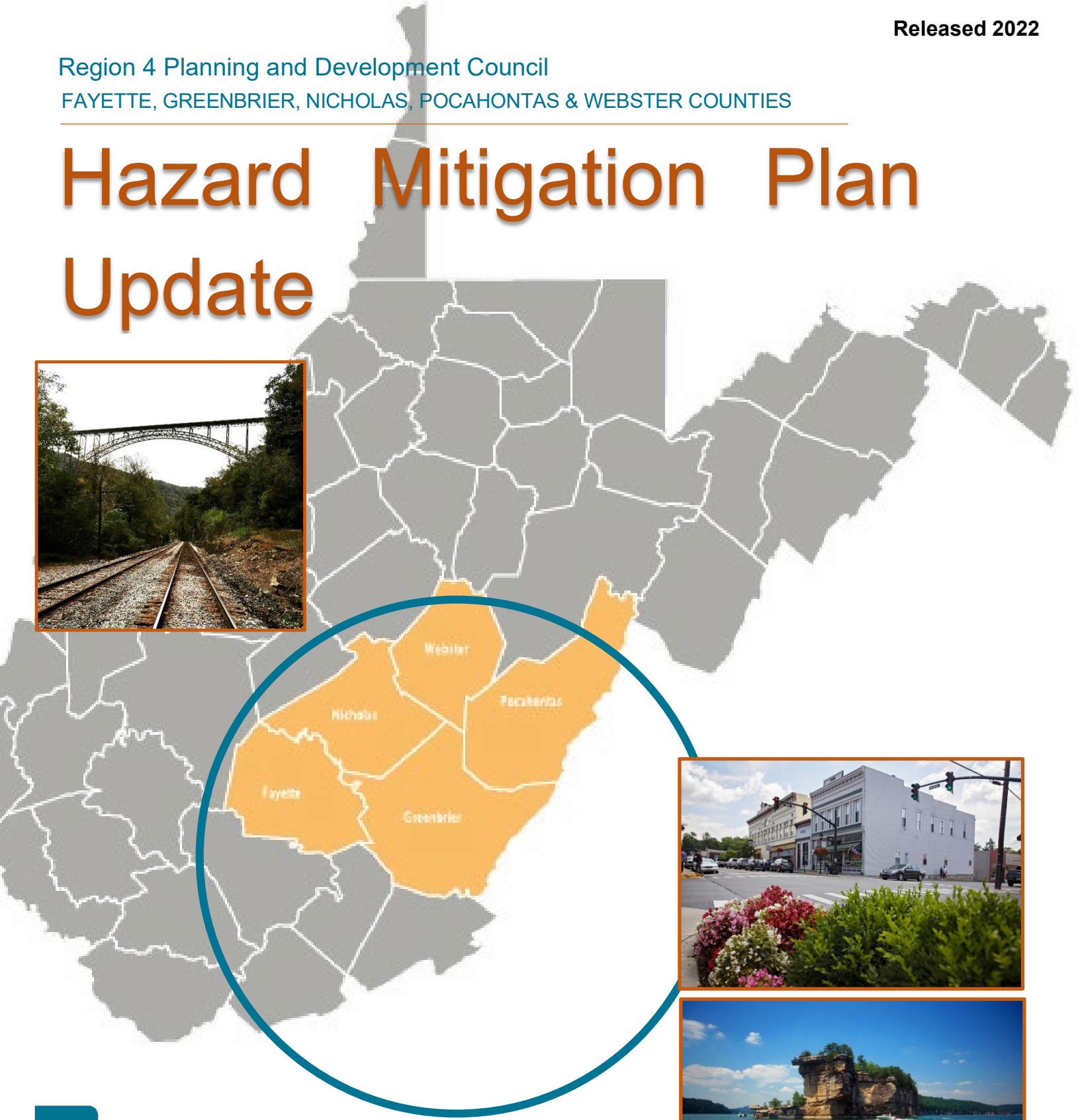
Released 2022

Region 4 Planning and Development Council

FAYETTE, GREENBRIER, NICHOLAS, POCAHONTAS & WEBSTER COUNTIES

Hazard Mitigation Plan Update



E.L. ROBINSON ENGINEERING

5088 Washington Street W | Charleston, WV 25313

T: 304.776.7473 | E: rlewis@elrobinson.com

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1.0 INTRODUCTORY MATERIALS

This section will present an introduction to the Hazard Mitigation Plan as well as define the authority, scope, and purpose of the plan.

Plan Introduction

The Region 4 Multi-Jurisdictional Hazard Mitigation Plan is a multijurisdictional plan that details natural hazards that threaten Region 4 and its various counties. The plan fulfills the requirements set forth by the Mitigation Act of 2000 (DMA, 2000). This Act requires counties to formulate a hazard mitigation plan to be eligible for mitigation funds made available by the Federal Emergency Management Agency (FEMA).

Plan Authority

This plan has been completed in accordance with Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the Disaster Mitigation Act of 2000. The guidelines for the completion of this plan appear in the Code of Federal Regulations under Title 44: Emergency Services, Part 201.6. Specific reference is made to the Local Mitigation Planning Handbook (USDHS/FEMA, 2013). The plan is further authorized through the West Virginia Code Section 15-5 Public Safety and the West Virginia Statewide Hazard Mitigation Plan Update 2018.

The West Virginia Department of Homeland Security and Emergency Management (WVDHSEM) and FEMA Region 3 further monitored the original planning as well as subsequent updating processes. The Region 4 Planning and Development Council acted as the coordinating agency for the completion of this plan revision at the local level.

Plan Scope

The Region 4 Multi-Jurisdictional Hazard Mitigation Plan includes each unincorporated area of Region 4 as well as the incorporated areas of each municipality within the region. The plan addresses natural hazards identified by FEMA, WV EM, and the Region 4 mitigation planning team. The hazards for which the combination of likelihood/risk and impact are deemed sufficient have been analyzed. That is, most hazards have been analyzed except those that are unlikely to occur and would have a relatively minor impact if they did. As an update to the 2016 plan, some minor and co-related hazards have been combined. Considering changes to the risk landscape, other hazards have been added. Hazard mitigation objectives, goals and projects are discussed, as are project lead agencies and potential funding sources.

Plan Purpose

The purpose of the Region 4 Multi-Jurisdictional Hazard Mitigation Plan is to identify and evaluate the natural hazards that can and may affect Region 4 and to describe mitigation strategies to address these hazards.

1.1 DOCUMENTATION OF THE PLANNING PROCESS

§201.6(b) and 201.6(c)(1)

An open public involvement process is essential to the development of an effective plan. To develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval
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
3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

[The plan shall document] 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.

This plan was developed in accordance with Part 201.6 of Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the Disaster Mitigation Act of 2000. Several resources were used during the development of the plan, including the United States Department of Homeland Security (DHS) / Federal Emergency Management Agency's (FEMA) Local Mitigation Planning Handbook (USDHS/FEMA, 2013), and the governing regulations in the Code of Federal Regulations.

To guide the completion of the plan at the local level, a multi-jurisdictional Steering Committee was established. The Steering Committee consisted of community leaders and those who have regulatory responsibilities. The final group that guided the 2021-2022 update process included the following:

Table 1.1 Steering Committee Members

Organization	Participation Status
Alderson, Town of	Participated
Ansted	Participated
Camden-on-Gauley	Participated
Durbin	Participated
Fayette County	Participated
Fayetteville	Participated
FEMA Region III	Participated

Gauley Bridge	Participated
Greenbrier County	Participated
Lewisburg	Participated
Marlinton	Participated
Meadow Bridge	Participated
Montgomery	Participated
Mount Hope	Participated
Nicholas County	Participated
Oak Hill, City of	Participated
Pax	Participated
Pocahontas County	Participated
Rainelle	Participated
Region 4 PDC	Participated
Renick	Participated
Richwood	Participated
Ronceverte	Participated
Rupert	Participated
Smithers	Participated
Summersville	Participated
Thurmond	Participated
Webster County	Participated

Webster Springs	Participated
White Sulphur Springs	Participated
WV Emergency Management Division	Participated

In addition to the Steering Committee, outside organizations were consulted such as WVU and WVDEP Dam Safety.

Risk Assessment Survey Results by Municipality

Zip Code	Town	Responses
25085	Gauley Bridge	1
25136	Montgomery	2
25812	Ansted	3
25840	Fayetteville	9
25880	Mt. Hope	1
25901	Oak Hill	6
25936	Thurmond	1
25976	Meadow Bridge	1
25186	Smithers	1
25904	Pax	2
26261	Richwood	32
26651	Summersville	3
24901	Lewisburg	10
24970	Ronceverte	7
24986	White Sulfur Springs	10
25962	Rainelle	8
25981	Quinwood	1
25984	Rupert	2
24946	Hillsboro	1
24954	Marlinton	1
26264	Durbin	1
26206	Cowen	1
26208	Camden-on-Gauley	1
26088	Addison/Webster Springs	2

1.1.1 Current Update Process

As noted in the introduction, the Region 4 Planning and Development Council (PDC) served as the coordinating agency for this update. To that end, the Region 4 PDC sought support for the planning effort, identifying the resources needed to update the plan and re-engaging governmental organizations and other technical expertise available in the region.

To update the plan, the Region 4 PDC assembled the steering committee listed on the prior page. The Region 4 PDC sought to make the committee as broadly experienced and representative as possible and ensured opportunities for the following types of organizations to participate: emergency management, the fire service,

parks and recreation officials, planning districts of various types, transportation organizations, schools, public works, and law enforcement. Ultimately, the following agencies/organizations were invited to send representatives to planning committee meetings. Those that attended are documented on sign-in sheets in Appendix 1.

1.1.2 Committee Involvement

On August 24, 2021, the consultant team and Region 4 PDC met virtually to discuss and formally kick-off the project. The steering committee met virtually with the Region 4 PDC on three occasions during the update of the plan. Meeting dates included the following:

- September 20, 2021
- December 10, 2021
- February 4, 2022

The agenda for the first meeting included a review of the mitigation planning process and an overview of the applicable region hazards. The consultant presented and the Steering Committee accepted two additional hazards – pandemic and riverine erosion. The Steering Committee members were also asked to review the county asset list from the 2016 plan and edit, mark for deletion, and/or add assets to the lists for each county. County staff returned these lists in early October.

During the second meeting, the consultant presented a revised work plan that incorporated asset inventories and risk assessment tools available from West Virginia University. The WVU Flood Tool was given particular attention as a powerful and precise addition to the Hazard Identification and Risk Assessment (HIRA) section of the plan. Additionally, the consultant team and the Region discussed the creation of a survey and mapping tool for Steering Committee members to use to catalog assets and risks.

In the third and final meeting, the Steering Committee discussed the overall project goals.

Several existing plans and reports were reviewed to (a) identify any obvious inconsistencies between other development and mitigation efforts, (b) as baseline information for such sections as Analyzing Development Trends, and (c) to support discussions surrounding mitigation projects. Those documents included the following:

Table 1.2 Reference Planning Documents

DOCUMENT TYPE	DOCUMENT CITATION	HOW INCORPORATED INTO THE PLAN
Plan	Division of Forestry (2020) *West Virginia 2020 State Fire Action Plan. https://wvforestry.com/wv-2020-state-forest-action-plan/*	Used to identify changes to wildfire hazards and status of mitigation strategies
Plan	Region 4 Planning and Development Council. (2020) *Comprehensive Economic Development Strategy.* https://secureservercdn.net/104.238.71.109/d8u.8b6.myftpupload.com/wp-content/uploads/2020/12/CEDS-2020-Update.pdf	Used as background and to identify economic assets and targeted development areas
Plan	Margaret Stout (2020) *City of Summersville Comprehensive Plan 2030 Draft https://summersvillewv.org/wp-content/uploads/2021/01/Draft-Summersville-Comprehensive-Plan-2030.pdf*	Used to understand development history and priorities within Nicholas County.
Plan	Emergency Management Division. (2018) *West Virginia Statewide Standard Hazard Mitigation Plan Update. https://emd.wv.gov/MitigationRecovery/Documents/WV%20State%20Hazard%20Mitigation%20Plan%20FINAL%2011-2018.pdf*	Used to identify changes in hazards, vulnerability analysis and mitigation strategy.
Plan	JH Consulting. (2016) *Region 4 PDC Multi-Jurisdictional Hazard Mitigation Plan.*	Used as a basis for past plans, HIRA, vulnerability analysis and mitigation strategy.

1.1.3 Engaging the Public

The Region 4 PDC, and the members of the Steering Committee, coordinated multiple ways for the public to engage in the hazard mitigation plan update process. Public meetings were held with each County. Meetings were publicized through traditional media, social media, and on the Region 4 website. Attendees included governmental representatives; however, other members of the public did not attend. These meetings were held virtually on September 20, 2021, January 28, 2022, and January 31, 2022. Within these meetings the plan update process and the public risk assessment survey was discussed. Specific mitigation strategy meetings were held with each County to review existing and identify new mitigation strategies, these meetings were held on February 4 & 7, 2022. The existing HMP was made available on the Region 4 website for public review. Examples of announcements of these meetings, and attendance records, can be found in Appendix 1.

In addition to the public comments gathered during the planning process, additional public input will be gathered when the draft plan is circulated for review. These public comments will be reviewed and incorporated into the plan update.

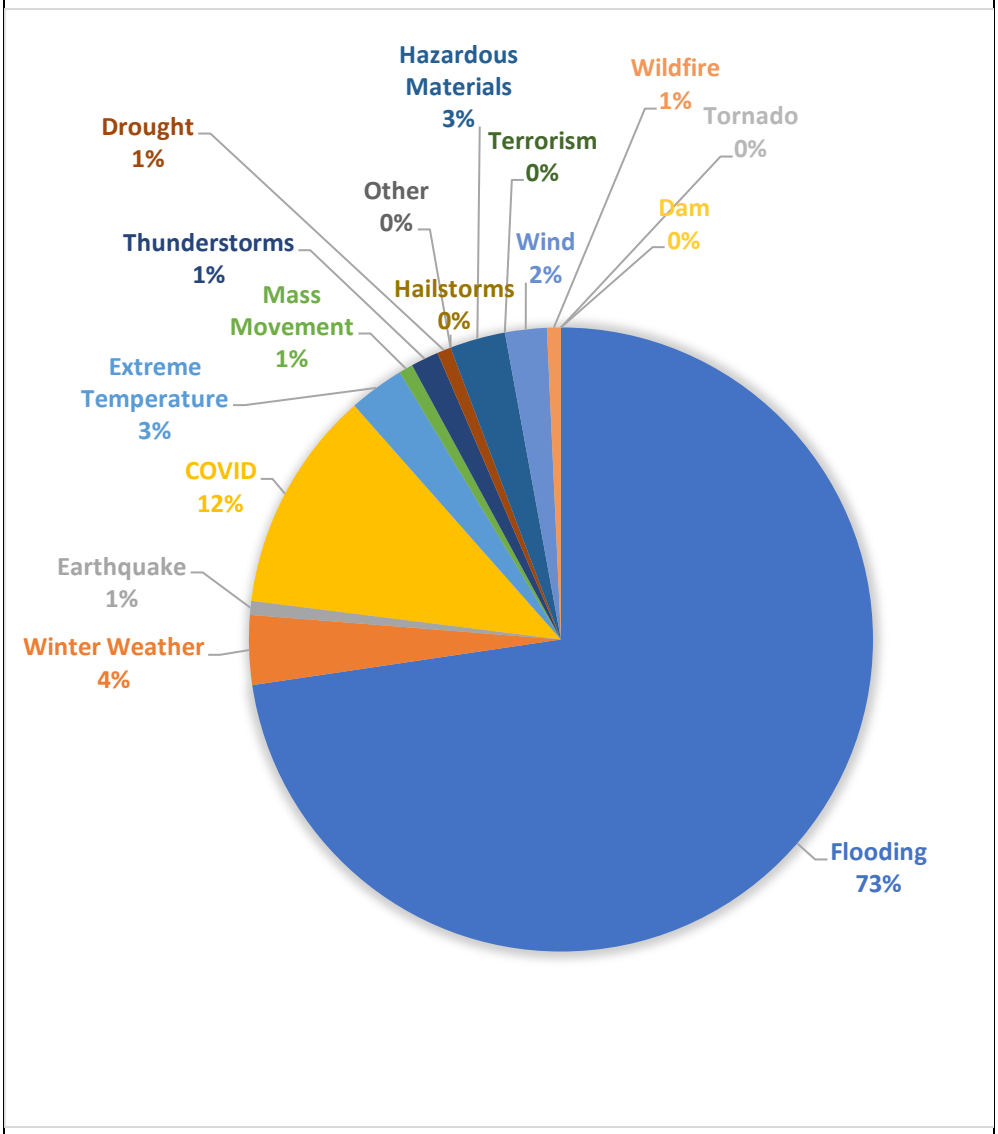
Public Risk Assessment Survey Results

To gain more input on hazard mitigation knowledge and attitudes from the citizens in region 4, the Region 4 PDC published an online survey using the ArcGIS. This risk assessment survey was distributed throughout the County's to residents, public officials, and the steering committee. 150 responses were received, a copy of the survey that was distributed can be found in Appendix 2.

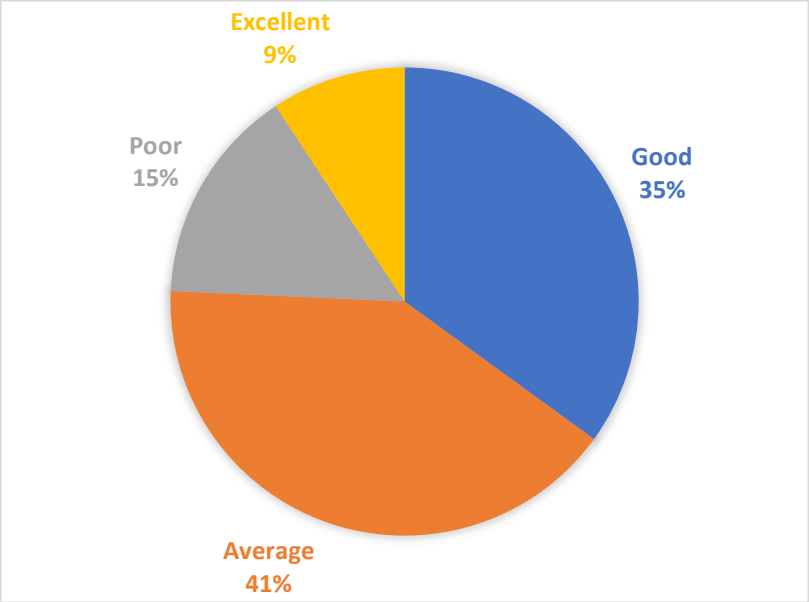
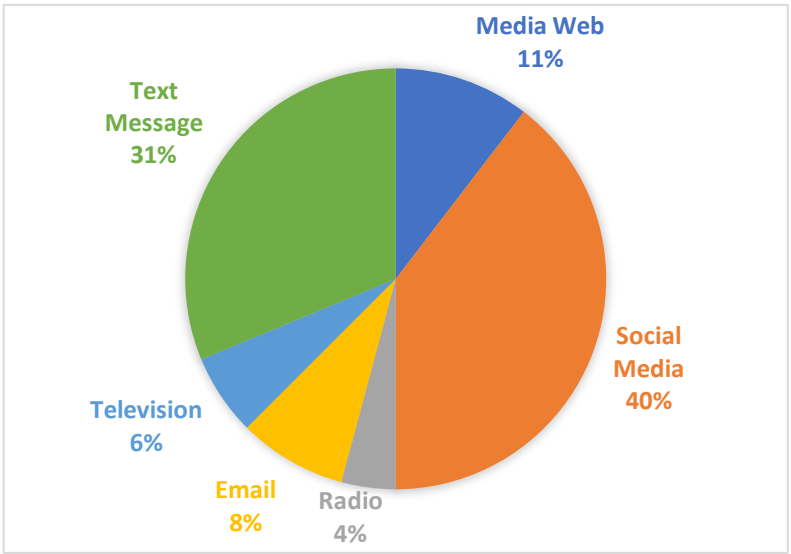
This survey was widely advertised through social media as well as through traditional media and was posted on the Region 4 PDC's website. Examples of these postings can be found in Appendix 1. The survey was available to the public between December 2021 to February 2022. Below is a summary of the survey results.

Respondents answered a variety of questions regarding their perceptions of hazards that threaten their community. The highest rated hazard to have risk within the community was flooding (73%). Respondents were next asked to rate how they felt their community handled recent hazard events. The chart shows these responses, where nearly half of respondents considered the ability of the community to handle such an event to be either 'Average" or "Good". Few residents thought that the ability of the community was "Poor", and none considered it "Horrible". Nearly 70% of respondents received information or warnings from local public officials or emergency management officials during a recent hazard event. Over 40% of these indicated that they received this information via social media, while 35% received information via text messages.

Respondents were asked several questions to assess their own household preparedness and to assess what mitigation efforts they support and/or have done for their own household. Of the 150 respondents who answered the question, 56% have a 72-hour kit (www.ready.gov/build-a-kit) in their household. Nearly all the respondents (86%) have homeowner's/renter's insurance. However, only 14% of those respondents stated that their insurance does include flood insurance. Nearly 72% of respondents are both willing to spend their own money on mitigation activities for their home.

Hazard Information	
What hazard do you believe poses the largest risk for you community?	

Household Preparedness		
	YES	NO
Do you/does your household have a 72-hour kit?	56%	44%
Do you have homeowners/renters' insurance?	86%	14%
If you live in a SFHA, do you have floodplain insurance?	14%	86%
Are you willing to spend money on mitigation activities for your home?	72%	28%
Have you performed any improvements to your home to reduce risk from a hazard?	66%	34%

<table>
<tr><th colspan="3">Hazard Response</th></tr>
<tr><td>How would you rate your community's ability to handle a recent hazard event?</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="2">During this event did you receive information or warnings from your local public officials/emergency management officials?</td><td>YES</td><td>NO</td></tr>
<tr><td>70%</td><td>30%</td></tr>
<tr><td>How did you receive information or warnings from your local public officials/emergency management officials?</td><td colspan="2"> 
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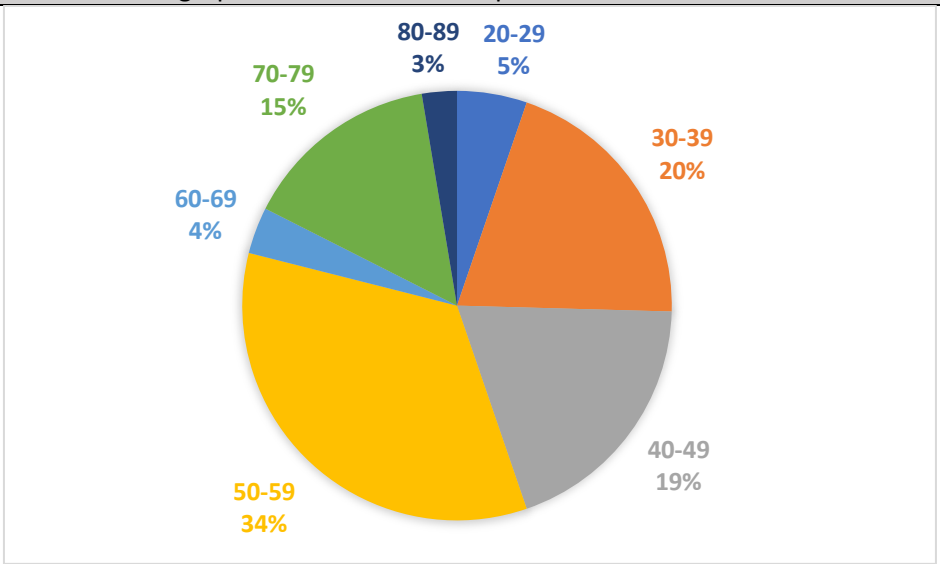
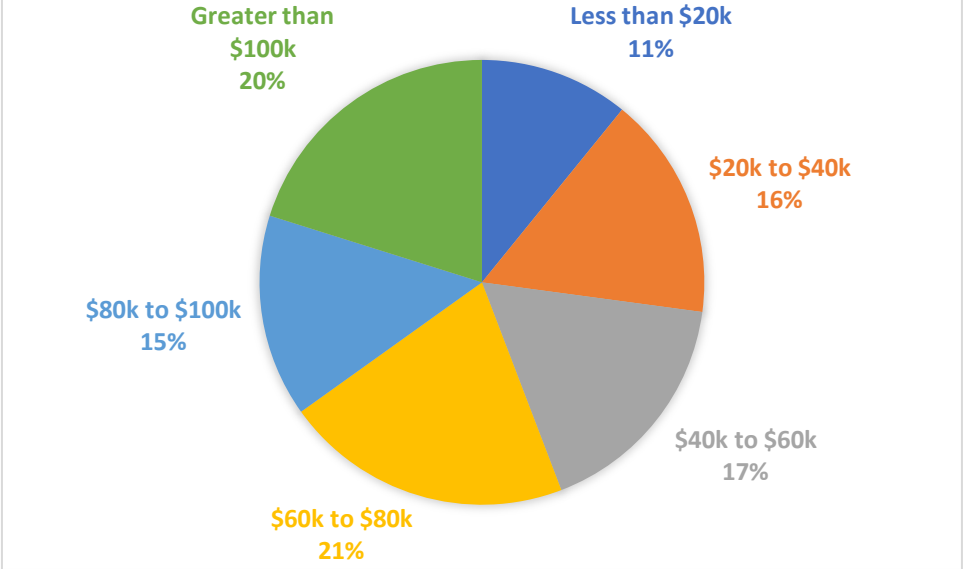
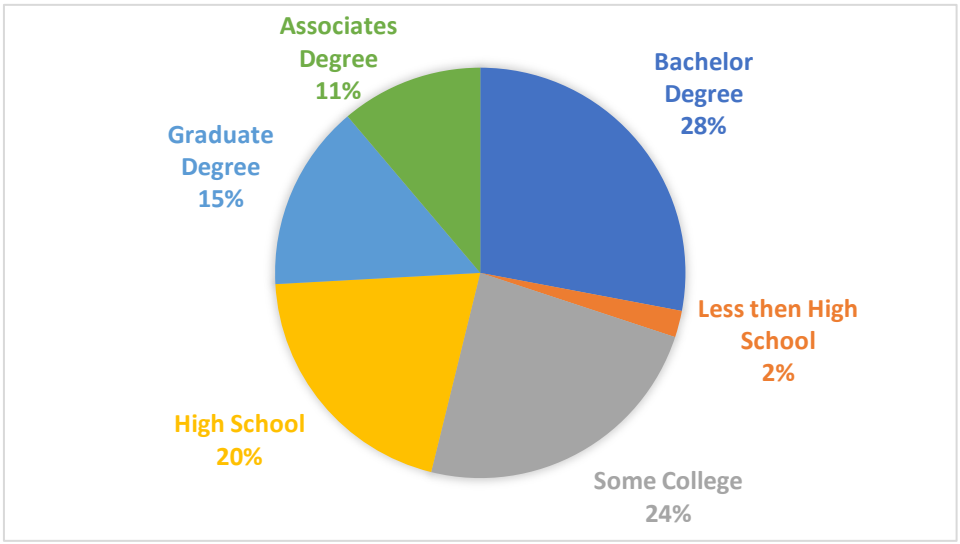
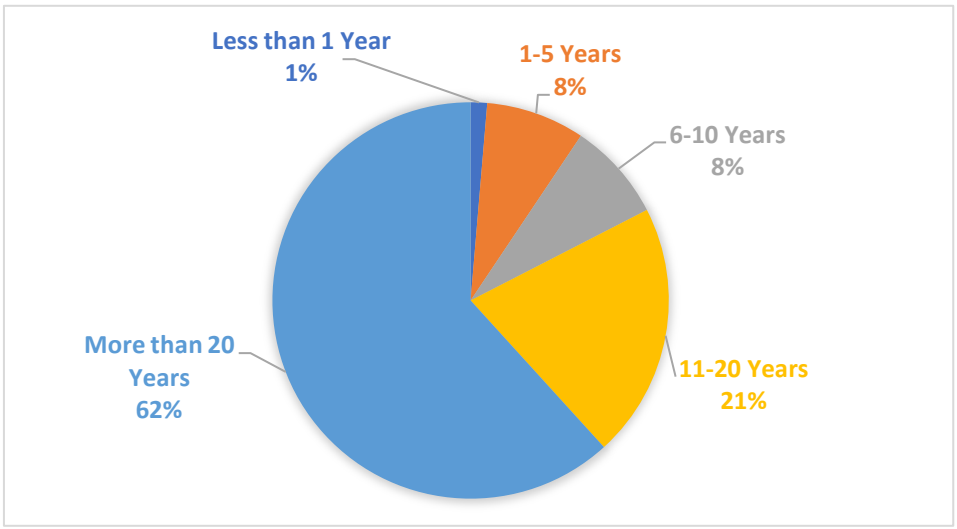
<table>
<tr><th colspan="3">Demographic Information of Respondents</th></tr>
<tr><td>Age</td><td colspan="2"> 
</td></tr>
<tr><td>Gender</td><td>FEMALE</td><td>MALE</td></tr>
<tr><td></td><td>38%</td><td>62%</td></tr>
<tr><td>Household Income</td><td colspan="2"> 
</td></tr>
</table>

Highest Level of Education	
How long have you resided in your community?	

1.1.4 Research

Mitigation Plan Development and Update

As noted in 1.2.2 on the prior page, the planning committee was intimately involved in updating the mitigation plan. The primary purpose of the first committee meeting was to review the assets; the second meeting was used to present a more sophisticated survey tool to capture assets and geo-located risk information.

The county's consultant guided committee members through the process of re-prioritizing mitigation projects. The prioritized list was then presented as an overall mitigation strategy for Region 4 (i.e., each project is listed with a timeframe, potential cost, and funding source, and coordinating agency). The project lists can be found in Section 4.

1.1.5 Implementing the Plan and Monitoring Progress

Region 4's stakeholders realize that the plan must remain viable to appropriately guide mitigation in the region. Plan implementation (i.e., the mitigation strategy and project prioritization) are presented in Section 3.0: Action Plan. The monitoring process is presented in Section 4.0: Plan Maintenance Process. The governing body of each participating jurisdictions will formally adopt this plan by resolution. To streamline that process, the jurisdictions opted to submit the plan, in full, to the West Virginia Emergency Management Division (WVEMD) as well as the Federal Emergency Management Agency (Region III) prior to formal adoption of receiving an 'Approved Pending Adoption' (APA) designation. With the APA, the jurisdictions will then formally adopt the plan (so that the resolution process only needs to occur once).

1.2 PLANNING AREA DESCRIPTION

County Geography

The Region 4 Planning and Development Council (PDC) is comprised of five (5) counties which contain twenty-six (26) municipalities. The map below illustrates the five-county region and shows the locations of the municipalities within the counties.

Region 4 is in southeastern West Virginia, with two of its counties bordering Virginia. The region contains a combined 3,845 square miles, 3,822 square miles being land and 23.6 square miles being water. Greenbrier County is the largest in the region, making up over a quarter of the total land area.

As shown on the vicinity map, the region is crossed by many roads and rivers, while much of the land area is comprised of national and state parks and forests.

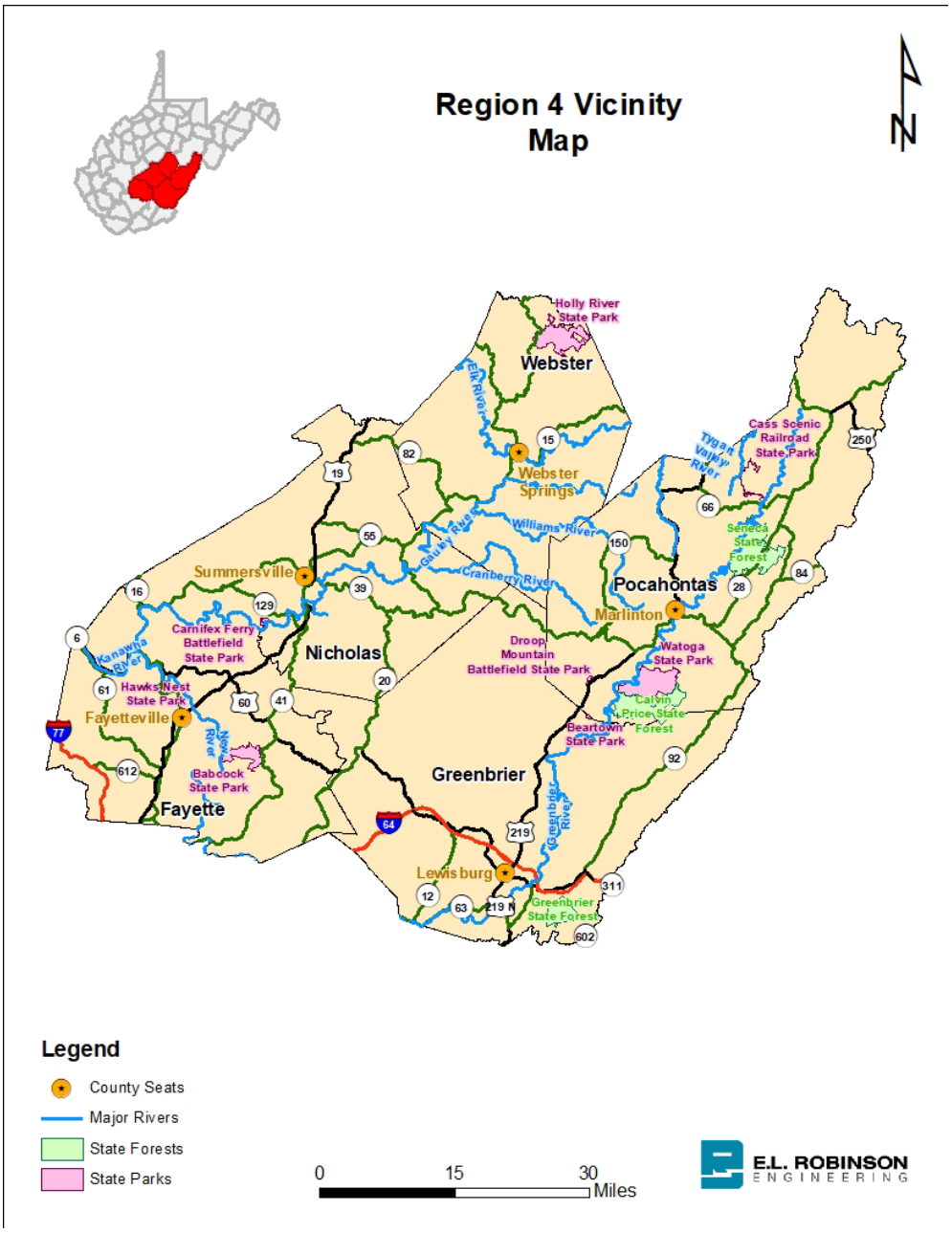


Figure 1.1 Region 4 Vicinity Map

County Demographics

The total population of the region was 114,316 in 2020.[1] Combined, the region has a population density of 30 people per square mile. Fayette County is the most populous county in the region and the most population dense

[1] 2020 Census, DEC Redistricting Data (PL 94-171), Table P2

while Pocahontas County is the least populous and least population dense.[2] All counties lost population between 2010 and 2020, with Fayette and Pocahontas Counties losing 10% or more.

Table 1.3 County Populations According to the 2000, 2010, and 2020 Census Counts

Jurisdiction	2000 Census Population	2010 Census Population	2020 Census Population	Population Change 2010-2020	Percent Change 2010 to 2020
Fayette County	47,579	46,039	40,488	-5,551	-12%
Greenbrier County	34,4533	35,480	32,977	-2,503	-7%
Nicholas County	26,562	26,233	24,604	-1,629	-6%
Pocahontas County	9,131	8,719	7,869	-850	-10%
Webster County	9,719	9,154	8,378	-776	-8%
Total	**127,444**	**125,625**	**114,316**	**-11,309**	**-9%**

Just over 30% of the regional population (36,062 people) resides within one of the 26 municipalities below.

[2] 2020 Census, DEC Redistricting Data (PL 94-171), Table P2

Table 1.4 Towns and Cities with More than 1,000 residents

Name	2020 Population Estimate	County
Oak Hill	8,028	Fayette
Lewisburg	3,766	Greenbrier
Summersville	3,225	Nicholas
Fayetteville	2,684	Fayette
White Sulphur Springs	2,325	Greenbrier
Richwood	1,842	Nicholas
Ronceverte	1,649	Greenbrier
Rainelle	1,516	Greenbrier
Montgomery	1,492	Fayette
Ansted	1,300	Fayette
Mount Hope	1,259	Fayette
Alderson	1,111	Greenbrier

Table 1.5: Towns and Cities with Fewer than 1,000 residents

Name	2020 Population Estimate	County
Marlinton	956	Pocahontas
Rupert	880	Greenbrier
Smithers	726	Fayette
Webster Springs (Addison)	660	Webster
Gauley Bridge	545	Fayette
Cowen	463	Webster
Meadow Bridge	344	Fayette
Durbin	297	Pocahontas
Quinwood	260	Greenbrier
Hillsboro	236	Pocahontas
Renick (Falling Springs)	200	Greenbrier
Pax	150	Fayette
Camden-on-Gauley	143	Webster
Thurmond	5	Fayette

Social Vulnerability

The region is home to a number of vulnerable populations, which includes the homeless, disabled, and those below poverty line, among others. Vulnerability is described below.

Drug Overdoses

Vulnerability to addiction has grown with 2020 being the deadliest year for drug-related overdoses across the state.[3] Sadly, West Virginia also has the nation's highest rate of overdose deaths, 51.5 deaths per 100,000

[3] West Virginia Office of Drug Control Policy, 2021 ODCP Semi-Annual Report. Published July 31, 2021.https://dhhr.wv.gov/office-of-drug-control-policy/news/Documents/H01_CY_2021_15220.pdf, Accessed February 21, 2022

people.[4] Fayette County had an even higher rate of 85 deaths per 100,000 people, while Greenbrier had 33, Nicholas had 17, Webster had 10, and Pocahontas did not have data reported.[5]

Homelessness

Those who are homeless, whether chronically or temporarily, can be at increased risk due to their circumstances. The West Virginia Coalition to End Homelessness (WVCEH) publishes data yearly, which compiles several statistics on homelessness around the state and publishes this on their website.[6] In Fayette County, from 4 to 13 people have been without homes in the past 5 years. In Greenbrier County, from 5 to 17 people have been without homes in the past 5 years, including three families with children as of 2021. In Nicholas County, from 4 to 6 people have been without homes in the past 5 years. Almost no one has been without a home in Pocahontas or Webster Counties in the past 5 years.

