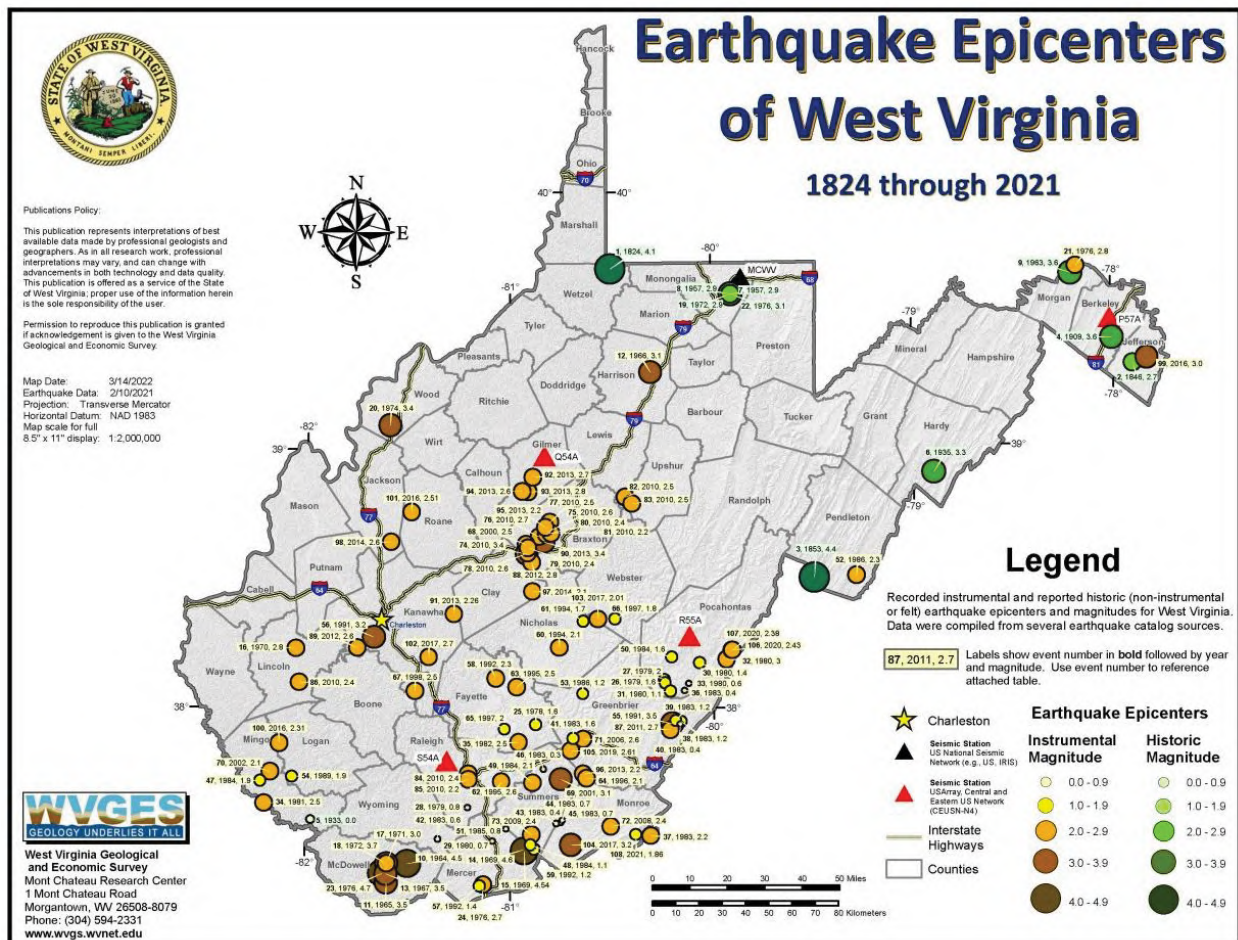
- Multiple jurisdictions within Region 3 have participated in all-hazard public awareness campaigns.

Historical Occurrences

One hundred eight earthquakes have occurred in West Virginia, since 1824 (WVGES, 2022). Six earthquakes have had an epicenter in Region 3. Below is a list of the WVGES recorded earthquakes in Region 3.

REGION 3 HISTORICAL EARTHQUAKE EVENTS		
Date	County	Magnitude
June 28, 1991	Kanawha	3.20
October 2, 1998	Kanawha	2.50
March 16, 2012	Kanawha	2.60
May 29, 2013	Kanawha	2.26
April 14, 2014	Clay	2.10
June 21, 2017	Kanawha	2.70

The following is a graphic from the West Virginia Geological and Economic Survey shows earthquake epicenters in West Virginia. The southwest portion of the state is an area of high earthquake activity.



Loss and Damages

Planners utilized the HAZUS-MH program from the Federal Emergency Management Agency to analyze the effects of a potential earthquake striking Region 3 Counties. The scenarios depict a 5.0 earthquake (the lowest possible magnitude to use in the program) located in the center of each county. The following tables describe the expected building damages by occupancy type and the building-related economic loss estimates.

BOONE COUNTY EXPECTED BUILDING DAMAGE BY OCCUPANCY (HAZUS)										
	None		Slight		Moderate		Extensive		Complete	
	Count	%	Count	%	Count	%	Count	%	Count	%
Agriculture	5.95	0.05	0.04	0.03	0.01	0.03	0.00	0.05	0.00	0.03
Commercial	251.04	2.29	2.29	1.93	0.60	1.95	0.06	3.59	0.00	2.82
Education	35.55	0.32	0.35	0.30	0.09	0.29	0.01	0.51	0.00	0.48
Government	30.68	0.28	0.25	0.21	0.06	0.20	0.01	0.34	0.00	0.22
Industrial	55.38	0.50	0.49	0.41	0.12	0.39	0.01	0.65	0.00	0.40
Other Residential	3557.75	32.40	72.06	60.71	17.89	57.76	0.30	17.85	0.00	1.28
Religion	52.33	0.48	0.50	0.42	0.15	0.49	0.02	0.97	0.00	0.96
Single Family	6992.83	63.68	42.72	35.99	12.05	38.90	1.29	76.03	0.12	93.81
TOTAL	10,982		119		31		2		0	

BOONE COUNTY HAZUS BUILDING-RELATED ECONOMIC LOSS ESTIMATES (MILLIONS OF DOLLARS)							
Category	Area	Single-Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses	Wage	0.0000	0.0011	0.0163	0.0002	0.0090	0.0266
	Capital Related	0.0000	0.0005	0.0118	0.0003	0.0015	0.0141
	Rental	0.0261	0.0053	0.0090	0.0001	0.0018	0.0423
	Relocation	0.0918	0.0290	0.0115	0.0010	0.0183	0.1516
	Subtotal	0.1179	0.0359	0.0486	0.0016	0.0306	0.2346
Capital Stock Losses	Structural	0.1339	0.0411	0.0150	0.0033	0.0226	0.2159
	Non-Structural	0.1762	0.0576	0.0173	0.0031	0.0321	0.2863
	Content	0.0148	0.0016	0.0036	0.0015	0.0054	0.0267
	Inventory	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001
	Subtotal	0.3249	0.1003	0.0357	0.0000	0.0601	0.5290
TOTAL		0.44	0.14	0.08	0.01	0.09	0.76

CLAY COUNTY EXPECTED BUILDING DAMAGE BY OCCUPANCY (HAZUS)										
	None		Slight		Moderate		Extensive		Complete	
	Count	%	Count	%	Count	%	Count	%	Count	%
Agriculture	1.03	.005	0.71	0.06	0.81	0.09	0.35	0.09	0.11	0.11
Commercial	24.11	1.14	15.48	1.40	21.09	2.37	10.87	2.94	3.45	3.64
Education	3.66	0.17	2.21	0.20	3.09	0.35	1.55	0.42	0.49	0.52
Government	1.63	0.08	1.12	0.10	1.85	0.21	1.05	0.28	0.35	0.37
Industrial	11.01	0.52	5.59	0.50	7.58	0.85	3.71	1.01	1.11	1.17
Other Residential	316.67	14.99	260.28	23.49	415.32	46.60	219.99	59.55	48.74	51.38
Religion	8.59	0.41	3.62	0.33	3.07	0.34	1.34	0.36	0.37	0.39
Single Family	1745.72	82.64	819.1	73.92	438.47	49.20	130.55	35.34	40.24	42.42
TOTAL	2,112		1,108		891		369		95	

CLAY COUNTY HAZUS BUILDING-RELATED ECONOMIC LOSS ESTIMATES (MILLIONS OF DOLLARS)							
Category	Area	Single-Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses	Wage	0.0000	0.5064	1.6404	0.0321	0.1735	2.3524
	Capital Related	0.0000	0.2147	0.8784	0.0246	0.0411	1.1588
	Rental	1.4809	0.5785	0.7490	0.0117	0.0881	2.9082
	Relocation	5.2032	1.7976	1.1584	0.0671	0.6674	8.8937
	Subtotal	6.6841	3.0972	4.4262	0.1355	0.9701	15.3131
Capital Stock Losses	Structural	6.6915	2.6722	1.6159	0.2272	0.7285	11.9353
	Non-Structural	25.3228	8.2632	4.3212	0.7704	2.2872	40.9648
	Content	10.1749	1.7966	2.4394	0.5372	1.2278	16.1759
	Inventory	0.0000	0.0000	0.0713	0.0888	0.0025	0.1626
	Subtotal	42.1892	12.7320	8.4478	1.6236	4.2460	69.2386
TOTAL	48.87	15.83	12.87	1.76	5.22	84.55	

KANAWHA COUNTY EXPECTED BUILDING DAMAGE BY OCCUPANCY (HAZUS)										
	None		Slight		Moderate		Extensive		Complete	
	Count	%	Count	%	Count	%	Count	%	Count	%
Agriculture	69.2	0.13	34.72	0.18	36.12	0.30	14.64	0.35	4.32	0.38
Commercial	2119.28	4.04	1137.47	6.06	1498.22	12.30	749.57	18.17	233.47	20.34
Education	100.05	0.19	46.40	0.25	61.30	0.50	29.35	0.71	8.90	0.78
Government	145.30	0.28	82.25	0.44	132.47	1.09	74.69	1.81	24.30	2.12
Industrial	465.39	0.89	196.28	1.04	269.57	2.21	138.54	3.36	42.21	3.68
Other Residential	6852.92	13.06	2678.18	14.26	2657.85	21.81	915.11	22.19	180.95	15.76
Religion	424.69	0.81	176.44	0.94	157.52	1.29	74.43	1.80	21.91	1.91
Single Family	42298.52	80.61	14433.10	76.83	7371.14	60.50	2128.47	51.60	631.77	55.05
TOTAL	52,475		18,785		12,184		4,125		1,148	

KANAWHA COUNTY HAZUS BUILDING-RELATED ECONOMIC LOSS ESTIMATES (MILLIONS OF DOLLARS)							
Category	Area	Single-Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses	Wage	0.0000	11.4618	138.6508	1.7958	14.7897	166.6981
	Capital Related	0.0000	4.8686	121.5216	1.1513	1.8260	129.3675
	Rental	26.8979	20.8272	56.1705	0.6064	9.2097	113.7117
	Relocation	94.5349	16.9849	92.8959	3.6566	41.9175	249.9898
	Subtotal	121.4328	54.1425	409.2388	7.2101	67.7429	659.7671
Capital Stock Losses	Structural	146.2186	38.5868	133.3093	12.1802	40.5686	370.8635
	Non-Structural	546.7836	185.1671	384.8881	40.6767	124.6493	1,282.1648
	Content	218.0322	53.7241	210.9021	27.5086	68.7211	578.8881
	Inventory	0.0000	0.0000	4.5801	4.9996	0.3333	9.9130
	Subtotal	911.0344	277.4780	733.6796	85.3651	234.2723	2241.8294
TOTAL		1032.47	331.62	1142.92	92.58	302.02	2901.60

PUTNAM COUNTY EXPECTED BUILDING DAMAGE BY OCCUPANCY (HAZUS)										
	None		Slight		Moderate		Extensive		Complete	
	Count	%	Count	%	Count	%	Count	%	Count	%
Agriculture	17.01	0.14	14.24	0.25	16.71	0.41	6.99	0.45	2.04	0.51
Commercial	294.13	2.48	198.06	3.44	259.34	6.43	122.30	7.84	34.18	8.47
Education	13.76	0.12	9.36	0.16	13.02	0.32	6.12	0.39	1.75	0.43
Government	12.44	0.10	8.82	0.15	13.69	0.34	7.03	0.45	2.01	0.50
Industrial	83.39	0.70	55.35	0.96	83.78	2.08	43.5	2.81	12.62	3.13
Other Residential	979.79	8.25	770.72	13.41	1211.75	30.03	671.81	43.04	149.4	37.14
Religion	50.63	0.43	26.16	0.46	23.65	0.59	10.69	0.68	2.86	0.71
Single Family	10429.57	87.79	4666.52	81.17	2412.60	59.80	692.00	44.34	198.31	49.12
TOTAL	11,881		5,749		4,035		1,561		404	

PUTNAM COUNTY HAZUS BUILDING-RELATED ECONOMIC LOSS ESTIMATES (MILLIONS OF DOLLARS)							
Category	Area	Single-Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses	Wage	0.0000	1.310	16.2266	0.7603	1.663	19.8142
	Capital Related	0.0000	0.4815	15.5196	0.4493	0.3054	16.7558
	Rental	9.2361	2.4963	10.9507	0.2989	0.8687	23.8507
	Relocation	32.5038	5.7480	16.9511	1.7684	5.5421	62.5134
	Subtotal	41.7399	9.8565	59.6480	3.2769	8.4125	122.9341
Capital Stock Losses	Structural	55.2913	8.7076	27.0264	5.4098	6.3069	102.7420
	Non-Structural	207.4536	30.0080	66.1584	17.2641	17.7568	338.6409
	Content	82.8579	7.0021	35.4911	11.6020	9.7108	146.6639
	Inventory	0.0000	0.0000	1.0133	1.8711	0.0842	2.9686
	Subtotal	345.6028	45.7177	129.6892	36.1470	33.8587	591.0154
TOTAL		387.34	55.57	189.34	39.42	42.27	713.95

Vulnerability Assessment

This section summarizes the risk to Region 3 from earthquakes. Region 3 conducted an online survey for the public to share its thoughts on hazard vulnerabilities. The following table presents the results of that survey regarding earthquakes.

PUBLIC SENTIMENT, EARTHQUAKE – REGION 3					
Hazard	Level of Concern				Total Responses
	Not at All	Somewhat	Concerned	Very	
Earthquake	136	47	4	1	188
In the past ten years, do you remember this hazard occurring in your community?				16 (8.51%)	188
Have you noticed an increase in the occurrences or intensity of this hazard?				12 (6.38%)	188
Have you noticed a decrease in the occurrences or intensity of this hazard?				7 (3.72%)	188

The following table assigns point totals based on the research presented in this profile for each category.

EARTHQUAKE VULNERABILITY SUMMARY			
Category	Points	Description	Notes
Frequency	2	Low	Six incidents have occurred since 1824, for an average of 0.03 earthquakes per year in Region 3.
Response	2	One day	Historical data indicate that earthquakes have not caused enough damage for a FEMA declaration; thus, the response would be minimal.
Onset	4	Less than 6 hours	Earthquakes occur with little or no warning.
Magnitude	1	Less than 10% of land area affected	Six earthquakes have occurred in Region 3. Of the six earthquakes, only one was a magnitude of 3.0 or higher.
Business	1	Less than 24 hours	No historical earthquakes disrupted the county's economy.
Human	1	Minimum/minor injuries	Past earthquakes near Region 3 have been low magnitude and have not caused any human injuries or deaths.
Property	1	Less than 10% of property affected	Earthquakes near Region 3 have been low magnitude and caused little to no damage.
Total	12	Low	

2.0 RISK ASSESSMENT

2.2.4 Epidemic/Pandemic

This profile examines two types of public health emergencies, each corresponding to a level of disease presence.			
	Vulnerability	Period of Occurrence: At any time	Hazard Index Ranking: High
		Warning Time: Little to none	State Risk Ranking: N/A
		Probability: Remote (unlikely to occur on an annual basis)	Severity: Limited
		Type of Hazard: Natural	Disaster Declarations: EM-3450 DR-4517

Hazard Overview

An epidemic can affect all parts of Region 3, but is more probable to impact densely populated areas, particularly large, multi-unit residential developments associated the population. Epidemics or pandemics can develop with little or no warning and quickly erode the capacity of local medical care providers. A fast-developing epidemic can last several days and extend into several weeks. In some extreme cases, they can last for several months. An outbreak can occur at any time of the year, but the warm summer months, when bacteria and microorganism growth are at their highest, present the greatest risk. Seasonal outbreaks, of such diseases as flu, typically occur in the winter months.

Location and Extent

According to the Centers for Disease Control and Prevention (CDC) there are three widely-accepted levels of disease presence.

- **Endemic** refers to the baseline level of a particular disease in population of area. This level is not necessarily the desired level, but the observed level.
- **Epidemic** refers to 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** refers to an epidemic that has spread over several countries or continents, typically affecting a large number of people.

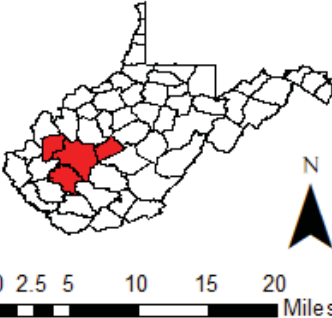


An epidemic or pandemic can affect all parts of Region 3 but is most probable to occur in densely populated areas such as the cities. Smaller scale outbreaks could occur in particularly large, multi-unit residential developments and facilities where a large workforce is employed.

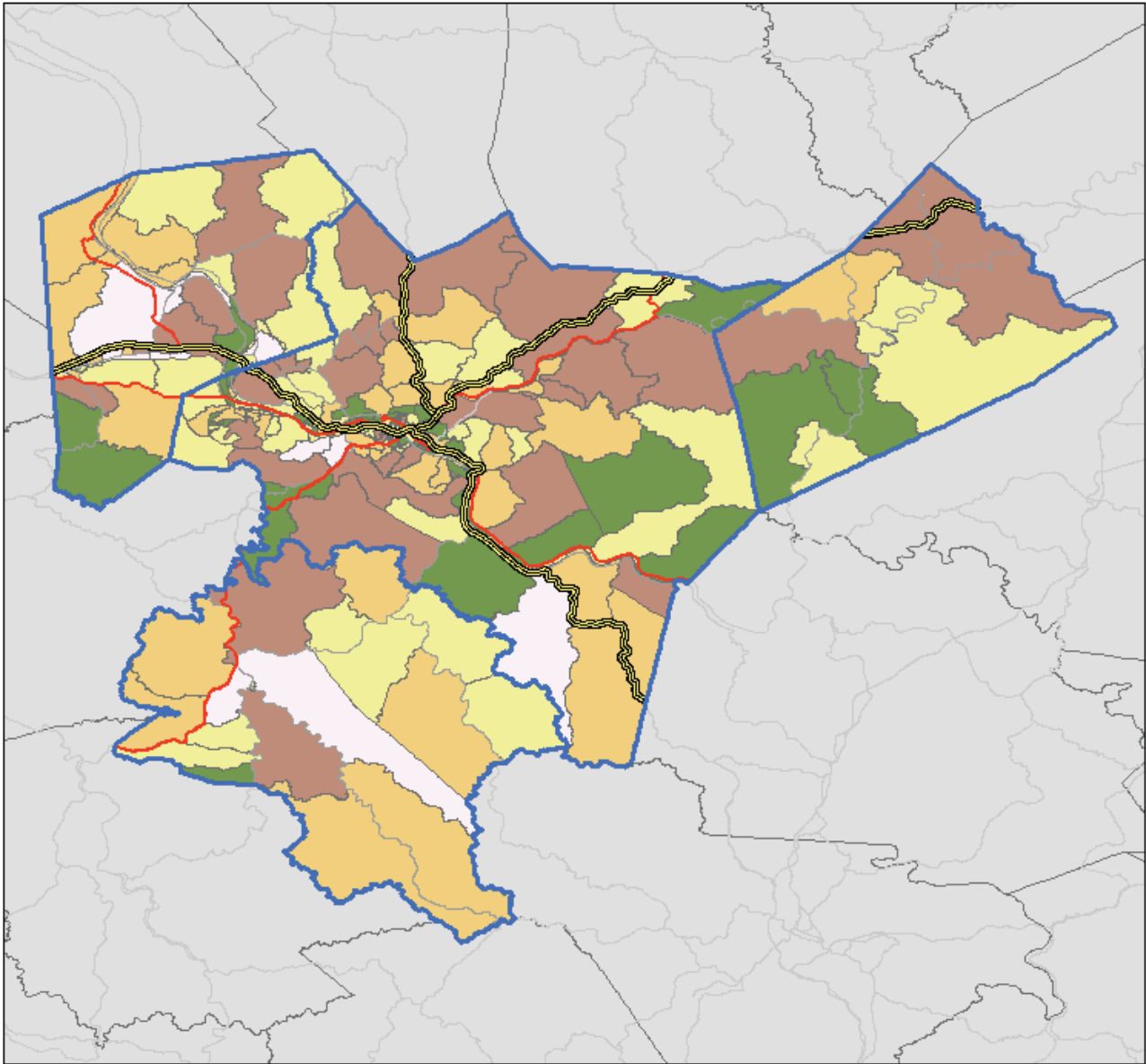
Impacts and Vulnerability

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. Cascading effects of epidemics and pandemics include the following.

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

Disease can affect any age group; however, it can more easily affect the youngest and oldest populations. The map on the following page uses the U.S. Census tracts to determine the areas where risks of pandemics are higher. Planners identified the younger and older population to show their general location on the map.

<p>Population by Age (by Block Group) Vulnerable Pops. (Under 18 and 65+)</p> <ul style="list-style-type: none">45 - 279280 - 450451 - 643644 - 913914 - 1433		<p>REGION 3 HAZARD MITIGATION PLAN</p> <p>Epidemic-Pandemic Risk Map</p> <p>Data Source(s): U.S. Census (ACS 2019, 5-year)</p>
<p><i>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.</i></p>  		



There are also economic impacts of a pandemic. The global COVID-19 pandemic has had sweeping impacts on our 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.

Past Mitigation Efforts: Epidemic/Pandemic

- This is a new hazard profile to the 2022 update.

Historical Occurrences

This plan was written during the Coronavirus Disease 2019 (COVID-19) pandemic. COVID-19 was first detected in West Virginia on March 17, 2020. Prior to the first case, Governor Justice and the West Virginia Department of Health and Human Resources took steps to prepare. Throughout the pandemic, the Governor issued Executive Orders to help combat the spread of COVID-19. As of June 14, 2022, West Virginia has had 523,876 confirmed cases with 7,013 deaths since March of 2020. Confirmed cases for the region include: Boone County, 6,859, Clay County, 2,398, Kanawha County, 48,759, and Putnam County 17,269 (CDC, 2022).

As of June 16, 2022, there have been 535,248,141 confirmed cases of the virus, resulting in over 6.3 million deaths worldwide (WHO, 2022). The virus has spread to every country and continent of the world. The pandemic completely shut-down the entire United States for several months due to stay-at-home and social distancing order, isolation and quarantine mandates, global air travel was restricted for several months, the pandemic is still having a negative effect on the countries supply-chain. The overall cost of the pandemic on the US economic is in the trillions.

Additionally, the region felt the impacts of the 2009 swine flu pandemic, caused by the H1N1 influenza virus. The World Health Organization (WHO) designated the pandemic from June 2009 through August 2010. Though its effects paled in comparison to the Covid-19 pandemic (e.g., there were substantially fewer deaths and significantly less economic disruption during the 2009 pandemic), the incident was the first widely-agreed upon pandemic to noticeably impact West Virginia in many years.

Loss and Damages

Losses based on historical epidemic occurrences are difficult to estimate. According to a study seasonal influenza results in a substantial economic impact, estimated, in part, at \$16.3 billion in lost earnings (Molinari, 2007). By population, Region 3 represents 0.08% of the United States. Since seasonal influenza primarily impacts the human population, using Region 3’s composition of the U.S. as a multiplier (i.e., 0.0008) and applying it to the potential economic impact, lost earnings in Region 3 could reach a staggering \$13,040,000 each year. Though that number appears high, it equates to approximately \$90.85 per year for each person listed by the U.S. Census Bureau as “in civilian labor force” for the region. Epidemics rarely affect structures. Epidemics may affect people and, at times, the operations of critical facilities, businesses, and other community assets. Comprehensive estimates of losses associated with the Covid-19 pandemic will inform this discussion in future updates, but at the time of this writing, reliable estimates were not available.

Vulnerability Assessment

This section summarizes the risk to Region 3 from Epidemic/Pandemic. Region 3 conducted an online survey for the public to share its thoughts on hazard vulnerabilities. The following table presents the results of that survey regarding Epidemic/Pandemic.

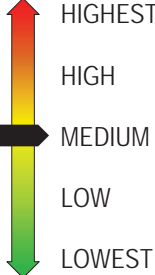
PUBLIC SENTIMENT, EPIDEMIC/PANDEMIC – REGION 3					
Hazard	Level of Concern				Total Responses
	Not at All	Somewhat	Concerned	Very	
Epidemic/pandemic	32 (17.02%)	54 (28.72%)	55 (29.25%)	47 (25.00%)	188
In the past ten years, do you remember this hazard occurring in your community?				165 (87.77%)	188
Have you noticed an increase in the occurrences or intensity of this hazard?				153 (80.53%)	190
Have you noticed a decrease in the occurrences or intensity of this hazard?				16 (8.42%)	190

The following table assigns point totals based on the research presented in this profile for each category.

EPIDEMIC/PANDEMIC VULNERABILITY SUMMARY			
<i>Category</i>	<i>Points</i>	<i>Description</i>	<i>Notes</i>
Frequency	1	Low	Although this plan was written during the COVID-19 pandemic, there are few historical occurrences of pandemics in Region 3
Response	5	Excessive	As seen with the COVID 19 pandemic, the response can last years.
Onset	1	Over 24 hours	Epidemics and pandemics are usually observed through health surveillance before they affect an area.
Magnitude	4	Catastrophic	Pandemics, as seen during the COVID 19 pandemic, can affect an entire nation or multiple nations throughout the world.
Business	5	More than one month	As seen with the COVID 19 pandemic, the economy was affected and businesses were closed for extended periods of time as part of the response efforts.
Human	4	Multiple deaths	As epidemics/pandemics are a hazard that has a direct correlation with illness and death, there are multiple deaths that can be expected.
Property	1	Less than 10% of property affected	Epidemics/pandemics do not have a direct effect on property.
Total	10	Lowest	

2.0 RISK ASSESSMENT

2.2.5 Extreme Temperatures

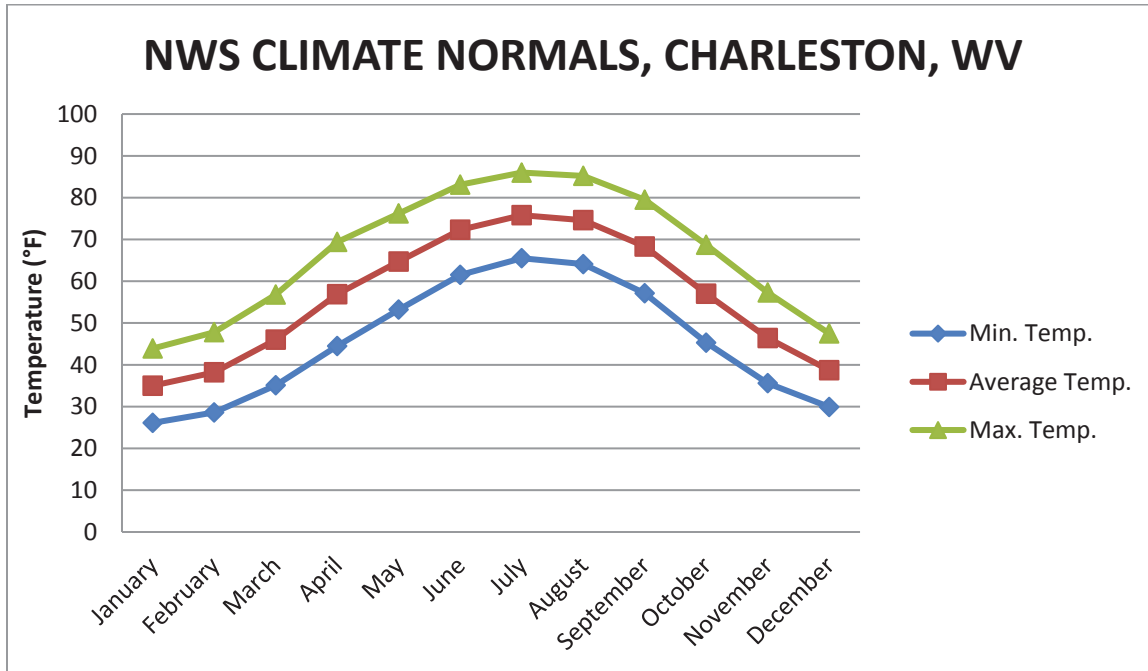
Extreme temperatures are those that are significantly higher or lower (i.e., more than ten degrees Fahrenheit) than the average temperature for a given location and time.			
 <p>Vulnerability</p> <p>HIGHEST</p> <p>HIGH</p> <p>MEDIUM</p> <p>LOW</p> <p>LOWEST</p>	Period of Occurrence:	June-August, December-February	Hazard Index Ranking: Medium
	Warning Time:	12-24 Hours	State Risk Ranking: N/A
	Probability:	Probable (likely to occur on an annual basis)	Severity: Limited
	Type of Hazard:	Natural	Disaster Declarations: N/A

Hazard Overview

Extreme temperatures include both extreme heat and extreme cold events. Extreme heat includes temperatures that hover 10°F or more above the average high temperature for a region during the summer months. Extreme cold temperatures drop well below what is considered normal for an area during the winter months and often accompany winter storm events. Combined with high wind speed, such temperatures can be life-threatening to those exposed for extended periods.

Location and Extent

Extreme temperature events will affect each jurisdiction in Region 3 essentially equally. Although temperatures may vary slightly throughout the region, the average temperatures and extent of extremes are very similar. The following figure depicts the National Weather Service average temperatures from the NWS station at Yeager Airport, Charleston, WV. As noted, temperatures are highest from June to August, and lowest from December to February.



To give a warning for extreme temperatures, the National Weather Service, in collaboration with local partners, issues several temperature-related products as conditions warrant. The table below describes these products for both heat and cold temperatures

NATIONAL WEATHER SERVICE TEMPERATURE-RELATED PRODUCTS	
<i>Product</i>	<i>Description</i>
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 night time 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. Officials use a watch when the risk of a heatwave has increased, but its occurrence and timing is 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. It provides information to those who need considerable lead time to prepare for an event.
Frost Advisory	Issued when temperatures, winds, and sky cover are favorable for frost development. Frost advisories are 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

Extreme temperatures tend to affect the population's health rather than infrastructure. The extent of damage to infrastructure consists of broken pipes and cracks in the pavement due to expansion/contraction during extreme cold events and power outages during both extreme heat and cold events.

Extreme heat has a variety of impacts on human health at the individual level. Exposure to high temperatures can trigger a variety of heat stress conditions such as heart attack, 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. Prolonged exposure to heat may necessitate medical intervention, and in extreme cases cause death. The following table presents human health risk by heat index temperature.

HEAT RISKS	
<i>Heat Index</i>	<i>Possible Heat Disorders for People in High-Risk Groups</i>
80°F-90°F	Fatigue possible with prolonged exposure to physical activity
90°F -105°F	Sunstroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
105°F -130°F	Sunstroke, heat cramps, or heat exhaustion likely, and heatstroke possible with prolonged exposure and/or physical activity
130°F +	Heat/Sunstroke highly likely with continued exposure
Source: https://nws.weather.gov/blog/nwsdesmoines/2014/06/06/iowa-heat-awareness-day-june-5-2014-2/	

Like extreme heat, extreme cold temperatures can cause serious human health impacts. When exposed to cold temperatures, the human body begins to lose heat. Prolonged exposure to such temperatures will use up the entirety of the body's stored energy, causing cold-related illnesses such as hypothermia, frostbite, trench foot, and chilblains (CDC).

Individuals most likely to experience the negative effects of extreme heat include those 65 years and older, children younger than two, and people with chronic diseases (CDC, 2018). These individuals should limit outdoor activity during the warmest parts of the day and wear appropriate clothing and sun protection. Those most susceptible to cold include older adults, children, people who remain outdoors for extended periods, and those who use alcohol or illicit drugs. These individuals, to the extent possible, should minimize time spent outdoors and dress in appropriate clothing that minimizes skin exposure to the cold.

Historical Occurrences

The National Center for Environmental Information (NCEI) Storm Event Database maintains records of extreme temperature occurrences. The following table presents the NCEI extreme temperature events for Region 3. There have been 15 extreme temperature events in the past 20 years, which means Region 3 has a 75% chance of experiencing an event on any given year.

EXTREME TEMPERATURE EVENTS, REGION 3					
<i>Date</i>	<i>Event Type</i>	<i>Deaths</i>	<i>Injuries</i>	<i>Property Damage</i>	<i>Crop Damage</i>
1/2/2000	Excessive Heat	0	0	\$0	0
1/28/2000	Extreme Cold/Wind Chill	0	0	\$0	0
2/25/2000	Excessive Heat	0	0	\$0	0
2/26/2000	Excessive Heat	0	0	\$0	0
3/8/2000	Excessive Heat	0	0	\$0	0
11/21/2000	Extreme Cold/Wind Chill	0	0	\$0	0
2/9/2001	Excessive Heat	0	0	\$0	0
1/28/2002	Excessive Heat	0	0	\$0	0
1/31/2002	Excessive Heat	0	0	\$0	0
4/16/2002	Excessive Heat	0	0	\$0	0
5/19/2002	Extreme Cold/Wind Chill	0	0	\$0	0
8/16/2007	Excessive Heat	0	0	\$0	0
1/6/2014	Extreme Cold/Wind Chill	0	0	\$640,000	0
1/27/2014	Extreme Cold/Wind Chill	0	0	\$150,000	0
2/18/2015	Extreme Cold/Wind Chill	0	0	\$400,000	0
TOTALS		0	0	\$1,190,000	0

January 6, 2014

Between midnight and 4 a.m. on January 6, 2014, a cold front swept through West Virginia. Temperatures fell into the 20's by dawn. Temperatures continued to drop throughout the day and in January 7. For many counties, it was the first time with subzero temperatures since 2008. Reports of frozen pipes in homes, government buildings, and schools as well as underground mains came from throughout the state. Many schools closed not only from water issues but since biodiesel in the school buses was gelling, engine problems resulted. Damages were estimated at \$300,000 for both Kanawha and Putnam counties, and \$20,000 for both Boone and Clay counties.

February 18, 2015

The second arctic front in less than a week swept through West Virginia during the early afternoon hours on February 18, 2015. Temperatures dropped into the single digits overnight, and reached 0 to -5 degrees after dawn on February 19. Daytime temperatures remained in the single digits throughout the day time hours, with wind chills reaching minus 10 to minus 20 across the lowland counties. By dawn on February 20, temperatures were well below zero. The official temperature in Sissonville, in Kanawha County, was recorded as -21 degrees.

In Kanawha County there were approximately 10,000 customers without power, necessitating that warming shelters be set up by churches and towns. Broken water lines were reported across the region, including under a street in the East End of Charleston. Broken pipes in the Boone County Courthouse resulted in 1 to 2 feet of water collecting in the basement, damaging the floors. Finally, a local water utility lost the water stored in their tanks due to broken pipes, leading to water service being cut off for thousands in Charleston and Boone County. Service was not restored for several days. The NCDC data reports property damage of \$250,000 in Kanawha County and \$150,000 in Boone County (2022).

Loss and Damages

Unlike many other natural hazards, damages from extreme temperature events are primarily health-related. According to scholars, the median cost for a heat-related hospitalization is \$8,965 (Schmeltz, 2016). Costs for heat-related hospitalizations are higher among women, and among those insured by Medicare or Medicaid (compared to private or HMO insurance).

The Agency for Healthcare Research and Quality studied the economic effect of cold-related hospitalizations in 2005 (Merrill, 2008). The center found that the average cost for a cold-related hospitalization was \$12,500, which is significantly higher than the cost for a heat-related hospitalization.

Vulnerability Assessment

This section summarizes the risk to Region 3 from extreme temperatures. Region 3 conducted an online survey for the public to share its thoughts on hazard vulnerabilities. The following table presents the results of that survey regarding extreme temperatures.


PUBLIC SENTIMENT, EXTREME TEMPERATURES - REGION 3					
Hazard	Level of Concern				Total Responses
	Not at All	Somewhat	Concerned	Very	
Extreme Temperatures	54 (28.72%)	70 (37.23%)	42 (22.34%)	22 (11.70%)	188
In the past ten years, do you remember this hazard occurring in your community?				91 (48.40%)	188
Have you noticed an increase in the occurrences or intensity of this hazard?				91 (48.40%)	188
Have you noticed a decrease in the occurrences or intensity of this hazard?				3 (1.59%)	188

The following table assigns point totals based on the research presented in this profile for each vulnerability category.

EXTREME TEMPERATURES VULNERABILITY SUMMARY			
Category	Points	Description	Notes
Frequency	4	High	Based on historical data, Region 3 has a 75% chance of experiencing extreme temperature events in any given year.
Response	1	Less than one day	Extreme temperatures would not require an extended emergency response.
Onset	1	Over 24 hours	Extreme temperature events develop over a few days or weeks and occur during the warmest and coolest months.
Magnitude	5	N/A	Extreme temperatures would affect the entire region.
Business	1	Less than 24 hours	The county's economy would not typically be affected by extreme temperature events.
Human	3	Medium	Although no injuries or deaths occurred due to extreme temperatures in the region, extreme temperatures may cause human health impacts.
Property	1	Less than 10% of property	Extreme temperatures do not typically result in structural damage to property. Damages to pipes and the like would yield small replacement/repair costs relative to the value of the entire structure.
Total	16	Medium	

2.0 RISK ASSESSMENT

2.2.6 Flooding

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 waters from any source. A flash flood is a sudden local flood, typically due to heavy rain.			
 <p>Vulnerability</p> <p>HIGHEST</p> <p>HIGH</p> <p>MEDIUM</p> <p>LOW</p> <p>LOWEST</p>	Period of Occurrence:	At any time, typically after prolonged periods of precipitation	Hazard Index Ranking: High
	Warning Time:	12-24 hours	State Risk Ranking: High
	Probability:	Frequent (will occur on an annual basis)	Severity: Critical
	Type of Hazard:	Natural	Disaster Declarations: DR-224 DR-1168 DR-323 DR-1319 DR-416 DR-3052 DR-628 DR-4273 DR-1115 DR-4605

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 for 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 that can reach the soil almost immediately, the snowpack can store the water for an extended amount of time 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 on 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 2.2.1 Dam 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 that 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.

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 National Flood Insurance Program (NFIP) define repetitive loss and severe repetitive loss slightly differently. The table below outlines both definitions.

REPETITIVE LOSS AND SEVERE REPETITIVE LOSS DEFINITIONS		
<i>Program</i>	<i>Repetitive Loss</i>	<i>Severe Repetitive Loss</i>
Flood Mitigation Assistance (FMA) Grant	<p><i>A repetitive loss (RL) property is a structure covered by a contract for flood insurance made available under the NFIP that:</i></p> <p>Has incurred flood-related damage on 2 occasions, in which the cost of the repair, on the average, equaled or exceeded 25% of the market value of the time of each such flood event;</p> <p>At the time of the second incidence of flood-related damage, the contract for flood insurance contains increased cost of compliance coverage.</p>	<p>(a) Is covered under a contract for flood insurance made available under the NFIP; and</p> <p>(b) Has incurred flood-related damage</p> <ol style="list-style-type: none"> i. For <u>which 4 or more separate claims payments</u> (includes 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 <u>at least 2 separate claims payments</u> (includes only building) have been made under such coverage, with the cumulative amount of such claims exceeding the market value of the insured structure.
National Flood Insurance Program (NFIP)	<p>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.</p>	<p>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 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.</p>

The following table outlines NFIP policies in force throughout Region 3.

NFIP POLICIES IN FORCE - REGION 3			
Location	Policies in Force	Total Coverage	Total Written Premium + FPF
Boone County	216	\$32,462,400	\$288,461
Clay County	69	\$10,721,500	\$89,602
Kanawha County	1,083	\$179,994,400	\$1,259,472
Putnam County	312	\$72,437,400	\$321,170
Bancroft, Town	10	\$890,700	\$13,882
Belle, Town	18	\$3,069,200	\$23,019
Buffalo, Town	31	\$4,113,700	\$22,662
Cedar Grove, Town	8	\$524,600	\$8,698
Charleston, City	237	\$58,622,200	\$475,606
Chesapeake, Town	17	\$1,626,400	\$13,594
Clay, Town	9	\$4,775,100	\$60,485
Clendenin Town	45	\$6,348,900	\$88,530
Danville, Town	12	\$2,569,800	\$17,955
Dunbar, City	177	\$19,934,400	\$261,202
East Bank Town	10	\$1,341,700	\$8,639
Glasgow, Town	6	\$454,400	\$5,132
Hurricane, Town	11	\$2,935,100	\$6,895
Madison, Town	22	\$4,422,600	\$38,572
Marmet, Town	5	\$595,500	\$5,630
Nitro, City	94	\$11,061,700	\$100,359
Poca, Town	15	\$2,424,300	\$12,172
Pratt, Town	9	\$1,612,200	\$9,640
South Charleston, City	58	\$8,810,100	\$130,308
St. Albans, City	51	\$7,901,100	\$89,540
Sylvester, Town	17	\$1,486,800	\$13,274
Whitesville, Town	9	\$1,440,000	\$13,038
Winfield, Town	38	\$10,416,100	\$29,829
Totals	2,589	\$452,992,300	\$3,407,366

There are 285 repetitive loss properties in Region 3¹.

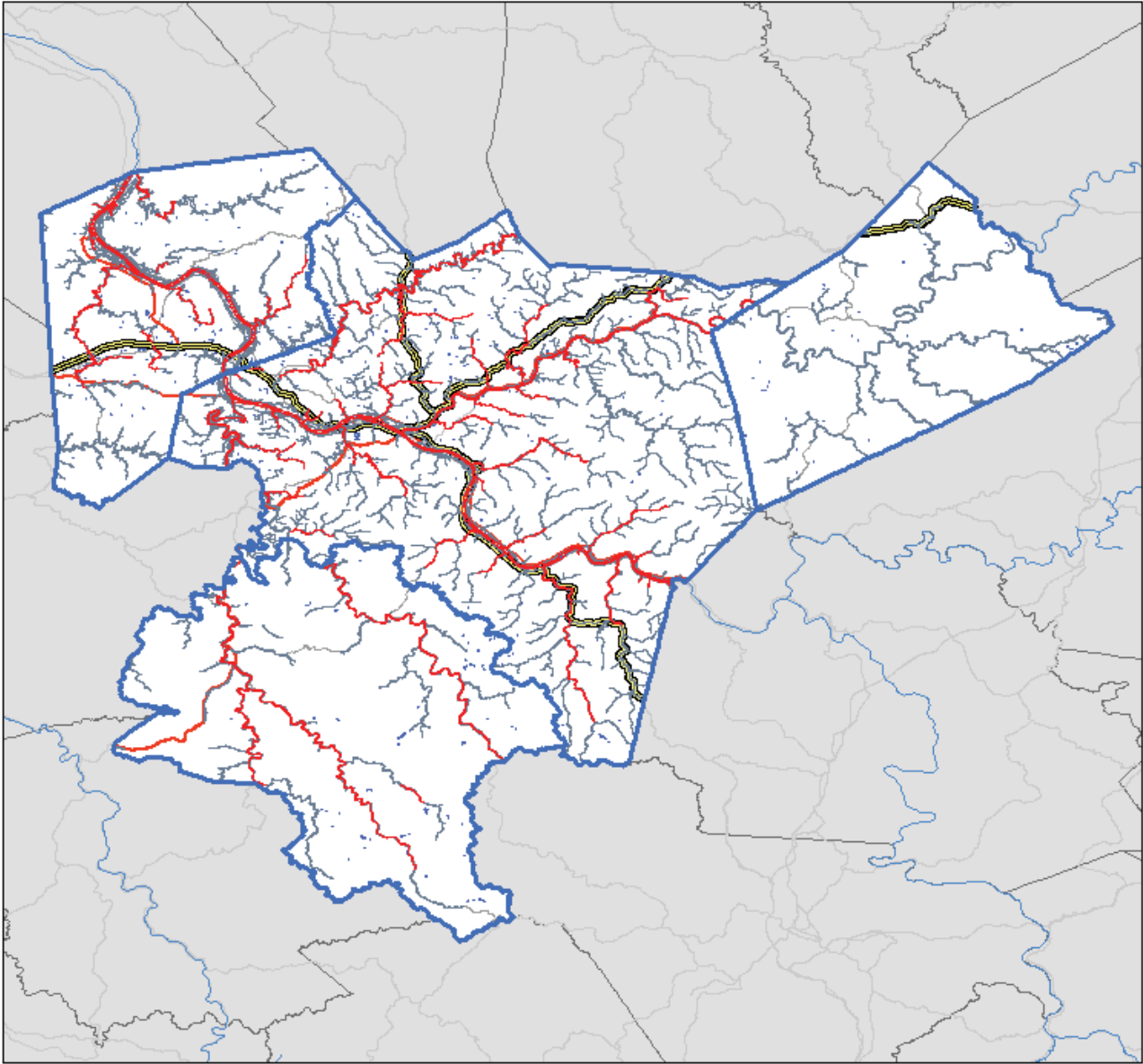
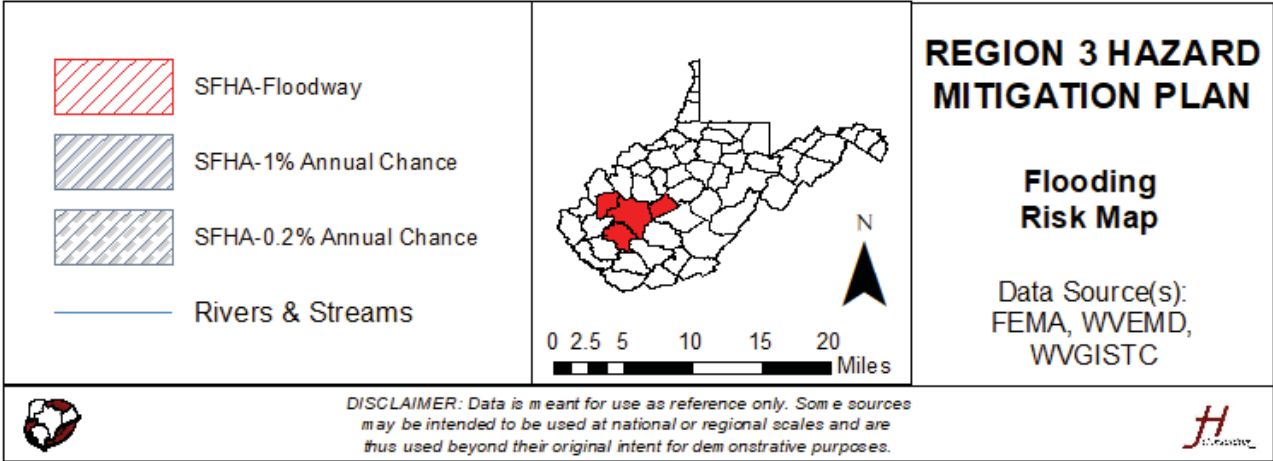
¹ The RL/SRL database was offline for this update. As such building types could not be presented.

REPETITIVE LOSS PROPERTIES					
County	Number of Properties	Number of Losses	Total Contents Paid	Total Building Paid	Total Paid
Boone	56	15	\$426,819	\$1,226,124	\$1,652,943
Clay	5	11	\$42,696	\$257,823	\$300,518
Kanawha	190	661	\$1,420,185	\$10,930,460	\$12,350,645
Putnam	34	111	\$296,704	\$1,326,310	\$1,623,013

There are 33 severe repetitive loss properties in the region.

SEVERE REPETITIVE LOSS PROPERTIES					
County	Number of Properties	Number of Losses	Total Contents Paid	Total Building Paid	Total Paid
Kanawha	29	15	\$100,505	\$471,369	\$571,874
Putnam	4	20	\$47,217	\$409,749	\$456,966

The map below shows the floodway, 1% annual chance (100-year), and the 0.2% annual chance (500-year) Special Flood Hazard Areas (SFHA) in Region 3. Building-level risk assessment and aerial flood maps by jurisdiction are located in Appendix 5.



Impacts and Vulnerability

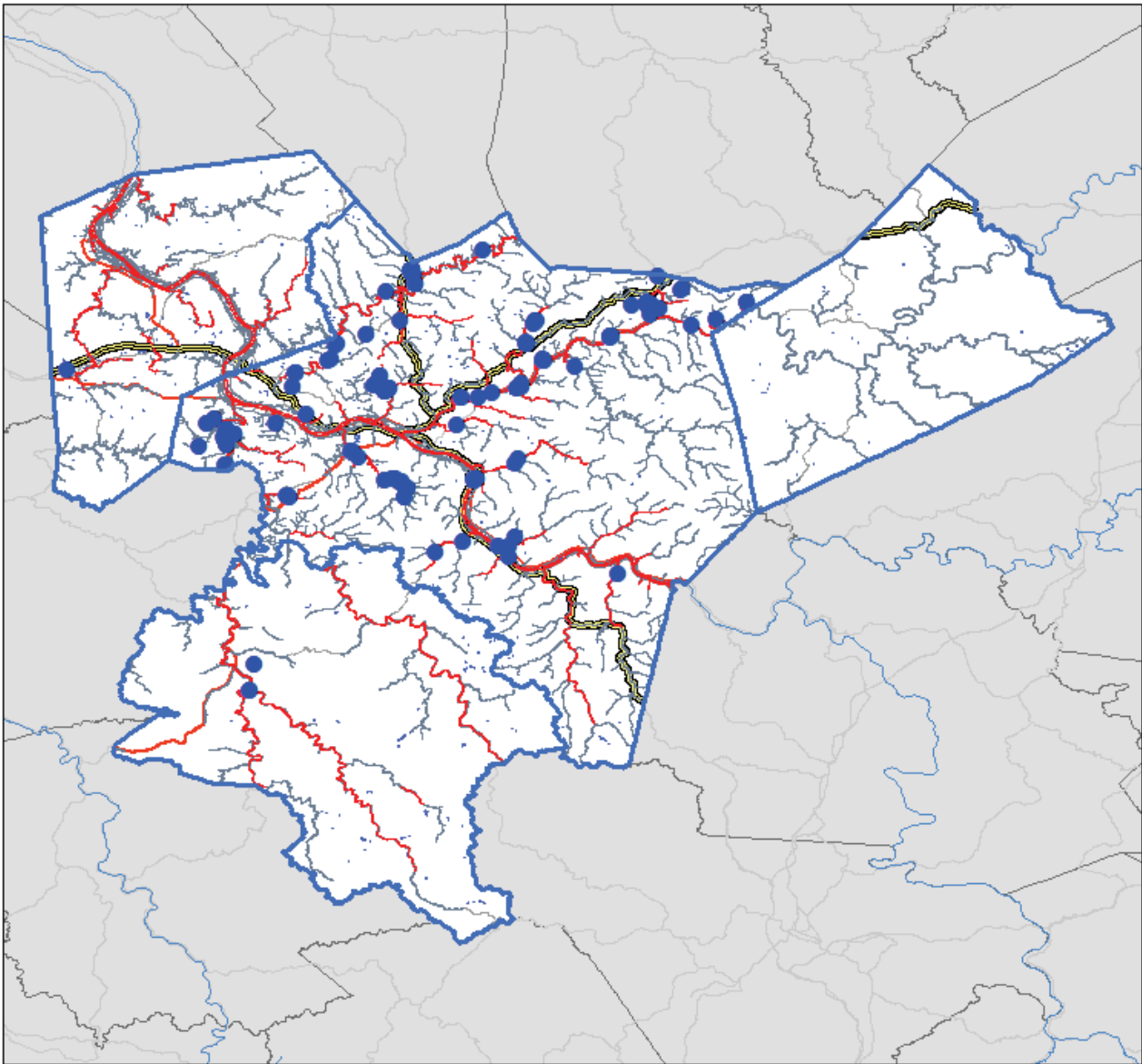
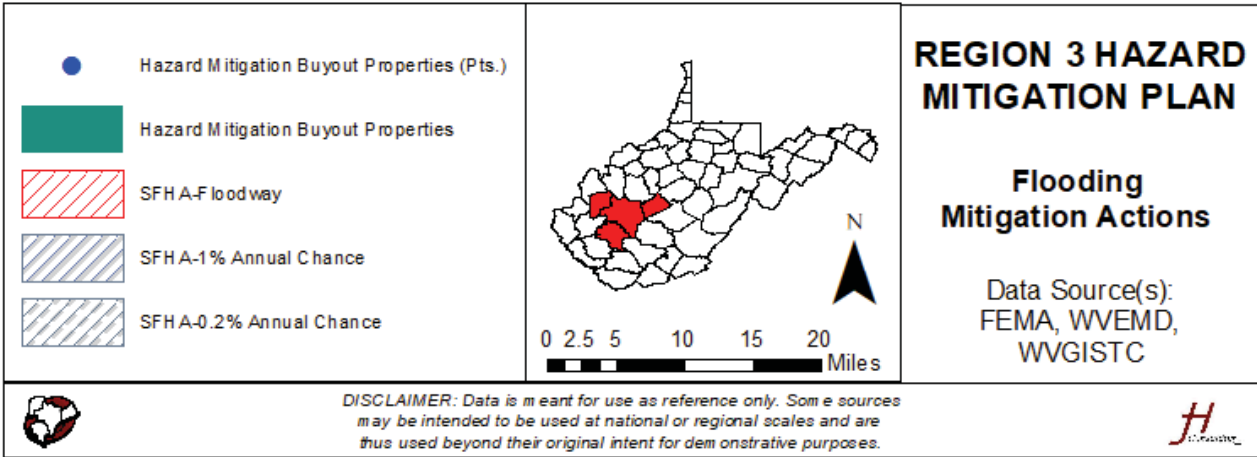
Impacts from flooding can be primary or secondary. Primary effects are those that occur due to contact with water. Secondary effects occur because of flooding, such as disruption of services and changes in the position of river channels.

EFFECTS OF FLOODING	
<i>Type</i>	<i>Description</i>
Primary Impacts	<ul style="list-style-type: none"> • With higher velocities, streams are able to transport larger particles as suspended load. 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 cause 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 floodwaters allows the water to carry more sediment as suspended load. When the floodwaters retreat, velocity is generally much lower and sediment is deposited. After 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	<p>Disruption of services -</p> <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Location of river channels may change as the 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 misuse of relief funds. • Destruction of wildlife habitat.

Past Mitigation Efforts: Flooding

- Enforced floodplain regulations.
- Completed acquisitions and demolitions, elevation, and relocation of flood prone properties.

The West Virginia GIS Tech Center compiled data from multiple sources to provide information on locations buyout properties. The map below shows the locations of these properties in Region 3.



The most common hazard leading to flooding as a *complicating variable* is a dam failure. Dams can breach or overtop with little warning. Natural breaches can be triggered by flash floods, debris jams, the accumulation of melting snow, and the build-up of water pressure on a dam with unknown deficiencies after days of heavy rain, etc. Flooding can also occur when excess water is released downstream to relieve pressure from a dam.

Historical Occurrences

There have been 98 floods and 111 flash floods in Region 3 since 2002, for an average of 4.9 floods and 5.55 flash floods per year. These events have caused a combined \$120,246,000 in damage. The following table outlines the instances of flooding.