Social Vulnerability Index

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 Index describes social vulnerability at a community level within a specified county. The 2018 Index, the most recent year available, calculates vulnerability based on fifteen census-derived factors grouped into four themes. The four factor groups are socioeconomic status, household composition/disability, race/ethnicity/language, housing type/transportation.

To better describe the planning area, and explore the unique hazards related to its population, the four factor groups are presented below.

Socioeconomic Variables

The SVI includes a variable that measures the estimated number of persons who live below the poverty level. Flanagan, Gregory, Hallisey, Heitgerd, and Lewis, researchers at the CDC, who authored *A Social Vulnerability Index for Disaster Management*, explain that "economically disadvantaged populations are disproportionately affected by disasters."[7] Similarly, A study on households in counties with extensive hazard damages (at least $10 billion from 1999 to 2013) found that white households, homeowners, and residents with higher education actually *gained* wealth after disasters, while black and Hispanic households, renters, and those with less education lost wealth.[8] The difference was as high as $150,000.

[4] https://drugabusestatistics.org/, National Center for Drug Abuse Statistics. Accessed February 21, 2022
[5] Https://www.countyhealthrankings.org, University of Wisconsin Population Health Institute, The County Health Rankings & Roadmaps
[6] https://public.tableau.com/app/profile/wvceh, West Virginia Coalition to End Homelessness Tableau Site. Accessed February 16, 2022
[7] Flanagan, Barry E. et al., *A Social Vulnerability Index for Disaster Management* Journal of Homeland Security and Emergency Management. 2011 (8), pages 1-22.
[8] *Damages Done: The Longitudinal Impacts of Natural Hazards on Wealth Inequality in the United States,* Howell, Junia and Elliott, James R, *Social Problems, Volume 66, Issue 3.* August 2019, Pages 448–467, *https://doi.org/10.1093/socpro/spy016.* Accessed February 21, 2022.

The map below shows the socioeconomic vulnerability of census tracts across the region using the Center for Disease Control's scale that is applied nationally. In other words, the vulnerability is not just comparing census tracts within the region but comparing census tracts against national numbers. Many tracts have high vulnerability (dark green) and only one tract has low vulnerability (light green).

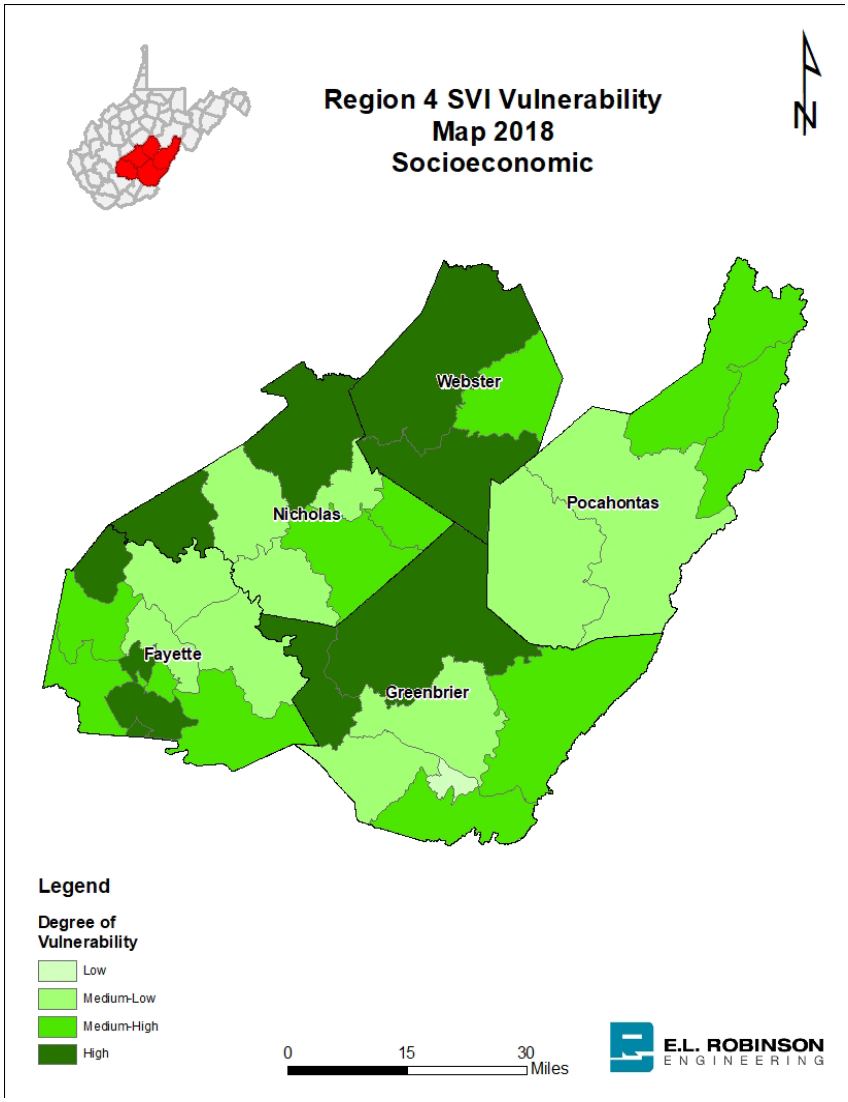


Figure 1.2. Region 4 Social Vulnerability Index Socioeconomic Map

The reasons why socioeconomic vulnerability is important is described in more detail below. 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. These areas will need significant support during recovery activities and could greatly benefit from target mitigation. Education is included as a socioeconomic variable, though the relationship between education and vulnerability is not absolutely understood.[9] Education is, however, associated with both income and poverty. Many people without a high school diploma will struggle to find steady, well-paying jobs.

[9] Flanagan, Barry E. *et al*., *A Social Vulnerability Index for Disaster Management* Journal of Homeland Security and Emergency Management. 2011 (8), pages 1-22.

This is especially true within the boom-and-bust cycles associated with the 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. Roughly 15-20% of residents in Region 4 have not earned a high school degree or equivalent, with Greenbrier and Nicholas Counties having the most educated population and Webster County having the least educated. Greenbrier and Nicholas Counties are also the only counties with more than half of the population over age 16 participating in the labor force (50.7% and 50.1%, respectively).[10]

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.

The median household income in 2019 dollars for the region ranges from $34, 927 (Webster County) to $41,882 (Pocahontas County).[11] Roughly 20% of residents are in poverty, with Webster County having the highest level below the poverty line at 23.7%, again indicating the relationship between education level and income.

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.[12]

Many elderly citizens have special needs or medical issues that require the assistance of either machines (oxygen concentrators for example) or other, more able-bodied people (difficulty walking for example.) As Flanagan, Gregory, Hallisey, Heitgerd, and Lewis point out the family members or neighbors who can typically be counted on to assist the elderly may be either overwhelmed by the disaster or be physically unable to gain access to the elderly. 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. By not including this population in the planning process responders are not adequately prepared or equipped to deal with children.

Roughly twenty percent of the population in Region 4 is under age 18, and more than 20% of the population is aged 65 and older.

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[10] United States Census Bureau QuickFacts, https://www.census.gov/quickfacts/fact/table/webstercountywestvirginia,pocahontascountywestvirginia,nicholascountywestvirginia,greenbriercountywestvirginia,fayettecountywestvirginia/AGE295219
Accessed February 21, 2022

[11] United States Census Bureau QuickFacts, https://www.census.gov/quickfacts/fact/table/webstercountywestvirginia,pocahontascountywestvirginia,nicholascountywestvirginia,greenbriercountywestvirginia,fayettecountywestvirginia/AGE295219
Accessed February 21, 2022

[12] Flanagan, Barry E. *et al*., *A Social Vulnerability Index for Disaster Management* Journal of Homeland Security and Emergency Management. 2011 (8), pages 1-22.

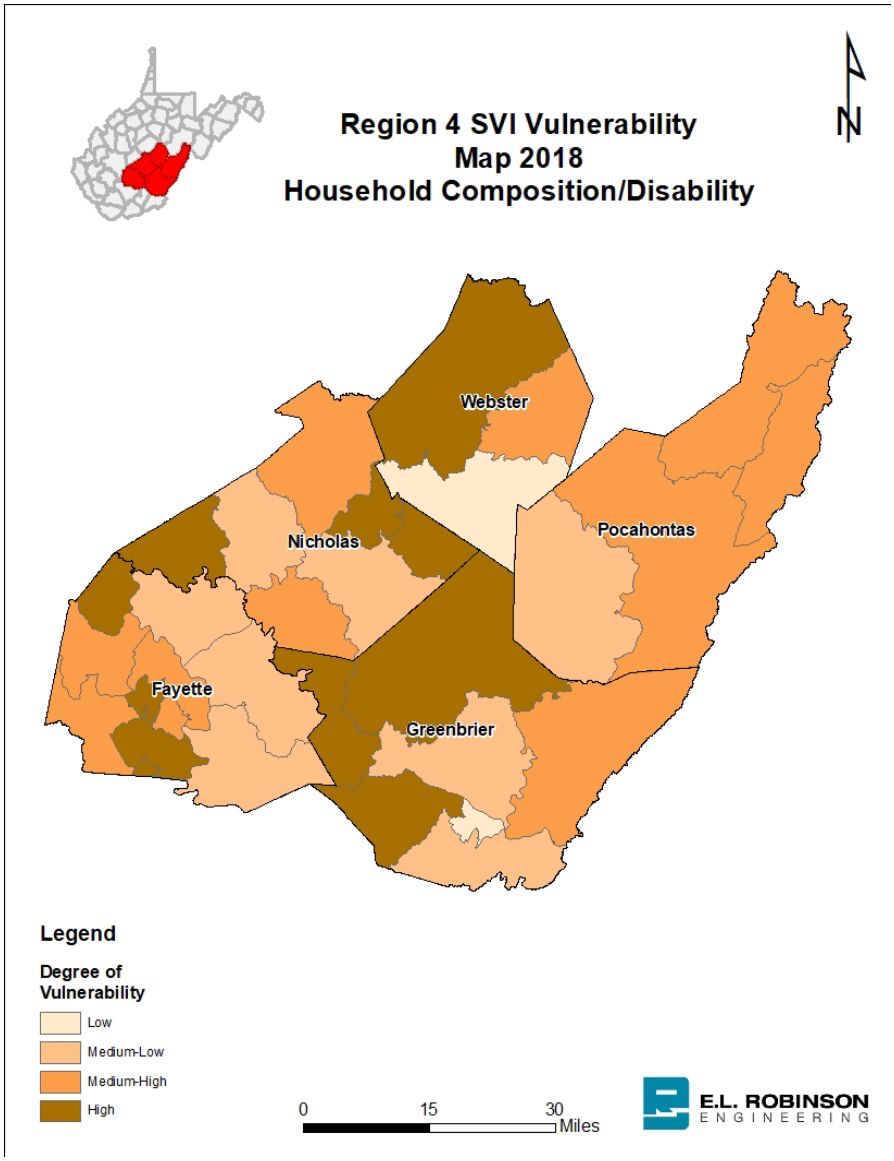


Figure 1.3. Region 4 Social Vulnerability Index Household Composition/Disability Map

The map above shows the household composition vulnerability of census tracts across the region using the Center for Disease Control's scale that is applied nationally. In other words, the vulnerability is not just comparing census tracts within the region but comparing census tracts against national numbers. Many tracts have high vulnerability (dark brown) and only two tracts have low vulnerability (light beige).

Minority Status/Language

Several studies have found that the overall marginalization of racial and ethnic minority groups has made these populations more vulnerable during each stage of a disaster (Flanagan, Gregory, Hallisey, Heitgerd, & Lewis, 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, Gregory, Hallisey,

Heitgerd, & Lewis, 2011.) The region is overwhelmingly Caucasian (92%).[13] Those of African American descent make up 2%, those of Hispanic or Latino descent make up just over 1% of the population, while those of two or more races make up 3%; people of American Indian and Alaska Native descent and Asian descent each make up less than half a percent[14].

Language barriers can also increase vulnerability during disasters, however, fewer than 3% of region households speak a language other than English spoken at home. Fewer than 1% of households in Webster County speak a language other than English at home.

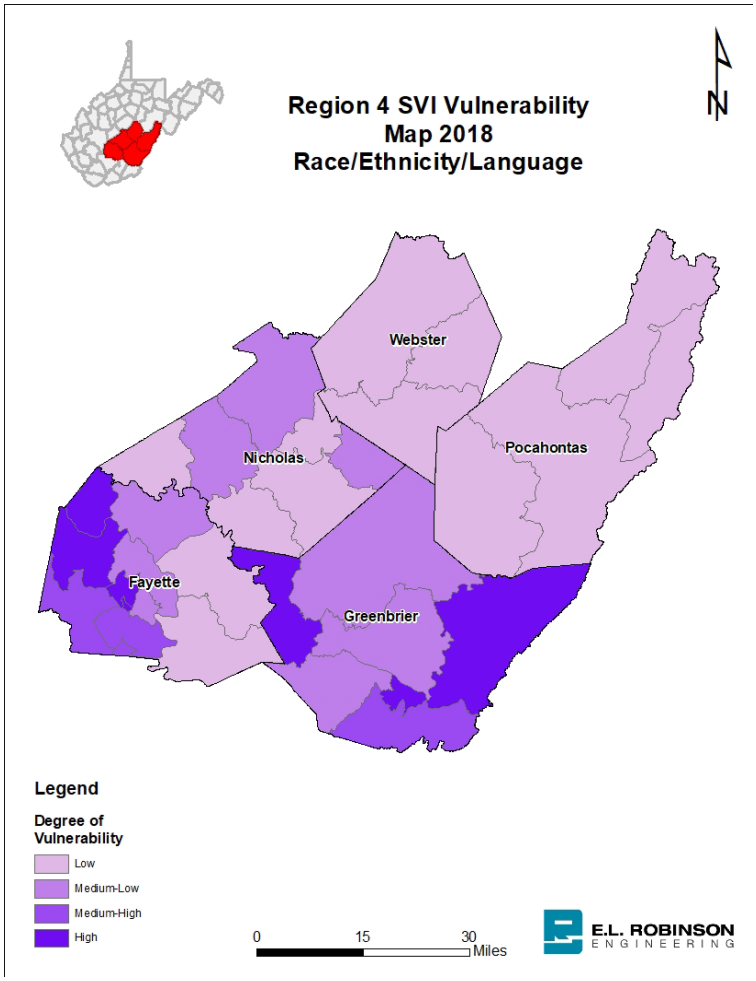


Figure 1.4. Region 4 Social Vulnerability Index Race/Ethnicity/Language Map

The map above shows the race, ethnicity, and language vulnerability of census tracts across the region using the Center for Disease Control's scale that is applied nationally. In other words, the vulnerability is not just comparing census tracts within the region but comparing census tracts against national numbers. Compared with other indicators of social vulnerability, the region is less vulnerable using the race/ethnicity/language indicator, though several census tracts have high or medium high vulnerability.

[13] 2020 Census, DEC Redistricting Data (PL 94-171), Table P2
[14] 2020 Census, DEC Redistricting Data (PL 94-171), Table P2

Housing/Transportation

The SVI includes several variables that describe housing and transportation. For the purposes of this discussion 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, Gregory, Hallisey, Heitgerd, & Lewis, 2011.) Mobile homes, which typically are inhabited by those of lower socioeconomic status, are not designed to withstand severe weather and flooding.

Mobile homes are frequently found outside of metropolitan areas. By design, they are lighter and less well anchored than other homes. Across the region, more than 10% of occupied housing is estimated to be "mobile home or other type of housing," with Fayette, Greenbrier, and Nicholas Counties each estimated to have thousands of mobile homes. A small, but significant portion are renter occupied. [15]
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 to obtain preparedness supplies and will have less capacity to bring those supplies back to their home. In the region, Fayette, Greenbrier, Nicholas and Pocahontas counties are estimated to have between 8-9% of households without a vehicle. Webster County is estimated to have more than 12% without a vehicle.[16]

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 and present special concerns for evacuations (Flanagan, Gregory, Hallisey, Heitgerd, & Lewis, 2011.) Nursing homes and other residential medical facilities are particularly vulnerable. According to Care Pathways, there are 14 nursing homes/skilled care facilities within Region 4. These populations are especially vulnerable due to their special and timely needs and because of understaffing in these institutions in emergencies (Flanagan, Gregory, Hallisey, Heitgerd, & Lewis, 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.

[15] United States Census Bureau QuickFacts, 2019 American Community Survey, S2504 (Physical Housing Characteristics for Occupied Housing) Accessed February 21, 2022
[16] United States Census Bureau QuickFacts, 2019 American Community Survey, S2504 (Physical Housing Characteristics for Occupied Housing) Accessed February 21, 2022

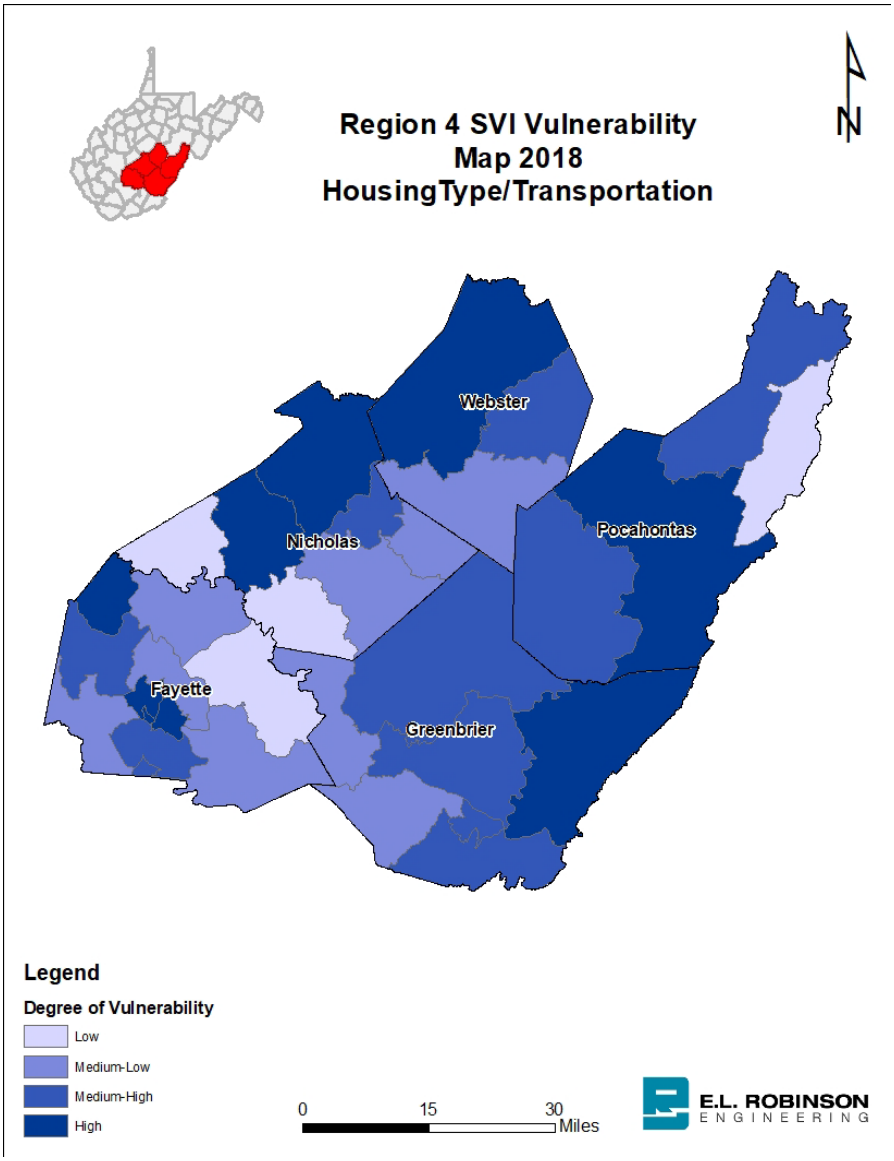


Figure 1.5. Region 4 Social Vulnerability Index Housing Type/Transportation Map

The map above shows the socioeconomic vulnerability of census tracts across the region using the Center for Disease Control's scale that is applied nationally. In other words, the vulnerability is not just comparing census tracts within the region but comparing census tracts against national numbers. The majority of census tracts are either high or medium high vulnerability.

As the previous sections have shown there are areas and populations within the region that are more vulnerable than others based on these social vulnerability variables. These areas of increased vulnerability will be incorporated into the risk assessment (Section 2.0) to document where hazard vulnerability and social vulnerability overlap.

Transportation

Roads

The transportation network in Region 4 consists of four lane divided highways, two lane roadways and single lane roadways. Region 4 is a mountainous and mostly rural area, so many of these transportation routes are curvy and must traverse steep road grades. The main and secondary routes are Interstate 64, Interstate 77, U.S. Route 19 (Appalachian Corridor L) U.S. Route 60, U.S. Route 219. Secondary transportation routes are largely well-maintained two-lane highways that are more rural than primary routes. There is also a network of county roads that can range from well-maintained two-lane roads to single lane roads. The map below shows the location of major roads in the region.

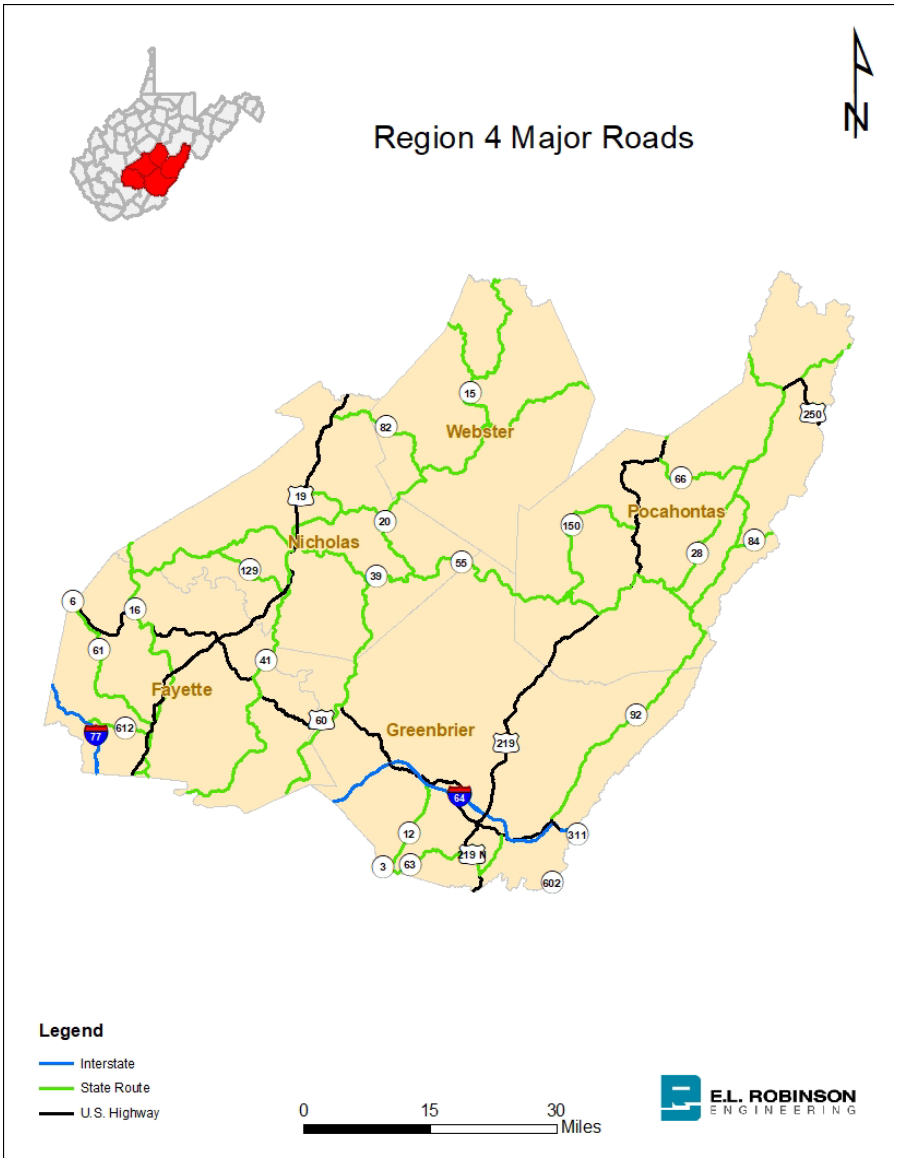


Figure 1.6. Region 4 Major Roads

Rail

Each of the five counties in Region 4 are crossed by train tracks. Some of these routes are spurs off main lines, while others traverse the region enroute to other areas such as Charleston, which is a major industrial area. Amtrak passenger service is also present in the region. The Cardinal Route runs from New York to Chicago via Washington, DC, Cincinnati, and Indianapolis and makes several stops in West Virginia. Stops within Region 4 include White Sulphur Springs, Alderson, Thurmond, and Montgomery (Cardinal Route Info, 2022). The rail lines are shown in the map below.

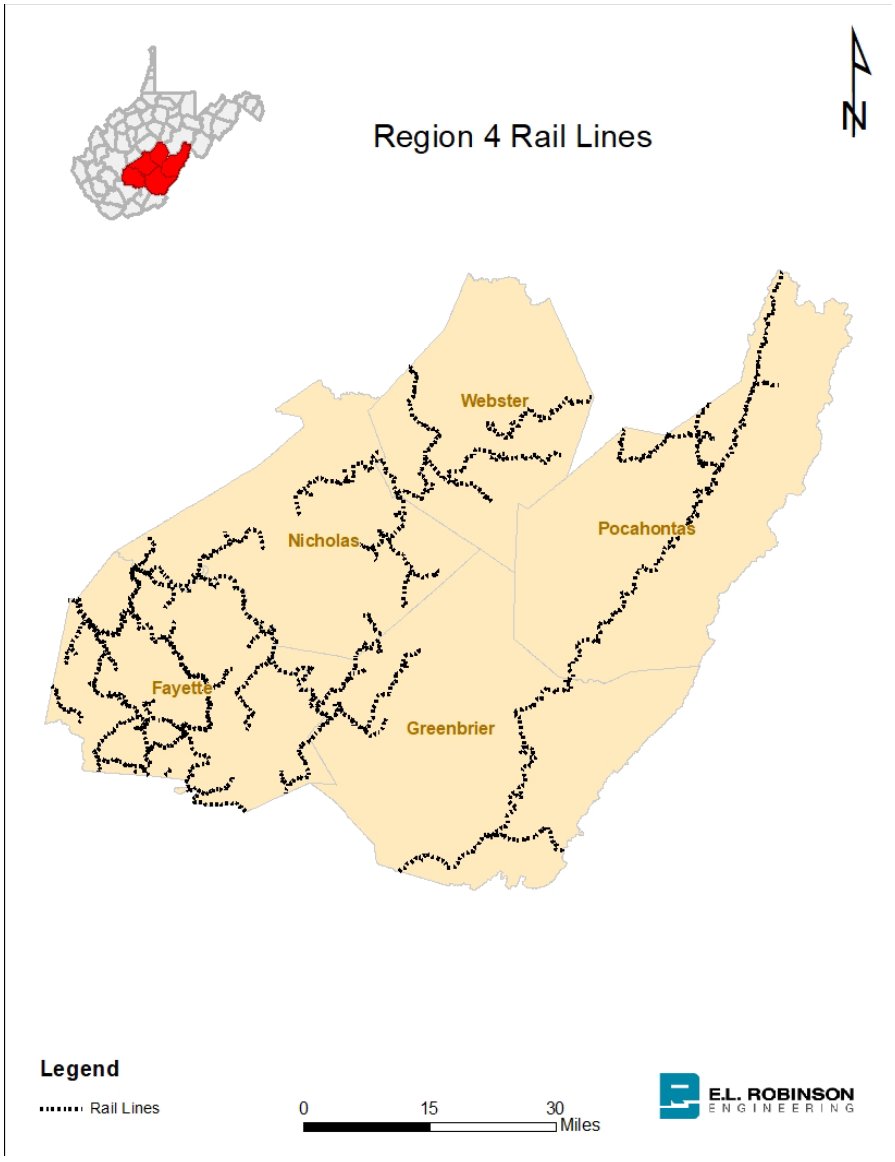


Figure 1.7. Region 4 Major Rail Lines

Air

There is one commercial airport located within Region 4, the Greenbrier Valley Airport, located north of Lewisburg in Greenbrier County. The airport has one runway and provides daily flights to Chicago and Washington and nearly daily flights to Shenandoah Valley via its one carrier, Sky West Airlines.

Public Transportation

There are two providers of public transit within Region 4, The Mountain Transit Authority (MTA) and the New River Transit Authority (NRTA) The MTA serves bus transportation for Summersville, Webster Springs, Richwood, Greenbrier County, Pocahontas County along US corridor 19. The NRTA serves parts of Raleigh and Fayette counties. Both providers operate on a Monday – Friday schedule, meaning that on Saturday and Sunday there is no public transportation in the region. Additionally, neither service runs outside of normal business hours. According to the WV Department of Transportation there are currently no public transportation services in Pocahontas County.

Human service agencies in the region provide transportation for select populations including seniors, youth, people with disabilities, and people with low-income, according to an older study by the Fayette-Raleigh Metropolitan Planning Organization.[17]

Vehicles for Hire and Rent

There are taxi services (City Cab, Oak Hill Taxi) in the region. Additionally, most of the major rental car companies operate in the area.

Medical Access

Hospitals

There are seven hospitals in Region 4. Of these seven hospitals, four are designated as Critical Access Hospitals: Montgomery General Hospital, Plateau Medical Center, Pocahontas Medical Center, and Webster County Memorial Hospital. Critical Access Hospitals have to meet a set of standards per the U.S. Department of Health and Human Services, one of which is that be located at least 25 miles from any other hospital. These hospitals are both the front and back lines of emergency and critical care in their regions, making them highly important in the planning process. The loss of any of these facilities will leave residents without emergency medical care within a reasonable distance.

Clinics

There are also several health centers located throughout Region 4, some of which are affiliated with the region's hospitals and some which are not. There are five rural health clinics and twenty-two community health care providers. Rural health clinics aim to serve Medicare and Medicaid recipients to increase their access in rural areas. They are required to be in non-urban rural areas that are designated as areas of health care shortage (Health Resources & Services Administration).

Economy

The economy of Region 4 is driven by a number of industries, including government, medicine, mining and tourism. According to the Census's County Business Pattern's 2019 report, there are 2,509 individual

[17] Parsons Brinckerhoff, Review of Transit Needs: Recommendations for Transition to an Urban Transit System (May 2014), https://www.frmpo.org/_files/ugd/d85018_3b854453a0524cca895defe5455ba0ab.pdf accessed April 7, 2022

businesses in Region 4 (down from 2,648 in 2013) employing 29,568 people. Those employees are making an average of just over $36,000 a year.

The industry with the most business in each county is the retail industry (430 businesses) followed by health care (328 businesses). The four industries that employ the most people in each county are shown in the table on the next page along with the number of businesses in that industry.

Table 1.6. Top Four Industries and Number of Businesses in Each County

County	Industry #1	Industry #2	Industry #3	Industry #4
Fayette	Retail (125)	Health Care and Social Assistance (106)	Other services, except public administration (95)	Accommodation and Food Services (81)
Greenbrier	Retail (155)	Health Care and Social Assistance (138)	Other services, except public administration (96)	Construction (95)
Nicholas	Retail (95)	Health Care and Social Assistance (68)	Other services, except public administration (61)	Accommodation and Food Services (53)
Pocahontas	Construction (33)	Retail Trade (33)	Accommodation and Food Services (27)	Other Services (except Public Administration) (25)
Webster	Retail Trade (22)	Agriculture, Forestry, Fishing and Hunting (19)	Transportation and Warehousing (18)	Health Care and Social Assistance (16)

Unemployment

The average unemployment rate for the region, based on data from the Bureau of Labor Statistics (BLS), was 3.2% in December 2021. Regionally, there has been a significant drop in the unemployment rates since the beginning 2011, when it was nearly 8%.

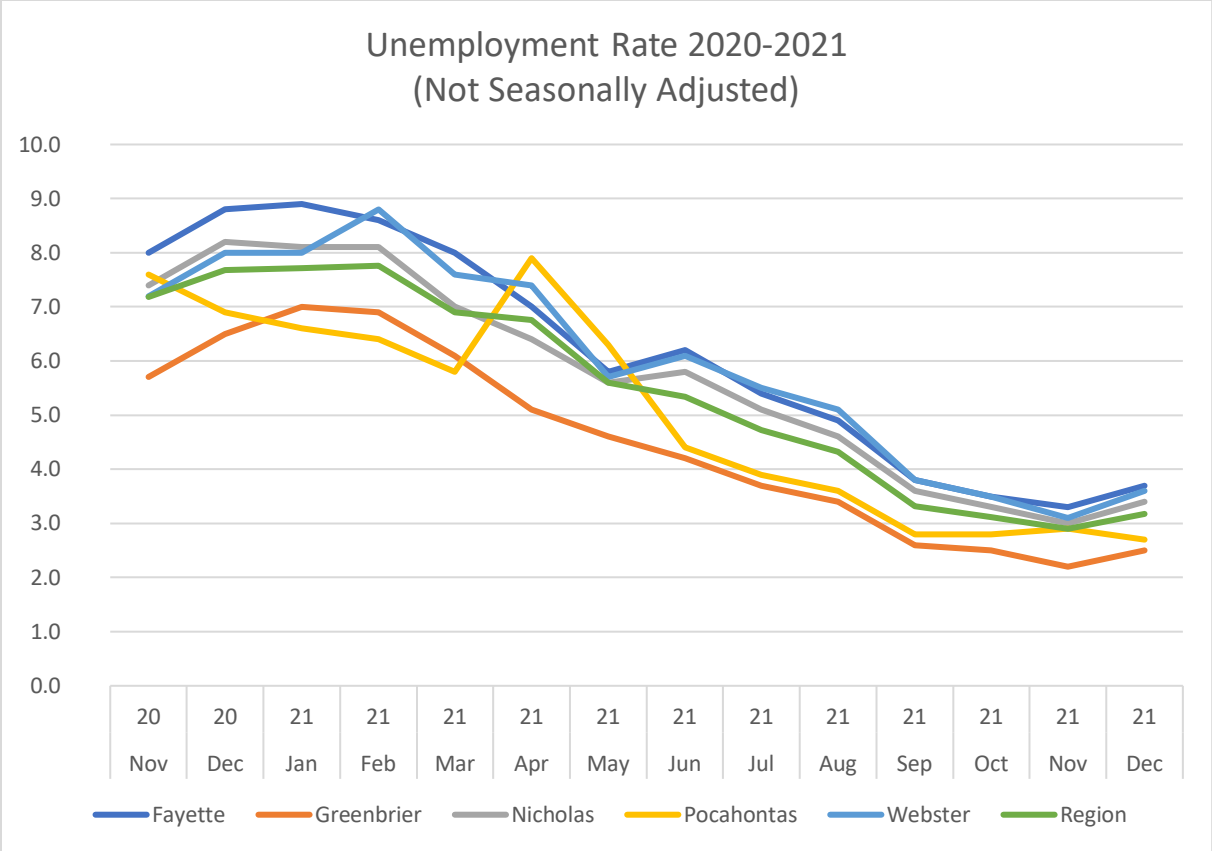


Figure 5.8. Region 4 Unemployment Rate

Tourism

The region has numerous attractions including "white-water rafting, hunting, fishing, rock climbing, snow skiing, mountain biking, recreational boating, etc."[18] Tourism continues to be a significant part of the economy in Region 4, though not uniformly. A 2019 statewide report on travel impacts to West Virginia noted Greenbrier and Pocahontas among three counties for which "the travel industry is an extremely significant component of the total local economy as measured by the proportion of travel-generated employment and earnings."[19] Indeed, travel represented about 14% of those in the workforce in Greenbrier County and more than 27% of those in the workforce in Pocahontas County, from preliminary 2018 figures. Although figures were lower for Nicholas County, tourism is central to the Comprehensive Plan for the City of Summersville, the County seat.

Each county has several tourist attractions, as seen below, and there are two attractions that stretch across county lines. These two attractions are the Monongahela National Forest, which is in parts of Greenbrier, Nicholas and Pocahontas counties, and the Gauley River, which flows through Pocahontas, Nicholas, and Fayette counties.

[18] Comprehensive Economic Development Strategy 2020 Update, Region 4 Planning and Development Council

[19] West Virginia Travel Impacts 2000-2018p Dean Runyan Associates, October 2019, https://wvtourism.com/wp-content/uploads/2019/10/2019.10.15-Travel-Impacts_Final_Web.pdf, Accessed February 23, 2022

Table 1.7 Tourist Attractions

County	Sites	Events
Fayette	New River, New River Gorge, Hawks Nest State Park, They Mystery Hole, Babcock state Park, Thurmond Railroad Depot, Summit-Bechtel Reserve	New River Gorge Bridge Day
Greenbrier	The Greenbrier, Organ Cave, Lost World Caverns,	West Virginia State Fair
Nicholas	Summersville Lake, Carnifex Ferry State Park	Feast of the Ramson, Gospel and Bluegrass Festival
Pocahontas	Cass State Park, Pearl S. Buck Birthplace, Snowshoe Mountain, Watoga State Park, Durbin and Greenbrier Valley Railroad, Greenbrier River Trail State Park, Droop Mountain Battlefield, Beartown State Park, Cranberry Glades Nature Center, and Botanical Area	Upcoming Events – Pocahontas County, WV : Pocahontas County, WV (pocahontascountywv.com)
Webster	Holly River State Park, Big Ditch Lake, Camp Caesar	Woodchoppers Festival

Critical Facilities

The 2018 WV Statewide Standard Hazard Mitigation Plan Update lists 149 Critical Facilities in Region 4 including 5 OES, 34 Police Departments, 49 Fire Departments, 6 Hospitals, and 55 K-12 Schools. Recommended enhancements (Section 4.B.3.e) in the Mitigation Plan Update include additional facilities such as 911 centers, jails/correctional facilities, emergency medical services, health departments, colleges/universities, nursing homes, primary care centers, private schools, public libraries, and court houses.

Climate

The climate of Region 4 is generally a humid continental climate with warm to hot, humid summers and cold winters, increasing in severity with elevation. The plant hardiness zones (as determined by the US Department of Agriculture [USDA]) range from zone 5b in the central Appalachian Mountains to zone 7a in the warmest parts of the lowest elevations.

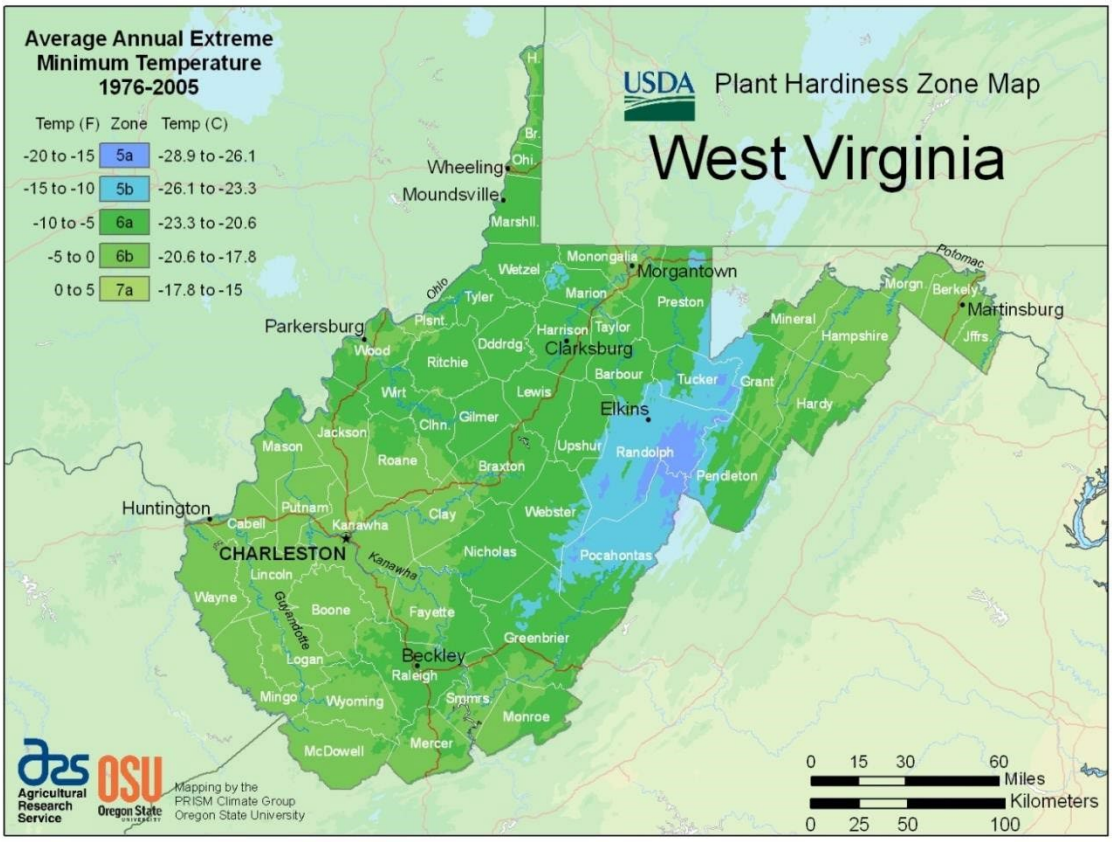


Figure 6.9. USDA Plant Hardiness Zone Map

Average January temperatures range from a low of 25°F in Pocahontas County to 30°F in Fayette and Nicholas Counties. The USDA Plant Hardiness Zone map, seen above, shows that temperatures are generally cooler as the elevation rises. July averages range from 70°F to 71°F.

Annual precipitation ranges from less than 32 inches (81 cm) in the lower eastern section to more than 56 inches (140 cm) in higher parts of the Allegheny Front. In the Region 4 area, an average of 45.2 inches of precipitation falls annually. Slightly more than half the rainfall occurs from April to September. West Virginia is also one of the cloudiest states in the nation. In addition to persistent cloudy skies caused by the damming of moisture by the Alleghenies, West Virginia also experiences some of the most frequent precipitation in the nation, with Snowshoe averaging nearly 200 days a year with either rain or snow. Snow usually lasts only a few days in the lower sections of the region but may persist for weeks in the higher mountain areas. Average snowfall in the Allegheny Highlands can range up to 180 inches (460 cm) per year.

Climate Change

Climate change refers to any significant change in the measures of climate lasting for an extended period. This means large changes in temperature, precipitation, or wind patterns, among others, that occur over at least several decades. The National Oceanic and Atmospheric Administration (NOAA) calculates U.S. Climate

Normals as 30-year averages.[20] The current climate changes indicate an increase in average temperature, which has risen by 1.5°F over the past century. According to the Fourth National Climate Assessment, the average temperature is projected to rise by another several degrees Fahrenheit over the next century with the number of extreme heat events (aka heatwaves) increasing as well.[21]

This ongoing warming will lead to increased risks from some hazards within Region 4, including heat waves and extreme precipitation.[22] Two of the challenges identified note that the past is no longer a reliable indicator of future conditions and that current design criteria - often established as industry or regulatory standards - are based on past events.[23] Both challenges will have to be faced in communities across the country in the coming years and decades. Changes in future risk based on climate hazards will be discussed in more detail the hazard profiles that follow in Section 2.

Utilities

Utilities are provided by several different private companies. However, residents in the more rural areas of the region may also rely on private wells for their water source and may have septic tanks rather than being connected to a sewer system. The Public Service Commission of West Virginia tracks which companies operate in which counties. The table on the next page shows the different utility companies by county served in Region 4. Cellular service in Region 4, including both wireless phone and data service, is provided by several national companies including Verizon, T-Mobile, AT&T and U.S. Cellular among others.

[20] Lindsey, Rebecca *Climate change and the 1991-2020 U.S. Climate Normals,* https://www.climate.gov/news-features/understanding-climate/climate-change-and-1991-2020-us-climate-normals. Published April 19, 2021. Accessed February 22, 2022.

[21] Hayhoe, K., et al. *Our changing climate*. In: *Impacts, risks, and adaptation in the United States: Fourth national climate assessment, volume II* U.S. Global Change Research Program, Washington, DC, pp. 91–94. https://nca2018.globalchange.gov/chapter/2/ Published 2018.

[22] *Ibid.*

[23] Trask, Jeffrey A. *An academic approach to climate change emergency preparedness*. Journal of Business Continuity and Emergency Planning, 2015-2016 Winter;9(2), pages 119-28.

Table 1.8 Utility Services Providers by County

County	Electric	Gas	Telephone	Broadband
Fayette	Appalachian Power	Mountaineer Gas, Southern Public Service	Frontier	Frontier
Greenbrier	Appalachian Power, Mon Power, and West Virginia Power	Mountaineer Gas	Frontier	Frontier, Crystal Broadband Shentel
Nicholas	Appalachian Power, and Monongahela	Hope Gas, Inc.	Frontier	Suddenlink, Shentel
Pocahontas	Mon Power, and West Virginia Power	N/A	Citizens Telecommunications Company, Spruce Knob Seneca Rocks Telephone	Spruce Knob Seneca Rocks Telephone, Citynet, Frontier
Webster	Mon Power	Hope Gas, Inc.	Citizens Telecommunications Company	HughesNet, Shentel, Viasat

Water and sewer service in Region 4 is provided by a network of private companies, municipalities, and public service districts (PSDs.) The table shown on the next page, also based on data from the Public Service Commission of West Virginia, shows the number of each type of service for each county in the region. In total, there are 30 PSD, 5 private companies and 31 municipal water and sewer systems in Region 4. There are slightly more water suppliers (35) than sewer suppliers (31.) While some of these were listed as having the same names, they are identified separately by the Public Service Commission of West Virginia rather than being identified as “water and sewer” districts.

Table 1.9 Water & Wastewater Utility Services Providers by County

County	Municipal	Private	PSD
Fayette			
Sewer	7	1	7
Water	3	2	6
Greenbrier			
Sewer	3	0	2
Water	7	0	2
Nicholas			
Sewer	2	0	1
Water	2	0	6
Pocahontas			
Sewer	3	0	1
Water	2	1	1
Webster			
Sewer	1	0	3
Water	1	1	1

2.0 RISK ASSESSMENT

2.1 HAZARD IDENTIFICATION

44 CFR Requirement
44 CFR Part 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.

Region 4 is vulnerable to a wide range of natural and human-caused hazards that threaten life and property. Current FEMA regulations and guidance under the Disaster Mitigation Act of 2000 (DMA 2000) require, at a minimum, an evaluation of a full range of natural hazards. An evaluation of human-caused (i.e., terrorism) and technological hazards (i.e., hazardous materials incident) is encouraged, though not required, for plan approval. Region 4 has included a comprehensive assessment of all hazards. It should be noted however, that this list may not be all inclusive and will be revisited with each plan update.

Upon a review of the full range of natural hazards suggested under FEMA planning guidance, the participating jurisdictions in Region 4 have identified a number of hazards that are to be addressed in this Regional Hazard Mitigation Plan. These hazards were identified through an extensive process that utilized input from the Region 4 Hazard Mitigation Planning Team members, research of past disaster declarations in the participating counties, and review of the West Virginia State Hazard Mitigation Plan (2018). Readily available information from reputable sources (such as federal and state agencies) was also evaluated to supplement information from these key sources.

The following chart illustrates the various hazards that may occur in the planning area. Included are research sources that were used to identify and quantify these hazards. Not all of the following hazards are included in the analysis, the reasoning for not including these are listed in the chart. The chart is based on the same section of the prior iteration of the Multi-Jurisdictional Hazard Mitigation Plan.

It should also be noted that the previous plan update in 2016 included hailstorms and wind events as separate events, and for this update they were combined under Thunderstorm collectively. Lightning was not previously profiled but was included for this plan update under Thunderstorm.

Table 2.1.1: Identified Hazards of the WV Region 4 Planning Area

Hazard	Description
Dam Failure	Dam failure is the collapse, breach, or other failure of a dam structure resulting in downstream flooding. In the event of a dam failure, the energy of the water stored behind even a small dam can cause loss of life and severe property damage if development exists downstream of the dam. Dam failure can result from natural events, human-induced events, or a combination of the two. The most common cause of dam failure is prolonged rainfall that produces flooding. Failures due to other natural events such as hurricanes, earthquakes or landslides are significant because there is generally little or no advance warning.
Drought	A prolonged period of less than normal precipitation such that the lack of water causes a serious hydrologic imbalance. Common effects of drought include crop failure, water supply shortages, and fish and wildlife mortality. High temperatures, high winds, and low humidity can worsen drought conditions and also make areas more susceptible to wildfire. Human demands and actions have the ability to hasten or mitigate drought-related impacts on local communities.
Earthquake	A sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the surface. This movement forces the gradual building and accumulation of energy. Eventually, strain becomes so great that the energy is abruptly released, causing the shaking at the earth's surface which we know as an earthquake. Roughly 90 percent of all earthquakes occur at the boundaries where plates meet, although it is possible for earthquakes to occur entirely within plates. Earthquakes can affect hundreds of thousands of square miles; cause damage to property measured in the tens of billions of dollars; result in loss of life and injury to hundreds of thousands of persons; and disrupt the social and economic functioning of the affected area.
Extreme Temperature	A heat wave may occur when temperatures hover 10 degrees or more above the average high temperature for the region and last for several weeks. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a "dome" of high atmospheric pressure traps hazy, damp air near the ground. Excessively dry and hot conditions can provoke dust storms and low visibility. A heat wave combined with a drought can be very dangerous and have severe economic consequences on a community.[1] Exposure to cold can cause frostbite or hypothermia and become life-threatening. Infants and elderly people are most susceptible. What

[1] Centers for Disease Control: Extreme Heat: https://www.cdc.gov/disasters/extremeheat/heat_guide.html

Hazard	Description
	constitutes extreme cold varies in different parts of the country. In the southern U. S., near freezing temperatures are considered extreme cold. Freezing temperatures can cause severe damage to citrus fruit crops and other vegetation. Pipes may freeze and burst in homes that are poorly insulated or without heat. Here in the north, extreme cold means temperatures well below zero. Wind Chill is the term used to describe the rate of heat loss on the human body resulting from the combined effect of low temperature and wind. As winds increase, heat is carried away from the body at a faster rate, driving down both the skin temperature and eventually the internal body temperature. Animals are also affected by wind chill; however, cars, plants and other objects are not. [2]
Flooding	The accumulation of water within a water body which results in the overflow of excess water onto adjacent lands, usually floodplains. The floodplain is the land adjoining the channel of a river, stream ocean, lake or other watercourse or water body that is susceptible to flooding. Most floods fall into the following three categories: riverine flooding, coastal flooding, or shallow flooding (where shallow flooding refers to sheet flow, ponding, and urban drainage).
Haz-Mat Incident	Hazardous material (HAZMAT) incidents can apply to fixed facilities as well as mobile, transportation-related accidents in the air, by rail, on the nation's highways and on the water. HAZMAT incidents consist of solid, liquid and/or gaseous contaminants that are released from fixed or mobile containers, whether by accident or by design as with an intentional terrorist attack. A HAZMAT incident can last hours to days, while some chemicals can be corrosive or otherwise damaging over longer periods of time. In addition to the primary release, explosions and/or fires can result from a release, and contaminants can be extended beyond the initial area by persons, vehicles, water, wind and possibly wildlife as well.
Mass Movement (Including Landslide, Debris Flow, Expansive Soils)	The movements of a mass of rock, debris, or earth down a slope when the force of gravity pulling down the slope exceeds the strength of the earth materials that comprise to hold it in place. Slopes greater than 10 degrees are more likely to slide, as are slopes where the height from the top of the slope to its toe is greater than 40 feet. Slopes are also more likely to fail if vegetative cover is low and/or soil water content is high.
Pandemic	Pandemics are infectious and contagious outbreaks typically caused by a virus that originated in animals and spreads to humans. Common sources

[2] National Weather Service: Extreme Cold https://www.weather.gov/dlh/extremecold

Hazard	Description
	are swine and avian. There are several definitions of pandemic depending on the severity of the outbreak. It can be defined generally as an epidemic occurring over a large geographic area. Pandemic viruses reproduce and mutate rapidly. Unlike seasonal influenza, humans have no immunity to the mutated strains, making it especially deadly in populations.
Riverine Erosion	The gradual wearing away of land surface materials, especially rocks, sediments, and soils, by the action of water, wind, or a glacier. Usually, erosion also involves the transfer of eroded material from one place to another, as from the top of a mountain to an adjacent valley, or from the upstream portion of a river to the downstream portion.
Terrorism	Terrorism is use of force or violence against persons or property with the intent to intimidate or coerce. Acts of terrorism include threats of terrorism; assassinations; kidnappings; hijackings; bomb scares and bombings; cyber-attacks (computer-based); and the use of chemical, biological, nuclear, and radiological weapons (FEMA, 2009). Increasingly, cyberattacks have become a more pressing concern for governments across America. Summerville Dam and the WV State Fair, Bridge Day and Greenbank Observatory are examples of terrorist threats for the region.
Thunderstorm (Including Wind, Hail, Lightning)	Thunderstorms are caused by air masses of varying temperatures meeting in the atmosphere. Rapidly rising warm moist air fuels, the formation of thunderstorms. Thunderstorms may occur singularly, in lines, or in clusters. They can move through an area very quickly or linger for several hours. Thunderstorms may result in hail, tornadoes, or straight-line winds. Windstorms pose a threat to lives, property, and vital utilities primarily due to flying debris and can down trees and power lines. A hailstorm is any storm that produces hailstones that fall to the ground; usually used when the amount or size of the hail is considered significant. Hail is formed when thunderstorms carry raindrops into parts of the atmosphere where the temperatures are below freezing.
Tornadoes	A tornado is a violently rotating column of air that has contact with the ground and is often visible as a funnel cloud. Its vortex rotates cyclonically with wind speeds ranging from as low as 40 mph to as high as 300 mph. Tornadoes are most often generated by thunderstorm activity when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The destruction caused by tornadoes ranges from light to catastrophic depending on the intensity, size and duration of the storm.

Hazard	Description
Wildfire	An uncontrolled fire burning in an area of vegetative fuels such as grasslands, brush, or woodlands. Heavier fuels with high continuity, steep slopes, high temperatures, low humidity, low rainfall, and high winds all work to increase risk for people and property located within wildfire hazard areas or along the urban/wildland interface. Wildfires are part of the natural management of forest ecosystems, but most are caused by human factors. Over 80 percent of forest fires are started by negligent human behavior such as smoking in wooded areas or improperly extinguishing campfires. The second most common cause for wildfire is lightning.
Winter Storm	Winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Blizzards, the most dangerous of all winter storms, combine low temperatures, heavy snowfall, and winds of at least 35 miles per hour, reducing visibility to only a few yards. Ice storms occur when moisture falls and freezes immediately upon impact on trees, power lines, communication towers, structures, roads and other hard surfaces. Winter storms and ice storms can down trees, cause widespread power outages, damage property, and cause fatalities and injuries to human life.

Table 2.1.2: Documentation of the Hazard Evaluation Process

HAZARD	HOW IDENTIFIED	WHY IDENTIFIED
Avalanche	Research indicates that these jurisdictions are not susceptible to this hazard.	• The general contour of the land in the region is mountainous, but they are not steep enough to cause avalanche activity. • Further, the amount of snowfall the region receives is insufficient for any kind of avalanche.
Coastal Erosion	MapQuest	Coastal erosion is not a significant risk as the region is not located along a coast.
Coastal Storm	See "Thunderstorm"	Coastal storms are not a threat to the region as it is not located along a coast.
Dam Failure	• WV Department of Environmental Protection (WVDEP) • Information from local officials • American Society of Civil Engineers (ASCE) • Association of State Dam Safety Officials (ASDSO) • Stanford University's National Performance of Dams Program	• Research shows that there are 35 dams within Region 4. • Seventeen dams are classified as a high hazard dam. • Nine are classified as a significant hazard. • Six are classified as a low hazard dam.
Debris Flow	See "Mass Movement"	See "Mass Movement"
Drought	• NOAA National Climactic Data Center (NCEI) Storm Events Database • USDA National Agriculture Statistics Service • Environmental Protection Agency (EPA)	40 drought events since 1997

Earthquake	• US Geological Survey (USGS) • West Virginia Geological & Economic Survey	• According to the USGS, the counties in Region range from a 2 to a 4 in Peak Ground Acceleration (PGA) with a 10% chance of exceedance in 50 years. • While perceived shaking is expected to be light and damage minimal, USDHS Federal Emergency Management Agency (FEMA) still recommends analyzing hazards in areas with these PGAs. • Twenty-six epicenters reported since 1974
Expansive Soils	See "Mass Movement"	See "Mass Movement"
Extreme Temperatures	NCEI Event Records	202 extreme temperature events since 1996. 90 cold/wind chill 35 extreme cold/wind chill 43 heat o 34 extreme heat
Flooding	• NOAA National Center for Environmental Information (NCEI) • National Flood Insurance Program (NFIP) • FEMA Total Exposure in Floodplain (TEIF) 2.0	263 events in Region 4 since 1996
Hailstorm	• SEE THUNDERSTORM HAZARD PROFILE	
Hazmat Incident	• Commodity flow studies from various Region 4 jurisdictions • TIER2 data • U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) • Department of Transportation (DOT) • National Transportation Safety Board (NTSB) The Register-Herald	All 5 counties contain "covered facilities" that report the use and storage of hazardous materials to the appropriate Local Emergency Planning Committee (LEPC).

Hurricane	See "Thunderstorm"	• The region does not experience the hurricane conditions of extremely high winds, rains, and hail. • In some instances, the region may be affected by rainfall brought about by the remnants of a hurricane, which are addressed elsewhere.
Landslide	See "Mass Movement"	See "Mass Movement"
Mass Movement (including Landslide, Debris Flow, Expansive Soils)	• NOAA National Center for Environmental Information (NCEI) • USGS	• Two debris flow events since 1997 • Evaporate rock formations, which are present through some parts of the region, are prone to caves and sink holes. • According to local officials, land subsidence occurs as a secondary result to other hazards and development.
Pandemic	Centers for Disease Control (CDC)	• COVID-19 Major Disaster Declaration declared April 3, 2020, and ongoing (DR-4517-WV & EM-3450-WV)
Riverine Erosion	NCEI Event Records	• None Found
Terrorism	Department of Homeland Security Federal Emergency Management Agency (FEMA)	• The New River Gorge Bridge is both a component of the transportation infrastructure of Fayette County and a tourist attraction (e.g., Bridge Day). • Pocahontas Co. contains the Green Bank Observatory (comms. infrastructure, govt. operation) & Snowshoe Resort (tourist attraction).

Thunderstorm (including Tropical & Post-Tropical Storms) including Wind, Hail, Lightning)	NCEI Event Records	• 519 Thunderstorm wind events since 1990 • 7 lightning events since 1997 • 278 events within Region 4 since 1990 • 278 events within Region 4 since 1990
Tornadoes	• NOAA National Center for Environmental Information • The Tornado Project Online	14 tornado events in Region 4 since 1961
Tsunami	MapQuest	The nearest coastal area is not close enough to the region to pose a threat.
Wildfire	• NOAA National Center for Environmental Information • West Virginia Department of Forestry. NFIRS Data	There have been 4 wildfire events in Region 4 since 1999.
Winter Storm	NCEI Event Records	528 winter weather events in Region 4 since 1996

Figure 2.1: WV State Level Hazard Rank Score[3]

	Geographic Area Impacted	Property Damage	Population Vulnerability	State Infrastructure Damage	Death or Injury	History of Occurrence	Regional HMP Ranking	Ranking Score
Flood	4	4	4	2	4	5	5	**95**
Landslide/Subsidence	3	1	1	2	1	5	3	**43**
Severe Storms	2	2	3	1	1	5	3	**48**
Winter Weather	2	1	4	1	0	5	5	**45**
Wildfire	2	1	1	1	0	5	3	**28**
Dam & Levee Failure	1	2	1	3	1	2	1	**17**
Drought	1	4	3	0	0	3	1	**25**
Earthquake	1	1	1	1	0	5	1	**21**

Table 21 – State Level Hazard Rank Score

While the table identifies potential and likely hazards, it is important to point out that not every area of Region 4 will have the same vulnerability to these hazards. The region contains 3,845 square miles, ranging from river valleys to the heights of mountains. For example, Fayette and Greenbrier Counties have sections of interstate highway running through them, while Nicholas County and Fayette County have long stretches of U.S. 19 known as the Appalachian Corridor L. These are major transportation routes and have numerous hazardous materials passing along them on a daily basis. Since the majority of hazardous materials incidents occur during shipment, these three counties are at a higher risk for a hazardous materials incident than Webster or Pocahontas counties.

Probability vs. Severity

Part of the risk assessment is to assess both the probability of a hazard occurring, and the potential severity of the event. Doing so allows for the identification of which hazards pose the most significant risk to the jurisdictions within Region 4. This identification enables the jurisdictions to focus mitigation efforts on those hazards that are most likely to occur and cause significant harm. The probability of an event, and its potential severity, are largely based on historical research.

[3] WV State Hazard Mitigation Plan (2018)

The numerical probability of an event can only be determined if that event has occurred in the past. For example, flooding is a recurring hazard in Region 4. The probability of a flooding event is found by summing the total number of events and dividing by the number of years that were researched. There were 263 flooding events in Region 4 over a course of 25 years (1996-2021.) The probability of a flooding event, using the formula, is 10.52. It is estimated that each year there will be 10.52 flooding events within Region 4. Hazards such as terrorism and dam failure will not have a numerical probability, because there have been no recorded instances of these hazards occurring in Region 4. Hazard probabilities are broken into five classifications, shown below

Table 2.1.3: Probability of Hazard Occurring Within the Next Year

Probability	Definition
Highly Likely	90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
Likely	10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.
Occasional	1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.
Unlikely	Less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years.

The severity of an event is based on a three main factors: 1) the historical deaths, injuries, property damage and crop damage as determined through research; 2) the extent of potential secondary and/or cascading impacts of the hazard and 3) the potentially impacted geographic area as determined by research and mapping. Primary impacts occur as a direct result of the event, while secondary/cascading impacts can only arise after the primary impact. For example, a primary impact of a flood may be a road closure due to submerged roadways. The secondary impact would be the cost of detouring around the area, both in terms of time and fuel.

Severity calculations are generally less exact than probability calculations. While historical records give researchers the ability to estimate losses, these figures are estimates. The four classifications of hazard severity and their definitions are shown on next page.

Table 2.1.4: Severity of an Event

Description	Definition
Catastrophic	Death or major structural loss
Critical	Severe injury, severe illness, or marginal structural damage
Marginal	Minor injury, minor illness, or structural damage
Negligible	Less than minor injury, illness or structural damage

Disaster Declarations

Disaster declarations provide overall insight into the specific hazards that may impact the Region 4 planning area. Since 2012, 9 presidential disaster declarations have occurred in the region. This includes 4 events related to flooding, 2 events related to high wind, 2 events related to hurricane and tropical storms, 1 event related to winter storm events, and 1 pandemic.

Table 2.1.5: FEMA Disaster & Emergency Declarations Region 4 from 2011 to 2021

Declaration #	County Impacted	Date	Event
EM-3450*	All Counties	March 13, 2020	Covid-19
4517*	All Counties	April 3, 2020	Covid-19 Pandemic
4273*	Kanawha, Greenbrier, Nicholas, Fayette, Wayne, Lincoln, Summers, Monroe, Pocahontas, Clay, Webster, Braxton, Roane, Jackson, Gilmer, Lewis, Upshur, Randolph	June 25, 2016	Severe Storms, Flooding, Landslides and Mudslides
4236*	Logan, Lincoln, Wood, Jackson, Roane, Clay, Braxton, Nicholas, Webster	August 7, 2015	Severe Storms, Straight-line Winds, Flooding, Landslides and Mudslides
4221*	Pleasants, Wirt, Calhoun, Roane, Jackson, Cabell, Greenbrier, Summers	May 21, 2015	Severe Storms, Flooding, Landslides, and Mudslides

4210*	Marshall, Wetzel, Monongalia, Tucker, Barbour, Harrison, Tyler, Doddridge, Lewis, Upshur, Webster, Braxton, Gilmer, Ritchie, Wood, Wirt, Roane, Jackson, Putnam, Kanawha, Fayette, Summers, Mercer, McDowell, Mingo, Wayne, Cabell, Lincoln, Logan, Wyoming, Raleigh, Boone	March 31, 2015	Severe Winter Storm, Flooding, Landslides, and Mudslides
4093*	Preston, Taylor, Tucker, Barbour, Randolph, Pendleton, Upshur, Lewis, Braxton, Webster, Pocahontas, Nicholas, Clay, Kanawha, Fayette, Boone, Raleigh, Wyoming	November 27, 2012	Hurricane Sandy
4071*	All counties except Hancock, Brooke, Ohio, Monongalia, Marion, Mineral, Hampshire, Morgan	July 23, 2012	Severe Storms & Straight-Line Winds
3358*	All Counties	October 29, 2012	Hurricane Sandy
3345*	All Counties	June 30, 2012	Severe Storms

*Disaster and Emergency Declarations Including Region 4 Counties

2.2 HAZARD PROFILES

44 CFR Requirement
44 CFR Part 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

44 CFR Requirement
44 CFR Part 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. The description shall include an overall summary of each hazard and its impact on the community. The plan should describe vulnerability in terms of: (A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; (B) An estimate of the potential 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; (C) Providing 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 Overview

This section includes detailed hazard profiles and builds upon the information provided for each of the hazards identified in the previous section (Hazard Identification) as significant enough for further evaluation in the WV Region 4 hazard risk assessment by creating a hazard profile. Each hazard profile includes a general description of the hazard including its location, extent (or severity), historical occurrences, and probability of future occurrences.

In addition, the potential impact and expected number of damages caused to these assets by each identified hazard event is assessed. The primary objective of the vulnerability assessment is to quantify exposure and the potential loss estimates for each hazard. In doing so, the WV Region 4 planning area counties and their participating jurisdictions may better understand their unique risks to identified hazards and be better prepared to evaluate and prioritize specific hazard mitigation actions.

Methodology

This vulnerability assessment was conducted using distinct methodologies: (1) A stochastic risk assessment; and (2) a geographic information system (GIS)-based analysis. Each approach provides estimates for the potential impact of hazards by using a common, systematic framework for evaluation, including historical occurrence information provided in the Hazard Identification section. A brief description of the different approaches is provided on the following pages.

Stochastic Risk Assessment

The stochastic risk assessment methodology was applied to analyze hazards of concern that were outside the scope of hazard risk models and the GIS-based risk assessment. This includes hazards that do not have geographically definable boundaries and are therefore excluded from spatial analysis through GIS. A stochastic risk methodology was used for the following hazards:

- Dam Failure
- Drought
- Earthquake
- Extreme Temperature
- Hazardous Material Incidents
- Mass Movement (landslide, debris flow, expansive soils)
- Pandemic
- Riverine Erosion
- Terrorism
- Thunderstorm (wind, hailstorm, lightning)
- Tornado
- Wildfire
- Winter Storm

Many of the hazards listed above are considered atmospheric and have the potential to affect all buildings and all populations. For many of these hazards listed above, no additional analysis was performed. When possible, annualized loss estimates were determined using the best available data on historical losses from sources including NOAA's National Centers for Environmental Information records, WV Region 4 planning area hazard mitigation plans, and local knowledge. Annualized loss is the estimated long-term weighted average value of losses to property in any single year in a specified geographic area (i.e., municipal jurisdiction or county). Annualized loss estimates were generated by totaling the amount of property damage over the period for which records were available and calculating the average annual loss. Given the standard weighting analysis, losses can be readily compared across hazards providing an objective approach for evaluating mitigation alternatives.

For the erosion, dam and levee failure, landslide, and land subsidence hazards no data with historical property damages was available. Therefore, annualized potential losses for these hazards are presumed to be negligible. Winter storm and freeze, drought / heat wave, thunderstorm (wind, hailstorm, lightning), and tornado have the potential to impact the entire WV Region 4 planning area. The results for these hazards are found near the end of this section.

GIS-Based Analysis

Other hazards have specified geographic boundaries that permit additional using Geographic Information Systems (GIS). These hazards include:

- Flood

The objective of the GIS-based analysis was to determine the estimated vulnerability of critical facilities and populations for the identified hazards in the WV Region 4 planning area using best available geospatial data. Digital data was collected from local, regional, state, and national sources for hazards and buildings.

Explanation of Data Sources

Flood

For this plan update, extensive use of the WV Flood Tool[1] was utilized. In 2006, during the conversion of all FEMA's modernization of its Digital Flood Insurance Rate Maps, an Internet map application called the WV Flood Tool was developed as a cooperating technical partnership with FEMA and the State National Flood Insurance Program to allow the public to make informed decisions about the degree of flood risk for a specific area or property. During the past decade, the functionality and quality of data layers of the WV Flood Tool have progressed, resulting in an increased use of the application. This is evident by web utilization statistics in that the WV Flood Tool was viewed by more than 126,000 visitors this past calendar year, and now is one of the most popular web map applications hosted by the State. Over time the WV Flood Tool has become more than just a flood determination tool, and today is routinely used by floodplain managers for building permit applications, floodplain regulations enforcement, pre- and post-disaster assessments, and for receiving flood insurance discount credits.

FEMA Digital Flood Rate Insurance Maps (DFIRM) flood data was used to determine flood vulnerability. DFIRM data can be used in ArcGIS for mapping purposes, and they identify several features including floodplain boundaries and base flood elevations. Identified areas on the DFIRM represent some features of a Flood Insurance Rate Maps including the 100-year flood areas (1.0-percent annual chance flood), and the 500-year flood areas (0.2-percent annual chance flood). For the vulnerability assessment, local improved property data and critical facilities were overlaid on the 1.0-percent annual chance floodplains (ACF) and 0.2-percent annual chance floodplain areas for counties that had digital parcel data available. It should be noted that such an analysis does not account for building elevation.

Hazardous Materials Incident

For the fixed hazardous materials incident analysis, Toxic Release Inventory (TRI) data was used. The Toxics Release Inventory is a publicly available database from the federal Environmental Protection Agency (EPA) that contains information on toxic chemical releases and other waste management activities reported annually by certain covered industry groups as well as federal facilities. This inventory was established under the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) and expanded by the Pollution Prevention Act of 1990. Each year, facilities that meet certain activity thresholds must report their releases and other waste management activities for listed toxic chemicals to EPA and to their state or tribal entity. A facility must report if it meets the following three criteria:

- The facility falls within one of the following industrial categories: manufacturing; metal mining; coal mining; electric generating facilities that combust coal and/or oil; chemical wholesale distributors; petroleum terminals and bulk storage facilities; RCRA Subtitle C treatment, storage, and disposal (TSD) facilities; and solvent recovery services.

- Has 10 or more full-time employee equivalents; and

- Manufactures or processes more than 25,000 pounds or otherwise uses more than 10,000 pounds of any listed chemical during the calendar year. Persistent, bio accumulative, and toxic (PBT) chemicals are subject to different thresholds of 10 pounds, 100 pounds, or 0.1 grams depending on the chemical.

[1] WV Flood Tool https://www.mapwv.gov/flood/map/

DAM FAILURE

Period of Occurrence	Anytime, particularly vulnerable after heavy rains.
Number of Events	None in WV Region 4
Warning Time	None to days.
Potential Impacts	Death, injuries, and damage to property.
Cause Injury or Death	High probability to cause injury or death.
Potential Facility Shutdown	Hours to weeks.

Hazard Profile

Since the Buffalo Creek Dam failure in 1972, West Virginia continues to make improvements to dams across the state. Seventy-five percent of the state's dams are classified as high hazard potential, and 75% of those have current Monitoring and Emergency Action Plans (MEAPs) – essentially tying the national average of 74%. Approximately 89% of West Virginia's state-regulated high hazard dams are rated to be in fair or satisfactory condition compared to approximately 71% nationwide. Dam management is performed in West Virginia by the Division of Water and Waste Management, Environmental Enforcement, Dam Safety Section.

Recent dam failures in the country – including Michigan's Edenville Dam and Sanford Dam in 2020 – have highlighted the importance of dams and their conditions. According to the latest United States Army Corps of Engineers (USACE) published National Inventory of Dams (NID), the average age of the 586 dams in West Virginia is 53 years. In West Virginia, according to the 2019 NID, approximately 75% of dams are classified as high hazard potential, 15% significant hazard potential, 4% low hazard potential, and 6% undetermined.[2] The state regulates 78% of dams, while federal agencies regulate 5%. The remaining dams are unregulated according to both the WV Dam Safety Program Performance Report and the 2019 NID. Many dams are affected by some combination of major issues including seepage, slips, missing or dilapidated toe drains, regular maintenance, and outlet channel work.

The West Virginia Department of Environmental Protection (WVDEP) Division of Water and Waste Management (DWWM) Dam Safety Program has regulatory jurisdiction over dams in West Virginia and performs inspections of dams as necessary to enforce the provisions of the West Virginia Dam Control and Safety Act.

Dam failure is often the result of prolonged rainfall or flooding or, during prolonged dry periods, erosion. The primary hazard surrounding dam failure is the swift and unpredictable flooding of areas immediately

[2] American Society of Civil Engineers – 2020 Infrastructure Report Card: https://infrastructurereportcard.org/wp-content/uploads/2021/07/WV-2020-Infrastructure-Report-Card-UPDATED.pdf

downstream. According to the Association of State Dam Safety Officials (ASDSO) most dam failures fall into one of three categories:

Structural Failures: Foundation defects, including settlement and slope instability or damaged cause by earthquakes, have caused about 30% of all U.S. dam failures.

Mechanical Failures: Malfunctioning gates, conduits or valves can cause dam failure or flooding both upstream and downstream.

Hydraulic Failures: Overtopping of a dam is often a precursor of dam failure. National statistics show that overtopping due to inadequate spillway design, debris blockage of spillways or settlement of the dam crest account for approximately 34% of all U.S. dam failures (ASDSO, 2012).

Dam Risks

The State of West Virginia determines when high hazard dams fail to meet minimum state dam safety standards and subsequently poses an unacceptable risk to the public. All dam risk includes the following:

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 misoperation, 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' dam 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, p A-2). 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.

Location & Spatial Extent

There are twenty-five (25) high hazard dams within the Region 4 planning area, and of those, seventeen (17) have an Emergency Action Plan filed. The table below lists the dams found in Region 4. According to the West Virginia State Hazard Mitigation plan 2018 update, the Bluestone Dam in Summers County poses the largest threat in the event of a failure. Part of Fayette County in Region 4 would also be in the inundation zone of the Bluestone Dam.

Dams are classified into three categories by the American Society of Civil Engineers (ASCE) based on their hazard potential. Dams are classified as high hazard, significant hazard, or low hazard.