HISTORICAL OCCURRENCES - FLOOD/FLASH FLOOD 2002-2021						
County	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Putnam	3/20/2002	Flood	0	0	\$35,000	\$0
Kanawha	3/20/2002	Flood	0	0	\$20,000	\$0
Putnam	4/28/2002	Flood	0	0	\$0	\$0
Kanawha	4/28/2002	Flood	0	0	\$10,000	\$0
Clay	4/28/2002	Flood	0	0	\$0	\$0
Kanawha	5/7/2002	Flash Flood	0	0	\$2,000	\$0
Boone	7/19/2002	Flash Flood	0	0	\$25,000	\$0
Boone	2/15/2003	Flood	0	0	\$500,000	\$0
Putnam	2/15/2003	Flood	0	0	\$300,000	\$0
Kanawha	2/15/2003	Flood	1	0	\$500,000	\$0
Kanawha	2/22/2003	Flood	0	0	\$250,000	\$0
Clay	2/22/2003	Flood	0	0	\$0	\$0
Boone	2/22/2003	Flood	0	0	\$0	\$0
Kanawha	5/15/2003	Flood	0	0	\$10,000	\$0
Kanawha	6/11/2003	Flash Flood	0	0	\$3,000,000	\$0
Kanawha	6/14/2003	Flash Flood	0	0	\$30,000	\$0
Putnam	6/14/2003	Flash Flood	0	0	\$600,000	\$0
Kanawha	6/16/2003	Flash Flood	0	0	\$7,000,000	\$0
Boone	6/16/2003	Flash Flood	0	0	\$3,000,000	\$0
Putnam	6/16/2003	Flash Flood	0	0	\$15,000	\$0
Kanawha	8/9/2003	Flash Flood	0	0	\$20,000	\$0
Boone	9/4/2003	Flood	0	0	\$30,000	\$0
Kanawha	11/12/2003	Flood	1	0	\$6,600,000	\$0
Putnam	11/12/2003	Flood	0	0	\$250,000	\$0
Clay	11/12/2003	Flood	0	0	100,000	\$0
Boone	11/12/2003	Flood	0	0	100,000.00	\$0

HISTORICAL OCCURRENCES - FLOOD/FLASH FLOOD 2002-2021						
County	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Putnam	11/19/2003	Flood	0	0	500,000.00	\$0
Kanawha	11/19/2003	Flood	0	0	2,000,000.00	\$0
Clay	11/19/2003	Flood	0	0	150,000.00	\$0
Boone	11/19/2003	Flood	0	0	225,000.00	\$0
Putnam	5/27/2004	Flash Flood	0	0	750,000.00	\$0
Kanawha	5/27/2004	Flash Flood	0	0	500,000.00	\$0
Clay	5/27/2004	Flood	0	0	\$50,000.00	\$0
Boone	5/31/2004	Flood	0	0	\$150,000.00	\$0
Kanawha	6/15/2004	Flood	0	0	\$85,000.00	\$0
Kanawha	7/10/2004	Flood	0	0	\$2,000.00	\$0
Putnam	9/8/2004	Flood	0	0	\$10,000.00	\$0
Kanawha	9/17/2004	Flood	0	0	\$1500,000.00	\$0
Clay	9/17/2004	Flood	0	0	\$125,000	\$0
Kanawha	7/19/2005	Flash Flood	0	0	\$20,000	\$0
Putnam	7/27/2005	Flash Flood	0	0	\$20,000	\$0
Putnam	8/29/2005	Flash Flood	0	0	\$25,000	\$0
Kanawha	8/29/2005	Flash Flood	0	0	\$5,000	\$0
Clay	8/29/2005	Flash Flood	0	0	\$50,000	\$0
Putnam	9/13/2006	Flood	0	0	\$2,000	\$0
Kanawha	4/15/2007	Flood	0	0	\$200,000	\$0
Boone	4/15/2007	Flood	0	0	\$750,000	\$0
Clay	4/15/2007	Flood	0	0	\$10,000	\$0
Clay	6/4/2008	Flood	0	0	\$5,000	\$0
Kanawha	5/25/2009	Flash Flood	0	0	\$250,000	\$0
Kanawha	8/2/2009	Flash Flood	0	0	\$25,000	\$0
Putnam	8/10/2009	Flash Flood	0	0	\$150,000	\$0
Clay	8/29/2009	Flash Flood	0	0	\$175,000	\$0
Putnam	2/5/2010	Flood	0	0	\$5,000	\$0
Kanawha	2/5/2010	Flood	0	0	\$5,000	\$0
Kanawha	3/13/2010	Flood	0	0	\$700,000	\$0
Boone	3/13/2010	Flood	0	0	\$50,000	\$0
Kanawha	5/12/2010	Flash Flood	0	0	\$40,000	\$0
Kanawha	5/17/2010	Flash Flood	0	0	\$1,200,000	\$0
Boone	5/17/2010	Flash Flood	0	0	\$15,000	\$0
Boone	6/21/2010	Flash Flood	0	0	\$5,000	\$0
Kanawha	7/13/2010	Flash Flood	0	0	\$20,000	\$0
Kanawha	7/18/2010	Flash Flood	0	0	\$5,000	\$0
Kanawha	7/20/2010	Flash Flood	0	0	\$20,000	\$0
Boone	7/25/2010	Flash Flood	1	0	\$100,000	\$0

HISTORICAL OCCURRENCES - FLOOD/FLASH FLOOD 2002-2021						
County	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Kanawha	2/28/2011	Flood	0	0	\$1,000	\$0
Putnam	4/16/2011	Flash Flood	0	0	\$15,000	\$0
Putnam	7/23/2011	Flash Flood	0	0	\$40,000	\$0
Kanawha	11/22/2011	Flood	0	0	\$50,000	\$0
Putnam	11/22/2011	Flood	0	0	\$10,000	\$0
Kanawha	7/1/2013	Flash Flood	0	0	\$50,000	\$0
Kanawha	7/12/2013	Flash Flood	0	0	\$90,000	\$0
Clay	7/21/2013	Flash Flood	0	0	\$20,000	\$0
Putnam	8/10/2013	Flash Flood	0	0	\$10,000	\$0
Kanawha	12/6/2013	Flood	0	0	\$275,000	\$0
Clay	12/6/2013	Flood	0	0	\$100,000	\$0
Boone	12/6/2013	Flood	0	0	\$50,000	\$0
Putnam	4/29/2014	Flash Flood	0	0	\$2,000	\$0
Kanawha	9/6/2014	Flash Flood	0	0	\$300,000	\$0
Boone	3/4/2015	Flood	0	0	\$100,000	\$0
Kanawha	3/4/2015	Flood	0	0	\$500,000	\$0
Clay	3/4/2015	Flood	0	0	\$75,000	\$0
Putnam	3/4/2015	Flood	0	0	\$300,000	\$0
Kanawha	3/13/2015	Flood	0	0	\$300,000	\$0
Boone	4/3/2015	Flash Flood	0	0	\$ 25,000	\$0
Boone	4/3/2015	Flood	0	0	\$0	\$0
Kanawha	4/4/2015	Flood	0	0	\$5,000	\$0
Kanawha	4/14/2015	Flood	0	0	\$125,000	\$0
Putnam	4/14/2015	Flood	0	0	\$20,000	\$0
Boone	4/14/2015	Flood	0	0	\$10,000	\$0
Clay	4/14/2015	Flood	0	0	\$5,000	\$0
Boone	7/5/2015	Flash Flood	0	0	\$25,000	\$0
Clay	7/10/2015	Flash Flood	0	0	\$175,000	\$0
Putnam	7/11/2015	Flash Flood	0	0	\$15,000	\$0
Clay	7/11/2015	Flash Flood	0	0	\$100,000	\$0
Kanawha	7/11/2015	Flash Flood	0	0	\$75,000	\$0
Kanawha	7/14/2015	Flash Flood	0	0	\$75,000	\$0
Putnam	7/14/2015	Flash Flood	0	0	\$400,000	\$0
Boone	7/14/2015	Flash Flood	0	0	\$50,000	\$0
Putnam	7/18/2015	Flash Flood	0	0	\$100,000	\$0
Putnam	7/18/2015	Flash Flood	0	0	\$40,000	\$0
Kanawha	8/17/2015	Flash Flood	0	0	\$100,000	\$0
Putnam	8/17/2015	Flash Flood	0	0	\$5,000	\$0
Kanawha	12/25/2015	Flash Flood	0	0	\$450,000	\$0

HISTORICAL OCCURRENCES - FLOOD/FLASH FLOOD 2002-2021						
County	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Putnam	12/25/2015	Flash Flood	0	0	\$100,000	\$0
Clay	12/25/2015	Flash Flood	0	0	\$75,000	\$0
Boone	5/1/2016	Flash Flood	0	0	\$5,000	\$0
Clay	6/23/2016	Flash Flood	0	0	\$8,000,000	\$0
Kanawha	6/23/2016	Flood	2	0	\$26,000,000	\$0
Clay	6/23/2016	Flood	0	0	\$9,000,000	\$0
Kanawha	6/23/2016	Flood	4	0	\$36,000,000	\$0
Clay	6/27/2016	Flash Flood	0	0	\$5,000	\$0
Kanawha	6/27/2016	Flash Flood	0	0	\$15,000	\$0
Putnam	7/14/2016	Flash Flood	0	0	\$200,000	\$0
Kanawha	5/12/2017	Flood	0	0	\$20,000	\$0
Kanawha	5/12/2017	Flood	0	0	\$20,000	\$0
Kanawha	6/16/2017	Flash Flood	0	0	\$30,000	\$0
Boone	6/19/2017	Flash Flood	0	0	\$5,000	\$0
Boone	6/19/2017	Flash Flood	0	0	\$10,000	\$0
Boone	6/19/2017	Flood	0	0	\$5,000	\$0
Kanawha	6/23/2017	Flash Flood	0	0	\$5,000	\$0
Putnam	7/28/2017	Flash Flood	0	0	\$2,000	\$0
Kanawha	2/11/2018	Flood	0	0	\$2,000	\$0
Clay	2/11/2018	Flood	0	0	\$1,000	\$0
Kanawha	2/16/2018	Flood	0	0	\$2,000	\$0
Putnam	2/16/2018	Flood	0	0	\$1,000	\$0
Putnam	5/6/2018	Flood	0	0	\$10,000	\$0
Kanawha	5/6/2018	Flood	0	0	\$70,000	\$0
Putnam	5/26/2018	Flash Flood	0	0	\$3,000,000	\$0
Kanawha	5/26/2018	Flash Flood	0	0	\$5,000	\$0
Kanawha	5/27/2018	Flash Flood	0	0	\$25,000	\$0
Putnam	5/31/2018	Flash Flood	0	0	\$2,000	\$0
Kanawha	6/17/2018	Flash Flood	0	0	\$5,000	\$0
Kanawha	6/21/2018	Flash Flood	0	0	\$30,000	\$0
Kanawha	7/1/2018	Flash Flood	0	0	\$20,000	\$0
Kanawha	7/2/2018	Flash Flood	0	0	\$10,000	\$0
Kanawha	7/27/2018	Flash Flood	0	0	\$1,000	\$0
Kanawha	7/30/2018	Flash Flood	0	0	\$5,000	\$0
Putnam	8/3/2018	Flash Flood	0	0	\$500,000	\$0
Kanawha	8/17/2018	Flash Flood	0	0	\$500	\$0
Kanawha	8/18/2018	Flash Flood	0	0	\$500	\$0
Kanawha	8/18/2018	Flash Flood	0	0	\$500	\$0
Kanawha	9/1/2018	Flash Flood	0	0	\$10,000	\$0

HISTORICAL OCCURRENCES - FLOOD/FLASH FLOOD 2002-2021						
County	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Kanawha	9/27/2018	Flood	0	0	\$500	\$0
Kanawha	9/28/2018	Flood	0	0	41,000	\$0
Kanawha	2/24/2019	Flood	0	0	\$10,000	\$0
Kanawha	5/4/2019	Flash Flood	0	0	\$1,000	\$0
Kanawha	5/4/2019	Flash Flood	0	0	\$500	\$0
Boone	5/4/2019	Flash Flood	0	0	\$2,000	\$0
Kanawha	5/4/2019	Flash Flood	0	0	\$500	\$0
Kanawha	5/4/2019	Flash Flood	0	0	\$1,000	\$0
Kanawha	5/31/2019	Flash Flood	0	0	\$4,000	\$0
Kanawha	5/31/2019	Flash Flood	0	0	\$2,000	\$0
Clay	7/21/2019	Flash Flood	0	0	\$5,000	\$0
Boone	7/22/2019	Flash Flood	0	0	\$1,000	\$0
Boone	7/22/2019	Flash Flood	0	0	\$1,000	\$0
Kanawha	12/16/2019	Flood	0	0	\$8,000	\$0
Putnam	2/13/2020	Flood	0	0	\$2,000	\$0
Kanawha	4/8/2020	Flash Flood	0	0	\$2,000	\$0
Kanawha	4/8/2020	Flash Flood	0	0	\$4,000	\$0
Kanawha	5/20/2020	Flood	0	0	\$10,000	\$0
Kanawha	5/28/2020	Flash Flood	0	0	\$5,000	\$0
Kanawha	5/28/2020	Flash Flood	0	0	\$4,000	\$0
Clay	6/14/2020	Flash Flood	0	0	\$1,000	\$0
Kanawha	7/12/2020	Flash Flood	0	0	\$50,000	\$0
Clay	8/15/2020	Flash Flood	0	0	\$500	\$0
Boone	8/15/2020	Flash Flood	0	0	\$15,000	\$0
Kanawha	8/25/2020	Flash Flood	0	0	\$1,000	\$0
Clay	8/27/2020	Flash Flood	0	0	\$80,000	\$0
Kanawha	2/28/2021	Flood	0	0	\$8,000	\$0
Putnam	2/28/2021	Flood	0	0	\$10,000	\$0
Kanawha	2/28/2021	Flood	0	0	\$2,000	\$0
Clay	2/28/2021	Flood	0	0	\$4,000	\$0
Kanawha	2/28/2021	Flood	0	0	\$9,000	\$0
Kanawha	3/1/2021	Flood	0	0	\$50,000	\$0
Clay	3/1/2021	Flood	0	0	\$25,000	\$0
Boone	3/1/2021	Flood	0	0	\$6,000	\$0
Putnam	3/1/2021	Flood	0	0	\$8,000	\$0
Boone	3/1/2021	Flood	0	0	\$4,000	\$0
Kanawha	3/1/2021	Flood	0	0	\$12,000	\$0
Kanawha	3/1/2021	Flood	0	0	\$6,000	\$0
Kanawha	3/1/2021	Flood	0	0	\$20,000	\$0

HISTORICAL OCCURRENCES - FLOOD/FLASH FLOOD 2002-2021						
County	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Clay	3/1/2021	Flood	0	0	\$5,000	\$0
Kanawha	3/1/2021	Flood	0	0	\$3,000	\$0
Kanawha	3/18/2021	Flash Flood	0	0	\$8,000	\$0
Clay	6/10/2021	Flash Flood	0	0	\$3,000	\$0
Kanawha	6/10/2021	Flash Flood	0	0	\$5,000	\$0
Clay	6/13/2021	Flash Flood	0	0	\$15,000	\$0
Boone	6/13/2021	Flash Flood	0	0	\$3,000	\$0
Boone	6/30/2021	Flash Flood	0	0	\$3,000	\$0
Putnam	8/3/2021	Flood	0	0	\$5,000	\$0
Boone	8/11/2021	Flash Flood	0	0	\$3,000	\$0
Clay	8/11/2021	Flash Flood	0	0	\$3,000	\$0
Boone	8/11/2021	Flood	0	0	\$13,000	\$0
Boone	8/13/2021	Flash Flood	0	0	\$2,000	\$0
Boone	8/19/2021	Flash Flood	0	0	\$4,000	\$0
Boone	8/19/2021	Flash Flood	0	0	\$3,000	\$0
Clay	9/1/2021	Flash Flood	0	0	\$5,000	\$0
Putnam	10/8/2021	Flash Flood	0	0	\$1,500	\$0
Kanawha	10/8/2021	Flash Flood	0	0	\$4,000	\$0
Totals			9	0	\$120,246,000	\$0

June 2016, Flooding

On June 23, 2016, heavy rains swept through the Mid-Ohio Valley and into southern West Virginia, dropping large amounts of rain on the region. Over the span of the afternoon, Nicholas County saw between three and four inches of rain, with some areas seeing up to five inches according to the National Weather Service. The flooding resulted in states of emergency being declared by the Governor in 44 of the 55 counties in the state, with 22 deaths and millions of dollars in damages. Large portions of the town of Richwood, in Nicholas County, were under water and public safety personnel from around the state were assisting with rescuing those trapped by the rapid flooding (Desrochers & Beck, 2016).

These scenes repeated themselves around much of the southern areas of West Virginia. Multiple water rescue teams were activated in Kanawha County, with 37 active rescues being recorded by 7 p.m. that day, mostly in the Clendenin area. Also, near the Clendenin area, Interstate 79 was closed in both directions after a mudslide covered the highway. A culvert at the entrance to the Crossing Mall in Elkview was destroyed by the flooding, stranding workers and customers in the mall. By the evening of June 24, Appalachian Power was reporting more

than 34,000 customers without power. In addition to the large rain totals, the storm line produced wind gusts in excess of 60 mph according to the National Weather Service (Desrochers, 2016).

May 2010

After several days of heavy rain in mid-May, 2010, showers and thunderstorms moved through the region, producing upwards of 2-3 inches within an hour. The ground was already more saturated than is normal, leading to flash flooding along creeks and streams in the region from rainwater runoff. A number of structures were flooded, including multiple homes, outbuildings, and an elementary school. According to the *WV Gazette Mail*, multiple rescues had to be made by rescue teams in the Sissonville area of Kanawha County. Parts of Interstate 77 were reported to have water up to three feet deep standing on them, while a mudslide closed an exit ramp off of Interstate 64 (WV Gazette Mail, 2010). According to the NOAA records, this flash flood event caused \$15,000 in property damage in Boone County and \$1.2 million in property damage in Kanawha County (NCEI, 2021).

March 2, 2021

Over four inches of rain fell from the end of February through the morning of March 1, 2021. Multiple disturbances passed through the area causing pockets of heavy rain. The entire state had at least one to two inches with the worst hit area being below Interstate 64. This led to creeks rising out of their banks and spilling onto roadways. Some river gages recorded historic crests in Coal, Elk and Tug Fork Rivers. The Clay Roane PSD experienced flooding which caused the water plan to begin to fail. Due to the flooding the pumps were inaccessible leaving technicians waiting for the water to recede to access the pumps.

Loss and Damages

Floods and flash flood have caused \$120,246,000 in damages in Region 3 since 2002; this is a loss per year of \$6,012,300 per year or \$575,340 per event. Further, the West Virginia statewide Total Exposure in Floodplain (TEIF) can be used to determine future potential losses. The table below shows possible losses by structure use type, as provided by TEIF data, for each jurisdiction in Region 3.

TOTAL EXPOSURE IN FLOODPLAIN								
	Residential		Non-Residential				Floodplain Total	
	Count	Dollar Amount	Commercial Count	Commercial Dollar Amount	Other NR Count	Other NR Dollar Amount	Floodplain Total Count	Floodplain Total Dollar Amount
Boone County*	3,119	\$124,974K	112	\$17,868K	82	\$37,956K	3,313	\$180,798K
Danville	80	\$5,566K	48	\$6,743K	5	\$953K	133	\$13,261K
Madison	246	\$12,559K	41	\$28,547K	12	\$9,912K	299	\$51,018K
Sylvester	72	\$3,926K	4	\$286K	4	\$336K	80	\$4,548K
Whitesville	100	\$4,085K	16	\$895K	6	\$4,725K	122	\$9,705K
Boone County Totals	3,617	\$151,110K	221	\$54,339K	109	\$53,882K	3,947	\$259,331K
Clay	37	\$1,131K	15	\$2,533K	4	\$19,697K	56	\$23,362K
Clay County*	943	\$25,827K	22	\$2,766K	19	\$2,777K	984	\$31,369K
Clay County Totals	980	\$26,959K	37	\$5,298K	23	\$22,474K	1,040	\$54,731K
Belle	138	\$7,583K	14	\$1,571K	8	\$4,805K	160	\$13,958K
Cedar Grove	125	\$5,902K	4	\$681K	2	\$11,007K	131	\$17,590K
Charleston	1,594	\$133,021K	205	\$349,874K	73	\$175,254K	1,872	\$658,149K
Chesapeake	277	\$11,675K	11	\$1,341K	8	\$588K	296	\$13,604K
Clendenin	212	\$10,448K	64	\$3,643K	21	\$8,989K	297	\$23,080K
Dunbar	995	\$56,864K	61	\$11,928K	12	\$46,791K	1,068	\$115,584K
East Bank	88	\$4,803K	3	\$229K	2	\$10,543K	93	\$15,575K
Glasgow	80	\$4,735K	-	\$0K	3	\$790K	83	\$5,525K
Handley	19	\$534K	1	\$39K	1	\$118K	21	\$690K
Kanawha County*	8,272	\$457,333K	422	\$95,292K	196	\$104,619K	8,890	\$657,244K
Marmet	116	\$6,602K	12	\$1,821K	-	\$0K	128	\$8,423K
Nitro	585	\$42,041K	42	\$5,000K	7	\$1,532K	634	\$48,573K
Pratt	40	\$2,220K	-	\$0K	1	\$280K	41	\$2,500K
South Charleston	351	\$28,663K	32	\$110,363K	6	\$6,777K	389	\$145,803K
St. Albans	639	\$46,684K	37	\$12,652K	7	\$34,088K	683	\$93,425K
Kanawha County Totals	13,531	\$819,108K	908	\$594,433K	347	\$406,182K	14,786	\$1,819,723K
Bancroft	93	\$3,668K	4	\$136K	3	\$338K	100	\$4,143K
Buffalo	279	\$16,172K	12	\$609K	9	\$20,402K	300	\$37,183K
Eleanor	5	\$372K	-	\$0K	2	\$13,507K	7	\$13,879K
Hurricane	19	\$2,964K	5	\$664K	-	\$0K	24	\$3,628K
Nitro	91	\$4,136K	5	\$675K	2	\$414K	98	\$5,224K
Poca	65	\$4,951K	2	\$244K	3	\$1,271K	70	\$6,466K
Putnam County*	1,761	\$142,720K	119	\$34,148K	22	\$8,564K	1,902	\$185,432K
Winfield	175	\$34,311K	3	\$439K	3	\$1,406K	181	\$36,156K
Putnam County Totals	2,488	\$209,294K	150	\$36,915K	44	\$45,902K	2,682	\$292,110K

TOTAL EXPOSURE IN FLOODPLAIN								
	Residential		Non-Residential				Floodplain Total	
	Count	Dollar Amount	Commercial Count	Commercial Dollar Amount	Other NR Count	Other NR Dollar Amount	Floodplain Total Count	Floodplain Total Dollar Amount

* = Unincorporated areas of county

The TEIF data used for the loss estimates and mapping (see Appendix 5) is available to all the counties and municipalities in Region 3 through the Regional Intergovernmental Council. Due to several factors, the way the information was used for this plan was vetted through the steering committee and not each jurisdiction. However, those jurisdictions that reviewed the information indicated they look forward to reviewing the TEIF data in the near future.

Vulnerability Assessment

This section summarizes the vulnerability to Region 3 from flooding. Region 3 conducted an online survey for the public to share its thoughts on hazard vulnerabilities. The following table presents the results of that survey regarding flooding.

PUBLIC SENTIMENT, FLOODING – REGION 3					
Hazard	Level of Concern				Total Responses
	Not at All	Somewhat	Concerned	Very	
Flooding	20 (10.64%)	43 (22.87%)	58 (30.85%)	67 (35.64%)	188
In the past ten years, do you remember this hazard occurring in your community?				158 (84.04%)	188
Have you noticed an increase in the occurrences or intensity of this hazard?				131 (69.68%)	188
Have you noticed a decrease in the occurrences or intensity of this hazard?				2 (1.06%)	188

Flooding is a primary hazard for all of the communities in Region 3, and rising waters can result from several other hazards identified elsewhere in this plan. For example, severe thunderstorms as well as storms stemming from the remnants of tropical storms and hurricanes can include soaking rain that causes flooding. Combined with increased development (that often includes an increase in impervious surfaces that add to stormwater runoff), these hyper-local, intense rainfalls can yield flooding in both areas that regularly experience it and those with little prior experience. During the winter, a rise in the water level or a sudden thaw can break ice that forms on rivers and streams into chunks that jam at bridges and natural obstructions, yielding flooding if accompanied by a rain event. Further, mid-winter or early spring thaws can produce

heightened quantities of runoff that is not absorbed by hard, frozen ground, and the additional runoff can cause flooding. These climatic occurrences are not new, though changing weather patterns, particularly with respect to more intense rainfall, widely varying temperatures in off-seasons, etc. suggest that flooding may be both more frequent as well as more common in areas with previously low flood risk.

The following table assigns point totals based on the research presented in this profile for each category of vulnerability.

FLOODING VULNERABILITY SUMMARY			
<i>Category</i>	<i>Points</i>	<i>Description</i>	<i>Notes</i>
Frequency	5	Excessive	There have been a combined 210 flooding and flash flooding events in Region 3 since 2002 for a combined average of 10.5 events per year.
Response	4	One Month	The recovery to large scale flooding events can take several weeks.
Onset	3	6-12 hours	With current technology, flash floods can be detected up to six hours prior to an event.
Magnitude	2	Limited (10-25% of land area affected)	On average between 10 and 25% of land area is affected by a flood event.
Business	3	At least two weeks	Several commercial structures are vulnerable to flooding conditions, as such; the general economy of the region would likely be impacted for at least two weeks.
Human	3	Medium	Nine death and no injuries have occurred since 2002. Flooding events have the potential to cause severe injuries.
Property	3	25-50% of property affected	Historical data indicates that the average property damage is \$575,00 per flood event
Total	23	High	

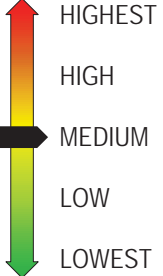
In addition to the standard vulnerability maps found in Appendix 5, planners included a map with each jurisdiction’s traditional flood mitigation project to “consider...acquisition and demolition, elevation, relocation, and mitigation reconstruction.” To develop these maps, four problem statements may aid local leaders in their decision making as they consider implementing these projects. The maps highlight one of the following criteria (denoted as “TEIF Criteria X,” with X replaced by the appropriate number from the list below).

1. Structures in the floodway
2. Structures in the 1% annual chance area and with a potential flood depth exceeding 5’ in the structure
3. All structures listed in the TEIF analysis for the jurisdiction

4. Structures in the 1% annual chance area and with a potential depth exceeding 4' in the structure.

2.0 RISK ASSESSMENT

2.2.6 Forest Fire

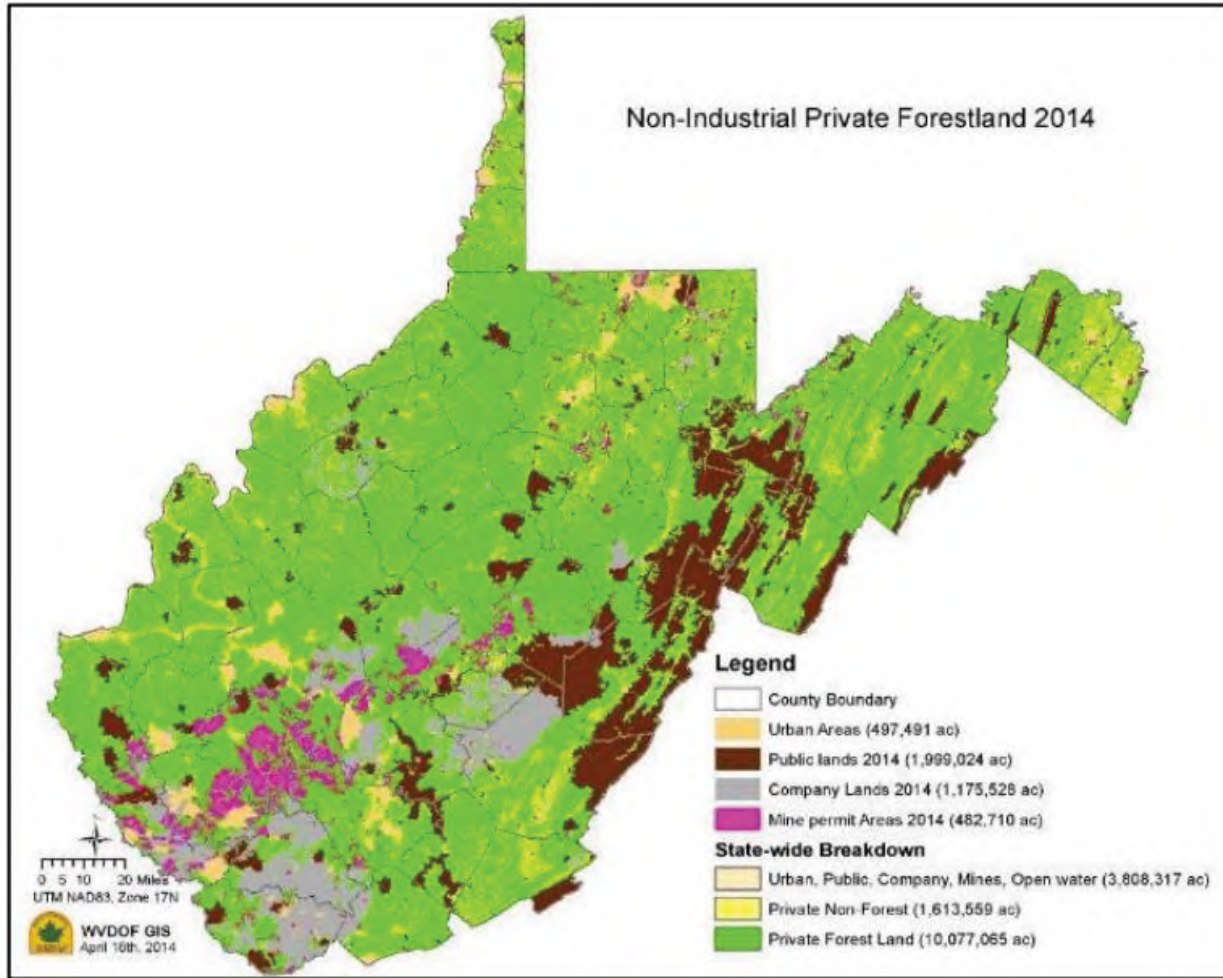
"Uncontrolled combustion or burning of plants in a natural setting, such as a forest, grassland, brush land or tundra" (Haddow, Bullock, & Coppola, 2014).			
 <p>Vulnerability</p> <p>HIGHEST</p> <p>HIGH</p> <p>MEDIUM</p> <p>LOW</p> <p>LOWEST</p>	Period of Occurrence:	At any time, typically after a period of prolonged absence of precipitation	Hazard Index Ranking: Medium
	Warning Time:	Over 24 hours	State Risk Ranking: Low
	Probability:	Occasional (may or may not occur on an annual basis)	Severity: Limited
	Type of Hazard:	Natural	Disaster Declarations: FSA-2391-WV

Hazard Overview







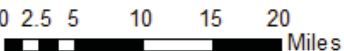


A forest fire or wildfire is a raging, uncontrolled fire that spreads rapidly through vegetative fuels, exposing and possibly consuming structures. Wildfires often begin unnoticed and can spread quickly, creating dense smoke that is visible for miles. Wildfires can occur at any time of the year but mostly happen during prolonged, dry, hot spells. 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. In some instances, lightning strikes can precipitate spontaneous combustion. The West Virginia Division of Forestry protects nearly 12 million acres of forestland across the state.

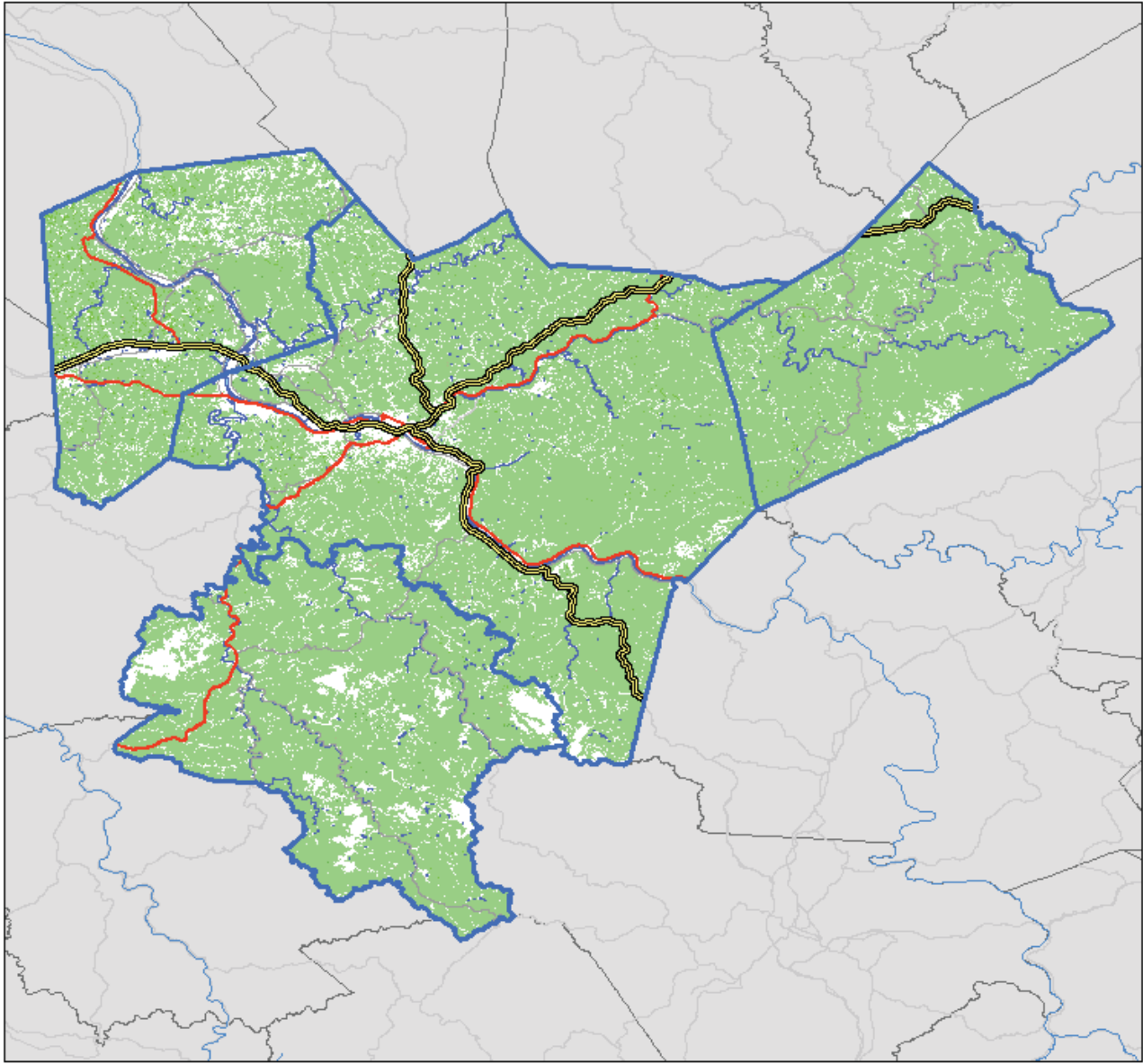
Location and Extent

According to the *West Virginia Statewide Standard Hazard Mitigation Plan (WVSSHMP)* (2018), "West Virginia is the third most heavily forested state in the nation." However, most forested areas in the state are privately-owned. The map below from the WVSSHMP shows the non-industrial private forestland in West Virginia and that every county in Region 3 has forested areas within their borders making this a region-wide hazard.



The land cover map below shows Region 3's deciduous forest, evergreen forest, mixed forest, and shrub & scrub covered areas.

<p>National Land Cover Dataset (NLCD)</p> <ul style="list-style-type: none"> Deciduous Forest Evergreen Forest Mixed Forest Shrub/Scrub Rivers & Streams	 <p>N</p>  <p>Miles</p>	<p>REGION 3 HAZARD MITIGATION PLAN</p> <p>Forest Fire Risk Map</p> <p>Data Source(s): USGS MRLC, US Census (Tiger Data)</p>
	<p><i>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.</i></p>	



Causes of forest fires are broken down into nine categories. West Virginia Rivers (WVR) provides information on the breakdown of forest fires by category from the state. The table below shows the breakdown as provided by WVR.

CAUSES OF WILD FIRE	
Debris Burning	42%
Incendiary/Arson	32%
Equipment	13%
Children	4%
Misc.	3%
Campfires	2%
Smokers	2%
Railroad	1%
Lightning	1%
https://wvrivers.org/2018/02/the-truth-about-fires-and-forest-health/	

Impacts and Vulnerability

Aside from the obvious effects in humans such as burns and injuries, the smoke from fires is of great concern. “The smoke produced by wildfires can produce effects ranging from airway and eye irritation to death, especially among individuals with conditions that make them more susceptible to inhalation exposures” (Clements, 2009). Forest fires can also damage structures and homes in wildfire-urban interface areas. Cascading effects from forest fires include erosion and water quality from vegetation being removed from a watershed (Keller, 2015).

Past Mitigation Efforts: Drought

- Boone County developed a proactive policy on issuing countywide burning bans during dry weather.
- Multiple jurisdictions worked with the division of forestry to provide public service announcements on burning laws.

Historical Occurrences

The National Center for Environmental Information (NCEI) Storm Event Database maintains records of wildfire occurrences. The following table presents the NCEI wildfire events for Region 3.

WILDFIRE EVENTS, REGION 3					
<i>Location</i>	<i>Date</i>	<i>Deaths</i>	<i>Injuries</i>	<i>Property Damage</i>	<i>Crop Damage</i>
Boone Clay Kanawha	11/9/1999	0	0	\$0	\$0
Boone	11/9/2000	0	0	\$0	\$0
Boone Kanawha	11/1/2001	0	0	\$0	\$0
Kanawha	3/11/2014	0	0	\$25,000	\$0
Boone	4/6/2016	0	0	\$25,000	\$0
TOTALS		0	0	\$50,000	\$0

Multiple Counties, November, 2001

A federal declaration was for counties in West Virginia, including Boone, Clay, and Kanawha, from November 16 through November 30, 2001. The prolonged stretch of Indian summer caused autumn fire season to peak in November. The West Virginia Division of Forestry estimated over 450 individual fires during the month burning approximately 37,600 acres throughout the state. The state used 400 National Guard troops and two tanker aircrafts to help fight the fires. The estimated cost was approximately \$22,500,000.

Loss and Damages

Loss estimates for wildfire events can be calculated using the historical data available from NCEI. There have been five events recorded in the region between 1999 and 2021. By dividing the number of events by the study period (22 years), an estimate of events per a year is found: 0.23. It is estimated that one wildfire event will occur in the region approximately every four years. Dividing the total property damage reported in NCEI by the number of events, a per event property damage estimate is found: \$10,000. It is therefore estimated that every four years the region will see this amount of property damage caused by a wildfire event.

Vulnerability Assessment

This section summarizes the vulnerability to Region 3 from forest fire. Region 3 conducted an online survey for the public to share its thoughts on hazard vulnerabilities. The following table presents the results of that survey regarding fire.

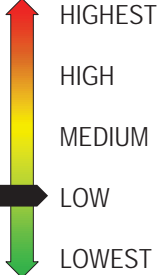
PUBLIC SENTIMENT, FOREST FIRE – REGION 3					
Hazard	Level of Concern				Total Responses
	Not at All	Somewhat	Concerned	Very	
Forest Fire	36 (19.15%)	75 (39.89%)	48 (25.53%)	29 (15.43%)	188
In the past ten years, do you remember this hazard occurring in your community?				67 (35.64%)	188
Have you noticed an increase in the occurrences or intensity of this hazard?				45 (23.93%)	188
Have you noticed a decrease in the occurrences or intensity of this hazard?				5 (2.65%)	188

The following table assigns point totals based on the research presented in this profile for each vulnerability category.

FOREST FIRE VULNERABILITY SUMMARY			
Category	Points	Description	Notes
Frequency	2	Low	Five incidents have occurred since 1999, for an average of 0.23 forest fires per year in Region 3.
Response	4	High	Forest fires can burn for weeks until they are deemed “under control.”
Onset	4	Less than six hours.	Forest fires can go unnoticed early on. This allows them to spread rapidly.
Magnitude	1	Localized (Less than 10% of land area affected)	The multi-county fire in 2001 affected 37,600 acres, which is less than 1% of the state's land area.
Business	2	Some economic effect	Region 3 may see some economic effects due to a forest fire.
Human	3	Medium	Even though there are no reported injuries or fatalities in the region, there is a probability for either to occur during a forest fire.
Property	1	Less than 10% of property affected	A wildland-urban interface event would affect less than 10% of the property of the region.
Total	17	Medium	

2.0 RISK ASSESSMENT

2.2.8 Hazardous Materials Incidents

A hazardous material incident is an unintentional release of a hazardous material during storage, transport, use, or as the result of a natural hazard event like a flood or earthquake.			
 <p>Vulnerability</p>	Period of Occurrence:	At any time	Hazard Index Ranking: Low
	Warning Time:	None	State Risk Ranking: N/A
	Probability:	Frequent (will occur on an annual basis)	Severity: Limited
	Type of Hazard:	Human-caused	Disaster Declarations: DR 3366

Hazard Overview

According to the National Fire Protection Association (NFPA), a hazardous material is defined as 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 (FEMA, 2019). They are in nearly every home and in most hospitals and factories.

Incidents involving chemical releases are common and on the rise (Kein, 2011). Before World War II, these events affected primarily employees of specific occupations, but the expansion of the chemical industry and increase in industrialization has led to danger to people outside work environments. The manufacture, storage, transportation, and utilization of large amounts of varying types of chemicals, as well as growing population densities in areas where chemicals are manufactured have contributed to an increase of population exposed to hazardous materials.

Hazardous materials incidents can occur because of an industrial accident during production, while in storage, while in transportation, during use, during disposal, or as part of an intentional attack. They can also occur as a result of or in tandem with natural hazard events, such as earthquakes, floods, windstorms, or winter storms (Planning for Hazards, 2021). 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 to human and ecological health.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, was enacted in 1980 and provided 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 liability of persons responsible for releases of hazardous wastes at these sites, and established a trust to provide for cleanup when no responsible party could be identified.

The U.S. EPA's 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 are required to report the amount 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 with access to information about potentially hazardous chemicals in their communities.

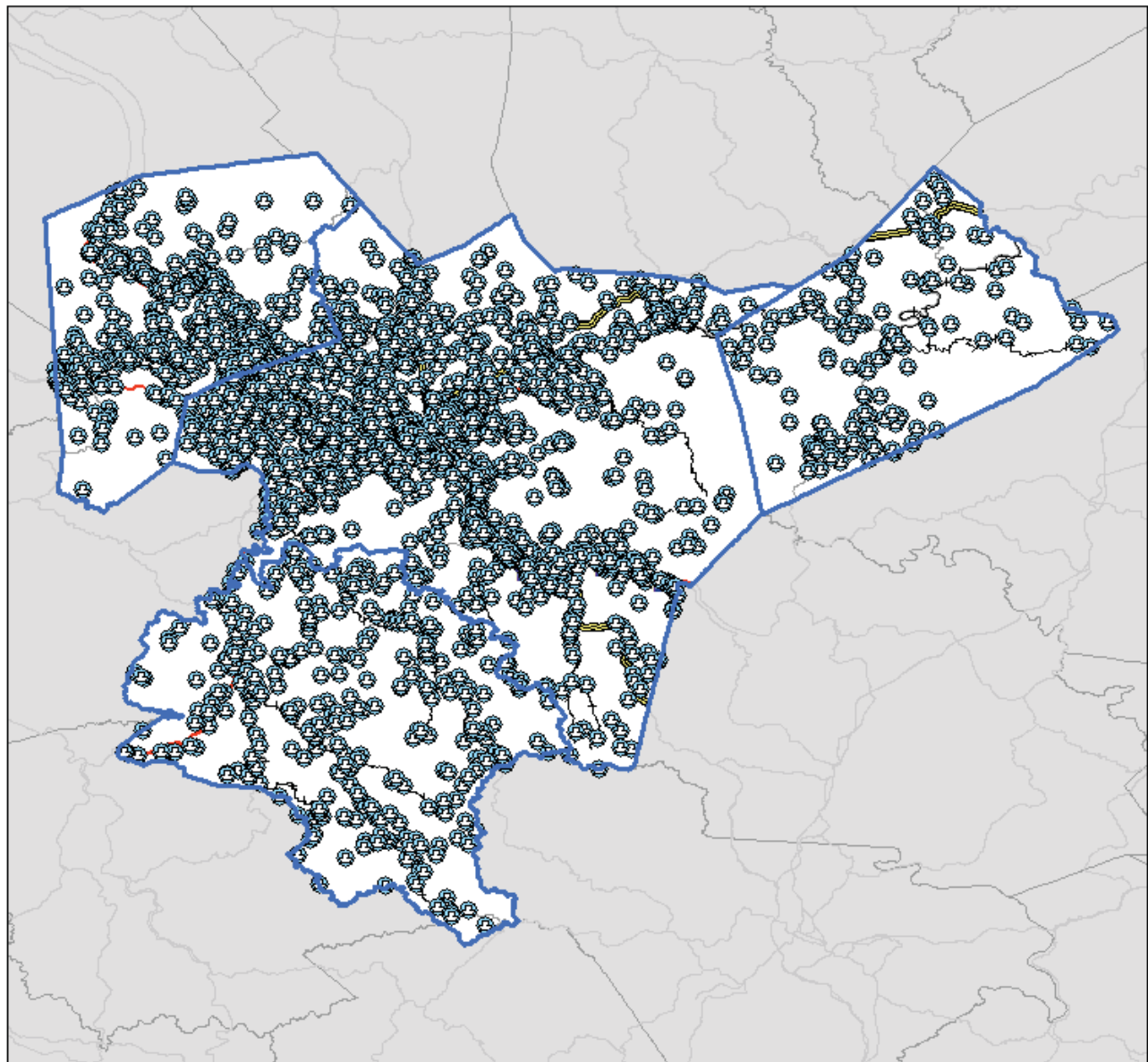
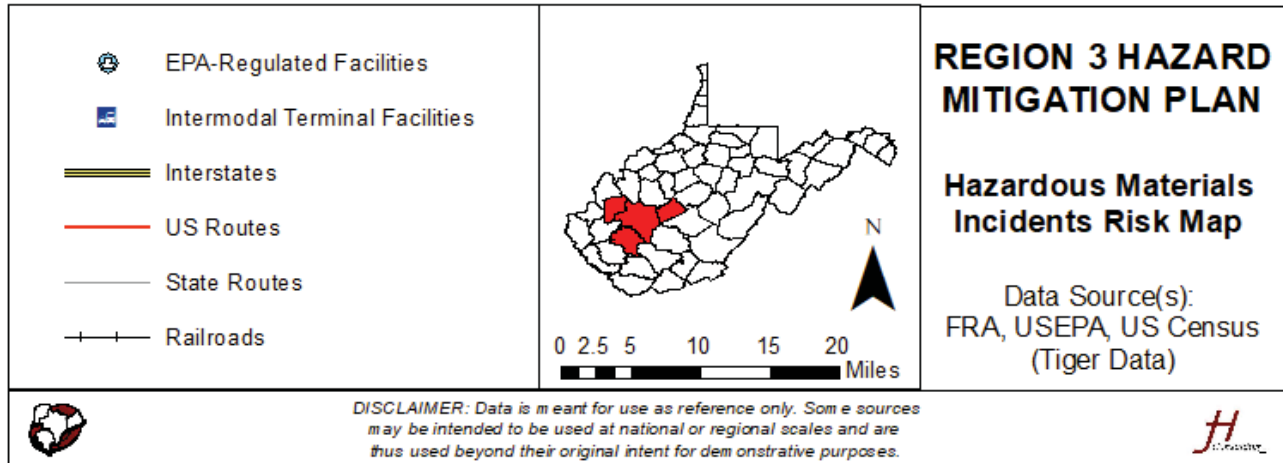
Location and Extent

Hazardous materials releases can be localized events, such as small releases at a fixed site, or regional events, such as radiological events. Several factors determine a community's risk to hazardous materials 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.

Hazardous materials are classified several ways. The United States Department of Transportation (DOT) organizes substances into nine classes, which are listed in the following table. Other agencies further categorize hazardous materials, but the nine DOT classifications are consistent across all reporting agencies.

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION SYSTEM	
<i>Hazard Classification</i>	<i>Category</i>
Class 1	Explosives
Class 2	Gases
Class 3	Flammable liquids (and combustible liquids)
Class 4	Flammable solids
Class 5	Oxidizing substances and organic peroxides
Class 6	Toxic substances
Class 7	Radioactive materials
Class 8	Corrosive substances
Class 9	Miscellaneous dangerous goods/hazardous materials and articles

There are also multiple fixed facilities in the region that make or store hazardous chemicals. These facilities are regulated by the EPA as well as by Local Emergency Planning Committees (LEPC). LEPCs monitor these sites through Tier II reporting and on-site visits. The following map shows those facilities in the EPA's Echo database, and includes many of the facilities that report to the LEPCs serving the region.



The EPA established a list of extremely hazardous substances in 1987. Though the EPA does not explicitly define “extremely hazardous substance” in its legislation, but in general, these substances are known to cause harm to human health. The list of extremely hazardous substances and their reportable quantities is listed in the Emergency Planning and Community Right to Know Act of 1986.

Impacts and Vulnerability

The effects of a hazardous materials release on the environment can be devastating. On land or in bodies of water, animals and plants in affected areas can be killed or experience reproductive complications (EPA, 2017). Certain hazardous materials have the potential to explode or cause a fire, threatening all organisms in close proximity to the incident.

Hazardous materials vary greatly in the types of health risks they pose to humans. According to the EPA, hazardous substances may irritate the skin or eyes, make it difficult to breathe, cause headaches or nausea, or cause other types of illnesses (EPA,2021). 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 close 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 poses a threat to 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 extremely-concentrated forms of 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 exposure to chemicals, including poisons and corrosives. Injuries and illnesses vary by material.

- **Biological Harm:** Biological harm results from exposure to biological materials, including bacteria, viruses, and biological toxins. Symptoms of biological harm are often delayed, because the pathogens often require time to multiply sufficiently to 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). Certain predictable reactions occur during and immediately following an explosion, which routinely injure or kill anyone in close proximity. The degree of harm is closely related to the size of the explosion and proximity to the device. Sources of injury include fragmentation and flying debris, blast overpressure, and secondary blast injuries.

The impacts of hazardous material incidents can also vary based on interactions with other phenomena. If a part of a transportation incident, the hazardous release may be a primary hazard, but it must be managed while giving consideration to the impacts on the physical roadways, traffic flow (particularly if the incident occurs on a busy thoroughfare like I-64), etc. Similarly, hazardous material concerns may be a cascading impact of other hazard events. Flood waters may inundate areas where hazardous materials are used or stored, thereby becoming contaminated and carrying those materials elsewhere. Severe summer and winter weather can impact covered facilities that report using and storing hazardous materials. In some of these instances, hazardous materials may not be released, yet extra response measures may be necessary to keep them from releasing.

Historical Occurrences

The U.S. Agency for Toxic Substances and Disease Registry (ATSDR)'s National Toxic Substance Incidents Program 2013-2014 report states that of the 4,284 incidents reported, approximately 1.5 as many incidents occurred at a fixed facility as during transport. However, incidents that occurred during transport were more likely to result in injuries (ATSDR, 2014).

Between 2012 and 2021, approximately 189,341 hazardous materials incidents occurred during transport nationwide. Nearly 90% of these were highway incidents, seven percent involved the air industry, and three percent were railroad incidents (Incidents Reports Database, n.d.). Region 3's transportation network consists primarily of roadways and railways. The Pipeline and Hazardous Materials Safety Administration maintains data on the frequency of

hazardous materials incidents that occur during rail, air, and highway transportation. The following table describes the PHMSA incidents that occurred in Region 3.

Carrier Reporter Name	Incident City	Date of Incident	Commodity Name	DOT Hazard Class	Total Hazmat Fatalities	Damages (\$)	Mode of Transportation
Norfolk Southern Railway Company	Belle	1/4/2012	Environmentally Hazardous Substance	9	0	\$700	Rail
FedEx Freight Inc	Nitro	1/5/2012	Cleaning Liquid	3	0	\$0	Highway
Con-way Freight	Belle	1/10/2012	Toxic Solids	6.1	0	\$4,817	Highway
Con-way Freight	Belle	1/24/2012	Paint	3	0	\$0	Highway
Con-way Freight	Belle	2/10/2012	Paint	3	0	\$0	Highway
Norfolk Southern Railway Company	Belle	2/11/2012	Flammable Liquid	3	0	\$0	Rail
United Parcel Service	Charleston	2/16/2012	N/A	N/A	0	\$0	Air
Norfolk Southern Railway Company	Belle	3/27/2012	N, N-Dimethylformamide	3	0	\$0	Rail
Norfolk Southern Railway Company	Belle	5/22/2012	Dimethylamine, Anhydrous	2.1	0	\$0	Rail
Con-way Freight	Belle	5/30/2012	Adhesives	3	0	\$0	Highway
UPS Ground	Nitro	6/9/2012	Paint	2	0	\$2,500	Highway
Petroleum Transport Inc.	Julian	6/15/2012	Diesel Fuel	3	0	\$347,700	Highway
Con-way Freight	Belle	6/18/2012	Paint	3	0	\$0	Highway
Norfolk Southern Railway Company	Belle	7/11/2012	Trimethylamine Anhydrous	2.1	0	\$0	Rail
Eagle Transport Corp	Nitro	7/11/2012	Gasoline	3	0	\$20,800	Highway
UPS Ground Freight	Nitro	8/1/2012	Corrosive Liquids	8	0	\$2,000	Highway
FedEx Ground Package System, Inc.	Charleston	8/20/2012	Printing Ink	3	0	\$0	Highway
Con-way Freight	Belle	9/28/2012	Adhesives	3	0	\$0	Highway
Con-way Freight	Belle	10/6/2012	Hydrogen Peroxide	5.1	0	\$0	Highway
Con-way Freight	Belle	11/6/2012	Resin Solution	3	0	\$0	Highway
UPS Ground Freight	NITRO	11/16/2012	Corrosive Liquid	8	0	\$2,000	Highway
Con-way Freight	Belle	12/13/2012	Disinfectant	8	0	\$0	Highway
Con-way Freight	Belle	12/19/2012	Paint Related material	3	0	\$0	Highway
Advantage Tank Lines	St. Albans	12/22/2012	Gasoline	3	0	\$2,590	Highway
UPS	Charleston	1/18/2013	Corrosive Liquid	8	0	\$0	Highway
Con-way Freight	Belle	1/19/2013	Hydrogen Peroxide	5.1	0	\$0	Highway
Con-way Freight	Belle	1/26/2013	Paint	3	0	\$0	Highway
Norfolk Southern Railway Company	Belle	2/28/2013	Dimethylamine, Anhydrous	2.1	0	0	Rail

Norfolk Southern Railway Company	Belle	3/1/2013	Trimethylamine, Anhydrous	2.1	0	0	Rail
Norfolk Southern Railway Company	Belle	3/1/2013	Sodium Hydroxide	8	0	0	Rail
CSX Transportation	South Charleston	4/10/2013	Ammonium Nitrate	5.1	0	2500	Rail
Con-way Freight	Belle	4/19/2013	Resin Solution	3	0	0	Highway
Quality Carriers Inc.	Belle	4/26/2013	Isobutyl Methacrylate	3	0	0	Highway
Bridge Terminal Transport, Inc.	Buffalo	5/10/2013	Corrosive Liquid, Toxic	8	0	\$255,000	Highway
Vitran	Belle	5/14/2013	Paint	3	0	850	Highway
Norfolk Southern Railway Company	Belle	7/29/2013	Trimethylamine Anhydrous	2.1	0	0	Rail
Con-way Freight	Belle	8/6/2013	Sodium Hydroxide	8	0	0	Highway
Con-way Freight	Belle	9/6/2013	Adhesives	3	0	0	Highway
Con-way Freight	Belle	9/17/2013	Organic Peroxide	5.2	0	0	Highway
FedEx Freight	Nitro	9/18/2013	Paint	3	0	0	Highway
Norfolk Southern Railway Company	Institute	9/24/2013	Hydrochloric Acid	8	0	0	Rail
Con-way Freight	Belle	10/15/2013	Corrosive Liquid	8	0	0	Highway
Norfolk Southern Railway Company	Belle	10/22/2013	Trimethylamine Anhydrous	2.1	0	0	Rail
Con-way Freight	Belle	11/2/2013	Paint	3	0	0	Highway
Con-way Freight	Belle	11/2/2013	Paint	3	0	0	Highway
Norfolk Southern Railway Company	Institute	11/14/2013	Environmentally Hazardous Substance	9	0	0	Rail
Con-way Freight	Belle	12/5/2013	Flammable Liquid	3	0	0	Highway
Norfolk Southern Railway Company	Belle	12/11/2013	Methylamine, Anhydrous	2.1	0	0	Rail
Norfolk Southern Railway Company	Belle	12/11/2013	Methylamine, Anhydrous	2.1	0	0	Rail
UPS	South Charleston	12/11/2013	Corrosive Liquid	8	0	0	Air
CSX Transportation	South Charleston	1/22/2014	Styrene Monomer	3	0	2500	Rail
Norfolk Southern Railway Company	Belle	1/27/2014	Trimethylamine, Anhydrous	2.1	0	0	Rail
Con-way Freight	Belle	2/12/2014	Oxidizing Solid, Toxic	5.1	0	0	Highway
Clean Harbors Environmental Services	Institute	3/11/2014	Flammable Liquid	3	0	0	Highway
FedEx Freight	Nitro	4/1/2014	Resin Solution	3	0	0	Highway
UPS	South Charleston	5/1/2014	Gasoline	3	0	0	Highway
FedEx Freight	Nitro	5/8/2014	Cleaning Liquid	3	0	0	Highway
Con-way Freight	Belle	5/27/2014	Adhesives	3	0	0	Highway
Con-way Freight	Belle	5/28/2014	Adhesives	3	0	0	Highway
UPS Freight	Nitro	5/29/2014	Paint	3	0	0	Highway
Con-way Freight	Belle	7/2/2014	Methanol	3	0	0	Highway

Con-way Freight	Belle	7/24/2014	Paint	3	0	0	Highway
Con-way Freight	Belle	7/30/2014	Paint	3	0	0	Highway
FedEx Freight	Nitro	8/9/2014	Paint	3	0	0	Highway
FedEx Freight	Nitro	9/29/2014	Trichloroethylene	6.1	0	0	Highway
Pitt Ohio Express	Belle	10/23/2014	Organic Peroxide	5.2	0	0	Highway
Liquid Transport	South Charleston	11/2/2014	Hypochlorite Solutions	8	0	35000	Highway
UPS	South Charleston	11/3/2014	Isopropyl Alcohol	3	0	0	Highway
UPS	South Charleston	11/7/2014	Corrosive Liquid	8	0	0	Highway
Con-way Freight	Belle	11/12/2014	Printing Ink	3	0	0	Highway
FedEx Freight	Nitro	12/15/2014	Paint	3	0	0	Highway
Norfolk Southern Railway Company	Institute	1/28/2015	Flammable Liquid	3	0	2500	Rail
Con-way Freight	Belle	2/10/2015	Paint	3	0	0	Highway
Con-way Freight	Belle	2/21/2015	Paint Related Materials	3	0	0	Highway
Con-way Freight	Belle	4/2/2015	Adhesives	3	0	0	Highway
Con-way Freight	Belle	4/10/2015	Methanol	3	0	0	Highway
Con-way Freight	Belle	5/6/2015	Paint	3	0	0	Highway
Quality Carriers Inc.	South Charleston	7/18/2015	Sodium Hydroxide	8	0	0	Highway
FedEx Freight	Nitro	7/27/2015	Corrosive Liquid	8	0	0	Highway
Con-Way Freight	Belle	8/4/2015	Sodium Hydroxide	8	0	0	Highway
FedEx Ground Package System, Inc.	Charleston	8/6/2015	Hydrochloric Acid	8	0	0	Highway
Con-Way Freight	Belle	8/11/2015	Flammable Liquid	3	0	0	Highway
Con-way	Belle	9/2/2015	Printing Ink	3	0	0	Highway
Con-Way Freight	Belle	9/8/2015	Paint	3	0	0	Highway
FedEx Ground Package System, Inc.	Charleston	9/16/2015	Corrosive Liquid	8	0	0	Highway
Conway	Belle	10/26/2015	Corrosive Liquid	8	0	0	Highway
Con-Way Freight	Belle	10/30/2015	Paint	3	0	0	Highway
Norfolk Southern Railway Company	Dickinson	11/5/2015	Dimethylamine Solution	3	0	2500	Rail
FedEx Ground Package System, Inc.	Charleston	12/16/2015	Hydrogen Peroxide	5.1	0	0	Highway
XPO Logistics	BELLE	12/28/2015	Combustible Liquid	2	0	3500	Highway
UPS	South Charleston	1/27/2016	Paint	3	0	0	Highway
UPS	South Charleston	1/28/2016	Fire Extinguishers	2.2	0	0	Highway
XPO Logistics	Belle	2/20/2016	Paint	3	0	0	Highway
UPS	South Charleston	3/4/2016	Paint	3	0	0	Highway

UPS	South Charleston	3/16/2016	Paint	3	0	0	Highway
FedEx Freight	Nitro	3/23/2016	Flammable Liquid	3	0	0	Highway
FedEx Freight	Nitro	4/21/2016	Resin Solution	3	0	0	Highway
UPS	South Charleston	4/23/2016	Xylenes	3	0	0	Highway
FedEx Freight	Nitro	4/28/2016	Ethylenediamine	8	0	0	Highway
XPO Logistics	BELLE	5/10/2016	Printing Ink	3	0	0	Highway
Pitt Ohio Express	BELLE	5/10/2016	Sulfuric Acid	8	0	0	Highway
FedEx Freight	Nitro	5/10/2016	Paint	3	0	0	Highway
XPO Logistics	BELLE	6/10/2016	Hydrogen Peroxide	5.1	0	0	Highway
FedEx Freight	Nitro	6/21/2016	Paint	3	0	0	Highway
UPS	South Charleston	6/27/2016	Articles Pressurized Pneumatic	2.2	0	0	Highway
UPS	South Charleston	6/30/2016	Paint	3	0	0	Highway
UPS FREIGHT	Nitro	7/22/2016	Alcohol	3	0	0	Highway
UPS Freight	Nitro	8/22/2016	Sodium Nitrate	5.1	0	\$1,500	Highway
UPS	South Charleston	8/30/2016	Flammable Liquids	3	0	0	Highway
Clean Harbors Environmental Services Inc	Hurricane	9/17/2016	Corrosive Liquid	8	0	\$0	Highway
XPO LOGISTICS LLC	Belle	9/20/2016	Printing Ink	3	0	0	Highway
R and L Carriers	Belle	9/21/2016	Flammable Liquids	3	0	0	Highway
XPO Logistics	Belle	10/22/2016	Hydrochloric acid	8	0	3500	Highway
XPO Logistics	Belle	11/21/2016	Flammable Liquids	3	0	4500	Highway
UPS FREIGHT	Nitro	12/1/2016	Acetone	3	0	1500	Highway
UPS	South Charleston	12/13/2016	Sodium Hydroxide Solution	8	0	0	Highway
FedEx Freight	Nitro	1/5/2017	Petroleum Distillates	3	0	0	Highway
UPS	South Charleston	3/27/2017	Corrosive Liquids	8	0	0	Highway
UPS	South Charleston	3/28/2017	Flammable Liquids	3	0	0	Highway
FedEx Freight	Nitro	4/11/2017	Ferric Chloride	8	0	0	Highway
XPO Logistics	Belle	4/20/2017	Toxic Solid, Inorganic	6.1	0	4500	Highway
UPS	South Charleston	4/25/2017	Paint	3	0	0	Highway
FedEx Freight	Nitro	5/17/2017	Paint	3	0	\$0	Highway
FedEx Freight	Nitro	5/23/2017	Dichloromethane	6.1	0	\$0	Highway
Pitt Ohio	South Charleston	7/1/2017	Compounds, Cleaning Liquid	8	0	\$0	Highway
XPO Logistics	Belle	7/15/2017	Adhesives	3	0	\$0	Highway
UPS	South Charleston	7/25/2017	Paint	3	0	\$0	Highway
FedEx Freight	Nitro	8/5/2017	Resin	3	0	\$0	Highway

NEMF World Transport Inc.	Charleston	8/22/2017	Corrosive Liquid	8	0	\$5,500	Highway
UPS	South Charleston	9/14/2017	Corrosive Liquid	8	0	\$0	Highway
XPO Logistics	Belle	9/20/2017	Organometallic Solution	6.1	0	\$4,000	Highway
UPS	South Charleston	9/28/2017	Paint	3	0	\$0	Highway
FedEx Freight	Nitro	11/16/2017	Paint	3	0	\$0	Highway
FedEx Freight	Nitro	12/5/2017	Coating Solution	3	0	\$0	Highway
XPO Logistics	Belle	3/26/2018	Flammable Liquids	3	0	\$4,500	Highway
XPO Logistics	Belle	5/18/2018	Nitrocellulose Solution	3	0	\$1,000	Highway
Eagle Transport Corp	Madison	5/28/2018	N/A	3	0	\$1,500	Highway
XPO Logistics	Belle	6/19/2018	Paint	3	0	\$0	Highway
XPO Logistics	Belle	6/20/2018	Paint	3	0	\$1,000	Highway
UPS	South Charleston	6/25/2018	Corrosive Liquid	8	0	\$0	Highway
FedEx Ground Package System, Inc.	Charleston	6/28/2018	Corrosive Liquid	8	0	\$0	Highway
XPO Logistics	Belle	7/16/2018	Flammable Liquid	3	0	\$1,000	Highway
XPO Logistics	Belle	7/18/2018	Printing Ink	3	0	\$0	Highway
Veolia ES Technical Solutions, LLC	Poca	7/24/2018	Corrosive Liquid	8	0	\$0	Highway
XPO Logistics	Belle	7/24/2018	Petroleum Distillates	3	0	\$6,500	Highway
XPO Logistics	Belle	7/26/2018	Flammable Liquids	3	0	\$4,000	Highway
UPS Freight	Nitro	8/22/2018	Caustic Alkali Solution	8	0	\$1,500	Highway
R&L Carrier Shared Services	Charleston	9/6/2018	Corrosive Liquid	8	0	\$6,750	Highway
XPO Logistics	Belle	9/18/2018	Flammable Liquids	3	0	\$0	Highway
FedEx Freight	Nitro	9/25/2018	Corrosive Liquid	8	0	\$0	Highway
UPS	South Charleston	10/9/2018	Corrosive Liquid	8	0	\$0	Highway
XPO Logistics	Belle	10/10/2018	Printing Ink	3	0	\$1,000	Highway
UPS	South Charleston	10/17/2018	Corrosive Liquid	8	0	\$0	Highway
XPO Logistics	Belle	10/24/2018	Corrosive Liquid	8	0	\$3,500	Highway
UPS	South Charleston	11/1/2018	Aerosols, Poison	2.2	0	\$0	Highway
UPS Co.	South Charleston	12/5/2018	Paint	3	0	\$0	Highway
FedEx Freight Inc.	Nitro	1/25/2019	Butyl Alcohols	3	0	\$0	Highway
UPS	South Charleston	1/30/2019	Hydrogen Peroxide	5.1	0	\$0	Highway
UPS	South Charleston	2/15/2019	Paint	3	0	\$0	Highway
FedEx Ground Package System, Inc.	Charleston	2/26/2019	Corrosive Liquid	8	0	\$0	Highway

Ross Transportation Services	Belle	3/8/2019	Corrosive Liquid	8	0	\$0	Highway
XPO Logistics	Belle	4/8/2019	Corrosive Liquid	8	0	\$5,500	Highway
R&L Carriers Shared Services	Winfield	4/11/2019	Batteries, Wet Filled	8	0	\$7,700	Highway
UPS Co.	South Charleston	4/20/2019	Paint	3	0	\$0	Highway
UPS Freight	Nitro	4/22/2019	Corrosive Liquid	8	0	\$1,500	Highway
CSX Transportation	South Charleston	4/30/2019	Potassium Hydroxide	8	0	\$2,500	Rail
UPS Co.	South Charleston	5/1/2019	Ethanol	3	0	\$0	Highway
UPS Co.	South Charleston	5/9/2019	Paint	3	0	\$0	Highway
UPS	South Charleston	5/15/2019	Hydrogen Peroxide	5.1	0	\$0	Highway
Veolia ES Technical Solutions, LLC	Poca	5/21/2019	Batteries, Wet Filled	8	0	\$0	Highway
XPO Logistics	Belle	6/18/2019	Adhesives	3	0	\$0	Highway
UPS	South Charleston	7/6/2019	Hydrogen Peroxide	5.1	0	\$0	Highway
UPS	South Charleston	7/9/2019	Hydrogen Peroxide	5.1	0	\$0	Highway
UPS	South Charleston	7/13/2019	Sodium Hydroxide	8	0	\$0	Highway
YRC Inc	Charleston	7/23/2019	Corrosive Liquid	8	0	\$0	Highway
XPO Logistics	Belle	7/27/2019	Amines, Liquid	8	0	\$0	Highway
XPO CNW Inc.	Belle	8/23/2019	Adhesives	3	0	\$1,000	Highway
XPO CNW Inc.	Belle	9/6/2019	N-Propanol	3	0	\$1,000	Highway
XPO CNW Inc.	Belle	9/12/2019	Paint	3	0	\$1,000	Highway
XPO CNW Inc.	Belle	10/3/2019	Paint	3	0	\$1,000	Highway
XPO CNW Inc.	Belle	10/5/2019	Paint	3	0	\$1,000	Highway
Pitt Ohio	Belle	10/15/2019	Corrosive Liquid	8	0	\$0	Highway
XPO CNW Inc.	Belle	10/17/2019	Resin Solution	3	0	\$1,000	Highway
FedEx Freight	Nitro	10/29/2019	Chloroacetic Acid, Solid	6.1	0	\$0	Highway
FedEx Freight	Nitro	12/3/2019	Paint	3	0	\$0	Highway
FedEx Freight	Nitro	12/10/2019	Hypochlorite Solutions	8	0	\$0	Highway
FedEx Freight	Nitro	12/18/2019	Flammable Liquids	3	0	\$0	Highway
Linden Bulk Transportation	Charleston	1/2/2020	Flammable Liquids	3	0	\$84,145	Highway
UPS Freight	Nitro	1/9/2020	Nitrobenzene	6.1	0	\$1,250	Highway
XPO CNW Inc.	Belle	3/27/2020	Adhesives	3	0	\$1,000	Highway
XPO Logistics	Belle	4/22/2020	Sodium Hydroxide	8	0	\$0	Highway
Fedex Ground Package System, Inc.	Charleston	5/21/2020	Corrosive Liquids	8	0	\$0	Highway
XPO Logistics	Belle	6/3/2020	Adhesives	3	0	\$0	Highway
FedEx Freight	Nitro	6/12/2020	Resin Solution	3	0	\$0	Highway

XPO Logistics	Belle	7/8/2020	Flammable Liquids	3	0	\$0	Highway
Pitt Ohio Express	Belle	8/7/2020	Organic Peroxide Type F	5.2	0	\$0	Highway
XPO Logistics	Belle	8/13/2020	Azodicarbonamide	4.1	0	\$0	Highway
XPO Logistics	Belle	8/17/2020	Corrosive Liquid	8	0	\$0	Highway
FedEx Freight	Nitro	9/28/2020	Paint	3	0	\$0	Highway
FedEx Ground Package System, Inc.	Charleston	12/8/2020	Isopropanol	3	0	\$0	Highway
FedEx Freights	Nitro	12/28/2020	Sodium Hydroxide	8	0	\$0	Highway
UPS	South Charleston	1/28/2021	Hydrogen Peroxide	5.1	0	\$0	Highway
UPS	South Charleston	2/10/2021	Dichlorodifluoromethane	2.2	0	\$0	Highway
CLI Transport	Charleston	3/16/2021	Diesel Fuel	3	0	\$0	Highway
UPS	South Charleston	3/26/2021	Hydrogen Peroxide	5.1	0	\$0	Highway
XPO Logistics	Belle	4/15/2021	Paint	3	0	\$0	Highway
FedEx Freight	Nitro	4/26/2021	Casinghead Gasoline	3	0	\$0	Highway
XPO Logistics	Belle	5/13/2021	Environmentally Hazardous Substance, Liquid	9	0	\$0	Highway
FedEx Freight	Nitro	5/25/2021	Casinghead Gasoline	3	0	\$0	Highway
FedEx Freight	Nitro	5/25/2021	Paint	3	0	\$0	Highway
FedEx Freight	Nitro	5/26/2021	Acetone	3	0	\$0	Highway
FedEx Freight	Nitro	5/26/2021	Corrosive Liquid	8	0	\$0	Highway
XPO Logistics	Belle	6/2/2021	Paint	3	0	\$0	Highway
FedEx Freight	Nitro	6/4/2021	Corrosive Liquid	8	0	\$0	Highway
XPO Logistics	Belle	6/15/2021	Paint	3	0	\$0	Highway
Veolia ES Technical Solutions, LLC	Poca	7/2/2021	Cyanuric Chloride	8	0	\$0	Highway
XPO Logistics	Belle	7/8/2021	Paint	8	0	\$0	Highway
UPS	South Charleston	7/13/2021	Receptacles containing Gas	2.1	0	\$0	Highway
FedEx Freight	Nitro	7/14/2021	Paint	3	0	\$0	Highway
XPO Logistics	Belle	7/19/2021	Paint	3	0	\$0	Highway
XPO Logistics	Belle	7/24/2021	Flammable Liquids	3	0	\$2,000	Highway
XPO Logistics	Belle	7/28/2021	Paint	3	0	\$0	Highway
XPO Logistics	Belle	8/6/2021	Corrosive Liquid	8	0	\$0	Highway
XPO Logistics	Belle	8/14/2021	Adhesives	3	0	\$0	Highway
UPS	South Charleston	8/23/2021	Sodium Hydroxide	8	0	\$0	Highway
UPS	South Charleston	8/23/2021	Sodium Hydroxide	8	0	\$0	Highway
FedEx Freight	Nitro	8/24/2021	Batteries, Wet Filled	8	0	\$0	Highway
UPS	South Charleston	8/24/2021	Sodium Hydroxide	8	0	\$0	Highway
CSX Transportation	Charleston	9/13/2021	Styrene Monomer	3	0	\$1,000	Rail

FedEx Freight	Nitro	9/16/2021	Flammable Liquids	3	0	\$0	Highway
UPS	South Charleston	9/28/2021	Sodium Hydroxide, Solid	8	0	\$0	Highway
XPO Logistics	Belle	9/29/2021	Paint	3	0	\$0	Highway
XPO Logistics	Belle	10/4/2021	Xylenes	3	0	\$0	Highway
FedEx Ground Package System	Charleston	10/15/2021	Hydrogen Peroxide and Peroxyacetic Acid Mixtures	5.1	0	\$0	Highway
XPO Logistics	Belle	11/11/2021	Printing Ink	3	0	\$0	Highway
XPO Logistics	Belle	11/16/2021	Flammable Liquids	3	0	\$0	Highway
Eagle Transport	Charleston	12/5/2021	Casinghead Gasoline	3	0	\$5,000	Highway
Eagle Transport	Charleston	12/5/2021	Casinghead Gasoline	3	0	\$5,000	Highway
XPO Logistics	Belle	12/22/2021	Paint Related Materials	3	0	\$0	Highway

July 2018

On July 16, 2018, XPO Logistics reported a spill that occurred in Belle, WV, during loading. Personnel were loading 55-gallon steel drums of UN 1993 Unisol Liquid Green 2B when the forklift blade punctured a drum causing a release of approximately 55 gallons of material onto the dock floor. Terminal personnel placed granular absorbents on the spill to contain the release on their own. Terminal personnel generated four 55-gallon metal drums with spent absorbent. All drums were properly disposed of (PMHSA, 2021).