Table 2.2.1: American Society of City Engineers (ASCE) Dam Classifications

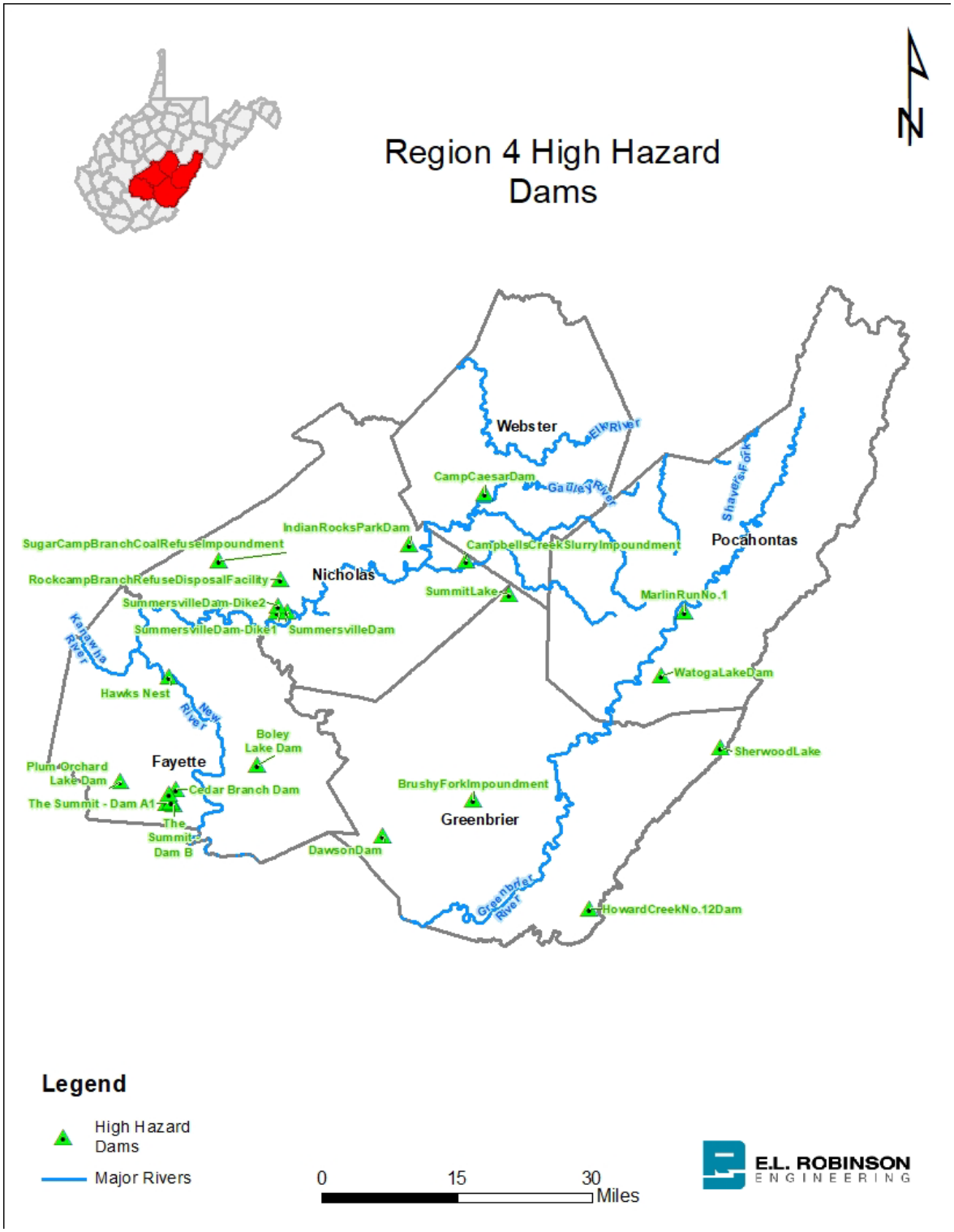
Hazard Classification	Description
Low	Dam failure may cause damage to farm buildings (excluding residences), agricultural land, or county or minor roads.
Significant	Dam failure may cause significant damage to main roads, minor railroads, or cause interruption of use or service of relatively important public utilities.
High	Dam failure may cause loss of life, serious damage to homes, industrial or commercial buildings, important public utilities, main highways, or railroads. Dams constructed in existing or proposed residential, commercial, or industrial areas will be classified as high hazard dams, unless the applicant presents clear and convincing evidence to the contrary.

The WVDEP includes a fourth category of dams Class 4 (Negligible Hazard) Dams - Class 4 dams are dams where failure is expected to have no potential for loss of human life, no potential for property damage and no potential for significant harm to the environment. Examples of Class 4 dams include: dams across rivers, failure of which under any conditions will not flood areas above normal stream bank elevations; dams located in the reservoir of another dam which, under any conditions, can contain water released by failure of the Class 4 dam; and dams in series where the toe of the Class 4 dam(s) is in close proximity to the reservoir of a dam which can contain failure of the Class 4 dam(s) under any condition. In considering a request for a Class 4 designation, the Secretary may require written concurrence from the owner(s) of downstream dams that may be affected by failure of the Class 4 dam. Approval for use of this classification is vested in the Secretary and will be based on engineering evaluation of the dam(s) and downstream areas in question.

Table 2.2.2: High Hazard Dams in WV Region 4

Dam Name	Hazard	County	City	Year	EAP
Cedar Branch Dam	H	Fayette	THURMOND	1979	No
Plum Orchard Lake Dam	H	Fayette	MOSSY	1961	Yes
Boley Lake Dam	H	Fayette	GLEN FERRIS	1965	Yes
The Summit - Dam B	H	Fayette	HARVEY	2012	Yes
The Summit - Dam A1	H	Fayette	THURMOND	2013	Yes
The Summit - Dam A	H	Fayette	HARVEY	2013	Yes
The Summit - Dam 1.2	H	Fayette	HARVEY	2012	Yes
Hawks Nest	H	Fayette	Gauley Bridge	1936	Yes
Sherwood Lake	H	Greenbrier	NEOLA	1957	No
Summit Lake	H	Greenbrier	RICHWOOD	1955	Yes
Howard Creek No. 12 Dam	H	Greenbrier	TUCKAHOE	1995	Yes
Dawson Dam	H	Greenbrier	RUPERT	2009	Yes
Rock Camp Branch Dam	H	Nicholas			No
Crooked Run Cr Dam	H	Nicholas			No
Indian Rocks Park Dam	H	Nicholas	CRAIGSVILLE		No
Campbells Creek Slurry Impoundment	H	Nicholas	PORT AMHERST	1999	No
Sugar Camp Branch Coal Refuse Impoundment	H	Nicholas	DRENNEN	2006	No
Rockcamp Branch Refuse Disposal Facility	H	Nicholas	Gilboa		Yes
Summersville Dam - Dike 1	H	Nicholas	SUMMERSVILLE	1965	Yes
Summersville Dam	H	Nicholas	SWISS	1965	Yes
Summersville Dam - Dike 2	H	Nicholas	SUMMERSVILLE	1965	Yes
Watoga Lake Dam	H	Pocahontas	SEEBERT	1934	Yes
Marlin Run No. 1	H	Pocahontas	MARLINTON	1961	Yes
Camp Caesar Dam	H	Webster	GAULEY MILLS	1955	Yes

Figure 2.2.1: Map of High Hazard Dams in the WV Region 4 Planning Area[3]



[3] U.S. Army Corps of Engineers – National Inventory of Dams – Retrieved 1/31/2022

Many of the dams in the region are owned and operated by the government, either the State Division of Natural Resources and the West Virginia Conservation Agency or a local government. Dams associated with the division of natural resources are inspected by that division. Dams associated with state parks can be large, such as the Watoga facility, but are generally located in rural areas where a failure would not result in significant loss of life or have a significant economic effect. In addition to those facilities owned by state and municipal government there are a number of dams that are associated with mining activity prevalent in the region.

The risks associated with a dam failure are not isolated to the region, however. A dam failure can easily cascade into other waterways, possibly overflowing these waterways. A cascade effect can quickly spread; causing facilitates to fail in numerous locations. This is especially true in an event caused by heavy rains or snow melt (or any combination thereof) where local rivers and dam facilities will already be near max capacity. Failures within the region can cause cascading effects in other areas such as Kanawha County. Failures outside the region, such as the Bluestone Dam in Hinton, West Virginia could cause cascading effects into the region.

While the hazards of dam failure exist through much of the region, there are primary risk areas associated with certain facilities and waterways. These areas are along the New, Gauley and Kanawha Rivers, which include a number of communities and unincorporated areas.

Historical Occurrences

There are no comprehensive databases of historical dam or levee failure in West Virginia. Most failures occur due to lack of maintenance of facilities in combination with major precipitations events, such as hurricanes and thunderstorms.[4] There are no notable dam failures in the WV Region 4 planning area. However, the most significant dam failure occurred February 26, 1972. On February 26, 1972, at approximately 8:00 A.M., Coal Slurry Impoundment #3 at the Buffalo Creek coal mine in Logan County, West Virginia gave way sending millions of gallons of water and millions of cubic yards of coal slurry down the Buffalo Creek. Over the next three hours it would devastate the communities of Saunders, Pardee, Lorado, Craneco, Lundale, Stove, and 11 others. The wave washed away or demolished over 500 homes, left over 4,000 homeless and took the lives of 125 people. The impoundment was used as a settling pond for mining operation and was the third impoundment in that valley. Impoundments #1 and #2 were downstream of Impoundment #3 and subsequently failed as well. All three impoundments had been built with almost no engineering involvement. Property damage was in excess of $50 million. [5,6]

Probability of Future Occurrences

Given the current dam inventory and historic data, a dam breach is occasional (between 1 and 10 percent annual probability) in the future. However, as has been demonstrated in the past, regular monitoring is necessary to prevent these events.

[4] West Virginia State Hazard Mitigation Plan (2018) pg. 222
[5] Kelley, J.H. (1973). The Buffalo Creek Flood and Disaster: Official Report from the Governor's Ad Hoc Commission of Inquiry. West Virginia Department of Arts, Culture and History.
[6] Stern, G.M. (1976). The Buffalo Creek Disaster. Vintage.

Loss Estimates

There are no readily available records of losses in the WV Region 4 planning area due to dam failures. The data and time necessary to perform a probabilistic failure analysis for each dam in the WV Region 4 planning area is beyond the scope of this plan.

Vulnerability & Risk Assessment

Social Vulnerability

Dam failure can cause spectacular destruction, which can potentially lead to injuries or deaths. An individual's vulnerability depends on:

- Proximity downstream of the dam
- Hazard class of the dam. For example, High Hazard dams are expected to cause the loss of human life
- Regulations/plans in place

Critical Facilities

Dam failure obviously damages the dam itself and any public or private infrastructure that crosses the stream such as water and sewer lines. Dam failure can also severely damage or destroy both public and private property. Particularly vulnerable are those properties within the dam inundation zone.

Vulnerability Assessment Conclusion

In some regions, climate change is causing an increase in precipitation in the form of rainfall.[7] These changes in hydrological conditions are creating stress on dams that were not built to withstand such amounts of water. Increased rainfall and increased streamflow into reservoirs also create an influx of sedimentation, which limits the functionality of the dam and degrades its performance.[8] In 2017, the American Society of Civil Engineers gave US dams a D in their last infrastructure report card.[9] As a whole, dams in the US are not engineered to withstand the effects of climate change.

Combined data from the National Climate Assessment and the Army Corps of Engineers predicts that regions northeast, east and south of the Ohio River will experience an increase in precipitation in the form of rainfall by 40-50% by the year 2100.[10] [11]

Due to data limitations related to dam inundation zones related to the planning area it is not entirely clear what the impacts of a dam failure in the planning area would be.

[7] Lee, B., & You, G. (2013, March 20). An assessment of long-term overtopping risk and optimal termination time of dam under climate change. Retrieved February 7, 2022
[8] Fountain, H. (2020, May 21). 'Expect More': Climate Change Raises Risk of Dam Failures. Retrieved February 7, 2022, from https://www.nytimes.com/ 2020/05/21/climate/dam-failure-michigan-climate-change.html
[9] Ironcore. (2017). Dams. Retrieved February 7, 2022, from https:// www.infrastructurereportcard.org/cat-item/dams/
[10] Hayhoe, K., Wuebbles, D. J., Easterling, D. R., Fahey, D. W., Doherty, S., Kossin, J. P., . . . Wehner, M. F. (2018). Chapter 2 : Our Changing Climate. Impacts, Risks, and Adaptation in the United States: The Fourth National Climate Assessment, Volume II. doi:10.7930/nca4.2018.ch2
[11] United States, US Army Corps of Engineers, Institute for Water Resources. (2017). Ohio River Basin: Formulating climate change mitigation/adaptation strategies through regional collaboration with the ORB Alliance. US Army Corps of Engineers. Retrieved February 27 2022, from https://usace.contentdm.oclc.org/ digital/collection/p266001coll1/id/5108/.

Identified Data Limitations

There are no readily available records of losses in the WV Region 4 planning area due to dam losses.

Rehabilitation of High Hazard Dams (HHDP) Notice of Funding Opportunity (NOFO) for Fiscal Year 2021
The West Virgina Dam Safety Section has not had potential dam owners pursue this grant funding.

DROUGHT

Period of Occurrence	Anytime, primarily September - November
Number of Events (1996 – 2021)	47
Warning Time	Weeks to months
Potential Impacts	Property damage, and damage to crops.
Cause Injury or Death	Little potential to cause injury or death.
Potential Facility Shutdown	Minimal

Hazard Profile

A drought, according to the National Climactic Data Center (NCEI), is a complex event that is difficult to monitor or define. There are four types of droughts, increasing in severity level: meteorological drought, hydrological drought, agricultural drought, and socioeconomic drought. Droughts are slow-onset hazards, but, over time, can have very damaging affects to crops, municipal water supplies, recreational uses, and wildlife. If drought conditions extend over several years, the direct and indirect economic impact can be significant.

Table 2.2.3: Drought Classification Definitions[12]

Meteorological Drought	The degree of dryness or departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
Hydrologic Drought	The effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
Agricultural Drought	Soil moisture deficiencies relative to water demands of plant life, usually crops.
Socioeconomic Drought	The effect of demands for water exceeding the supply as a result of a weather-related supply shortfall.

[12] *Multi-Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy, FEMA*

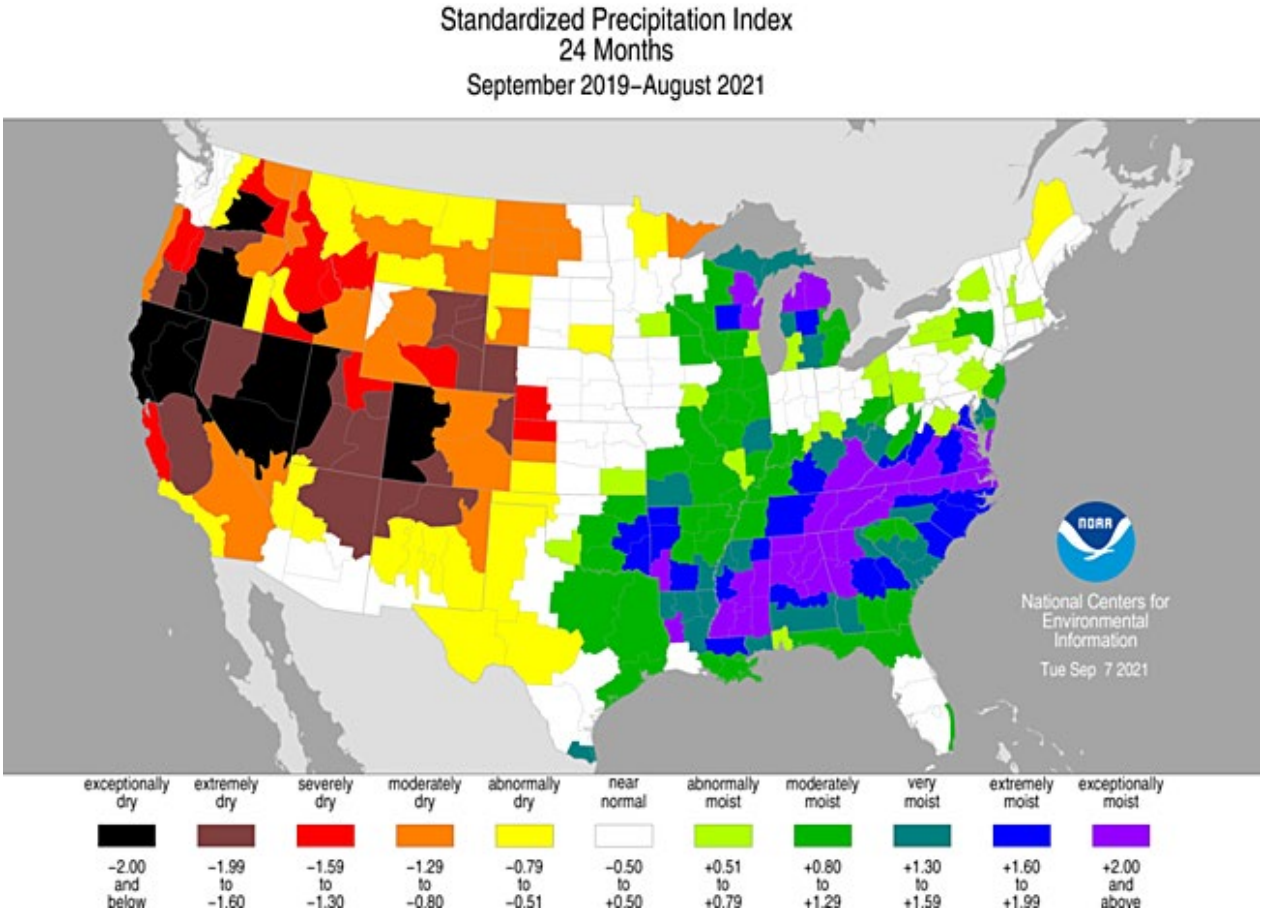
Location & Spatial Extent

Drought typically covers a large area and it is assumed that the WV Region 4 planning area would be uniformly exposed to drought, making the spatial extent potentially widespread. However, the data in the table below indicates some variability across counties. Microclimate, distance to groundwater, relative position within a watershed and other local conditions are likely to produce varying levels of impact at the sub-county level. An NCEI event summary for a September 2007 drought describes how water resources are impacted at a highly localized scale. “Surface water was being depleted in small streams, ponds, and small impoundments. This generated additional stress on the wildlife, in their search for water.” It is notable that drought conditions typically do not cause significant damage to the built environment but may exacerbate wildfire conditions.

Droughts can impact drinking water both in terms of availability and demand. According to the 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 (hydroelectric and nuclear power generation for example) and growing food crops. As available water sources are reduced by droughts water usage will need to be closely monitored to maintain enough for critical uses.

The Standardized Precipitation Index (SPI) measures moisture supply. The SPI maps here show the spatial extent of anomalously wet and dry areas at time scales for the last 24 months. According to the following SPI map, WV Region 4 is in a “moderately moist” to “very moist” area.

Figure 2.2.2: Standardized Precipitation Index[13]



[13] NOAA – Standardized Precipitation Index: https://www.weather.gov/hfo/spi_info

Figure 2.2.3: Number of Weeks US Counties have experienced D3 Drought or Greater, 2000-2019[14]

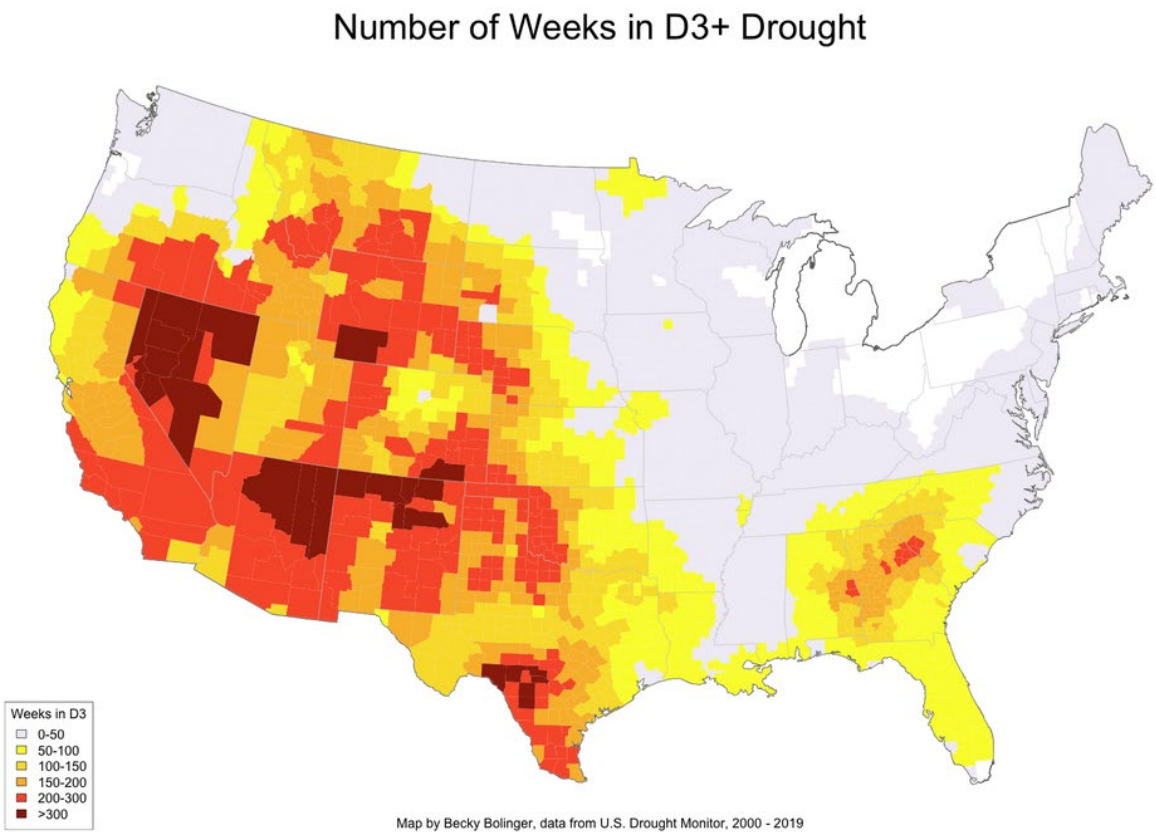


Figure 2.2.4: U.S. Drought Monitor

D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered
D1	Moderate Drought	Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing or imminent; voluntary water-use restrictions requested
D2	Severe Drought	Crop or pasture losses likely; water shortages common; water restrictions imposed
D3	Extreme Drought	Major crop/pasture losses; widespread water shortages or restrictions
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies

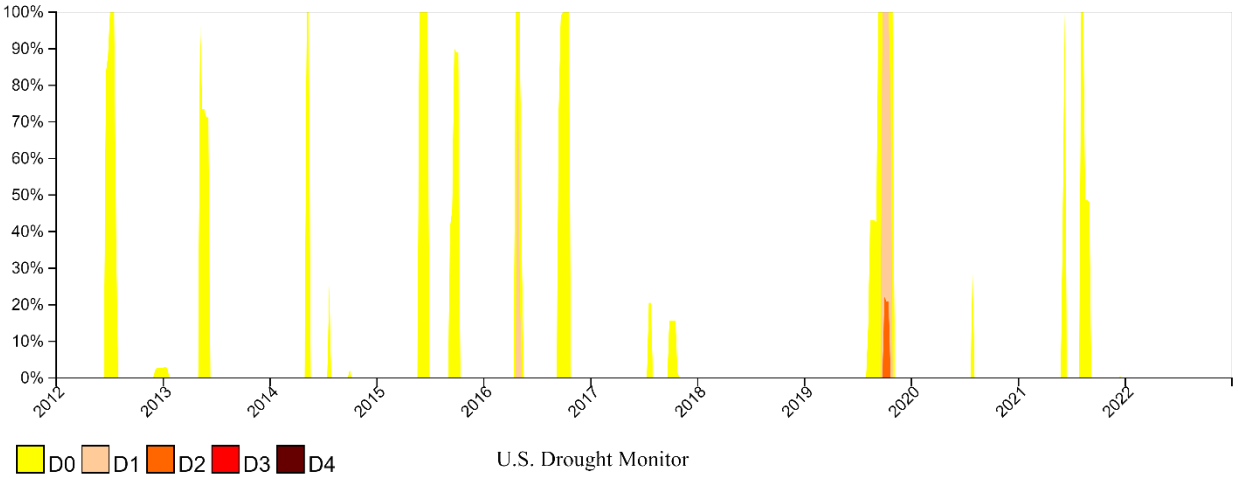
[14] https://www.drought.gov/news/how-drought-prone-your-state-look-top-states-and-counties-drought-over-last-two-decades, *How Drought Prone is Your State*, Becky Bolinger, National Integrated Drought Information System. August 18, 2019. Accessed, February 8, 2022

Historically the planning area does not typically have occurrences of drought as it is a relatively moist area. It can be expected that the planning area occasionally experiences D0 Abnormally Dry conditions.

Historical Occurrences

Data from the U.S. Drought Monitor and National Centers for Environmental Information (NCEI) were used to ascertain historical drought events in the WV Region 4. The U.S. Drought Monitor reports data at the county level on a weekly basis throughout the county. It classifies drought conditions on a scale of D0 to D4, as described above.

Figure 2.2.5: U.S. Drought Monitor for WV Region 4 Historical Conditions 2012 – 2022[15]



According to NCEI, there have been a number of drought occurrences in the WV Region 4 planning area. The number of events is determined by how the events are measured. With each month of drought in each county counted individually, there have been 47 events. However, 22 of those events could be combined into a single event, beginning in June 1999 and ending in October 1999 and occurring across all five counties. The years in which drought events occurred were 1997, 1998, 1999, 2002, 2005, 2007, 2019.

[15] U.S. Drought Monitor: https://www.drought.gov/states/west-virginia

Table 2.2.4: Number of Monthly Drought Occurrences in the WV Region 4 Planning Area by County [16]

Location	Number of Drought Events
Fayette County	12
Greenbrier County	7
Nicholas County	9
Pocahontas County	9
Webster County	9
TOTAL	46

The most recent severe drought (D2) to affect the Region was in 2019.[17] Governor Justice declared a State of Emergency due to drought conditions that lasted from October 3 to November 4, 2019, and which followed an earlier proclamation banning outdoor burning.[18] The declaration activated the statewide EOC and included voluntary water reduction guidelines across all 55 counties, including Region 4. Storm data produced by NCEI described the rarity of this event in Greenbrier County

Severe drought (D2) was shown across most of northeast Greenbrier County on the U.S. Drought Monitor from October 1 to October 22nd. Impacts were primarily agricultural and included pasture losses and reduced hay cuttings. The NWS COOP site at Lewisburg 3N (LWBW2) in Greenbrier County recorded a mere 0.08 inches of rain in September. This was the driest September and 2nd driest of any month on record at this station with nearly complete data back to 1900. The previous record was 0.04 inches in October 2000.

Damage estimates are not provided for Greenbrier County, however, other counties outside the Region sustained hundreds of thousands of dollars of damage. The drought prompted the State Conservation Committee to authorize an emergency program to assist farmers with water tank equipment for livestock.[19] And a headline for the Gazette-Mail declared "Drought threatens drinking water supplies in Southern WV counties," describing stream flows in the Greenbrier River as far below long-term medians.[20]

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that all of the WV Region 4 planning area has a probability level of likely (between 10 and 90 percent annual probability) for future drought events. However, the extent (or magnitude) of drought and the amount of geographic area covered by drought,

[16] National Centers for Environmental Information – Storm Events
[17] U.S. Drought Monitor: https://www.drought.gov/states/west-virginia
[18] https://governor.wv.gov/News/press-releases/2019/Pages/Gov.-Justice-declares-State-of-Emergency-for-all-55-counties-due-to-drought-conditions.aspx, "Gov. Justice declares State of Emergency for all 55 counties due to drought conditions" October 3, 2019. Accessed February 1, 2022.
[19] https://www.wvgazettemail.com/news/program-to-help-wv-livestock-farmers-affected-by-drought/article_159fa4ef-a8f1-5966-bfe1-69804d9152bf.html, "Program to help WV Livestock Farmers," Charleston Gazette-Mail, October 9, 2019. Accessed February 8, 2022
[20] https://www.wvgazettemail.com/news/drought-threatens-drinking-water-supplies-in-southern-wv-counties/article_4f4db555-73f4-5144-b737-cc9fdc58e40f.html, "Drought threatens drinking water supplies in Southern WV counties," Rick Steelhammer. September 30, 2019. Accessed February 8, 2022

varies with each year. Historic information indicates that there is a much lower probability for extreme, long-lasting drought conditions.

Climate change models predict increased frequency and intensity of precipitation events in the eastern US, with an overall trend towards more precipitation, not less. However, warming trends will also impact the timing and availability of water resources. More precipitation will fall as rain in winter, reducing snowpack, while rising spring temperatures will cause earlier snowmelt-related runoff. In turn, higher summer temperatures will cause demand for water to peak earlier and last longer. As a possible example, the September 2019 drought was caused by a combination of record low precipitation and heat. That month was West Virginia's second hottest September since 1895 and its driest September since 1895.

Loss Estimates

According to NCEI, there are no recorded drought loss estimates for the WV Region 4 planning area. Counties outside the Region sustained hundreds of thousands of dollars of damage in the 2019 drought. The drought prompted the State Conservation Committee to authorize an emergency program to assist farmers with water tank equipment for livestock.[21]

Vulnerability & Risk Assessment

Social Vulnerability

Given some level of susceptibility across the entire WV Region 4 planning area, it is assumed that the total population is at risk to droughts. Determining the exact number of people is difficult with existing data and could be misleading. In particular, the expansion of residential development from urban centers out into rural landscapes, increases the potential for wildland fire threat to public safety and the potential for damage to crops, farmland, and forests. Rural households relying on well water may be impacted by groundwater level drops.

Critical Facilities

While droughts in general may not pose a significant risk to buildings directly, they do however pose a threat to critical facilities through enhanced risks from wildfire. Low water flows not only reduce water supply available but can make treatment difficult. Poor water quality from low flows and restrictions on withdrawals can impact facilities like power plants that rely on water for cooling.

Vulnerability Assessment Conclusion

In West Virginia, drought conditions are often the exception rather than the norm. Drought events are usually followed by years of average or slightly below average rainfall that may not restore surface water and/or groundwater levels to pre-drought conditions.

Mitigation management for drought is a proactive process. The best practices include early assessment, public education, and water conservation programs. Identifying the early phases of a drought and reacting with water conservation at the earliest time will help mitigate a drought later in the disaster.

[21] https://www.wvgazettemail.com/news/program-to-help-wv-livestock-farmers-affected-by-drought/article_159fa4ef-a8f1-5966-bfe1-69804d9152bf.html, "Program to help WV Livestock Farmers," Charleston Gazette-Mail, October 9, 2019. Accessed February 8, 2022

Identified Data Limitations

Data on drought was obtained from NCEI as well as the US. Drought Monitor. The available data shouldn't be assumed to be all inclusive as many droughts go under or unreported. Drought data from NCEI appears to exclude historical droughts roughly before 1995, including significant events in 1988, 1966, 1953, 1947, 1941, 1940, and the exceptional multi-state drought of 1930-1931, which are visible through the National Integrated Drought Information System's online tool only.[22]

EARTHQUAKES

Period of Occurrence	Anytime
Number of Events	26 epicenters in WV Region 4
Warning Time	None
Potential Impacts	Loss of life, and property damage
Cause Injury or Death	Potential to cause injury or death
Potential Facility Shutdown	Hours to weeks

Hazard Profile

Earthquake is movement or trembling of the ground produced by sudden displacement of rock in the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured in the tens of billions of dollars, result in loss of life and injury to hundreds of thousands of persons, and disrupt the social and economic functioning of the affected area.

Most property damage and earthquake-related deaths are caused by the failure and collapse of structures due to ground shaking. The level of damage depends upon the amplitude and duration of the shaking, which are directly related to the earthquake size, distance from the fault, site, and regional geology. Other damaging earthquake effects include landslides, the down-slope movement of soil and rock (mountain regions and along hillsides), and liquefaction, in which ground soil loses the ability to resist shear and flows much like quicksand. In the case of liquefaction, anything relying on the substrata for support can shift, tilt, rupture, or collapse.

Most earthquakes are caused by the release of stresses accumulated as a result of the rupture of rocks along opposing fault planes in the Earth's outer crust. These fault planes are typically found along borders of the Earth's tectonic plates. The areas of greatest tectonic instability occur at the perimeters of the slowly moving plates, as these locations are subjected to the greatest strains from plates traveling in opposite directions and at different speeds. Deformation along plate boundaries causes strain in the rock and the consequent buildup of stored energy. When the built-up stress exceeds the rocks' strength a rupture occurs. The rock on both sides of the fracture is snapped, releasing the stored energy, and producing seismic waves, generating an earthquake.

The greatest earthquake threat in the United States is along tectonic plate boundaries and seismic fault lines located in the central and western states; however, the Eastern United State does face moderate risk

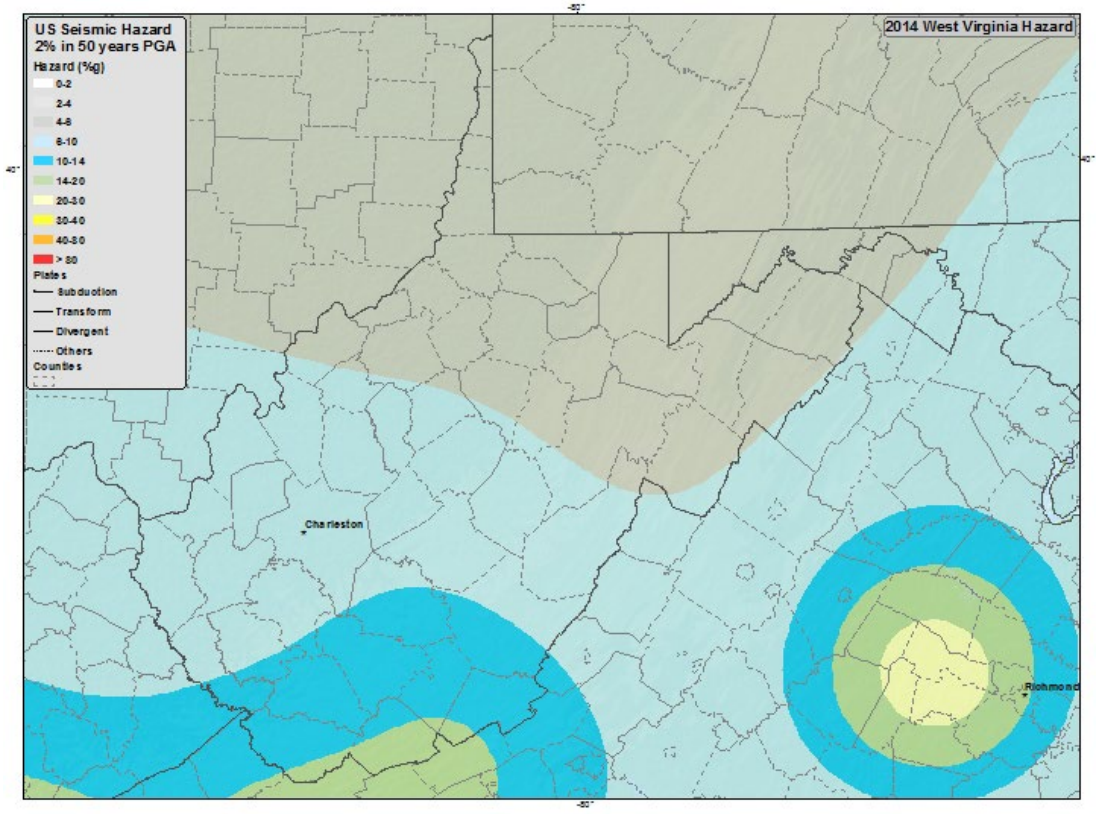
[22] https://www.drought.gov/historical-information, Historical Data and Conditions. Accessed February 8, 2022

to less frequent, less intense earthquake events. Figure below shows relative seismic risk for the United States.

Location & Spatial Extent

The U.S. Geological Survey map below shows that parts of Region 4 are considered more at risk for earthquake activity than others, technically the peak horizontal ground acceleration (PGA) with a 2% probability of being exceeded in 50 years measured in percent of gravity. Note that risk increases roughly on a northeast-southwest axis across the state. However, all areas of the region are within the bottom three hazard rankings.

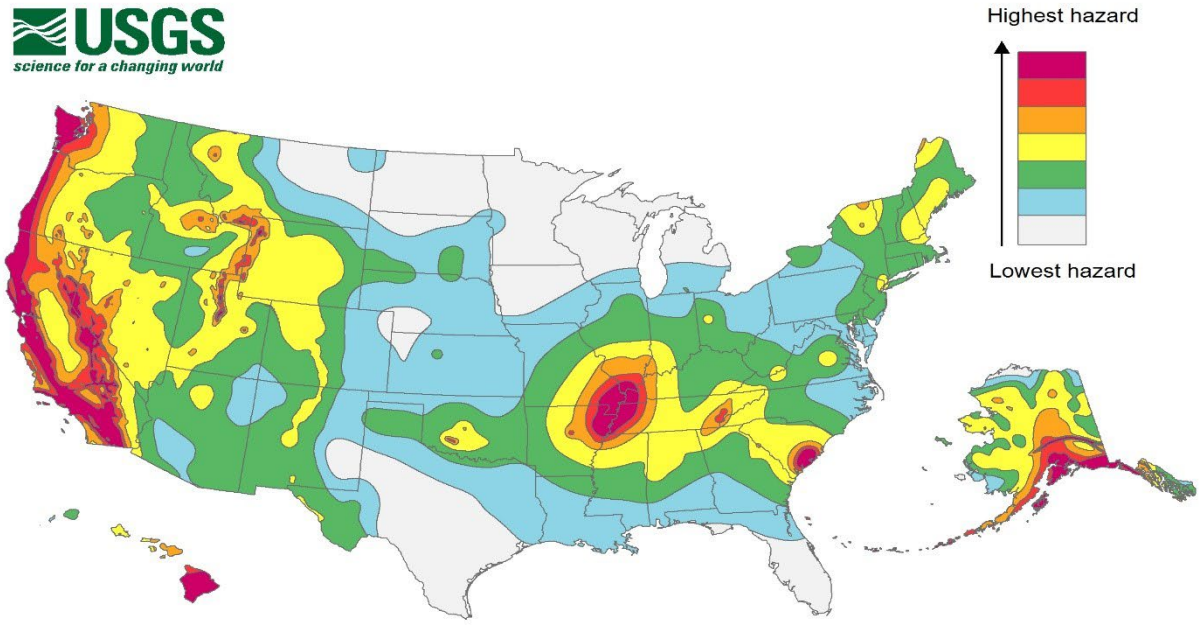
Figure 6: US Seismic Hazard Risk Map for West Virginia[23]



The somewhat random historical occurrences of earthquakes would indicate that all structures throughout Region 4 are at risk from earthquakes, with structures in Greenbrier and Pocahontas County being slightly more vulnerable. Historically, there have not been any epicenters in Region 4 of high enough magnitude to cause structural damage, with most averaging a II or less on the MMI.

[23] https://www.usgs.gov/media/images/2014-seismic-hazard-map-west-virginia, 2014 Seismic Hazard Map – West Virginia, accessed February 2, 2022 and https://www.arcgis.com/home/webmap/viewer.html?url=https%3A%2F%2Fearthquake.usgs.gov%2Farcgis%2Frest%2Fservices%2Fhaz%2FUSpga250_2014%2FMapServer&source=sd, US Probabilistic Seismic Hazard Peak Ground Acceleration, accessed February 2, 2022

Figure 2.2.7: United States Earthquake Hazard Map[24]



Earthquakes are measured in terms of their magnitude and intensity. Magnitude is measured using the Richter Scale, an open-ended logarithmic scale that describes the energy release of an earthquake through a measure of shock wave amplitude. Each unit increase in magnitude on the Richter Scale corresponds to a 10-fold increase in wave amplitude, or a 32-fold increase in energy. Intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale based on direct and indirect measurements of seismic effects. The scale levels are typically described using roman numerals, ranging from "I" corresponding to imperceptible (instrumental) events to "XII" for catastrophic (total destruction). A detailed description of the Modified Mercalli Intensity Scale of earthquake intensity and its correspondence to the Richter Scale is given below.