January 2014

A tank located adjacent to the Elk River just north of Charleston leaked a hazardous chemical used for cleaning coal of impurities into the river on January 9, 2014. The leak occurred approximately 1.5 miles upriver from a water intake pipe at the West Virginia American Water Company. The resulting contamination of the water supply left up to 300,000 residents in nine counties (including all of Region 3) in southern West Virginia without potable water (The Washington Post, 2015).

Loss and Damages

By law, the parties responsible for the use, transportation, storage, and disposal of hazardous substances and oil are liable for costs of containment, cleanup, and damages resulting from a release to their own activities (EPA, 2017). When a responsible party cannot be identified, or refuses to cooperate with the response effort, the EPA and participants in the National Response System ensure the emergency is dealt with in an appropriate and timely

manner. According to PHMSA incident data, the 239 transportation-based hazardous materials incidents in Region 3 caused \$867,302 in damages, for an average of \$3,628 per incident.

Vulnerability Assessment

This section summarizes the risk to Region 3 from hazardous material incidents. Region 3 conducted an online survey for the public to share its thoughts on hazard vulnerabilities. The following table presents the results of that survey regarding hazardous material incidents.

PUBLIC SENTIMENT, HAZARDOUS MATERIALS – REGION 3					
Hazard	Level of Concern				Total Responses
	Not at All	Somewhat	Concerned	Very	
Hazardous Material	29 (15.42%)	61 (32.44%)	41 (21.80%)	57 (30.39%)	188
In the past ten years, do you remember this hazard occurring in your community?				83 (44.15%)	188
Have you noticed an increase in the occurrences or intensity of this hazard?				37 (19.68%)	188
Have you noticed a decrease in the occurrences or intensity of this hazard?				7 (3.72%)	188

Future vulnerability to hazardous material incidents is contingent on a variety of factors, including industry trends, economic conditions, etc. Disruptions to commodity flow systems like rail can push more transport via truck over roadways, and historical data suggests that many more incidents occur during roadway transport. However, more concentrated hazardous material shipments via rail may yield a smaller number of incidents, but the incidents that do occur may be more severe. Region 3 is no stranger to economic fluctuations and the effects such fluctuation can have on local economies. Particularly in Kanawha and Putnam Counties, the chemical industry along the Kanawha River has changed over the last fifty years. The risk of acute hazardous material incidents (and the associated vulnerability) decreases as activity decreases and increases as activity ramps back up.

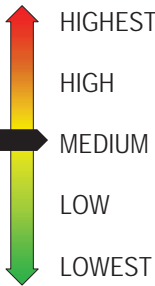
Longer term impacts may result from heretofore unknown environmental contamination. For instance, as industrial facilities close and the sites are considered for redevelopment, communities may learn of residual contamination to the surround areas (to include soils, groundwater, etc.). These impacts are longitudinal in the sense that they develop slowly over time, often compounding over time, and their effects in the human population are typically realized long after the initial exposure. A future vulnerability could include these types of impacts.

The following table assigns point totals based on the research presented in this profile for each vulnerability category.

HAZMAT VULNERABILITY SUMMARY			
<i>Category</i>	<i>Points</i>	<i>Description</i>	<i>Notes</i>
Frequency	5	Excessive	There have been 239 hazardous material events recorded by PHMSA since 2012 (10 years), for an average of 23.9 events per year.
Response	1	Less than half a day	Most hazardous material spills are cleared within 12 hours.
Onset	4	Less than 6 hours	There is usually no warning before a hazardous materials event.
Magnitude	1	Localized	Hazmat events are usually localized and only effect the immediate surrounding area.
Business	1	Less than 24 hours	Most hazmat events will not affect the economy of the region
Human	2	Low	Hazardous materials can cause injury or death to humans.
Property	1	Less than 10% of property affected	Hazmat events are localized events.
Total	15	Low	

2.0 RISK ASSESSMENT

2.2.9 Landslides and Subsidence

Land subsidence is the loss of elevation caused by the removal of support below the surface. These events can range in size from large regional lowering to severe localized collapses, such as sinkholes and can strike with little to no warning. Landslides occur when dry rock, soil, or debris move down a slope.					
	Vulnerability	Period of Occurrence:	At any time. Increased in areas where mining and extraction of groundwater have occurred.	Hazard Index Ranking:	Medium
	HIGHEST	Warning Time:	Ranges from no warning to months	State Risk Ranking:	High
	HIGH	Probability:	Probable (likely to occur on an annual basis)	Severity:	Minor (Less than 10% of land area affected)
	MEDIUM	Type of Hazard:	Natural	Disaster Declarations:	None
LOW					
LOWEST					

Hazard Overview

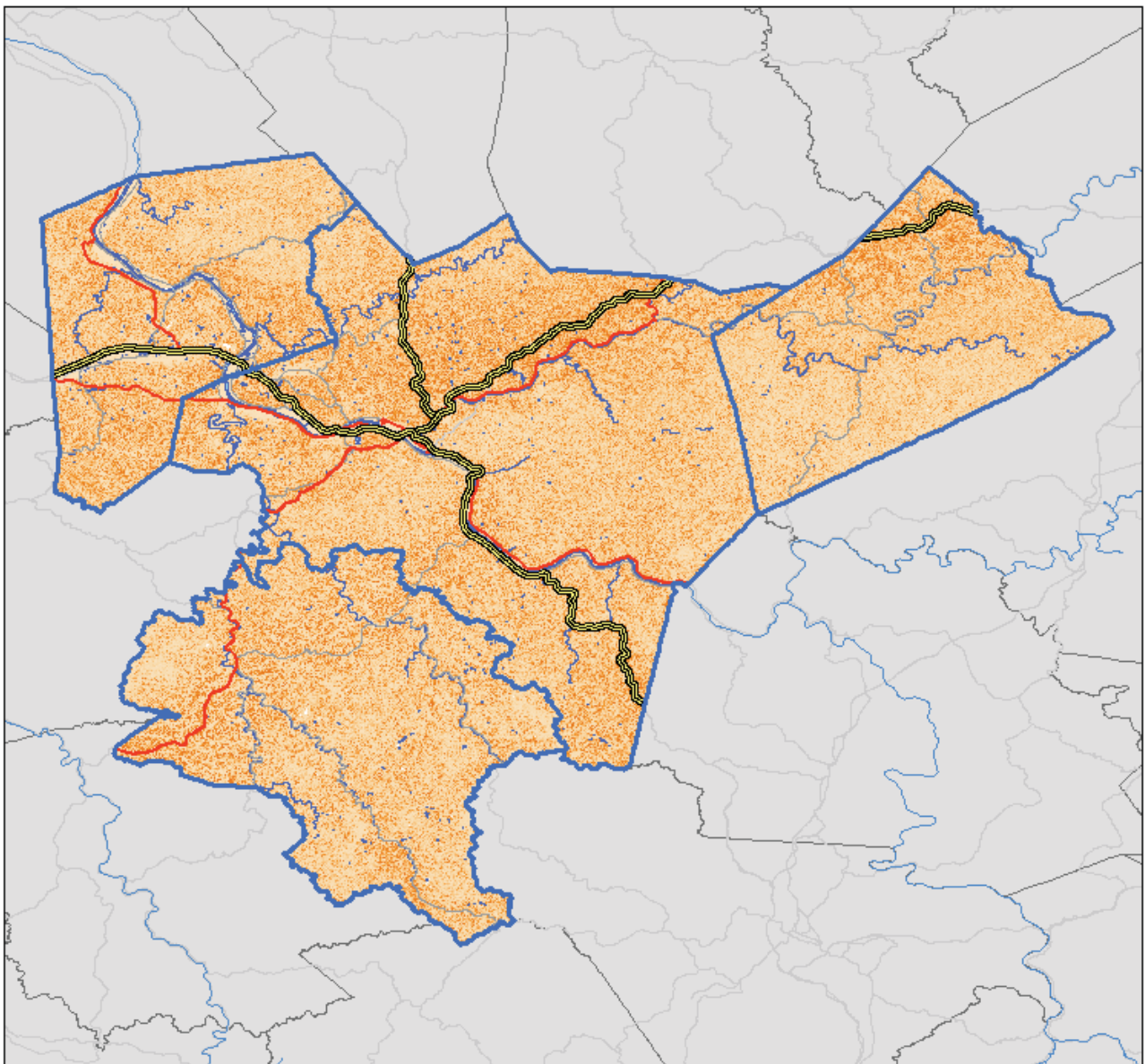
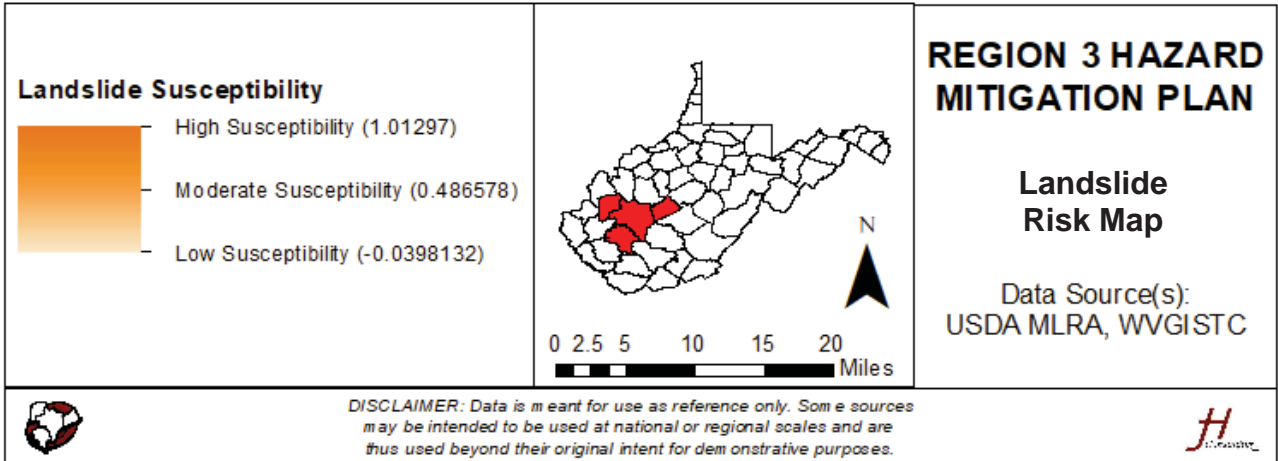
Land subsidence is the sinking of the ground often caused by the removal of water, oil, gas, or mineral resources from the ground. However, subsidence can also be caused by natural events such as earthquakes or soil compaction (NOAA, 2022). Put differently, land subsidence is the motion of the Earth’s surface as it shifts downward relative to a benchmark (often sea-level) of the surrounding terrain. There are a number of causes for this effect. In West Virginia, the primary cause is Abandoned Underground Mines (AUMs). Underground mining of coal began in the early 1800’s and continues to current day. All mining activities create voids under the Earth’s surface. Several key 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. The other form of land subsidence is associated with expansive soils, which are soils or soft rock that dramatically expand, or swell when wet and shrink or contract when dry. The swelling and shrinking action 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 experience significant shifting.

Mine subsidence is the loss of elevation caused by the removal of support below the surface. These events can range in size from large regional lowering to severe localized collapses, such as sinkholes. Mine subsidence is a geologic hazard that can strike with little or no warning and can result in catastrophic and costly damages.

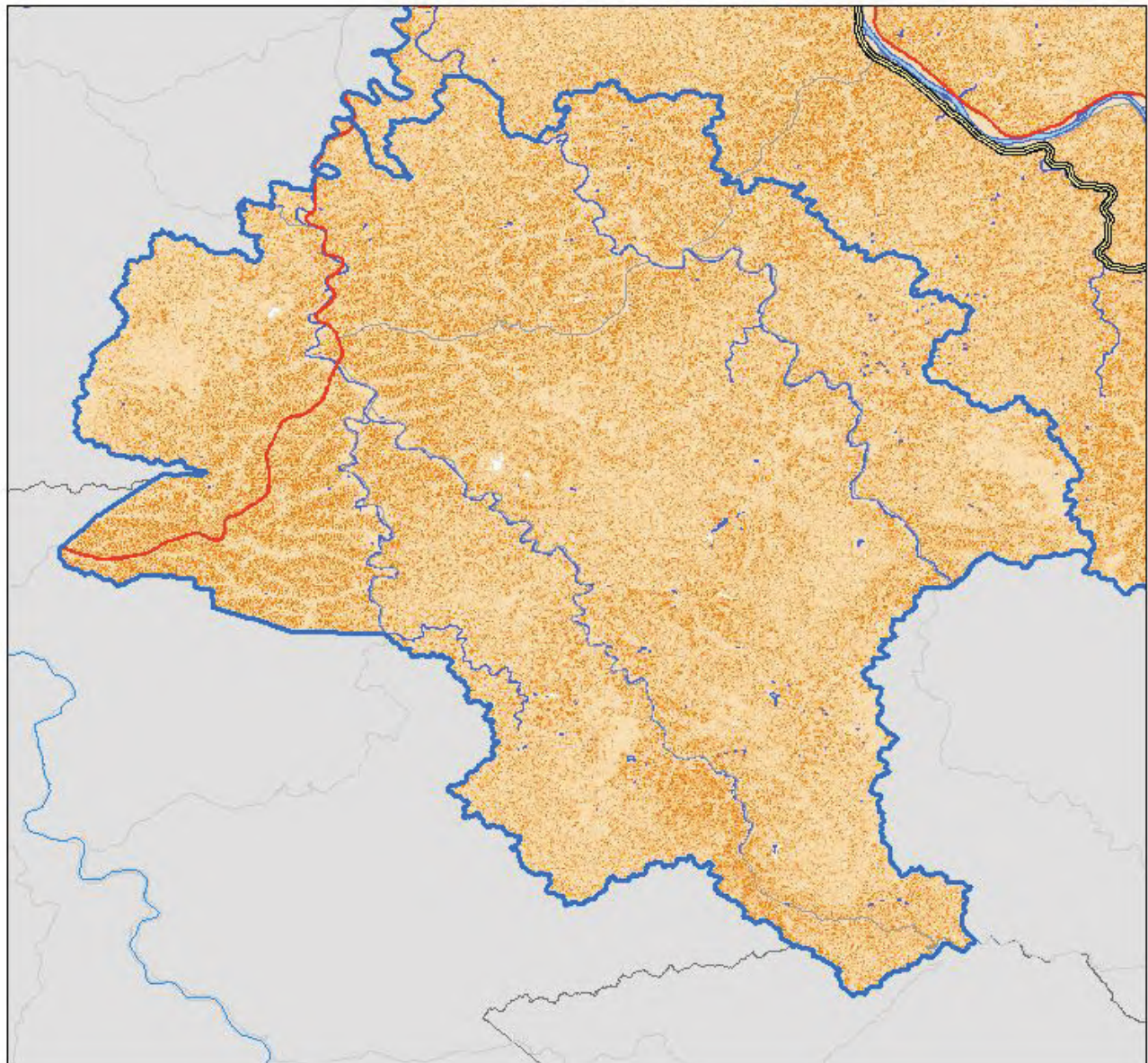
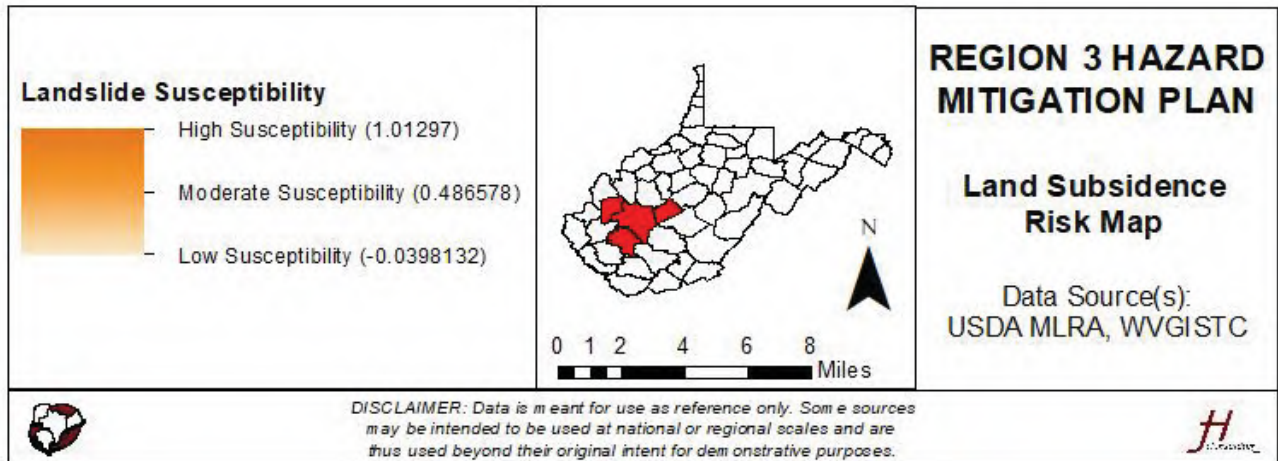
Landslides occur when dry rock, soil, and/or debris move down a slope. These uncontrolled movements can be localized or massive in size. Landslides can also vary in speed. Landslides are caused by the anchoring material becoming compromised (usually by the loss of vegetation) and releasing (Haddow, 2011).

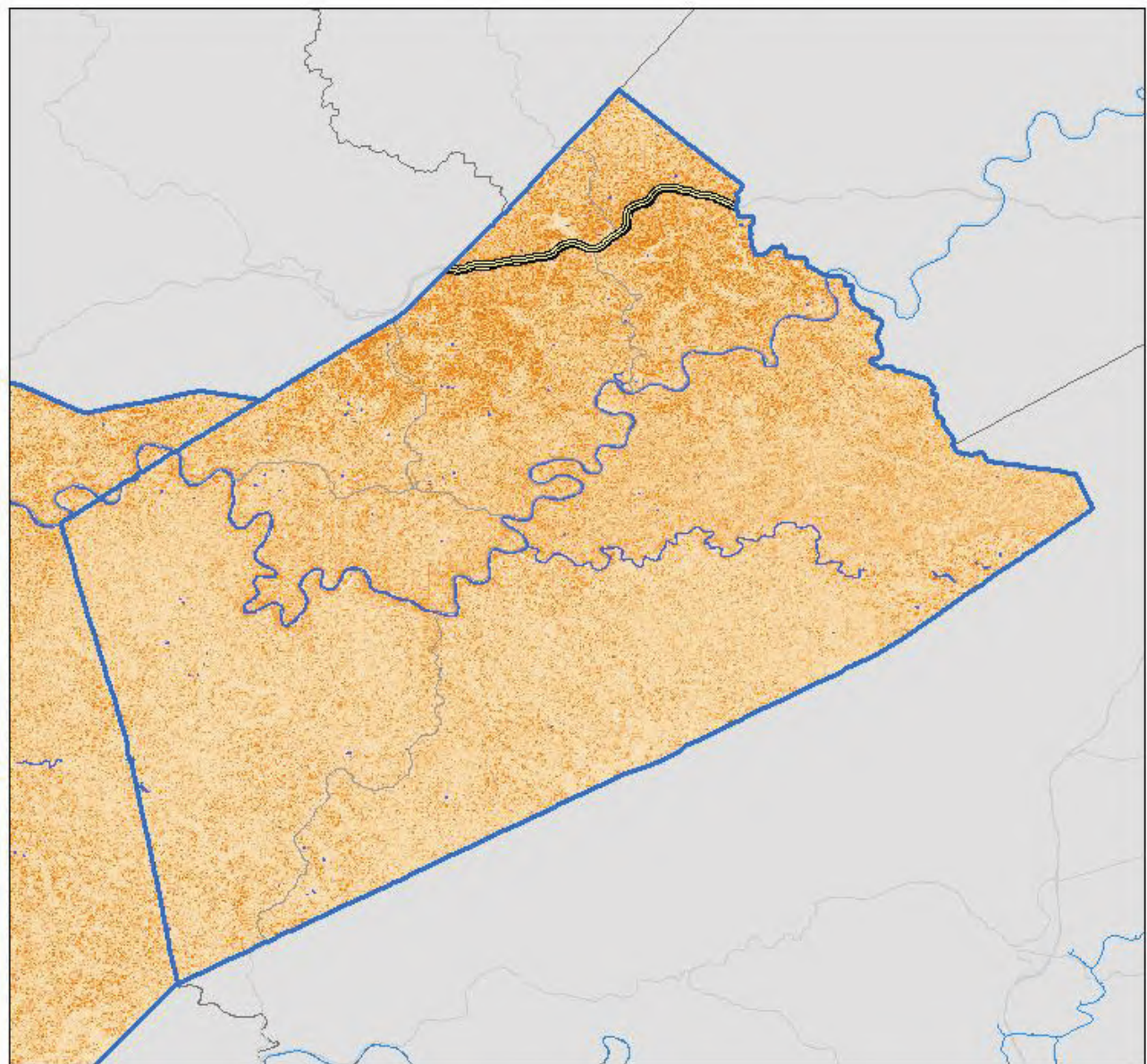
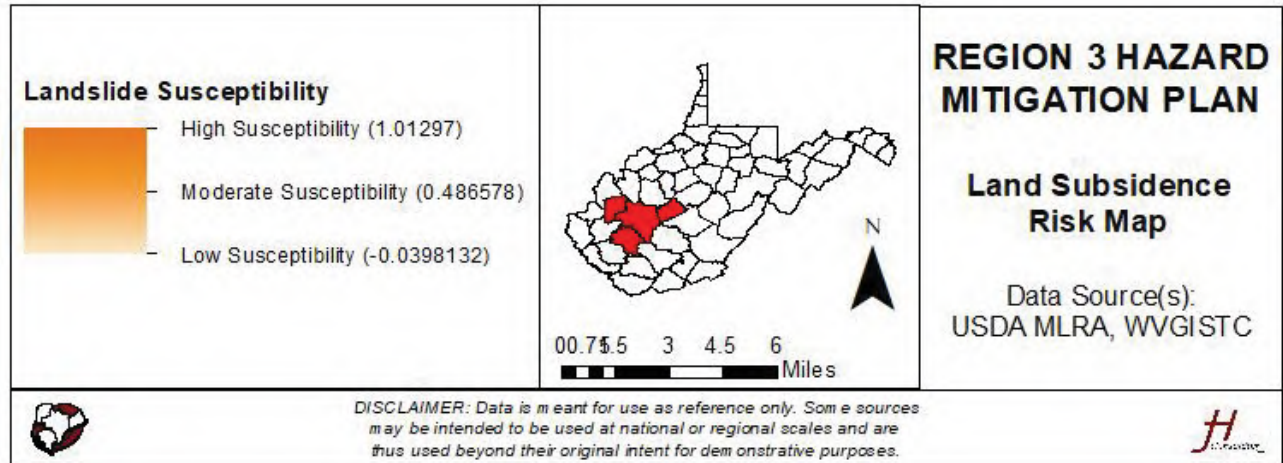
Location and Extent

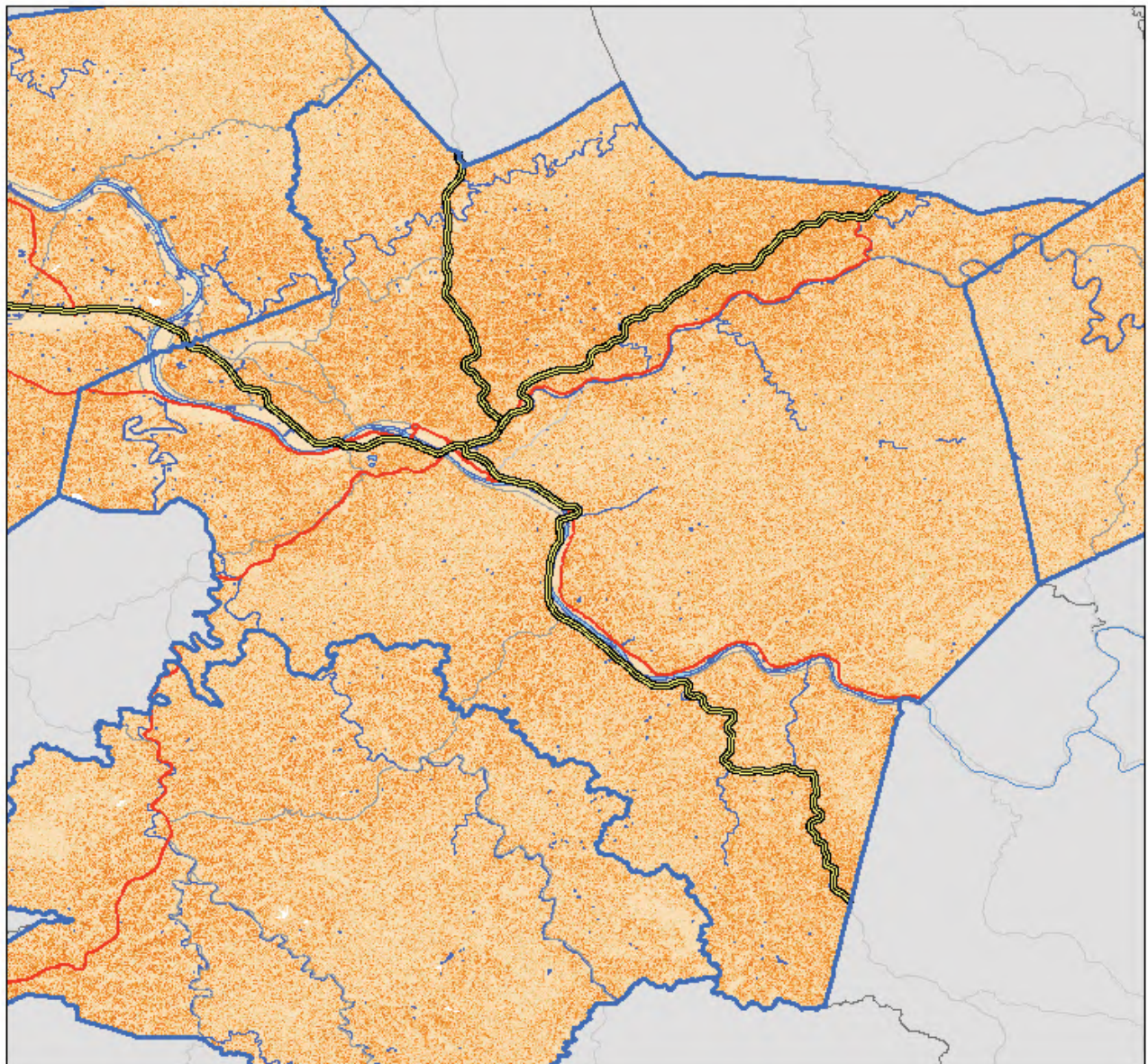
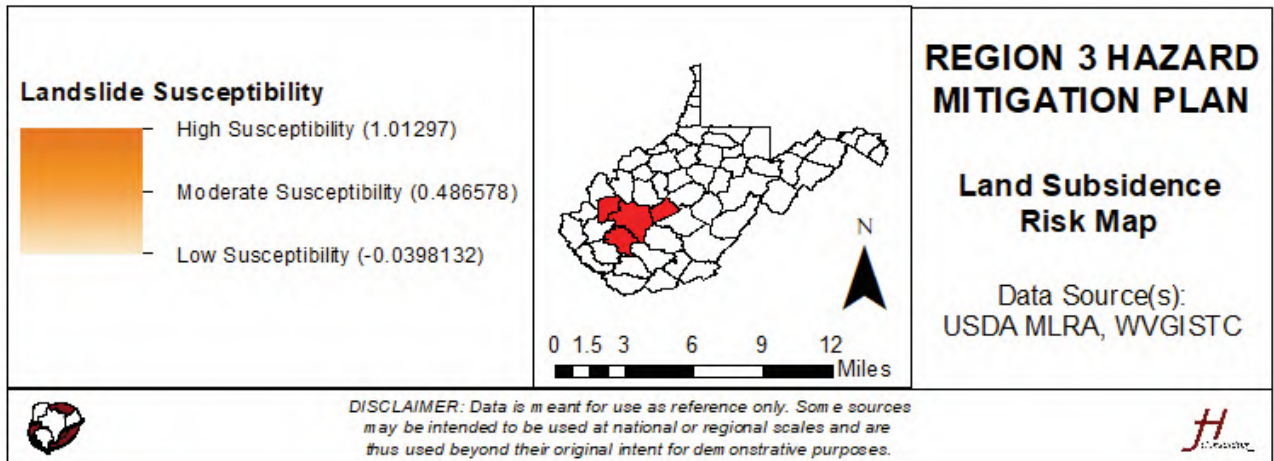
The geography of the region creates large areas that are vulnerable to the landslides and land subsidence, as is true for most of the state. The West Virginia Emergency Management Division, Department of Homeland Security, and Federal Emergency Management Agency facilitated a landslide susceptibility study and community-based risk assessment. The map below shows the susceptibility for Region 3. The maps show a range of orange color that corresponds to the landslide susceptibility of the area. The brighter, more vibrant the orange over an area, the more susceptible to landslides.

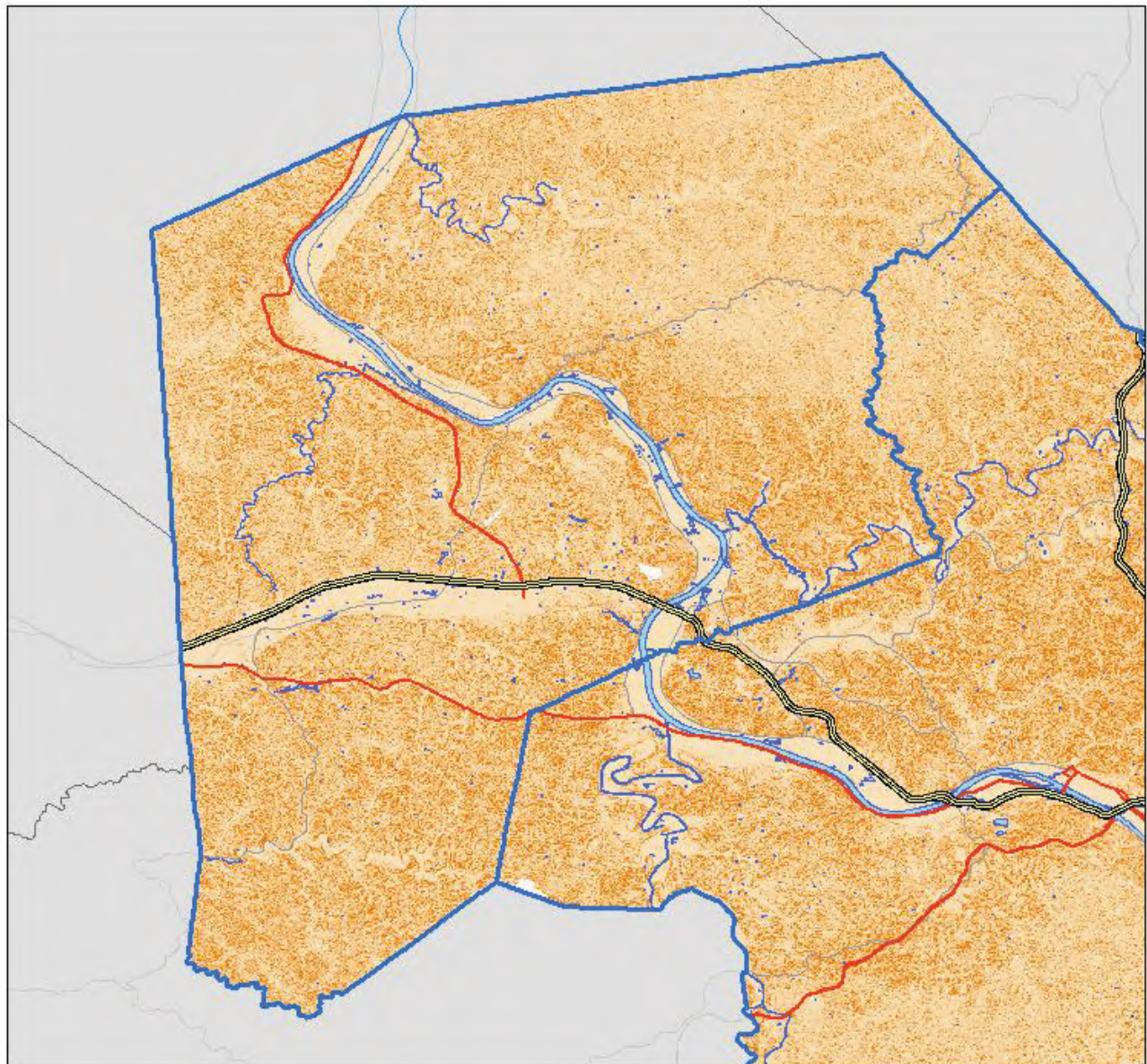
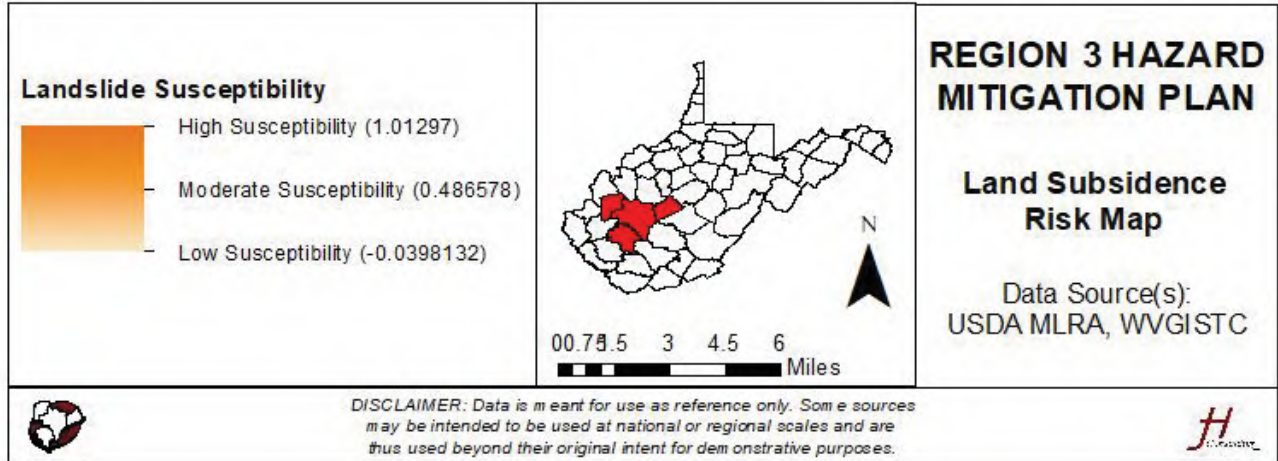


Generally, there is a “band” of higher susceptibility loosely paralleling the I-79 corridor through Clay County and into Kanawha County, running west along the Kanawha River valley and the southern portions of Putnam County. Additionally, susceptibility increases in southeastern Boone County and the extreme southeastern corner of Kanawha County. The following four maps are county-level versions of the regional map.

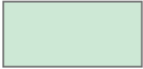
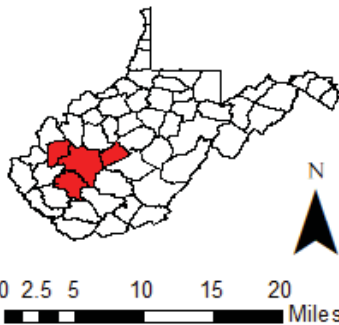




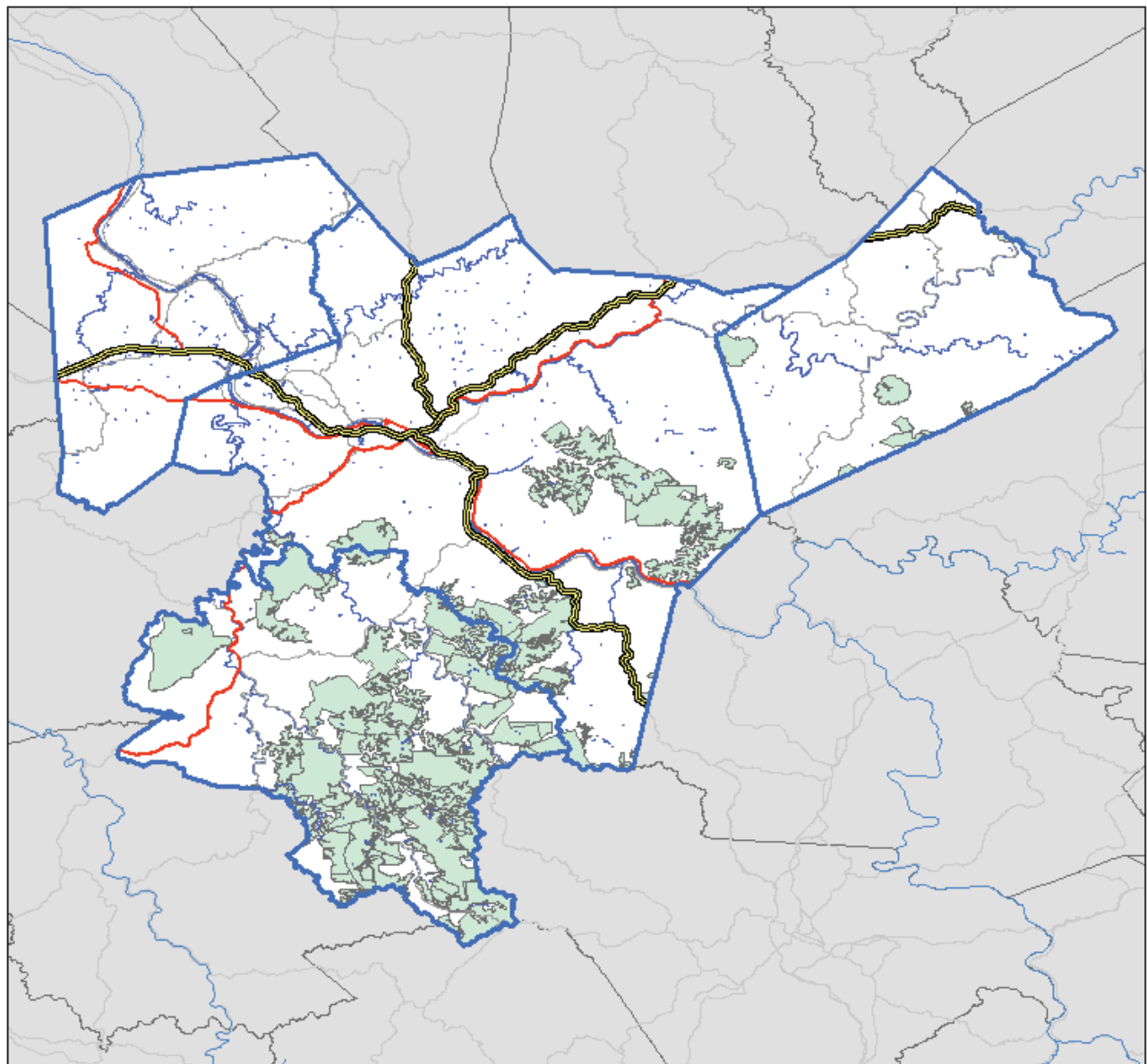


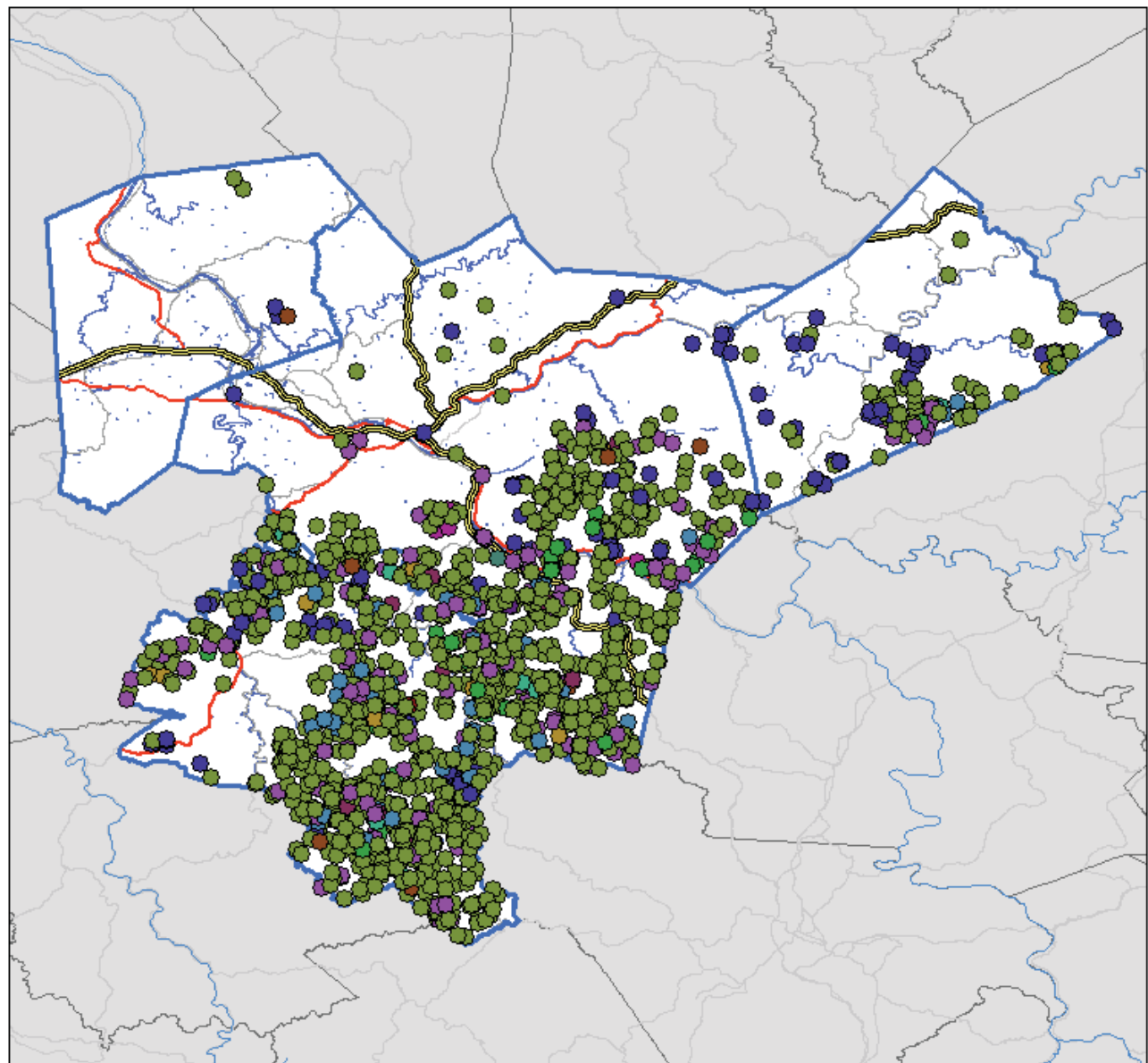
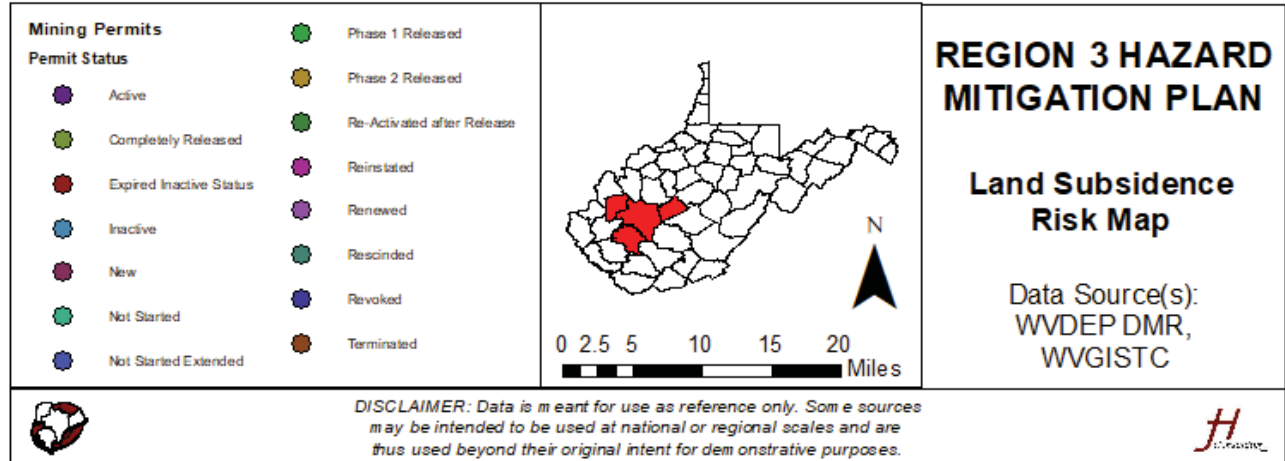




Of particular concern for Region 3 are mine subsidence events, a type of land subsidence caused by human activity. According to the West Virginia Geological & Economic Survey, mine subsidence occurs when the land over an underground mine settles after the collapse of the mine roof. The region has a strong history in coal mining, with numerous closed and abandoned mines being located across the four counties. The following maps show areas of Region 3's underground mine limits (areas susceptible to mine subsidence) and mining permits and their status in the region.

 <p>Underground Mine Limits</p> <p>Extents of potential underground mining; data taken from subsidence control plan maps. For the purposes of subsidence planning, and not the area which already has been mined.</p>	 <p>0 2.5 5 10 15 20 Miles</p>	<p>REGION 3 HAZARD MITIGATION PLAN</p> <p>Land Subsidence Risk Map</p> <p>Data Source(s): WVDEP DMR, WVGISTC</p>
<p> <i>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.</i> </p>		





Hazard Impacts

Buildings constructed above mines can suffer major damage to walls and foundations can occur if the mine subsides. As with land movement, mine subsidence can damage homes and property. Most homeowner insurance policies do not automatically cover mine subsidence damage to homes.

Land subsidence is not random, and is not a totally unpredictable phenomenon. Certain inherent geologic conditions are a prerequisite and one or more of the following conditions can serve as an alert to potential land subsidence problems.

- Joined rocks
- Fine-grained, permeable rock or sediment
- Areas of abandoned underground mines
- Areas with large buried pipelines

The whole of Earth's surface is endangered by land slippage, and all landslides or slips involve the failure of earth materials under stress. Particularly vulnerable areas to landslides are mountainous regions and those that experience volcanic, seismic, or excessive flooding activity, Removal of lateral support, overloading, vibrations from earthquakes, soil composition, and change in weather or water content all contribute to land movement. Slope saturation by water is a primary cause of landslides (USGS, 2004). This can occur from intense rainfall, snowmelt, changes in ground-water levels, and water-level changes along coastlines, earth dams, and the bands of lakes, reservoirs, canals, and rivers.

Landslides can destroy individual homes or sweep away whole communities, devastate farm and forest land, destroy mines, cut roadways, roads, bridges, tunnels, cables, surface mains and pipelines, and damage dams, channels, and protecting walls. Significant rock movement may also cause secondary losses, as debris may dam whole valleys and create temporary or permanent water reservoirs.

Generally, landslides and subsidence cause death, injuries, trauma and suffocation from entrapment. Depending on the location, these events could cause losses and damages to homes, infrastructure and critical facilities and block whole communities off.

Historical Occurrences

February 19, 2014

On the morning of February 19, 2014, a rockslide (listed as a "debris flow" in the NCEI) occurred in western Kanawha County. According to the NCEI, a large portion of a hillside had

been cut away years before to make room for a building, creating a vertical cliff approximately 20 to 25 feet high. Freezing and thawing events over the year caused the cliff face to become unstable until a large section gave way. Several large six by six foot chunks of rock slid down the steep embankment, causing damage to the building and the vehicles stored inside. The NCEI data shows \$20,000 in damage from the event (2021).

March 12, 2015

The most widely covered landslide event to occur in the region recently occurred on March 12th, 2015, at Charleston’s Yeager Airport. A large section of a 240 foot high man made hillside that supported a safety system on the runways at the airport failed, causing a landslide that covered a local church and destroyed two homes in the area while also blocking a creek, causing flooding. Dozens of residents were evacuated due to the slide, which also destroyed trees, power lines, and poles in the area (ABC News, 2015). The slide continued to spread into the early morning hours of March 13th. The image shows the extent of the event. The runway seen in the image was not damaged. The NCEI data lists the property damage for this event as \$1 Million.



Loss and Damages

The West Virginia statewide Total Exposure Area Landslide (TEAL) data can be used to determine future potential losses. The table below shows susceptibility by structure count and value for each jurisdiction.

LANDSLIDE SUSCEPTIBILITY BY JURISDICTION						
Jurisdiction	High Susceptibility		Medium Susceptibility		Low Susceptibility	
	Count	Value	Count	Value	Count	Value
Boone County*	28	\$347K	243	\$11,898K	11,209	\$240,903K
Danville	0	\$0K	5	\$212K	307	\$17,632K
Madison	2	\$1K	18	\$607K	1,274	\$99,352K
Sylvester	0	\$0K	0	\$0K	59	\$2,667K
Whitesville	0	\$0K	4	\$46K	236	\$7,898K
Total Boone County	30	\$347K	270	\$12,762K	13,085	\$368,451K

LANDSLIDE SUSCEPTIBILITY BY JURISDICTION						
Jurisdiction	High Susceptibility		Medium Susceptibility		Low Susceptibility	
	Count	Value	Count	Value	Count	Value
Clay County*	6	\$45K	284	\$3,518K	5,516	\$100,018K
Clay	0	\$0K	40	\$1,057K	328	\$16,062K
Total Clay County	6	\$45K	324	\$4,575K	5,844	\$116,080K
Kanawha County*	95	\$5,587K	2,233	\$106,022K	50,718	\$2,969,558K
Belle	0	\$0K	4	\$141K	653	\$41,665K
Cedar Grove	0	\$0K	5	\$120K	538	\$18,829K
Charleston	161	\$9,976K	2,250	\$189,324K	26,141	\$3,482,131K
Chesapeake	0	\$0K	-	\$0K	894	\$30,647K
Clendenin	0	\$0K	80	\$1,939K	620	\$26,909K
Dunbar	3	\$291K	103	\$6,322K	4,067	\$271,838K
East Bank	0	\$0K	4	\$61K	472	\$22,324K
Glasgow	0	\$0K	1	\$28K	400	\$24,609K
Handley	1	\$25K	2	\$27K	173	\$3,537K
Marmet	2	\$0K	9	\$118K	912	\$50,711K
Nitro**	1	\$105K	35	\$3,187K	2,954	\$257,839K
Pratt	0	\$0K	-	\$0K	305	\$16,992K
South Charleston	35	\$3,797K	585	\$61,494K	6,645	\$807,347K
St. Albans	10	\$646K	130	\$10,377K	5,628	\$442,018K
Total Kanawha County	308	\$20,428K	5,441	\$379,161K	95,492	\$8,024,937K
Putnam County*	14	\$343K	517	\$34,219K	21,399	\$2,463,613K
Bancroft	0	\$0K	10	\$56K	229	\$5,221K
Buffalo	0	\$0K	0	\$0K	726	\$43,667K
Eleanor	0	\$0K	8	\$1,038K	724	\$103,417K
Hurricane	0	\$0K	17	\$2,182K	2,924	\$360,909K
Nitro**	0	\$0K	8	\$140K	578	\$52,494K
Poca	0	\$0K	0	\$0K	428	\$50,563K
Winfield	0	\$0K	1	\$169K	1,098	\$168,753K
Total Putnam County	14	\$343K	561	\$37,803K	28,106	\$3,248,637K

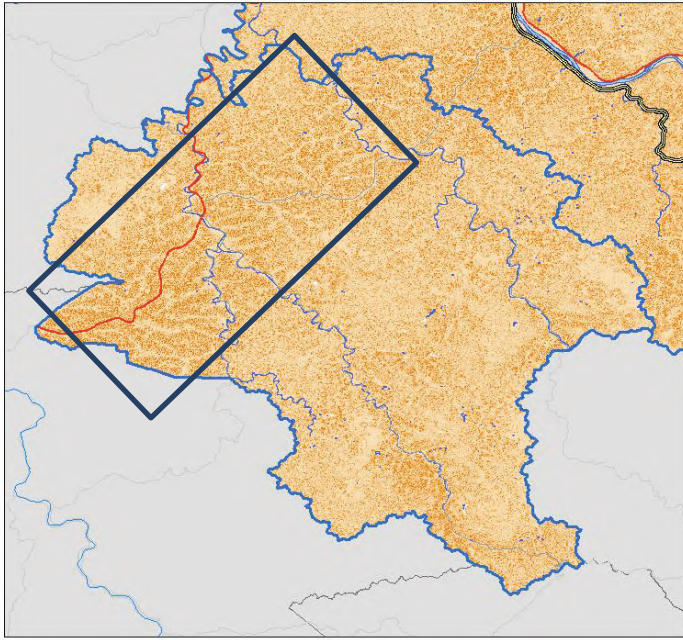
Vulnerability Assessment

Region 3 conducted an online survey for the public to share its thoughts on hazard vulnerabilities. The following table presents the results of that survey regarding Land Subsidence.