[24] U.S. Geological Survey

Table 2.2.5: Richter Scale

RICHTER MAGNITUDES	EARTHQUAKE EFFECTS
< 3.5	Generally not felt but recorded.
3.5 - 5.4	Often felt, but rarely causes damage.
5.4 - 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1 - 6.9	Can be destructive in areas up to about 100 kilometers across where people live.
7.0 - 7.9	Major earthquake. Can cause serious damage over larger areas.
8 or >	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Table 2.2.6: Modified Mercalli Intensity Scale

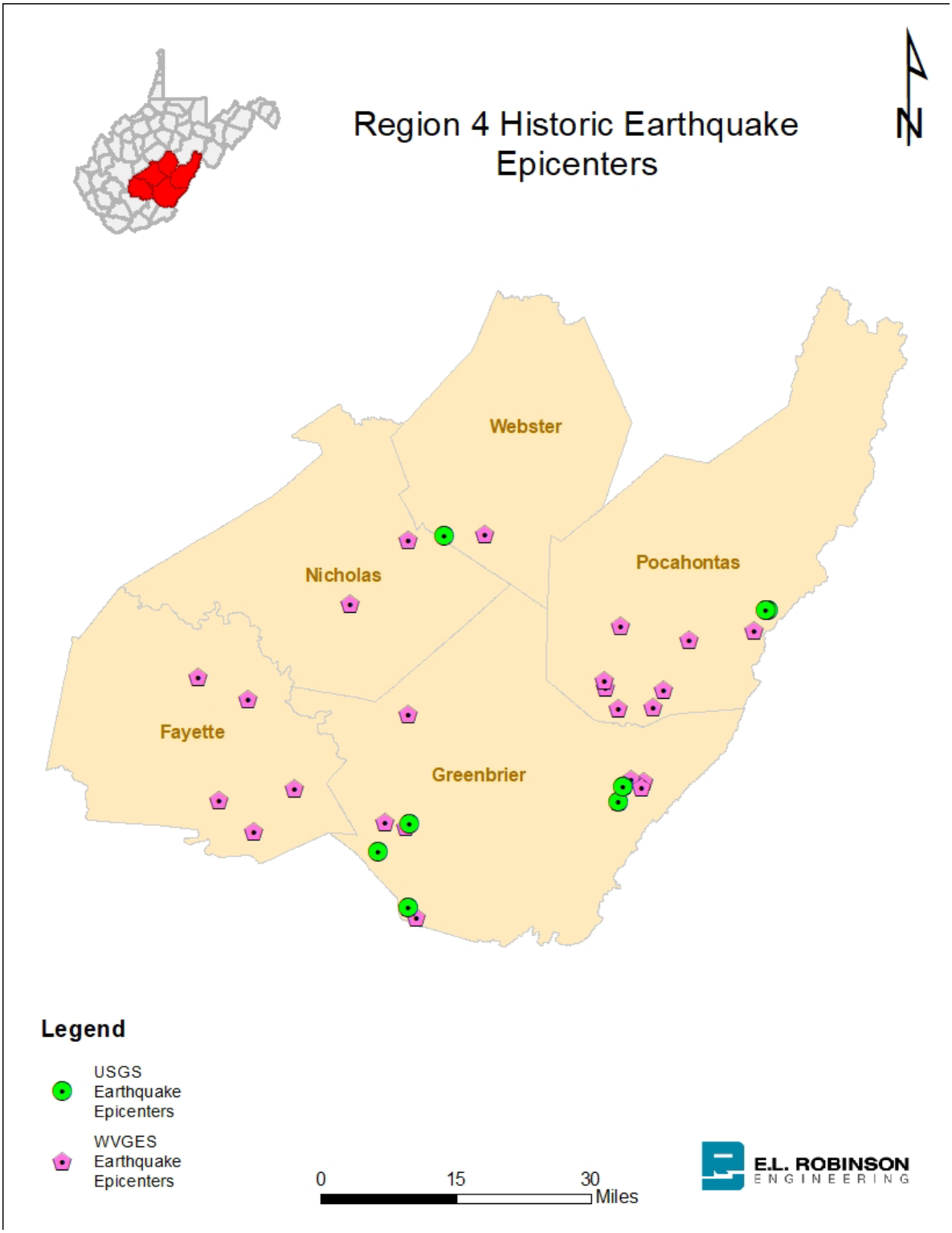
SCALE	INTENSITY	DESCRIPTION OF EFFECTS	CORRESPONDING RICHTER SCALE MAGNITUDE
I	INSTRUMENTAL	Detected only on seismographs.	
II	FEEBLE	Some people feel it.	< 4.2
III	SLIGHT	Felt by people resting; like a truck rumbling by.	
IV	MODERATE	Felt by people walking.	
V	SLIGHTLY STRONG	Sleepers awake; church bells ring.	< 4.8
VI	STRONG	Trees sway: suspended objects swing, objects fall off shelves.	< 5.4
VII	VERY STRONG	Mild alarm; walls crack; plaster falls.	< 6.1
VIII	DESTRUCTIVE	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged.	
IX	RUINOUS	Some houses collapse; ground cracks; pipes break open.	< 6.9
X	DISASTROUS	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread.	< 7.3
XI	VERY DISASTROUS	Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards.	< 8.1
XII	CATASTROPHIC	Total destruction: trees fall; ground rises and falls in waves.	> 8.1

Historical Occurrences

According to official databases, there have been no Federal Declared Disasters or National Center for Environmental Information (NCEI) recorded events for earthquakes in West Virginia. There is a moderate risk of seismic activity in West Virginia. However, any potential damage from this seismic activity is relatively low, when compared to other states with more dense populations and taller buildings.
The West Virginia Geological & Economic Survey tracks earthquakes within West

Virginia, recording their locations and magnitudes among other variables. According to historical records, there have been twenty-six earthquakes with epicenters in WV Region 4. The locations by county are seen in the following figure. The average magnitude of these events is 1.8, meaning they are mostly below the threshold of being felt. The largest magnitude event on record was an epicenter with a 3.5 magnitude that occurred in Greenbrier County in the early morning hours of April 4th, 1991. While earthquakes with epicenters within Region 4 are rare, the effects of earthquakes outside the region can be still be felt. A recent example is an earthquake in 2011 that was centered in Louisa County, VA (38 miles northwest of Richmond, VA.) This quake registered a magnitude of 5.8 and a VII (very strong) on the Mercalli intensity scale. The effects of this event, and the damage it caused, were felt up and down the east coast including across West Virginia.

Figure 2.2.8: Earthquakes Epicenters in WV Region 4



Probability of Future Occurrences

The probability of significant, damaging earthquake events affecting the WV Region 4 planning area is unlikely. However, it is possible that future earthquakes resulting in light to moderate perceived shaking and damages ranging from none to very light will affect the region. The 2016 Hazard Mitigation Plan estimated the annual risk to the region to be less than 1%. Since 2009, the USGS has recorded a spike in the number of earthquakes with a magnitude 3.0 or larger in the central and eastern US, possibly induced by artificial underground activity such as oil production and wastewater disposal.[25] It is uncertain if Region 4 is likely to be exposed to these earthquakes.

Loss Estimates

In April 2017, FEMA released a report that conducted a nationwide evaluation of earthquake losses in the United States: HAZUS-MH Estimated Annualized Earthquake Losses for the United States. FEMA's evaluation ranked West Virginia 41st in the Nation for Annualized Earthquake Loss Ratio (AELR) ($7.4 million) and 44th for Annualized Earthquake Losses (AEL) ($1.4 million).[26] [27]

Annualized loss was computed, in HAZUS, by multiplying losses from eight potential ground motions by their respective annual frequencies of occurrence, and then summing the values. The results for WV Region 4 are in the table below.

Table 2.2.7: Earthquake Annualized Loss Estimates – WV Region 4

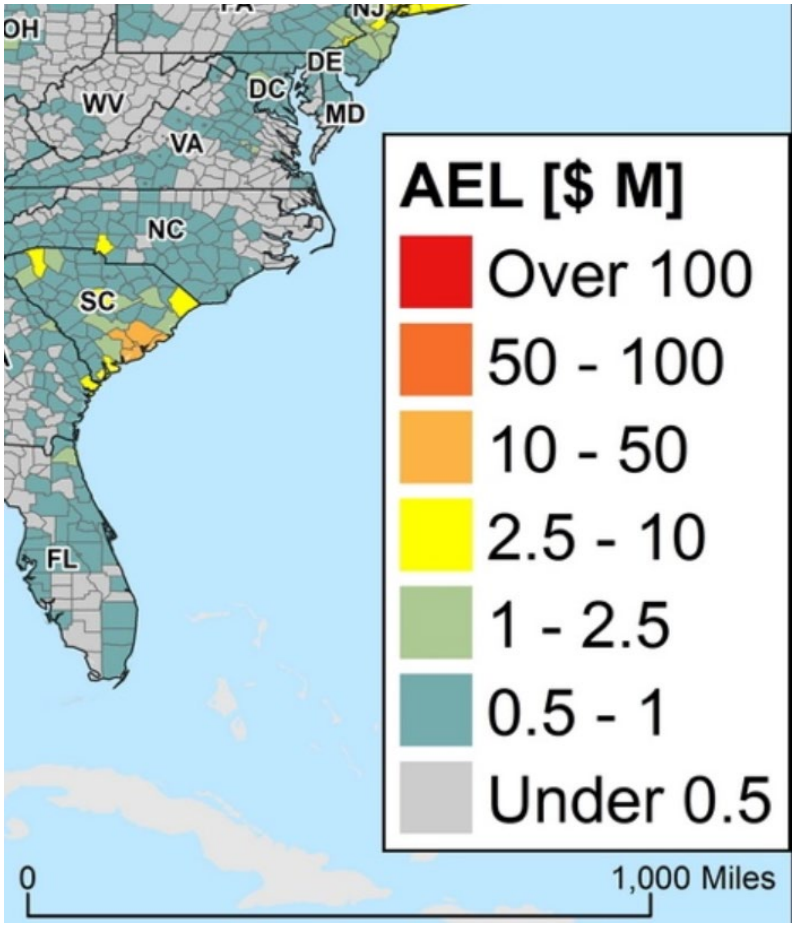
Jurisdiction	Annualized Losses
Fayette County	$289,284
Greenbrier County	$224,273
Nicholas County	$123,458
Pocahontas County	$62,390
Webster County	$82,590

[25] https://www.usgs.gov/programs/earthquake-hazards/induced-earthquakes, Induced Earthquakes

[26] U.S. Geological Survey – Report by FEMA 2017. Retrieved on 02/25/2022: https://www.usgs.gov/news/science-snippet/usgs-collaborates-fema-national-earthquake-loss-estimate

[27] W.V. State Hazard Mitigation Plan 2018 Update, pg. 264

Figure 2.2.9: Annualized Earthquake Loss by County[28]



Vulnerability & Risk Assessment

Social Vulnerability

While no major earthquake is on record as causing damage within Region 4, it is not risk that should be disregarded. A major earthquake could cause significant damage to homes and infrastructure in the region, including hospitals and utilities.

Critical Facilities

A major earthquake in Region 4 could cause significant disruption to utilities, hospitals, and public safety response. The entire region would be exposed to such damage in the event of a major earthquake originating nearby.

Vulnerability Assessment Conclusion

Damage from earthquakes can be mitigated for existing buildings by structural retrofits and

[28] U.S. Geological Survey – Report by FEMA 2017. Retrieved on 02/25/2022: https://www.usgs.gov/news/science-snippet/usgs-collaborates-fema-national-earthquake-loss-estimate

non-structural retrofits for interior contents that can be damaged by a fall (e.g., computer) or can cause harm by falling (e.g., bookshelves). Structures erected before standard building codes, such as un-reinforced adobe and masonry buildings, are typically vulnerable to earthquake damage. Structural retrofits are generally very expensive whereas non-structural can be relatively inexpensive.

Identified Data Limitations

Records of reported losses in the WV Region 4 planning area due to seismic events were not identified.

EXTREME TEMPERATURES

Period of Occurrence	Anytime
Number of Events (1996 – 2021)	203
Warning Time	Days to weeks.
Potential Impacts	Loss of life, and property damage.
Cause Injury or Death	Potential to cause injury or death.
Potential Facility Shutdown	Hours to days.

Hazard Profile

Extreme temperatures comprise both extreme heat and extreme cold. When the temperature is consistently greater than the normal in summer meteorologists refer to it as a heat wave. The definition of a heat wave varies by source. The National Weather Service describes a heat wave as "a period of abnormally hot weather generally lasting more than two days." Emergency management literature uses a more expansive definition, "temperatures of ten or more degrees above the average high temperature persist[ing] across the geographic region for several days or weeks".[29]

The cold temperature corollary to a heat wave is a cold snap or cold spell, although this name is colloquial and can occur any time of year. Recently, the term "polar vortex" has been mis-applied to winter-time jet stream paths that allow Artic air far south.

Temperatures vary widely over the course of a year, but each season has general temperature ranges associated. Summer and winter have, generally, the highest and lowest range of temperatures, respectively.

High heat can contribute to drought conditions when combined with a lack of rainfall, causing below average harvests. Repeated years of extreme temperatures can easily cause significant economic impacts on agricultural industries. Similarly, heat can cause disease and death in livestock and wildlife. Prolonged and intense heat can strain non-living systems, including energy infrastructure, roads, railroads, bridges, and airports. The efficiency and safety of industrial and chemical processes can also be impacted.

While there is no widely accepted definition of extremely cold temperatures, periods of colder than average conditions can cause an array of negative consequences depending on their duration in unprotected structures cold temperatures can freeze water pipes causing them to burst upon thawing,

[29] Introduction to Emergency Management - Haddow, Bullock, & Coppola, 2014, pg.51

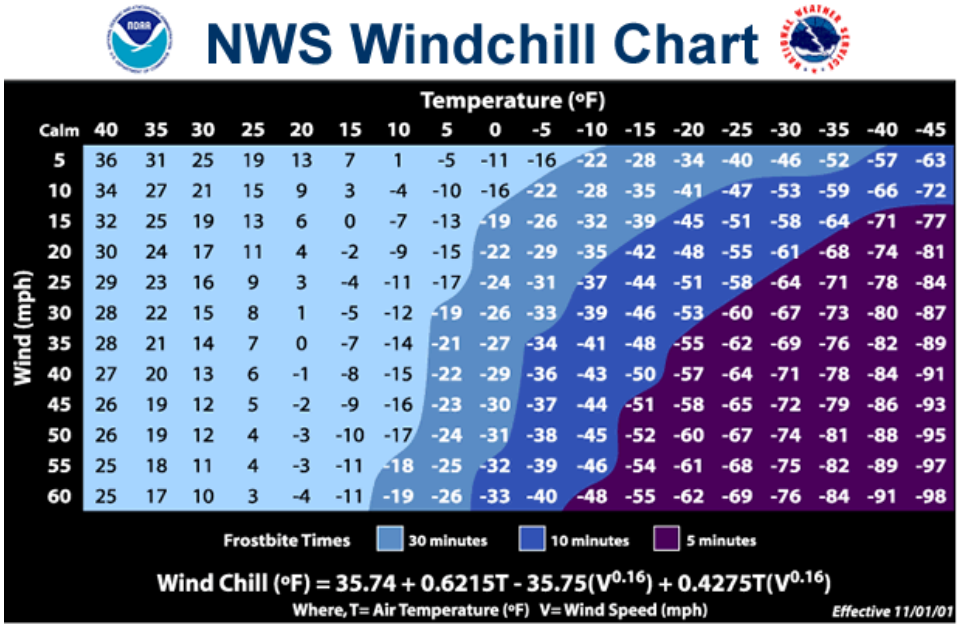
leading to significant damage. Cold snaps during typically warmer weather during the growing season can damage and destroy some crops, depending on their sensitivity to temperature.

The National Centers for Environmental Information (NCEI) tracks four types of extreme temperatures: Cold/Wind Chill, Extreme Cold/Wind Chill, Heat, and Excessive Heat.

- **Cold/Wind Chill:** Period of low temperatures or wind chill temperatures reaching or exceeding locally/regionally defined advisory (typical value is -18° For colder) conditions, on a widespread or localized basis. There can be situations where advisory criteria are not met, but the combination of seasonably cold temperatures and low wind chill values (roughly 15° F below normal) must result in a fatality.

- **Extreme Cold/Wind Chill:** A period of extremely low temperatures or wind chill temperatures reaching or exceeding locally/regionally defined warning criteria (typical value around -35 F or colder), on a widespread or localized basis. Normally these conditions should cause significant human and/or economic impact.

Figure 10: National Weather Service Windchill Chart[30]



- **Heat:** A period of heat resulting from the combination of high temperatures (above normal) and relative humidity. A heat event occurs whenever heat index values meet or exceed locally/regionally established advisory thresholds or a directly related fatality occurs due to the heat event. The Product Issuance Criteria from the Charleston, WV Weather Forecast Office of the National Weather Service describes that a heat advisory is "issued for heat index of equal to 100º F and less than 105º F for a period of at least 2 hours"

[30] National Weather Service

- **Excessive Heat:** Excessive Heat results from a combination of high temperatures (well above normal) and high humidity. An Excessive Heat event occurs whenever heat index values meet or exceed locally/regionally established excessive heat warning thresholds, on a widespread or localized basis. The Product Issuance Criteria from the Charleston, WV Weather Forecast Office of the National Weather Service describes that an excessive heat warning is "issued when the heat index is expected to reach around 105º F or higher for a period of at least 2 hours."

Table 2.2.8: National Weather Service – Heat Product Criteria

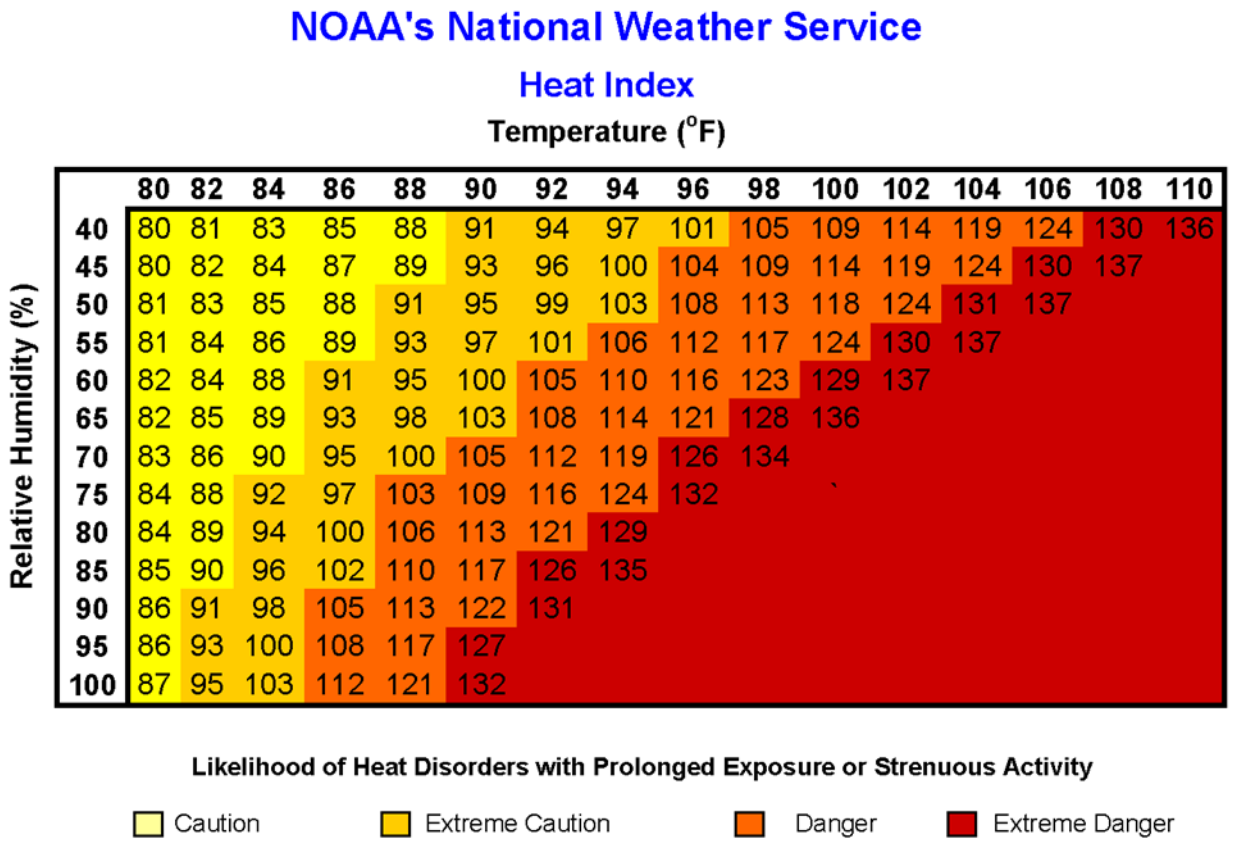
Alert Issued	Criteria
Excessive Heat Warning	An Excessive Heat Warning is issued within 12 hours of the onset of extremely dangerous heat conditions. The general rule of thumb for this Warning is when the maximum heat index temperature is expected to be 105° or higher for at least 2 days and nighttime air temperatures will not drop below 75°; however, these criteria vary across the country, especially for areas not used to extreme heat conditions. If you don't take precautions immediately when conditions are extreme, you become seriously ill or even die.
Excessive Heat Watch	Heat watches are issued when conditions are favorable for an excessive heat event in the next 24 to 72 hours. A Watch is used when the risk of a heat wave has increased but its occurrence and timing is still uncertain.
Heat Advisory	A Heat Advisory is issued within 12 hours of the onset of extremely dangerous heat conditions. The general rule of thumb for this Advisory is when the maximum heat index temperature is expected to be 100° or higher for at least 2 days, and nighttime air temperatures will not drop below 75°; however, these criteria vary across the country, especially for areas that are not used to dangerous heat conditions. Take precautions to avoid heat illness. If you don't take precautions, you could become seriously ill or even die.
Excessive Heat Outlook	Excessive Heat Outlooks are issued when the potential exists for an excessive heat event in the next 3-7 days. An Outlook provides information to those who need considerable lead-time to prepare for the event.

Meanwhile, the National Weather Service's Eastern Region Heat Index Advisory Criteria directs weather stations to issue heat warnings for Greenbrier County (and areas South and East) when the Heat Index is expected to exceed 105° F for 2 or more consecutive hours and for Pocahontas, Nicholas, Greenbrier and

Webster Counties (and areas North and West) when the Heat Index is expected to exceed 100° F for 2 or more consecutive hours in the next 24-72 hours.[31]

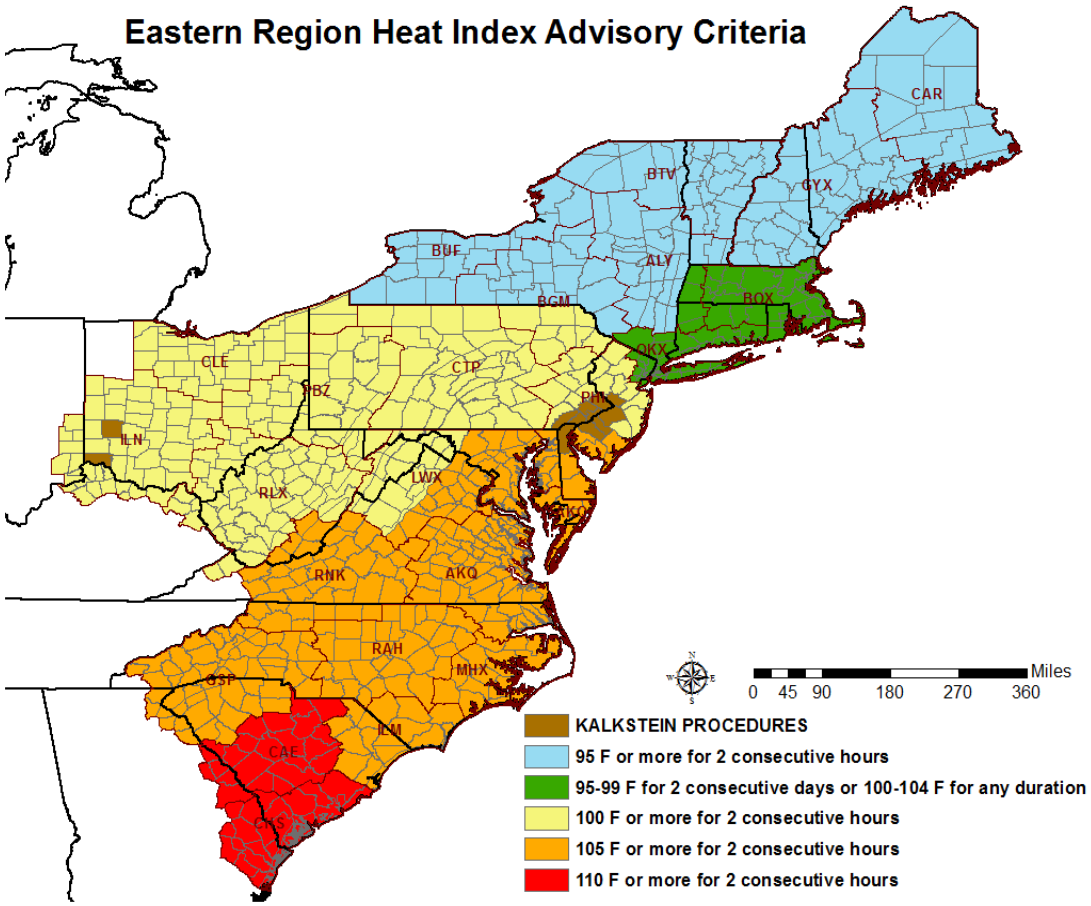
The NWS relies on the Heat Index to determine and relay the potential effects of temperature and humidity on the human body to the population. Heat Index values are reduced by shady and light wind conditions, but full sunshine conditions can increase heat index values by up to 15°F.

Figure 2.2.11: National Weather Service – Heat Index Chart



[31]NOAA - National Weather Service

Figure 2.2.12: Eastern Region Heat Index Advisory Criteria



Location & Spatial Extent

Given the topographical and development differences across the Region, risk is not uniform. There is a roughly 3,000 ft elevation difference between areas of Pocohontas (Cheat Mountain 4,848 ft) and Greenbrier (4,232 feet) Counties and Fayette County (1,276 ft at lowest) which translates to differences in temperatures.

The coldest and second coldest temperatures recorded in the state were in Pocohontas and Greenbrier Counties (Lewisburg and Snowshoe at -37 and -36 ° F.) There have been more cold hazard events than heat hazard events, as shown in the table below.

Table 2.2.9: Extreme Cold Events in the WV Region 4 Planning Area

Type	Approximate Criteria (° F)	Total
Cold/Wind Chill	< -18	92
Extreme Cold/ Wind Chill	< -35	34
Heat	>100	43
Excessive Heat	>105	34
Total		203

The same topographical differences that effect extreme cold, also impact extreme heat. The hottest temperature recorded in elevated Pocahontas County was 100° F while the hottest temperature in lower Fayette County was 107 ° F.[32] The limited urban areas and strip malls within the Region are susceptible to localized high heat above area temperatures due to the density of paved surfaces and roofs and relative lack of trees.

In the prior 25 years, there have been a number of excessive temperature events, shown in the table below. Cold/Wind Chill and Extreme Cold/Wind Chill clearly make up the majority of extreme temperature events in Region 4, accounting for 126 of the 203 events between 1996 and 2021.

Table 2.2.10: Extreme Temperature Events in the WV Region 4

County	Total	Deaths	Property Damage ($)	Crop Damage ($)
Fayette	48	0	$ 45,000.00	$ -
Greenbrier	3	0	$ -	$ 5,000.00
Nicholas	45	1	$ 53,000.00	$ -
Pocahontas	56	0	$ 45,000.00	$ -
Webster	51	0	$ 45,000.00	$ -
Total	203	1	$ 188,000.00	$ 5,000.00

The table above breaks down the events by county and illustrates the damages caused by these events. Over the 25-year study period, extreme temperature events have caused nearly $200,000 in reported property damage, and $5,000 in reported crop damage. These figures could be much higher as crop damage due to excessive heat is difficult to differentiate from crop damage due to drought since these two events often occur concurrently.

Historical Occurrences

- September and October 2019

[32] https://www.weather.gov/rlx/HazardRiskAssessment, Natural Hazard Risk Assessment, specifically "Hottest Temperature Observed" https://www.weather.gov/images/rlx/outreach/HottestTempsEachCounty.png
, Accessed February 14, 2022

Heat waves caused the month of September to be the second warmest on record across the state, with average temperatures 5.6 degrees above normal.[33]

- January 21st and 22nd, 2014

  A 79-year-old Nicholas County man, who suffered from dementia, is believed to have frozen to death. He was last seen on the 20th, the day before the snow arrived. He apparently made a wrong turn, drove several miles along a remote mountain road near Muddlety. His vehicle got stuck in an old snow cover. He apparently spun the wheels so much that his car caught fire. He walked off and his body was not found until the 23rd. Temperatures were in the 20s during the daylight hours of the 21st, then dropped to below zero that night. The date of his death was estimated on the 21st (NCEI).

- January 6th-7th, 2014

  Coldest temperatures since 1996 in many areas. Snowshoe reported 21 degrees below zero temperatures; wind chills on exposed mountain ridges were in the -20s and -30s overnight. University, high school, and elementary schools cancelled classes or closed buildings as a result of "frozen pipes, power outages, furnace difficulties, and vehicular engine problems." Property damage of $20,000 in every county except Greenbrier was reported. (NCEI)

- March 8th – March 12th, 1996

  Record breaking low temperatures from the 8th through the 12th damaged some fruit trees and berry crops. Greenbrier County reported $5K in crop damage. Low temperatures during this period were mostly in the single numbers. Some of the higher elevations reported low temperatures below zero (NCEI).

Loss Estimates

Historically, the property and crop damages listed in the hazard profile are all associated with cold temperature events rather than heat events.

For crop damage to occur, the event generally has to occur during a portion of the growing season. The only historical event occurred in Greenbrier County in early March and led to $5,000 in damage. Property damage is most associated with leaks from frozen pipes.

High temperatures can also be, and often are, associated with droughts. The agricultural loss of droughts is further discussed in the drought profile.

Vulnerability & Risk Assessment

Social Vulnerability

Excessive heat has a history of being deadly. In the United States "more than 1,500 die from exposure to excessive heat"[34]. Generally, three groups of people are more likely to suffer from excessive heat. The first is people who are more vulnerable because of their physical conditions. These include the elderly, infants and young children, people who are sick or have chronic illness, people who are pregnant, people with mental or physical disabilities. The second group is those who are particularly exposed to heat

[33] https://www.newstribune.info/story/news/2019/10/19/september-second-warmest-in-west/2492671007/, *September second warmest in West Virginia*, October 19, 2019. Accessed February 14, 2022
[34] Introduction to Emergency Management - Haddow, Bullock, & Coppola, 2014, pg.51

because they work or spend time outside, such as outdoor workers, homeless, student athletes. The third group are those who lack or are unable to afford or access air conditioning or cooling.

Extremely cold temperatures are immediately dangerous to both humans and livestock by causing frostbite and hypothermia which can lead to permanent injury and death. Again, people who are exposed to extreme cold because of outdoor work, housing insecurity, substandard housing, and those who are unable to afford heating are most at risk. Fuel shortages or inability to deliver fuel to rural residents can have drastic impacts.

Critical Facilities

Critical facilities are more likely to be affected when extreme temperatures are compounded with extreme weather events like thunderstorms or ice storms. In cold weather, particularly unseasonal cold weather, frozen pipes can cause water leaks. Combustion engines in vehicles and in furnaces can suffer in extreme cold.

In high heat, the expansion of materials ranging from asphalt to steel can cause distortions that impact transportation infrastructure like bridges and rail lines.

Probability of Future Occurrence of the Hazard

The WV Region 4 Planning area experiences on average of 3 heat/excessive heat events annually (77 events / 25 years). The probability that the region will experience a high heat event in the next year is Highly Likely. However, the region experienced on average of 5 cold/extreme cold events annually since 1996 (125 events / 25 years). It remains Highly Likely that the WV Region 4 Planning area will experience a cold/extreme cold event within the next year. Heat and extreme heat are predicted to increase as climate changes continues. Data in a report from the Union of Concerned Scientists and reported on by West Virginia Public Broadcasting, describe how many days of heat per year each county in the US can expect.[35]

By mid-century, 2035-2065, all counties in Region 4 are predicted to have multiple days a year with a heat index above 100° F. Pocahontas County has had the fewest days historically with a heat index above 90° F and will continue to be protected by its high elevation, relative to other counties in Region 4.

[35] https://www.wvpublic.org/news/2019-07-19/as-heat-wave-approaches-study-finds-west-virginia-faces-hotter-future, *As Heat Wave Approaches, Study Finds West Virginia Faces Hotter Future,* Brittany Patterson, Published July 19, 2019. Accessed February 14, 2022.

Table 2.2.11: Days with Heat Index Above 100° F

County	Days per year with a heat index above 100° F				
		Midcentury (2036-2065)		Late century (2070-2099)	
	Historical (1971-2000)	Slow Emissions Action	No Emissions Action	Slow Emissions Action	No Emissions Action
Fayette County	0	6	12	9	36
Greenbrier County	0	4	8	6	28
Nicholas County	0	5	11	8	35
Pocahontas County	0	0	2	1	11
Webster County	0	3	7	5	25

Extended days of high heat can be expected to cause discomfort and disruption, as well as the possibility of fatalities.

The US Department of Agriculture (USDA) describes a complex forecast for yields in West Virginia related to growing season, precipitation, cloud cover, and soil moisture.

Cold and Extreme Cold/Wind Chill are generally expected to decrease as climate change continues.

Vulnerability Assessment Conclusions

Extreme heat and extreme cold have historically impacted Region 4 and occasionally caused financial and health impacts. Warming global temperatures are likely to be reflected in an increase in extreme heat. Weather advisories along with outreach to known vulnerable populations and increased staffing for monitoring and inspections of critical facilities are reliable mitigation pathways.

Identified Data Limitations

NCEI data does not include historical records earlier than 1950, however many of the hottest temperatures in West Virginia were observed in the 1930s, with a Channel 12 WBOY article sites a 21-day streak of temperatures above 90 degrees.[36]

[36] https://www.wboy.com/weather/heat-wave-breaks-this-week/, *Heat Wave Breaks This Week*, July 6, 2020. *Accessed February 14, 2022.*

FLOODING

Period of Occurrence	Anytime, primarily March - July
Number of Events (1996 – 2021)	263
Warning Time	Hours to days.
Potential Impacts	Loss of life, and property damage.
Cause Injury or Death	Potential to cause injury or death.
Potential Facility Shutdown	Hours to days.

Hazard Profile

There are areas in the WV Region 4 planning area that are susceptible to flood events. Special flood hazard areas in the region were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM).1This includes Zone A (1-percent annual chance floodplain), Zone AE (1-percent annual chance floodplain with elevation), and Zone X500 (0.2-percent annual chance floodplain).

Table 2.2.12: Flood Zone Designations & Descriptions

Zone Designation	Percent Annual Chance of Flood	Description
Zone V	1%	Areas along coasts subject to inundation by the 1% annual chance of flooding with additional hazards associated with storm-induced waves. Because hydraulic analyses have not been performed, no BFEs or flood depths are shown.
Zones VE and V1-30	1%	Areas along coasts subject to inundation by the 1% annual chance of flooding with additional hazards associated with storm-induced waves. BFEs derived from detailed hydraulic analyses are shown within these zones. (Zone VE is used on new and revised maps in place on Zones V1-30.)
Zone A	1%	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas, no depths or base flood elevations are shown within these areas.
Zone AE	1%	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. In most instances, base flood elevations derived from detailed analyses are shown at selected intervals within these zones.

Zone Designation	Percent Annual Chance of Flood	Description
Zone AH	1%	Areas with a 1% annual chance of flooding where shallow flooding (usually areas of ponding) can occur with average depths between one and three feet.
Zone AO	1%	Areas with a 1% annual chance of flooding, where shallow flooding average depths are between one and three feet.
Zone X (shaded)	0.2%	Represents areas between the limits of the 1% annual chance flooding and 0.2% chance flooding.
Zone X (unshaded)	Undetermined	Areas outside of the 1% annual chance floodplain and 0.2% annual chance floodplain, areas of 1% annual chance sheet flow flooding where average depths are less than one (1) foot, areas of 1% annual chance stream flooding where the contributing drainage area is less than one (1) square mile, or areas protected from the 1% annual chance flood by levees. No Base Flood Elevation or depths are shown within this zone.

Flooding is the highest priority hazard for all five counties in the WV Region 4 planning area. According to FEMA, flooding events have been responsible for 28 disaster declarations. The geography of the region contributes highly to this, with low lying areas adjacent to several large waterways, including the New and Gauley rivers.

According to GIS analysis, of the 3,800 square miles that make up the WV Region 4 planning area, there are 194 square miles of land in zones A and AE (1-percent annual chance floodplain/100-year floodplain) and 3 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain).

These flood zone values account for 5 percent of the total land area in Region 4. It is important to note that while FEMA digital flood data is recognized as best available data for planning purposes, it does not always reflect the most accurate and up-to-date flood risk. Flooding and flood-related losses often do occur outside of delineated special flood hazard areas.

There are a number of types of floods, each with their own time frame. River floods typically develop over a period of days and occur when a river gradually rises and overspills its banks. These floods can be attributed to large amounts of rain or snowmelt both in the region impacted and upstream.

In addition, the NWS issues official watches and warnings, to alert those that may be at risk from potential flooding. The table below defines the terms used by the NWS in these watches and warnings.

Table 2.2.13: Flood Watch/Warning Terminology

Term	Definition
Flood Potential Outlook	In hydrologic terms, an NWS outlook that is issued to alert the public of potentially heavy rainfall that could send area rivers and streams into flood or aggravate an existing flood
Flood Watch	Issued to inform the public and cooperating agencies that current and developing hydrometeorological conditions are such that there is a threat of flooding, but the occurrence is neither certain nor imminent.
Flood Warning	In hydrologic terms, a release by the NWS to inform the public of flooding along larger streams in which there is a serious threat to life or property. A flood warning will usually contain river stage (level) forecasts.
Flood Statement	In hydrologic terms, a statement issued by the NWS to inform the public of flooding along major streams in which there is not a serious threat to life or property. It may also follow a flood warning to give later information.
Flash Flood Watch	Issued to indicate current or developing hydrologic conditions that are favorable for flash flooding in and close to the watch area, but the occurrence is neither certain nor imminent.
Flash Flood Warning	Issued to inform the public, emergency management and other cooperating agencies that flash flooding is in progress, imminent, or highly likely.
Flash Flood Guidance	Forecast guidance produced by the River Forecast Centers, often model output, specific to the potential for flash flooding (e.g., how much rainfall over a given area will be required to produce flash flooding).
Flash Flood Statement	In hydrologic terms, a statement by the NWS which provides follow-up information on flash flood watches and warnings.

The other type discussed in this section is a flash flood. According to the National Flood Insurance Program (NFIP), flash floods are the most common severe weather emergency in the United States (2021.) The NFIP also states that a flash flood is defined as “a rapid flooding of low-lying areas in less than six hours, which is caused by intense rainfall from a thunderstorm or several thunderstorms” (2016). Flash floods are a common concern in the region and have historically occurred frequently. Of the 263 flooding events compiled by the NCEI in the studied time period, 155 were classified as flash floods. In fact, all of the 16 reported deaths that occurred due to flooding in the region were due to flash flooding. Flash floods develop more quickly that river flooding and are harder to predict. Unlike river flooding, flash floods can

occur in many places that river flood does not. These areas are less prepared for flooding, leading to greater danger and potential for property damage.

There are areas in in the region that are susceptible to flood events. Special flood hazard areas in the region were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM). This includes Zone A (1-percent annual chance floodplain), Zone AE (1-percent annual chance floodplain with elevation), and Zone X500 (0.2-percent annual chance floodplain).

Since the Greenbrier County Commission began using Hazard Mitigation Grant Program (HMGP) funds to acquire properties at risk of flooding there have been 58 buyouts. Twenty-three (23) of these were then deeded to the municipality that the property resides in. The remaining 35 are leased by the Greenbrier County Commission.

Building Dollar Exposure

This section identifies high-valued buildings and other building characteristics exposed in the 1%-annual-chance (100-year) floodplain. Flood Risk Assessment datasets are developed by pinpointing all primary insurable structures in the high-risk effective and advisory floodplains. Essential facilities (schools, fire, police, E-911, nursing homes, hospitals, nursing homes) are inventoried to the 0.2-pecent (500-year) annual chance flood event. Community assets (government buildings, churches, historical structures, utilities, etc.) are also inventoried. Building characteristics inventoried and verified are Occupancy Class, Foundation Type, First Floor Height, Number of Stories, Area, and Replacement Cost. Default values are populated from the WV Property Tax Assessment Database and if necessary, modified with user-defined values.

The repair costs to rebuild residential or non-residential structures from flood damage are significant insurance rating and mitigation construction factors. In addition, the structure's replacement value and other building characteristics (occupancy class, foundation type, first floor height, number of stories, and structure area) are inputs to model flood damage estimates. Appraisal values from the West Virginia property tax assessment records are the primary data source for buildings exposed in the 1%-annual-chance (100-yr) floodplain. These building replacement values in the statewide tax assessment database are updated every year by the WV Property Tax Division. If necessary, modified or user-defined values are entered in the enhanced building inventory database to override default appraisal records values when no appraisal values exist or are identified in an adjacent parcel; or if multiple buildings on a single parcel must be apportioned. Other data sources for building dollar replacement costs include neighborhood appraisal values, BRIM Insurance, and RS Means.

The following five tables present the building counts, building dollar exposure totals, median building values, residential/non-residential occupancy classes, owner-occupancy, building year, and Post-FIRM percentage. These building characteristics are for structures inventoried in the high-risk effective and advisory flood zones for a 1%-annual-chance (100-year) event.

Table 2.2.14: Building Counts & Building Replacement Values for WV Region 4[37]

BUILDING COUNT RANKING		
Community	Region	State
INCORPORATED		
White Sulphur Springs	1	12
Marlinton	2	15
Rainelle	3	18
Richwood	4	21
Alderson**	5	36
Addison (Webster Springs)	6	63
UNINCORPORATED		
Fayette	1	14
Greenbrier	2	16
Webster	3	25
Nicholas	4	41
Pocahontas	5	42
COUNTY		
Greenbrier	1	15
Fayette	2	18
Webster	3	30
Nicholas	4	31
Pocahontas	5	35

BUILDING $ VALUE RANKING		
Community	Region	State
INCORPORATED		
White Sulphur Springs	1	20
Marlinton	2	29
Ronceverte	3	34
Rainelle	4	52
Alderson**	5	53
Richwood	6	57
UNINCORPORATED		
Greenbrier	1	12
Fayette	2	19
Webster	3	32
Nicholas	4	41
Pocahontas	5	42
COUNTY		
Greenbrier	1	9
Fayette	2	31
Webster	3	36
Pocahontas	4	38
Nicholas	5	40

** Split Community

[37] West Virginia University – Retrieved 2/14/2022 from: https://data.wvgis.wvu.edu/pub/RA/State/CL/

Table 2.2.15: Building Dollar Exposure – Residential vs. Non-Residential[38]

Community	RESIDENTIAL				COMMERCIAL NON-RESIDENTIAL		OTHER NON-RESIDENTIAL		TOTAL BUILDING VALUE		
Community Name	#	% Count	Value ($)	% Value	#	Value ($)	#	Value ($)	#	Value ($)	Rank[1]
Ansted	1	100.0%	$66K	100.0%	0	$0K	0	$0K	1	$66K	19
Fayette County*	1425	93.2%	$50,385K	66.9%	57	$6,523K	47	$18,398K	1529	$75,307K	2
Gauley Bridge	21	46.7%	$869K	27.4%	24	$2,302K	0	$0K	45	$3,171K	11
Meadow Bridge	21	91.3%	$695K	96.8%	2	$23K	0	$0K	23	$718K	16
Montgomery**	13	86.7%	$1,083K	25.2%	1	$1,000K	1	$2,215K	15	$4,298K	
Mount Hope	32	84.2%	$787K	65.1%	4	$101K	2	$322K	38	$1,210K	14
Oak Hill	50	90.9%	$2,262K	95.3%	5	$111K	0	$0K	55	$2,373K	12
Pax	32	82.1%	$925K	67.9%	3	$98K	4	$340K	39	$1,362K	13
Smithers**	63	85.1%	$2,064K	55.8%	8	$837K	3	$796K	74	$3,698K	
FAYETTE	**1658**	**91.1%**	**$59,136K**	**64.1%**	**104**	**$10,994K**	**57**	**$22,071K**	**1819**	**$92,201K**	**2**
Alderson**	121	84.6%	$6,485K	56.7%	17	$1,028K	5	$3,931K	143	$11,443K	5**
Falling Springs	3	100.0%	$157K	100.0%	0	$0K	0	$0K	3	$157K	18
Greenbrier County*	1101	93.1%	$103,297K	77.7%	68	$6,511K	13	$23,065K	1182	$132,873K	1
Rainelle	253	74.4%	$8,392K	55.4%	78	$5,751K	9	$1,006K	340	$15,149K	4
Ronceverte	34	50.7%	$1,354K	4.5%	32	$4,436K	1	$24,000K	67	$29,790K	3
Rupert	58	93.5%	$2,321K	73.2%	2	$291K	2	$561K	62	$3,173K	10
White Sulphur Springs	375	87.6%	$18,910K	36.4%	42	$5,144K	11	$27,940K	428	$51,994K	1
GREENBRIER	**1945**	**87.4%**	**$140,916K**	**57.6%**	**239**	**$23,161K**	**41**	**$80,503K**	**2225**	**$244,580K**	**1**
Nicholas County*	624	90.2%	$21,060K	68.1%	42	$6,646K	26	$3,230K	692	$30,936K	4
Richwood	265	80.5%	$7,518K	55.8%	47	$1,399K	17	$4,556K	329	$13,473K	6
Summersville	23	63.9%	$1,497K	11.3%	11	$1,657K	2	$10,109K	36	$13,263K	7
NICHOLAS	**912**	**86.3%**	**$30,075K**	**52.1%**	**100**	**$9,703K**	**45**	**$17,895K**	**1057**	**$57,672K**	**5**
Durbin	23	85.2%	$645K	72.4%	2	$157K	2	$89K	27	$891K	15
Marlinton	286	75.1%	$15,309K	44.3%	82	$9,635K	13	$9,586K	381	$34,529K	2
Pocahontas County*	502	93.0%	$23,166K	84.7%	23	$2,460K	15	$1,731K	540	$27,358K	5
POCAHONTAS	**811**	**85.5%**	**$39,120K**	**62.3%**	**107**	**$12,252K**	**30**	**$11,406K**	**948**	**$62,779K**	**4**
Addison	107	84.9%	$3,855K	32.7%	15	$3,053K	4	$4,892K	126	$11,799K	8
Camden-On-Gauley	13	61.9%	$263K	45.9%	4	$32K	4	$279K	21	$573K	17
Cowen	28	80.0%	$814K	15.4%	4	$92K	3	$4,375K	35	$5,281K	9
Webster County*	839	94.1%	$25,759K	51.1%	27	$2,685K	26	$21,957K	892	$50,400K	3
WEBSTER	**987**	**91.9%**	**$30,690K**	**45.1%**	**50**	**$5,861K**	**37**	**$31,502K**	**1074**	**$68,053K**	**3**
SUMMARY	**6,313**	**88.5%**	**$299,937K**	**56.3%**	**600**	**$61,971K**	**210**	**$163,376K**	**7,123**	**$525,285K**	

5**: Ranking for split community of Alderson is based on the sum of values in both parts of the town:

Alderson**	175	0.0%	$8,869K	60.4%	24	$1,482K	10	$4,332K	209	$14,683K	5

*** Unincorporated**

**** Split Community**

[38] West Virginia University – Retrieved 2/14/2022 from: https://data.wvgis.wvu.edu/pub/RA/State/CL/

Table 2.2.16: Building Dollar Breakdown by Single Family[39]

Community		SINGLE FAMILY HOME		MANUFACTURED (MOBILE) HOME			SINGLE FAMILY TOTAL		
Community Name	County	Count	Value ($)	Count	% Count	Value ($)	Count	Value ($)	Group Rank[1]
Ansted	FAYETTE	1	$66K	0	0.0%	$0K	1	$66K	18
Fayette County*	FAYETTE	1165	$44,640K	239	17.0%	$4,131K	1404	$48,771K	2
Gauley Bridge	FAYETTE	17	$619K	1	5.6%	$10K	18	$629K	15
Meadow Bridge	FAYETTE	13	$551K	7	35.0%	$113K	20	$664K	13
Montgomery**	FAYETTE	11	$931K	1	8.3%	$15K	12	$945K	3
Mount Hope	FAYETTE	31	$771K	1	3.1%	$16K	32	$787K	12
Oak Hill	FAYETTE	47	$2,173K	2	4.1%	$39K	49	$2,212K	7
Pax	FAYETTE	28	$827K	4	12.5%	$97K	32	$925K	10
Smithers**	FAYETTE	54	$1,802K	6	10.0%	$77K	60	$1,879K	2
	FAYETTE	**1367**	**$52,379K**	**261**	**16.0%**	**$4,499K**	**1628**	**$56,877K**	**2**
Alderson**	GREENBRIER	107	$5,786K	10	8.5%	$248K	117	$6,034K	1
Falling Springs	GREENBRIER	2	$137K	1	33.3%	$20K	3	$157K	17
Greenbrier County*	GREENBRIER	822	$96,262K	264	24.3%	$6,626K	1086	$102,888K	1
Rainelle	GREENBRIER	229	$7,621K	16	6.5%	$579K	245	$8,200K	3
Ronceverte	GREENBRIER	29	$1,138K	0	0.0%	$0K	29	$1,138K	9
Rupert	GREENBRIER	45	$1,974K	11	19.6%	$329K	56	$2,302K	6
White Sulphur Springs	GREENBRIER	338	$15,856K	4	1.2%	$125K	342	$15,981K	1
	GREENBRIER	**1572**	**$128,774K**	**306**	**16.3%**	**$7,926K**	**1878**	**$136,699K**	**1**
Nicholas County*	NICHOLAS	455	$17,833K	165	26.6%	$2,939K	620	$20,772K	5
Richwood	NICHOLAS	217	$6,725K	42	16.2%	$630K	259	$7,356K	4
Summersville	NICHOLAS	19	$1,423K	3	13.6%	$55K	22	$1,478K	8
	NICHOLAS	**691**	**$25,981K**	**210**	**23.3%**	**$3,624K**	**901**	**$29,605K**	**5**
Durbin	POCAHONTAS	15	$499K	7	31.8%	$130K	22	$629K	14
Marlinton	POCAHONTAS	244	$8,263K	22	8.3%	$354K	266	$8,617K	2
Pocahontas County*	POCAHONTAS	400	$21,017K	90	18.4%	$1,504K	490	$22,521K	4
	POCAHONTAS	**659**	**$29,779K**	**119**	**15.3%**	**$1,988K**	**778**	**$31,767K**	**3**
Addison	WEBSTER	95	$3,434K	11	10.4%	$211K	106	$3,645K	5
Camden-On-Gauley	WEBSTER	9	$171K	4	30.8%	$92K	13	$263K	16
Cowen	WEBSTER	13	$423K	15	53.6%	$391K	28	$814K	11
Webster County*	WEBSTER	598	$20,815K	238	28.5%	$4,885K	836	$25,700K	3
	WEBSTER	**715**	**$24,842K**	**268**	**27.3%**	**$5,580K**	**983**	**$30,422K**	**4**
SUMMARY		**5,004**	**$261,756K**	**1,164**	**19.6%**	**$23,616K**	**6,168**	**$285,371K**	

* Unincorporated

** Split Community

[39] West Virginia University – Retrieved 2/14/2022 from: https://data.wvgis.wvu.edu/pub/RA/State/CL/

Table 2.2.17: Building Year, Building Value, Building Value Single Family Dwelling (RES 1 occupancy class)[40]

Community Name	County	Average Building Year	Median Building Year	Average Building Value	Median Building Value	Average Building Value RES 1	Median Building Value RES 1
Ansted	FAYETTE	1946	1946	$66K	$66K	$66K	$66K
Fayette County*	FAYETTE	1949.1	1945	$44K	$29K	$35K	$28K
Gauley Bridge	FAYETTE	1953.2	1947.5	$70K	$36K	$41K	$28K
Meadow Bridge	FAYETTE	1944.6	1936	$31K	$25K	$33K	$29K
Montgomery**	FAYETTE	1953.1	1950	$287K	$55K	$83K	$50K
Mount Hope	FAYETTE	1926.9	1920	$32K	$26K	$25K	$26K
Oak Hill	FAYETTE	1936.8	1933.5	$43K	$27K	$45K	$28K
Pax	FAYETTE	1940.1	1940	$35K	$24K	$29K	$24K
Smithers**	FAYETTE	1951.6	1947.5	$50K	$25K	$33K	$25K
	FAYETTE	**1948.2**	**1941**	**$46K**	**$29K**	**$38K**	**$31K**
Alderson**	GREENBRIER	1947.3	1948	$80K	$50K	$54K	$50K
Falling Springs	GREENBRIER	1997.7	1995	$52K	$44K	$52K	$44K
Greenbrier County*	GREENBRIER	1970.8	1976	$98K	$38K	$94K	$37K
Rainelle	GREENBRIER	1957.9	1950	$45K	$35K	$33K	$34K
Ronceverte	GREENBRIER	1931.4	1920	$99K	$41K	$40K	$41K
Rupert	GREENBRIER	1967.4	1967	$51K	$36K	$40K	$33K
White Sulphur Springs	GREENBRIER	1944.2	1940	$82K	$46K	$50K	$45K
	GREENBRIER	**1960.6**	**1960**	**$84K**	**$40K**	**$82K**	**$43K**
Nicholas County*	NICHOLAS	1966.6	1970	$45K	$28K	$34K	$26K
Richwood	NICHOLAS	1942.5	1944	$39K	$20K	$28K	$21K
Summersville	NICHOLAS	1975.7	1975.5	$93K	$70K	$65K	$60K
	NICHOLAS	**1959.3**	**1960**	**$44K**	**$26K**	**$38K**	**$30K**
Durbin	POCAHONTAS	1942.2	1940	$33K	$25K	$28K	$25K
Marlinton	POCAHONTAS	1942.7	1940	$91K	$30K	$35K	$27K
Pocahontas County*	POCAHONTAS	1967.5	1975	$51K	$35K	$46K	$33K
	POCAHONTAS	**1956.6**	**1960**	**$66K**	**$32K**	**$45K**	**$34K**
Addison	WEBSTER	1945	1942	$94K	$35K	$36K	$31K
Camden-On-Gauley	WEBSTER	1939.3	1930	$27K	$17K	$20K	$17K
Cowen	WEBSTER	1973.3	1977	$151K	$28K	$29K	$28K
Webster County*	WEBSTER	1964.8	1970	$49K	$26K	$31K	$25K
	WEBSTER	**1962**	**1963**	**$57K**	**$27K**	**$35K**	**$30K**
State Statistics		**1959.1**	**1960**	**$91K**	**$37K**	**$57K**	**$44K**

* Unincorporated

** Split Community

[40] West Virginia University – Retrieved 2/14/2022 from: https://data.wvgis.wvu.edu/pub/RA/State/CL/

Table 2.2.18: Initial FIRM Effective Date, Pre-FIRM/Post-FIRM percentages[41]

CID	Community Name	County	Initial FIRM Effective Date	Total Building Count	% Pre-FIRM	% Post-FIRM	% Unknown
540027	Ansted	FAYETTE	10/30/1981	1	100%	0%	0%
540026	Fayette County*	FAYETTE	3/4/1988	1529	74%	13%	7%
540293	Fayetteville	FAYETTE	3/4/1988				
540294	Gauley Bridge	FAYETTE	9/18/1991	45	93%	4%	0%
540028	Meadow Bridge	FAYETTE	1/2/1991	23	65%	17%	17%
540029	Montgomery**	FAYETTE	6/1/1982	15	47%	27%	27%
540280	Mount Hope	FAYETTE	8/10/1979	38	95%	5%	0%
540031	Oak Hill	FAYETTE	1/18/1980	55	89%	9%	2%
540032	Pax	FAYETTE	8/10/1979	39	74%	18%	8%
540033	Smithers**	FAYETTE	4/15/1982	74	73%	16%	7%
		FAYETTE		**1819**	**75%**	**13%**	**7%**
540041	Alderson**	GREENBRIER	9/27/1991	143	90%	10%	0%
540243	Falling Springs	GREENBRIER	9/24/1984	3	0%	100%	0%
540281	Lewisburg	GREENBRIER	3/25/1977				
540040	Greenbrier County*	GREENBRIER	1/15/1988	1182	63%	27%	1%
540244	Quinnwood	GREENBRIER	2/27/1981				
540228	Rainelle	GREENBRIER	11/19/1987	340	79%	1%	1%
540043	Ronceverte	GREENBRIER	5/17/1990	67	90%	10%	0%
540044	Rupert	GREENBRIER	8/24/1984	62	73%	15%	2%
540045	White Sulphur Springs	GREENBRIER	8/1/1978	428	89%	9%	0%
		GREENBRIER		**2225**	**73%**	**18%**	**1%**
540146	Nicholas County*	NICHOLAS	11/6/1991	692	70%	21%	8%
540147	Richwood	NICHOLAS	9/27/1991	329	86%	6%	8%
540148	Summersville	NICHOLAS	8/24/1984	35	60%	37%	3%
		NICHOLAS		**1056**	**75%**	**17%**	**8%**
540158	Durbin	POCAHONTAS	8/24/1984	27	67%	11%	7%
540159	Marlinton	POCAHONTAS	10/17/1989	381	87%	11%	2%
540283	Pocahontas County*	POCAHONTAS	10/17/1989	540	63%	27%	5%
		POCAHONTAS		**948**	**73%**	**20%**	**4%**
540204	Addison	WEBSTER	2/16/1990	126	90%	6%	3%
540205	Camden-On-Gauley	WEBSTER	8/24/1984	21	91%	5%	0%
540206	Cowen	WEBSTER	8/24/1984	35	66%	34%	0%
540203	Webster County*	WEBSTER	2/16/1990	892	68%	23%	7%
		WEBSTER		**1074**	**71%**	**21%**	**7%**

*** Unincorporated**
**** Split Community**

*** Building Count, Pre/Post FIRM, and percentage unknown data is not available through WVU.

For Region 4, all 26 incorporated communities participate in the NFIP except for Hillsboro and Thurmond.

[41] West Virginia University – Retrieved 2/14/2022 from: https://data.wvgis.wvu.edu/pub/RA/State/CL/

Historical Occurrences

Table 2.2.19: Historical Flood Events for the WV Region 4 Planning Area[42]

County	Events	Deaths	Injuries	Property Damage	Crop Damage	Annualized Losses[43]
BECKWITH	1	0	0	$900000	$0	$36,000
BELLWOOD	2	0	0	$2015000	$0	$80,600
BOOMER	2	0	0	$105000	$0	$4,200
BROOKLYN	1	0	0	$10000	$0	$400
CARLISLE	1	0	0	$0	$0	$0
COAL FIELD	1	0	0	$4000	$0	$160
DEEPWATER	1	0	0	$10000	$0	$400
FAYETTE ARPT	1	0	0	$2000	$0	$80
GATEWOOD	1	0	0	$6000	$0	$240
GAYMONT	1	0	0	$50000	$0	$2,000
GLADE	1	0	0	$10000	$0	$400
KILSYTH	1	0	0	$0	$0	$0
KIMBERLY	2	0	0	$125000	$0	$5,000
LIVELY	1	0	0	$0	$0	$0
LOCHGELLY	1	0	0	$2000	$0	$80
LUCAS	1	0	0	$10000	$0	$400
MINDEN	1	0	0	$25000	$0	$1,000
MONTGOMERY	2	0	0	$1002000	$0	$40,080
MT HOPE	1	0	0	$3000	$0	$120
Oak Hill	1	0	0	$2000	$0	$80

[42] National Centers for Environmental Information: Retrieved on 02/10/2022
[43] Annualized losses are calculated by dividing the total losses on record with NCEI (1996 – 2021) by the number of years of record, and in this particular instance, that time period is 25 years.

County	Events	Deaths	Injuries	Property Damage	Crop Damage	Annualized Losses[43]
PAGE	1	0	0	$20000	$0	$800
PAGE	4	0	0	$20000	$0	$800
Pax	1	0	0	$1515000	$0	$60,600
RUSSELLVILLE	1	0	0	$3000	$0	$120
WEST PORTION	2	0	0	$47000000	$0	$1,880,000
WHIPPLE	4	0	0	$5000	$0	$200
COUNTYWIDE	7	0	0	$2,165,000	$0	$86,600
Fayette County Total	41	0	0	$54,989,000	$0	$2,199,560
ALDERSON	8	0	0	$973560	$0	$38,942
ALVON	1	0	0	$20000	$0	$800
ASBURY	2	0	0	$0	$0	$0
BLAKE MILLS	1	0	0	$0	$0	$0
BLUE SULPHUR SPGS	3	0	0	$0	$0	$0
CALDWELL	4	0	0	$50000	$0	$2,000
CHARMCO	3	0	0	$1005000	$0	$40,200
CHICHTON	1	0	0	$0	$0	$0
CORNSTALK	1	0	0	$0	$0	$0
Countywide	4	0	0	$1400000	$0	$56,000
CRAWLEY	1	0	0	$50000	$0	$2,000
DAWSON	2	0	0	$0	$0	$0
DENNIS	1	0	0	$0	$0	$0
EAST RAINELLE	4	0	0	151000	$0	$6,040
ESTY	1	0	0	$75000	$0	$3,000

County	Events	Deaths	Injuries	Property Damage	Crop Damage	Annualized Losses[43]
FAIRLEA	1	0	0	$0	$0	$0
FT SPRING	1	0	0	$0	$0	$0
GRASSY MEADOWS	1	0	0	$0	$0	$0
HARTS RUN	1	0	0	$0	$0	$0
HENNING	1	0	0	$0	$0	$0
HINES	3	0	0	$30000	$0	$1,200
KESSLER	3	0	0	$0	$0	$0
LESLIE	1	0	0	$0	$0	$0
LEWISBURG	2	0	0	$30000	$0	$1,200
Maxwelton	1	0	0	$10000	$0	$400
MC ROSS	1	0	0	$0	$0	$0
MEADOW BLUFF	1	0	0	$0	$0	$0
Neola	2	0	0	$0	$50,000	$2,000
RAINELLE	5	16	0	$0	$0	$0
RENICK	2	0	0	$2000	$0	$80
RICHLANDS	1	0	0	$0	$0	$0
ROCKLAND	1	0	0	$0	$0	$0
RONCEVERTE	1	0	0	$10000	$0	$400
SAM BLACK CHURCH	1	0	0	$0	$0	$0
SMOOT	1	0	0	$0	$0	$0
SUE	1	0	0	$15000	$0	$600
Greenbrier County Total	**88**	**16**	**0**	**$43,949,560**	**$50,000**	**$1,759,982**
ALLINGDALE	1	0	0	$4000000	$0	$160,000

County	Events	Deaths	Injuries	Property Damage	Crop Damage	Annualized Losses[43]
BAYS	1	0	0	$22000000	$0	$880,000
BENTREE	1	0	0	$2000	$0	$80
Birch River	1	0	0	$5000	$0	$200
CALVIN	1	0	0	$1000	$0	$40
Countywide	3	0	0	$5,130,000	$0	$205,200
CRAIGSVILLE	5	0	0	$393000	$0	$15,720
DRENNEN	2	0	0	$220000	$0	$8,800
GILBOA	2	0	0	$45000	$0	$1,800
MORRIS	1	0	0	$10000	$0	$400
MUDDLETY	1	0	0	$5000	$0	$200
NORTHERN PORTION	1	0	0	$200000	$0	$8,000
PERSINGER	1	0	0	$2000	$0	$80
POOL	1	0	0	$3000	$0	$120
RICHWOOD	5	0	0	$110000	$0	$4,400
Summersville	4	0	0	$30000	$0	$1,200
TIOGA	1	0	0	$25000	$0	$1,000
Nicholas County Total	**37**	**0**	**0**	**$32,181,000**	**$0**	**$1,287,240**
BARTOW	3	0	0	$7000	$0	$280
BUCKEYE	1	0	0	$25000	$0	$1,000
CLAWSON	1	0	0	$300000	$0	$12,000
CLOVER LICK	1	0	0	$5000	$0	$200
Countywide	10	0	0	$2,797,000	$0	$
DEER CREEK	1	0	0	$1000	$0	$40

County	Events	Deaths	Injuries	Property Damage	Crop Damage	Annualized Losses[43]
DUNMORE	1	0	0	$15000	$0	$600
DURBIN	3	0	0	$108000	$0	$4,320
Edray	1	0	0	$5000	$0	$200
GREEN BANK	1	0	0	$2000	$0	$80
HUNTERSVILLE	3	0	0	$7000	$0	$280
LINWOOD	1	0	0	$200000	$0	$8,000
MARLINTON	3	0	0	$10000	$0	$400
MILL PT	1	0	0	$2000	$0	$80
NORTHERN HALF	1	0	0	$900000	$0	$36,000
OLIVE	1	0	0	$20000	$0	$800
SEEBERT	1	0	0	$10000	$0	$400
SLATY FORK	6	0	0	$367000	$0	$14,680
THORNWOOD	1	0	0	$15000	$0	$600
WANLESS	1	0	0	$500	$0	$20
WATOGA	1	0	0	$50000	$0	$2,000
WEST PORTION	1	0	0	$5000	$0	$200
Pocahontas County Total	**47**	**0**	**0**	**$4,851,500**	**$0**	**$194,060**
12N WEBSTER SPRINGS	1	0	0	$1130000	$0	$45,200
BERGOO	4	0	0	$15000	$0	$600
BIG RUN	1	0	0	$47000	$0	$1,880
CAMDEN ON GAULEY	3	0	0	$20000	$0	$800
Cleveland	2	0	0	$5010000	$0	$200,400
Countywide	17	0	0	$5,170,000	$0	$206,800

County	Events	Deaths	Injuries	Property Damage	Crop Damage	Annualized Losses[43]
COWEN	2	0	0	$1020000	$0	$40,800
Diana	2	0	0	$7000	$0	$280
DONALDSON	1	0	0	$20000	$0	$800
DYER	2	0	0	$4000	$0	$160
EAST PORTION	1	0	0	$3000	$0	$120
ERBACON	1	0	0	$25000	$0	$1,000
GUARDIAN	1	0	0	$3000	$0	$120
HACKER VLY	2	0	0	$25000	$0	$1,000
STROUDS	1	0	0	$12000	$0	$480
WAINVILLE	2	0	0	$0	$0	$0
WANETA	1	0	0	$278000	$0	$11,120
WEBSTER SPGS	4	0	0	$1000	$0	$40
WHEELER	1	0	0	$652500	$0	$26,100
Webster County Total	**50**	**0**	**0**	**$12,317,500**	**$0**	**$492,700**
Total	**263**	**16**	**0**	**$148,288,560**	**$50,000**	**$5,933,542**

The number of flooding events recorded by the NCEI and their economic costs are shown in the table above. Fayette County gives an example of the unpredictability and destructive force of flooding. Of the total of almost $55 million in property damage, $47 million is attributed to the flood of July 8th, 2001.

June 23, 2016

On Thursday June 23, 2016, heavy rains swept through the Mid-Ohio Valley and into Clay, Nicholas, Webster, and Greenbrier counites in West Virginia, dropping up to 10 inches of rain on the region. 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.

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. The Greenbrier Resort, in Greenbrier County, was cut off from the rest of the county with the closing of U.S. 60, stranding employees and guests. By the evening of the 24th, Appalachian Power was reporting more than 34,000 customers without power. In addition to the large rain totals, the storm line produced wind gusts more than 60 mph according to the National Weather Service (Desrochers & Beck, 2016).

The speed of the flooding was demonstrated in White Sulfur Springs, in Greenbrier County. In less than an hour of heavy rains, Howard's Creek overflowed its banks and engulfed whole neighborhoods. Dozens of homes in the area were destroyed, forcing 150 people into a shelter set up at the civic center on the night of 24th. There were 15 confirmed deaths in Greenbrier County (Gutman, 2016). As the storm continued into the night, flash flooding in small creeks gave way to flooding of larger streams. The Cherry River swept through downtown Richwood (e-WV|Flood of 2016(wvencyclopedia.org).

There were twelve water rescues performed in Webster County overnight on the 24th according to the Webster County Emergency Manager Richard Rose. "Everything from vehicles to campers to boats to homes knocked off the foundation and numerous propane tanks floating down the river" (Beck & Kersey, 2016).

The economic damage from these storms, including both the flooding and strong winds, will take weeks, if not months or years, to fully quantify.

July 8th, 2001

In a 3-to-6-hour period, rains of 3 to 5.5 inches were common within that band. Maximum rain rates of 1.5 to 2.5 inches per hour occurred. Upslope, into these higher elevations, likely aided these rain amounts. Despite the initially dry topsoil and low stream levels, the steep terrain and narrow valleys were quickly saturated (NCEI). As explained by Brown in his report on the event an average of 5 inches of rain fell in the Fayette County area within a twenty-four-hour period (2002). While the damage was extensive in a number of areas in the region, Fayette County was the hardest hit, accumulating up to $14 million worth of road damage and $11 million worth of damage to local water and sewer infrastructure, leading to a county wide boil water advisory (Brown, 2002). For many affected residents, this flood was not a matter of property loss, but of survival. Many along the small streams had to escape "walls of water" within minutes (Brown, 2002). A father of a family in Dorothy thought, "We'll never get out of this alive" (Brown, 2002). Water roared out of the hollows and onto the wider valleys, carrying trees, rocks, mud, and pieces of homes. As the steep topsoil turned into a liquid, considerable damage was done to dwellings, due to the runoff and debris slides (NCEI.) Fayette County, along with 23 other counties was declared a federal disaster area. Brown's observation that "houses, cars, roads, and utility services were washed away in areas that had never flooded before" perfectly showcases just how dangerous and damaging flash flooding can be (2002.)

March 13th, 2010

After a cold and snowy February, a switch to a warmer pattern began during the second week of the month. This started the runoff from a deep snowpack over the West Virginia mountainous counties. A widespread 2 to 4 inches of water resided in the snowpack with some ridgetops exceeding 6 inches of water in the snow. Flood concerns were high preceding the event, but mainly for the central and northern

mountain counties of the state. The deepest snow cover still resided across the high terrain in those counties. Prior to the heavy rain, the snow cover over Fayette and Raleigh Counties had already melted away. However, the ground was left soggy and primed to allow for a quick runoff. Oak Hill in Fayette County had 2.95 inches ending at dawn on the 13th. Major small stream flooding was widespread in Raleigh and Fayette Counties. There were 2 direct fatalities from Raleigh County. Flooding of less severity occurred in Kanawha, Nicholas, Boone, and Wyoming Counties. No homes were destroyed in Fayette County, but 38 homes had major damage. Several vehicles were flooded. Damage to the public infrastructure was estimated at around a half million dollars (NCEI).

July 13th, 2015

In a northwest flow aloft, clusters of showers and thunderstorms formed during the evening hours on the 12th. Two distinct areas of heavy rain occurred, including toward dawn on the 13th over the headwaters of the Elk River from Sutton to Webster Springs and to a lesser extent south into Nicholas County around Richwood. Webster Springs observed 3.06 inches. Numerous roads were closed by flooding streams or runoff and debris off mountainsides. This included Route 15 and 20 between Webster Springs and Diana. Runoff came off the steep mountainsides and ran through the streets of Webster Springs. Water came down off of Spillman Mountain. The mountainside had a 26 percent grade or slope. The small unnamed stream overflowed. Its water ran down Euclyde Street and tore up the asphalt on Miller Mountain Road in front of the hospital. Water got inside the hospital too, causing it to close temporarily. The kitchen area of the hospital was most affected. A few windows were shattered (NCEI).

Probability of Future Events

The region experiences 10.52 flood events annually. Flood events will remain a threat in the region, and the probability is highly likely (100 percent annual probability) that flooding events will occur each year i. The participating jurisdictions and unincorporated areas have risk to flooding, though not all areas will experience flood. The probability of future flood events based on magnitude and according to best available data is illustrated in the figures above, which indicates those areas susceptible to the 1-percent annual chance flood (100-year floodplain) and the 0.2-percent annual chance flood (500-year floodplain).

It can be inferred from the floodplain location maps, previous occurrences, and repetitive loss properties that risk varies throughout the region.

Loss Estimates

The National Centers for Environmental Information records show that of the 187 flooding events that occurred between 1996 and 2021, 155 were flash floods and 108 were non-flash floods. Reported property damage, historically, has averaged $408,421 per flooding event in Region 4. Using the historical probability of a flooding event, which equals 10.52 events per year (263 events / 25 years), it is possible to estimate the yearly loss using the average per event property loss. It is estimated that flooding will cause $5,931,542 in property loss annually. The worst-case scenario (WCS) for flooding based on the research is the flood of June 8th, 2001, the details of which are discussed in the historical occurrences section of the profile. That single event caused a reported $47 Million in property damage.

National Flood Insurance Program (NFIP) Compliance

The NFIP also identifies the town of Thurmond, in Fayette County, as being a community with an identified hazard area that is not enrolled in the program. Each jurisdiction that is enrolled in the NFIP has a

designated coordinator, also referred to as the floodplain manager. These individuals maintain the floodplain ordinance and ensure that any development is complaint with that ordinance. Generally, floodplain managers/coordinators provide three services: floodplain identification, management, and outreach.

As part of the NFIP, Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties are considered in assessing the risk and vulnerability of a community and inform future planning and development. RL properties are those for which two or more losses of at least $1,000 each have been paid under the NFIP within any 10-year period since 1978. SRL properties are residential properties that have at least 4 NFIP payments of over $5,000 each and the cumulative amount of such claims exceeds $20,000, or at least two separate claims payments with the cumulative amount exceeding the market value of the building (FEMA). The following is a list of these properties in Region 4.