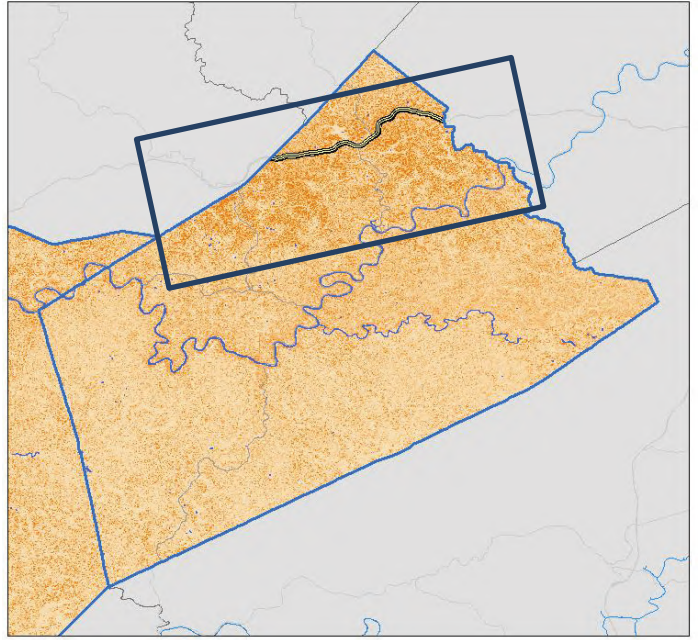
PUBLIC SENTIMENT, LAND SUBSIDENCE – REGION 3					
Hazard	Level of Concern				Total Responses
	Not at All	Somewhat	Concerned	Very	
Land Subsidence	32 (17.02%)	53 (28.19%)	64 (34.04%)	39 (20.74%)	188
In the past ten years, do you remember this hazard occurring in your community?				94 (50.00%)	188
Have you noticed an increase in the occurrences or intensity of this hazard?				88 (46.80%)	188
Have you noticed a decrease in the occurrences or intensity of this hazard?				2 (1.06%)	188

The TEAL-generated maps in the “Location and Extent” section above provide insights about the locations of potential future vulnerability to landslides. Development in the brighter orange areas may be more susceptible to landslides than development in the lighter orange areas. The following images identify specific areas of higher concern via a blue inset box.

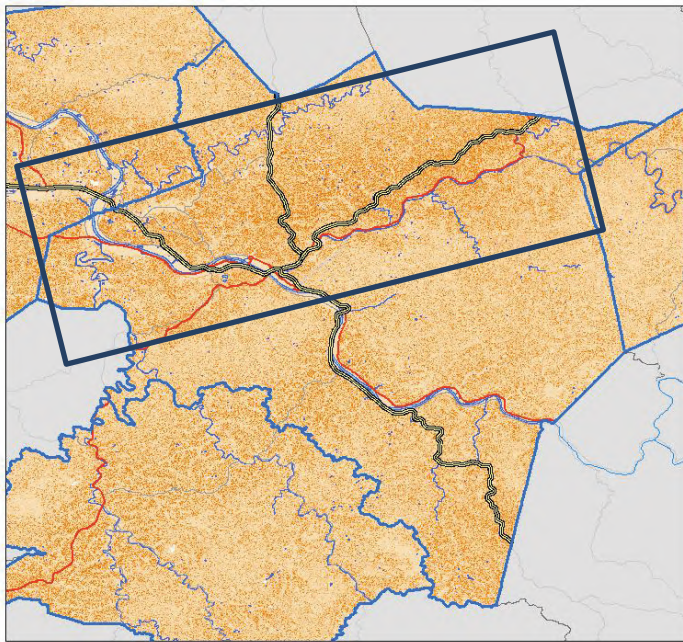
Boone County



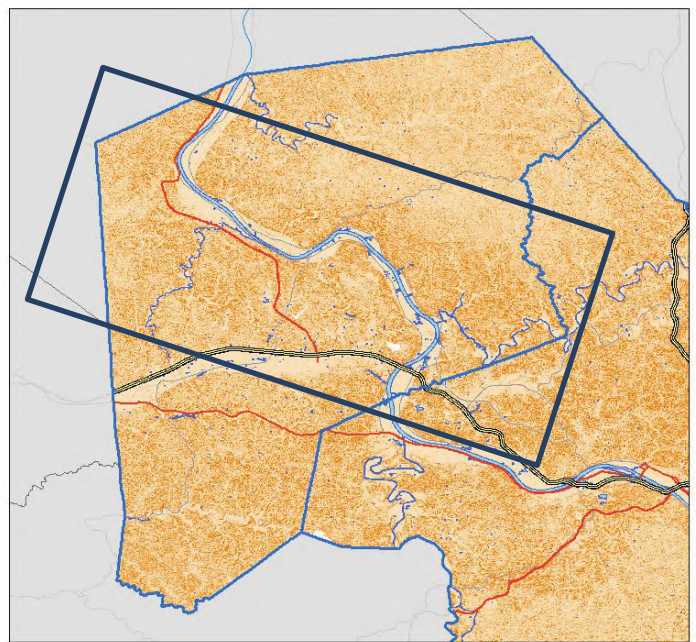
Clay County



Kanawha County



Putnam County

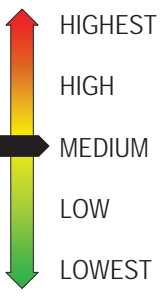


The following table assigns point totals based on the research presented in this profile for each vulnerability category.

LANDSLIDE AND LAND SUBSIDENCE VULNERABILITY SUMMARY			
Category	Points	Description	Notes
Frequency	4	High	According to the <i>West Virginia Standard Statewide Hazard Mitigation Plan</i> , Region 3 is an area highly susceptible to landslides.
Response	3	One week	Most land subsidence areas take a minimum of one week to clean-up and repair.
Onset	3	6-12 hours	Some instances of land subsidence can occur with minimal warning.
Magnitude	1	Localized (< 10% of land area affected)	Most land subsidence events are site specific in natures, and do not affect vast areas.
Business	2	One Week	Businesses located in the affected area of a large-scale land subsidence event would be impacted for a minimum of one week.
Human	2	Minimum (minor injuries)	Historically land subsidence has only resulted in property damage. The greatest chance of personal injury would be to motorists.
Property	2	Less than 10% of property affected	Most land subsidence events are site specific in natures, and do not affect vast areas.
Total	17	Medium	

2.0 RISK ASSESSMENT

2.2.10 Severe Weather

A severe thunderstorm is one that produces a tornado, winds in excess of 58 miles per hour, or hail of one inch in diameter or larger. Severe hail is often a product of severe storms, producing hailstones of one inch in diameter or larger. Straight-line winds (Derechos), downburst, macrobursts, and gust fronts are all part of severe wind events.			
 <p>Vulnerability</p> <p>HIGHEST</p> <p>HIGH</p> <p>MEDIUM</p> <p>LOW</p> <p>LOWEST</p>	Period of Occurrence:	At any time.	Hazard Index Ranking: Medium
	Warning Time:	12-24 hours	State Risk Ranking: High
	Probability:	Frequent (will occur on an annual basis)	Severity: Limited
	Type of Hazard:	Natural	Disaster Declarations: DR-1229 DR-1696 DR-1378 DR-1893 DR-1410 EM-13345 DR-1474 DR-4071 DR-1500 DR-4219 DR-1522 DR-4219 DR-1558 DR-4236

Hazard Overview

For this update of the Region 3 Hazard Mitigation Plan, the heading of Severe Weather analyzes severe/high winds, hail, and thunder and lightning storms. 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, heavy rain, hail, damaging wind, and tornadoes.

TYPES OF THUNDERSTORMS				
Type	Description	Duration	Wind Speeds	Associated Hazards
Single Cell	Uncommon	20 - 30 minutes	N/A	<ul style="list-style-type: none"> • Non-damaging hail • Microbursts • Weak tornadoes
Multi-Cell	Common, organized cluster of two or more single cells.	Each cell lasts approximately 20 minutes	Downbursts of up to 80 mph	<ul style="list-style-type: none"> • Heavy rainfall • Downbursts • Hail • Weak tornadoes

Mesoscale Convective System (MCS)	A well-organized system of thunderstorms	Up to 12 hours or more	55 mph or more	<ul style="list-style-type: none"> • Torrential rainfalls • Derechos • Tornadoes
Squall Lines	May extend over 250 to 500 miles and 10 to 20 miles wide	Individual cells last from 30 to 60 minutes	N/A	<ul style="list-style-type: none"> • Significant rain after the storm • Derechos
Super Cells	Most dangerous storms, visible with Doppler radars	1 - 6 hours	Updrafts and downdrafts of more than 100 mph	<ul style="list-style-type: none"> • Tornadoes • Hail

Lightning is a naturally-occurring 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.

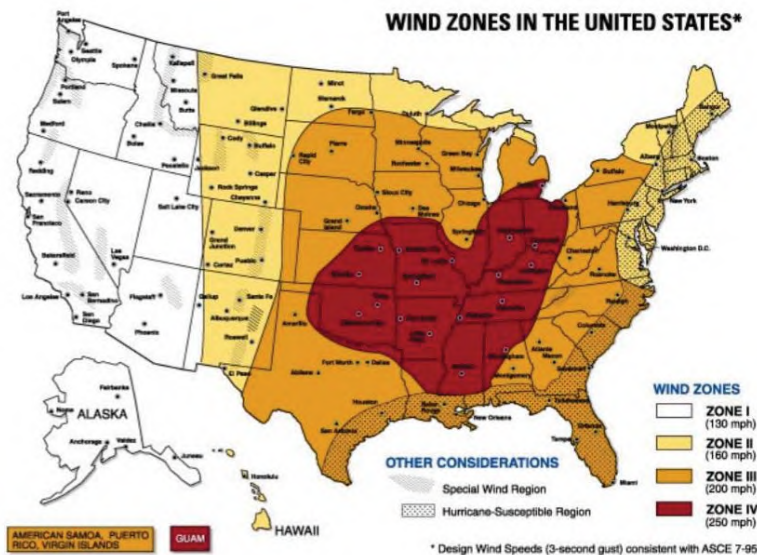
Severe wind includes non-tornadic, damaging winds from thunderstorms. There are six types of severe wind: straight-line wind, downbursts, macrobursts, microbursts, gust fronts, and derechos.

- **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 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 wind storm 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 58 mph and a diameter of 240 miles is a derecho.

Location and Extent

Thunderstorms and hail can affect all areas of the region. These events can last a few seconds (i.e., lightning), minutes, 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. All areas of Region 3 are at an equal risk of experiencing severe wind events. FEMA's wind zone map classifies wind zones in the United States. As shown below, all of West Virginia lies within a Zone III area, which means buildings should be constructed to withstand three-second gusts of up to 200 miles per hour.



The Beaufort Wind Scale measures wind. This scale 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					
Force	Wind Speed		Description	Appearance of Wind Effects	
	Knots	MPH		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 1-4 ft. becoming longer, numerous whitecaps	Dust, leaves, and loose paper lifted, small tree branches move

BEAUFORT WIND SCALE					
Force	Wind Speed		Description	Appearance of Wind Effects	
	Knots	MPH		On Water	On Land
5	17-21	19-24	Fresh Breeze	Moderate waves 4-8 ft. taking longer form, many whitecaps, some spray	Small trees in leaf begin to sway
6	22-27	25-31	Strong Breeze	Larger waves 8-13 ft., whitecaps common, more spray	Larger tree branches moving, whistling in wires
7	28-33	32-38	Near Gale	Sea heaps up, waves 13-19 ft., white foam streaks off breakers	Whole trees moving, resistance felt walking against wind
8	34-40	39-46	Gale	Moderately high (18-25 ft.) waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks	Twigs breaking off trees, generally impedes progress
9	41-47	47-54	Strong Gale	High waves (23-32 ft.), 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 (29-41 ft.) 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 (37-52 ft.) waves, foam patches cover sea, visibility more reduced	N/A
12	64+	72+	Hurricane	Air filled with foam, waves over 45 ft., sea completely white with driving spray, visibility greatly reduced	N/A

Impacts and Vulnerability

The impacts of thunderstorms include injury and even death. In some cases, lightning has caused fires in structures and open land or forests, while heavy rains can damage vegetation and infrastructure. Hail associated with thunderstorms has caused substantial damage to vehicles and buildings in the region. Recently, some of the most damaging impacts of severe thunderstorms have been the cascading effects of long-term power outages.

Severe wind events can cause a variety of secondary and tertiary hazard events. In addition to damaging roofs and other home finishings, wind can cause damage to trees that

may interrupt power service or block roadways. Such damages could be widespread and severe, potentially overwhelming the capacity of local responders to address the situation.

Drought, flooding, and severe storms are likely to be the hazards most-impacted by climate changes in West Virginia. In fact, the impacts to both drought and flooding may stem from what the region feels with respect to changes in future severe storms. According to the USEPA, annual precipitation in most of West Virginia has increased since the first half of the 20th century, “and precipitation from extremely heavy rainstorms in the eastern United States increased by more than 25 percent since 1958” (USEPA, 2016). A *Washington Post* article cited Huntington, West Virginia, just to the west of the region, as seeing severe storms “30% more extreme than in 1970” (Dennis, 2022). The EPA anticipates continued increases in average annual precipitation as well as in the frequency of heavy downpours. Interestingly, the EPA expects precipitation to increase in the winter and spring rather than the summer and fall. Thanks to these changes, intense, hyper-local rainfall events may exacerbate flooding in both areas that frequently experience it as well as those with little history of flooding. Rising temperatures may melt snow earlier in the spring season and increase evaporation, which may dry the soil in the summer and fall seasons.

Past Mitigation Efforts: Severe Thunderstorm

- Coordinating efforts with local media and the National Weather Service to provide advanced warning of severe weather.
- Conducting emergency public information campaigns on severe weather.

Historical Occurrences

Region 3 has experienced 70 severe storm events with at least \$25,000 in property damages since 2002. This rate is an average of 3.5 severe storms per year. These events appear in the table below.

SEVERE STORM EVENTS WITH AT LEAST \$25,000 DAMAGE, 2002-2021 (NCEI, 2022)						
County	Date	Event Type	Deaths	Injuries	Property Damage	Crop Damage
Kanawha	6/8/2005	Thunderstorm Wind	0	0	\$75,000	\$0
Kanawha	8/30/2006	Thunderstorm Wind	0	0	\$75,000	\$0
Kanawha	8/30/2006	Hail	0	0	\$6,000,000	\$0
Kanawha	3/19/2008	Thunderstorm Wind	0	0	\$125,000	\$0
Kanawha	3/19/2008	Thunderstorm Wind	0	0	\$25,000	\$0

SEVERE STORM EVENTS WITH AT LEAST \$25,000 DAMAGE, 2002-2021 (NCEI, 2022)						
<i>County</i>	<i>Date</i>	<i>Event Type</i>	<i>Deaths</i>	<i>Injuries</i>	<i>Property Damage</i>	<i>Crop Damage</i>
Kanawha	6/16/2008	Hail	0	0	\$50,000	\$0
Putnam	2/11/2009	Thunderstorm Wind	0	0	\$25,000	\$0
Kanawha	12/9/2009	High Wind	0	0	\$125,000	\$0
Kanawha	7/13/2010	Thunderstorm Wind	0	0	\$25,000	\$0
Kanawha	8/4/2010	Thunderstorm Wind	1	1	\$200,000	\$0
Putnam	8/14/2010	Thunderstorm Wind	0	0	\$100,000	\$0
Kanawha	4/4/2011	Thunderstorm Wind	0	0	\$200,000	\$0
Kanawha	4/4/2011	Thunderstorm Wind	0	0	\$75,000	\$0
Boone	6/23/2011	Thunderstorm Wind	0	0	4\$0,000	\$0
Kanawha	1/1/2012	Strong Wind	0	0	\$50,000	\$0
Putnam	6/29/2012	Thunderstorm Wind	0	0	\$2,500,000	\$0
Putnam	6/29/2012	Thunderstorm Wind	0	0	\$25,000	\$0
Kanawha	6/29/2012	Thunderstorm Wind	0	0	\$6,000,000	\$0
Kanawha	6/29/2012	Thunderstorm Wind	0	0	\$500,000	\$0
Kanawha	6/29/2012	Thunderstorm Wind	0	0	\$300,000	\$0
Kanawha	6/29/2012	Thunderstorm Wind	0	0	\$100,000	\$0
Kanawha	6/29/2012	Thunderstorm Wind	0	0	\$25,000	\$0
Clay	6/29/2012	Thunderstorm Wind	0	0	\$1,000,000	\$0
Boone	6/29/2012	Thunderstorm Wind	0	0	\$750,000	\$0
Kanawha	7/5/2012	Lightning	0	0	\$100,000	\$0
Kanawha	7/8/2012	Thunderstorm Wind	0	0	\$250,000	\$0
Putnam	5/22/2013	Thunderstorm Wind	0	2	\$125,000	\$0
Kanawha	7/4/2013	Thunderstorm Wind	0	0	\$90,000	\$0
Kanawha	7/4/2013	Thunderstorm Wind	0	0	\$25,000	\$0
Kanawha	11/1/2013	Thunderstorm Wind	0	0	\$25,000	\$0
Kanawha	11/1/2013	Thunderstorm Wind	0	0	\$25,000	\$0
Kanawha	2/21/2014	Thunderstorm Wind	0	0	\$50,000	\$0
Kanawha	3/12/2014	Strong Wind	0	0	\$150,000	\$0
Putnam	7/14/2014	Lightning	0	0	\$500,000	\$0
Putnam	8/27/2014	Lightning	0	0	\$50,000	\$0
Kanawha	11/1/2014	Strong Wind	0	0	\$30,000	\$0
Kanawha	6/18/2015	Thunderstorm Wind	0	0	\$25,000	\$0
Kanawha	6/18/2015	Thunderstorm Wind	0	0	\$25,000	\$0
Kanawha	6/18/2015	Thunderstorm Wind	0	0	\$25,000	\$0
Putnam	3/1/2016	Strong Wind	0	0	\$25,000	\$0
Kanawha	3/1/2016	Strong Wind	0	0	\$75,000	\$0
Kanawha	4/2/2016	High Wind	0	0	\$50,000	\$0
Kanawha	6/21/2016	Thunderstorm Wind	0	0	\$30,000	\$0

SEVERE STORM EVENTS WITH AT LEAST \$25,000 DAMAGE, 2002-2021 (NCEI, 2022)						
<i>County</i>	<i>Date</i>	<i>Event Type</i>	<i>Deaths</i>	<i>Injuries</i>	<i>Property Damage</i>	<i>Crop Damage</i>
Putnam	6/21/2016	Hail	0	0	\$100,000	\$0
Putnam	6/21/2016	Hail	0	0	\$75,000	\$0
Putnam	6/21/2016	Hail	0	0	\$50,000	\$0
\$0Putnam	6/21/2016	Hail	0	0	\$25,000	\$0
\$0Boone	3/1/2017	Thunderstorm Wind	0	0	\$30,000	\$0
Kanawha	11/18/2017	High Wind	0	0	\$40,000	\$0
Putnam	7/31/2018	Thunderstorm Wind	0	0	\$35,000	\$0
Putnam	10/20/2018	Strong Wind	0	0	\$25,000	\$0
Kanawha	10/20/2018	Strong Wind	0	0	\$80,000	\$0
Boone	10/20/2018	Strong Wind	0	0	\$25,000	\$0
Putnam	2/24/2019	Strong Wind	0	0	\$50,000	\$0
Boone	2/24/2019	Strong Wind	0	0	\$50,000	\$0
Clay	2/24/2019	Strong Wind	0	0	\$50,000	\$0
Kanawha	2/24/2019	Strong Wind	0	0	\$50,000	\$0
Kanawha	5/2/2019	Thunderstorm Wind	0	0	\$200,000	\$0
Putnam	5/3/2019	Hail	0	0	\$500,000	\$0
Kanawha	5/23/2019	Hail	0	0	\$500,000	\$0
Kanawha	6/24/2019	Thunderstorm Wind	0	0	\$50,000	\$0
Putnam	11/27/2019	Strong Wind	0	0	\$30,000	\$0
Kanawha	11/27/2019	Strong Wind	0	0	\$50,000	\$0
Putnam	4/9/2020	Thunderstorm Wind	0	0	\$200,000	\$0
Putnam	4/9/2020	Thunderstorm Wind	0	0	\$150,000	\$0
Putnam	4/9/2020	Thunderstorm Wind	0	0	\$25,000	\$0
Kanawha	4/9/2020	Thunderstorm Wind	0	0	\$50,000	\$0
Kanawha	4/9/2020	Thunderstorm Wind	0	0	\$50,000	\$0
Kanawha	4/9/2020	Thunderstorm Wind	0	0	\$30,000	\$0
Kanawha	8/13/2021	Thunderstorm Wind	0	0	\$75,000	\$0
TOTALS			1	3	\$23,110,000	\$0

June 29, 2012

The event known as “The Derecho” throughout West Virginia occurred on June 29, 2012. This event impacted areas across the eastern United States including all four counties of Region 3. A strong line of storms moved across a large section of the Midwestern United States, across the Appalachians, and into the Mid-Atlantic States on the afternoon and evening of the 29th. The storm destroyed powerlines and utility poles across the state, leaving over 640,000 residents in West Virginia without power. MetroNews reported that 70 high voltage powerlines

were downed by the storm. The NCEI data shows that the region sustained over \$11 million dollars in property damage. Examples of damage in the region include a damaged hangar and small airplane at Yeager Airport in Kanawha County, two destroyed homes, three severely damaged homes and a damaged roof at the career and technical center in Putnam County, and a destroyed home and numerous damage homes in Clay and Boone counties (NCEI, 2022).

May 3, 2019

Following a morning of sunshine, an upper-level disturbance crossed the middle Ohio River Valley and central Appalachians during the afternoon. Hot and humid conditions in combination with the disturbance resulted in severe thunderstorms and hail. Hundreds of vehicles and a few dozen homes were damaged from golf ball sized hail in Teays Valley.

Loss and Damages

Loss estimates for future occurrences of severe storms can be found using the historical data in the NCEI Storm Events Database. Events were broken into four categories (hail, lightning, strong/high wind, and thunderstorms) and total property damage was calculated for each category. Using a 20-year study period (2002-2021), the number of events per year, property damage per year, and crop damage per year, were determined.

TYPE	EVENTS/YEAR	PROPERTY DAMAGE/YEAR	CROP DAMAGE/YEAR
HAIL	11.15	\$377,200	\$0
LIGHTNING	.65	\$34,200	\$0
STRONG/HIGH WIND	2.70	\$62,200	\$0
THUNDERSTORM	14.25	\$784,950	\$0

Vulnerability Assessment

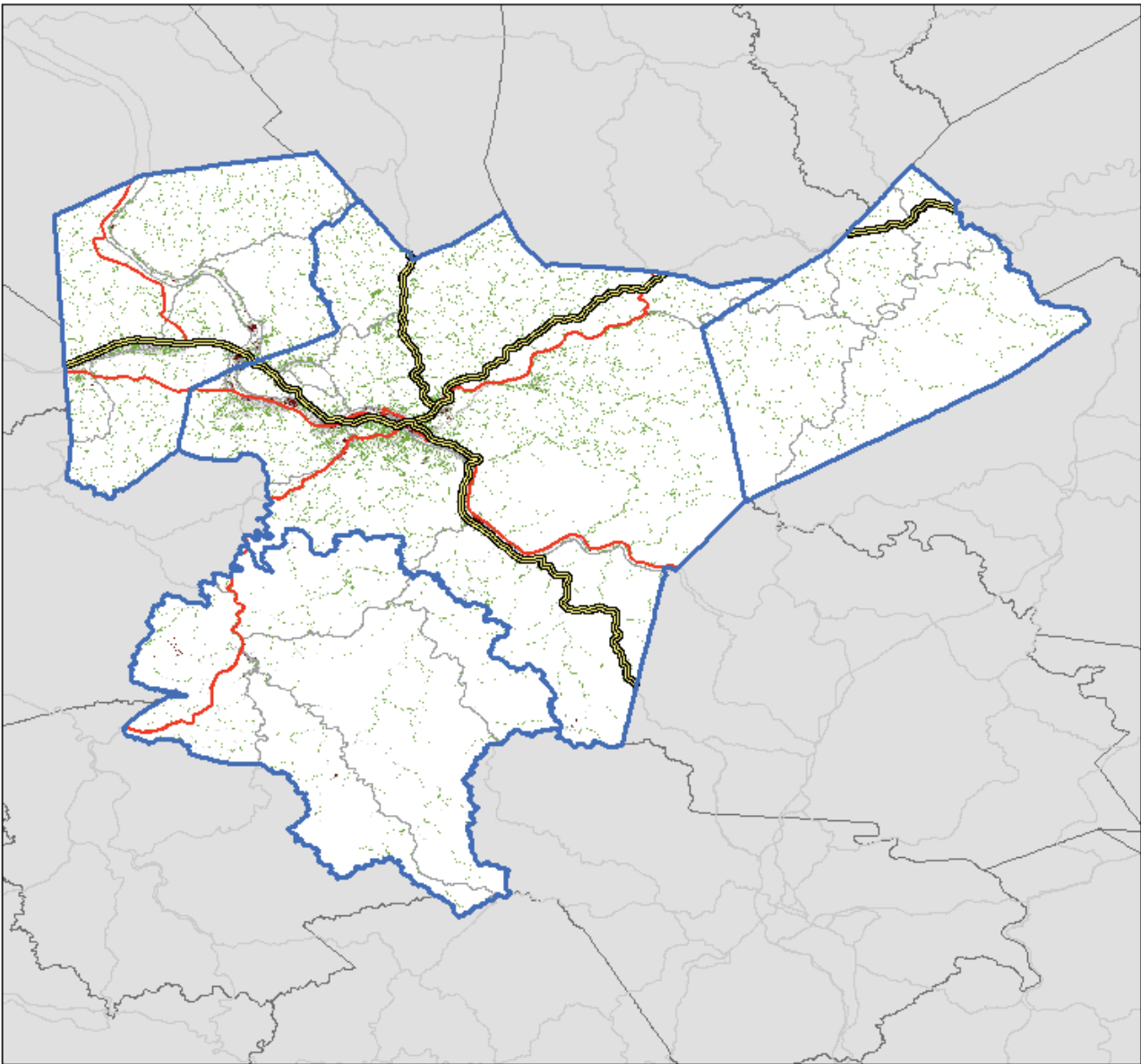
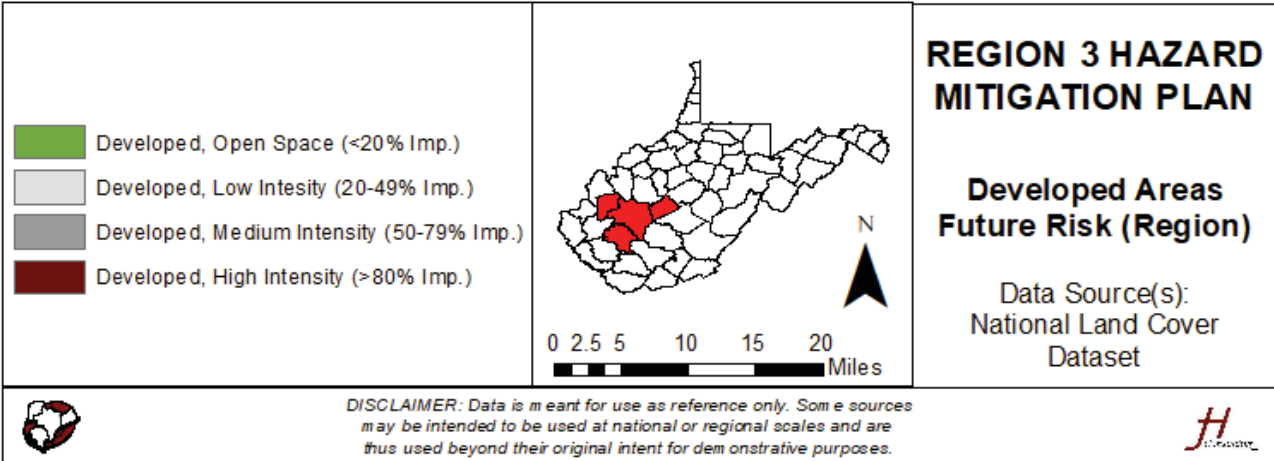
This section summarizes the vulnerability to Region 3 from severe storms. Region 3 conducted an online survey for the public to share its thoughts on hazard vulnerabilities. The following table presents the results of that survey regarding severe storms.

PUBLIC SENTIMENT, SEVERE STORMS – REGION 3					
Hazard	Level of Concern				Total Responses
	Not at All	Somewhat	Concerned	Very	
Severe Storms	13 (6.91%)	48 (25.53%)	74 (39.36%)	53 (28.19%)	188
In the past ten years, do you remember this hazard occurring in your community?				151 (80.30%)	188
Have you noticed an increase in the occurrences or intensity of this hazard?				110 (58.51%)	188
Have you noticed a decrease in the occurrences or intensity of this hazard?				3 (1.59%)	188

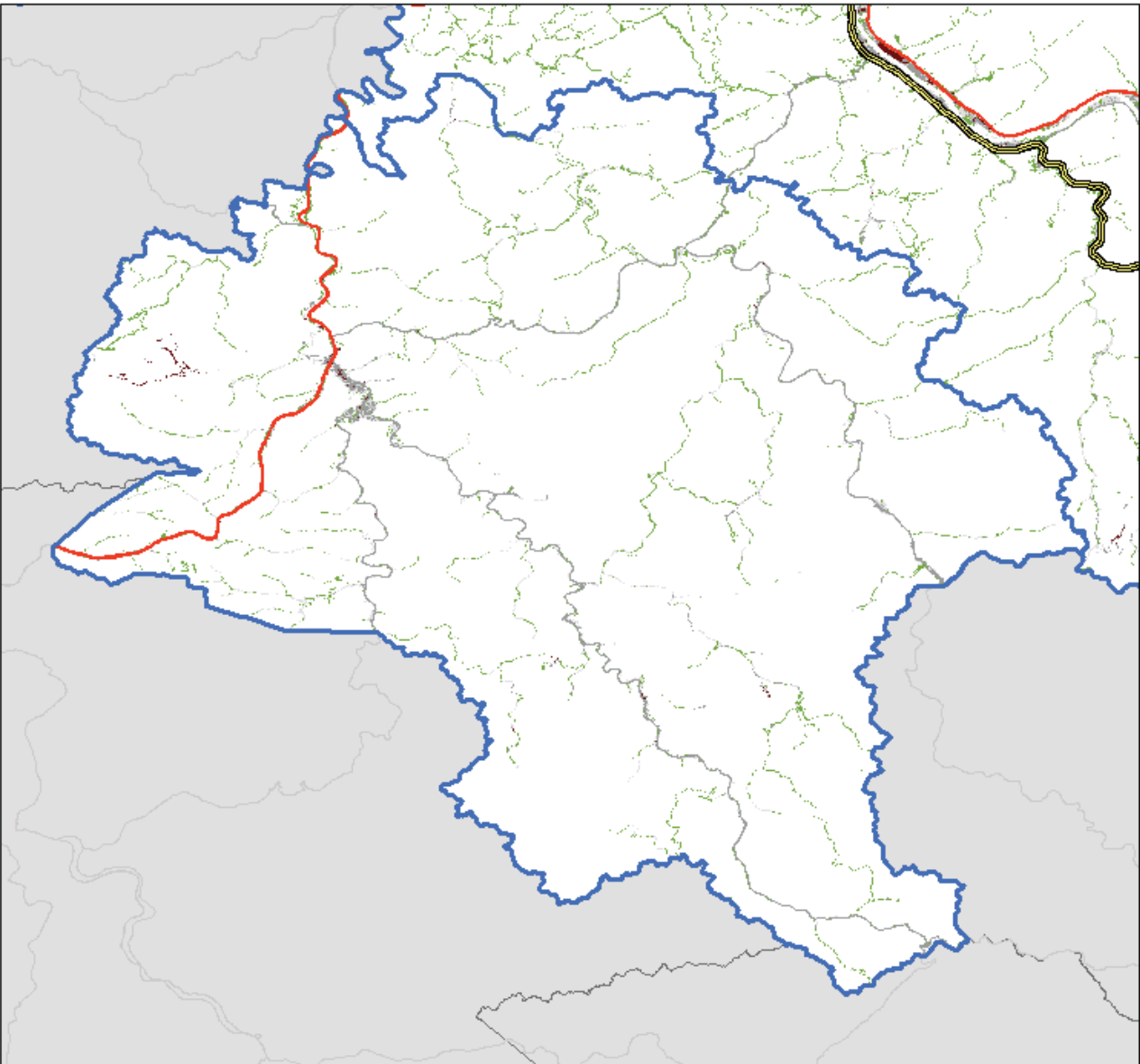
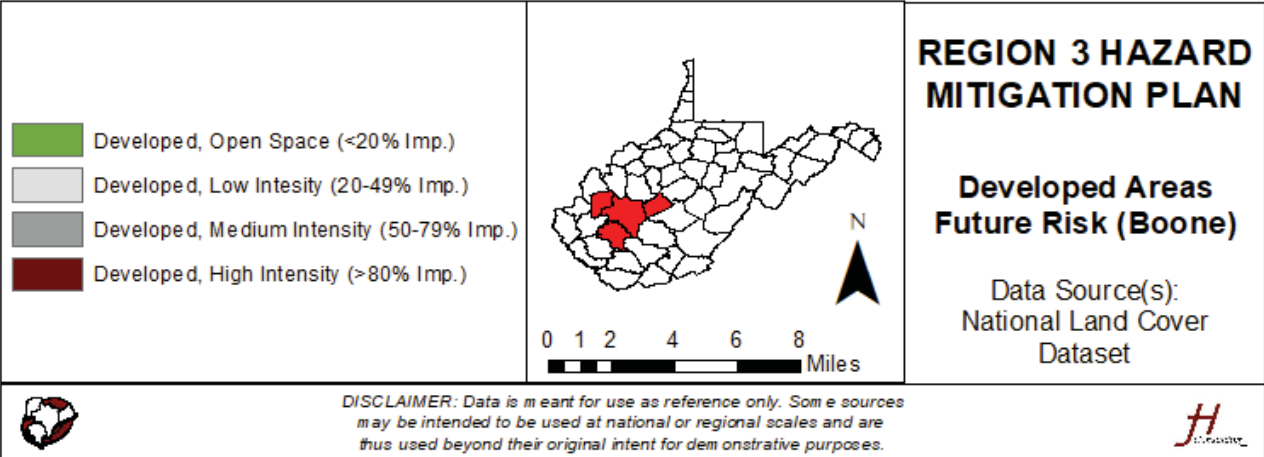
Future vulnerability from severe storms is somewhat difficult to predict, though based on an assumption that future, severe rainfall events will be more common, planners examined areas that could be impacted by those events. The following map examines land cover, and in particular, impervious land cover. These maps identify areas by the percentage of land covered by impervious surfaces per the National Land Cover Dataset. Only developed areas were considered, and the shaded areas identify one of four conditions:

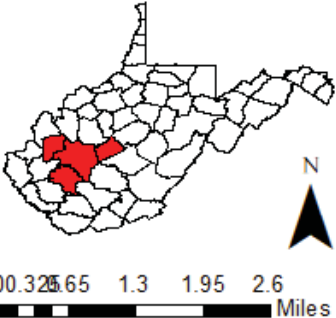


- Less than 20% of surfaces covered with impervious materials,
- 20-49% of surfaces considered to be impervious,
- 50-79% of surfaces impervious, and
- Greater than 80% of surfaces covered with impervious materials.

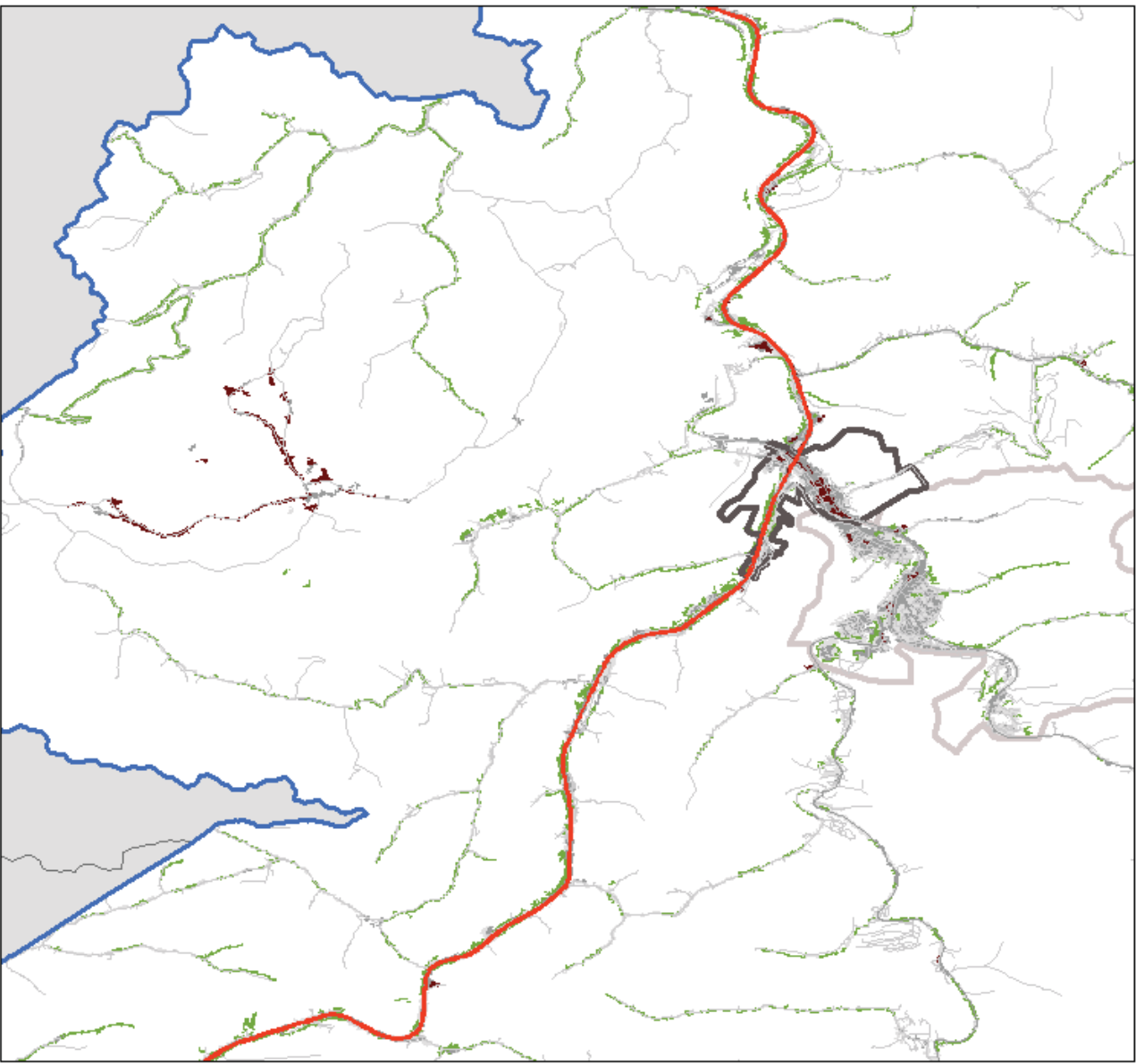
The higher the coverage with impervious surfaces, the less water from severe rainfall events can be absorbed. Consequently, these areas may see increased future vulnerability to flooding.

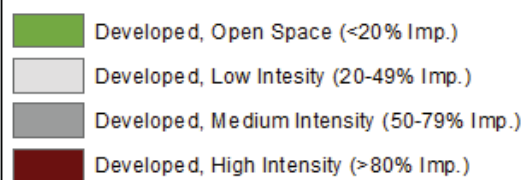
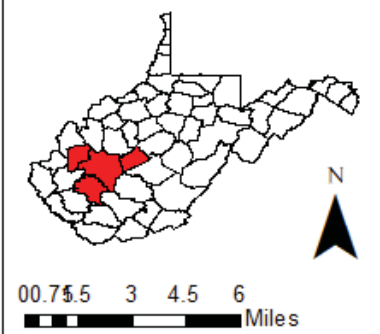




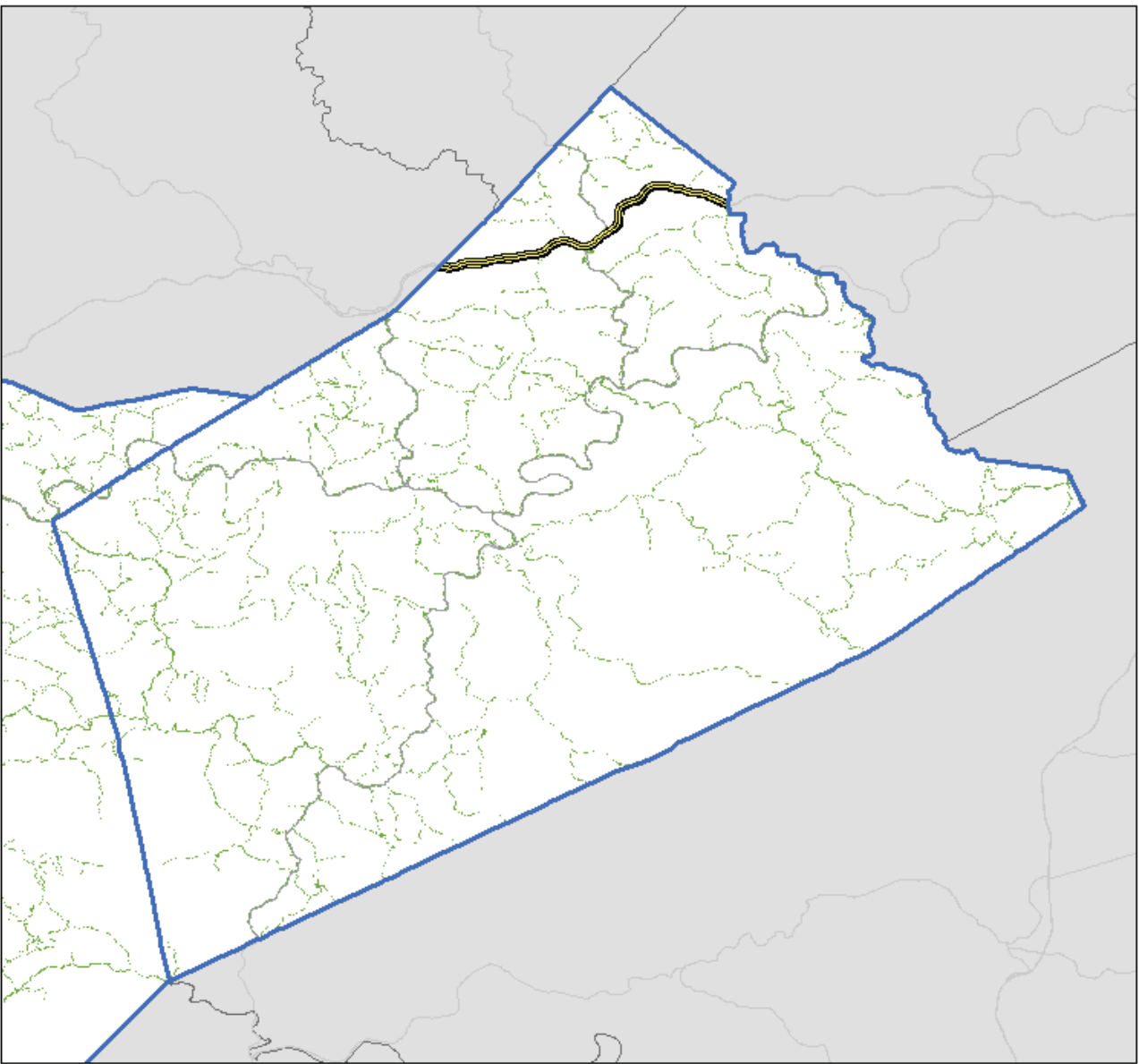
A similar map for each county follows, and when applicable, an inset map to show greater detail on high density areas is included.

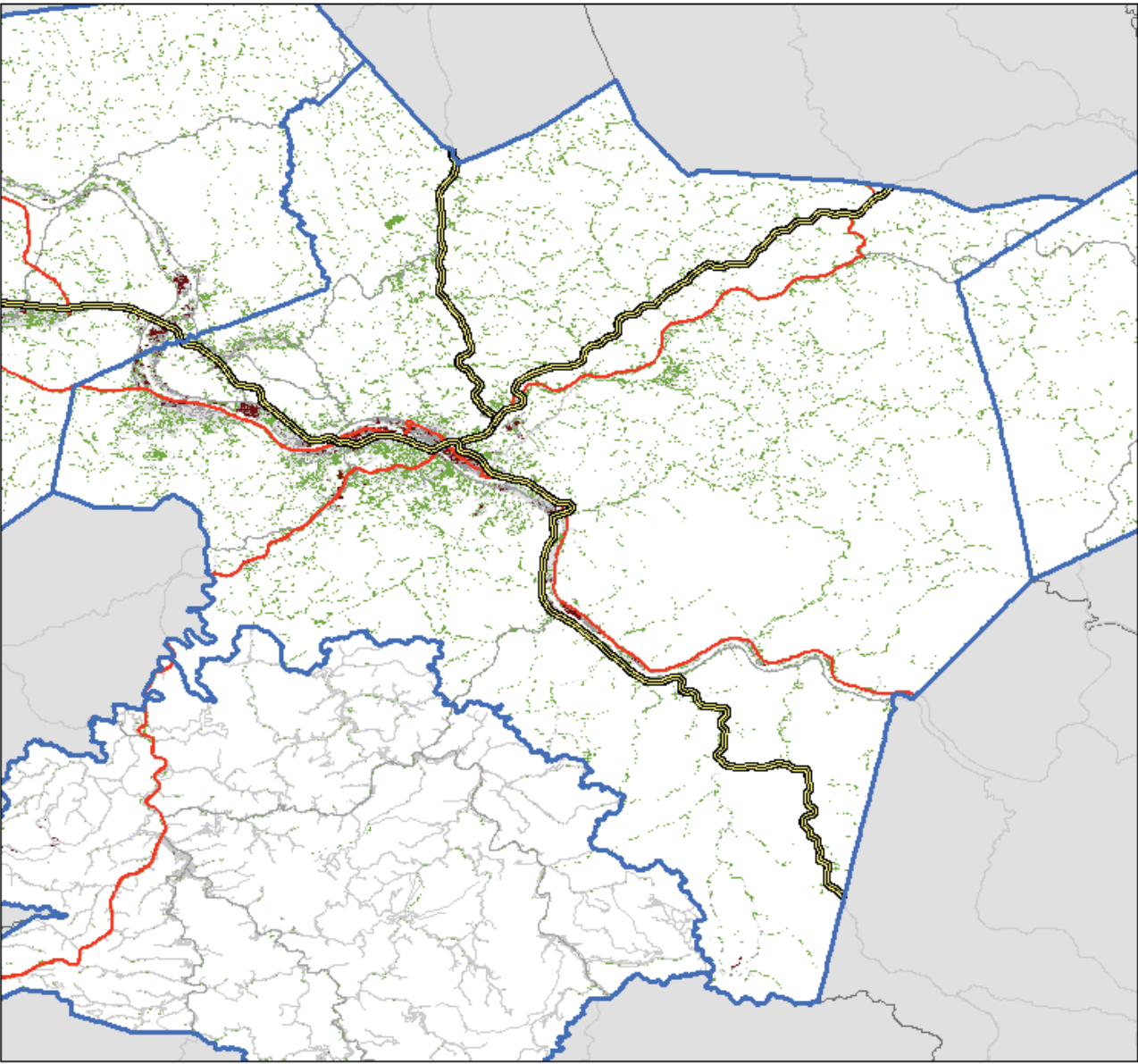
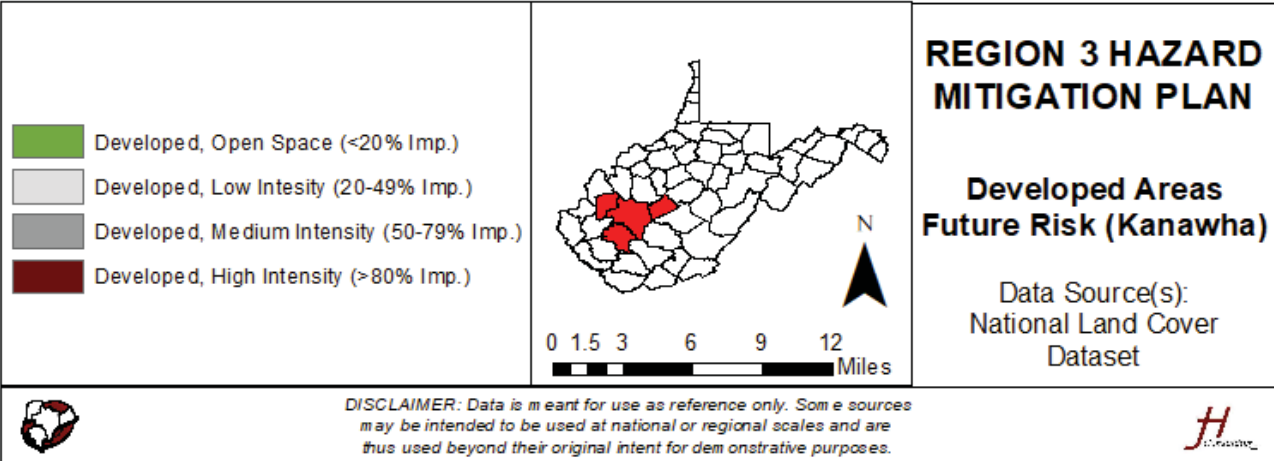


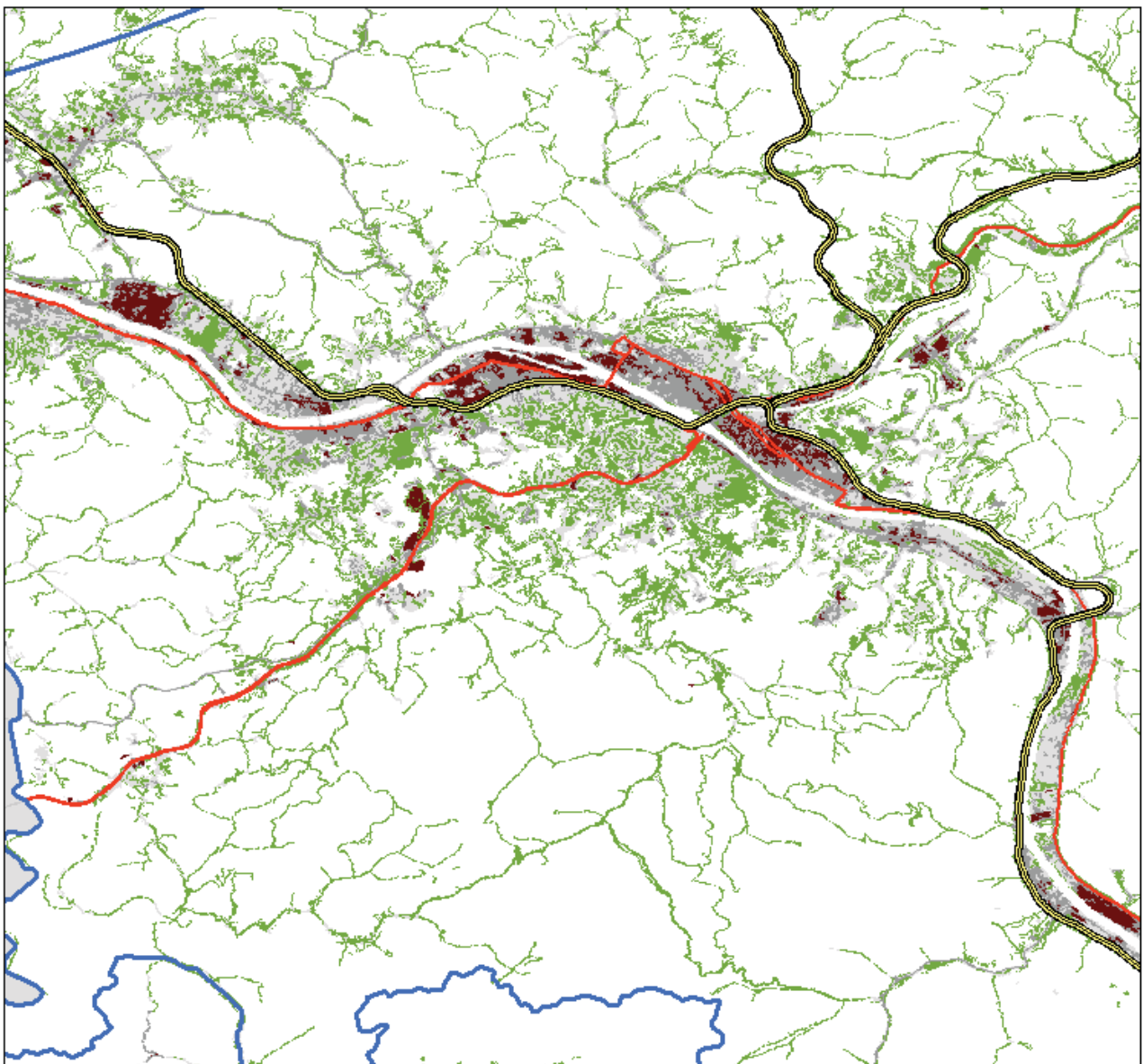
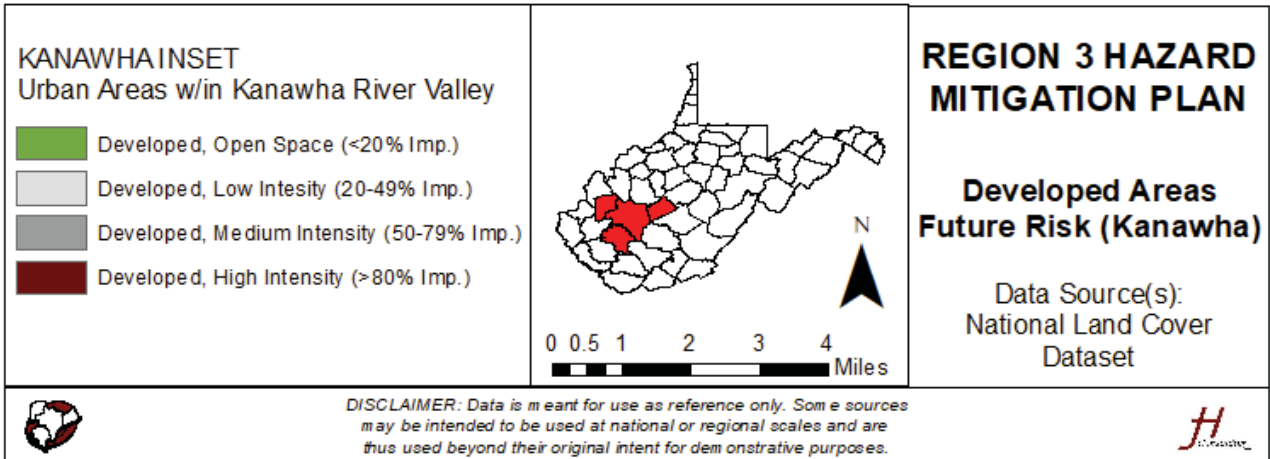
<p>BOONE INSET Danville/Madison Areas and Points West</p> <ul style="list-style-type: none"> Developed, Open Space (<20% Imp.) Developed, Low Intensity (20-49% Imp.) Developed, Medium Intensity (50-79% Imp.) Developed, High Intensity (>80% Imp.) 		<p>REGION 3 HAZARD MITIGATION PLAN</p> <p>Developed Areas Future Risk (Boone)</p> <p>Data Source(s): National Land Cover Dataset</p>
<p> <i>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.</i> </p>		

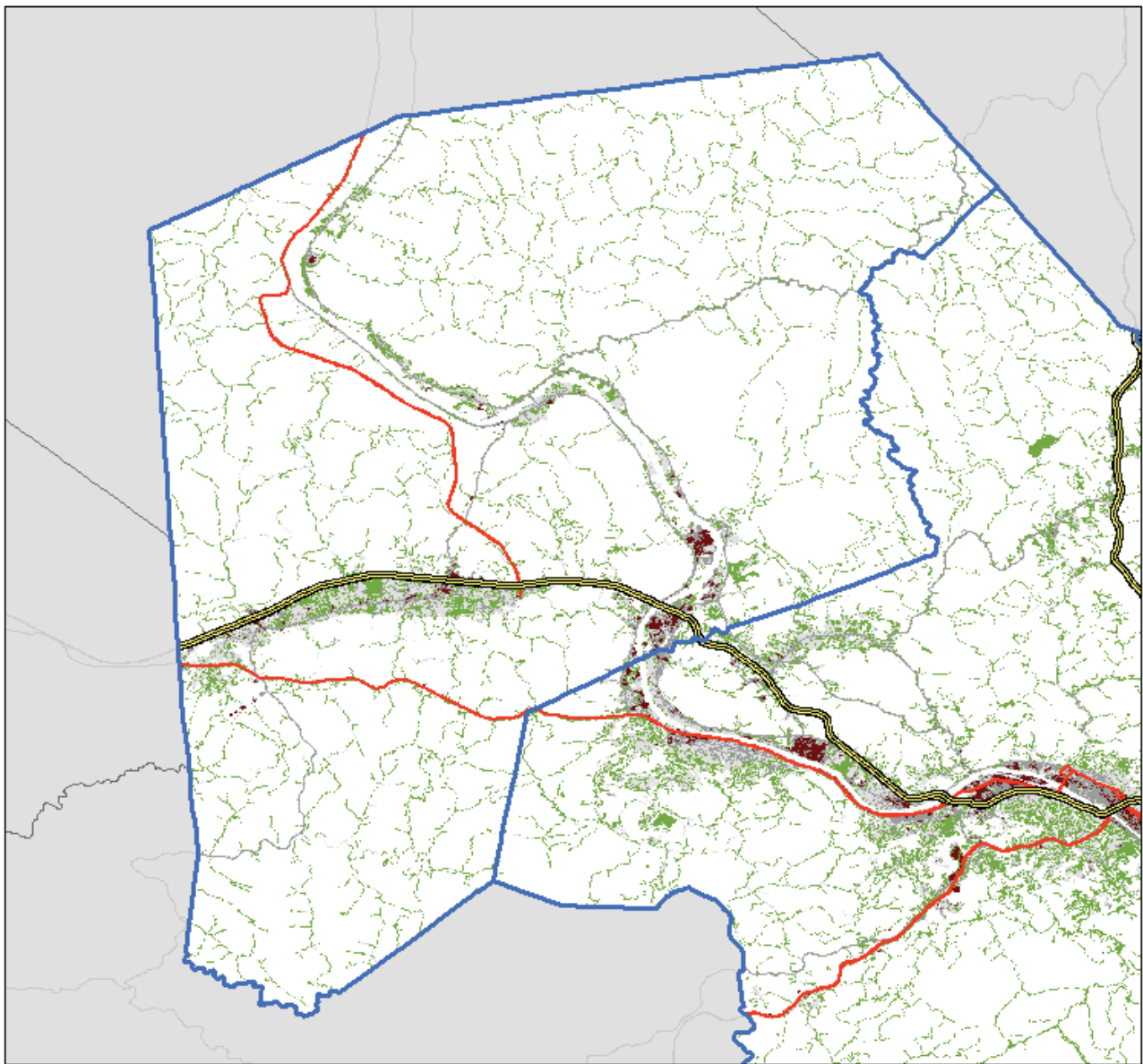
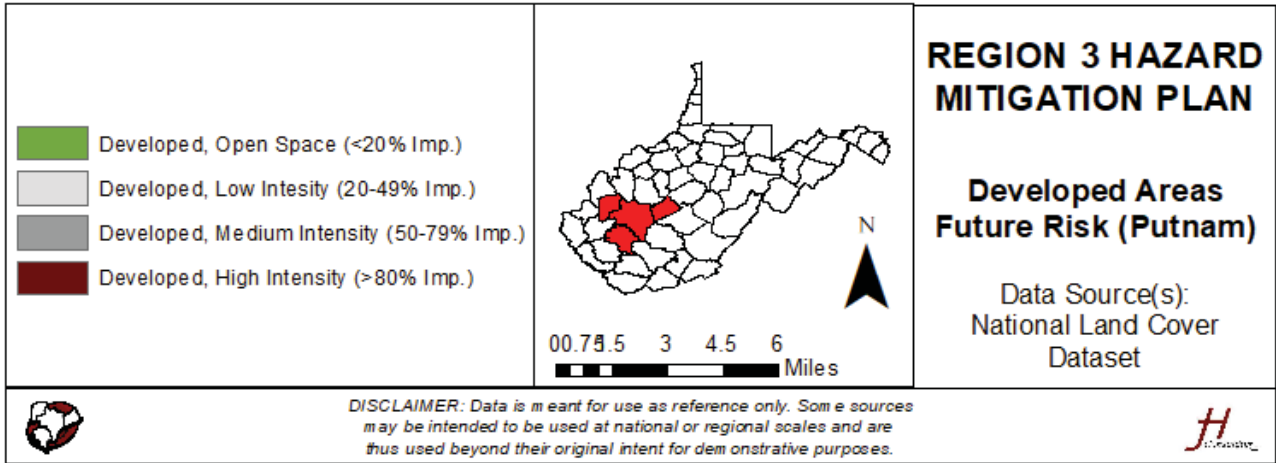


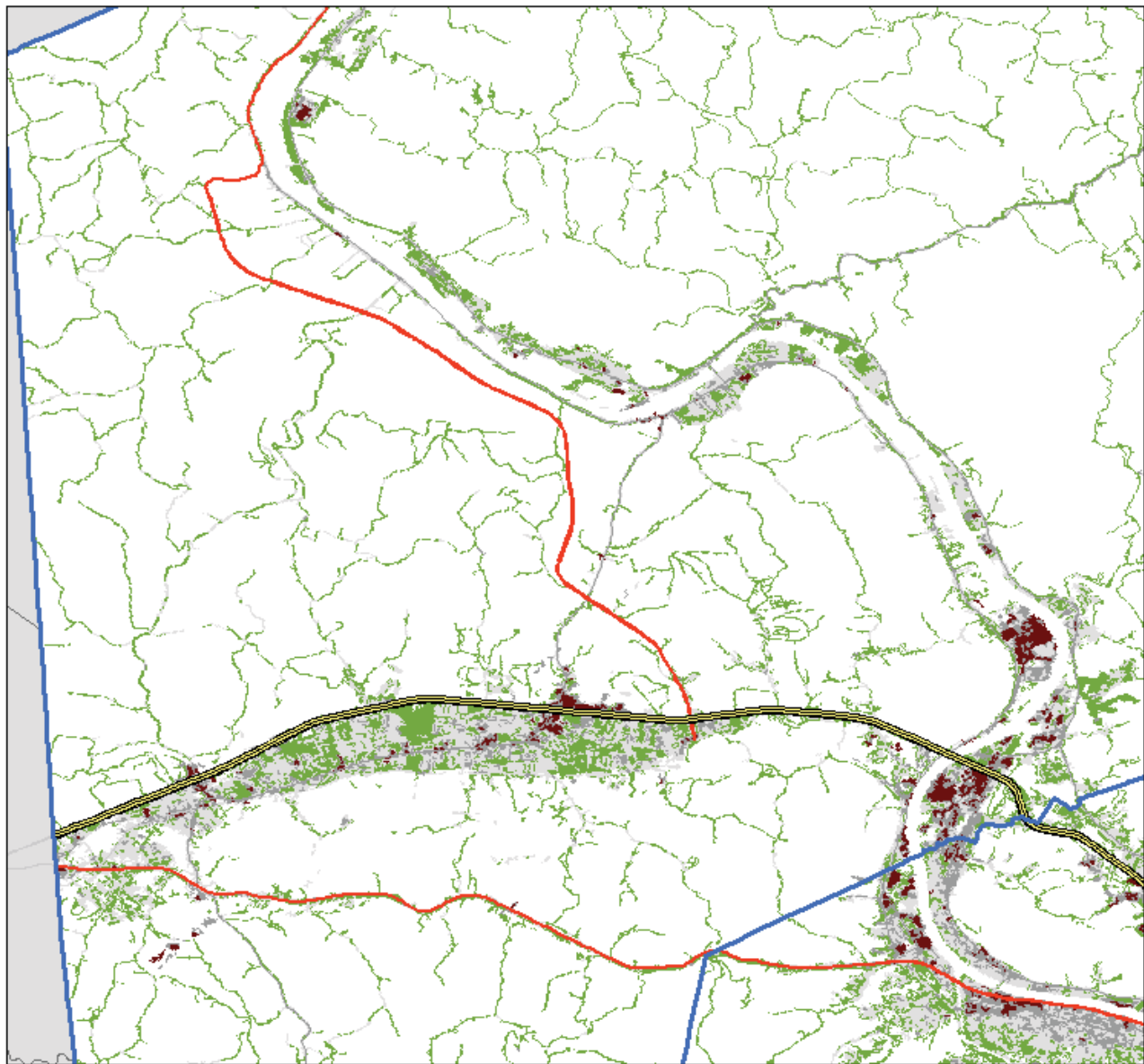
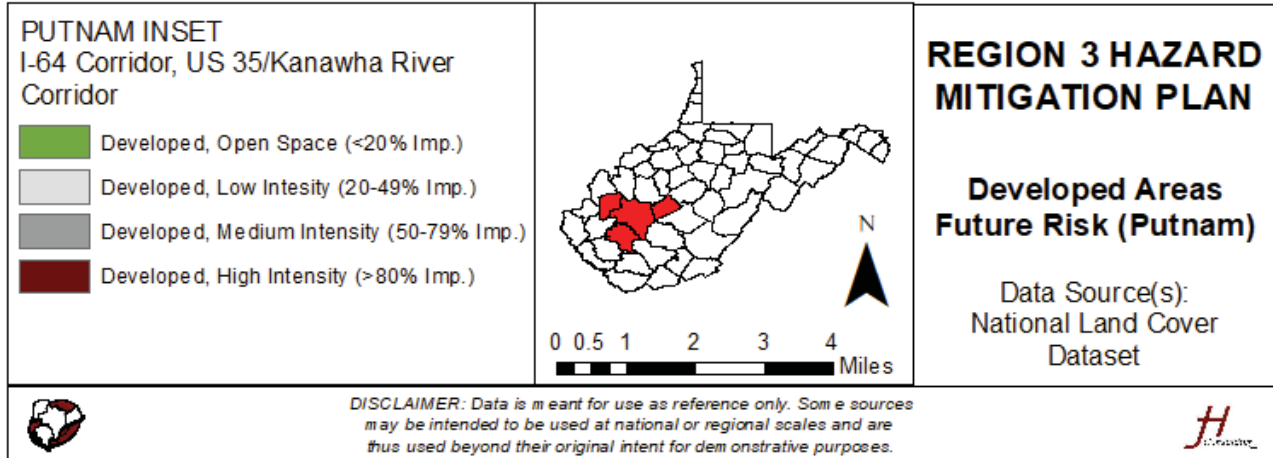
 <ul style="list-style-type: none">Developed, Open Space (<20% Imp.)Developed, Low Intensity (20-49% Imp.)Developed, Medium Intensity (50-79% Imp.)Developed, High Intensity (>80% Imp.)	 <p>0 0.75 1.5 3 4.5 6 Miles</p>	<h3>REGION 3 HAZARD MITIGATION PLAN</h3> <h4>Developed Areas Future Risk (Clay)</h4> <p>Data Source(s): National Land Cover Dataset</p>
<p> 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. </p>		











The following table assigns point totals based on the research presented in this profile.