Figure 2.2.13: Repetitive Losses in the WV Region 4 Planning Area[44]

Jurisdiction	Properties	Property Type	Number of Losses	Building Payments	Contents Payments	Total Paid
Gauley Bridge	1	1 Nonresidential / Business	3	$47,782	$3,315	$51,097
Mount Hope	6	6 Residential	17	$123,396	$20,147	$143,544
Pax	4	2 Residential, 2 Nonresidential	8	$45,990	$2,103	$48,093
Fayette County (unincorporated)	17	16 Residential, 1 Nonresidential	40	$3,932,312	$36,734	$429,046
Fayette County Total	28	24 Residential, 4 Nonresidential / Business	68	$4,149,480	$62,299	$671,780
Town of Alderson	17	14 Residential, 1 Business, 1 Other Nonresidential, 1 Other Residential	37	$406,776	$142,222	$548,999

[44] W.V. Office of the Insurance Commission -Repetitive Loss data provided 02/18/2022

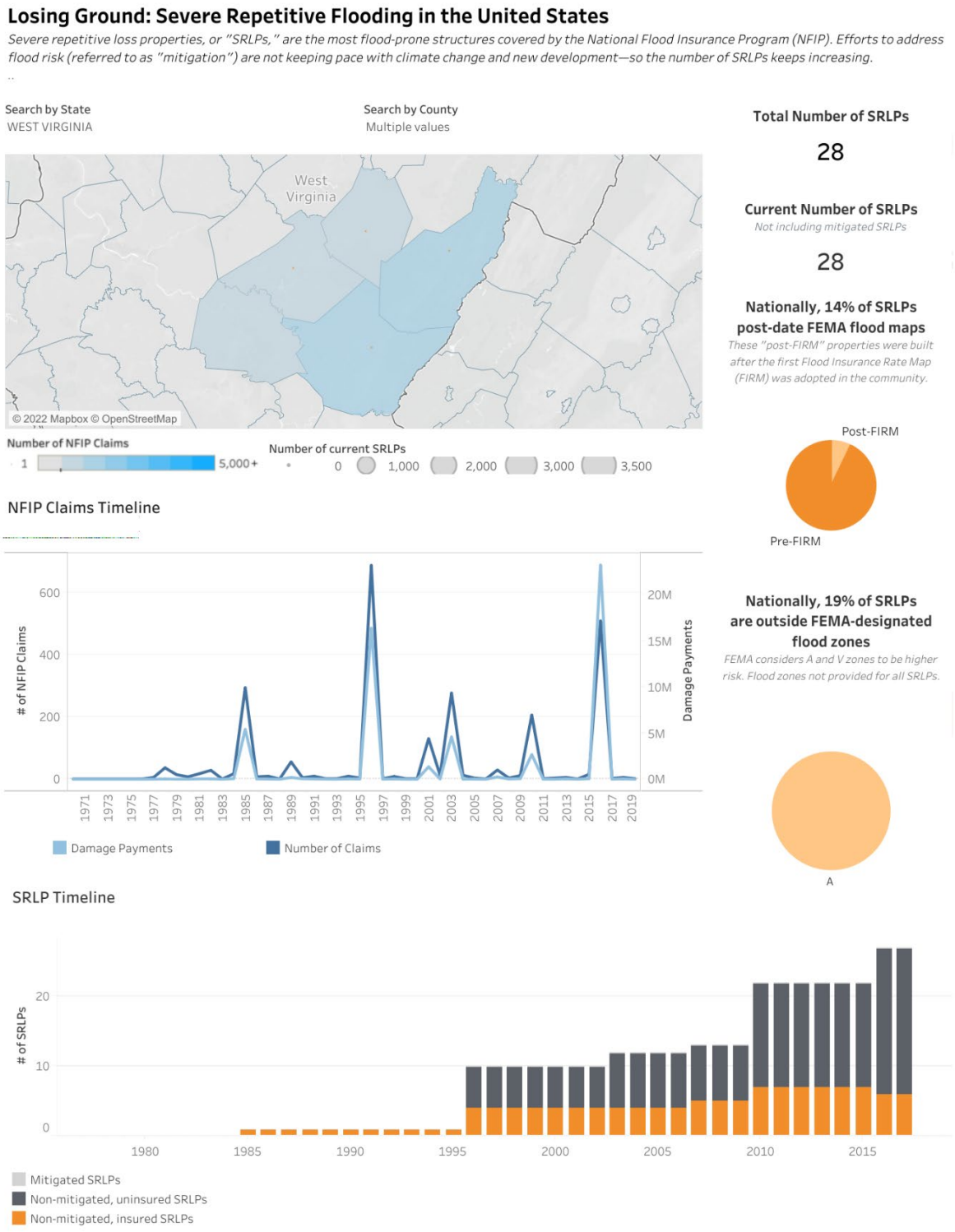
Jurisdiction	Properties	Property Type	Number of Losses	Building Payments	Contents Payments	Total Paid
Town of Rainelle	16	13 Residential, 1 Multi-family, 2 Business	35	$1,138,469	$132,678	$1,271,148
Town of Rupert	4	4 Residential	9	$282,540	$50,000	$332,540
City of White Sulphur Springs	1	1 Residential	2	$51,298	$20,000	$71,298
Greenbrier County (unincorporated)	50	49 Residential, 1 Other Nonresidential	114	$2,118,884	$501,862	$2,620,747
Greenbrier County Total	88	81 Residential, 3 Business, 2 Other Nonresidential, 1 Other Residential	197	$3,997,967	$846,762	$4,844,732
City of Richwood	29	20 Residential, 8 Business, 1 Nonresidential / Other	62	$3,940,516	$1,408,410	$5,348,926
City of Summersville	1	1 Nonresidential / Other	2	$0	$29,440	$29,440
Nicholas County (unincorporated)	3	3 Residential	6	$75,123	$157	$75,280
Nicholas County Total	33	23 Residential, 8 Business, 2 Nonresidential / Other	70	$4,015,639	$1,438,007	$5,453,646
Town of Marlinton	103	68 Residential, 1 Multi-family, 5 Business, 1 Other Residential, 28	267	$5,897,176	$4,063,136	$9,960,312

Jurisdiction	Properties	Property Type	Number of Losses	Building Payments	Contents Payments	Total Paid
		Other Nonresidential				
Pocahontas County (unincorporated)	10	6 Residential, 2 Business, 2 Other Nonresidential	26	$388,802	$140,992	$529,794
Pocahontas County Total	113	74 Residential, 1 Multi-family, 7 Business, 1 Other Residential, 30 Other Nonresidential	293	$6,284,978	$4,204,128	$10,490,106
Town of Addison	1	1 Residential	2	$18,876	$0	$18,876
Town of Camden-On-Gauley	4	4 Residential	11	$106,859	$25,409	$132,269
Town of Cowen	1	1 Residential	2	$3,831	$2,318	$6,149
Webster County (unincorporated)	15	13 Residential, 2 Nonresidential	36	$364,466	$130,319	$494,785
Webster County Total	21	19 Residential, 2 Nonresidential	51	$494,032	$158,046	$652,079

Jurisdictions throughout Region 4 have undertaken a number of flood mitigation projects. Since the last hazard mitigation plan update (in 2016), Nicholas County has completed one buyout, Pocahontas County is in the process of buying one, Fayette County completed 10 buyouts, Greenbrier County has acquired 45 homes and demolished one.

Severe repetitive loss properties, or “SRLPs” are the most flood prone structures covered by the National Flood Insurance Program (NFIP). The follow figures are from the Natural Resources Defense Council, obtained from FEMA. SRLP data as of May 31, 2018, and NFIP claims data as of September 30, 2019.

Figure 2.2.14: Severe Repetitive Loss Properties[45]



[45] Natural Resources Defense Council – Losing Ground – Retrieved on 2/22/2022: https://www.nrdc.org/resources/losing-ground-flood-visualization-tool

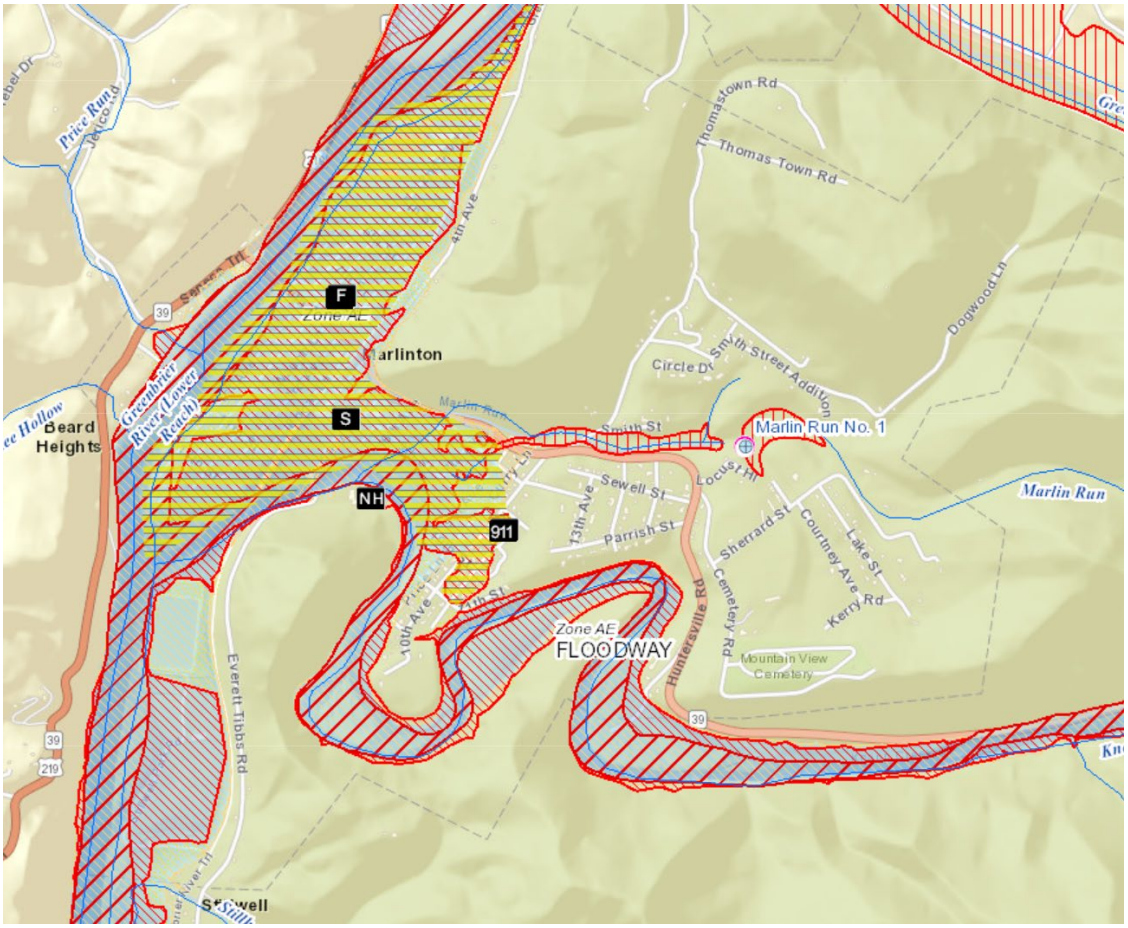
Vulnerability & Risk Assessment

Social Vulnerability

A total of 170 community assets (non-historical) were inventoried in the 1%-annual-chance floodplain for the Region 4 Planning and Development Council (following table). Fayette County has the largest number of inventoried community resources of which the majority are religious buildings. Besides Fayette County ranked 10th of counties in the statewide risk assessment, Nicholas (ranked 16th), Webster (18th), and Greenbrier (24th) counties also have significant numbers of churches/religious buildings. Fayette County is ranked 10th in the State for the number of inventoried utility buildings and Pocahontas County (ranked 11th) has 10 government buildings in the high-risk floodplain. The town of Marlinton (ranked 3rd of all incorporated areas) has six government and two utility buildings (ranked 5th) located in the floodplain. It should also be noted that the Town of White Sulphur Springs in Greenbrier County has the highest number of structures, and highest building value exposure in a 1% floodplain.

The following figure is a closer view of the Town of Marlinton, located in Pocahontas County. According to the WV Flood Tool, there four are critical facilities (a school, fire station, nursing home, and a 911 dispatch center) located in the 100-year flood zone, and a repetitive loss area.

Figure 2.2.15: Marlinton 100-year Flood Zone & Repetitive Loss Area[46]



[46] WV University – WV Flood Tool: Retrieved 2/15/2022 from: https://www.mapwv.gov/flood/map

Figure 2.2.16: Town of Rupert Mitigated Properties near the Big Clear Creek

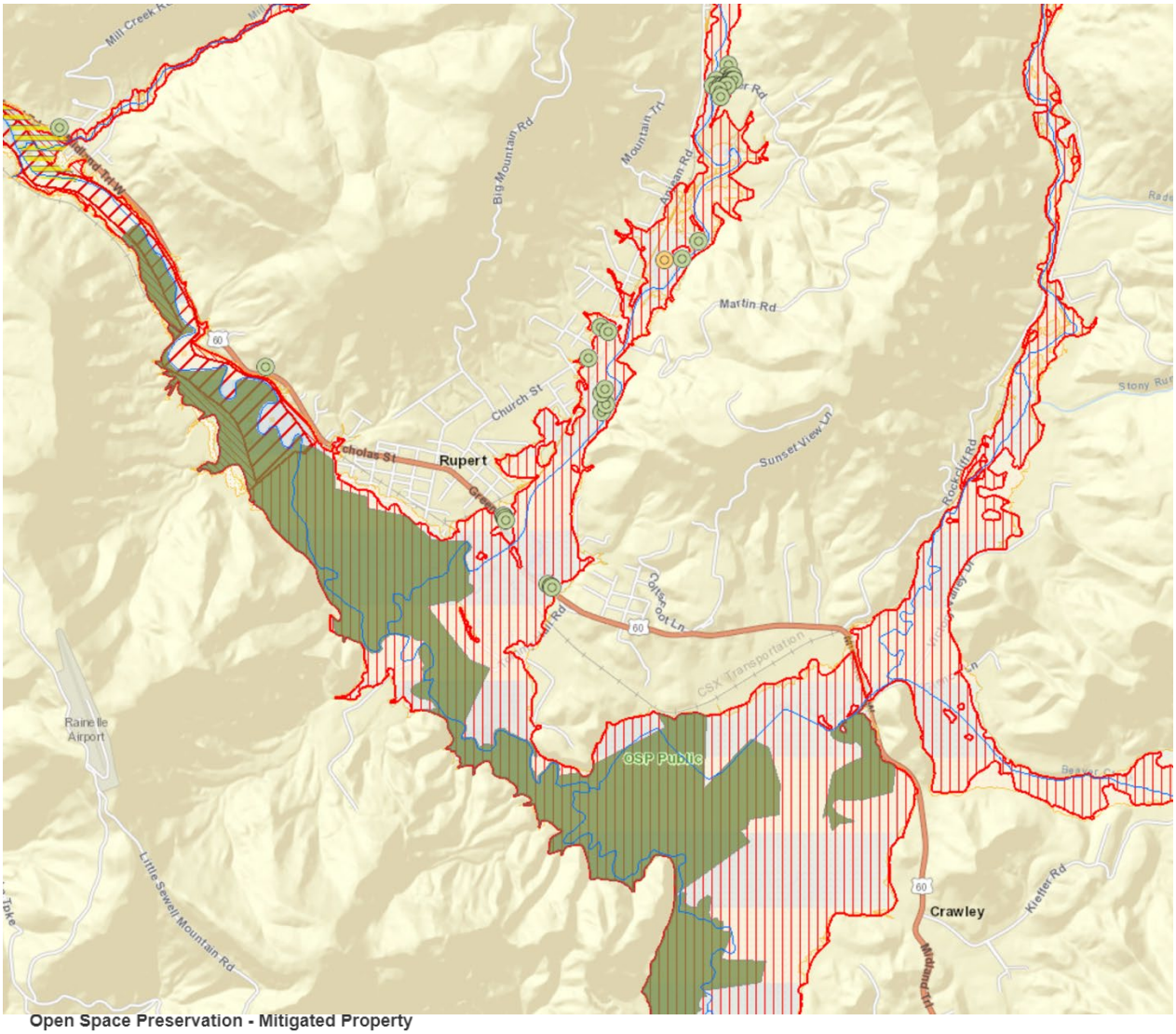


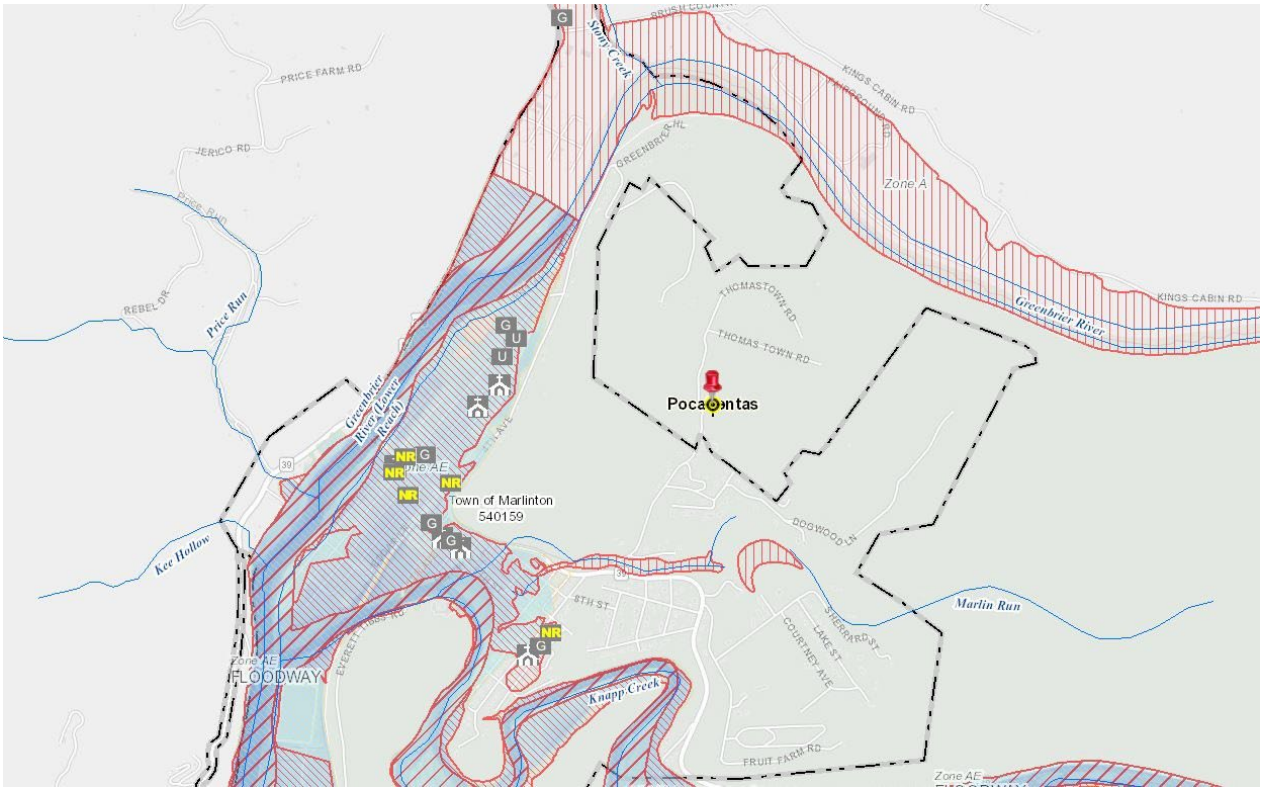
Table 2.2.20: Community Assets Vulnerable to Flooding[47]

Community Name	County	Religious Org.	Govt. Bldg.	Utility	Education	EMS	Other	Total (Non-Historical)
Ansted	FAYETTE	0	0	0	0	0	0	0
Fayette County*	FAYETTE	34	7	4	0	0	0	45
Fayetteville	FAYETTE	0	0	0	0	0	0	0
Gauley Bridge	FAYETTE	0	0	0	0	0	0	0
Meadow Bridge	FAYETTE	0	0	0	0	0	0	0
Montgomery**	FAYETTE	1	0	0	0	0	0	1
Mount Hope	FAYETTE	2	0	0	0	0	0	2
Oak Hill	FAYETTE	0	0	0	0	0	0	0
Pax	FAYETTE	2	0	0	0	0	0	2
Smithers**	FAYETTE	3	0	0	0	0	0	3
Thurmond	FAYETTE	0	0	0	0	0	0	0
SUM	**FAYETTE**	**42**	**7**	**4**	**0**	**0**	**0**	**53**
Alderson**	GREENBRIER	2	1	1	0	0	0	4
Falling Springs	GREENBRIER	0	0	0	0	0	0	0
Greenbrier County*	GREENBRIER	8	2	1	0	0	0	11
Lewisburg	GREENBRIER	0	0	0	0	0	0	0
Quinwood	GREENBRIER	0	0	0	0	0	0	0
Rainelle	GREENBRIER	4	2	0	0	0	0	6
Ronceverte	GREENBRIER	0	0	1	0	0	0	1
Rupert	GREENBRIER	2	0	0	0	0	0	2
White Sulphur Springs	GREENBRIER	4	2	0	0	0	0	6
SUM	**GREENBRIER**	**20**	**7**	**3**	**0**	**0**	**0**	**30**
Nicholas County*	NICHOLAS	17	4	2	0	0	0	23
Richwood	NICHOLAS	5	3	0	0	0	0	8
Summersville	NICHOLAS	1	0	1	0	0	0	2
SUM	**NICHOLAS**	**23**	**7**	**2**	**0**	**0**	**0**	**33**
Durbin	POCAHONTAS	0	2	0	0	0	0	2
Hillsboro	POCAHONTAS	0	0	0	0	0	0	0
Marlinton	POCAHONTAS	6	6	2	0	0	0	14
Pocahontas County*	POCAHONTAS	7	2	0	0	0	0	9
SUM	**POCAHONTAS**	**13**	**10**	**2**	**0**	**0**	**0**	**25**
Addison (Webster Springs)	WEBSTER	1	1	1	0	0	0	3
Camden-On-Gauley	WEBSTER	1	0	0	0	0	0	1
Cowen	WEBSTER	0	1	0	0	0	0	1
Webster County*	WEBSTER	20	2	2	0	0	0	24
SUM	**WEBSTER**	**22**	**4**	**3**	**0**	**0**	**0**	**29**
TOTAL		**120**	**35**	**14**	**0**	**0**	**0**	**170**

* Unincorporated Community
** Split Community

[47] West Virginia University – Retrieved 2/14/2022 from: https://data.wvgis.wvu.edu/pub/RA/State/CL/

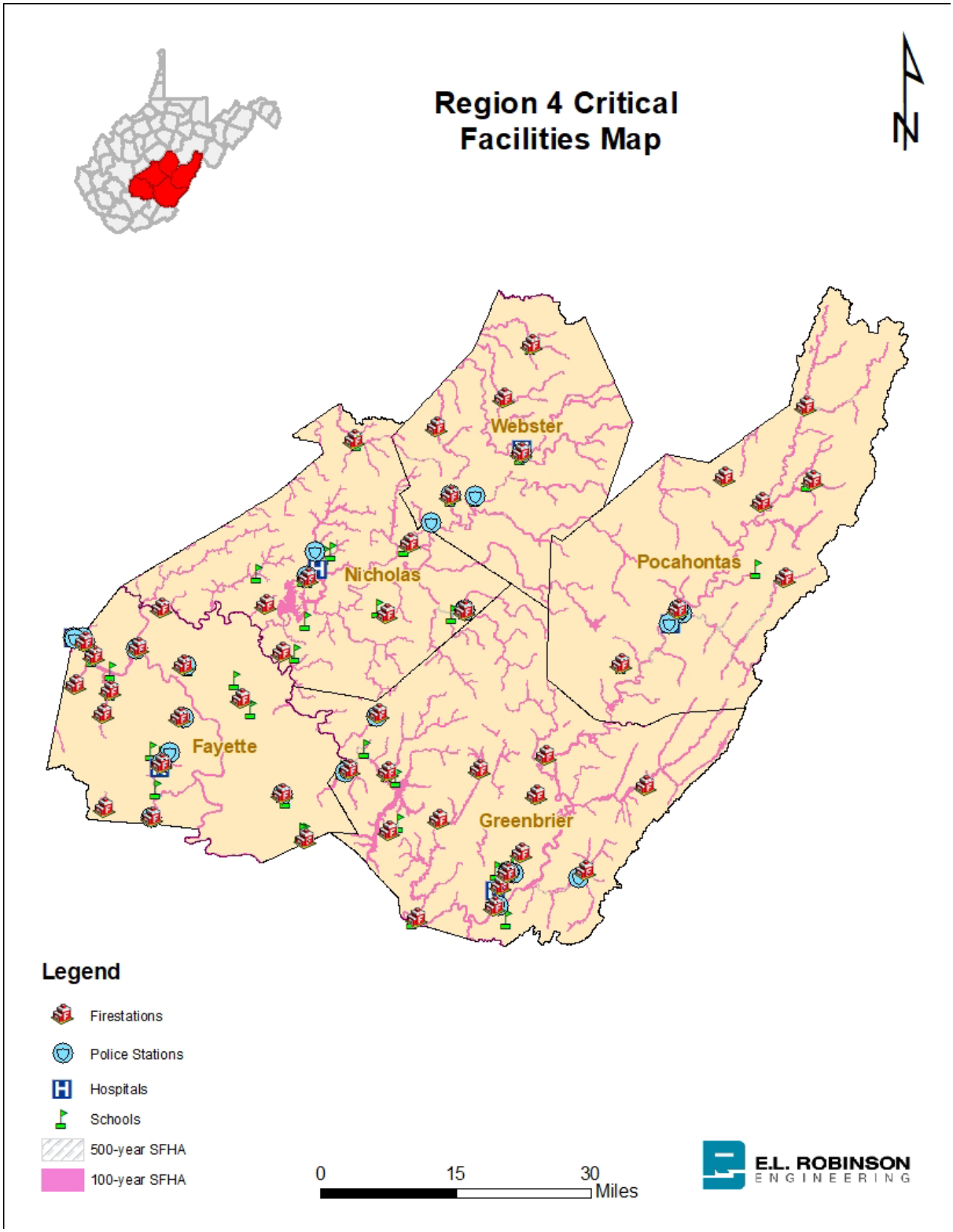
Figure 2.2.17: Community Assets in the Town of Marlinton



Critical Facilities

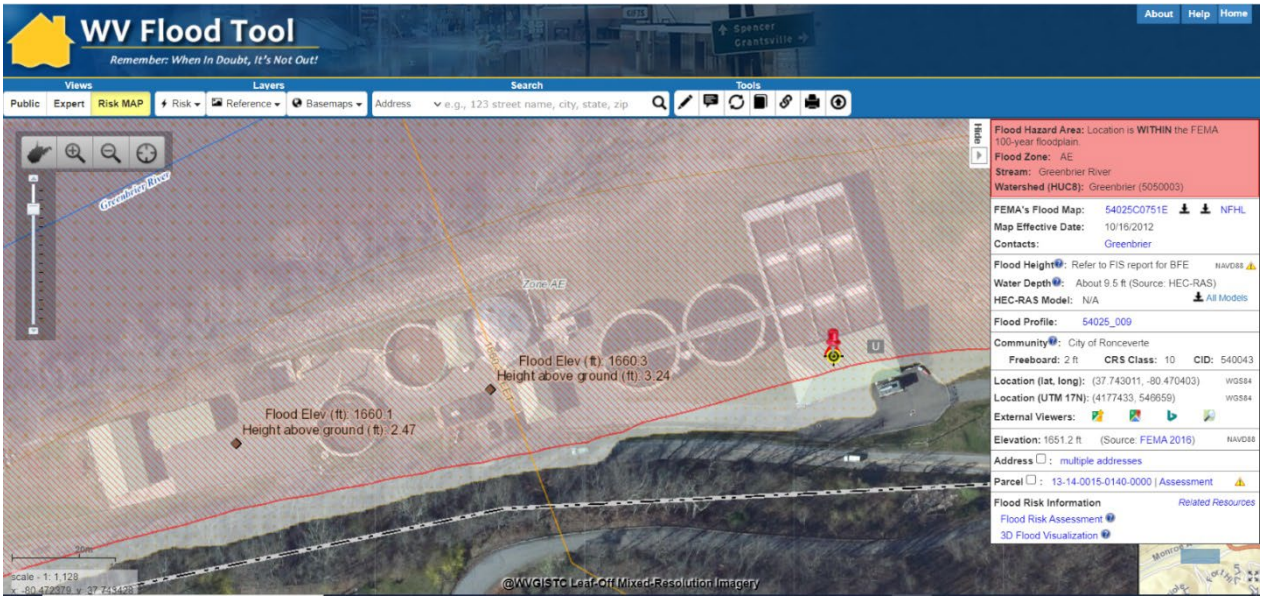
There are 25 facilities in the high risk effective and advisory 1%-annual-chance (100-yr) flood level and 12 facilities in the moderate risk 0.2%-annual-chance (500-yr) flood level. No essential facilities exist in the Regulatory Floodway. The highest valued structure in a floodplain appraised at $24 million is the wastewater treatment plant in Ronceverte. The flood source is the Greenbrier River. In 2018, the new Ronceverte's wastewater treatment plant was constructed at a cost of $24 million. All structures of the wastewater treatment plant are in the effective high-risk floodplain at a 1% (100-year) estimated flood inundation depth of 9.5 feet. At the treatment plant location, the 0.2% (500-year) estimated flood inundation depth is about two feet higher than that of the 1% floodplain. The USGS high water marks show the maximum inundation of 3.24 feet above the ground at the facility site for the 2016 flood event. The structures are also located in the preliminary floodplain at a 1% (100-year) estimated inundation depth of 6.5 feet.

Figure 18: Critical Facilities in the WV Region 4 Planning Area with SFHA Layer[48]



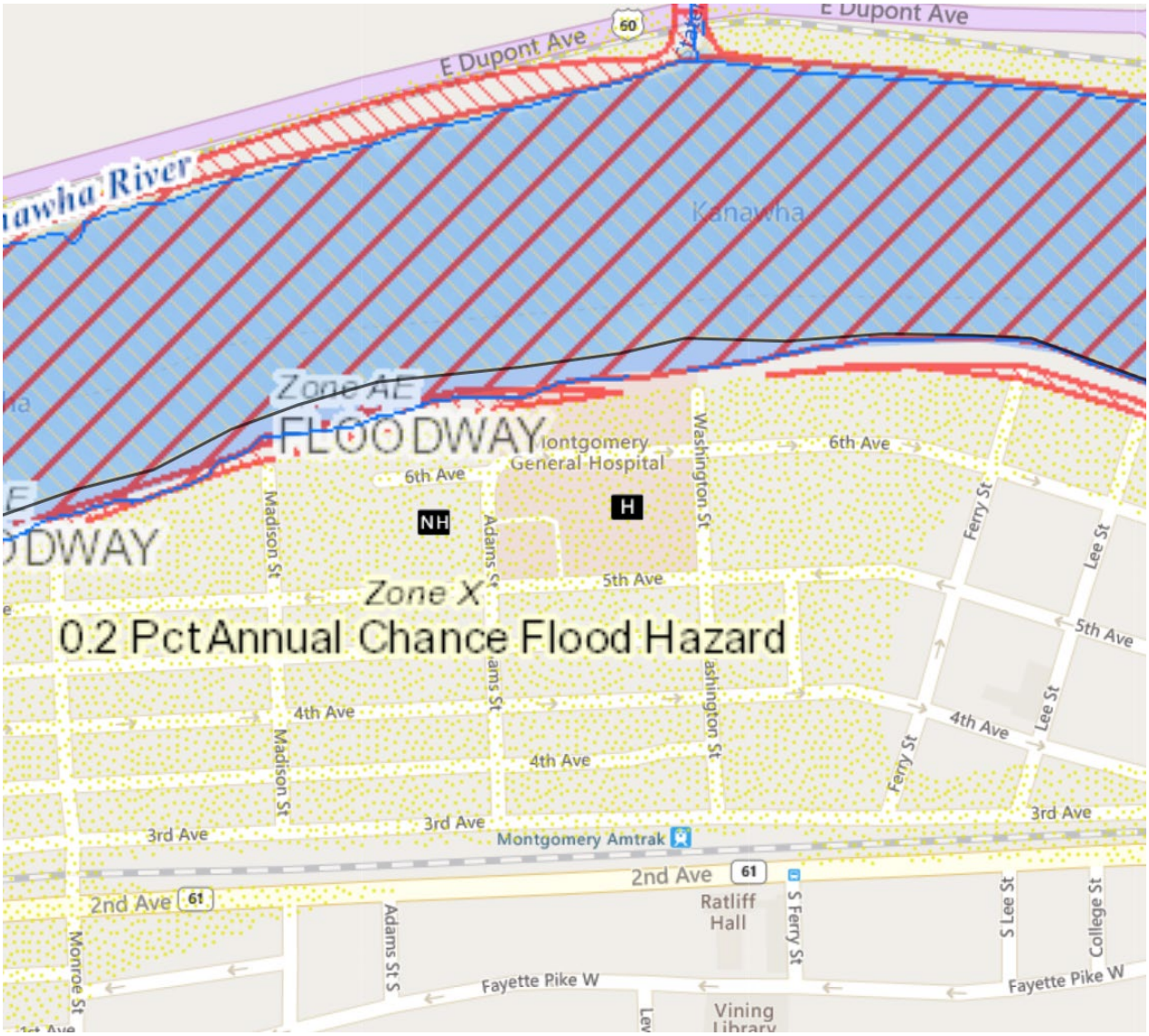
[48] FEMA Flood Insurance Rate Maps - GIS

Figure 2.2.19: Ronceverte Wastewater Treatment Plan[49]



[49] West Virginia University – Retrieved 2/14/2022 from: https://data.wvgis.wvu.edu/pub/RA/State/CL/

Figure 2.2.20: Montgomery General Hospital in Fayette County[50]

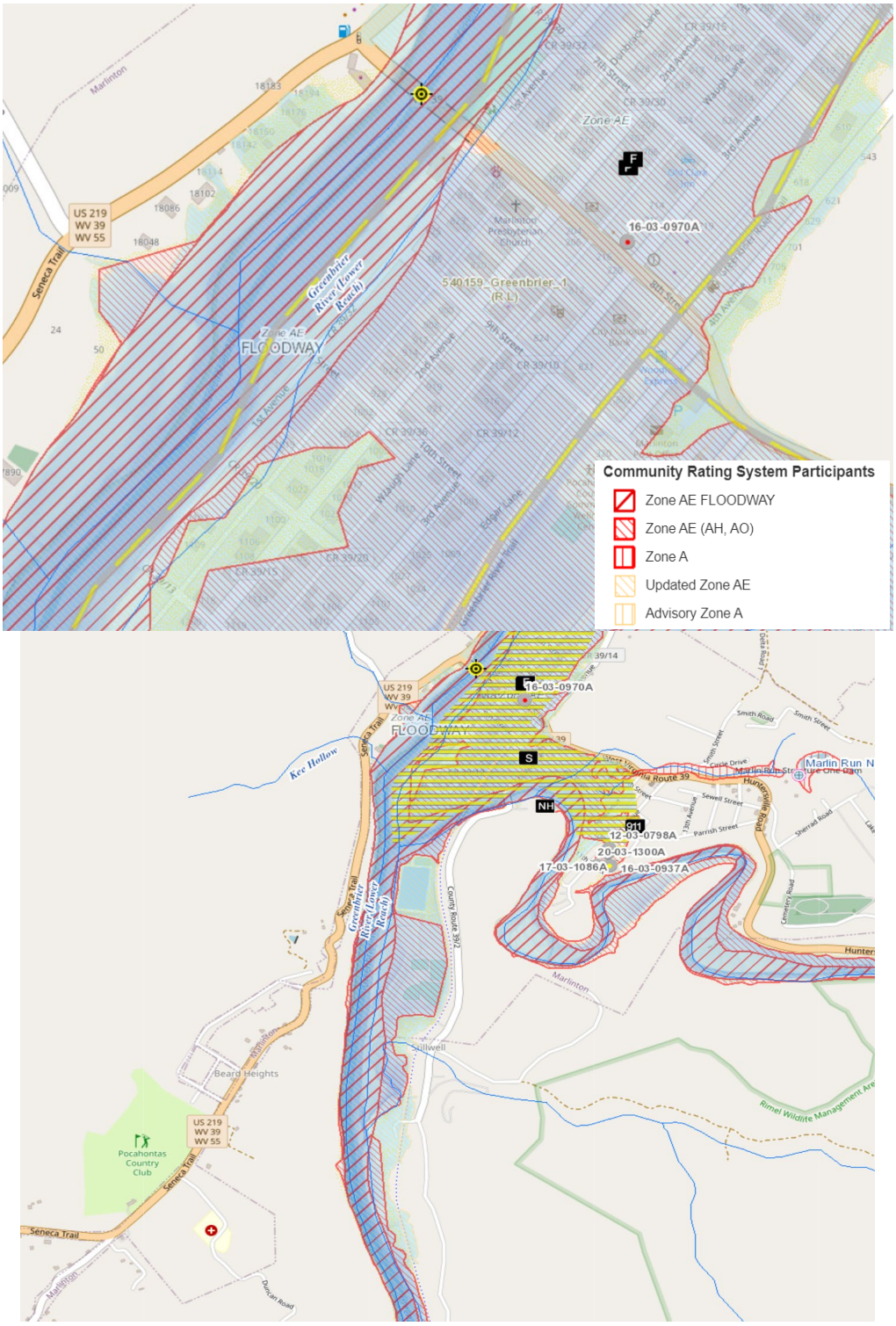


The map above depicts Montgomery General Hospital in the City of Montgomery in Fayette County. The hospital is located within a moderate risk 500-yr flood zone, and on the edge of a 100-yr floodplain of the Kawaha River.

The location of critical facilities in relation to floodplains is important, but so is the public's ability to reach these critical facilities in times of flooding. Pocahontas Memorial Hospital in Pocahontas County is located between the Town of Marlinton and Buckeye. While the hospital itself is not in a FEMA floodplain, the areas to the north and south are. The 8th Street bridge located in Marlinton would be inaccessible at flood stage, thus severely impacting the residents of Marlinton from accessing Pocahontas Memorial Hospital.

[50] West Virginia University – Retrieved 2/14/2022 from: https://data.wvgis.wvu.edu/pub/RA/State/CL/

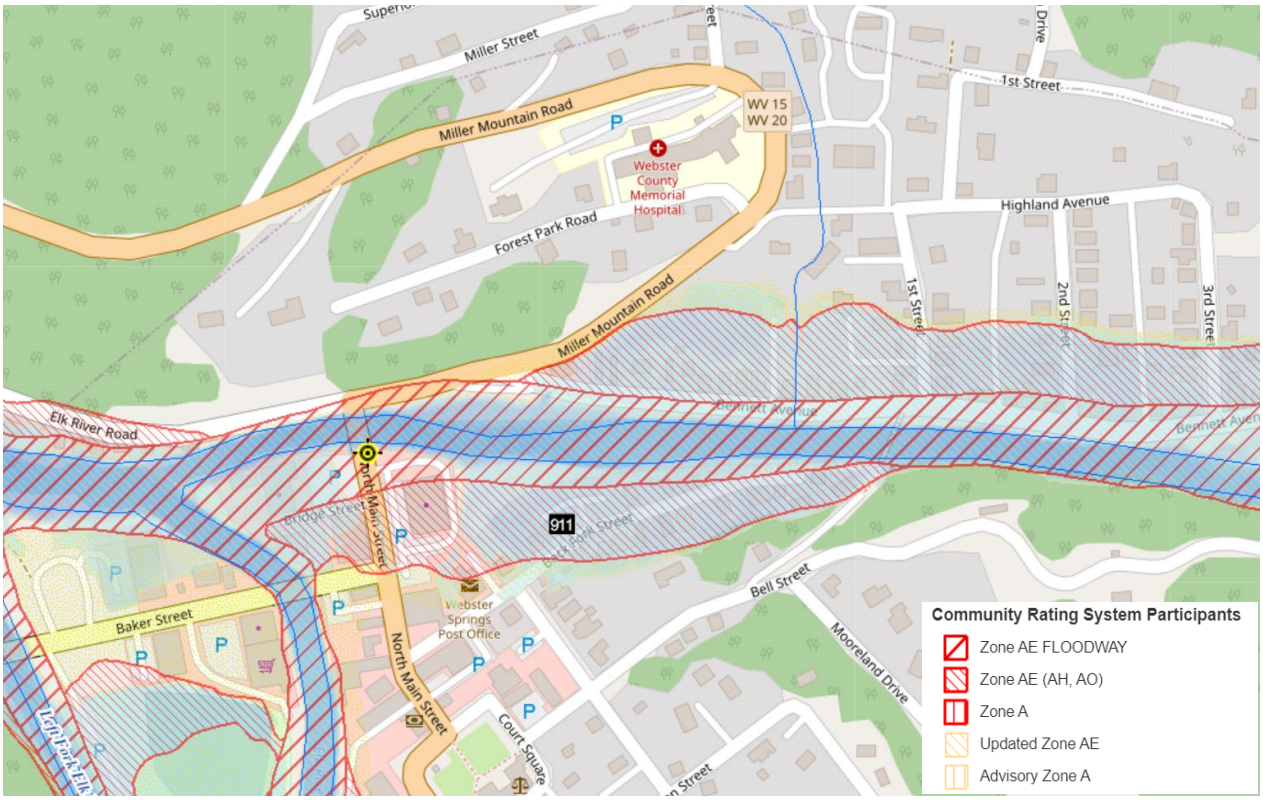
Figure 2.2.21: Map of the Town of Marlinton and the SFHA[51]



[51] West Virginia University – Retrieved 2/14/2022 from: https://data.wvgis.wvu.edu/pub/RA/State/CL/

The Webster County Memorial Hospital located in Webster Springs is built on an elevated position, but the entire south side of town across the Back Fork Elk River would be cut off from the hospital during a flood event as seen in the following image.