SEVERE THUNDERSTORM VULNERABILITY SUMMARY			
<i>Category</i>	<i>Points</i>	<i>Description</i>	<i>Notes</i>
Frequency	5	Excessive	There have been 70 severe weather events with at least \$25,000 in damages since 2002 for an average of 3.5 severe weather events per year.
Response	2	One day	The response to severe thunderstorms typically occurs over a day (though storms impacting infrastructure can necessitate more extended responses).
Onset	2	12-24 hours	Most severe weather can be predicted up to 24 hours in advance.
Magnitude	4	More than 50% of land area affected	Severe thunderstorms could affect large portions of the region, but the most severe impacts would be localized.
Business	1	Less than 24 hours	Businesses would not typically close for a severe storm event. Damages from a significant storm may cause a disruption of services.
Human	2	Low (some injuries)	There have been three injuries, and one death reported due to severe storms. While injury and death are possible, it is unlikely that thunderstorms would cause significant human injuries.
Property	1	Less than 10% of property affected	Though impacting large land areas, severe storms often result in minimal property damage (when considering it at a regional level).
Total	17	Medium	

2.0 RISK ASSESSMENT

2.2.11 Tornado

Tornadoes are violently-rotating columns of air that touch the ground and are usually attached to the base of a thunderstorm.					
	Vulnerability	Period of Occurrence:	At any time, typically when warm and cold air temperatures are present together	Hazard Index Ranking:	Low
	HIGHEST	Warning Time:	Less than 6 hours	State Risk Ranking:	High (combined with Severe Storms in State Plan)
	HIGH	Probability:	Remote (unlikely to occur on an annual basis)	Severity:	Critical
	MEDIUM	Type of Hazard:	Natural	Disaster Declarations:	N/A
LOW					
LOWEST					

Hazard Overview

A tornado is a violently rotating column of air extending from a thunderstorm to the ground. Since wind is invisible, it is hard to see tornadoes unless they form a condensation funnel made of water droplets, dust, and debris. Tornadoes originate from rotating thunderstorms called “supercells” or from quasi-linear convective systems (QLCS). Normally, thunderstorms and associated tornadoes develop in warm, moist air in advance of strong eastward-moving cold fronts in late winter and early spring 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.

The key atmospheric ingredient for tornado formation is instability, or warm moist air near the ground and cooler dry air higher in the atmosphere, and wind shear. An unstable air mass promotes the development of strong updrafts, and promotes the rotation from which tornadoes are spawn. Tornadoes can have wind speeds up to 250 miles per hour and a width of approximately 660 feet. They occur in the U.S. more than anywhere else in the world.

Location and Extent








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 better estimate wind and storm damage. The table below describes the EF Scale.

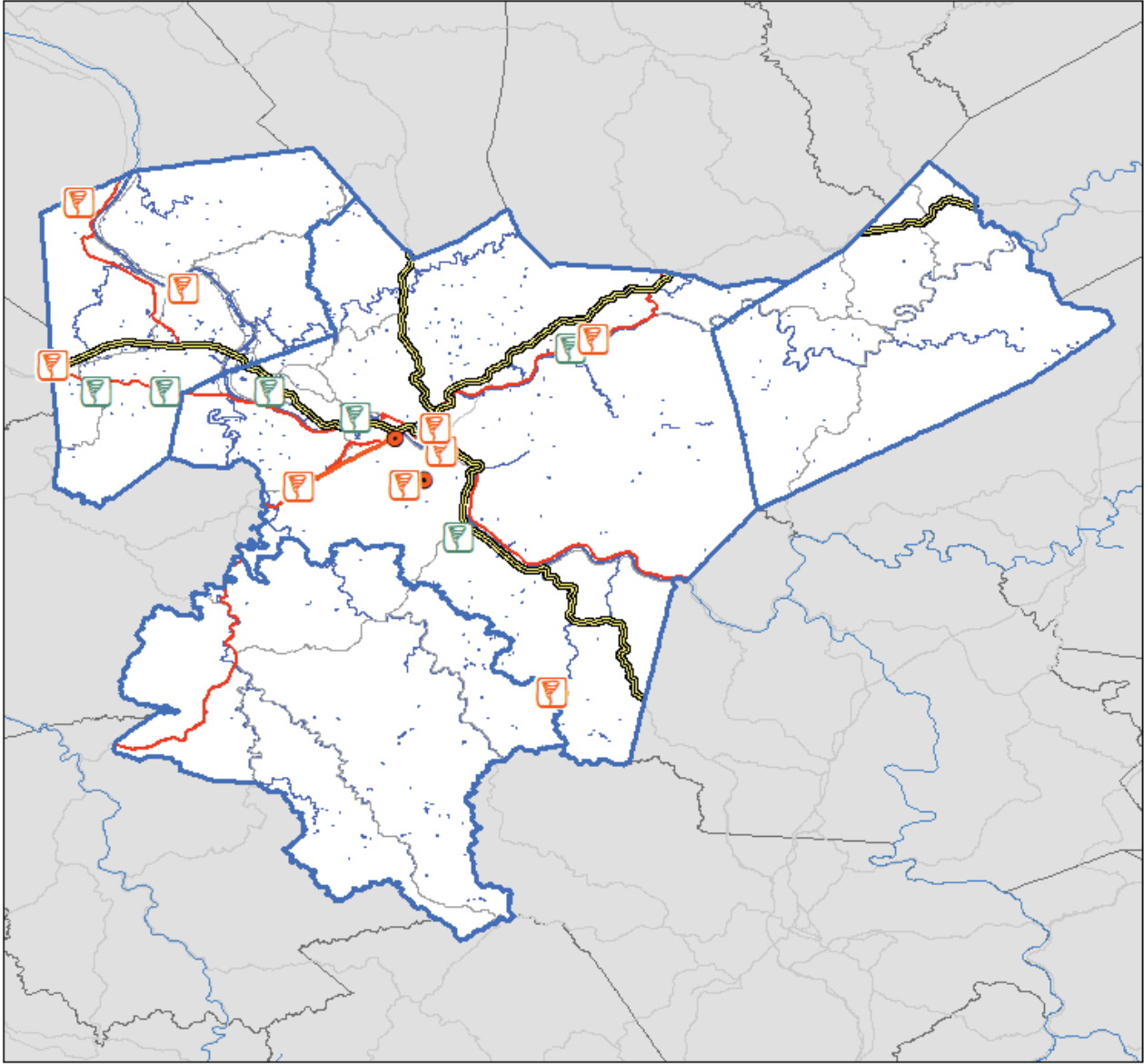
ENHANCED FUJITA (EF) SCALE		
EF Rating	3-second Gust Speed (mph)	Possible Damage
0	65-85	Light Damage. Some damage to chimneys; break branches off trees; push over shallow-rooted trees; damage to signboards.
1	86-110	Moderate Damage. Surface peeled off roofs; mobile homes pushed off foundations or overturned; 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 blown off some distance; cars thrown and large missiles generated.
5	200+	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 only three documented events that have occurred in Region 3 were measured utilizing the Enhanced Fujita 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; cars 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.

The map below shows tornado touchdown locations and paths in Region 3.

<ul style="list-style-type: none"> Tornado (with Path Identified) Paths (w/ End Noted) Tornado Touchdown (No Path)	 <p style="text-align: right;">N</p>  <p style="text-align: center;">0 2.5 5 10 15 20 Miles</p>	<p>REGION 3 HAZARD MITIGATION PLAN</p> <p>Tornado Risk Map</p> <p>Data Source(s): NOAA NCEI</p>
<p> <i>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.</i> </p>		



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. Secondary and tertiary impacts from tornadoes include damage to roofs and other home finishing's. Additionally, fallen trees can interrupt power service or block transportation access.

Past Mitigation Efforts: Tornado

- The development and distribution of public awareness materials about natural hazard risks, preparedness, and mitigation

Historical Occurrences

Region 3 has experienced 14 tornado events. These events caused \$931,000 in property damage and two injuries.

HISTORICAL OCCURRENCES TORNADOES (Source: NCEI Storm Events Database)						
<i>Location</i>	<i>Date</i>	<i>Scale</i>	<i>Length</i>	<i>Width</i>	<i>Injuries</i>	<i>Damage</i>
Kanawha	4/8/1969	F1	0.3 Miles	33 Yards	1	\$25,000
Putnam	8/9/1969	F1	-	33 Yards	0	\$2,500
Putnam	12/8/1978	F0	-	33 Yards	1	\$25,000
Kanawha	6/23/1980	F1	0.2 Miles	17 Yards	0	\$25,000
Kanawha	7/9/1980	F1	1.5 Miles	30 Yards	0	\$25,000
Kanawha	9/14/1990	F0	0.2 Miles	60 Yards	0	\$2,500
Putnam	6/2/1998	F1	0.3 Miles	40 Yards	0	\$20,000
Kanawha	6/2/1998	F1	1.5 Miles	80 Yards	0	\$100,000
Kanawha	6/2/1999	F0	0.5 Miles	60 Yards	0	\$10,000
Putnam	10/13/1999	F1	0.3 Miles	200 Yards	0	\$80,000
Putnam	8/9/2000	F0	0.3 Miles	50 Yards	0	\$1,000
Kanawha	3/19/2008	EF0	0.2 Miles	50 Yards	0	\$40,000
Kanawha	7/4/2016	EF0	1.87 Miles	100 Yards	0	\$5,000
Kanawha	6/24/2019	EF1	7.85 Miles	350 Yards	0	\$500,000
Kanawha	6/24/2019	EF0	0.83 Miles	75 Yards	0	\$70,000
TOTALS					2	\$931,000

June 24, 2019

During the afternoon and evening a line of thunderstorms stretched across central Appalachia resulting in wind damage and two tornadoes touching down near the City of Charleston. An EF1 touched down 4 miles east northeast of Alum Creek. The tornado moved northeastward in the vicinity of Route 119 and dissipated near the Kanawha River approaching downtown Charleston. The tornado was not continuously on the ground but frequently touched down along its path. Many trees were snapped and uprooted and minor roof damage was reported. The Berry Hills Country Club also reported damage. The incident caused \$500,000 in property damage (NCEI, 2022).

October 13, 1999

A brief tornado touched down in Hurricane on the evening of October 13, 1999. The F1 tornado damaged a house and its detached garage. All occupants were able to escape without injury. The incident caused \$80,000 in property damage (NCEI, 2022).

June 2, 1998

A “rotating supercell” formed in southeast Ohio and moved up the Kanawha River Valley impacting Putnam and Kanawha counties. The storm caused significant damage from wind and hail while also spawning multiple tornadoes. One of these, an F1, touched down in the Kanawha City area of Charleston moving up Chappell Hollow. The tornado missed the nearby homes but still caused damage to multiple buildings through fallen trees. Property damage was reported as \$100,000 (NCEI, 2022).

Loss and Damages

Loss estimates for tornado events can be calculated using the historical data available from the NCEI. There have been 14 events recorded in Region 3 between 1950 and 2021 (71 years). By dividing the number of events by the study period an estimate of events per year is found: 0.20. It is estimated that one tornado will occur in the region every five years. Dividing the total property damage reported in NCEI by the number of events, a per event property damage estimate is found: \$66,500. It can be estimated that approximately every five years the region will see this amount damage from tornado events.

Vulnerability Assessment

This section summarizes the vulnerability to Region 3 from tornadoes. Region 3 conducted an online survey for the public to share its thoughts on hazard vulnerabilities. The following table presents the results of that survey regarding tornadoes.

PUBLIC SENTIMENT, SEVERE WIND AND TORNADOES – REGION 3					
Hazard	Level of Concern				Total Responses
	Not at All	Somewhat	Concerned	Very	
Tornadoes	68 (36.17%)	83 (44/15%)	32 (17.02%)	5 (2.66%)	188
In the past ten years, do you remember this hazard occurring in your community?				42 (22.34%)	188
Have you noticed an increase in the occurrences or intensity of this hazard?				27 (14.14%)	191
Have you noticed a decrease in the occurrences or intensity of this hazard?				11 (5.76%)	191

The following table assigns point totals based on the research presented in this profile for each vulnerability category.

TORNADOES RISK SUMMARY			
Category	Points	Description	Notes
Frequency	2	Low	Region 3 has experience 14 tornado events in 71 years giving an average of 0.20 tornadoes per year.
Response	3	One Week	Response to a tornado may last several days to a week as utilities are interrupted.
Onset	4	Less than 6 Hours	Tornadoes are among the most unpredictable natural hazards. While storms that produce tornadoes can be predicted, there is currently no way to predict a tornado.
Magnitude	1	Localized	Though there effects are severe, tornadoes typically affect only a small portion of land area.
Business	1	Less than 24 Hours	Generally, tornadoes will not interrupt Region 3's economy.
Human	3	Medium	Historically, there have been two reported injuries and no fatalities due to tornadoes.
Property	1	Less than 10% of property	Tornadoes are localized events. They significantly impact small areas.
TOTAL	15	Low	

2.0 RISK ASSESSMENT

2.2.10 Utility Disruption

This profile will focus on the disruption of power, gas, water, water, wastewater, and phone utilities that are not secondary to another event or disaster.			
	Vulnerability	Period of Occurrence: Can occur at any time	Hazard Index Ranking: Low
	Warning Time: Minimal	State Risk Ranking: N/A	
	Probability: Probable (likely to occur on an annual basis)	Severity: Critical	
	Type of Hazard: Human-caused	Disaster Declarations: DR 3366	

Hazard Overview

Utility failure is the failure or shortage of natural gas, electricity or other utilities. Utility disruptions and failures are a nuisance but can also be life threatening especially for vulnerable populations such as those requiring at home medical equipment. Most healthcare facilities, government facilities, and other critical facilities have backup generators in case of a blackout. However, it is estimated that only five percent of homeowners own backup generators (Sixel, 2020).

Location and Extent

Generally, utility disruption can be a localized event affecting a one street or a large-scale incident affecting the entire-county or state. Usually, utility disruptions do not cause property damage but can cause financial losses such as lost wages, operational shutdowns, and cleanup costs (sewer line damage). Utility failures can cause schools, businesses, and government buildings to shut down until services can be restored. Utility failures can also have cascading effects on other utility providers. The loss of electricity can cause a disruption to water treatment plants, phone service, etc.

Power (i.e., electricity) outages may last seconds, hours, or days depending on the cause. The most common causes of power outages are natural causes, human error, and equipment failure. Natural causes included strong storms, heat, and sometimes small animals. Strong storms may result in trees or branches falling on power lines. The region's experiences,

along with much of West Virginia's, in the aftermath of the June/July 2012 super derecho event is an example of how a natural phenomenon can severely impact the electricity infrastructure. Lightning strikes can damage substations, power lines, and equipment. High winds, heavy rains, salt, snow, and ice can damage equipment as well. Even temperature extremes (particularly heat) can impact the power grid as cables expand and stretch due to the demand for air conditioning, which also results in high current. Overheating equipment per this demand can also lead to preventive shut downs or mechanical failure.

Power outages can occur over widespread areas or within a concentrated location. Appalachian Power (a division of American Electric Power) serves the majority of the Region 3 area. Mon Power (of First Energy) covers the northern portions of Clay County. Both corporations routinely maintain their systems and upgrade elements of the system as needed. However, as systems age and demand increases, keeping up with upgrades is a challenge.

Though not as high profile as electricity failures, water and sewer system failures can be just as disruptive. The Region 3 area was impacted by the 2014 Elk River chemical spill that left up to 300,000 residents in nine counties (including all four in the region) without potable water. Water system disruptions or failures can be a cascading result of other situations, ranging from long-term power failures to erosion, landslides, drought, etc. Water systems may also be impacted by construction materials, such as instances where lead is discovered from old piping, etc. Boil water advisories as systems come back online are common, and while systems are offline, manual water distribution may be necessary. Sewer system failures are apparently less common than water system disruptions, but potential sewer system issues could be very problematic. The inability to treat waste could result in localized contamination and public health impacts.

As more and more industries, businesses, schools, and government operations turn to virtual options, communications and internet accessibility may begin to be considered a common utility. Landline telephone services are ubiquitous throughout the region and have been for many years. Over the past decade, adequate cellular service has increased significantly in the region, though areas remain with minimal or no service. The rural areas of all four counties experience spotty coverage.

Ensuring access to reliable, high-speed internet is a strategic goal of many entities in West Virginia, to include in particular the regional planning and development councils. The Regional Intergovernmental Council maintains a regional broadband plan (dated 2014) and has supported outreach for residents and businesses (in Clay County, for example) regarding access. Internet access is crucial for leveling the playing field in economically-disadvantaged

communities. Further, the internet itself can be a mitigative element. During the 2020-2021 Covid-19 pandemic, many schools, government offices, and businesses migrated to virtual service delivery. Even healthcare providers shifted to serving patients online.

Impacts and Vulnerability

The American Society of Civil Engineers (ASCE) issues a Report Card for America's Infrastructure (2021) for each state. The ASCE issue a "D" to West Virginia for drinking water stating "some drinking water systems in West Virginia are losing more than half of their treated water throughout the distribution systems. This non-revenue (lost) water requires investment in infrastructure replacements and technology improvements to locate and replace sections of the lines associated with the leaks." However, the ASCE goes on to say "interagency collaborations are expanding access to resources to upgrade drinking water infrastructure and for training personnel, including the implementation of asset management systems."

West Virginia's wastewater systems also received a "D" from the ASCE. The ASCE states that "as of 2020, significant portions of the state's wastewater systems have deteriorated including 59 combined sewer systems requiring \$1.2 billion to address state and federal requirements." The ASCE did not grade the power or gas utilities in West Virginia.

The steering committee for the 2022 update carefully considered not only utility disruptions, but also the ways in which infrastructure interacts with a range of hazards. For instance, local officials have acknowledged the contributions of "gray infrastructure," or areas covered in pavement, stormwater management systems, etc. to flooding in developed areas. These impervious surfaces create more runoff that overwhelms stormwater management systems. Further, many stormwater management features, such as culverts, were designed at a time when there were fewer paved developments in the area. As a result, they were not designed to handle the volume of stormwater that communities are currently seeing. An increase in impervious surfaces and mis-sized stormwater management infrastructure are only two variables, though. The increasing frequency of periods of more intense rainfall than previous experiences is a third. When systems like stormwater management infrastructure are overwhelmed, communities experience a disruption in the designed service that system provides.

Past Mitigation Efforts: Utility Disruption

- This is a new hazard added to the 2022 update.

Historical Occurrences

There is no resource for historical utility disruption. However, committee members, jurisdictional representatives, and respondents to the public survey listed this as a frequently occurring event. These events can include the loss of power, boil water advisories, etc.

Elk River Chemical Spill

In January 2014, approximately 7,500 gallons of crude 4-Methylcyclohexanemethanol (MCHM) leaked from the Freedom Industries facility into the Elk River just upstream from Charleston near the principal water intake for the West Virginia American Water treatment and distribution center. As a result, 300,000 residents in nine counties, including portions of Boone, eastern Cabell, Clay, Jackson, Kanawha, Lincoln, Logan, Putnam, and Roane, were without potable water.

Residents were advised not to drink, cook with, bathe, or wash with the affected water. According to the West Virginia Department of Health and Human Resources, 169 people sought treatment for symptoms including nausea and vomiting, with a total of 14 admitted to areas hospitals (though none were in serious condition). As many as 700 people contacted West Virginia's poison control center. The incident began on January 9, and by January 13, only 15% of the water company's customers were permitted to begin using the drinking water.

Miscellaneous Power Outages

WSAZ ran a story in September of 2021 about power outages in West Virginia. In it, they state that Appalachian Power customers have been without power for an average of more than 25 hours per year. This is with power companies serving West Virginia having spent over \$1 billion dollars on maintenance and improvement over the last 10 years.

Loss and Damages

There is no resource that provides historical losses from utility disruptions. An extended power outage may cost customers of the service to throw away food that spoiled while the power was out as well as businesses losing revenue from being unable to conduct business. Loss of water may have the same effects on businesses, especially the food industry.

Vulnerability Assessment

This section summarizes the vulnerability to Region 3 from Utility Disruption. Region 3 conducted an online survey for the public to share its thoughts on hazard vulnerabilities. The following table presents the results of that survey regarding utility disruption.


PUBLIC SENTIMENT, UTILITY DISRUPTION – REGION 3					
Hazard	Level of Concern				Total Responses
	Not at All	Somewhat	Concerned	Very	
Utility Disruption	7 (3.72%)	44 (23.40%)	48 (25.54%)	89 (47.34%)	188
In the past ten years, do you remember this hazard occurring in your community?				159 (84.57%)	188
Have you noticed an increase in the occurrences or intensity of this hazard?				116 (61.70%)	188
Have you noticed a decrease in the occurrences or intensity of this hazard?				7 (3.72%)	188

The following table assigns point totals based on the research presented in this profile for each vulnerability category.

UTILITY DISRUPTION VULNERABILITY SUMMARY			
Category	Points	Description	Notes
Frequency	4	High	Although there is no data on exactly how often a utility disruption occurs, it is likely that Region 3 will experience a utility disruption in each year.
Response	1	Less than half a day	Most responses to utility disruption can be handled within 12 hours.
Onset	4	Less than 6 hours	Usually there is no warning before the loss of a utility.
Magnitude	1	Localized	Utility disruption will only affect those residents that are customers of the service provider.
Business	1	Less than 24 hours	The economy of the region is not usually affected by a utility disruption
Human	1	Minimum	There are not usually injuries associated with utility disruption.
Property	1	Less than 10% of property affected	Utility disruption is a localized event.
Total	13	Low	

2.0 RISK ASSESSMENT

2.2.13 Winter Storms

Severe winter weather is a combination of heavy snow, blowing snow, and dangerous wind chills that could threaten life or property.			
 <p>Vulnerability</p> <p>HIGHEST</p> <p>HIGH</p> <p>MEDIUM</p> <p>LOW</p> <p>LOWEST</p>	Period of Occurrence:	At any type, typically during the winter months	Hazard Index Ranking: Medium
	Warning Time:	Over 24 hours	State Risk Ranking: High
	Probability:	Highly likely	Severity: Critical
	Type of Hazard:	Natural	Disaster Declarations: EM-3109 DR-1084 DR-1881 DR-4603

Hazard Overview

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:** A winter storm is a combination of heavy snow, blowing snow, and dangerous wind chills.
- **Heavy Snow:** 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.
- **Blizzard:** A blizzard is a dangerous winter storm that is a combination of blowing snow and wind and results in very low visibility (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 Storm:** An ice storm is a storm that results in the accumulation 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.

Just like 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

Generally, severe winter weather affects all areas of the region similarly. More specifically, winter weather affects several jurisdictions simultaneously, yet with varying severity and duration. 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.”

NORTHEAST SNOWFALL IMPACT SCALE		
<i>Category</i>	<i>NESIS Value</i>	<i>Description</i>
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

Significantly, the NESIS does not predict the impacts of a forecasted storm; instead, it is a mechanism for rating impacts after a storm occurs

Impacts and Vulnerability

According to the National Severe Storms Laboratory (NSSL), most deaths from winter storms are not from the storm itself. People die from traffic accidents on icy roads, heart attacks while shoveling snow, and hypothermia from prolonged exposure to cold. During severe 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.

Ice accumulation can topple power lines, utility poles, and communication towers. 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.

Past Mitigation Efforts: Severe Winter Storm

- One of the most common impacts of severe weather is the loss of commercial power. Since many other services rely on electricity for critical functions, providing backup power capabilities has long been a favored strategy for mitigating damages from winter storms.

- The development and distribution of public awareness materials about natural hazard risks, utilizing the media for the publication of hazard information, and updating websites and social media to provide hazard-related information that is easily accessible.

Historical Occurrences

According to the NOAA National Centers for Environmental Information Storm Event Database, there have been 54 winter storms, ice storms, and heavy snow events in Region 3 since 2002. The following table summarizes those events.

WINTER STORM EVENTS - REGION 3						
<i>Location</i>	<i>Date</i>	<i>Type</i>	<i>Deaths</i>	<i>Injuries</i>	<i>Property Damage</i>	<i>Crop Damage</i>
Boone Clay Kanawha Putnam	1/6/2002	Heavy Snow	0	0	\$0	\$0
Boone Clay Kanawha Putnam	1/19/2002	Heavy Snow	0	0	\$0	\$0
Kanawha	4/6/2002	Heavy Snow	0	0	\$0	\$0
Boone Clay Kanawha Putnam	12/4/2002	Winter Storm	0	0	\$3,500	\$0
Boone Clay Kanawha Putnam	2/16/2003	Winter Storm	0	0	\$1,800,000	\$0
Boone Clay Kanawha Putnam	1/25/2004	Winter Storm	0	0	\$0	\$0
Boone Clay Kanawha Putnam	2/7/2007	Winter Weather	0	0	\$0	\$0
Clay	2/20/2008	Winter Weather	0	0	\$0	\$0
Putnam	12/23/2008	Winter Weather	0	0	\$0	\$0
Clay Kanawha Putnam	1/27/2009	Winter Storm	0	0	\$50,000	\$0
Boone Clay Kanawha Putnam	12/18/2009	Heavy Snow	0	0	\$530,000	\$0
Boone Clay Kanawha	1/30/2010	Heavy Snow	0	0	\$0	\$0

WINTER STORM EVENTS - REGION 3						
<i>Location</i>	<i>Date</i>	<i>Type</i>	<i>Deaths</i>	<i>Injuries</i>	<i>Property Damage</i>	<i>Crop Damage</i>
Clay	2/5/2010	Winter Storm	0	0	\$0	\$0
Boone Clay Kanawha	2/26/2010	Heavy Snow	0	0	\$0	\$0
Boone Clay Kanawha Putnam	12/16/2010	Winter Storm	0	0	\$0	\$0
Boone Clay Kanawha	12/25/2010	Winter Weather	0	0	\$0	\$0
Clay	1/11/2011	Heavy Snow	0	0	\$0	\$0
Clay	1/12/2012	Winter Weather	0	0	\$0	\$0
Boone Clay Kanawha Putnam	3/5/2012	Heavy Snow	0	0	\$0	\$0
Boone Clay Kanawha Putnam	10/29/2012	Heavy Snow	0	0	\$4,000,000	\$0
Putnam	12/8/2013	Heavy Snow	0	0	\$0	\$0
Boone	1/2/2014	Winter Weather	0	0	\$50,000	\$0
Boone Clay Kanawha Putnam	1/21/2014	Heavy Snow	0	0	\$0	\$0
Boone Clay Kanawha Putnam	1/25/2014	Winter Weather	0	0	\$0	\$0
Boone Clay Kanawha Putnam	2/12/2014	Heavy Snow	0	0	\$0	\$0
Boone Clay Kanawha Putnam	3/2/2014	Winter Storm	0	0	\$0	\$0
Boone Clay Kanawha Putnam	3/16/2014	Heavy Snow	0	0	\$0	\$0
Boone Clay Kanawha Putnam	2/16/2015	Heavy Snow	0	0	\$0	\$0
Clay Kanawha Putnam	2/16/2015	Heavy Snow	0	0	\$0	\$0

WINTER STORM EVENTS - REGION 3						
<i>Location</i>	<i>Date</i>	<i>Type</i>	<i>Deaths</i>	<i>Injuries</i>	<i>Property Damage</i>	<i>Crop Damage</i>
Boone Kanawha Putnam	2/18/2015	Winter Weather	0	0	\$0	\$0
Boone Clay Kanawha Putnam	2/21/2015	Winter Storm	0	0	\$75,000	\$0
Boone Clay Kanawha Putnam	3/4/2015	Heavy Snow	0	0	\$0	\$0
Kanawha Putnam	1/8/2016	Winter Weather	0	0	\$100,000	\$0
Boone Clay Kanawha Putnam	1/22/2016	Heavy Snow	0	0	\$200,000	\$0
Boone Clay Kanawha Putnam	2/14/2016	Heavy Snow	0	0	\$0	\$0
Boone	3/3/2016	Winter Weather	0	0	\$25,000	\$0
Boone Clay Kanawha Putnam	1/5/2017	Winter Weather	0	0	\$0	\$0
Kanawha Putnam	1/29/2017	Winter Weather	0	0	\$0	\$0
Boone Kanawha Putnam	1/12/2018	Winter Weather	0	0	\$0	\$0
Boone Clay Kanawha Putnam	1/16/2018	Heavy Snow	0	0	\$0	\$0
Kanawha Putnam	2/6/2018	Winter Weather	0	0	\$0	\$0
Boone Clay Kanawha	3/12/2018	Heavy Snow	0	0	\$0	\$0
Clay	3/21/2018	Winter Weather	0	0	\$0	\$0
Boone	3/24/2018	Winter Weather	0	0	\$0	\$0
Kanawha Putnam	4/9/2018	Winter Weather	0	0	\$0	\$0
Boone Clay Kanawha	1/7/2020	Winter Weather	0	0	\$0	\$0
Kanawha Putnam	2/7/2020	Heavy Snow	0	0	\$0	\$0

WINTER STORM EVENTS - REGION 3						
Location	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Boone Clay Kanawha Putnam	12/24/2020	Heavy Snow	0	0	\$0	\$0
Kanawha Putnam	1/19/2021	Winter Weather	0	0	\$0	\$0
Boone Clay Kanawha Putnam	2/10/2021	Winter Storm	0	0	\$20,000	\$0
Boone Clay Kanawha Putnam	2/15/2021	Ice Storm	0	0	\$20,000	\$0
Boone Clay Kanawha Putnam	2/17/2021	Heavy Snow	0	0	\$8,000	\$0
Boone Clay Kanawha Putnam	1/6/2022	Heavy Snow	0	0	\$5,000	\$0
Boone Clay Kanawha Putnam	1/16/2022	Winter Storm	0	0	\$0	\$0
TOTALS			0	0	\$6,886,500	\$0

West Virginia, October 2012

One of the most significant winter weather events to impact the region occurred in late October 2012, when Tropical Storm Sandy (by then being referred to as “Superstorm Sandy”) collided with an arctic front. Blizzard warnings were in place in at least 14 counties prior to the arrival of the storm system (CBSNEWS, 2012). The heavy snow in Region 3 started late on October 29 and continued into the 30th. The impact of the early season storm varied significantly, with areas of Charleston receiving 1-2 inches and higher elevations in the region receiving up to 10 inches of wet, heavy snow. Counties located further east received the heaviest snowfall and damage, though Region 3 received \$4 million in property damage (NCEI, 2022).

Loss and Damages

Winter storms have caused \$6,886,500 in damages in Region 3 since 2002, with an average of \$127,528 per event or \$344,325 per year. This likely underestimates damages

caused to infrastructure and power lines. Severe winter storms can impact all areas and jurisdictions in Region 3.

Vulnerability Assessment

This section summarizes the vulnerability to Region 3 from winter storms. Region 3 conducted an online survey for the public to share its thoughts on hazard vulnerabilities. The following table presents the results of that survey regarding severe winter storms.

PUBLIC SENTIMENT, SEVERE WINTER STORMS – REGION 3					
Hazard	Level of Concern				Total Responses
	Not at All	Somewhat	Concerned	Very	
Winter Storms	20 (10.64%)	53 (28.19%)	74 (39.36%)	41 (21.81%)	188
Have you noticed an increase in the occurrences or intensity of this hazard?				71 (37.76%)	188
Have you noticed a decrease in the occurrences or intensity of this hazard?				13 (6.91%)	188

The following table assigns point totals based on the research presented in this profile for each vulnerability category.

SEVERE WINTER STORM VULNERABILITY SUMMARY			
Category	Points	Description	Notes
Frequency	5	Excessive	Based on historical data, Region 3 averages 2.7 severe winter storms per year.
Response	2	One day	Response to severe winter storms, including road clearing, can often take one or more days.
Onset	2	12-24 hours	Severe winter storms can be predicted up to 24-hours in advance with a certain degree of accuracy.
Magnitude	4	More than 50% of land area affected	Winter storms are usually a regional event and will most often involve multiple counties in the region.
Business	1	Less than 24 hours	Businesses would not typically close for more than a day due to winter storms.
Human	2	Low	Although there are no injuries or fatalities reported in the last 20 years, snow removal is a strenuous activity that can lead to injuries. Snow and iced covered roadways can also be hazardous.
Property	4	More than 50% of land area affected	Winter storms are usually a regional event and will most often involve multiple counties in the region.
Total	20	Medium	

2.0 RISK ASSESSMENT

2.3 Hazard Rankings

One of the components of the risk assessment is to determine the risk of and vulnerability to hazards, determined by the probability of occurrence and the potential severity of hazard events. This process helps identify which hazards pose the most significant concerns to Region 3 counties and communities. The probability of an event derives from the number of historical events within a certain timeframe. Timeframes vary based on information available from different sources (and they can vary widely).

It is important to recognize the value of implementing several categories to determine the overall risk and vulnerability. 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, not worst-case scenarios. In cases with zero occurrences, other available data (which varies across the hazards and is outlined in each profile) support determinations.

“Frequency” refers to the number of times a hazard occurs in a

FREQUENCY			
<i>Value</i>	<i>Score</i>	<i>Description</i>	<i>Definition</i>
.76 - >1.0	5	Excessive	Will occur during a year
.51 - .75	4	High	Likely to occur in a year
.26 - .50	3	Medium	May (or may not) occur in a year
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

specific period (based on available historical data). In most instances, the total occurrences (e.g., three occurrences) are divided by the length of time (in years) that data is available (e.g., ten years). Thus three occurrences divided by ten years equals 0.3. The table above translates the resultant numeric values into a narrative description of frequency. In the example described here, the hazard would have a ‘low’ frequency. At times, no historical data is available; in these cases, the hazard receives the lowest possible points for the category (i.e., one). The table below presents the remainder of the categories (including “frequency”).

VULNERABILITY CATEGORIES							
	<i>Frequency</i>	<i>Response</i>	<i>Onset</i>	<i>Magnitude</i>	<i>Business</i>	<i>Human</i>	<i>Property</i>
1	None	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	Low	One day	12-24 hours	Limited (10-25% of land area affected)	One week	Low (some injuries)	10-25% of property affected
3	Medium	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	High	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	Excessive	More than one month	N/A	N/A	N/A	N/A	N/A

Each hazard receives a score for each category that corresponds 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 an overall range by which planners ranked all of the hazards in this plan.

<u>Range of Points (Score)</u>	<u>Hazard Ranking</u>
7 - 10	Lowest
11 - 15	Low
16 - 20	Medium
21 - 25	High
26 - 30	Highest

The following table summarizes risk and vulnerability rankings for all of the hazards included in the plan. It outlines the points each hazard received per the above methodology.

SUMMARY OF HAZARD RANKINGS									
<i>Hazard</i>	<i>Risk</i>	<i>Frequency</i>	<i>Response</i>	<i>Onset</i>	<i>Magnitude</i>	<i>Business</i>	<i>Human</i>	<i>Property</i>	<i>Total</i>
Dam & Levee Failure	Lowest	2	2	1	1	1	1	1	9
Drought	Lowest	1	4	1	1	1	1	1	10
Earthquake	Low	2	2	4	1	1	1	1	12
Epidemic/Pandemic	High	1	5	1	4	5	4	1	21
Extreme Temperatures	Medium	4	1	1	5	1	3	1	16
Flood	High	5	4	3	2	3	3	3	23
Forest Fire	Medium	2	4	4	1	2	3	1	17
Hazardous Materials	Low	5	1	4	1	1	2	1	15

SUMMARY OF HAZARD RANKINGS									
<i>Hazard</i>	<i>Risk</i>	Frequency	Response	Onset	Magnitude	Business	Human	Property	Total
Land Subsidence	Medium	4	3	3	1	2	2	2	17
Severe Weather	Medium	5	2	2	4	1	2	1	17
Tornadoes	Low	2	3	4	1	1	3	1	15
Utility Disruption	Low	4	1	4	1	1	1	1	13
Winter Storms	Medium	5	2	2	4	1	2	4	20

2.0 RISK ASSESSMENT

2.4 Trends

Understanding the risk that the region faces from future hazard occurrences is a multifaceted exercise. The profiles in Section 2.2 provide a background of this risk and provide loss estimates based on historical data, but are generally based on past occurrences. Identifying and analyzing development trends allows for the consideration of future vulnerability. This information comes from a variety of sources, including economic trends, municipal comprehensive plans, and interviews with local officials. In this instance, the Regional Intergovernmental Council has developed a regional development plan, which is updated yearly, allowing for an analysis of region wide development. RIC has established priorities for development projects in the region. Water and sewer projects are the highest priority, followed by economic development, transportation, community development, and finally housing.

The fiscal year 2019 update to the Comprehensive Economic Development Strategy describes the economic atmosphere of the region. The region has a mixture of energy, chemicals and chemical-based products, biomedical, transportation and logistics, and mining (RIC, 2019). The region has felt the impact of the economic downturn that has affected the nation. The interstate highway system in Region 3 has allowed the region to grow as a major distributor of goods. The interstate system, coupled with rail, air, river, and highway networks, allows for trade with the rest of the nation stimulating all sectors of the region's economy. In addition to the regional efforts that the RIC makes, the individual counties, and in some instances the municipalities have economic development goals and priorities. The following sections will outline these for each.

Boone County

Boone County recently announced the development of the former Hobet Mine site straddling the Boone and Lincoln County line. The site is scheduled to become the state's largest solar panel field with areas for industry, lodging, recreation and hospitality. The \$320 million investment will establish a 3,000-acre solar panel field and create approximately 300 new construction jobs.

Along with the solar panel field, the West Virginia Division of Highways (DOH) is building an access road into the mine site off of US 119. This access road allows potential businesses the ability to visit the property. The Boone County Community and Economic Development Corporation (BCCEDC) announced that as of October 2021, one manufacturing company has

signed a formal agreement with the landowners and a second is highly interested in moving to the site.

Boone County also hopes to see an increase in tourism with the addition of and upgrades to the Hatfield-McCoy Trails. The newly reopened Ivy Branch Trail System, located in Boone and Lincoln counties, offers more than just off-road riding trails; it also includes a boat launch and lodging to attract kayakers, fishermen, and camping enthusiasts.

Clay County

Similar to the state, Clay County is committed to building a new economy dependent partly on tourism. In 2019, Governor Justice announced the addition of a new state park, the Elk River State Park, that includes a 72-mile trail along the Elk River in Clay County (West Virginia Explorer Magazine, 2019).

Clay County is also seeing an increase in campground, cabin rentals, and other outdoor recreational hospitality services. One such location is a privately owned cabin rental that incorporates rustic style cabins with modern amenities such as hot tubs internet access. These attractions are focused on bringing larger numbers of tourists into the county and region.

Kanawha County

As part of the *2020 Vision Comprehensive Plan* planning process, the community looked at the future development of the county through several key topics. These included such things as the arts and culture, buildings, housing and development, transportation, economic development, education and training, farms and agriculture, human and family services, natural resources, environment, and conservation, planning management, public health, recreation, and utilities and infrastructure. The committee created goals, objectives and strategies for each and made recommendations as part of an action plan.

The county has seen a steady trend of the population declining. From 2000 to 2010 the population went from 200,073 to 193,063 (-3.5%). The population decreased again to 180,745 (-6.4%) in 2020. The population in Kanawha County is expected to decrease by another 6% by 2040. However, during this same time period, employment in the county is expected to grow by approximately 27%.

Affordable housing in the county is mostly found in the older suburban and rural areas. Over 25,000 workers already commute to work from outside the county. These workers would likely relocate if affordable housing was available. However, Kanawha County has limited land

to develop. The lack of land to develop coupled with the addition of 25,000 new jobs over the next 20 years could cause higher sale prices and rental rates.

Putnam County

Putnam County has seen a population growth since 1940. The county has seen an 11% growth since 2000. Part of this growth can be attributed to the majority of the county being in the Metropolitan Statistical Area of Charleston with a smaller area in the Metropolitan Statistical Area of Huntington. Between 2000 and 2010 Putnam County added 4,737 housing units with an additional 1,468 added by 2020.

The *Putnam County Comprehensive Plan 2014* prioritized increasing the number of moderately priced housing options. The plan recognizes that much of the development in the past has focused on drawing new residents to the county and is more costly than average families can afford. Rental options are in short supply, especially in highly developed areas. This is causing rental rates to increase and making them unaffordable to some individuals.

The comprehensive plan recommended implementing regulations that create incentives to develop affordable housing, identifying sources of funding that promote development of affordable housing and encouraging utility providers to expand availability of their services.

Region-Wide Complicating Variables

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 the. 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. (Coppola, 2015). All of these also have a cost associated with them, but it is much more challenging to assign a specific dollar value and quantify them accurately. For this plan, the primary focus of loss estimates will be the direct consequences of the given hazard.

Countless situations could occur that could result in a disruption to critical systems throughout Region 3. Loosely-related variables often considered *cascading hazards*, can complicate some hazards. For example, high winds may cause sporadic damage, but usually do not become a significant region-wide or county-wide concern until a large number of residents are without power. In addition to weather-related power outages, cascading hazards in Region 3 could include (but not be limited to) the following. (NOTE: This list is consistent with the hazard-specific discussions of future vulnerability that appear in the profiles above.)

- Damage to infrastructure (i.e., roads, bridges, pipes, utility poles, etc.) and residences following flooding
- Flooding of downstream or protected areas in the event of a dam failure
- Drinking water supply shortages and contamination following severe and prolonged drought conditions or floods
- Power outages, ruptured gas lines, etc. following earthquakes or severe weather
- Public health conditions following flooding conditions
- Permanent or temporary population displacement before, during, or after an event

Construction and development can change natural drainage paths and create or increase flood risks. New buildings, parking lots, and roads (i.e., impervious surfaces) mean less land to absorb excess precipitation forcing water onto land it previously would not reach. Industrial companies may impound water for their operations, causing land disturbances. Timbering operations may alter natural drainage paths or change the vegetation that is available to absorb rainwater. Changes to wetlands and erosion are other land disturbances that impact the permeability of areas.

Erosion is not a hazard considered by this plan in-depth, but it can create challenges throughout the region. Dictionary.com defines erosion as “the process by which the surface of the earth is worn away by the action of water, glaciers, winds, waves, etc.” Erosion is a natural process controlled by weather drivers such as rainfall, bedrock wear in rivers, flooding, wind abrasion, groundwater process, and other mass movements of soils. The rates at which these processes act control how fast a surface is eroded (Cheraghi, Jomaa, Sander, & Barry, 2016).

Throughout Region 3, erosion may happen as a result of, or may otherwise complicate or worsen the impacts of a variety of hazards. Heavy rains or snow melt may swell creeks and streams, causing waters to rush through them at a much higher velocity than is normal. At extremely high flows, kolks or vortices form from large volumes of rapidly rushing water. Kolks cause extreme local erosion, plucking bedrock and creating pothole-type geographical features called rock-cut basins (Alt, 2001). Rushing waters may wash away part of stream banks, depositing the sediment and material in other areas, and the deposits may cause future occurrences of hazards such as flooding in areas previously unaffected by flooding. In areas where material erodes, residents may experience property damage if structures are built in close proximity to stream banks or may experience less tangible losses as parts of their properties are washed away.

High winds can also cause erosion, stripping lands of valuable minerals and other cover. Two varieties of wind erosion can occur. *Deflation* occurs when wind picks up loose particles and carries them away. *Abrasion* refers to instances when surfaces wear down after be struck by airborne particles in the wind (Blanco-Canqui & Rattan, 2008; Dewey, Ryan, & Anderson, 1993; Balba, 1995). Wind erosion is more severe during times of drought (Wiggs, 2011).

Hazards and Climate Change

Many natural hazards are related to the climate or weather, such as droughts, severe weather, and floods. There 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.

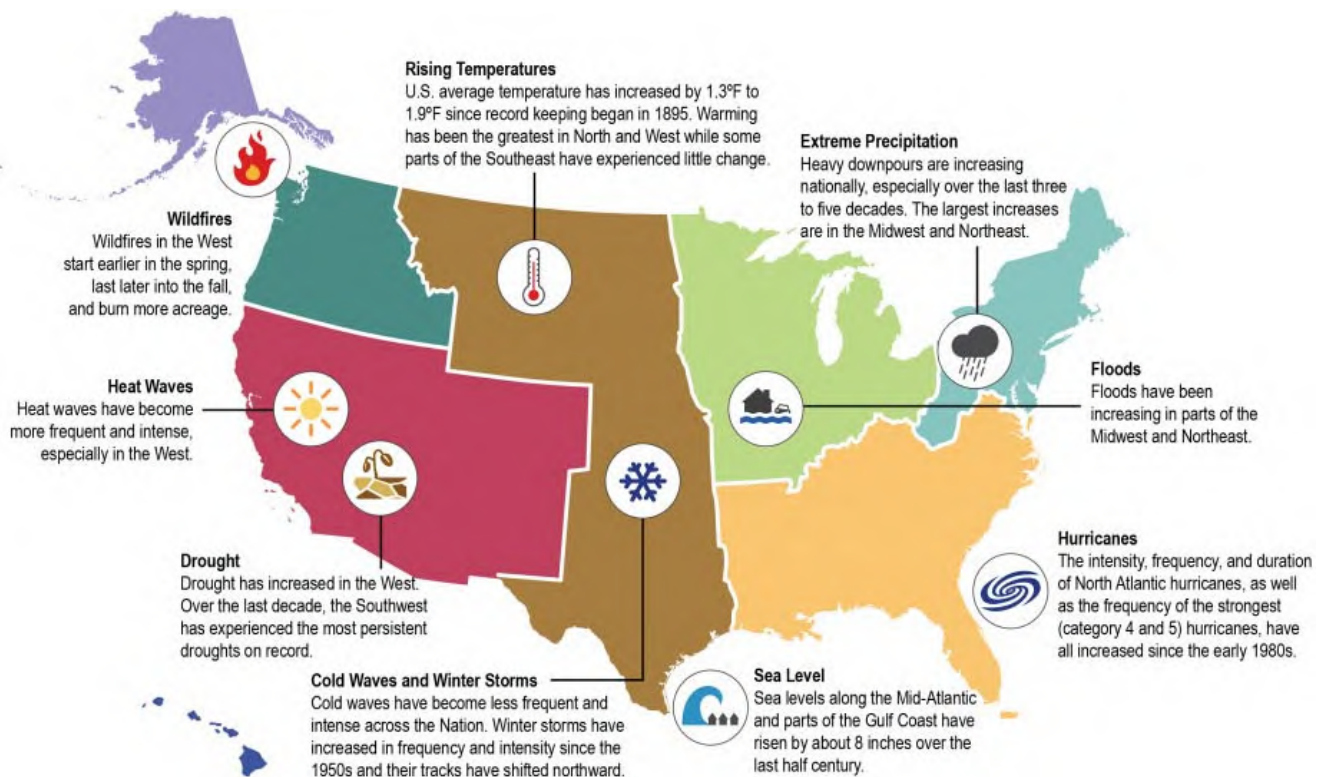
Climate change can have a significant impact on human health and the environment. The changes mentioned above can affect the environment by leading to changes in land use, ecosystems, infrastructure conditions, geography, and agricultural production. Extreme heat, poor air quality, reduced food and water 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 2014. 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.



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.
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According to FEMA (2013), “the mitigation strategy is made up of three main required components: mitigation goals, mitigation actions, and action plan for implementation. These provide the framework to identify, prioritize, and implement actions to reduce risk to hazards.” This section contains the aforementioned items; it describes the updated goals and objectives for this mitigation plan, it outlines the action items (or projects) for each participating jurisdiction within Region 3, 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

At the first plan update meeting, the committee decided to create comprehensive, realistic goals for the update of this plan. The steering committee created four new goals and continued six goals from the previous version of the plan that can be achieved through the mitigation projects that follow in the plan. These goals apply to the county's unincorporated areas as well as the cities and towns; this way, all communities within the region are working toward the same overall goals.

Goal 1: Remove abandoned buildings from high-risk and other known-impact areas.

Goal 2: Increase water flow capacities throughout the region.

Goal 3: Increase stormwater management capabilities throughout the region.

Goal 4: Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts.

Goal 5: Increase public awareness, understanding, support, and demand for hazard mitigation activities and future strategies or projects.

Goal 6: Protect Boone, Clay, Kanawha and Putnam Counties from a catastrophic release or failure of a dam or coal waste slurry impoundment.

Goal 7: Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards.

Goal 8: Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties.

Goal 9: Reduce the potential impact of disasters on Boone, Clay, Kanawha, and Putnam Counties historic structures and landmarks.

Goal 10: Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties.

3.0 MITIGATION STRATEGY

3.2 Mitigation Actions

This section serves as a mitigation action plan to reduce the losses and other impacts Region 3 may suffer from the hazards included in the risk assessment. “A mitigation action is a specific action, project, activity, or process taken to reduce or eliminate long-term risk to people and property from hazards and their impacts. Implementing mitigation actions helps achieve the plan’s mission and goals. The actions to reduce vulnerability to threats and hazards form the core of the plan and are a key outcome of the planning process” (FEMA, 2013).

§ 201.6(c)(3)(ii)	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)	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.

The Region 3 planning committee, the Regional Intergovernmental Council staff, and the county’s consultant coordinated directly with the jurisdictions in each county to update the project list. Outreach included individual calls, emails, and technical assistance.

Types of Mitigation Actions

There are five primary types of mitigation actions that can work to reduce long-term vulnerability: local plans and regulations, structure and infrastructure projects, natural systems protection, education programs, and preparedness and response activities (Coastal Hazards Research Center & Center for Sustainable Community Design, n.d.).

- **Local Plans and Regulations:** Local land use or comprehensive plans embody the goals, values, and aspirations of the community, as expressed through a process of community engagement. Local ordinances and review processes influence land development and building construction. In some cases, plans and regulations can work as cross-purposes.

For example, a capital improvement plan may call for extending water and sewer lines to an area that is vulnerable to natural hazards. Examples include the following.

- Comprehensive plans
 - Land use ordinances
 - Subdivision regulations
 - Development review
 - Building codes and enforcement
 - NFIP Community Rating System
 - 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. This type of action also involves projects to construct human-made structures to reduce the impact of hazards. 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:** These are actions that minimize damage and losses while preserving or restoring the functions of natural systems. Examples include the following.
 - Sediment and erosion control
 - Stream corridor restoration
 - Forest management
 - Conservation easements
 - Wetland restoration and preservation
-
- **Education Programs:** These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. Although this type of mitigation reduces risk less directly than structural projects or regulations, it is an

important foundation. A greater understanding and awareness of hazards and risk among local officials, stakeholders, and the public can lead to direct actions. Examples include the following.

- Social media, radio or television spots
 - Websites, with maps and information
 - Real estate disclosure
 - Presentations to school groups or neighborhood organizations
 - Mailings to residents in hazard-prone areas.
 - StormReady
 - Firewise Communities
- **Preparedness and Response Activities:** Mitigation actions that reduce or eliminate long-term risk are different from actions taken to prepare for, or respond to, hazard events. Mitigation activities lessen or eliminate the need for preparedness or response resources in the future. When analyzing risks and identifying mitigation actions, the planning team may also identify emergency response or operational preparedness actions.

For some hazards such as tornadoes, including preparedness actions in the mitigation plan may be necessary and practical. The mitigation plan may be the best place for your community to capture and justify the need for these actions. However, these will not supplant or meet the federal requirements for identifying mitigation actions. It is important that the planning team understands the difference and can distinguish between mitigation and other emergency management activities.

Prioritization

Region 3 prioritized the action items (i.e., projects) included in this plan. The committee and jurisdictions used the following criteria (roughly corresponding to the STAPLEE method) as considerations when prioritizing projects.

- **Social Impacts:** Consider whether the public would support implementation of the project. If so, priority likely rises.
- **Technical Feasibility:** Consider whether the project can be done and if it will yield the intended outcomes. If yes, priority would likely rise.
- **Administrative Requirements:** Consider the staffing, funding, and maintenance requirements of the project. If current capabilities can successfully manage and sustain the project, priority would be strengthened.
- **Political Impacts:** Consider the acceptability of the project from the political frame. If it is likely to cause political upheaval, it would receive a lower priority.
- **Legal Ramifications:** Consider whether the project can be lawfully implemented. If not, the project cannot be listed.
- **Environmental Impacts:** Consider whether there would be negative consequences to environmental assets should the project be implemented. If assets are impact, priority would be likely to fall.
- **Economic Impacts/Cost Benefit:** Consider the criteria in *FEMA Publication 386-5: Using Benefit Cost Review in Mitigation Planning (2007)* to determine the “pros” and “cons” of each project. Maximizing the use of available funds would positively affect a project’s priority.

Region 3’s steering committee permitted tie scores. As such, when reviewing the “Priority” line in the following table, readers may notice gaps in the numbering (e.g., “1, 2, 5, 6...”). In these instances, it means that three projects tied at the second-highest (thus, priority two) score.

Jurisdictional Mitigation Actions

The following table lists the active hazard mitigation actions for Region 3 and the towns and cities that participated in this plan update¹. These actions have broad applicability and benefit multiple jurisdictions or unincorporated areas.

¹ For jurisdictions with traditional flood mitigation projects, the median value of a housing unit was used. For municipalities not listed in the census, the county's estimate was used.

Region 3 Regional Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Region 1	Flooding	1	The Regional Intergovernmental Council can provide technical services to start up non-profit watershed groups.	5 years	Regional Intergovernmental Council	County Floodplain Coordinators	Natural System Protection	N/A	Local funding
Status: New									
Associated Goal(s): Increase water flow capacities throughout the region									
Region 2	Flooding	1	Work with individuals to start new watershed groups in unserved watersheds.	5 years	Regional Intergovernmental Council	County Floodplain Coordinators	Natural System Protection	N/A	Local funding
Status: New									
Associated Goal(s): Increase water flow capacities throughout the region									
Region 3	Flooding	1	Work with current nonprofit organizations to promote watershed improvement projects.	5 years	Regional Intergovernmental Council	County Floodplain Coordinators	Natural System Protection	N/A	Local funding
Status: New									
Associated Goal(s): Increase water flow capacities throughout the region									
Region 4	Flooding Landslides/Land Subsidence	1	Provide technical support to local jurisdictions with analyzing, mapping, future planning, etc. TEIF/TEAL data.	5 years	Regional Intergovernmental Council	Jurisdictional Representatives	Local Plans and Regulations	N/A	Local funding
Status: New									
Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties.									
Region 5	Flooding	1	Support jurisdiction's efforts to complete traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.	5 years	Regional Intergovernmental Council	Jurisdictional Floodplain Coordinators	Structure and Infrastructure	N/A	Local Funding HMGP



Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Status: New Associated Goal(s): Remove abandoned buildings from high-risk and other known-impact areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties.									
Region 6	Dams	1	Support the counties' efforts to obtain and update emergency action plans for high hazard dams.	5 years	Regional Intergovernmental Council	County Officials	Local Plans and Regulations	N/A	Local Funding
Status: New Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties.									

Boone County Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Status: On-going. Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties.									
Boone 1	Flooding	1	Continue to participate in the National Flood Insurance Program (NFIP).	Ongoing	Boone County Floodplain Coordinator	WVEMD	Local Plans & Regulations	N/A Program maintenance included in existing budgets	Local funding, WVEMD, FEMA
Status: On-going. Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties.									
Boone 2	Flooding	1	Continue to enforce current floodplain regulations.	Ongoing	Boone County Floodplain Coordinator	Boone County Commission	Local Plans & Regulations	N/A Program maintenance included in existing budgets	Local funding, WVEMD, FEMA
Status: On-going. Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties.									
Boone 3	With the availability of the Total Exposure in Floodplain (TEIF) data from the West Virginia Division of Emergency Management (WVEMD), Boone County can identify specific properties at risk from flooding. Project 3 identifies a "traditional" flood mitigation project for Boone County. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: "TEIF Criteria X"). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows. <ol style="list-style-type: none"> Structures in the floodway Structures in the 1% annual chance area AND with a potential flood depth exceeding 5' in the structure All structures listed in the TEIF analysis for the jurisdiction Structures in the 1% annual chance area AND with a potential flood depth exceeding 4' in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5'.) 								

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Boone 4	Misc.	17	Seek funding through state and federal resources to erect additional communications towers to improve radio coverage, and add to the back-up capabilities of the emergency operations center.	2 years	BCOEM	Boone County Commission	Emergency Services	Unknown	Local funding, SHSP, EMPG
<p>Status: On-going. Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties, Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards</p>									
Boone 5	Misc.	18	Seek funding through state and federal resources to purchase equipment and locate communications towers to improve interoperability to other counties and state agencies.	3 years	BCOEM	Boone County Commission	Emergency Services	Unknown	Local funding, EMPG
<p>Status: On-going. Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties, Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards</p>									
Boone 6	Misc.	4	Communicate to industry and private property owners the need to open private roads that lead to higher ground in an emergency to shorten evacuation routes.	Ongoing	BCOEM	Local Fire Departments	Education & Awareness Programs	N/A Partnerships require little to no additional funding	Private funding
<p>Status: On-going. Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts, Increase public awareness, understanding, support, and demand for hazard mitigation activities and future strategies or projects</p>									
Boone 7	Misc.	4	Place signs marking such routes	5 years	BCOEM	WVDOH	Education & Awareness Programs	Up to \$500 per sign	Local funding
<p>Status: On-going. Associated Goal(s): Increase public awareness, understanding, support, and demand for hazard mitigation activities and future strategies or projects</p>									

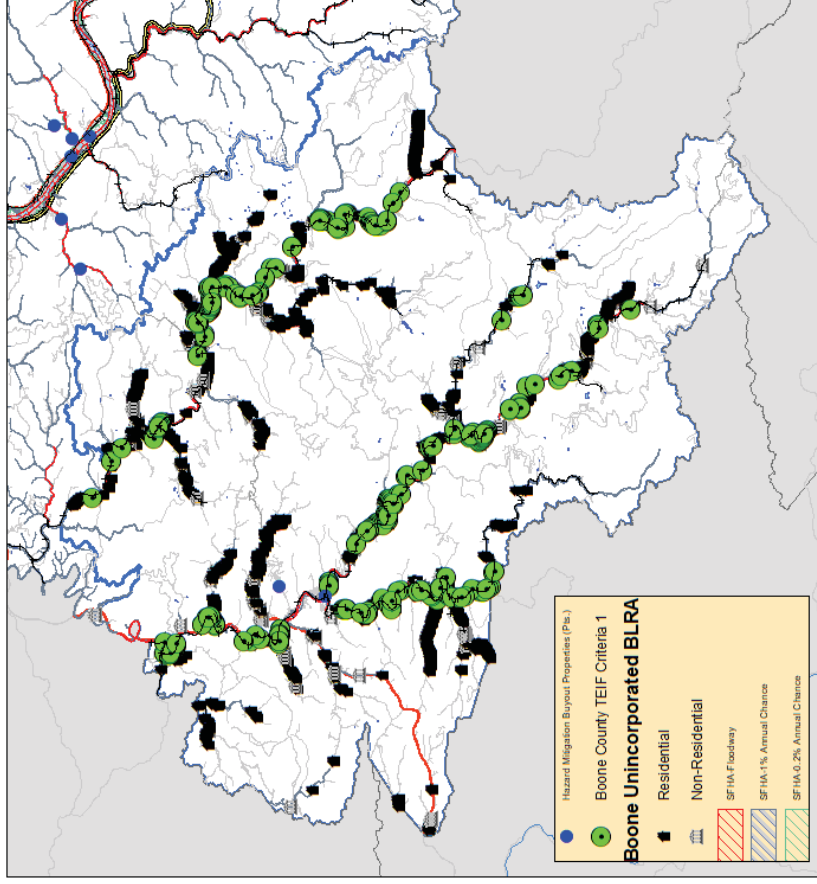
Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Boone 8	Misc.	4	Map routes and make maps available to public	5 years	BCOEM	Local Fire Departments	Education & Awareness Programs	Up to \$1,500 for printing	Local funding
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Boone 9	Misc.	4	Hold evacuation drills to familiarize the public with proper procedures	Ongoing	BCOEM	Local Fire Departments	Emergency Services	N/A General preparedness included in existing budgets	Local funding
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts Increase public awareness, understanding, support, and demand for hazard mitigation activities and future strategies or projects									
Boone 10	Flooding	4	Support the efforts of volunteer groups, state agencies, and other interested parties to clear stream banks, drainage ditches, and other areas of debris.	Ongoing	Boone County Commission	Industry, General Public	Education & Awareness Programs	N/A Partnerships require little to no additional funding	Local Government, Industry, and the Public
Status: On-going.									
Associated Goal(s): Increase water flow capacities throughout the region Increase stormwater management capabilities throughout the region									
Boone 11	Flooding	22	Perform channel modifications to increase flow capacities of rivers and streams in Boone County	5 years	Boone County Commission	WV Soil Conservation, Army Corps of Engineers	Natural System Protection	Unknown	WV Soil Conservation, Army Corps of Engineers
Status: On-going.									
Associated Goal(s): Increase water flow capacities throughout the region Increase stormwater management capabilities throughout the region									
Boone 12	Flooding	21	Support legislation to fund studies on various issues involving coal waste slurry impoundments	Ongoing	Boone County Commission	Industry, General Public	Local Plans & Regulations	N/A Partnerships require little to no additional funding	West Virginia Legislature
Status: On-going.									
Associated Goal(s): Protect Boone, Clay Kanawha and Putnam Counties from a catastrophic release or failure of a dam or coal waste slurry impoundment, Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties									

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Boone 13	Wildfire	19	Develop a proactive policy on issuing countywide burning bans during dry weather.	2 years	Boone County Commission	N/A	Local Plans & Regulations	N/A Policy creation should require little to no additional funding	Local funding
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Boone 14	Wildfire	4	Work with the Forestry Department to educate the public of the burning laws through Public Service Announcements in the Coal Valley News and WZAC radio.	2 years	BCOEM	WV Division of Forestry	Education & Awareness Programs	N/A Partnerships require little to no additional funding	Local funding, WV Division of Forestry
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Boone 15	Wildfire	4	Increase public awareness of the arson problem in Boone County through public education programs in schools, churches and civic groups.	Ongoing	BCOEM	WV Division of Forestry, WV State Fire Marshal	Education & Awareness Programs	Up to \$2,500 per outreach campaign	Local funding, BRIC FEMA Funding
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts.									
Boone 16	Wildfire	4	Support the WV Division of Forestry and the WV State Fire Marshall by increasing the award offered for arsonists	Ongoing	Boone County Commission	WVDOF, WVSFM	Education & Awareness Programs	N/A Partnerships require little to no additional funding	Local funding, WVDOF, WVSFM
Status: On-going.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Boone 17	Flooding	4	Develop an informational package to give to applicants for development permits.	1 year	Boone County Permit Office	BCOEM	Education & Awareness Programs	Up to \$2,500 per outreach campaign	Local funding, BRIC FEMA Funding
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts Increase public awareness, understanding, support, and demand for hazard mitigation activities and future strategies or projects									



Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Boone 18	Mass Movements	4	Advise the public to contact their insurance agency to confirm that they are covered for land subsidence events	1 year	Boone County Permit Office	BCOEM	Education & Awareness Programs	Up to \$2,500 per outreach campaign	Local funding, BRIC FEMA Funding
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Boone 19	Mass Movements	4	Suggest to the public that they add the proper coverage to their insurance policies	1 year	Boone County Permit Office	BCOEM	Education & Awareness Programs	Up to \$2,500 per outreach campaign	Local funding, BRIC FEMA Funding
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Boone 20	Dams	4	Work with the Army Corps of Engineers and dam owners to obtain and update emergency action plans for high hazard dams.	5 years	Boone County Emergency Management	USACE	Local Plans & Regulations	N/A	N/A
Status: New									
Associated Goal(s): Protect Boone, Clay Kanawha and Putnam Counties from a catastrophic release or failure of a dam or coal waste slurry impoundment									
Boone 21	Dam	21	Coordinate with dam owners to identify failure modes; determine qualitative risk values for each failure mode; rank dams risk values; and evaluate potential projects using FEMA's Risk-Based Prioritization Method.	5 years	Boone County Emergency Management	USACE FEMA Dam Owners	Structures & Infrastructure	Unknown	HHPD
Status: New									
Associated Goal(s): Protect Boone, Clay Kanawha and Putnam Counties from a catastrophic release or failure of a dam or coal waste slurry impoundment									

Project #	Boone 3
Hazard	Flooding
Project Priority	3
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	Boone County Commission
Support Agencies	BCOEM
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Approximately \$76,700 per structure acquired
Resources	HMGP
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,



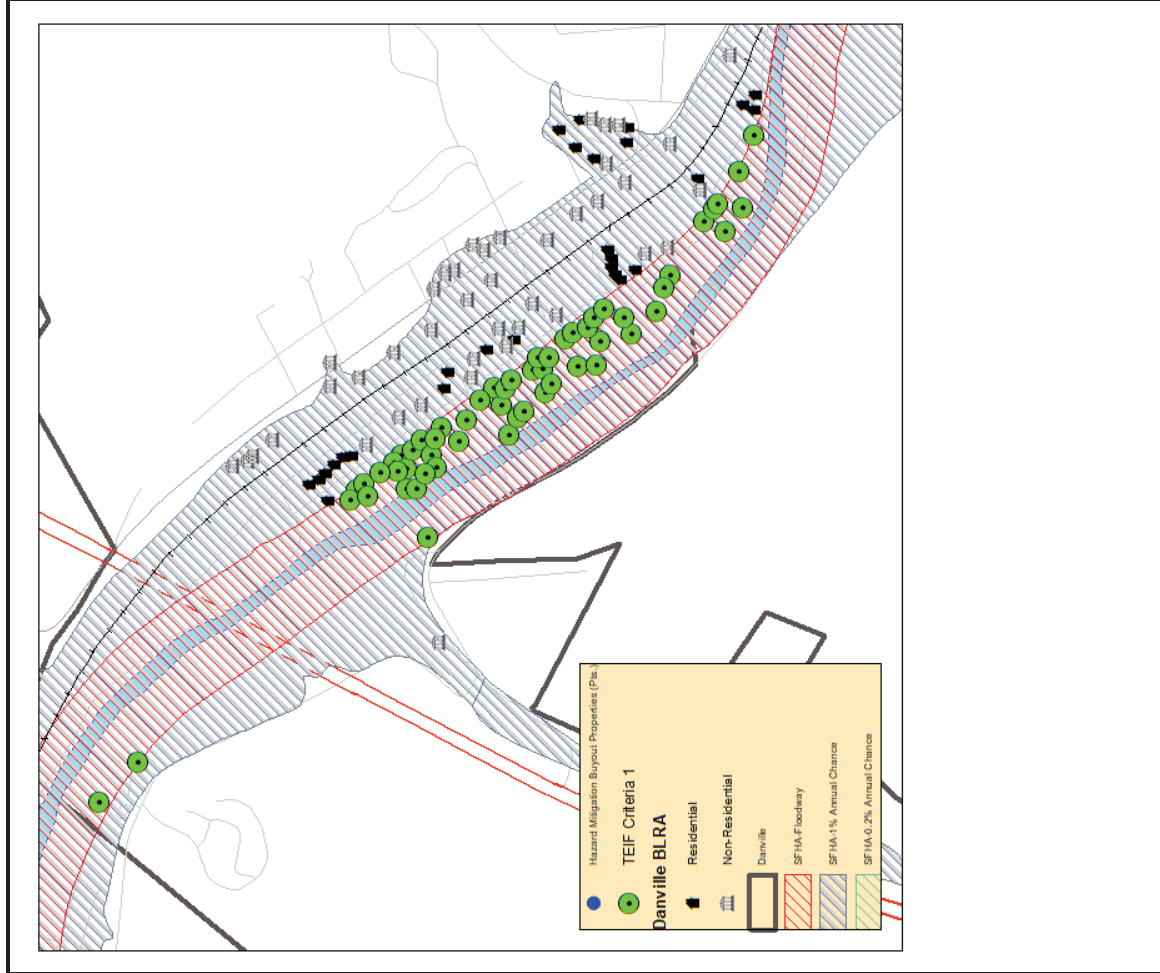
Town of Danville Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Danville 1	Flooding	1	Continue to participate in the National Flood Insurance Program (NFIP)	Ongoing	Danville Floodplain Coordinator	Boone County Floodplain Coordinator	Local Plans & Regulations	N/A Program maintenance already included in existing budgets	Local funding, WVEMD, FEMA
Status: On-going.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Danville 2	Flooding	1	Continue to enforce current floodplain regulations	Ongoing	Danville Floodplain Coordinator	Danville Town Council	Local Plans & Regulations	N/A Program maintenance already included in existing budgets	Local funding, WVEMD, FEMA
Status: On-going.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Danville 3	With the availability of the TEIF data from the WVEMD, Danville can identify specific properties at risk from flooding. Project 3 identifies a "traditional" flood mitigation project for Danville. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: "TEIF Criteria X"). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows.								
	<ol style="list-style-type: none"> Structures in the floodway Structures in the 1% annual chance area AND with a potential flood depth exceeding 5' in the structure All structures listed in the TEIF analysis for the jurisdiction Structures in the 1% annual chance area AND with a potential flood depth exceeding 4' in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5'.) 								
Danville 4	Misc.	1	Support county efforts to warn the public of impending emergency situations.	Ongoing	BCOES	Danville Town Council	Education & Awareness Programs	N/A Supporting existing efforts should require little to no additional funding	Local funding, BRIC FEMA Funding
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts, improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									



Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Danville 5	Multiple Hazards	3	Establish standards for all utilities regarding tree pruning around lines.	Ongoing	Danville Town Council	Utility Providers	Local Plans & Regulations	N/A	N/A
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Danville 6	Multiple Hazards	3	Bury power lines to provide uninterrupted service during severe weather	Ongoing	Danville Town Council	Utility Providers	Structure & Infrastructure	Unknown	BRIC
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Danville 7	Flooding	3	Plant trees to prevent erosion and promote cooler micro-climates.	Ongoing	Danville Floodplain Coordinator	Danville Town Council	Natural Systems Protections	N/A	N/A
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Danville 8	Multiple Hazards	3	Install generators in critical facilities such as clinics, police stations, fire stations, etc.	5 years	Danville Town Council	N/A	Structure & Infrastructure	Unknown	BRIC Local Funding HMGP
Status: Nw. This project was selected from the public survey responses									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Danville 9	Multiple Hazards	3	Upgrade water and sewer system	5 years	BCPSD	Danville Town Council	Structure & Infrastructure	Unknown	BRIC Local Funding
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									

Project #	Danville 3
Hazard	Flooding
Project Priority	4
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	Danville Floodplain Coordinator
Support Agencies	Boone County Floodplain Coordinator
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Up to \$76,700 per structure acquired
Resources	HMGF
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,



City of Madison Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Madison 1	Flooding	1	Develop a storm water management plan for existing drainage system and future development.	5 years	Madison City Council	N/A	Structural & Infrastructure Improvements	Unknown	CDBG, Local funding, WVJDC, USACE (Silver Jackets)
Status: Ongoing									
Associated Goal(s): Increase stormwater management capabilities throughout the region									
Madison 2	Flooding	20	Expand current drainage system.	5 years	Madison City Council	N/A	Structural & Infrastructure Improvements	Unknown	CDBG, Local funding, WVJDC
Status: Ongoing									
Associated Goal(s): Increase water flow capacities throughout the region									
Madison 3	Flooding	8	Repair or replace current storm water drainage system.	5 years	Madison City Council	N/A	Structural & Infrastructure Improvements	Unknown	CDBG, Local funding, WVJDC
Status: Ongoing									
Associated Goal(s): Increase stormwater management capabilities throughout the region									
Madison 4	Flooding	20	Place check valves in drains that empty into river to prevent back flow from flooding low lying areas.	5 years	Madison City Council	N/A	Structural & Infrastructure Improvements	Unknown	HMGP, CDBG, Local funding, WVJDC
Status: Ongoing									
Associated Goal(s): Increase stormwater management capabilities throughout the region									
Madison 5	Flooding	1	Continue to participate in the National Flood Insurance Program (NFIP).	Ongoing	Madison Floodplain Coordinator	Boone County Floodplain Coordinator	Local Plans & Regulations	N/A Program maintenance included in current budget	Local funding, WVEMD, FEMA
Status: On-going.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Madison 6	Flooding	1	Continue to enforce current flood plain regulations.	Ongoing	Madison Floodplain Coordinator	Madison City Council	Local Plans & Regulations	N/A Program maintenance included in current budget	Local funding, WVEMD, FEMA
Status: On-going.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									



Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Madison 7			With the availability of the TEIF data from the WVEMD, Madison can identify specific properties at risk from flooding. Project 7 identifies a "traditional" flood mitigation project for Madison. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: "TEIF Criteria X"). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows. 1. Structures in the floodway 2. Structures in the 1% annual chance area AND with a potential flood depth exceeding 5' in the structure 3. All structures listed in the TEIF analysis for the jurisdiction 4. Structures in the 1% annual chance area AND with a potential flood depth exceeding 4' in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5'.)						
Madison 8	MISC.	1	Purchase and install backup generator at Civic Center to be used as shelter.	5 years	Madison City Council	BCOES	Structural & Infrastructure Improvements	Up to \$50,000	HMGP
Status: New. This project was selected from the public survey responses Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Madison 9	MISC.	8	Partner with local faith based organizations to assist with transporting residents during evacuations.	1 year	Madison City Council	Local Faith Based Organizations	Education & Awareness Programs	N/A Partnerships require little to no funding	N/A
Status: New. This project was selected from the public survey responses Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Madison 10	MISC.	8	Partner with Madison Baptist Church to provide shelter for first responders.	1 year	Madison City Council	Madison Baptist Church	Emergency Services	N/A Partnerships require little to no funding	N/A
Status: New. This project was selected from the public survey responses Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Madison 11	MISC.	1	Purchase and install backup generator at Madison Baptist church to be used as shelter for first responders.	2 years	Madison City Council	Madison Baptist Church	Emergency Services	Up to \$50,000	HMGP
Status: New. This project was selected from the public survey responses Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Madison 12	MISC.	1	Repair or replace backup generator at City Hall.	5 years	Madison City Council	BCOES	Structural & Infrastructure Improvements	Up to \$50,000	HMGP
Status: New. This project was selected from the public survey responses Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Madison 13	MISC.	8	Enhance emergency warning by adding an Outdoor Siren System.	2 years	Madison City Council	BCOES	Education & Awareness Programs	Up to \$2,500 per siren	Local funding
Status: Ongoing									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Madison 14	MISC.	8	Set up a low watt FM station to broadcast emergency alerts.	3 years	Madison City Council	BCOES	Emergency Services	Up to \$1,500 for start-up	SHSP, Local funding, EMPG
Status: Ongoing									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Madison 15	Flooding	8	Support efforts of volunteer groups, state agencies and other interested parties to clear stream banks, drainage ditches and other areas of debris.	Ongoing	Madison City Council	BCOES	Education & Awareness Programs	N/A Partnerships require little to no funding	N/A
Status: Ongoing									
Associated Goal(s): Increase water flow capacities throughout the region									
Madison 16	Flooding	22	Perform channel modifications to increase flow capacities of rivers and streams.	5 years	Madison City Council	N/A	Natural System Protection	Unknown	N/A
Status: Ongoing									
Associated Goal(s): Increase water flow capacities throughout the region									
Madison 17	MISC.	25	Establish an Emergency Operations Center.	5 years	Madison City Council	BCOES	Emergency Services	N/A Identifying a space and staff would require little funding	Local funding
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Madison 18	Flooding	8	Support legislation to fund studies that research and develop a means to render coal slurry and study different types of impoundment designs that result in less slurry being stored.	5 years	Madison City Council	Local Legislative Representatives	Local Plans & Regulations	N/A Partnerships require little to no funding	N/A



Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Status: Ongoing									
Associated Goal(s): Protect Boone, Clay Kanawha and Putnam Counties from a catastrophic release or failure of a dam or coal waste slurry impoundment Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties									
Madison 19	Misc.	27	Update and add new technology to existing systems to shorten notification and evacuation times.	5 years	Madison City Council	BCOES	Emergency Services	Unknown	SHSP, Local funding
Status: Ongoing									
Associated Goal(s):									
Madison 20	Misc.	8	Partner with industry and private property owners to open private roads during evacuations.	5 years	Madison City Council	BCOES	Education & Awareness Programs	N/A Partnerships require little to no funding	N/A
Status: Ongoing									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Madison 21	Misc.	28	Place signs marking evacuation routes in the city.	5 years	Madison City Council	BCOES	Structural & Infrastructure Improvements	Up to \$500 per sign	Local funding
Status: Ongoing									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Madison 22	Misc.	25	Map evacuation routes and make maps available to the public.	5 years	Madison City Council	BCOES	Education & Awareness Programs	Up to \$1,500 for printing	Local funding, BRIC FEMA Funding
Status: Ongoing									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Madison 23	Tornado	8	Partner with local media to provide public service announcements.	Ongoing	Madison City Council	Local Media Outlets	Education & Awareness Programs	N/A Partnerships require little to no funding	N/A
Status: Ongoing									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Madison 24	Wildfire	22	Develop a proactive policy on issuing city wide burning bans during dry weather.	1 year	Madison City Council	N/A	Local Plans & Regulations	N/A Policy creation requires no additional funding	N/A
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									

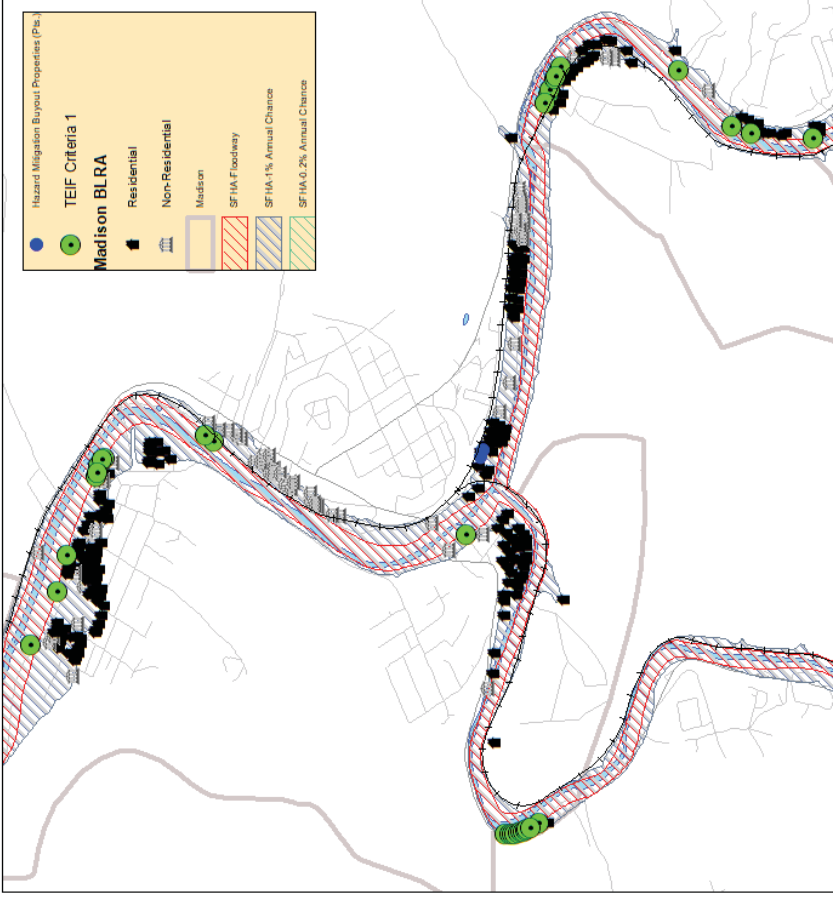


Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Madison 25	Wildfire	8	Partner with Forestry Department and local media to educate public on burning laws.	Ongoing	Madison City Council	WVDOF	Education & Awareness Programs	N/A Partnerships require little to no funding	N/A
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Madison 26	Wildfire	8	Partner with schools, churches and civic groups to increase awareness on arson problem in City of Madison.	Ongoing	Madison City Council	Boone County Schools, Local Faith Based Organizations, Civic Groups	Education & Awareness Programs	N/A Partnerships require little to no funding	N/A
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Madison 27	Land Subsidence	22	Develop an information brochure to give to applicants of building permits.	1 year	Madison City Council	BCOES	Education & Awareness Programs	N/A Creating the brochure should be a low-cost effort	Local funding
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Madison 28	Land Subsidence	8	Partner with insurance companies to educate public on proper coverage for land subsidence.	1 year	Madison City Council	Insurance Companies	Education & Awareness Programs	N/A Partnerships require little to no funding	N/A
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Madison 29	Multiple Hazards		Establish standards for all utilities regarding tree pruning around lines	5 years	Madison City Council	Utility Providers	Local Plans & Regulations	N/A	N/A
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Madison 30	Flooding		Plant trees to prevent erosion and promote cooler micro-climates	5 years	Madison City Council	Madison Emergency Management	Natural Systems Protection	N/A	N/A
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									



Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Madison 31	Multiple Hazards		Install generators in critical facilities.	5 years	Madison City Council	Madison Emergency Management	Structure & Infrastructure	Unknown	BRIC Local Funding HMGP
<p>Status: New. This project was selected from public survey responses.</p> <p>Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties</p>									

Project #	Madison 7
Hazard	Flooding
Project Priority	1
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	Madison Floodplain Coordinator
Support Agencies	Boone County Floodplain Coordinator
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Up to \$76,700 per structure acquired
Resources	HMGP
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,

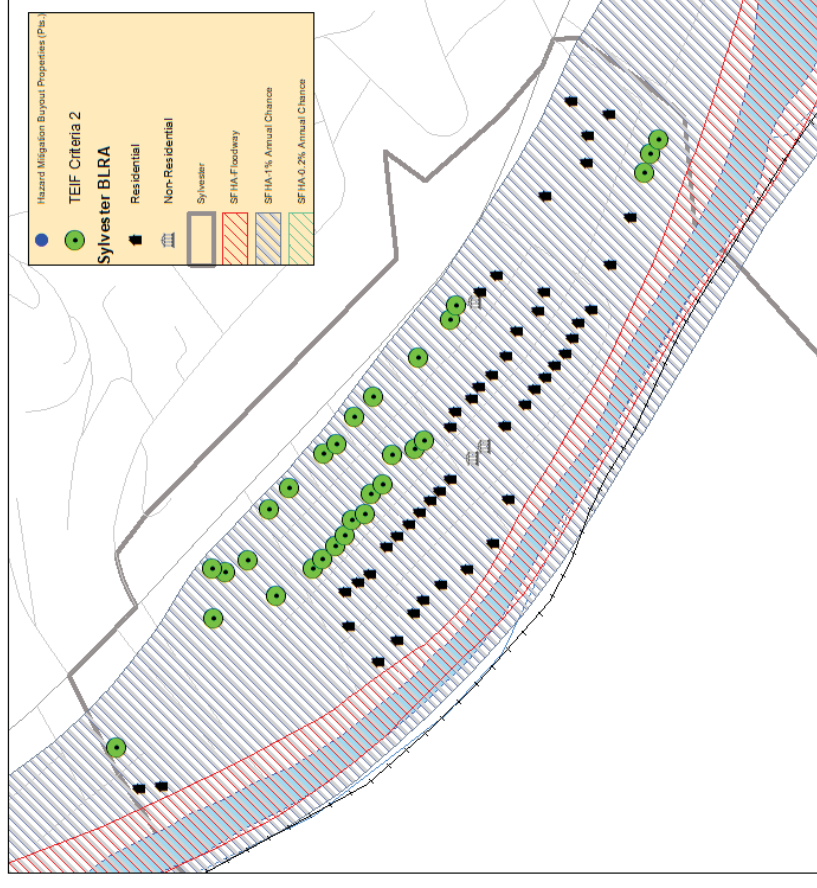


Town of Sylvester Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Sylvester 1	Flooding	2	Continue to participate in the National Flood Insurance Program (NFIP)	Ongoing	Sylvester Floodplain Coordinator	Boone County Floodplain Coordinator	Local Plans & Regulations	N/A Program maintenance already included in existing budgets	Local funding, WVEMD, FEMA
Status: On-going.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties.									
Sylvester 2	Flooding	1	Continue to enforce current floodplain regulations	Ongoing	Sylvester Floodplain Coordinator	Sylvester Town Council	Local Plans & Regulations	N/A Program maintenance already included in existing budgets	Local funding, WVEMD, FEMA
Status: On-going.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties.									
Sylvester 3	Misc.	4	Support county efforts to warn the public of impending emergency situations.	Ongoing	BCOES	Sylvester Town Council	Education & Awareness Programs	N/A Supporting existing efforts should require little to no additional funding	Local funding, BRIC FEMA Funding
Status: On-going									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Sylvester 4	<p>With the availability of the TEIF data from the WVEMD, Sylvester can identify specific properties at risk from flooding. Project 4 identifies a "traditional" flood mitigation project for Sylvester. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: "TEIF Criteria X"). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows.</p> <ol style="list-style-type: none"> Structures in the floodway Structures in the 1% annual chance area AND with a potential flood depth exceeding 5' in the structure All structures listed in the TEIF analysis for the jurisdiction Structures in the 1% annual chance area AND with a potential flood depth exceeding 4' in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5'.) 								

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Sylvester 5			Establish standards for all utilities regarding tree pruning around lines						
<p>Status: New. This project was selected from public survey responses.</p> <p>Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties</p>									

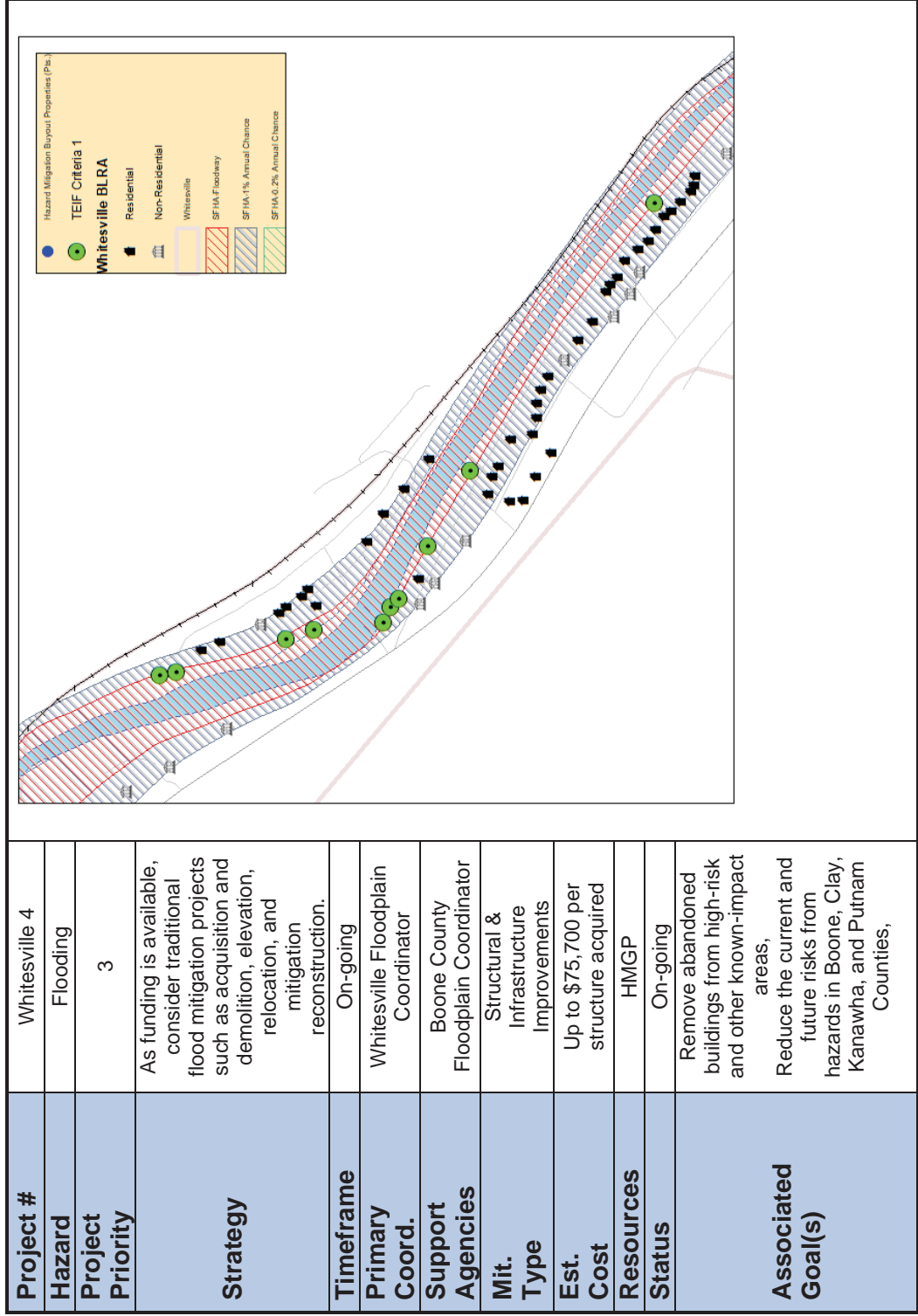
Project #	Sylvester 4
Hazard	Flooding
Project Priority	3
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation and reconstruction.
Timeframe	On-going
Primary Coord.	Sylvester Floodplain Coordinator
Support Agencies	Boone County Floodplain Coordinator
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Up to \$76,700 per structure acquired
Resources	HMGF
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,



Town of Whitesville Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Whitesville 1	Flooding	1	Continue to participate in the National Flood Insurance Program (NFIP)	Ongoing	Whitesville Floodplain Coordinator	Boone County Floodplain Coordinator	Local Plans & Regulations	N/A Program maintenance already included in existing budgets	Local funding, WVEMD, FEMA
Status: On-going.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties.									
Whitesville 2	Flooding	1	Continue to enforce current floodplain regulations	Ongoing	Whitesville Floodplain Coordinator	Whitesville Town Council	Local Plans & Regulations	N/A Program maintenance already included in existing budgets	Local funding, WVEMD, FEMA
Status: On-going.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties.									
Whitesville 3	Misc.	4	Support county efforts to warn the public of impending emergency situations.	Ongoing	BCOES	Whitesville Town Council	Education & Awareness Programs	N/A Supporting existing efforts should require little to no additional funding	Local funding, BRIC FEMA Funding
Status: Ongoing									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Whitesville 4	<p>With the availability of the TEIF data from the WVEMD, Whitesville can identify specific properties at risk from flooding. Project 4 identifies a “traditional” flood mitigation project for Whitesville. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: “TEIF Criteria X”). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows.</p> <ol style="list-style-type: none"> Structures in the floodway Structures in the 1% annual chance area AND with a potential flood depth exceeding 5’ in the structure All structures listed in the TEIF analysis for the jurisdiction Structures in the 1% annual chance area AND with a potential flood depth exceeding 4’ in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5’.) 								





Project #	Whitesville 4
Hazard	Flooding
Project Priority	3
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	Whitesville Floodplain Coordinator
Support Agencies	Boone County Floodplain Coordinator
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Up to \$75,700 per structure acquired
Resources	HMGP
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,

Clay County Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Clay 1	Misc.	10	Purchase and distribute the booklet "Getting Ready: A Family Emergency Guide" prepared by the State of West Virginia	Ongoing	Clay County Office of Emergency Services	Clay County LEPC	Education & Awareness Programs	N/A Booklets are available from state agencies	WVEMD
<p>Status: On-going. Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts Increase public awareness, understanding, support, and demand for hazard mitigation activities and future strategies or projects</p>									
Clay 2	Misc.	10	Publish timely articles in local newspapers about winter storms, tornados, floods, etc. to inform the public of what to do.	Ongoing	Clay County Office of Emergency Services	Clay County LEPC	Education & Awareness Programs	N/A Many media outlets will allow local govt. to run press releases at no charge	Local funding
<p>Status: On-going. Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards</p>									
Clay 3	Flooding	7	Continue to update a GIS data layer of flood maps on county mapping database to identify floodplain areas of Clay County	5 years	Clay County Office of Emergency Services	Region 3 PDC, WVU GIS Tech Center	Structural & Infrastructure Improvements	N/A Base layers are included with this project	Local funding
<p>Status: New Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties</p>									
Clay 4	Flooding	2	Institute a countywide permitting process that will require residents and/or developers to file a permit with the county before beginning any new construction as a means of regulating floodplain development	2 Years	Clay County Floodplain Coordinator	Clay County Commission	Local Plans & Regulations	N/A Policy creation should require little to no additional funding	Local funding
<p>Status: On-going. Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards</p>									



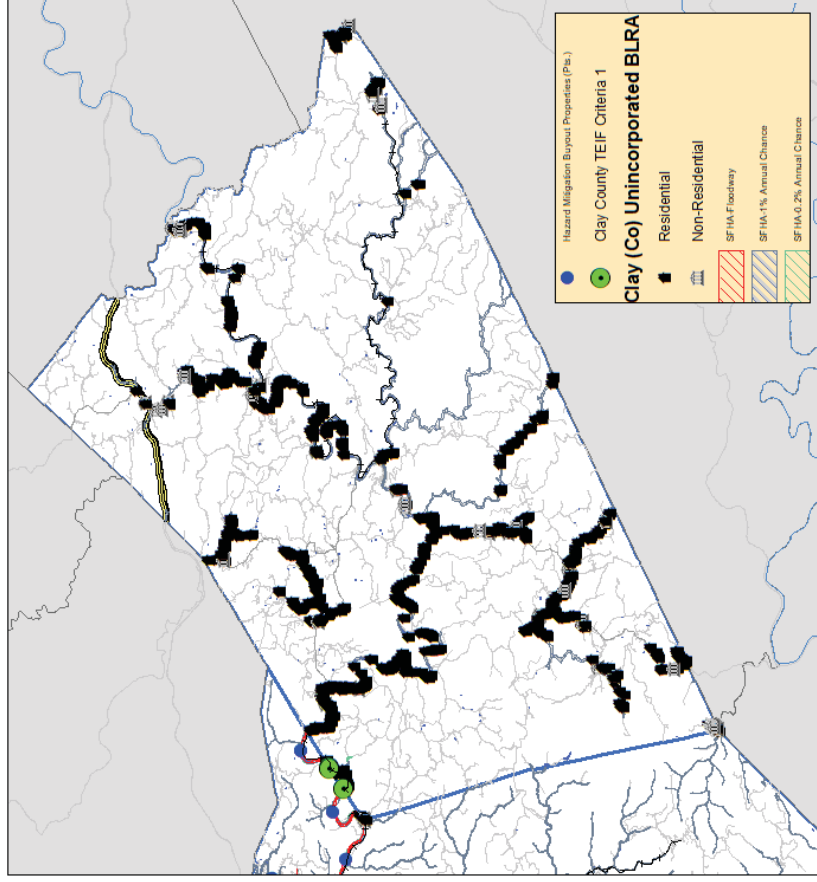
Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Clay 5	Flooding	2	Ensure general adherence to the guidelines contained in the IBC.	2 years	Clay County Commission	WVSFM	Local Plans & Regulations	N/A Policy creation should require little to no additional funding	Local funding
<p>Status: On-going. Project revised to show consistency with International Building Codes. Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties</p>									
Clay 6	Flooding	8	Educate citizens to clear trash, vegetation, and tree stumps from nearby creeks that impede water flow	3 years	Clay County Office of Emergency Services	WVDOH, WVOES, WVDEP, WV Division of Natural Resources, NRCS	Education & Awareness Programs	Up to \$2,500 per outreach campaign	HMGP, WVDEP, WV Division of Natural Resources, NRCS Grants
<p>Status: On-going. Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts</p>									
Clay 7	Flooding	2	Review existing regulations to ensure adequacy in reducing the amount of future development in identified hazard areas.		Clay County Floodplain Coordinator	Clay County Commission	Local Plans & Regulations	N/A Policy creation should require little to no additional funding	Local funding
<p>Status: On-going. Associated Goal(s):</p>									
Clay 8	Flooding	2	Review all comprehensive plans to ensure that designated growth areas are not in hazard areas.		Clay County Commission	Central Appalachian Empowerment Zone	Local Plans & Regulations	N/A Policy creation should require little to no additional funding	Local funding
<p>Status: On-going. Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties</p>									

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Clay 9	Flooding	2	Review all capital improvement plans to ensure that infrastructure improvements are not directed toward hazardous areas.	Ongoing	Clay County Floodplain Coordinator	Clay County Office of Emergency Services	Local Plans & Regulations	N/A Policy creation should require little to no additional funding	Local funding
Status: On-going.									
Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties									
Clay 10	Flooding	8	Provide additional training to county and municipal development officials on NFIP requirements	2 years	Clay County Floodplain Coordinator	Clay County Commission, Clay County Office of Emergency Services	Education & Awareness Programs	N/A Program maintenance included in existing budgets	Local funding
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Clay 11	Misc.	12	Coordinate with all county emergency services personnel to participate in exercises of simulated biological terrorist attacks to practice response efforts.	1 year	Clay County Office of Emergency Services	Local Emergency Services Providers	Emergency Services	Up to \$10,000 per full-scale exercise	SHSP, BRIC FEMA Funding, EMPG, HMEP, Local funding
Status: On-going									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Clay 12	<p>With the availability of the TEIF data from the WVEMD, Clay County can identify specific properties at risk from flooding. Project 12 identifies a "traditional" flood mitigation project for Clay County. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: "TEIF Criteria X"). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows.</p> <ol style="list-style-type: none"> Structures in the floodway Structures in the 1% annual chance area AND with a potential flood depth exceeding 5' in the structure All structures listed in the TEIF analysis for the jurisdiction Structures in the 1% annual chance area AND with a potential flood depth exceeding 4' in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5'.) 								
Clay 13	Dams	13	Work with the Army Corps of Engineers and dam owners to obtain and update emergency action plans for high hazard dams.	5 years	Clay County Office of Emergency Services	USACE	Local Plans & Regulations	N/A	N/A



Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Clay 14	Dams	14	Coordinate with dam owners to identify failure modes; determine qualitative risk values for each failure mode; rank dams risk values; and evaluate potential projects using FEMA's Risk-Based Prioritization Method.	5 years	Clay County Office of Emergency Services	USACE FEMA Dam Owners	Structures & Infrastructure	Unknown	HHPD
<p>Status: On-going Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha, and Putnam Counties</p>									
<p>Status: New Associated Goal(s): Protect Boone, Clay Kanawha and Putnam Counties from a catastrophic release or failure of a dam or coal waste slurry impoundment</p>									

Project #	Clay 12
Hazard	Flooding
Project Priority	1
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	Clay County Floodplain Coordinator
Support Agencies	Clay County Commission
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Approx. \$86,100 per structure acquired
Resources	HMGP
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,

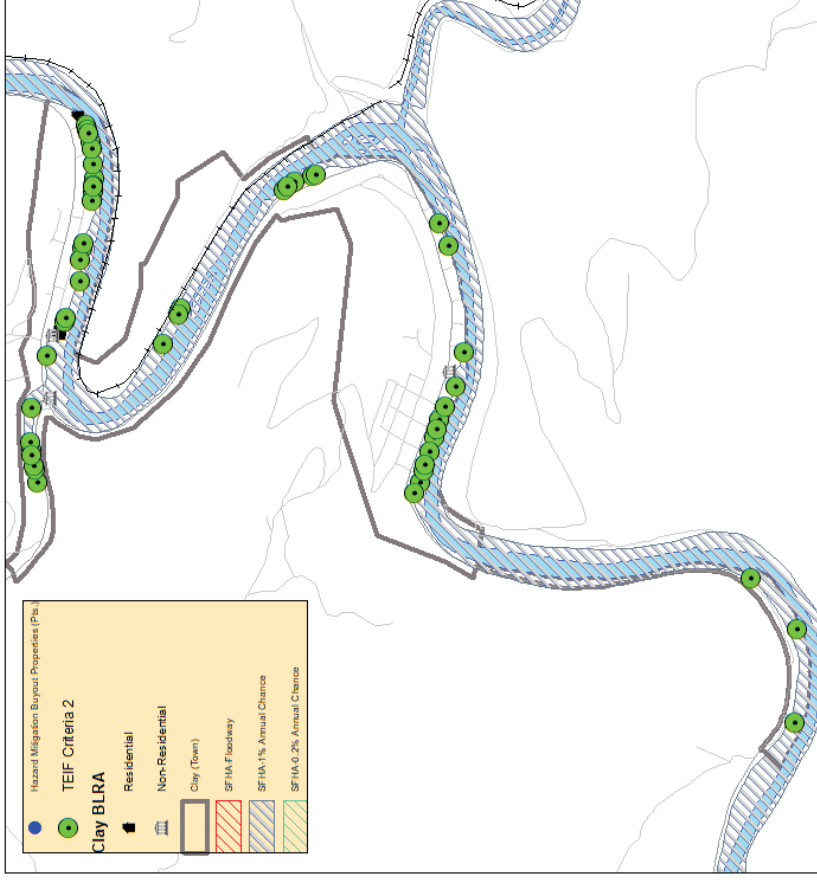


Town of Clay Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Town of Clay 1	Flooding	1	Elevate vital equipment for wastewater treatment to ensure continuous operation	2 years	Clay Buildings & Grounds	CCOES	Structural & Infrastructure Improvements	\$20,000	HMGP
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Town of Clay 2	Flooding	1	Continue to participate in the National Flood Insurance Program (NFIP)	Ongoing	Clay Floodplain Coordinator	Clay County Floodplain Manager, CCOES	Local Plans & Regulations	N/A No additional costs are expected	Local funding, FEMA, WVEMD
Status: On-going.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties.									
Town of Clay 3	Flooding	3	Work with the county to update all floodplain ordinances adopted prior to 1987	Ongoing	Clay Floodplain Manager	Clay County Floodplain Manager	Local Plans & Regulations	N/A No additional costs are expected	Local funding, FEMA, WVEMD
Status: On-going.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties.									
Town of Clay 4	Misc.	5	Support the county in releasing timely articles in local newspapers about winter storms, tornadoes, floods, etc. to inform the public of what to do.	Ongoing	Clay County Office of Emergency Services	Clay Town Council	Education & Awareness Programs	N/A Local media may allow periodic press releases at no charge	Local funding
Status: Ongoing									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Town of Clay 5	<p>With the availability of the TEIF data from the WVEMD, the Town of Clay can identify specific properties at risk from flooding. Project 5 identifies a "traditional" flood mitigation project for the Town of Clay. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: "TEIF Criteria X"). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows.</p> <ol style="list-style-type: none"> Structures in the floodway Structures in the 1% annual chance area AND with a potential flood depth exceeding 5' in the structure All structures listed in the TEIF analysis for the jurisdiction Structures in the 1% annual chance area AND with a potential flood depth exceeding 4' in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5'.) 								



Project #	Town of Clay 5
Hazard	Flooding
Project Priority	4
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, and elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	Clay Floodplain Coordinator
Support Agencies	Clay County Floodplain Coordinator
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Up to \$86,100 per structure acquired
Resources	HMGF
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,



Kanawha County Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Kanawha 1	Misc.	9	Create displays for use at public events	Ongoing	KCOEM	N/A	Education & Awareness Programs	N/A Once displays are created, little extra costs would be incurred	Local funding, FEMA, USEPA, NFPA
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Kanawha 2	Misc.	9	Utilize the media for the distribution and publication of hazard information	Ongoing	KCOEM	Charleston FD	Education & Awareness Programs	N/A Media often let local govt. issue press releases at no cost	Local funding, Local media outlets, FEMA
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Kanawha 3	Misc.	9	Create a public speaking series on hazard related topics such as what to do in the event of an emergency	Ongoing	KCOEM	N/A	Education & Awareness Programs	N/A Creation of the series and materials to require little funding	Local funding, BRIC FEMA Funding
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Kanawha 4	Misc.	9	Update Kanawha County website to provide hazard related information that is easily accessible	Ongoing	KCOEM	Kanawha County IT	Education & Awareness Programs	N/A Program maintenance included in existing budgets	Local funding
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Kanawha 5	Misc.	9	Continue to work with non-governmental organizations (youth service, professional, etc.) to promote mitigation education and awareness	Ongoing	KCOEM	N/A	Education & Awareness Programs	N/A Coordination should require little to no additional funding	Local funding



Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Status: On-going.									
Associated Goal(s): Increase public awareness, understanding, support, and demand for hazard mitigation activities and future strategies or projects									
Kanawha 6	Misc.	9	Distribute information on hazard related topics to local libraries, hospitals, city halls, insurance agencies, banks, and churches	Ongoing	KCOEM	KPEPC	Education & Awareness Programs	Up to \$1,500 per outreach campaign	Local funding, BRIC FEMA Funding
Status: On-going.									
Associated Goal(s): Increase public awareness, understanding, support, and demand for hazard mitigation activities and future strategies or projects									
Kanawha 7	Misc.	9	Work with utility companies to insert emergency information on monthly bills	Ongoing	KCOEM	Utility Companies	Education & Awareness Programs	Coordination should require little to no additional funding	Local funding
Status: On-going.									
Associated Goal(s): Increase public awareness, understanding, support, and demand for hazard mitigation activities and future strategies or projects									
Kanawha 8	Misc.	2	Ensure that all shelters have adequate emergency power resources	Ongoing	KCOEM	N/A	Structural & Infrastructure Improvements	Up to \$50,000 per generator	HMPG
Status: On-going.									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Kanawha 9	Misc.	9	Increase the number of trained citizen emergency responders	Ongoing	KCOEM	Local Fire Departments and EMS Agencies	Emergency Services	N/A Volunteer recruitment is difficult, but should not necessitate funds	Local funding
Status: On-going.									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Kanawha 10	Misc.	31	Conduct annual disaster exercises with local law enforcement, emergency personnel, city and county officials, and other disaster response agencies	Ongoing	KCOEM	KPEPC, Health Department	Emergency Services	Up to \$10,000	Local funding, EMPG, SHSP, HMEP



Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Status: On-going.									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Kanawha 11	Misc.	9	Provide information about local, regional, state and federal training opportunities to fire departments, EMS, ambulance services, and other emergency responders	Ongoing	KCOEM	KPEPC	Education & Awareness Programs	Up to \$1,500 per outreach campaign	Local funding, BRIC FEMA Funding
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Kanawha 12	Severe Storms	9	Conduct National Weather Service Storm Spotter Classes	Ongoing	KCOEM	NWS, KPEPC	Education & Awareness Programs	Up to \$1,000 for class logistics	Local funding, NWS, EMPG
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Kanawha 13	Severe Storms, Tornado	9	Promote awareness training for wind hazards to include training in standards and building codes	Ongoing	Kanawha County Planning	Municipalities that have adopted the building code	Education & Awareness Programs	Up to \$1,500 per outreach campaign	Local funding, BRIC FEMA Funding
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Kanawha 14	Severe Storms	6	Continue to be a National Weather Service Storm Ready Community	Ongoing	KCOEM	NWS	Local Plans & Regulations	N/A Program maintenance included in existing budgets	Local funding
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Kanawha 15	Flooding	9	Provide additional training to county and municipal personnel responsible for the enforcement of the floodplain regulations	Ongoing	Kanawha County Floodplain Office	N/A	Education & Awareness Programs	N/A Program maintenance included in existing budgets	Local funding
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Kanawha 16	Flooding	6	Continue participation in the Community Rating System (CRS)	Ongoing	Kanawha County Floodplain Office	Kanawha County Planning	Local Plans & Regulations	N/A Program maintenance included in existing budgets	Local funding
Status: On-going.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties.									
Kanawha 17	Flooding	29	Separate combined storm and sewer drain lines	Ongoing	Utility Operators	N/A	Structural & Infrastructure Improvements	Unknown	Local funding, CDBG
Status: On-going.									
Associated Goal(s): Increase stormwater management capabilities throughout the region									
Kanawha 18	Flooding	2	Routinely remove trash and debris from stream beds, culverts, storm grates and storm drains	Ongoing	Kanawha County Planning	WVDEP and Other State Agencies	Natural System Protection	Varies	Local funding, WVDEP
Status: On-going.									
Associated Goal(s): Increase water flow capacities throughout the region									
Kanawha 19	Flooding	32	Maintain information on the number and location of all repetitive loss properties throughout Kanawha County and the municipalities	Ongoing	Kanawha County Floodplain Office	Region 3 PDC, KCOEM	Local Plans & Regulations	N/A The list is already compiled at the state level	WVEMD, FEMA
Status: On-going.									
Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties									
Kanawha 20	Flooding	32	Maintain a database of information on all repetitive loss properties including maps	Ongoing	Kanawha County Floodplain Office	Region 3 PDC	Local Plans & Regulations	N/A The list is already compiled at the state level	WVEMD, FEMA
Status: On-going.									
Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties									

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources	
Kanawha 21			With the availability of the TEIF data from the WVEMD, Kanawha County can identify specific properties at risk from flooding. Project 21 identifies a "traditional" flood mitigation project for Kanawha County. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: "TEIF Criteria X"). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows. 1. Structures in the floodway 2. Structures in the 1% annual chance area AND with a potential flood depth exceeding 5' in the structure 3. All structures listed in the TEIF analysis for the jurisdiction 4. Structures in the 1% annual chance area AND with a potential flood depth exceeding 4' in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5'.)							
Kanawha 22	Flooding	32	Continue to update asset inventory data to include interface with assets-by-asset loss estimates.	Ongoing	KCOEM	Region 3 PDC	Local Plans & Regulations	N/A	Region 3 PDC	
Status: On-going.										
Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties										
Kanawha 23	Misc.	32	Develop mitigation strategies to protect any at risk historic properties	Ongoing	KCOEM	Region 3 PDC	Structural & Infrastructure Improvements	N/A Project creation should require little to no additional funding	Local funding, WVEMD, FEMA, Region 3 PDC	
Status: On-going.										
Associated Goal(s): Reduce the potential impact of disasters on Boone, Clay, Kanawha, and Putnam Counties historic structures and landmarks										
Kanawha 24	Flooding	9	Work with WV Department of Transportation to identify areas of frequent roadway flooding and develop mitigation strategies	Ongoing	KCOEM	Region 3 PDC, WVDOT, KPEPC	Education & Awareness Programs	N/A Project creation should require little to no additional funding	WVEMD, FEMA, WVDOT	
Status: On-going.										
Associated Goal(s): Increase stormwater management capabilities throughout the region										
Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties										
Kanawha 25	Misc.	28	Upgrade and improve communications in the rural areas of the county by creating back-up communication lines	Ongoing	KCOEM	N/A	Emergency Services	Unknown	N/A	
Status: On-going.										
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards										

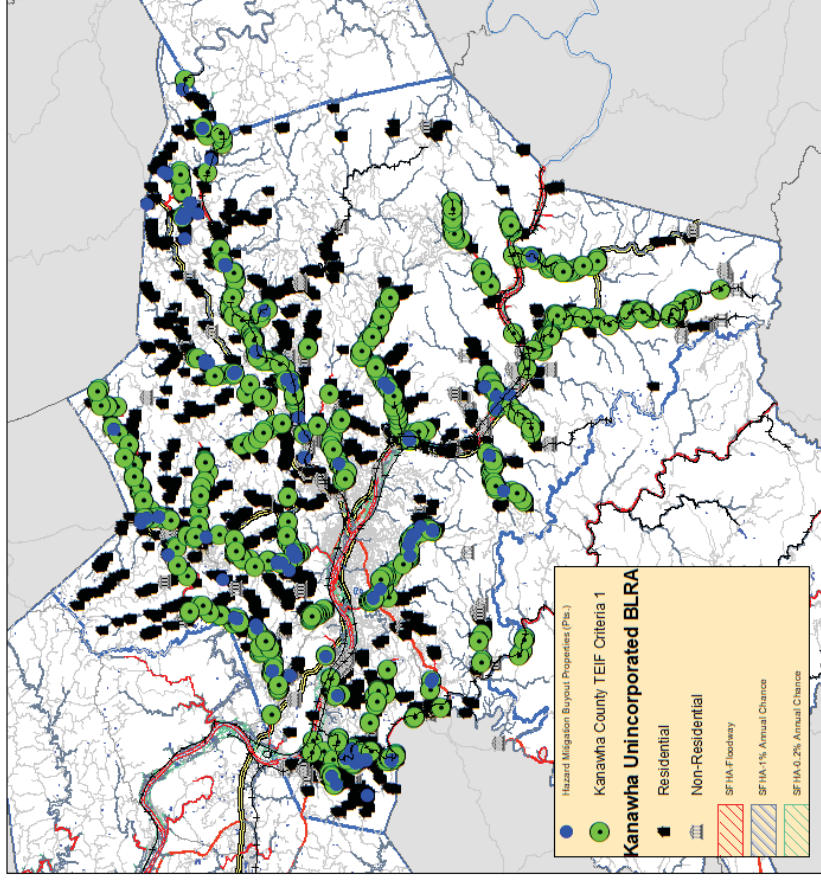


Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Kanawha 26	Drought	9	Develop and information brochure to distribute to residents focusing on the benefits of conserving water	Ongoing	KCOEM	Utility Operators	Education & Awareness Programs	Up to \$1,500 per outreach campaign	Local funding, BRIC FEMA Funding
Status: On-going.									
Associated Goal(s): Increase public awareness, understanding, support, and demand for hazard mitigation activities and future strategies or projects									
Kanawha 27	Drought	29	Continue construction of public water systems to eliminate wells	Ongoing	Utility Operators	Kanawha County Commission, Region 3 PDC	Structural & Infrastructure Improvements	Unknown	Local funding, CDBG, WV/JC
Status: On-going.									
Associated Goal(s): Increase public awareness, understanding, support, and demand for hazard mitigation activities and future strategies or projects									
Kanawha 29	Wildfire	9	Initiate fire department training programs to enhance response capabilities to wildfires	Ongoing	WV Division of Forestry	KCOEM	Emergency Services		
Status: On-going.									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Kanawha 29	Drought	9	Continue to educate the general public on risks during drought conditions	Ongoing	KCOEM	N/A	Education & Awareness Programs	Up to \$1,500 per outreach campaign	Local funding, BRIC FEMA Funding
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Kanawha 30	Mass Movements	36	Apply for additional Abandoned Mine Lands funding	Ongoing	Kanawha County Commission	Region 3 PDC	Local Plans & Regulations	Unknown	AML, WV/DEP
Status: On-going.									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Kanawha 31	Misc.	9	Participate in public awareness campaigns on the local television stations	Ongoing	KCOEM	N/A	Education & Awareness Programs	N/A Outreach via established media should require little to no additional funding	Local media outlets
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Kanawha 32	Misc.	36	Assess high traffic intersections for potential problems	Ongoing	WV Department of Transportation	KCOEM	Local Plans & Regulations	Up to \$5,000 for document	Local funding, WV/DOT
Status: On-going.									
Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties									
Kanawha 33	Misc.	9	Publicize evacuation plans in public places such as libraries, schools, hospitals, courthouse, city halls, banks and churches	Ongoing	KCOEM	KPEPC	Education & Awareness Programs	Up to \$1,500 for printing	Local funding, BRIC FEMA Funding
Status: On-going.									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Kanawha 34	Misc.	2	Purchase and install generators for key infrastructure and government buildings	Ongoing	KCOEM	N/A	Structural & Infrastructure Improvements	Up to \$50,000 per generator	HMGP
Status: On-going.									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Kanawha 35	Misc.	38	Remove abandoned, derelict or burned structures	Ongoing	Kanawha County Planning	Municipalities	Local Plans & Regulations	Up to \$10,000 per structure	Local funding
Status: On-going.									
Associated Goal(s): Remove abandoned buildings from high-risk and other known-impact areas									
Kanawha 36	Flooding	2	Generators for lift stations and municipal owned water treatment facilities.	Ongoing	KCOEM	Utility Operators	Structural & Infrastructure Improvements	Up to \$50,000 per generator	HMGP
Status: On-going.									
Associated Goal(s): Reduce the potential impact of disasters on Boone, Clay, Kanawha, and Putnam Counties historic structures and landmarks									
Kanawha 37	Dams	37	Work with the Army Corps of Engineers and dam owners to obtain and update emergency action plans for high hazard dams.	5 years	KCOEM	USACE	Local Plans & Regulations	N/A	N/A
Status: New									
Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties Protect Boone, Clay Kanawha and Putnam Counties from a catastrophic release or failure of a dam or coal waste slurry impoundment									

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Kanawha 38	Dams	38	Coordinate with dam owners to identify failure modes; determine qualitative risk values for each failure mode; rank dams risk values; and evaluate potential projects using FEMA's Risk-Based Prioritization Method.	5 years	KCOEM	USACE FEMA Dam Owners	Structures & Infrastructure	Unknown	HHPD
Status: New Associated Goal(s): Protect Boone, Clay Kanawha and Putnam Counties from a catastrophic release or failure of a dam or coal waste slurry impoundment									

Project #	Kanawha 21	
Hazard	Flooding	
Project Priority	1	
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.	
Timeframe	On-going	
Primary Coord.	Kanawha County Floodplain Coordinator	
Support Agencies	KCOEM WVEMD	
Mit. Type	Structural & Infrastructure Improvements	
Est. Cost	Approx. \$115,300 per structure acquired	
Resources	HMGP	
Status	On-going	
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,	



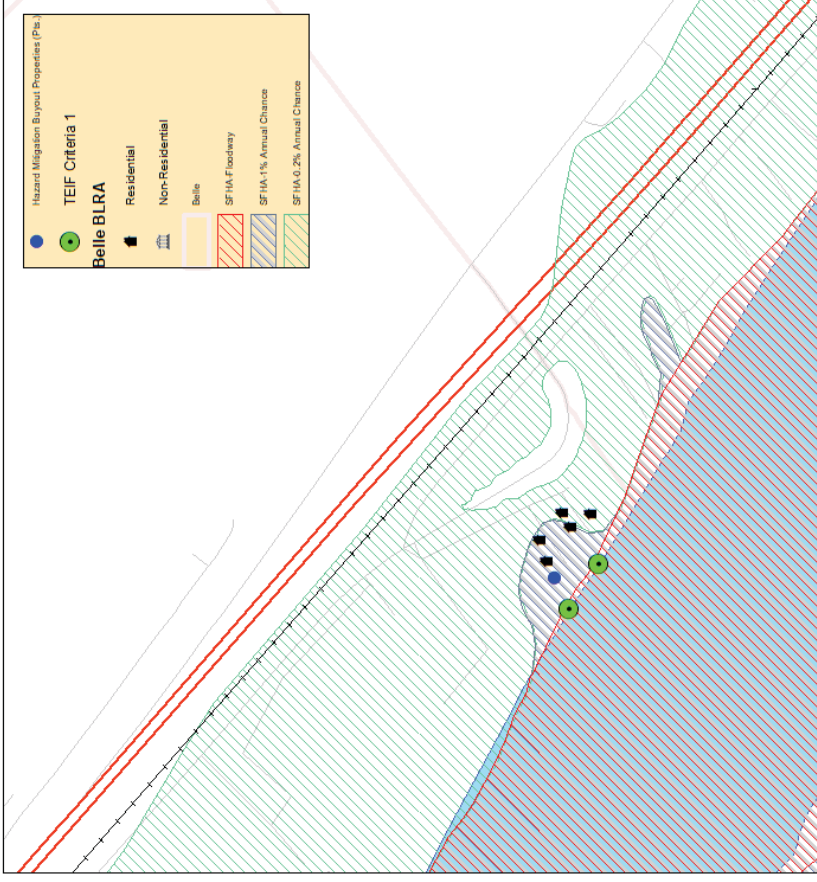
Town of Belle Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Belle 1	Flooding	4	Biennially dredge waterways to keep water below street level.	2 years	Belle Public Works Department	N/A	Natural System Protection	Unknown	Local funding
Status: Ongoing									
Associated Goal(s): Increase water flow capacities throughout the region									
Belle 2	Flooding	2	Continue to participate in the National Flood Insurance Program (NFIP)	Ongoing	Belle Floodplain Coordinator	Kanawha County Floodplain Office	Local Plans & Regulations	N/A Program maintenance included in budgets	Local funding, WVEMD, FEMA
Status: On-going.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties.									
Belle 3	Flooding	1	Continue to enforce current floodplain regulations	Ongoing	Belle Floodplain Coordinator	Belle Town Council	Local Plans & Regulations	N/A Program maintenance included in budgets	Local funding, WVEMD, FEMA
Status: On-going.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties.									
Belle 4	Severe Storms	6	Participate in county provided training for wind hazards to include training standards and building codes	Ongoing	Belle Town Council	KCOEM	Education & Awareness Programs	N/A Participation should require little to no additional funding	Local funding, KCOEM
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Belle 5	Flooding	6	Participate in county provided training on the enforcement of floodplain regulations	Ongoing	Belle Floodplain Coordinator	Kanawha County Floodplain Office	Education & Awareness Programs	N/A Participation should require little to no additional funding	Local funding, Kanawha County Floodplain Office
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									



Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Belle 6	Misc.	5	Support county efforts to utilize the media for the distribution and publication of hazard information	Ongoing	KCOEM	Belle Town Council	Education & Awareness Programs	N/A Support should require little to no additional funding	N/A
<p>Status: Ongoing</p> <p>Associated Goal(s): Increase public awareness, understanding, support, and demand for hazard mitigation activities and future strategies or projects improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards</p>									
Belle 7	<p>With the availability of the TEIF data from the WVEMD, Belle can identify specific properties at risk from flooding. Project 7 identifies a "traditional" flood mitigation project for Belle. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: "TEIF Criteria X"). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows.</p> <ol style="list-style-type: none"> Structures in the floodway Structures in the 1% annual chance area AND with a potential flood depth exceeding 5' in the structure All structures listed in the TEIF analysis for the jurisdiction Structures in the 1% annual chance area AND with a potential flood depth exceeding 4' in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5'.) 								

Project #	Belle 7
Hazard	Flooding
Project Priority	3
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	Belle Floodplain Coordinator
Support Agencies	Kanawha County Floodplain Coordinator
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Up to \$115,300 per structure acquired
Resources	HMGP
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,



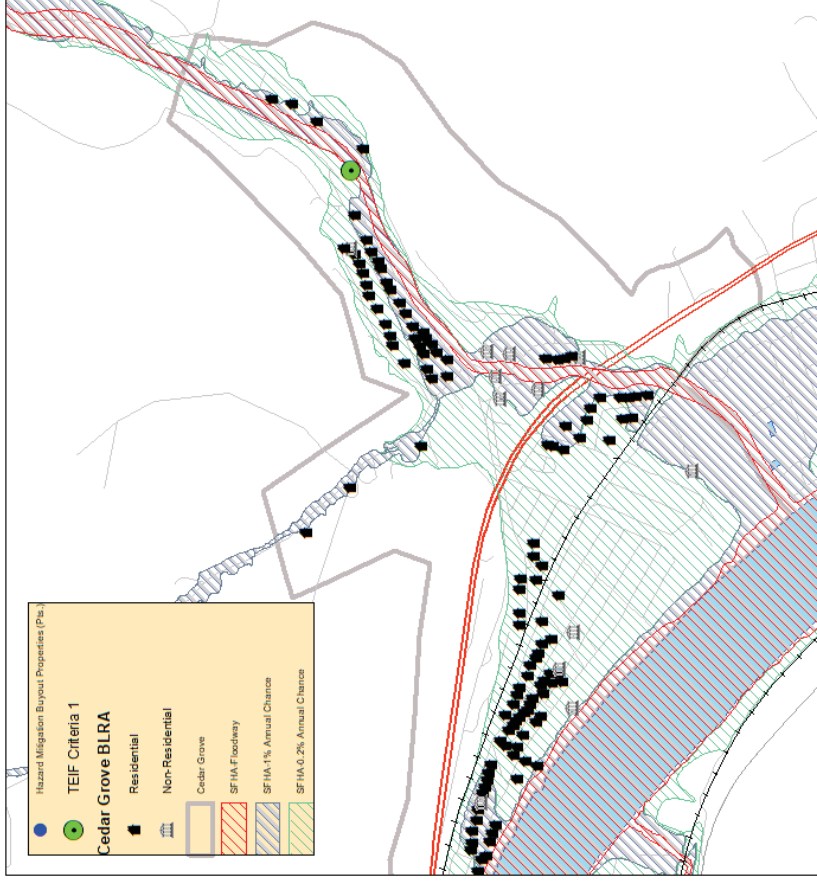
Town of Cedar Grove Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Cedar Grove 1	Flooding	1	Require a permit to build in a floodplain and certificate of elevation before utilities can be turned on in new structures.	Ongoing	Building Department	Cedar Grove Town Council	Local Plans & Regulations	N/A Program maintenance is included in existing budgets	Local funding, WVEMD, FEMA
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Cedar Grove 2	Flooding	3	Continue to participate in the National Flood Insurance Program (NFIP)	Ongoing	Cedar Grove Floodplain Coordinator	Kanawha County Floodplain Office	Local Plans & Regulations	N/A Program maintenance is included in budgets	Local funding, WVEMD, FEMA
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties.									
Cedar Grove 3	Flooding	4	Participate in county provided training on the enforcement of floodplain regulations	Ongoing	Building Department	Kanawha County Floodplain Office	Education & Awareness Programs	N/A Participation should require little to no additional funding	Local funding, Kanawha County Floodplain Office
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Cedar Grove 4	Flooding	2	Continue to enforce current floodplain regulations.	Ongoing	Building Department	Cedar Grove Town Council	Local Plans & Regulations	N/A Program maintenance is included in budgets	Local funding, WVEMD, FEMA
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Cedar Grove 5	Misc.	6	Support county efforts to utilize the media for the distribution and publication of hazard information	Ongoing	KCOEM	Cedar Grove Town Council	Education & Awareness Programs	N/A Support should require little to no additional funding	N/A
Status: Ongoing									
Associated Goal(s): Increase public awareness, understanding, support, and demand for hazard mitigation activities and future strategies or projects Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									



Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Cedar Grove 6			With the availability of the TEIF data from the WVEMD, Cedar Grove can identify specific properties at risk from flooding. Project 6 identifies a "traditional" flood mitigation project for Cedar Grove. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: "TEIF Criteria X"). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows. <ol style="list-style-type: none"> 1. Structures in the floodway 2. Structures in the 1% annual chance area AND with a potential flood depth exceeding 5' in the structure 3. All structures listed in the TEIF analysis for the jurisdiction 4. Structures in the 1% annual chance area AND with a potential flood depth exceeding 4' in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5'.) 						

Project #	Cedar Grove 6
Hazard	Flooding
Project Priority	1
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	Cedar Grove Floodplain Coordinator
Support Agencies	Kanawha County Floodplain Coordinator
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Up to \$115,300 per structure acquired
Resources	HMGP
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,



City of Charleston Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Charleston 1	Misc.	6	Create displays for use at public events (e.g. health fair, public awareness day, etc.).	On-going	Charleston Department of Homeland Security and Emergency Management (CDHSEM)	KCOEM, KPEPC	Education & Awareness Programs	\$500 - \$1,000	Local funds, EMPG
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Charleston 2	Misc.	29	Utilize the media for the distribution and publication of hazard information.	On-going	CDHSEM	Local media	Education & Awareness Programs	No local cost	N/A
Status: New, Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Charleston 3	Misc.	27	Create a public speaking series on hazard-related topics, such as what to do in the event of an emergency and who to contact.	On-going	CDHSEM	KPEPC, KCOEM	Education & Awareness Programs	\$5,000 - \$15,000	Local funds
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Charleston 4	Misc.	9	Ensure that the American Red Cross Citizen's Disaster Course is held on a frequent basis.	On-going	CDHSEM	American Red Cross (ARC)	Education & Awareness Programs	No local cost	N/A
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Charleston 5	Misc.	22	Continue to work with the Kanawha County School Board to promote hazard mitigation education and awareness and to discuss better ways to integrate mitigation into the curriculum, as well as using the school board as a means to distribute information to homes via students.	On-going	CDHSEM	Kanawha County Schools	Education & Awareness Programs	Little to no local cost	N/A
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Charleston 6	Misc.	18	Continue to work with non-governmental organizations (youth, service, professional, etc.) to promote mitigation education and awareness.	On-going	CDHSEM	Local civic organizations	Education & Awareness Programs	Little to no local cost	N/A
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Charleston 7	Misc.	28	Distribute information on hazard related topics to local libraries, hospitals, city halls, insurance agencies, banks, and churches.	On-going	CDHSEM	KPEPC, KCOEM	Education & Awareness Programs	\$1,000 - \$2,500	Local funds, EMPG
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Charleston 8	Misc.	7	Work with the tax office to insert emergency information into monthly bills.	On-going	CDHSEM	N/A	Education & Awareness Programs	\$1,000 - \$2,500	Local funds, EMPG
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Charleston 9	Flooding	20	Distribute information to all property owners in repetitive loss areas within the city of Charleston regarding potential flood hazards as required for participation in the Community Rating System.	On-going	Charleston Planning	CDHSEM	Education & Awareness Programs	Up to \$80,000	BRIC FEMA Funding
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Charleston 10	Misc.	24	Establish all-hazard resource centers. The centers should act as a repository for information on local hazard identification, preparedness, and mitigation strategies for use by citizens, realtors, and lenders.	On-going	CDHSEM	KCOEM, KPEPC	Education & Awareness Programs	Little to no local cost	N/A
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts Increase public awareness, understanding, support, and demand for hazard mitigation activities and future strategies or projects									
Charleston 11	Misc.	10	Conduct annual disaster exercises with local law enforcement, emergency personnel, city and county officials, and other disaster response agencies.	On-going	CDHSEM	KPEPC	Emergency Services	Up to \$5,000	Local funds, HMEP, EMPG, SERC
Status: Ongoing									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Charleston 12	Severe Storms	25	Become certified by the National Weather Service (NWS) as Storm Ready thereby offer Storm Spotter classes.	On-going	CDHSEM	National Weather Service – Charleston, WVEMD	Local Plans & Regulations	Contingent upon availability of NWS resources.	Local Funds
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Charleston 13	Misc.	21	Review existing regulations to ensure adequacy in reducing the amount of future development in identified hazard areas	On-going	Charleston Planning	CDHSEM	Local Plans & Regulations	Little to no local cost	N/A
Status: Ongoing									
Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties									
Charleston 14	Flooding	12	Continue participation in the Community Rating System (CRS).	On-going	Charleston Planning,	WVEMD	Local Plans & Regulations	Little to no local cost	N/A
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Charleston 15	Flooding	31	Separate combined storm and sewer drain lines	On-going	Charleston Public Works & Sanitary Board	N/A	Structural & Infrastructure Improvements	Up to \$5,000,000	CDBG
Status: New.									
Associated Goal(s): Increase stormwater management capabilities throughout the region									
Increase water flow capacities throughout the region									
Charleston 16	With the availability of the TEIF data from the WVEMD, Charleston can identify specific properties at risk from flooding. Project 16 identifies a "traditional" flood mitigation project for Charleston. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: "TEIF Criteria X"). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows.								
<ol style="list-style-type: none"> Structures in the floodway Structures in the 1% annual chance area AND with a potential flood depth exceeding 5' in the structure All structures listed in the TEIF analysis for the jurisdiction Structures in the 1% annual chance area AND with a potential flood depth exceeding 4' in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5'.) 									
Charleston 17	Flooding	4	Identify property owners of RL and non-RL properties that may be willing to participate in future property acquisition and demolition projects.	On-going	Charleston Planning	Kanawha County Floodplain Office	Structural & Infrastructure Improvements	Little to no local cost	N/A
Status: Ongoing.									
Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties									
Charleston 18	Flooding	13	Continue to participate in the National Flood Insurance Program (NFIP)	On-going	Charleston Planning	N/A	Local Plans & Regulations	Little to no local cost	N/A



Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Status: New.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Charleston 19	Flooding	11	Continue to enforce current floodplain regulations	On-going	Charleston Planning	N/A	Local Plans & Regulations	Little to no local cost	N/A
Status: New.									
Associated Goal(s):									
Charleston 20	Flooding	14	Continue to enforce stormwater regulations	On-going	Stormwater Department	Engineering Department	Local Plans & Regulations	Little to no local cost	N/A
Status: New.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Charleston 21	Flooding	1	Review all comprehensive plans to ensure that designated growth areas are not in hazard areas.	On-going	Charleston Planning	N/A	Local Plans & Regulations	Little to no local cost	N/A
Status: New.									
Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties									
Charleston 22	Flooding	5	Routinely remove trash and debris from stream beds, culverts, storm grates and storm drains	On-going	Public Works	WVDEP and Other State Agencies	Natural System Protection	Varies	Local funding, WVDEP
Status: New.									
Associated Goal(s): Increase water flow capacities throughout the region									
Charleston 23	Flooding	15	Continue to purchase tax delinquent property in the SFHA for conservation	On-going	Charleston Land Reuse Agency	Planning Department	Natural System Protection	Approx. \$4,000/property	CLRA Budget, General Fund, Grants
Status: New.									
Associated Goal(s): Remove abandoned buildings from high-risk and other known-impact areas									
Charleston 24	Misc.	30	Upgrade and improve communications in the rural areas of the county by creating back-up communication lines	On-going	CDHSEM	KCOEM, KPEPC	Emergency Services	Little to no local cost	N/A
Status: Ongoing									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Charleston 25	Drought	23	Develop an information brochure to distribute to residents focusing on the benefits of conserving water.	On-going	CDHSEM	KCOEM, KPEPC	Education & Awareness Programs	\$500 - \$1,000	Local funds, EMPG, BRIC FEMA Funding

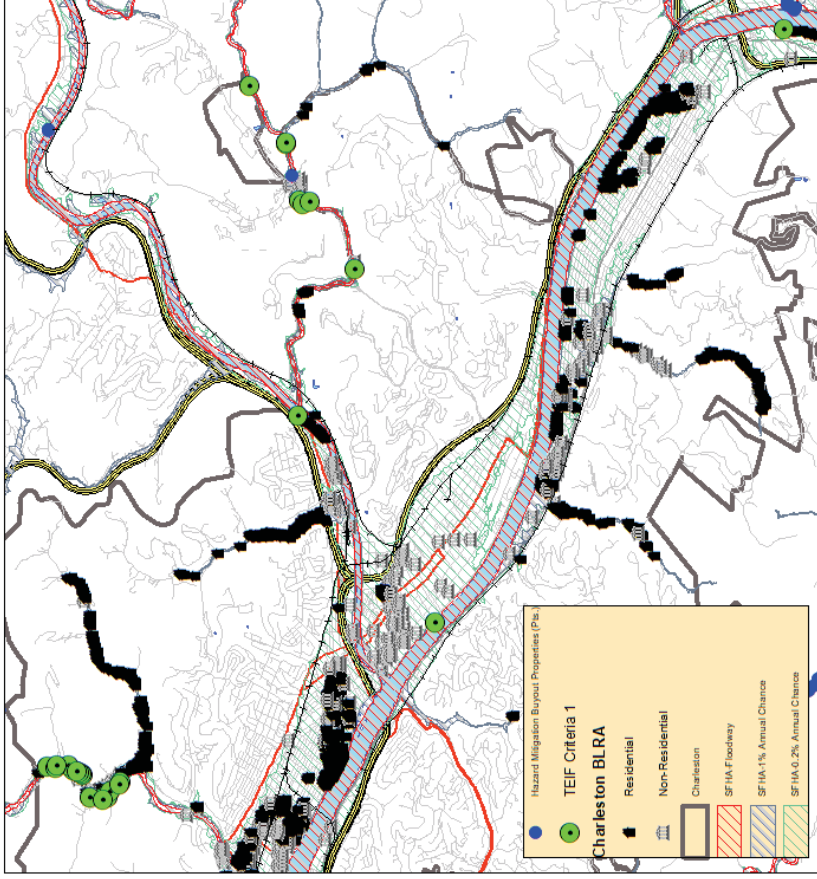


Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Status: Ongoing.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Charleston 26	Wildfire	17	Strengthen enforcement of burning bans with the U.S. Forestry Service.	On-going	Charleston City Council	USDA Forest Service	Local Plans & Regulations	Little to no local cost	N/A
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Charleston 27	Drought	19	Continue to educate the general public on risks during drought conditions.	On-going	CDHSEM	KCOEM, KPEPC	Education & Awareness Programs	\$500 - \$1,000	Local funds, BRIC FEMA Funding
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Charleston 28	Misc.	26	Continue to enforce International Building Codes and continue to update them as required	On-going	Charleston Building Commissioner	N/A	Local Plans & Regulations	Little to no local cost	N/A
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Charleston 29	Flooding	8	Continue to send out annual notification concerning floodplain management services to all lenders, insurance agents, and real estate agents within the city limits of Charleston	On-going	Charleston Planning	CDHSEM	Education & Awareness Programs	Little to no additional cost	Local funds
Status: Ongoing.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Charleston 30	Flooding	2	Maintain floodplain information on the Charleston Planning website	On-going	Charleston Planning	Charleston IT	Education & Awareness Programs	Little to no additional cost	Local funds
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Charleston 31	Flooding	3	Update and maintain outreach materials relating to flooding at the Kanawha County Library	On-going	Charleston Planning	Local Libraries	Education & Awareness Programs	Little to no additional cost	Local funds
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									



Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Charleston 32	Multiple Hazards	8	Renovations of the YMCA building to include areas for use as sheltering areas	5 years	Charleston Planning	YMCA	Structural & Infrastructure Improvements	Unknown	Local funds
Status: Ongoing									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Charleston 33	Flooding	33	Plant trees to prevent erosion and promote cooler micro-climate	5 years	Charleston Planning	Charleston City Council	Natural System Protection	N/A	N/A
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Charleston 34	Multiple Hazards	33	Install generators in critical facilities such as clinics, police stations, fire stations, etc.	5 years	Charleston Emergency Management	Charleston City Council	Structure & Infrastructure	Unknown	BRIC Local Funds HMGP
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Charleston 35	Multiple Hazards	33	Upgrade water and sewer systems	5 years	City Engineer	Public Works	Structure & Infrastructure	Unknown	BRIC Local Funds
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Increase stormwater management capabilities throughout the region									

Project #	Charleston 16
Hazard	Flooding
Project Priority	16
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	Charleston Planning
Support Agencies	Kanawha County Floodplain Coordinator
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Approx. \$156,900
Resources	HMGP
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,



Town of Chesapeake Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Chesapeake 1	Flooding	1	Continue to participate in the National Flood Insurance Program (NFIP)	Ongoing	Chesapeake Floodplain Coordinator	Kanawha County Floodplain Office	Local Plans & Regulations	N/A Program maintenance included in budgets	Local funding, WVEMD, FEMA
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Chesapeake 2	Flooding	1	Continue to enforce current floodplain regulations	Ongoing	Chesapeake Floodplain Coordinator	Chesapeake Town Council	Local Plans & Regulations	N/A Program maintenance included in budgets	Local funding, WVEMD, FEMA
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Chesapeake 3	Flooding	5	Perform a study of the town's sewer system	One year	Chesapeake Sanitary Board	Chesapeake Town Council	Structural & Infrastructure Improvements	Up to \$25,000	Local funding, CDBG, USACE (Silver Jackets)
Status: Ongoing									
Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties									
Chesapeake 4	Flooding	10	Develop a plan to eliminate issues in the town's sewer system	One year	Chesapeake Sanitary Board	Chesapeake Town Council	Structural & Infrastructure Improvements	Up to \$25,000	Local funding, USACE (Silver Jackets)
Status: Ongoing									
Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties									
Chesapeake 5	Flooding	12	Replace the town's current sewer system including pump/lift stations and pipelines	Two years	Chesapeake Sanitary Board	Chesapeake Town Council	Structural & Infrastructure Improvements	\$12 Million	Grants, Local funding, Other resources
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Chesapeake 6	Flooding	1	Enforce current ordinances and codes to prevent residents/businesses from pumping flood water into sewer system	Ongoing	Chesapeake Sanitary Board	Chesapeake Town Council	Local Plans & Regulations	N/A Program maintenance included in existing budgets	Local funding
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									

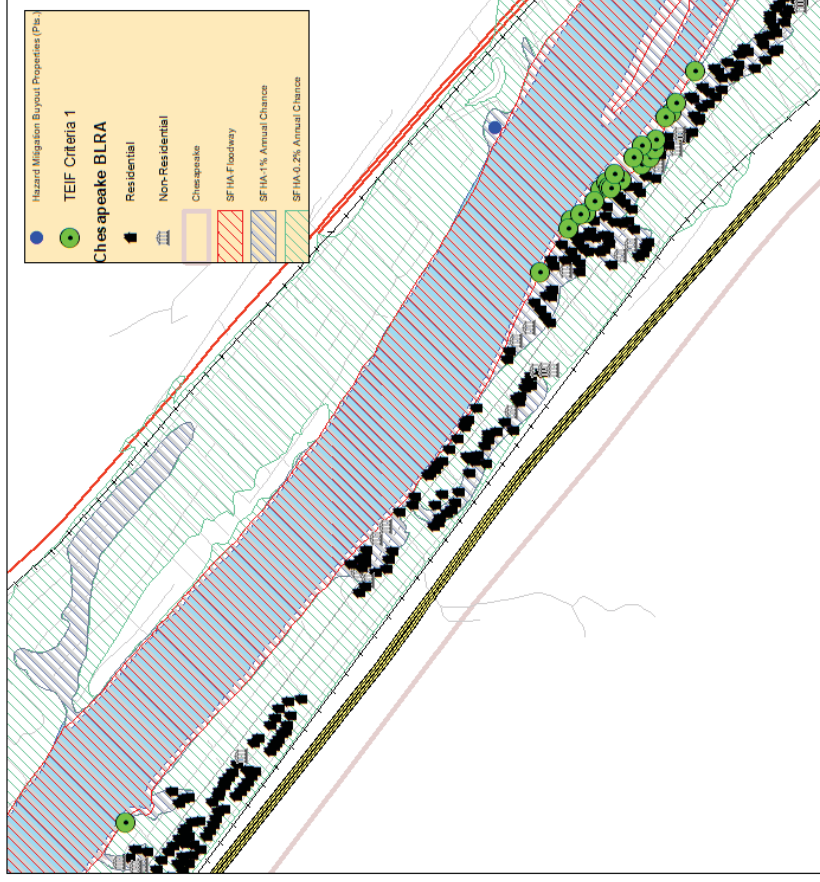


Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Chesapeake 7	Flooding	5	Perform a study of the town's storm water system	One year	Chesapeake Town Council	N/A	Structural & Infrastructure Improvements	Up to \$25,000	Local funding, CDBG, USACE (Silver Jackets)
Status: Ongoing									
Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties									
Chesapeake 8	Flooding	10	Develop a Storm Water Improvement Plan	One year	Chesapeake Town Council	N/A	Structural & Infrastructure Improvements	Up to \$25,000	Local funding, CDBG, USACE (Silver Jackets)
Status: Ongoing									
Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties									
Chesapeake 9	Flooding	12	Perform repairs and improvements to the storm water system	One year	Chesapeake Town Council	N/A	Structural & Infrastructure Improvements	Unknown	Local funding, CDBG
Status: Ongoing									
Associated Goal(s): Increase stormwater management capabilities throughout the region									
Chesapeake 10	Flooding	1	Update and enforce new storm water ordinances	One year	Chesapeake Town Council	N/A	Local Plans & Regulations	N/A Creation of policy should require little to no additional funding	Local funding
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Chesapeake 11	Flooding	5	Create a Storm Water Management Board	One year	Chesapeake Town Council	N/A	Local Plans & Regulations	N/A Creation of a board should require little to no additional funding	N/A
Status: Ongoing									
Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties									
Chesapeake 12	Flooding	5	Hold quarterly cleanup events to involve the community	Ongoing	Chesapeake Town Council	Kanawha County Planning	Natural System Protection	N/A Support existing efforts should require little to no funding	Kanawha County Planning
Status: Ongoing									
Associated Goal(s): Increase water flow capacities throughout the region									



Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Chesapeake 13	Flooding	15	Create educational series for schools on best practices to maintain local water sources	Ongoing	Chesapeake Town Council	Kanawha County Schools, KCOEM	Education & Awareness Programs	N/A	Kanawha County Schools, KCOEM, Local funding
Status: Ongoing									
Associated Goal(s):									
Chesapeake 14	Flooding	15	Develop plans for rain gardens in the community	One year	Chesapeake Town Council	USEPA	Natural System Protection	Unknown	Local funding, USEPA, USACE (Silver Jackets)
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Chesapeake 15	Flooding	5	Continue work on MS4 permitting	Ongoing	Chesapeake Town Council	WVDEP	Local Plans & Regulations	N/A	Local funding, WVDEP
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Chesapeake 16	Misc.	17	Support county efforts to utilize the media for the distribution and publication of hazard information	Ongoing	KCOEM	Chesapeake Town Council	Education & Awareness Programs	N/A	Local funding, WVDEP
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
With the availability of the TEIF data from the WVEMD, Chesapeake can identify specific properties at risk from flooding. Project 17 identifies a "traditional" flood mitigation project for Chesapeake. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: "TEIF Criteria X"). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows.									
<ol style="list-style-type: none"> Structures in the floodway Structures in the 1% annual chance area AND with a potential flood depth exceeding 5' in the structure All structures listed in the TEIF analysis for the jurisdiction Structures in the 1% annual chance area AND with a potential flood depth exceeding 4' in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5'.) 									

Project #	Chesapeake 17
Hazard	Flooding
Project Priority	14
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	Chesapeake Floodplain Coordinator
Support Agencies	Kanawha County Floodplain Coordinator
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Up to \$115,300 per structure acquired
Resources	HMGF
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,

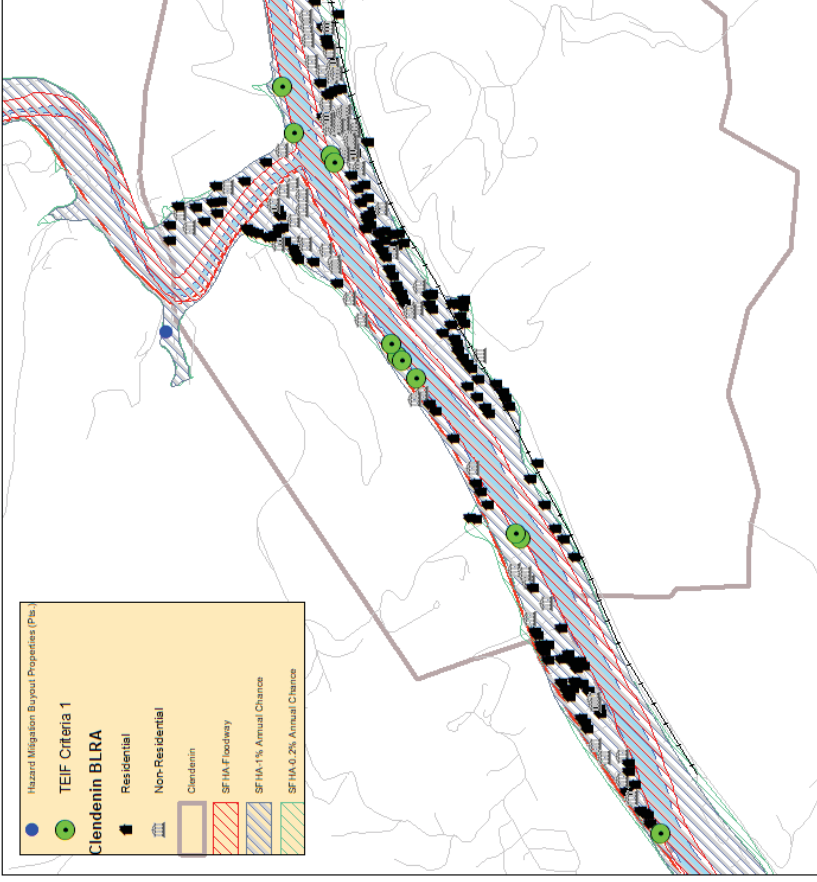


Town of Clendenin Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Clendenin 1	Flooding	1	Continue to buy back repetitive loss properties	Ongoing	Clendenin Building Department	Kanawha County Floodplain Office	Property Protection	Up to \$103,100 per structure acquired	HMGP
<p>Status: Ongoing Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties Remove abandoned buildings from high-risk and other known-impact areas</p>									
Clendenin 2	<p>With the availability of the TEIF data from the WVEMD, Clendenin can identify specific properties at risk from flooding. Project 2 identifies a "traditional" flood mitigation project for Clendenin. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: "TEIF Criteria X"). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows.</p> <ol style="list-style-type: none"> Structures in the floodway Structures in the 1% annual chance area AND with a potential flood depth exceeding 5' in the structure All structures listed in the TEIF analysis for the jurisdiction Structures in the 1% annual chance area AND with a potential flood depth exceeding 4' in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5'.) 								
Clendenin 3	Flooding	4	Continue to participate in the National Flood Insurance Program (NFIP)	Ongoing	Clendenin Building Department	Kanawha County Floodplain Office	Local Plans & Regulations	N/A Program maintenance included in budgets	Local funding, WVEMD, FEMA
<p>Status: Ongoing Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties</p>									
Clendenin 4	Flooding	3	Continue to enforce current floodplain regulations	Ongoing	Clendenin Building Department	Clendenin Town Council	Local Plans & Regulations	N/A Program maintenance included in budgets	Local funding, WVEMD, FEMA
<p>Status: Ongoing Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties</p>									
Clendenin 5	Misc.	5	Support county efforts to utilize the media for the distribution and publication of hazard information	Ongoing	KCOEM	Clendenin Town Council	Education & Awareness Programs	N/A Support should require little to no additional funding	N/A
<p>Status: Ongoing Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts</p>									



Project #	Clendenin 2
Hazard	Flooding
Project Priority	1
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	Clendenin Floodplain Coordinator
Support Agencies	Kanawha County Floodplain Coordinator
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Up to \$115,300 per structure acquired
Resources	HMGP
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,

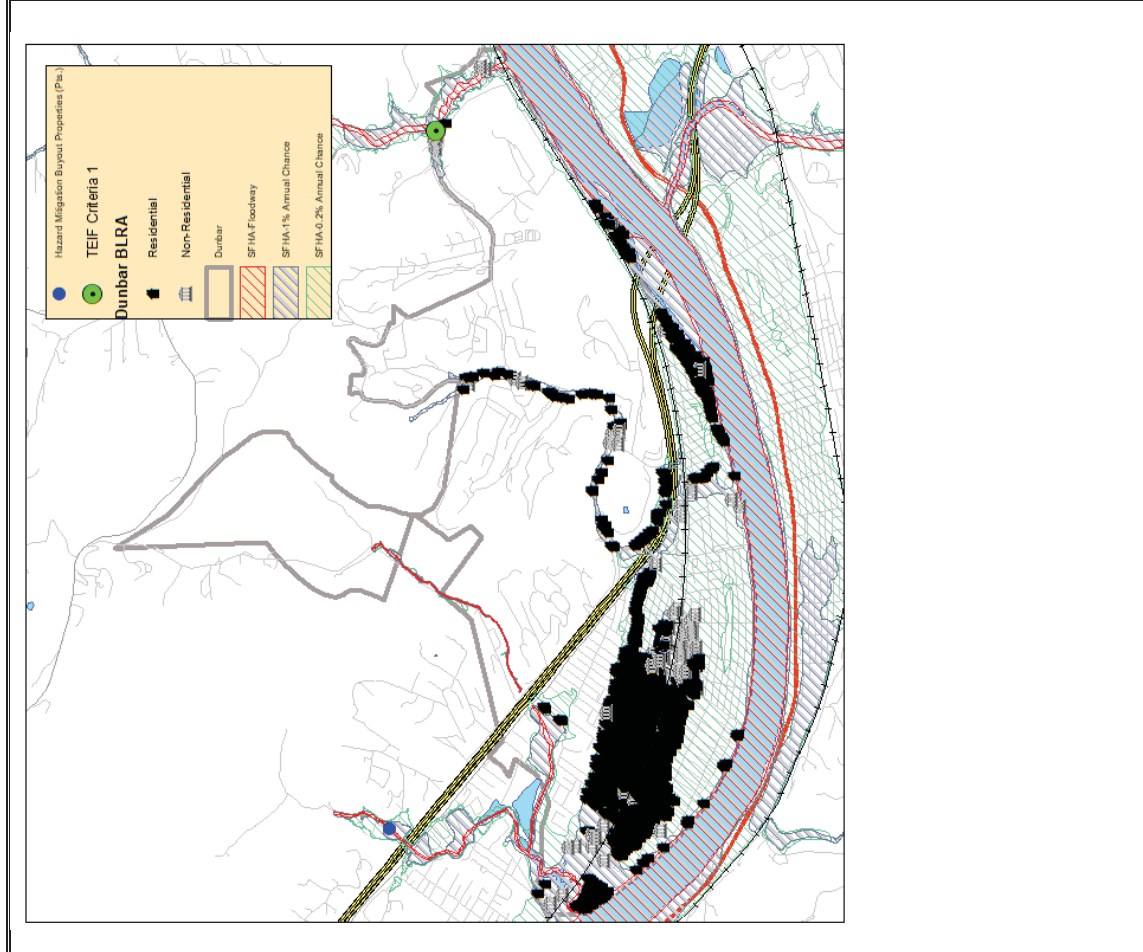


City of Dunbar Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Dunbar 1	Flooding	3	Continue to participate in the National Flood Insurance Program (NFIP)	Ongoing	Dunbar Building Department	Kanawha County Floodplain Office	Local Plans & Regulations	N/A Program maintenance included in budgets	Local funding, WVEMD, FEMA
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Dunbar 2	Flooding	1	Continue to enforce current floodplain regulations	Ongoing	Dunbar Building Department	Dunbar City Council	Local Plans & Regulations	N/A Program maintenance included in budgets	Local funding, WVEMD, FEMA
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Dunbar 3	Flooding	1	Continue to Participate in the WV MS4 Permit Program	Ongoing	Dunbar Building Department	Dunbar City Council, WVDEP	Local Plans & Regulations	N/A Creation of policy should require little to no additional funding	Local funding, WVDEP
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Dunbar 4	Misc.	5	Support county efforts to utilize the media for the distribution and publication of hazard information	Ongoing	KCOEM	Dunbar City Council	Education & Awareness Programs	N/A Support should require little to no additional funding	N/A
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Dunbar 5	<p>With the availability of the TEIF data from the WVEMD, Dunbar can identify specific properties at risk from flooding. Project 5 identifies a "traditional" flood mitigation project for Dunbar. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: "TEIF Criteria X"). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows.</p> <ol style="list-style-type: none"> Structures in the floodway Structures in the 1% annual chance area AND with a potential flood depth exceeding 5' in the structure All structures listed in the TEIF analysis for the jurisdiction Structures in the 1% annual chance area AND with a potential flood depth exceeding 4' in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5') 								



Project #	Dunbar 5
Hazard	Flooding
Project Priority	4
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	Dunbar Floodplain Coordinator
Support Agencies	Kanawha County Floodplain Coordinator
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Approx. \$98,400 per structure acquired
Resources	HMGP
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas. Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,

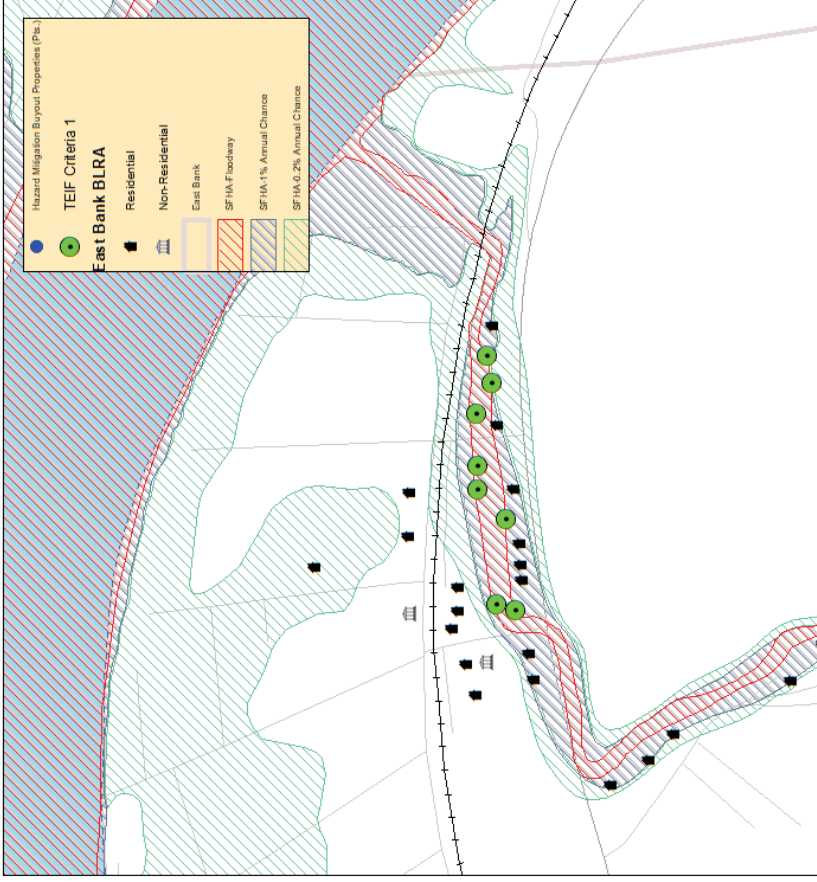


Town of East Bank Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
East Bank 1	Flooding	2	Continue to participate in the National Flood Insurance Program (NFIP)	Ongoing	East Bank Floodplain Coordinator	Kanawha County Floodplain Office	Local Plans & Regulations	N/A Program maintenance included in budgets	Local funding, WVEMD, FEMA
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
East Bank 2	Flooding	1	Continue to enforce current floodplain regulations	Ongoing	East Bank Floodplain Coordinator	East Bank Town Council	Local Plans & Regulations	N/A Program maintenance included in budgets	Local funding, WVEMD, FEMA
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
East Bank 3	Flooding	3	Replace municipal water pipelines	5 years	East Bank Public Works Department	Region 3 PDC	Structural & Infrastructure Improvements	>\$5,000,000	Local funding, CDBG, WVJDC
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
East Bank 4	Misc.	5	Support county efforts to utilize the media for the distribution and publication of hazard information	Ongoing	KCOEM	East Bank Town Council	Education & Awareness Programs	N/A Support should require little to no additional funding	N/A
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
East Bank 5	With the availability of the TEIF data from the WVEMD, East Bank can identify specific properties at risk from flooding. Project 5 identifies a "traditional" flood mitigation project for East Bank. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: "TEIF Criteria X"). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows.								
<ol style="list-style-type: none"> 1. Structures in the floodway 2. Structures in the 1% annual chance area AND with a potential flood depth exceeding 5' in the structure 3. All structures listed in the TEIF analysis for the jurisdiction 4. Structures in the 1% annual chance area AND with a potential flood depth exceeding 4' in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5'.) 									



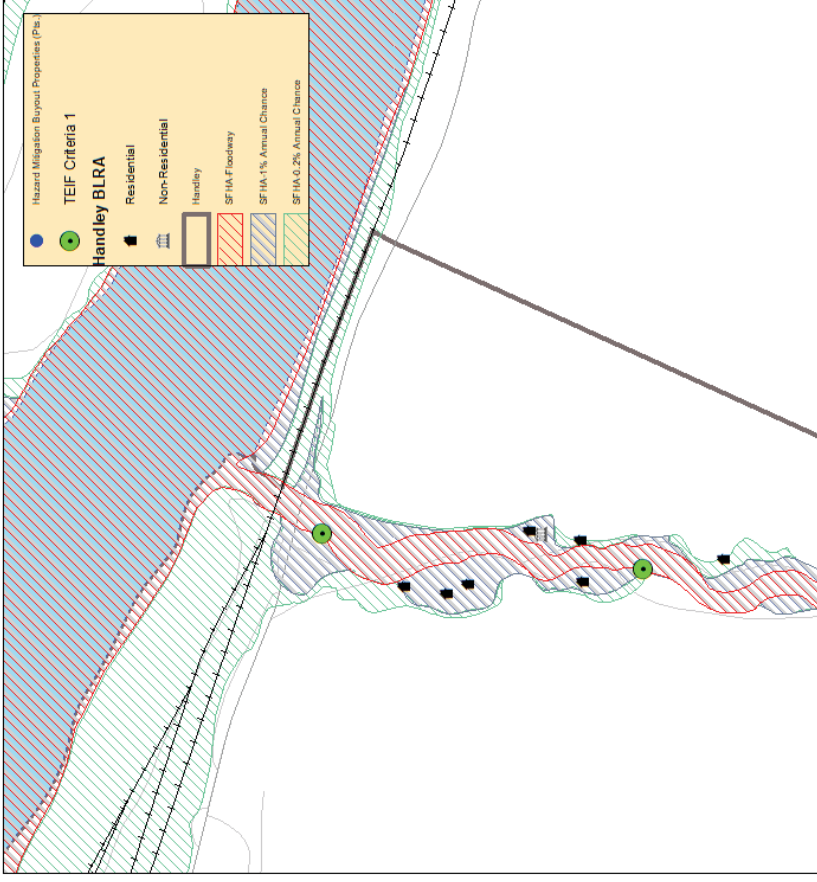
Project #	East Bank 5
Hazard	Flooding
Project Priority	4
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	East Bank Floodplain Coordinator
Support Agencies	Kanawha County Floodplain Coordinator
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Up to \$115,300 per structure acquired
Resources	HMGP
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,



Town of Handley Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Handley 1	Flooding	2	Continue to participate in the National Flood Insurance Program (NFIP)	Ongoing	Handley Floodplain Coordinator	Kanawha County Floodplain Office	Local Plans & Regulations	N/A Program maintenance included in budgets	Local funding, WVEMD, FEMA
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Handley 2	Flooding	1	Continue to enforce current floodplain regulations	Ongoing	Handley Floodplain Coordinator	Handley Town Council	Local Plans & Regulations	N/A Program maintenance included in budgets	Local funding, WVEMD, FEMA
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Handley 3	Misc.	4	Support county efforts to utilize the media for the distribution and publication of hazard information	Ongoing	KCOEM	Handley Town Council	Education & Awareness Programs	N/A Support should require little to no additional funding	N/A
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Handley 4	<p>With the availability of the TEIF data from the WVEMD, Handley can identify specific properties at risk from flooding. Project 4 identifies a “traditional” flood mitigation project for Handley. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: “TEIF Criteria X”). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows.</p> <ol style="list-style-type: none"> Structures in the floodway Structures in the 1% annual chance area AND with a potential flood depth exceeding 5’ in the structure All structures listed in the TEIF analysis for the jurisdiction Structures in the 1% annual chance area AND with a potential flood depth exceeding 4’ in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5’.) 								

Project #	Handley 4
Hazard	Flooding
Project Priority	3
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	Handley Floodplain Coordinator
Support Agencies	Kanawha County Floodplain Coordinator
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Up to \$115,300 per structure acquired
Resources	HMGP
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,



City of Marmet Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Marmet 1	Flooding	2	Continue to participate in the National Flood Insurance Program (NFIP)	Ongoing	Marmet Floodplain Coordinator	Kanawha County Floodplain Office	Local Plans & Regulations	N/A Program maintenance included in budgets	Local funding, WVEMD, FEMA
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Marmet 2	Flooding	1	Continue to enforce current floodplain regulations	Ongoing	Marmet Floodplain Coordinator	Marmet City Council	Local Plans & Regulations	N/A Program maintenance included in budgets	Local funding, WVEMD, FEMA
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Marmet 3	Misc.	4	Support county efforts to utilize the media for the distribution and publication of hazard information	Ongoing	KCOEM	Marmet City Council	Education & Awareness Programs	N/A Support should require little to no additional funding	N/A
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Marmet 4	<p>With the availability of the TEIF data from the WVEMD, Marmet can identify specific properties at risk from flooding. Project 4 identifies a “traditional” flood mitigation project for Marmet. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: “TEIF Criteria X”). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows.</p> <ol style="list-style-type: none"> Structures in the floodway Structures in the 1% annual chance area AND with a potential flood depth exceeding 5’ in the structure All structures listed in the TEIF analysis for the jurisdiction Structures in the 1% annual chance area AND with a potential flood depth exceeding 4’ in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5’.) 								

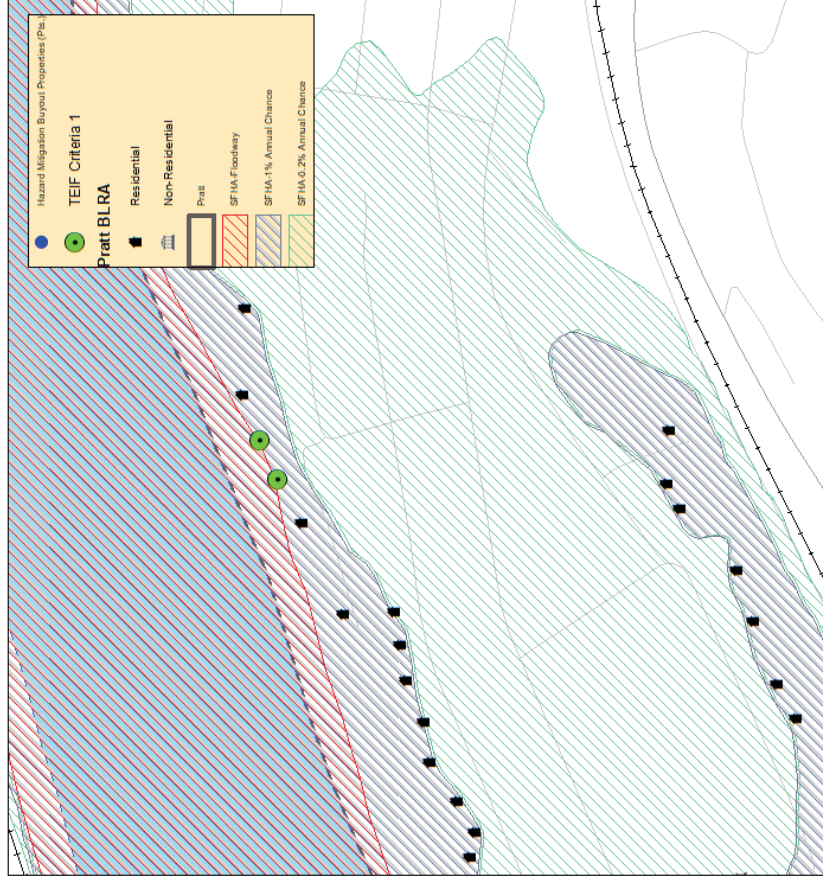
Project #	Marmet 4
Hazard	Flooding
Project Priority	3
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	Marmet Floodplain Coordinator
Support Agencies	Kanawha County Floodplain Coordinator
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Up to \$115,300 per structure acquired
Resources	HMGP
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,



Town of Pratt Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Pratt 1	Flooding	2	Continue to participate in the National Flood Insurance Program (NFIP)	Ongoing	Kanawha County Floodplain Office	N/A	Local Plans & Regulations	N/A Program maintenance included in budgets	Local funding, WVEMD, FEMA
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Pratt 2	Flooding	1	Continue to enforce current floodplain regulations	Ongoing	Kanawha County Floodplain Office	Pratt Town Council	Local Plans & Regulations	N/A Program maintenance included in budgets	Local funding, WVEMD, FEMA
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Pratt 3	Misc.	4	Support county efforts to utilize the media for the distribution and publication of hazard information	Ongoing	KCOEM	Pratt Town Council	Education & Awareness Programs	N/A Support should require little to no additional funding	N/A
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Pratt 4	<p>With the availability of the TEIF data from the WVEMD, Pratt can identify specific properties at risk from flooding. Project 4 identifies a “traditional” flood mitigation project for Pratt. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: “TEIF Criteria X”). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows.</p> <ol style="list-style-type: none"> Structures in the floodway Structures in the 1% annual chance area AND with a potential flood depth exceeding 5' in the structure All structures listed in the TEIF analysis for the jurisdiction Structures in the 1% annual chance area AND with a potential flood depth exceeding 4' in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5'.) 								

Project #	Pratt 4
Hazard	Flooding
Project Priority	3
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	Pratt Floodplain Coordinator
Support Agencies	Kanawha County Floodplain Coordinator
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Up to \$115,300 per structure acquired
Resources	HMGP
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,

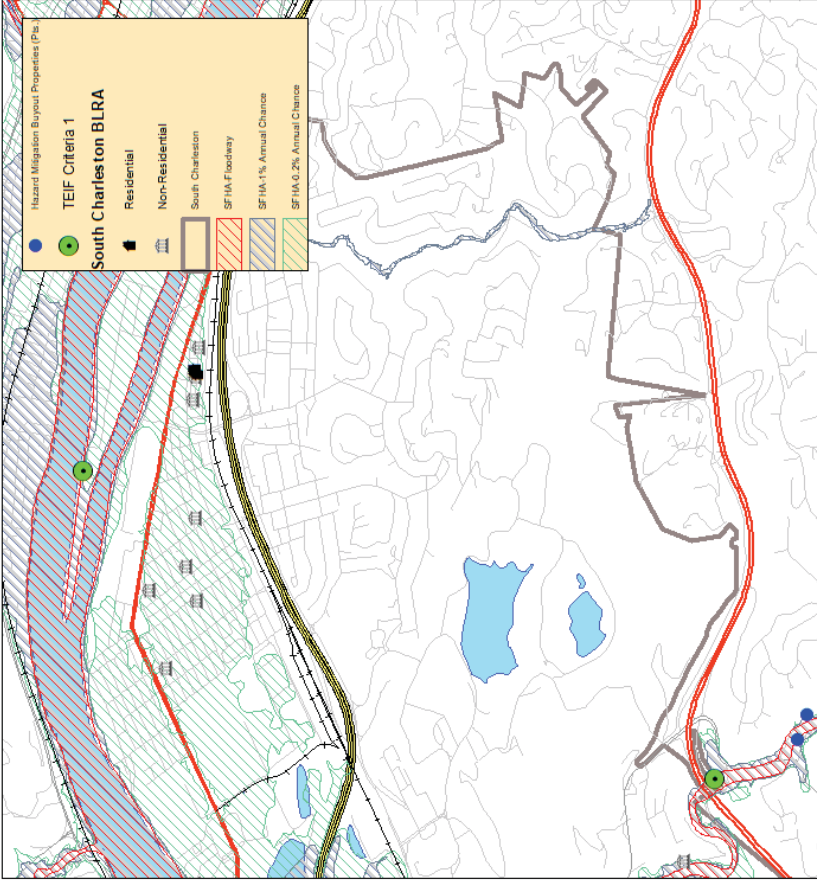


City of South Charleston Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
South Charleston 1	Flooding	3	Continue to participate in the National Flood Insurance Program (NFIP)	Ongoing	South Charleston Floodplain Coordinator	Kanawha County Floodplain Office	Local Plans & Regulations	N/A Program maintenance included in budgets	Local funding, WVEMD, FEMA
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
South Charleston 2	Flooding	2	Continue to enforce current floodplain regulations	Ongoing	South Charleston Floodplain Coordinator	South Charleston City Council	Local Plans & Regulations	N/A Program maintenance included in budgets	Local funding, WVEMD, FEMA
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
South Charleston 3	Flooding	1	Buy out six residences in low lying area	Ongoing	South Charleston Floodplain Coordinator	Kanawha County Floodplain Office	Structural & Infrastructure Improvements	Up to \$103,100 per structure acquired	HMGP
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
South Charleston 4	Misc.	5	Support county efforts to utilize the media for the distribution and publication of hazard information	Ongoing	KCOEM	South Charleston City Council	Education & Awareness Programs	N/A Support should require little to no additional funding	N/A
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
South Charleston 5	<p>With the availability of the TEIF data from the WVEMD, South Charleston can identify specific properties at risk from flooding. Project 5 identifies a "traditional" flood mitigation project for South Charleston. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: "TEIF Criteria X"). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows.</p> <ol style="list-style-type: none"> Structures in the floodway Structures in the 1% annual chance area AND with a potential flood depth exceeding 5' in the structure All structures listed in the TEIF analysis for the jurisdiction Structures in the 1% annual chance area AND with a potential flood depth exceeding 4' in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5'.) 								



Project #	South Charleston 5	
Hazard	Flooding	
Project Priority	4	
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.	
Timeframe	On-going	
Primary Coord.	South Charleston Floodplain Coordinator	
Support Agencies	Kanawha County Floodplain Coordinator	
Mit. Type	Structural & Infrastructure Improvements	
Est. Cost	Approx. \$127,500 per structure acquired	
Resources	HMGP	
Status	On-going	
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,	



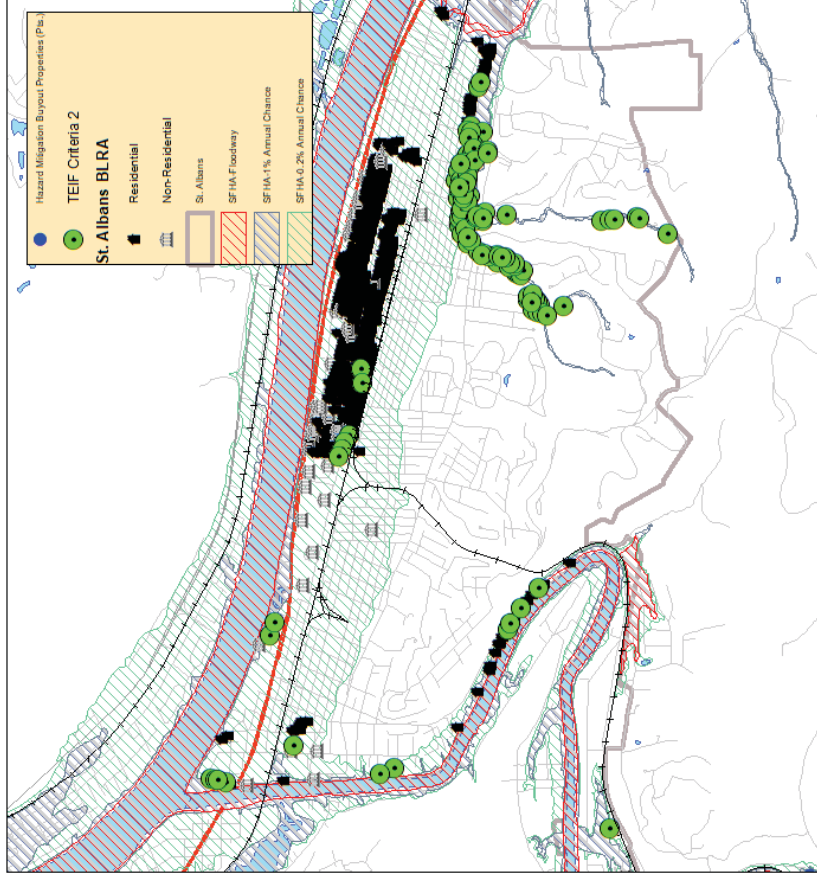
City of St. Albans Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
St. Albans 1	Flooding	4	Continue to participate in the National Flood Insurance Program (NFIP)	Ongoing	St. Albans Floodplain Coordinator	Kanawha County Floodplain Office	Local Plans & Regulations	N/A Program maintenance included in budgets	Local funding, WVEMD, FEMA
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
St. Albans 2	Flooding	3	Continue to enforce current floodplain regulations	Ongoing	St. Albans Floodplain Coordinator	St. Albans City Council	Local Plans & Regulations	N/A Program maintenance included in budgets	Local funding, WVEMD, FEMA
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
St. Albans 3	Flooding	2	Continue to update municipal website to provide information on storm water management	Ongoing	St. Albans IT Personnel	N/A	Education & Awareness Programs	N/A Program maintenance is included in existing budgets	Local funding
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
St. Albans 4	Flooding	1	Continue to participate in WV MS4 permitting process	Ongoing	St. Albans City Council	WVDEP	Local Plans & Regulations	N/A	N/A
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
St. Albans 5	Misc.	6	Support county efforts to utilize the media for the distribution and publication of hazard information	Ongoing	KCOEM	St. Albans City Council	Education & Awareness Programs	N/A Support should require little to no additional funding	N/A
Status: On-going									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									



Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
St. Albans 6	With the availability of the TEIF data from the WVEMD, St. Albans can identify specific properties at risk from flooding. Project 6 identifies a "traditional" flood mitigation project for St. Albans. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: "TEIF Criteria X"). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows. <ol style="list-style-type: none"> Structures in the floodway Structures in the 1% annual chance area AND with a potential flood depth exceeding 5' in the structure All structures listed in the TEIF analysis for the jurisdiction Structures in the 1% annual chance area AND with a potential flood depth exceeding 4' in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5'.) 								
St. Albans 7	Multiple Hazards	7	Establish standards for all utilities regarding tree pruning around lines.	5 years	City Council	Building & Zoning	Local Plans & Regulations	N/A	N/A
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
St. Albans 8	Multiple Hazards	7	Bury power lines to provide uninterrupted service during severe weather	5 years	City Council	Utility providers	Structure & Infrastructure	Unknown	BRIC Local funds
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
St. Albans 9	Multiple Hazards	7	Install generators in critical facilities such as clinics, police stations, fire stations, etc.	5 years	City Council	Public Works			BRIC Local funds
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
St. Albans 10	Multiple Hazards	7	Upgrade water and sewer systems.	5 years	Municipal Utility Commission	Public Works	Structure & Infrastructure	Unknown	BRIC Local Funds
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									

Project #	St. Albans 6
Hazard	Flooding
Project Priority	5
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	St. Albans Floodplain Coordinator
Support Agencies	Kanawha County Floodplain Coordinator
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Approx. \$123,200 per structure acquired
Resources	HMGP
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,



Putnam County Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Putnam 1	Flooding	16	Continue to participate in the National Flood Insurance Program (NFIP)	Ongoing	Putnam County Planning & Infrastructure	WVEMD	Local Plans & Regulations	N/A Program maintenance included in existing budgets	Local funding, WVEMD, FEMA
<p>Status: On-going. The county joined the CRS program. Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties</p>									
Putnam 2	Flooding	27	Continue to enforce current floodplain regulations	Ongoing	Putnam County Planning & Infrastructure	Putnam County Commission	Local Plans & Regulations	N/A	Local funding, WVEMD, FEMA
<p>Status: On-going. This is performed on every permit. Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties</p>									
Putnam 3	<p>With the availability of the TEIF data from the WVEMD, Putnam County can identify specific properties at risk from flooding. Project 3 identifies a "traditional" flood mitigation project for Putnam County. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: "TEIF Criteria X"). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows.</p> <ol style="list-style-type: none"> Structures in the floodway Structures in the 1% annual chance area AND with a potential flood depth exceeding 5' in the structure All structures listed in the TEIF analysis for the jurisdiction Structures in the 1% annual chance area AND with a potential flood depth exceeding 4' in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5'.) 								
Putnam 4	Misc.	23	Work with the board of education to place pagers in each school that can be activated from the emergency operations center to provide early warning to all schools	Ongoing	Putnam County Office of Emergency Services	Putnam County Schools	Structural & Infrastructure Improvements	Up to \$100 per pager	Local funding
<p>Status: On-going. PCOES is searching for funding opportunities. Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards</p>									



Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Putnam 5	Misc.	32	Local government, industry and the private sector will work to make available a low cost emergency alert radio that can be placed in all homes and businesses that can be activated from the emergency operations center during emergencies.	Ongoing	Putnam County Office of Emergency Services	Local Industry	Emergency Services	Up to \$500 per radio	Local funding, BRIC FEMA Funding
Status: On-going.									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Putnam 6	Misc.	35	Seek funding through state and federal resources to erect additional communications towers to improve radio coverage and add to the back-up capabilities of the emergency operations center	Ongoing	Putnam County Office of Emergency Services	WVEMD, Various Putnam County Agencies	Structural & Infrastructure Improvements	Unknown	Local funding, EMPG, SHSP
Status: On-going.									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Putnam 7	Misc.	35	Seek funding through state and federal resources to purchase equipment and locate communications towers to improve interoperability to other counties and state agencies	Ongoing	Putnam County Office of Emergency Services	WVEMD	Structural & Infrastructure Improvements	Unknown	Local funding, EMPG, SHSP
Status: On-going.									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Putnam 8	Misc.	32	Communicate to industry and private property owners the need to open private roads that lead to higher ground in an emergency to shorten evacuation routes	Ongoing	Putnam County Office of Emergency Services	WVEMD	Education & Awareness Programs	N/A Coordination should require little to no additional funding	Local funding
Status: On-going.									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Putnam 9	Misc.	23	Place signs marking such routes	Ongoing	Putnam County Office of Emergency Services	WVDOH	Education & Awareness Programs	Up to \$500 per sign	Local funding
Status: On-going.									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Putnam 10	Misc.	23	Map routes and make maps available to the public	Ongoing	Putnam County Office of Emergency Services	KPEPC	Education & Awareness Programs	Up to \$1,500 for printing	Local funding, BRIC FEMA Funding
Status: On-going.									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Putnam 11	Misc.	19	Hold evacuation drills to familiarize the public with proper procedures	Ongoing	Putnam County Office of Emergency Services	KPEPC	Emergency Services	Up to \$10,000 per exercise	Local funding, EMPG, SHSP, HMGP
Status: On-going. The county holds a few of these drills each year.									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards Increase public awareness, understanding, support, and demand for hazard mitigation activities and future strategies or projects									
Putnam 12	Flooding	30	Support the efforts of volunteer groups, state agencies and other interested parties to clear stream banks, drainage ditches and other areas of debris.	Ongoing	Putnam County Office of Emergency Services	Local Volunteer Groups	Education & Awareness Programs	N/A Support should require little to no additional funding	Local funding, WVDEP
Status: On-going.									
Associated Goal(s): Increase water flow capacities throughout the region									
Putnam 13	Flooding	30	Perform channel modifications to increase flow capacities of rivers and streams. When funds are available	Ongoing	WVSCS	Putnam County Office of Emergency Services	Natural System Protection	Unknown	WV Soil Conservation, WVDEP



Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Status: On-going.									
Associated Goal(s): Increase water flow capacities throughout the region									
Putnam 14	Misc.	16	Deliver public service announcements through local media, such as Hurricane Breeze, Putnam Post, Charleston Newspapers and WSAZ, WCHS, WVAH, and WOWK and local radio stations.	Ongoing	Putnam County Office of Emergency Services	Local Media	Education & Awareness Programs	N/A Local media often allows local govt. to release messages at no cost	Local funding, Local media
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Putnam 15	Wildfire	2	Develop a proactive policy on issuing county wide burn bans during dry weather	Ongoing	Putnam County Commission	Putnam County Office of Emergency Services, WV Division of Forestry, USDA	Local Plans & Regulations	Up to \$1,500 per targeted outreach effort	Local funding, BRIC FEMA Funding
Status: On-going.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Putnam 16	Wildfire	2	Work with the Forestry Department to educate the public of the burning laws through Public Service Announcements in the Hurricane Breeze, Putnam Post, Charleston Newspapers and WSAZ, WCHS, WVAH, and WOWK and local radio stations	Ongoing	Putnam County Office of Emergency Services	WV Division of Forestry	Education & Awareness Programs	N/A Coordination should require little to no additional funding	Local funding, Local media, WVDOF
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Putnam 17	Wildfire	2	Increase public awareness of the arson problem in Putnam County through public education programs in schools, churches, and civic groups	Ongoing	Putnam County Office of Emergency Services	WV Division of Forestry, Local Civic Groups	Education & Awareness Programs	Up to \$1,500 per targeted outreach effort	Local funding, BRIC FEMA Funding, WVDOF
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Putnam 18	Wildfire	28	Support the Forestry Department and State Fire Marshall's Office by increasing the reward offered for arsonists.	Ongoing	Putnam County Office of Emergency Services	WV Division of Forestry, WVSFM	Education & Awareness Programs	N/A Support should require little to no additional funding	Local funding
Status: On-going									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Putnam 19	Mass Movements	16	Advise the public to contact their insurance agent to confirm that they are covered for land subsidence	Ongoing	Putnam County Planning & Infrastructure	Putnam County Office of Emergency Services	Education & Awareness Programs	Up to \$1,500 per targeted outreach effort	Local funding, BRIC FEMA Funding, Local insurance agents
Status: On-going. Advice is broadcast when there are issues (or potential issues) from mass movements.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Putnam 20	Mass Movements	6	Suggest to the public that they add the proper coverage to their insurance policies	Ongoing	Putnam County Planning & Infrastructure	Putnam County Office of Emergency Services	Education & Awareness Programs	Up to \$1,500 per targeted outreach effort	Local funding, BRIC FEMA Funding, Local insurance agents
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts Increase public awareness, understanding, support, and demand for hazard mitigation activities and future strategies or projects									
Putnam 21	Misc.	6	Continue to work with non-governmental agencies to promote mitigation education and awareness	Ongoing	Putnam County Office of Emergency Services	KPEPC	Education & Awareness Programs	N/A Coordination should require little to no additional funding	WVEMD, FEMA, Region 3 PDC
Status: On-going.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts Increase public awareness, understanding, support, and demand for hazard mitigation activities and future strategies or projects									



Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Putnam 22	Misc.	1	Work on a survey to evaluate existing shelters to determine adequacy for current and future populations	5 years	Putnam County Office of Emergency Services	Red Cross, KPEPC	Education & Awareness Programs	N/A Coordination should require little to no additional funding	Local funding
Status: Ongoing.									
Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties									
Putnam 23	Misc.	5	Continue to work on adequate emergency shelter and evacuation plans for animals (domestic pets and livestock)	Ongoing	Putnam County Office of Emergency Services	KPEPC	Local Plans & Regulations	Up to \$5,000	Local funding, HMEP, EMPG, SHSP, KPEPC
Status: Ongoing.									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Putnam 24	Misc.	6	Conduct annual disaster exercises with local law enforcement, emergency personnel, city and county officials, and other disaster response agencies	Ongoing	Putnam County Office of Emergency Services	KPEPC	Emergency Services	Up to \$10,000	Local funding, SHSP, EMPG, HMEP
Status: Ongoing.									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Putnam 25	Severe Storms, Tornadoes	6	Become certified by the National Weather Service as Storm Ready	5 years	Putnam County Office of Emergency Services	National Weather Service	Local Plans & Regulations	N/A Participation in the program is no cost	National Weather Service
Status: Ongoing.									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Putnam 26	Flooding	6	Work with the West Virginia Department of Transportation to identify areas of frequent roadway flooding and develop mitigation strategies.	Ongoing	Putnam County Office of Emergency Services	WV DOT	Education & Awareness Programs	N/A Coordination should require little to no additional funding	WV DOT
Status: New.									
Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties									



Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Putnam 27	Hazardous Materials, Misc.	23	Study and evaluate transportation systems for problems that could lead to hazardous materials spills and other incidents.	Ongoing	Putnam County Office of Emergency Services	WV/DOT, CSXT, NSRR, KPEPC	Local Plans & Regulations	Up to \$5,000 for document	Local funding, HMEP, CSXT, NSRR, KPEPC
Status: Ongoing.									
Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties									
Putnam 28	Misc.	6	Evaluate railroad crossings for appropriate warning systems.	Ongoing	Putnam County Office of Emergency Services	CSXT, NSRR, WV/DOT	Structural & Infrastructure Improvements	N/A Coordination should require little to no additional funding	CSXT, NSRR
Status: Ongoing.									
Associated Goal(s): Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties									
Putnam 29	Misc.	6	Publicize evacuation plans in public places, such as libraries, schools, hospitals, the courthouse, city halls, banks, and churches.	Ongoing	Putnam County Office of Emergency Services	KPEPC	Education & Awareness Programs	Up to \$1,500 per targeted outreach effort	Local funding, BRIC FEMA Funding
Status: Ongoing.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Putnam 30	Misc.	6	Encourage those dependent on oxygen concentrators or other medical devices to install backup generators.	Ongoing	Putnam County Office of Emergency Services	KPEPC	Education & Awareness Programs	Up to \$1,500 per targeted outreach effort	Local funding, BRIC FEMA Funding
Status: Ongoing.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Putnam 31	Extreme Temperatures, Severe Storms	19	Inform the public on warming shelter locations	Ongoing	PCOEM	Local Fire, Local Law Enforcement	Education & Awareness Programs	Up to \$1,500 per targeted outreach effort	Local funding, BRIC FEMA Funding
Status: Ongoing.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Putnam 32	Misc.	6	Educate citizens on the importance of smoke detectors and encourage their use.	Ongoing	Putnam County Office of Emergency Services	Local Fire, Local Law Enforcement	Education & Awareness Programs	Up to \$1,500 per targeted outreach effort	Local funding, BRIC FEMA Funding



Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Status: Ongoing.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Putnam 33	Misc.	6	Use social media such as Twitter, Facebook, or mass texting systems to notify the public about hazardous events	Ongoing	Putnam County Office of Emergency Services	N/A	Education & Awareness Programs	N/A Social media options are available at no cost	N/A
Status: Ongoing.									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Putnam 34	Misc.	28	Provide training to engineers and surveyors on the new elevation certificate	Ongoing	Putnam County Office of Emergency Services	Putnam County Planning & Infrastructure	Education & Awareness Programs	Unknown	Local funding, WVEMD
Status: Ongoing.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Putnam 35	Misc.	19	Provide training to the insurance agents and banking institutions within the county	Ongoing	Putnam County Office of Emergency Services	Putnam County Planning & Infrastructure	Education & Awareness Programs	Unknown	Local funding, WVEMD
Status: Ongoing.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Putnam 36	Flooding	19	Provide outreach to the citizens of Putnam County on flood insurance and mitigation options.	Ongoing	Putnam County Office of Emergency Services	Putnam County Planning & Infrastructure	Education & Awareness Programs	Up to \$1,500 per targeted outreach effort	Local funding, BRIC FEMA Funding
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Putnam 37	Multiple Hazards	37	Establish standards for all utilities regarding tree pruning around lines.	Ongoing	Putnam County Office of Emergency Services	Putnam County Planning & Infrastructure	Local Plans & Regulations	N/A	N/A
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Putnam 38	Multiple Hazards	37	Bury power lines to provide uninterrupted service during severe weather	Ongoing	Putnam County Office of Emergency Services	Utility Providers	Structure & Infrastructure	Unknown	Local Funding
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									

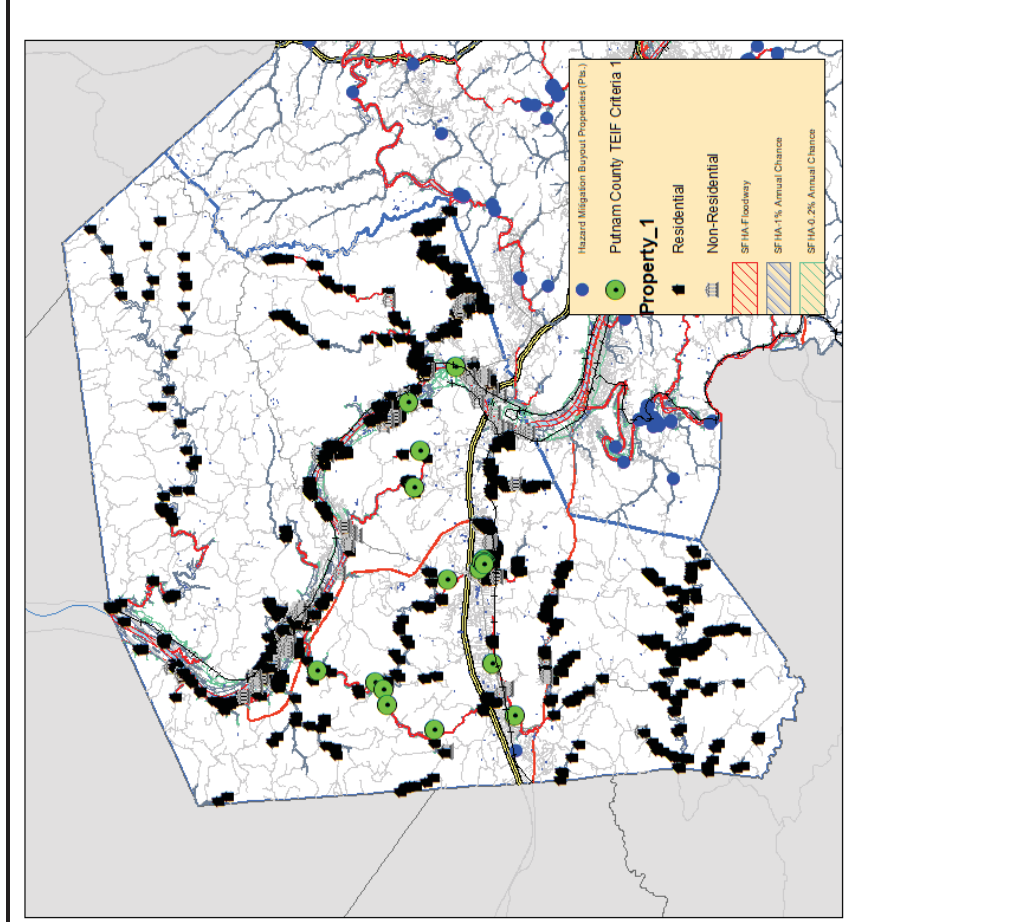


Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Putnam 39	Multiple Hazards	37	Install generators in critical facilities such as clinics, police stations, fire stations, etc.	Ongoing	Putnam County Office of Emergency Services	Putnam County Planning & Infrastructure	Structure & Infrastructure	Unknown	BRIC Local Funding
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Putnam 40	Multiple Hazards	37	Upgrade water and sewer systems	Ongoing	Putnam County Office of Emergency Services	Putnam County Planning & Infrastructure	Structure & Infrastructure	Unknown	BTIC Local Funding FEMA Funding
Status: New. This project was selected from public survey responses									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Putnam 41	Dams	37	Work with the Army Corps of Engineers and dam owners to obtain and update emergency action plans for high hazard dams.	5 years	Putnam County Office of Emergency Services	USACE	Local Plans & Regulations	N/A	N/A
Status: New.									
Associated Goal(s): Protect Boone, Clay Kanawha and Putnam Counties from a catastrophic release or failure of a dam or coal waste slurry impoundment Develop better hazard data for Boone, Clay, Kanawha and Putnam Counties									
Putnam 42	Dams	42	Coordinate with dam owners to identify failure modes; determine qualitative risk values for each failure mode; rank dams risk values; and evaluate potential projects using FEMA's Risk-Based Prioritization Method.	5 years	Putnam County Office of Emergency Services	USACE FEMA Dam Owners	Structures & Infrastructure	Unknown	HHPD
Status: New									
Associated Goal(s): Protect Boone, Clay Kanawha and Putnam Counties from a catastrophic release or failure of a dam or coal waste slurry impoundment									

Project #	Putnam 3
Hazard	Flooding
Project Priority	34



Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	Putnam County Planning & Infrastructure
Support Agencies	Putnam County Commission
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Approx. \$175,700 per structure acquired
Resources	HMGP
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,

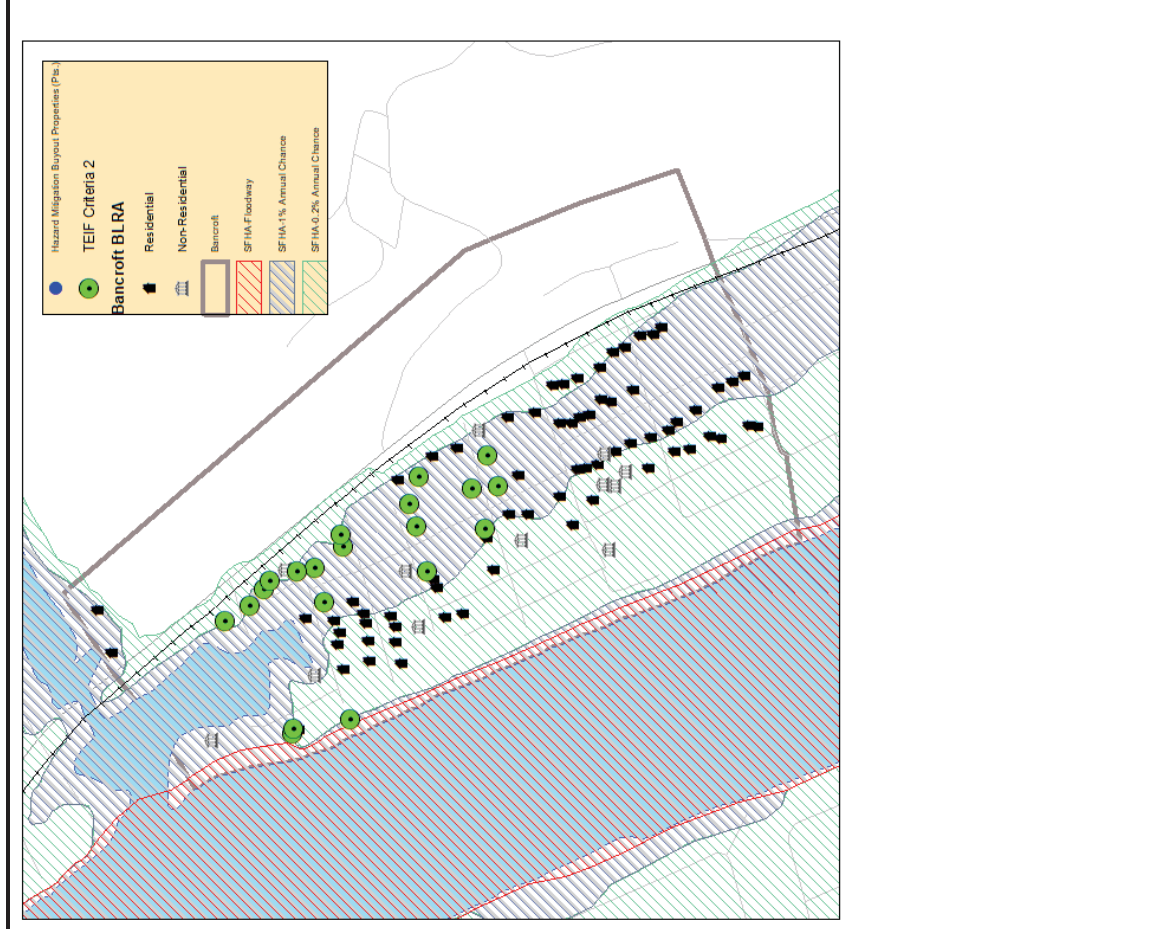


Town of Bancroft Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Bancroft 1	Flooding	1	Purchase and install a backup generator for the sewer system.	Ongoing	Bancroft Planning	Putnam County Planning & Infrastructure	Structural & Infrastructure Improvements	Up to \$25,000	USDHS, FEMA, BRIC FEMA Funding
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Bancroft 2	Flooding	1	Continue to participate in the National Flood Insurance Program (NFIP)	Ongoing	Putnam County Planning & Infrastructure	Bancroft Town Council	Local Plans & Regulations	N/A Factored into current budget	FEMA, WVEMD
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Bancroft 3	<p>With the availability of the TEIF data from the WVEMD, Bancroft can identify specific properties at risk from flooding. Project 3 identifies a “traditional” flood mitigation project for Bancroft. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: “TEIF Criteria X”). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows.</p> <ol style="list-style-type: none"> Structures in the floodway Structures in the 1% annual chance area AND with a potential flood depth exceeding 5’ in the structure All structures listed in the TEIF analysis for the jurisdiction Structures in the 1% annual chance area AND with a potential flood depth exceeding 4’ in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5’.) 								
Bancroft 4	Extreme Temperatures, Severe Storms	4	Support county efforts to inform the public on warming shelter locations	Ongoing	PCOEM	Local Fire & Law Enforcement	Education & Awareness Programs	N/A Supporting existing efforts should require little to no additional funding	Local funding, BRIC FEMA Funding
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Bancroft 5	Land Subsidence	1	Repair sinkhole located at park	1 year	Bancroft Town Council	Putnam County Planning & Infrastructure	Structural & Infrastructure Improvements	Not Known	Local Funding, HMGP
Status: New									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Bancroft 6	Multiple Hazards	6	Bury power lines to provide uninterrupted service during severe weather	5 years	Bancroft Town Council	Utility Providers	Structure & Infrastructure	Unknown	BRIC Local Funding
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Bancroft 7	Multiple Hazards	6	Install generators in critical facilities such as clinics, police, stations, fire stations, etc.	5 years	Bancroft Town Council	Public Works	Structure & Infrastructure	Unknown	BRIC Local Funding HMGP
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Bancroft 8	Flooding	6	Plant trees to prevent erosion and promote cooler micro-climates	5 years	Bancroft Town Council	N/A	Natural System Protection	N/A	N/A
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									

Project #	Bancroft 3
Hazard	Flooding
Project Priority	4
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	Bancroft Floodplain Coordinator
Support Agencies	Putnam County Planning & Infrastructure
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Up to \$175,700 per structure acquired
Resources	HMGP
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,



Town of Buffalo Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Buffalo 1	Flooding	2	Continue to participate in the National Flood Insurance Program (NFIP)	Ongoing	Putnam County Planning & Infrastructure	Buffalo Town Council	Local Plans & Regulations	N/A Factored into current budget	FEMA, WVEMD
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Buffalo 2	Flooding	1	Continue to enforce current floodplain regulations	Ongoing	Putnam County Planning & Infrastructure	Buffalo Town Council	Local Plans & Regulations	N/A Factored into current budget	FEMA, WVEMD
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Buffalo 3	<p>With the availability of the TEIF data from the WVEMD, Buffalo can identify specific properties at risk from flooding. Project 3 identifies a “traditional” flood mitigation project for Buffalo. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: “TEIF Criteria X”). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows.</p> <ol style="list-style-type: none"> Structures in the floodway Structures in the 1% annual chance area AND with a potential flood depth exceeding 5’ in the structure All structures listed in the TEIF analysis for the jurisdiction Structures in the 1% annual chance area AND with a potential flood depth exceeding 4’ in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5’.) 								
Buffalo 4	Extreme Temperatures, Severe Storms	4	Support county efforts to inform the public on warming shelter locations	Ongoing	PCOEM	Local Fire & Law Enforcement	Education & Awareness Programs	N/A Supporting existing efforts should require little to no additional funding	Local funding, BRIC FEMA Funding
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Buffalo 5	Multiple Hazards	5	Establish standards for all utilities regarding tree pruning around lines	5 years	Town Council	N/A	Local Plans & Regulations	N/A	N/A
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									

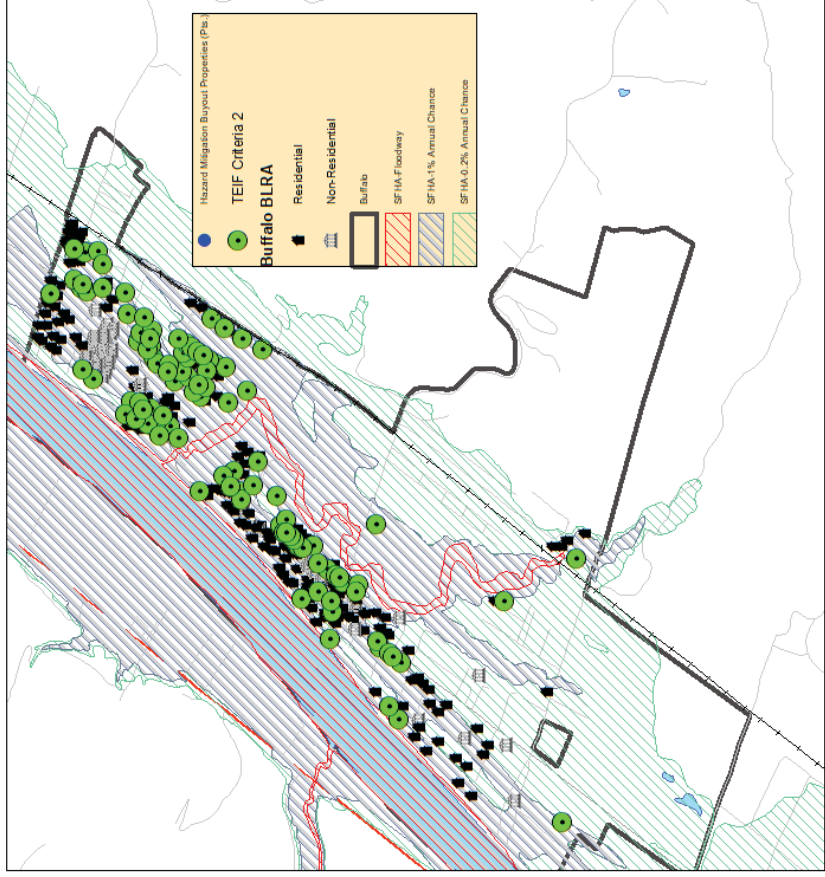


Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Buffalo 6	Multiple Hazards	5	Bury power lines to provide uninterrupted service during severe weather	5 years	Putnam County Planning	Utility Providers	Structure & Infrastructure	Unknown	Local Funding
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Buffalo 7	Flooding	5	Plant trees to prevent erosion and promote cooler micro-climates	5 years	Town Council	N/A	Natural Systems Protection	N/A	N/A
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Buffalo 8	Multiple Hazards	5	Install generators in critical facilities such as clinics, police stations, fire stations, etc.	5 years	Putnam County Planning	Town Council	Structure & Infrastructure	Unknown	BRIC Local Funding HMGP
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Buffalo 9	Multiple Hazards	5	Upgrade water and sewer system	5 years	Putnam County Planning	Town Council	Structure & Infrastructure	Unknown	BRIC Local Funding
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									

Project #	Buffalo 3
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Hazard Project Priority	Flooding 3
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	Buffalo Floodplain Coordinator
Support Agencies	Putnam County Planning & Infrastructure
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Up to \$175,700 per structure acquired
Resources	HMGP
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk areas, and other known-impact areas. Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,

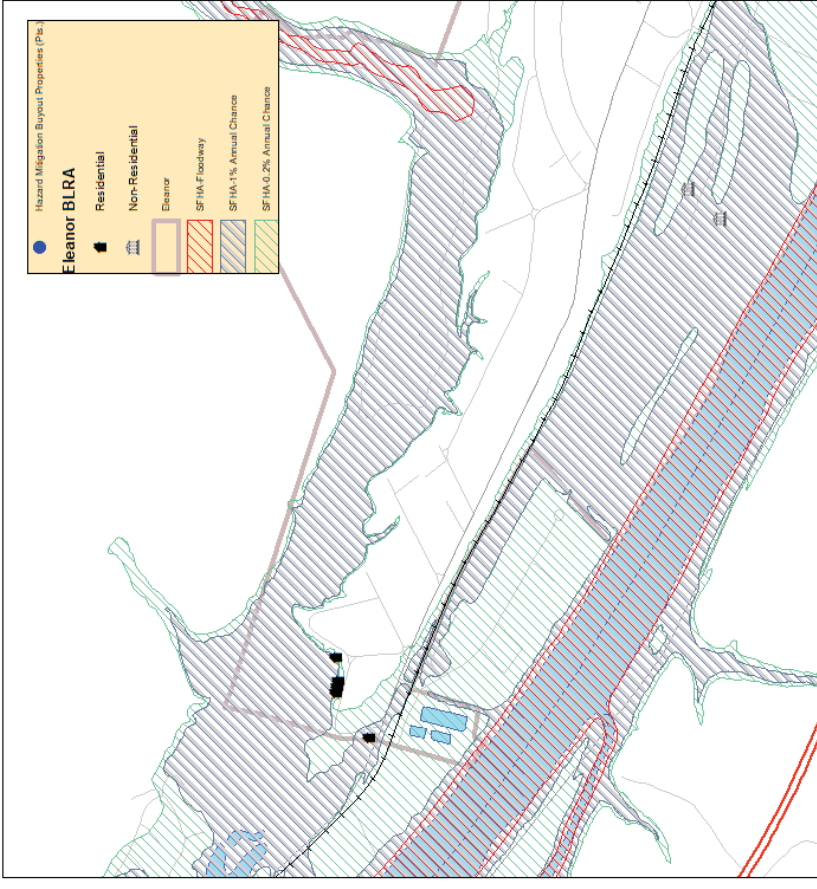


Town of Eleanor Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Eleanor 1	Flooding	1	Permit process for residents to purchase proper size storm water drains to be installed by the town to reduce residential flooding	Ongoing	Eleanor Storm Drain Board	Eleanor Public works Department	Local Plans & Regulations	N/A Program maintenance is in current budget	Storm Drain Board Tax
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Eleanor 2	Flooding	2	Continue to participate in the National Flood Insurance Program (NFIP)	Ongoing	Eleanor Floodplain Coordinator	Putnam County Planning & Infrastructure	Local Plans & Regulations	N/A Program maintenance is in current budget	FEMA, WVEMD
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Eleanor 3	Flooding	3	Continue to enforce current floodplain regulations	Ongoing	Eleanor Floodplain Coordinator	Eleanor Town Council	Local Plans & Regulations	N/A Program maintenance is in current budget	FEMA, WVEMD
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Eleanor 4	<p>With the availability of the TEIF data from the WVEMD, Eleanor can identify specific properties at risk from flooding. Project 4 identifies a "traditional" flood mitigation project for Eleanor. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: "TEIF Criteria X"). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows.</p> <ol style="list-style-type: none"> Structures in the floodway Structures in the 1% annual chance area AND with a potential flood depth exceeding 5' in the structure All structures listed in the TEIF analysis for the jurisdiction Structures in the 1% annual chance area AND with a potential flood depth exceeding 4' in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5'.) 								
Eleanor 5	Extreme Temperatures, Severe Storms	5	Support county efforts to inform the public on warming shelter locations	Ongoing	PCOEM	Local Fire & Law Enforcement	Education & Awareness Programs	N/A Supporting existing efforts little to no additional funding	Local funding, BRIC FEMA Funding
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									



Project #	Eleanor 4
Hazard	Flooding
Project Priority	4
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	Eleanor Floodplain Coordinator
Support Agencies	Putnam County Planning & Infrastructure
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Up to \$175,700 per structure acquired
Resources	HMGP
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas. Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,

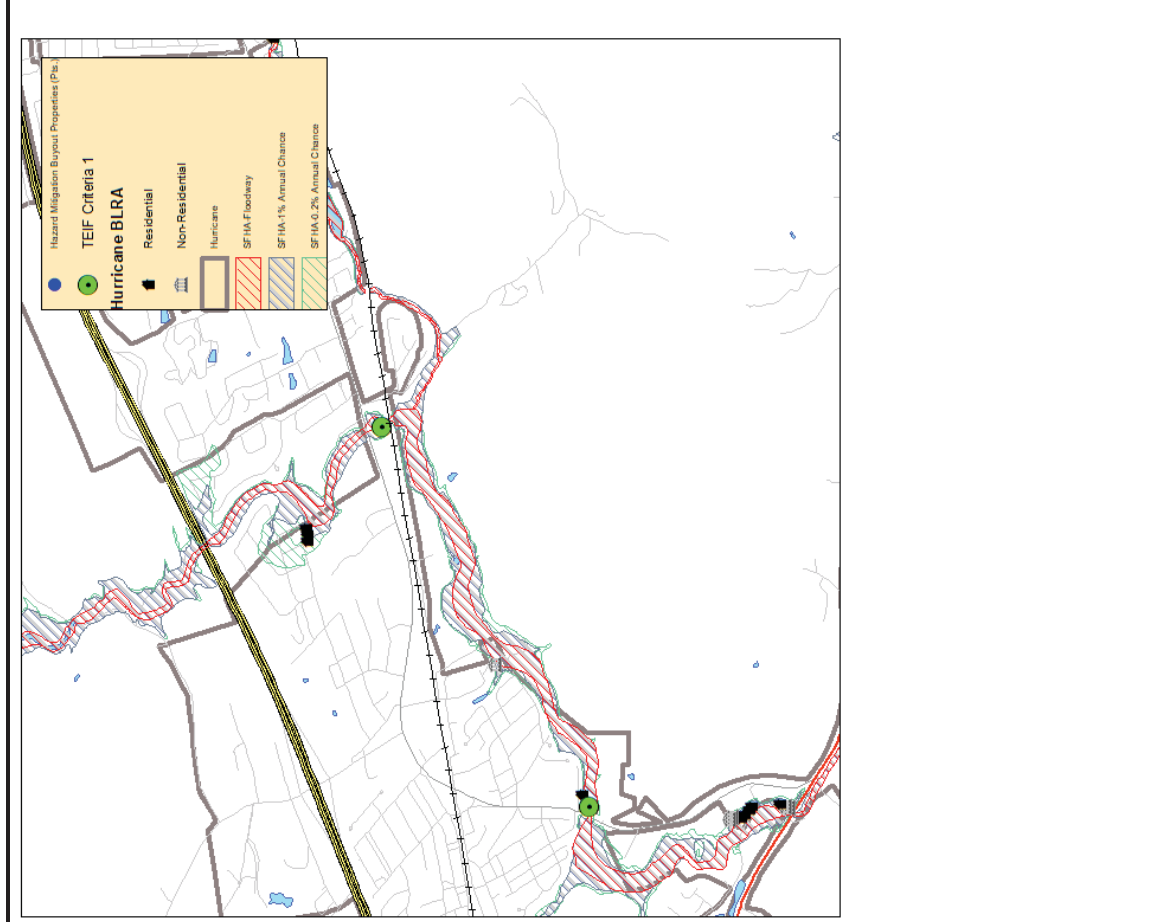


City of Hurricane Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Hurricane 1	Misc.	2	Purchase and install a backup generator at the senior center to be used as an emergency shelter	As funds become available	Hurricane Emergency Management	PCOEM	Structural & Infrastructure Improvements	Up to \$25,000	USDHS, BRIC FEMA Funding
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Hurricane 2	Misc.	3	Purchase portable message boards to be used to alert the community and along evacuation routes	As funds become available	Hurricane Emergency Management	PCOEM	Emergency Services	Up to \$5,000	USDHS, Local Funding
Status: Ongoing									
Associated Goal(s): Improve upon the protection of the citizens of Boone, Clay, Kanawha, and Putnam Counties from all natural and human-caused hazards									
Hurricane 3	Flooding	4	Continue to participate in the National Flood Insurance Program (NFIP)	Ongoing	Hurricane Floodplain Coordinator	Putnam County Planning & Infrastructure	Local Plans & Regulations	N/A Program maintenance is in current budget	FEMA, WVEMD
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Hurricane 4	Flooding	1	Continue to enforce current floodplain regulations	Ongoing	Hurricane Floodplain Coordinator	Hurricane City Council	Local Plans & Regulations	N/A Program maintenance is in current budget	FEMA, WVEMD
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Hurricane 5	<p>With the availability of the TEIF data from the WVEMD, Hurricane can identify specific properties at risk from flooding. Project 5 identifies a "traditional" flood mitigation project for Hurricane. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: "TEIF Criteria X"). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows.</p> <ol style="list-style-type: none"> Structures in the floodway Structures in the 1% annual chance area AND with a potential flood depth exceeding 5' in the structure All structures listed in the TEIF analysis for the jurisdiction Structures in the 1% annual chance area AND with a potential flood depth exceeding 4' in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5'.) 								



Project #	Hurricane 5
Hazard	Flooding
Project Priority	5
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	Hurricane Floodplain Coordinator
Support Agencies	Putnam County Planning & Infrastructure
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Approx. \$149,000 per structure acquired
Resources	HMGP
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,

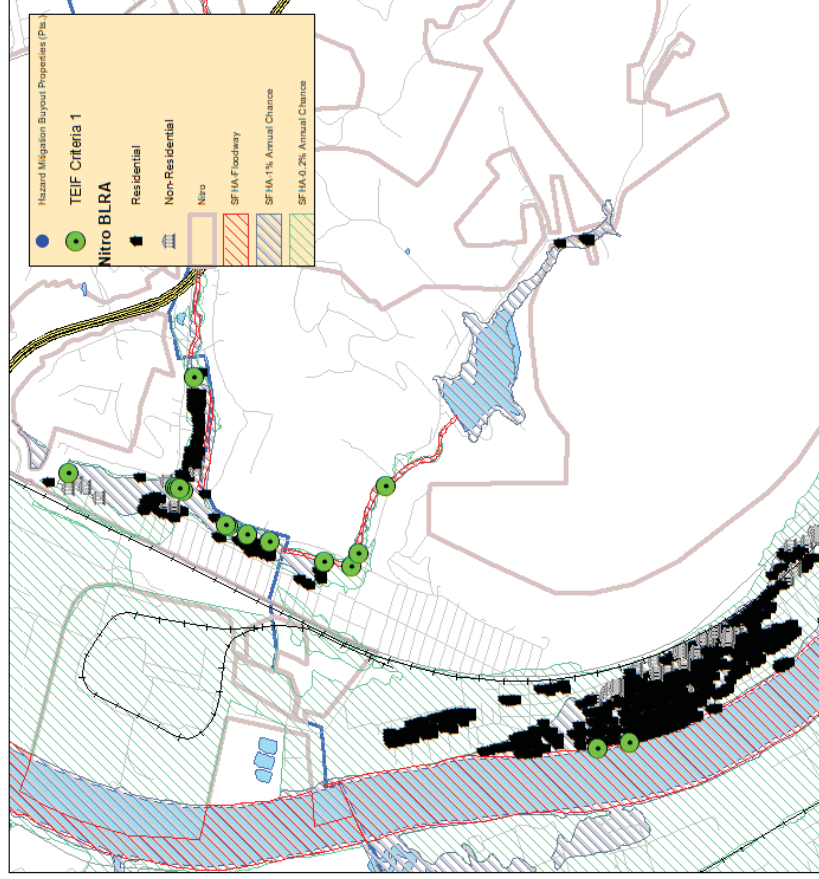


City of Nitro Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Nitro 1	Flooding	1	Continue to participate in the National Flood Insurance Program (NFIP)	Ongoing	Nitro Floodplain Coordinator	Putnam County Planning & Infrastructure	Local Plans & Regulations	N/A Program maintenance is in current budget	FEMA, WVEMD
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Nitro 2	Flooding	2	Continue to enforce current floodplain regulations	Ongoing	Nitro Floodplain Coordinator	Putnam County Planning & Infrastructure	Local Plans & Regulations	N/A Program maintenance is in current budget	FEMA, WVEMD
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Nitro 3	<p>With the availability of the TEIF data from the WVEMD, Nitro can identify specific properties at risk from flooding. Project 3 identifies a “traditional” flood mitigation project for Nitro. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: “TEIF Criteria X”). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows.</p> <ol style="list-style-type: none"> Structures in the floodway Structures in the 1% annual chance area AND with a potential flood depth exceeding 5’ in the structure All structures listed in the TEIF analysis for the jurisdiction Structures in the 1% annual chance area AND with a potential flood depth exceeding 4’ in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5’.) 								
Nitro 4	Extreme Temperatures, Severe Storms	4	Support county efforts to inform the public on warming shelter locations	Ongoing	PCOEM	Local Fire & Law Enforcement	Education & Awareness Programs	N/A Supporting existing efforts should require little to no additional funding	Local funding, BRIC FEMA Funding
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									



Project #	Nitro 3
Hazard	Flooding
Project Priority	3
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	Nitro Floodplain Coordinator
Support Agencies	Putnam County Planning & Infrastructure Kanawha County Floodplain Coordinator
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Approx. \$104,000 per structure acquired
Resources	HMGP
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk and other known-impact areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,



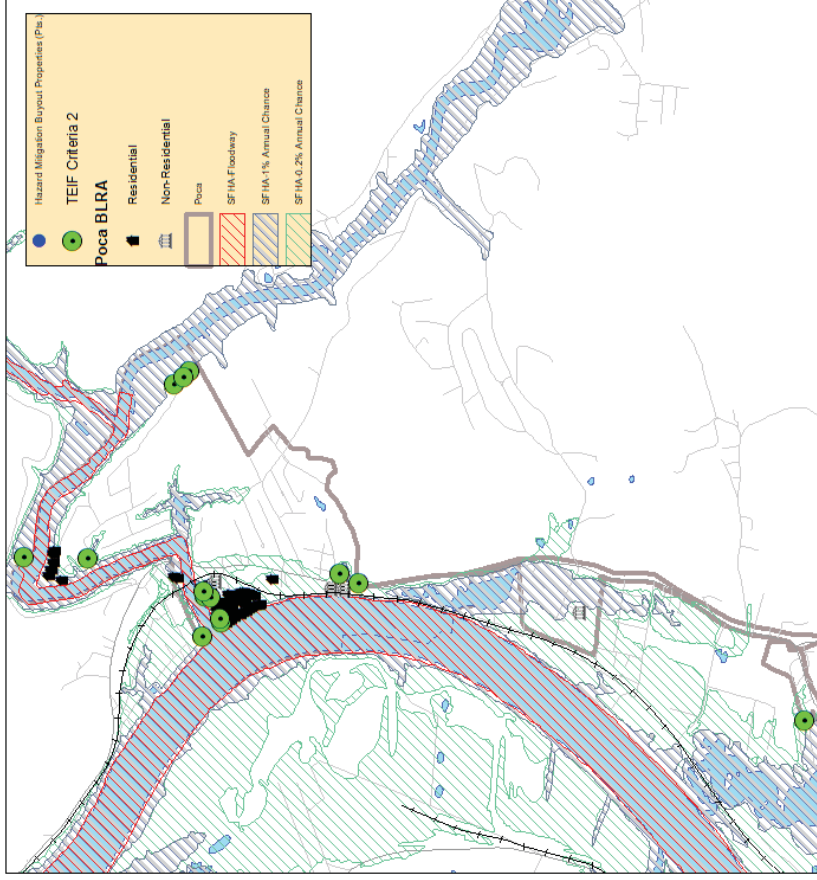
Town of Poca Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Poca 1	Flooding	1	Continue to participate in the National Flood Insurance Program (NFIP)	Ongoing	Putnam County Planning & Infrastructure	Poca Town Council	Local Plans & Regulations	N/A Program maintenance is in current budget	FEMA, WVEMD
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Poca 2	Flooding	2	Continue to enforce current floodplain regulations	Ongoing	Putnam County Planning & Infrastructure	Poca Town Council	Local Plans & Regulations	N/A Program maintenance is in current budget	FEMA, WVEMD
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Poca 3	<p>With the availability of the TEIF data from the WVEMD, Poca can identify specific properties at risk from flooding. Project 3 identifies a "traditional" flood mitigation project for Poca. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: "TEIF Criteria X"). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows.</p> <ol style="list-style-type: none"> Structures in the floodway Structures in the 1% annual chance area AND with a potential flood depth exceeding 5' in the structure All structures listed in the TEIF analysis for the jurisdiction Structures in the 1% annual chance area AND with a potential flood depth exceeding 4' in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5'.) 								
Poca 4	Extreme Temperatures, Severe Storms	4	Support county efforts to inform the public on warming shelter locations	Ongoing	PCOEM	Local Fire & Law Enforcement	Education & Awareness Programs	N/A Supporting existing efforts should require little to no additional funding	Local funding, BRIC FEMA Funding
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Poca 5	Multiple Hazards	5	Establish standards for all utilities regarding tree pruning around lines	5 years	Poca Town Council	N/A	Local Planning & Regulations	N/A	N/A
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									



Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Poca 6	Multiple Hazards	5	Bury power lines to provide uninterrupted service during severe weather	5 years	Poca Town Council	Utility Providers	Structure & Infrastructure	Unknown	Local Funding BRIC
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Poca 7	Flooding	5	Plant trees to prevent erosion and promote cooler micro-climates	5 years	Poca Town Council	N/A	Natural Systems Protection	N/A	N/A
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Poca 8	Multiple Hazards	5	Install generators in critical facilities such as clinics, police stations, fire stations, etc.	5 years	Poca Town Council	Public Works	Structure & Infrastructure	Unknown	BRIC Local Funding HMGP
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Poca 9	Multiple Hazards	5	Upgrade water and sewer systems	5 years	Putnam County Planning	Poca Town Council	Structure & Infrastructure	Unknown	BRIC Local Funding HMGP
Status: New. This project was selected from public survey responses.									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									

Project #	Poca 3
Hazard	Flooding
Project Priority	3
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	Poca Floodplain Coordinator
Support Agencies	Putnam County Planning & Infrastructure
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Up to \$175,700 per structure acquired
Resources	HMGP
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,

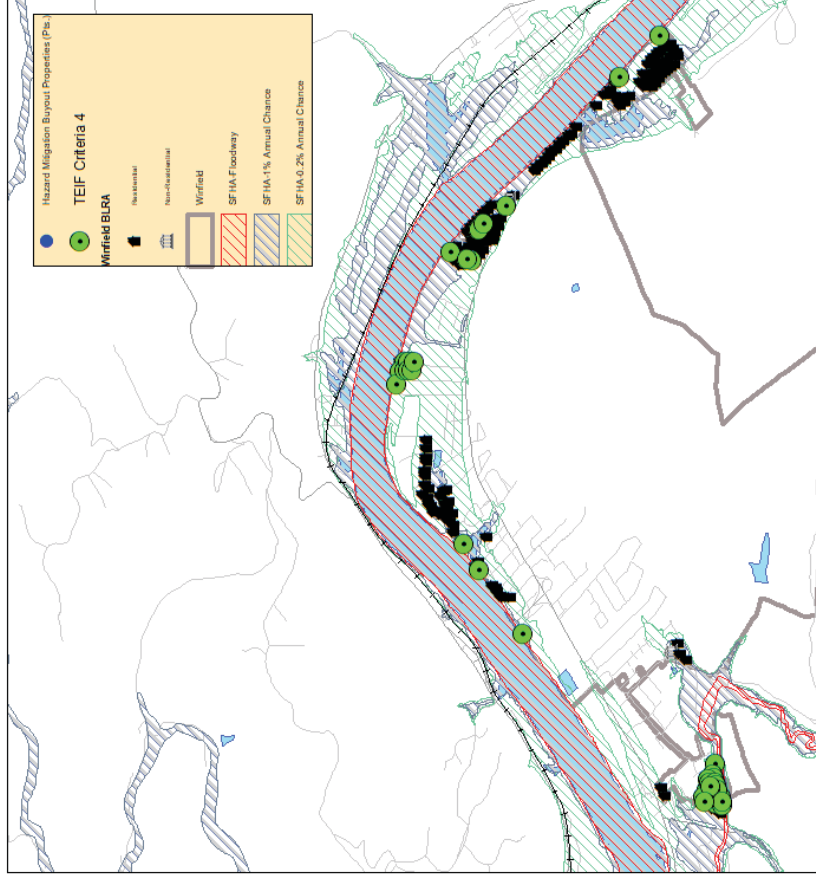


Town of Winfield Projects

Project #	Hazard	Project Priority	Strategy	Timeframe	Primary Coord.	Support Agencies	Mit. Type	Est. Cost	Resources
Winfield 1	Misc.	1	Continue to use push-app to notify community of impending hazards	Ongoing	Winfield Emergency Management	PCOEM	Emergency Services	N/A	Local funding
Status: Ongoing									
Associated Goal(s): Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts									
Winfield 2	Misc.	2	Purchase and install a backup generator at town hall to keep essential offices open	As funds become available	Winfield Emergency Management	PCOEM	Structural & Infrastructure Improvements	Up to \$25,000	USDHS, BRIC FEMA Funding
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Winfield 3	Flooding	3	Permit process for new structures to ensure compliance with floodplain regulations.	Ongoing	Winfield Building Department	Winfield Town Council	Local Plans & Regulations	N/A Program maintenance is in current budget	FEMA, WVEMD
Status: Ongoing									
Associated Goal(s): Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties									
Winfield 4			With the availability of the TEIF data from the WVEMD, Winfield can identify specific properties at risk from flooding. Project 4 identifies a "traditional" flood mitigation project for Winfield. See below for additional information, and an image will identify properties by one of four criteria (denoted by the number in the legend: "TEIF Criteria X"). Local leaders may use these criteria to aid in decision-making as they consider implementing projects. The criteria are as follows. 1. Structures in the floodway 2. Structures in the 1% annual chance area AND with a potential flood depth exceeding 5' in the structure 3. All structures listed in the TEIF analysis for the jurisdiction 4. Structures in the 1% annual chance area AND with a potential flood depth exceeding 4' in the structure (NOTE: In these areas, there were no structures with potential flood depths exceeding 5'.)						



Project #	Winfield 4
Hazard	Flooding
Project Priority	4
Strategy	As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
Timeframe	On-going
Primary Coord.	Winfield Floodplain Coordinator
Support Agencies	Putnam County Planning & Infrastructure
Mit. Type	Structural & Infrastructure Improvements
Est. Cost	Up to \$175,700 per structure acquired
Resources	HMGP
Status	On-going
Associated Goal(s)	Remove abandoned buildings from high-risk areas, Reduce the current and future risks from hazards in Boone, Clay, Kanawha, and Putnam Counties,



4.0 PLAN MAINTENANCE PROCESS

§201.6(c)(4)(i)	[The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.
§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.
§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.

4.1 Monitoring, Evaluating, and Updating the Plan

The Regional Intergovernmental Council (RIC/Region 3) and the committee overseeing this plan update established a method for the systematic and periodic review of this document. As the custodial agency, RIC assumes responsibility for scheduling committee meetings and serves as the point of contact for the committee and WVEMD during the 5-year period. The RIC also maintains the master copy of the plan, which is where all additions, corrections, and changes are made. Upon any review, the master copy will be brought up to date to reflect the most current information about the committee, the planning process, the most current hazard data, vulnerability analysis, mitigation strategy and plan maintenance processes.

The formal updating process will consist of a series of meetings (either face-to-face or virtual) to review mitigation projects, the risk assessment, and to compare the two. Region 3 will convene the committee annually (for a total of three meetings between formal updating processes).

- **Year 1:** Focus on plan adoption. The Regional Intergovernmental Council will ensure that participating jurisdictions receive copies of the plan and provide technical assistance, as necessary, to support adoption.
- **Year 2:** Meet to discuss plan integration opportunities (e.g., aligning mitigation objectives with efforts to upgrade stormwater systems, etc.).
- **Year 3:** Meet to conceptually plan the next update; begin targeting funding for the next update.
- **Year 4:** Meet to discuss project status and discuss effectiveness of implemented projects.
- **Year 5:** Coordinate the next plan update.

The Regional Intergovernmental Council (RIC) feels it is most beneficial to link the annual mitigation review with other recurring planning efforts. The council must also update its

comprehensive economic development strategy (CEDS) document annually. As such, the RIC will ensure completion of the CEDS and mitigation annual reviews simultaneously.

Topics for discussion at annual meetings include determining the effectiveness of any implemented mitigation strategies as well as evaluating the on-going performance of the plan based on several criteria. Within the risk assessment, the committee will evaluate how accurately the hazard profile and development trends sections predicted impact areas and losses (contingent on hazard occurrences).

Additionally, the committee will update one another on any completed or on-going mitigation projects. Each project listed in this plan includes resources that may aid in implementation; such resources may include potential funding sources. Many of these funding sources require stringent project administration tasks (including performance measures and close-out procedures), all of which would be followed by the jurisdiction implementing a project. Adherence to these requirements will ensure the successful implementation of projects funded by such programs. For projects funded locally, existing purchasing policies will be followed, including competitive bidding, maintenance of invoice copies, regular departmental budget reviews, etc. All files associated with purchasing at the local level are maintained. This procedure has been successful while implementing mitigation projects since the original development of this plan and will continue to be followed.

4.2 Planning Addendums

Addendums to this plan may become necessary during its life cycle as programs and priorities change. Addendums that are requested and approved at the local level may be passed through the Region 3 Planning and Development Council to the West Virginia Emergency Management Division (WVEMD) and to FEMA Region 3. Addendums that are approved by WVEMD and FEMA will be included in the plan and will not need to be adopted by resolution by the various municipalities of Region 3.

4.3 Implementation through Existing Programs

The members of the regional council are leaders within the communities and agencies/jurisdictions that they represent. They are often involved in the overall community, economic development, and capital improvements planning efforts of their jurisdictions. As members of the mitigation planning team, these individuals will carry mitigation concepts into other planning areas. The table below summarizes several plans maintained in the region and identifies mitigation themes in those documents (i.e., ways mitigation can be integrated into those

documents) as well as identifies specific mitigation goals and projects (from Section 3.0) that are consistent with those themes. The RIC and its member governments will integrate mitigation into other planning efforts through three primary means. The RIC maintains a series of community profiles on each of its member governments. RIC planners will add hazard risk and vulnerability to these profiles to ensure that information is available for consideration as its member governments compile community and economic development project lists.

Many member governments in Region 3 are small and do not have dedicated planning staffs. In those cases, the RIC serves as the planning staff, actually composing comprehensive plans for those jurisdictions. In those instances where the RIC serves as the principle author of the plan, mitigation projects will be prioritized. The RIC also frequently supports the larger member governments with jurisdiction-specific planning departments (e.g., Charleston, Kanawha County, Nitro, Putnam County, and St. Albans). The RIC recommends consideration of mitigation in those local planning efforts.

Significantly, a number of existing plans already include mitigation considerations. For instance, the *City of Charleston Comprehensive Plan (2013)* lists a transportation and infrastructure goal as continuing efforts to reduce the severity of flooding impacts. The plan recognizes participation in the Community Rating System (CRS) as an opportunity to exceed the minimum requirements of the National Flood Insurance Program (NFIP) requirements. The *2021 Region 3 Development Plan* lists projects for the counties and municipalities that will mitigate flooding issues. The following table lists several existing programs in the left-hand column. The table also include responsible agencies and specific plans, along with the mitigation action the plans/programs support. The right-hand columns identify specific elements of the identified plans that align with an associated mitigation goal for this plan (reference Section 3.1: Mitigation Goals).

Existing Program	Responsible Agency(ies)	Applicable Plan (i.e., Document)	Mitigation Action Comparison	
Emergency Operations Planning	Local Emergency Management Agencies (County/City Level) Kanawha-Putnam Emergency Planning Committee Local Emergency Planning Committees (Boone/Clay Counties)	Emergency operations plans Hazard/vulnerability analyses Commodity flow studies	<p>Ensure consistency between updated hazard analyses and the risk assessment portion of the plan</p> <p>Consider mitigation projects as part of the overall cycle of emergency management</p> <p>PLAN ELEMENTS/POLICIES Establish and maintain effective response program</p> <p>Support continuity of critical infrastructure and key resources</p> <p>Identify specific risk areas for certain hazards</p>	<p>ASSOCIATED MITIGATION GOAL Improve upon the protection of the citizens of Boone, Clay, Kanawha and Putnam counties from all natural and human-caused hazards</p> <p>Reduce the current and future risks from hazards in Boone, Clay, Kanawha and Putnam counties</p> <p>Develop better hazard data for Boone, Clay, Kanawha and Putnam counties</p>
Transportation Planning	Regional Intergovernmental Council	RIC 2050 Metropolitan Transportation Plan (regional level) Bicycle & Pedestrian Plan for Kanawha and Putnam Counties Cross Lanes Corridor Study Public Transit-Human Services Transportation Plan	<p>Ensure hazards are acknowledged in long-range transportation planning</p> <p>Consider response elements to the hazards identified in the mitigation plan, as appropriate, with respect to transportation (e.g., evacuation)</p> <p>Ensure planned transportation projects do not add to vulnerabilities (e.g., ensure projects utilize proper drainage, are properly elevated, etc.)</p> <p>Consider the incorporation of green infrastructure/low-impact development as transportation projects are undertaken (e.g., permeable pavements, green streets and alleys, etc.)</p> <p>PLAN ELEMENTS/POLICIES Provide for emergency access to all parts of the region and safe evacuation routes</p>	<p>ASSOCIATED MITIGATION GOAL Improve upon the protection of the citizens of Boone, Clay, Kanawha and Putnam counties from all natural and human-caused hazards</p>

Existing Program	Responsible Agency(ies)	Applicable Plan (i.e., Document)	Mitigation Action Comparison														
Floodplain Management	Jurisdictional Floodplain Coordinators Local Emergency Management Agencies (County/City Level)	Floodplain ordinances (county and municipal level)	<p>Continue to enforce floodplain development ordinances</p> <p>Consider participation in the Community Rating System, as appropriate for the jurisdiction</p> <p>Continue public outreach to ensure awareness of flood risk and mitigation options</p>														
			<table border="1"> <thead> <tr> <th>PLAN ELEMENTS/POLICIES</th> <th>ASSOCIATED MITIGATION GOAL</th> </tr> </thead> <tbody> <tr> <td>Establishes the definitions of flood hazard areas in the community</td> <td>Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts</td> </tr> <tr> <td>Outlines measures for preserving floodways and waterways</td> <td>Increase water flow capacities throughout the region</td> </tr> <tr> <td>Support resiliency by ensuring new development stays clear of known hazard areas or is built in such a way as to withstand the effects of known hazards</td> <td>Increase public awareness, understanding, support, and demand for hazard mitigation activities and future strategies or projects</td> </tr> <tr> <td>Protect green spaces in special flood hazard areas</td> <td>Remove abandoned buildings from high-risk and other known-impact areas</td> </tr> <tr> <td>Establishes specifications for development in flood hazard areas</td> <td>Reduce the current and future risks from hazards in Boone, Clay, Kanawha and Putnam counties</td> </tr> <tr> <td></td> <td>Reduce the current and future risks from hazards in Boone, Clay, Kanawha and Putnam counties</td> </tr> </tbody> </table>	PLAN ELEMENTS/POLICIES	ASSOCIATED MITIGATION GOAL	Establishes the definitions of flood hazard areas in the community	Raise awareness of local leaders and residents as to the hazards that impact the full region as well as a full range of their impacts	Outlines measures for preserving floodways and waterways	Increase water flow capacities throughout the region	Support resiliency by ensuring new development stays clear of known hazard areas or is built in such a way as to withstand the effects of known hazards	Increase public awareness, understanding, support, and demand for hazard mitigation activities and future strategies or projects	Protect green spaces in special flood hazard areas	Remove abandoned buildings from high-risk and other known-impact areas	Establishes specifications for development in flood hazard areas	Reduce the current and future risks from hazards in Boone, Clay, Kanawha and Putnam counties		Reduce the current and future risks from hazards in Boone, Clay, Kanawha and Putnam counties
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Existing Program	Responsible Agency(ies)	Applicable Plan (i.e., Document)	Mitigation Action Comparison
Infrastructure (i.e., Water, Sewer) Development	Regional Intergovernmental Council Municipal Utilities Public Service Districts WV American Water Company	Regional Development Plan Comprehensive Economic Development Strategy (CEDS) Regional Broadband Plan Jurisdictional Capital Improvement Plans Jurisdictional source water protection plans	<p>Ensure protection of environmental features as infrastructure projects are undertaken</p> <p>Support resiliency by extending or improving public utility service to residents</p> <p>Support improved emergency communications</p>
			<p>PLAN ELEMENTS/POLICIES</p> <p>Extend access to public utility services throughout the region</p> <p>Improve communications and access to high-speed internet</p> <p>Support infrastructure development as a means of attracting economic development</p> <p>ASSOCIATED MITIGATION GOAL</p> <p>Improve upon the protection of the citizens of Boone, Clay, Kanawha and Putnam counties from all natural and human-caused hazards</p> <p>Improve upon the protection of the citizens of Boone, Clay, Kanawha and Putnam counties from all natural and human-caused hazards</p> <p>Improve upon the protection of the citizens of Boone, Clay, Kanawha and Putnam counties from all natural and human-caused hazards.</p>

Existing Program	Responsible Agency(ies)	Applicable Plan (i.e., Document)	Mitigation Action Comparison	
Commercial/Economic Development	Regional Intergovernmental Council Boone County Community & Economic Development Corporation Central Appalachian Empowerment Zone Kanawha County Planning City of Charleston Planning Putnam County Office of Planning & Infrastructure	Regional development plan Comprehensive economic development strategy (CEDS) Twenty-twenty Vision (Kanawha County Comprehensive Plan) Putnam County Community Plan – Bridging to the Future Imagine Charleston Comprehensive Plan Nitro – A Plan for Moving the City Forward St. Albans Comprehensive Plan	Ensure adherence to floodplain and other development ordinances Consider the implementation of storm water management projects Consider incorporating green infrastructure/low-impact development into site-specific projects (e.g., use of porous pavement, tree planting initiatives, planter boxes, bio swales, etc.)	ASSOCIATED MITIGATION GOAL Reduce the current and future risks from hazards in Boone, Clay, Kanawha and Putnam Counties Remove abandoned buildings from high-risk and other known-impact areas Reduce the potential impact of disasters on Boone, Clay, Kanawha and Putnam counties' historic structures and landmarks Reduce the current and future risks from hazards in Boone, Clay, Kanawha and Putnam Counties Reduce the potential impact of disasters on Boone, Clay, Kanawha and Putnam counties' historic structures and landmarks Reduce the current and future risks from hazards in Boone, Clay, Kanawha and Putnam Counties Reduce the potential impact of disasters on Boone, Clay, Kanawha and Putnam counties' historic structures and landmarks
			PLAN ELEMENTS/POLICIES Encourage responsible land use	
			Identify areas suitable for residential development (or redevelopment)	
			Identify areas suitable for commercial development (or redevelopment)	
			Identify areas suitable for industrial development (or redevelopment)	



Existing Program	Responsible Agency(ies)	Applicable Plan (i.e., Document)	Mitigation Action Comparison				
Stormwater Management	Jurisdictional Utilities and Public Works	Jurisdictional MS4 permitting processes (where applicable)	<p>Identification of site-specific flooding concerns and other water quality issues Provides a means for consideration of low-impact development options for flood mitigation</p> <table border="1"> <thead> <tr> <th>PLAN ELEMENTS/POLICIES</th> <th>ASSOCIATED MITIGATION GOAL</th> </tr> </thead> <tbody> <tr> <td>Encourage onsite management of runoff</td> <td> Increase stormwater management capabilities throughout the region Reduce the current and future risks from hazards in Boone, Clay, Kanawha and Putnam counties </td> </tr> </tbody> </table>	PLAN ELEMENTS/POLICIES	ASSOCIATED MITIGATION GOAL	Encourage onsite management of runoff	Increase stormwater management capabilities throughout the region Reduce the current and future risks from hazards in Boone, Clay, Kanawha and Putnam counties
PLAN ELEMENTS/POLICIES	ASSOCIATED MITIGATION GOAL						
Encourage onsite management of runoff	Increase stormwater management capabilities throughout the region Reduce the current and future risks from hazards in Boone, Clay, Kanawha and Putnam counties						

4.4 Continued Public Involvement

Region 3 and the participating jurisdictions understand that the general public must be involved in the initial planning process, as well as the updates to the completed plan. As such, the committee/Region 3 will invite the public to participate as the plan is updated through attendance at future meetings, and distribution of questionnaires/surveys, etc. Further, as the updated plan is adopted, the public will be given the chance to comment on the updated plan prior to its adoption by passage resolution or ordinance.

Region 3, at a minimum, will maintain file copies of the hazard mitigation plan for review and inspection during routine business hours. Region 3 intends to log all comments received regarding the mitigation plan. Members of the public are invited to contact the Region 3 office with comments regarding hazard events, etc. Local officials are also invited to review the plan's effectiveness at determining hazard susceptibility based on data from hazard events as they occur.

As part of the continued public involvement, Region 3 counties will seek participation from local dam owners and the WV Department of Environmental Protection's Dam Safety Services.. The county representatives may use direct contact with individual owners or use surveys and meetings to seek assistance in determining the potential risks caused by the dams, ensure current emergency action plans are on file, and consider projects to mitigate the risks from individual dams.