Figure 2.2.22: Map of Webster Springs with SFHA[52]



[52] West Virginia University – Retrieved 2/14/2022 from: https://data.wvgis.wvu.edu/pub/RA/State/CL/

Table 2.2.21: Critical Facilities listed by Flood Zone in the WV Region 4 Planning Area[53]

COMMUNITY IDENTIFICATION			FLOOD ZONE BREAKDOWN				
			1%-Annual-Chance (100-yr) Floodplain			0.2% (500-yr) Floodplain	High & Moderate Risk
CID	Community Name	County	Floodway	Effective	Advisory	Effective	TOTAL
540027	Ansted	FAYETTE	0	0	0	0	0
540026	Fayette County*	FAYETTE	0	4	0	1	5
540294	Gauley Bridge	FAYETTE	0	0	0	2	2
540028	Meadow Bridge	FAYETTE	0	0	0	0	0
540029	Montgomery**	FAYETTE	0	0	0	3	3
540280	Mount Hope	FAYETTE	0	0	0	0	0
540031	Oak Hill	FAYETTE	0	0	0	0	0
540032	Pax	FAYETTE	0	1	0	0	1
540033	Smithers**	FAYETTE	0	0	0	5	5
SUM		**FAYETTE**	**0**	**5**	**0**	**11**	**16**
540041	Alderson**	GREENBRIER	0	1	0	0	1
540243	Falling Springs	GREENBRIER	0	0	0	0	0
540040	Greenbrier County*	GREENBRIER	0	0	0	0	0
540228	Rainelle	GREENBRIER	0	0	1	0	1
540043	Ronceverte	GREENBRIER	0	0	0	0	0
540044	Rupert	GREENBRIER	0	0	0	0	0
540045	White Sulphur Springs	GREENBRIER	0	1	0	1	2
SUM		**GREENBRIER**	**0**	**2**	**1**	**1**	**4**
540146	Nicholas County*	NICHOLAS	0	1	0	0	1
540147	Richwood	NICHOLAS	0	3	0	0	3
540148	Summersville	NICHOLAS	0	0	0	0	0
SUM		**NICHOLAS**	**0**	**4**	**0**	**0**	**4**
540158	Durbin	POCAHONTAS	0	0	0	0	0
540159	Marlinton	POCAHONTAS	0	5	0	0	5
540283	Pocahontas County*	POCAHONTAS	0	0	0	0	0
SUM		**POCAHONTAS**	**0**	**5**	**0**	**0**	**5**
540204	Addison	WEBSTER	0	3	0	0	3
540205	Camden-On-Gauley	WEBSTER	0	1	0	0	1
540206	Cowen	WEBSTER	0	1	0	0	1
540203	Webster County*	WEBSTER	0	3	0	0	3
SUM		**WEBSTER**	**0**	**8**	**0**	**0**	**8**
TOTAL			**0**	**24**	**1**	**12**	**37**

* Unincorporated Community
** Split Community

[53] West Virginia University – Retrieved 2/14/2022 from: https://data.wvgis.wvu.edu/pub/RA/State/CL/

Table 2.2.22: Critical Facilities by 1% Flood Depth in the WV Region 4 Planning Area[54]

Community Name	County	Facility Name	**Facility Type**	Flood Tool Link	**Flood Depth**	Building Damage Percent
Camden-On-Gauley	WEBSTER	Camden on Gauley Police Department (Storage Facility)	**Police Station**	FT	6.3	15.6
Alderson**	GREENBRIER	Alderson Elementary School	**School**	FT	3.5	8.0
Marlinton	POCAHONTAS	Marlinton Police Department	**Police Station**	FT	2.2	7.6
Marlinton	POCAHONTAS	Marlinton Volunteer Fire Department	**Fire Station**	FT	2.2	7.7
Fayette County*	FAYETTE	Loup Creek Volunteer Fire Department - Robson	**Fire Station**	FT	1.1	0.9
Webster County*	WEBSTER	Erbacon Volunteer Fire Department	**Fire Station**	FT	1.0	0.0
Marlinton	POCAHONTAS	Pocahontas County 911 Center	**Police Station**	FT	1.0	0.0
Marlinton	POCAHONTAS	Marlinton Elementary School	**School**	FT	0.8	0.0
Fayette County*	FAYETTE	Armstrong Creek Volunteer Fire Department	**Fire Station**	FT	0.8	0.0
Fayette County*	FAYETTE	Covenant Promise Christian Academy	**School**	FT	0.5	0.0
Webster County*	WEBSTER	Hacker Valley Elementary School	**School**	FT	0.4	0.0
White Sulphur Springs	GREENBRIER	White Sulphur Springs Police Department	**Police Station**	FT	0.2	0.0
Webster County*	WEBSTER	Hacker Valley Volunteer Fire Department	**Fire Station**	FT	0.1	0.0
Addison	WEBSTER	Webster County Office of Emergency Services/ E-911	**911 Center**	FT	0.1	0.0
Richwood	NICHOLAS	Richwood Police Department	**Police Station**	FT	0.1	0.0
Rainelle	GREENBRIER	Rainelle Volunteer Fire Department	**Fire Station**	FT	0.1	0.0
Pax	FAYETTE	Pax Volunteer Fire Department	**Fire Station**	FT	0.1	0.0

* Unincorporated Community
** Split Community

Vulnerability Assessment Conclusion

Fifty eight percent or 15 of the 26 flood-prone communities in Region 4 have critical facilities vulnerable to flooding. The county with the most essential facilities is Fayette County (ranked 8th for all counties), while the incorporated town with the highest number of facilities is Marlinton (ranked 7th for all municipalities in State) in Pocahontas County. Hospitals and nursing homes with immobile patients or residents are particularly vulnerable to a flood disaster. Small towns situated mostly in the floodplain are more challenged than unincorporated areas or larger cities to identify suitable sites that provide a high level of protection from flooding.

Climate Change

Climate change models predict increased frequency and intensity of precipitation events in the eastern US, with an overall trend towards more precipitation. A warmer atmosphere can "hold" more water vapor, with a 1 °C or 1.8 °F increase in global temperature corresponding to a roughly 5% increase in atmospheric moisture. Across the whole eastern US, more of the total annual precipitation is falling in the heaviest 1% of events.[55] The National Climate Assessment (2018) describes that these increases are linked to increases

[54] West Virginia University – Retrieved 2/14/2022 from: https://data.wvgis.wvu.edu/pub/RA/State/CL/
[55] Hayhoe, K., Wuebbles, D. J., Easterling, D. R., Fahey, D. W., Doherty, S., Kossin, J. P., . . . Wehner, M. F. (2018). Chapter 2 : Our Changing Climate. Impacts, Risks, and Adaptation in the United States: The Fourth National Climate Assessment, Volume II. doi:10.7930/nca4.2018.ch2

in the "frequency of organized clusters of thunderstorms and the amount of precipitation associated with them." Combined data from the National Climate Assessment and the Army Corps of Engineers predicts that regions northeast, east and south of the Ohio River will experience an increase in precipitation falling in the heaviest 1% of events by up to 40-50% by the late 21st century.[56] Simply, more of our rain is coming during extreme events and less is coming during "normal" events.

Under a high emissions scenario, winter and spring precipitation in West Virginia is projected to increase 10-15% in the late 21st century compared to a 1986-2015 baseline.[57] This means that that the total amount of precipitation during these seasons will increase.

Climate change will also impact the seasonality and form of precipitation. More precipitation will fall as rain in winter, reducing snowpack, while rising spring temperatures will cause earlier snowmelt-related runoff. Riverine flooding, that is very high stream flow, will be influenced by all of these factors related to frequency, intensity, and form of precipitation.

However, the relationship between precipitation and riverine flooding is complex. One study evaluating climate change on extreme precipitation in headwater subbasins projects an overall increase of high stream flow in the eastern US and a 44% increase of high stream flow in the central US.[58] Yet, the National Climate Assessment cautions that "extreme precipitation is [just] one of the controlling factors in flood statistics, including local land use, land-cover changes, and water management." In other words, floods are not exclusively a climate hazard, but are the result of a climate phenomenon (precipitation) in interaction with natural physical conditions like slope and soil moisture and with infrastructure like storm sewers and culverts.

Identified Data Limitations

Flood data and losses were compiled from a variety of sources, including the National Centers for Environmental Information, NFIP, FEMA, and other news sources where indicated. Losses reported to the NCEI should not be considered all-inclusive as they only include events that were submitted as many events and losses undoubtedly have gone unreported.

[56] United States, US Army Corps of Engineers, Institute for Water Resources. (2017). Ohio River Basin: Formulating climate change mitigation/adaptation strategies through regional collaboration with the ORB Alliance. US Army Corps of Engineers. Retrieved February 27 2022, from https://usace.contentdm.oclc.org/ digital/collection/p266001coll1/id/5108/.
[57] Hayhoe, K., Wuebbles, D. J., Easterling, D. R., Fahey, D. W., Doherty, S., Kossin, J. P., . . . Wehner, M. F. (2018). Chapter 2 : Our Changing Climate. Impacts, Risks, and Adaptation in the United States: The Fourth National Climate Assessment, Volume II. doi:10.7930/nca4.2018.ch2
[58] Naz, Bibi S. et al, *Effects of climate change on streamflow extremes and implications for reservoir inflow in the United States*, Journal of Hydrology, Vol 556, January 2018, p. 359-370, https://doi.org/10.1016/j.jhydrol.2017.11.027

HAZARDOUS MATERIALS

Period of Occurrence	Anytime, primarily along roadways or railways.
Number of Events	59
Warning Time	None
Potential Impacts	Loss of life, and property damage.
Cause Injury or Death	Potential to cause injury or death.
Potential Facility Shutdown	Hours to days.

According to the Environmental Protection Agency, West Virginia ranks 17th out of 56 states/territories based on the number of releases per square mile.[59] The use of hazardous materials is prevalent in many industries and products, including agriculture, medicine, and research[60]. The Emergency Planning and Citizen Right to Know Act (EPCRA) of 1984 requires facilities to report what chemicals they have on site and their quantities. The act also requires local governments to have emergency response plans in place. The Pipeline and Hazardous Materials Safety Administration (PHMSA), a division of the U.S. Department of Transportation, tracks hazardous materials incidents that occur during transport. Spills of hazardous materials are most difficult to plan for during transportation. While commodity flow studies give local jurisdictions a snapshot of what materials may travel through the area on any given day, responders will not know what materials, if any, are involved until an incident occurs.

Hazard Profile

As mentioned above, the majority of hazardous materials incidents occur during transport. This is confirmed in the data from the Pipeline Hazardous Materials Safety Administration which shows that 89% of reported incidents occurred on a roadway.

Figure 2.2.23: Incidents by Mode of Transportation between 2012 – 2021[61]

Mode Of Transportation	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Grand Total
FAA-AIR	1,460	1,442	1,327	1,130	1,204	1,166	1,433	1,668	1,582	726	13,138
FMCSA-HIGHWAY	13,257	13,887	15,316	15,130	16,527	15,746	17,928	20,683	19,605	19,630	167,709
FRA-RAILWAY	661	667	718	581	545	573	507	422	382	321	5,377
USCG-WATER	70	63	47	24	11	9	9	6	2	5	246
Grand Total	15,448	16,059	17,408	16,865	18,287	17,494	19,877	22,779	21,571	20,682	186,470

Region 4 is traversed by three major highways: US 19 which runs north/south through Fayette and Nicholas Counties, and I64 which runs east/west through Greenbrier County and runs north/south concurrently with I77 through Fayette County. The region is also crossed by other routes including US 219, US60, State Route 20, and State Route 92. The risk map below shows these routes and also shows the location of Tier

[59] U.S. Environmental Protection Agency – TRI Explorer, Retrieved on 02/09/2022 https://enviro.epa.gov/triexplorer/tri_factsheet.factsheet?pzip=&pstate=WV&pcity=&pcounty=Fayette&pyear=2020&pParent=TRI&pDataSet=TRIQ1#pane-1

[60] Introduction to Emergency Management Haddow, Bullock, & Coppola, 2014

[61] U.S. Department of Transportation -Pipeline Hazardous Materials Safety Administration

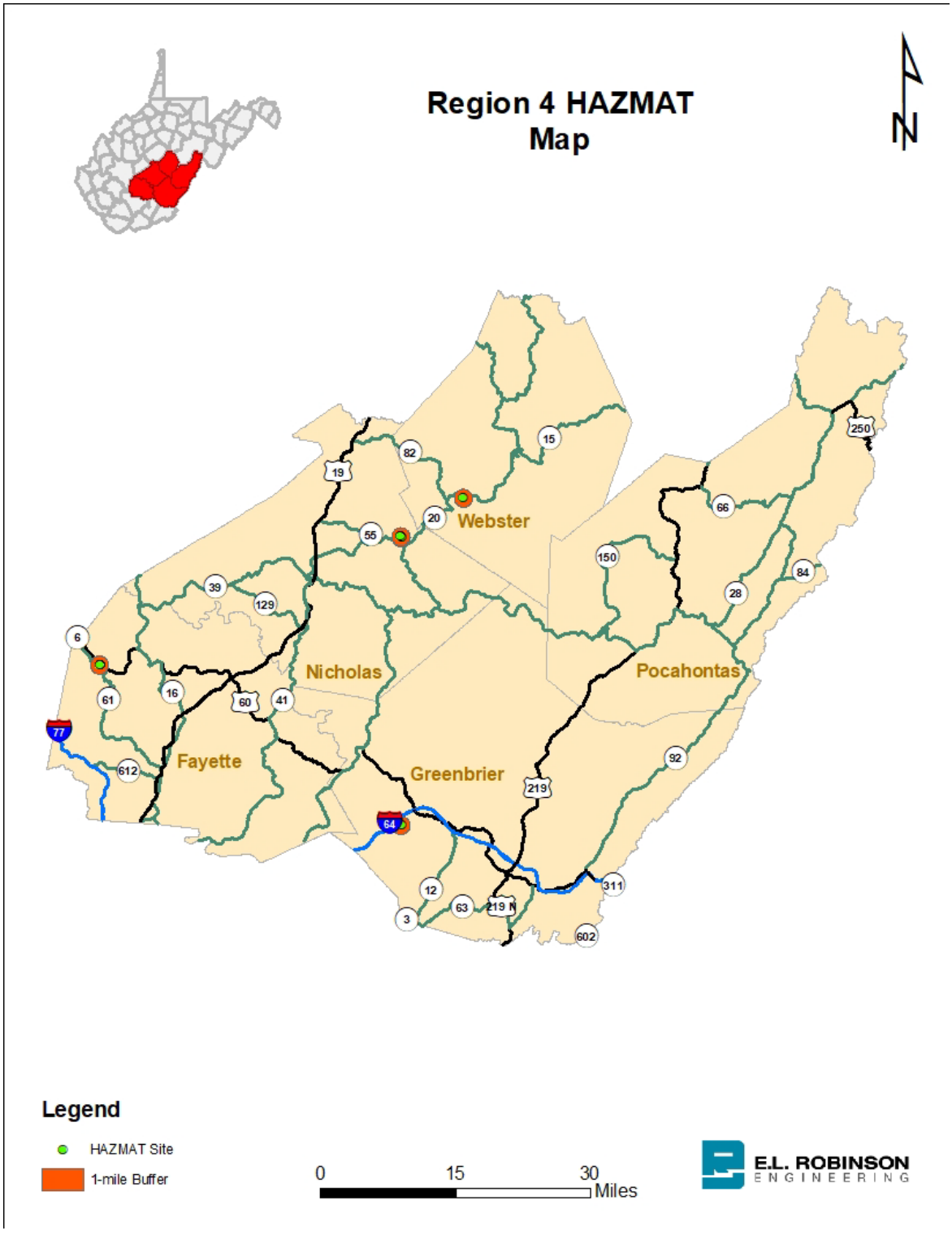
2 reporting facilities (as available from the County LEPC). A large number of these facilities are located near the transportation routes previously listed. It is important to note that the actual hazard zone for transportation accidents depends on the material and amount.

An important component of mitigating hazardous materials incidents is knowing what to plan for. For incidents during transit this is especially difficult, as there is no way of knowing the types of materials traversing the region at any given time. One way to reduce this uncertainty is to perform a Commodity Flow Study (CFS). While these studies represent a snapshot in time, they provide a starting point for planning.

Location & Spatial Extent

According to the U.S. Environmental Protection Agency, there are a total of five Toxic Release Inventory (TRI) sites in the WV Region 4 planning area as depicted on the following map.

Figure 2.2.24: Map of TRI Sites in the WV Region 4 Planning Area[62]



[62] U.S. Environmental Protection Agency – Toxic Release Inventory Sites – Retrieved 02/1/2022

Fayette County (2012)

A total of 155 hazardous materials were identified in the study, including six Extremely Hazardous Substances (EHSs). Of the hazardous materials identified in the study, 3.9% were not reported by any other analysis, including fixed facilities. It can be assumed that these materials simply pass through the county bound for destinations in other jurisdictions. A hazardous material event occurring along a roadway may involve a material not used or stored in Fayette County, and therefore unfamiliar to responders. Based on the data collected, the overwhelming majority of hazardous materials transported in the county are transported along US 119.

Greenbrier County (2015)

A total of 28 different materials were identified in the study, of which 5 were Extremely Hazardous Substances. Nearly 40% of these substances identified along roadways were not reported by any other analysis, including fixed facilities. It can be assumed that these materials are passing through the county bound for other jurisdictions. A hazardous material event occurring along a roadway may involve a material not used or stored in Greenbrier County, and therefore unfamiliar to responders. The overwhelming majority of materials were observed along I-64, more than three times more than the main north south route through the county, US 219.

Nicholas County (2007)

Twenty separate, specifically named materials were identified in this study, including two Extremely Hazardous Substances. Both were recorded on U.S. 19, as were 78% of all placarded vehicles. Three vehicles were carrying radioactive material according to their placards.

Webster County (2009)

Four different substances were recorded during the 2009 study, none of which were identified as Extremely Hazardous Substances. These substances were overwhelmingly limited to the major routes through the county, including State Route 20, State Route 15, and State Route 82.

In addition to hazardous materials located at fixed facilities and traveling through the region on the various highways and railroads, there is a proposed pipeline, the Mountain Valley Pipeline, which traverses large sections of Webster and Nicholas counties as well as the far western portion of Greenbrier County. A compressor station is planned for the Stallworth area of Greenbrier County as well. The pipeline will carry natural gas from the fracking fields of Northern West Virginia to Pittsylvania, Virginia (Adams, 2014). The Mountain Valley Pipeline is in the planning and development stage, with a stated goal to begin construction in December of 2016 (Mountain Valley Pipeline Schedule).

There is also concern within the region regarding the hazards of underground and above ground storage tanks in the wake of recent high-profile events. Committee members relate that an underground storage tank in the town of Rainelle, in Greenbrier County, leaked into a drinking water supply well, contaminating it.

Figure 2.2.25: HazMat Incidents in the United States from 2012 – 2021[63]

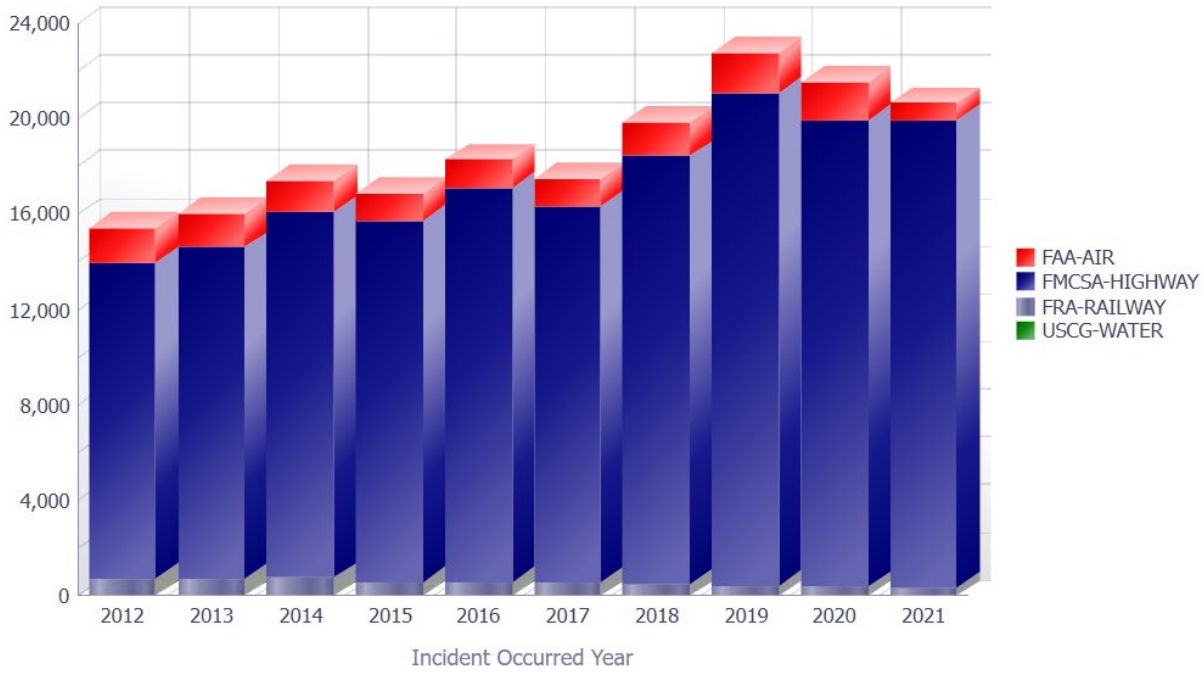


Figure 2.2.26: HazMat Damages in the United States from 2012 – 2021[64]

Damages By Mode and Incident Year

Mode Of Transportation	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Grand Total
FAA-AIR	$41,089	$143,105	$129,417	$46,971	$1,929,865	$27,446	$75,099	$64,891	$6,000	$13,920	**$2,477,803**
FMCSA-HIGHWAY	$60,189,859	$49,517,686	$59,605,470	$62,227,766	$50,178,906	$43,628,714	$92,134,193	$74,550,386	$28,325,000	$29,309,031	**$549,667,011**
FRA-RAILWAY	$17,838,609	$37,780,045	$22,656,840	$46,086,006	$27,387,862	$20,612,006	$22,200,033	$17,434,594	$31,587,475	$22,457,522	**$266,040,992**
USCG-WATER	$806,168	$18,713	$117,350	$3,427	$53,211	$5,497,886	$32,500	$15,100	$1,750	$0	**$6,546,105**
Grand Total	**$78,875,725**	**$87,459,549**	**$82,509,077**	**$108,364,170**	**$79,549,844**	**$69,766,052**	**$114,441,825**	**$92,064,971**	**$59,920,225**	**$51,780,473**	**$824,731,911**

Historical Occurrences

Table 2.2.23: HazMat Incidents in the WV Region 4 Planning Area

County	Number of Occurrences	Fatalities / Injuries	Property Damage
Fayette County	15	0/1	$23,700,000
Greenbrier County	11	0/1	$524,760
Nicholas County	18	0/0	$41,362
Pocahontas County	9	0/0	$476,100
Webster County	6	0/0	$148,500

[63] U.S. Department of Transportation - PHMSA
[64] U.S. Department of Transportation - PHMSA

WV Region 4 Total	59	0/2	$24,890,722

January 30th, 2007

In late morning a propane explosion occurred at a Little General Store located in Ghent, W.V., in Raleigh County. The investigation concluded that propane leaking from one of the tanks found a source of ignition in the store, leading to the explosion. Four people were killed in the explosion including two firefighters and two private gas company employees (Register – Herald).

January 9th, 2014

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

February 16th, 2015

A CSX train hauling 107 cars of crude oil derailed in Mount Carbon, WV, an unincorporated community in Fayette County. The derailment of numerous rail tankers caused a large oil spill that then caught fire, consuming 19 railcars. The fire spread to a nearby house and garage, destroying both. It was eventually determined that 378,000 gallons of crude oil were released. Two water treatment plants near the crash were temporarily closed due to the oil spill (NTSB & DOT Reports, 2015). [65]

Probability of Future Occurrences

Given the location of more than 5 toxic release inventory sites in the RV Region 4 planning area and prior roadway and railway incidents, it is likely (between 10 and 100 percent annual probability) that a hazardous material incident may occur in the region. WV Region 4 officials are mindful of this possibility and take precautions to prevent such an event from occurring. Furthermore, there are detailed plans in place to respond to an occurrence.

Loss Estimate

Damages from hazardous material incidents are difficult to calculate, and include more than property damage, such as remediation and response costs. This lack of data makes it difficult to calculate an accurate loss estimate.

Since 1989, there have been nearly $25 million in property damage and remediation costs incurred in the WV Region 4 planning area due to hazardous material incidents. Annualized, that is $777,835 in damages and costs. However, the February 16th, 2015, CSX derailment was an outlier, and that event alone cost $23.7 million. If we exclude this single event, annualized losses appear a more reasonable $37,210.

[65] U.S. DOT – Federal Railway Administration TECHNICAL ACCIDENT REPORT Derailment of CSX Transportation, Inc.'s Unit Crude Oil Train K08014 Transporting Crude Oil for Plains All American Mount Carbon, West Virginia, November 4, 2015

Vulnerability & Risk Assessment

Social Vulnerability

Given high susceptibility across the entire county, it is assumed that the total population is at risk to a hazardous materials incident. It should be noted that areas of population concentration may be at an elevated risk due to a greater burden to evacuate population quickly.

Critical Facilities

It should be presumed that any facility located near a public roadway or rail line is susceptible to a potential HAZMAT event.

Vulnerability Assessment Conclusion

The entire region is susceptible to hazardous material incidents. These events can occur anywhere along a public roadway, rail line, or near any of the region's TRI sites.

Identified Data Limitations

Data collected from the U.S. Department of Transportation's PHMSA database revealed the earliest recorded event in the WV Region 4 occurred in 1989 and included only those incidents that were reported on DOT Form 5800.1 and should not be assumed that this list is all-inclusive.

The following five maps show the half-mile and one-mile buffers along the major roadways and rail lines in the five counties that make up the WV Region 4 planning area.

Figure 2.2.27: Transportation Map of Fayette County

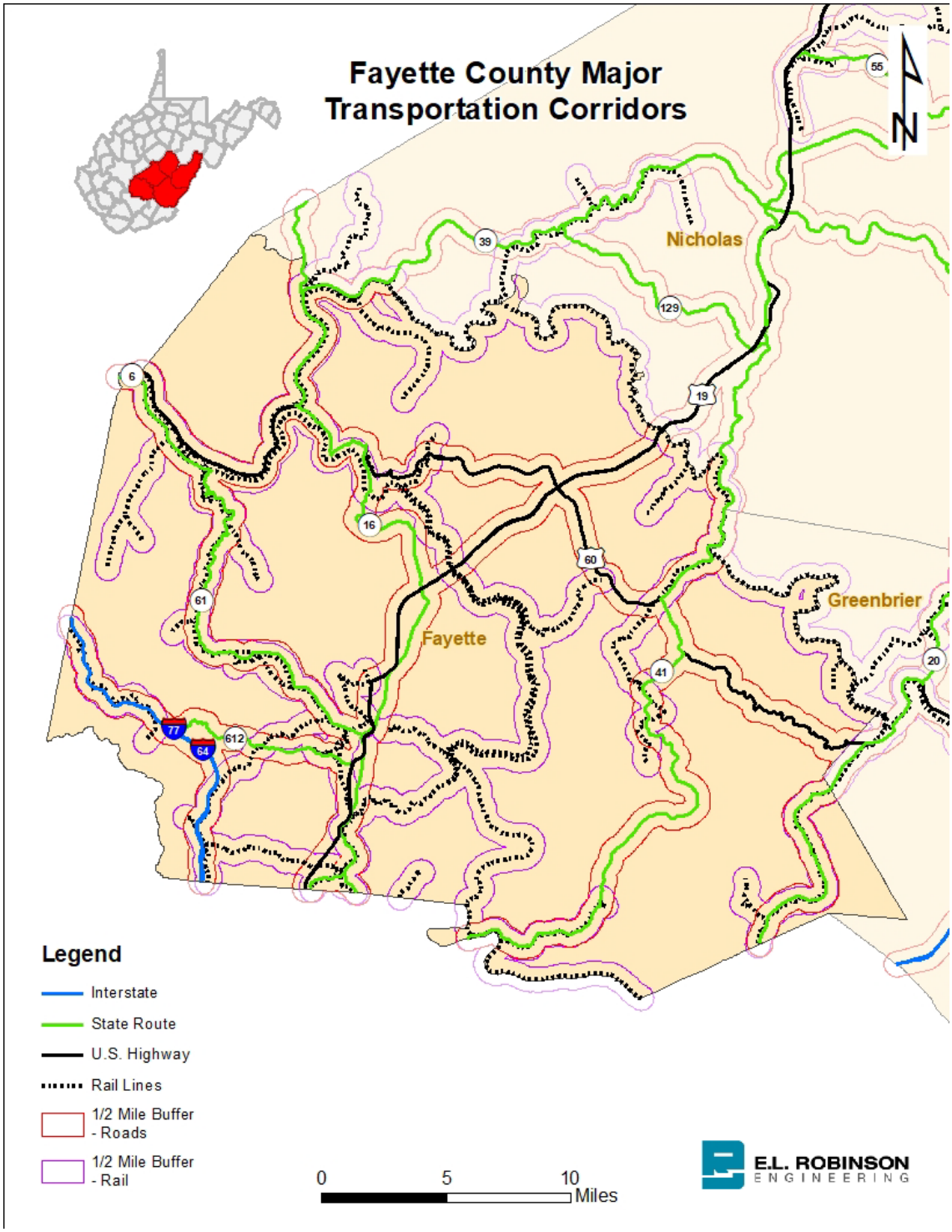


Figure 2.2.28: Transportation Map of Greenbrier County

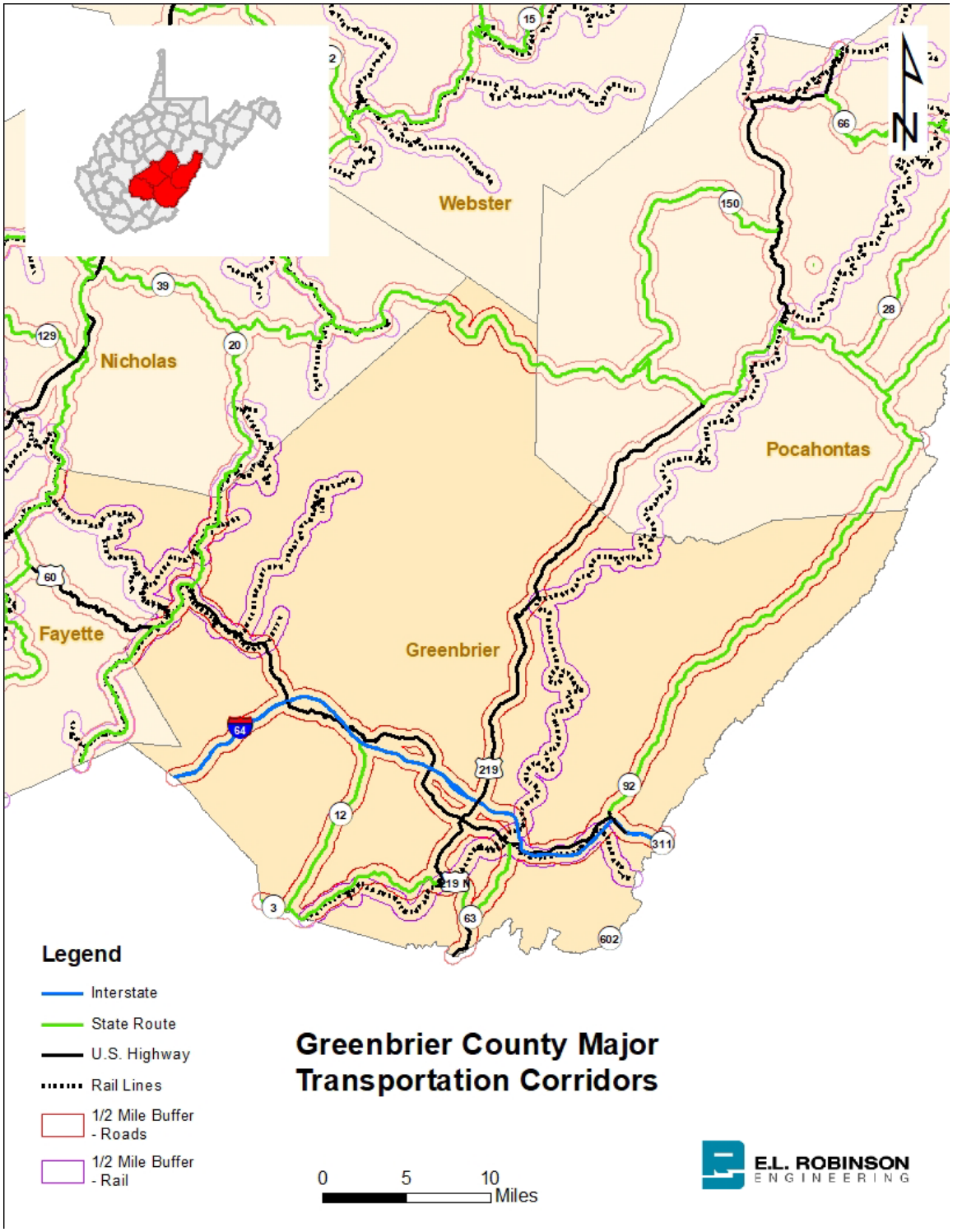


Figure 2.2.29: Transportation Map of Nicholas County

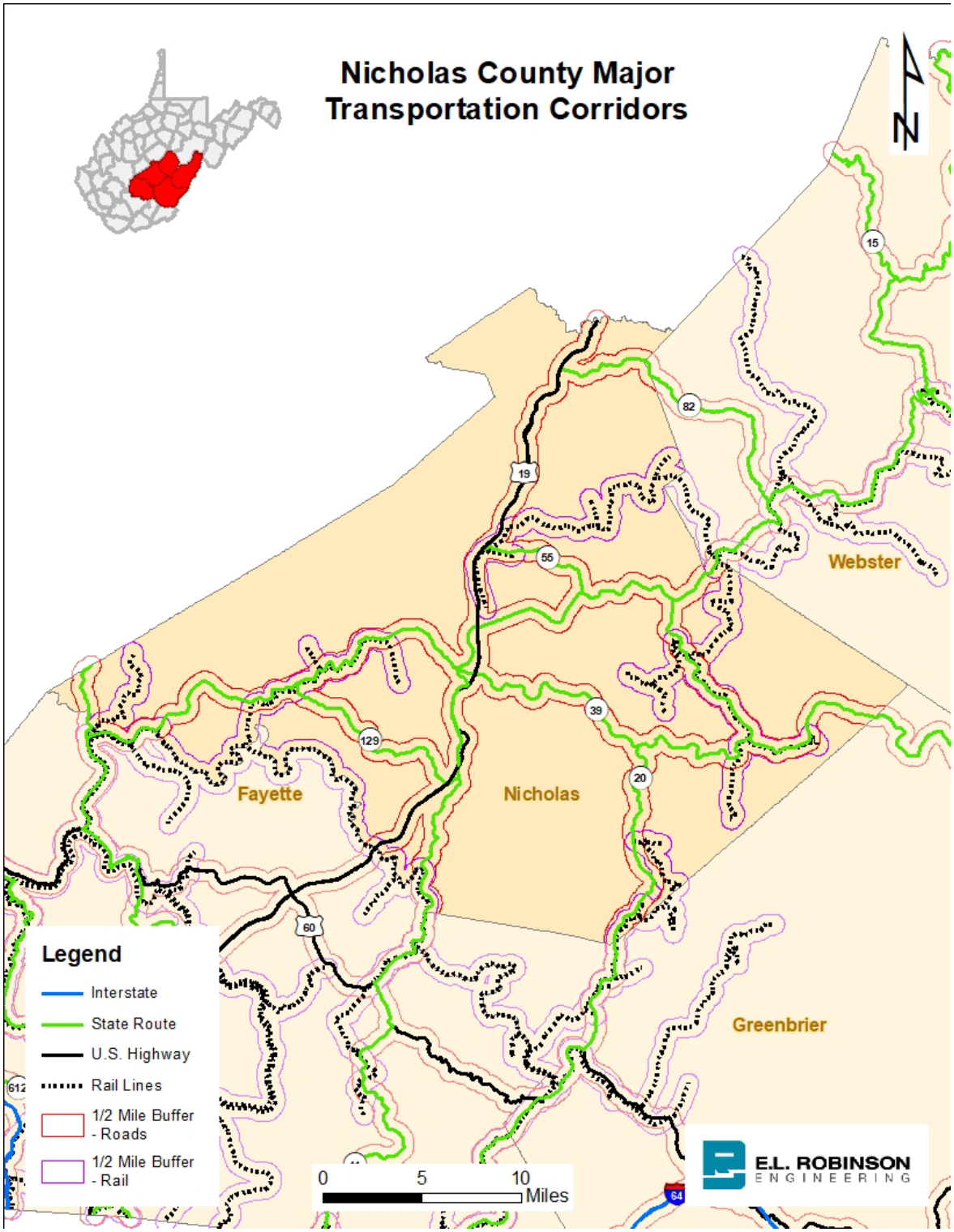


Figure 2.2.30: Transportation Map of Pocahontas County

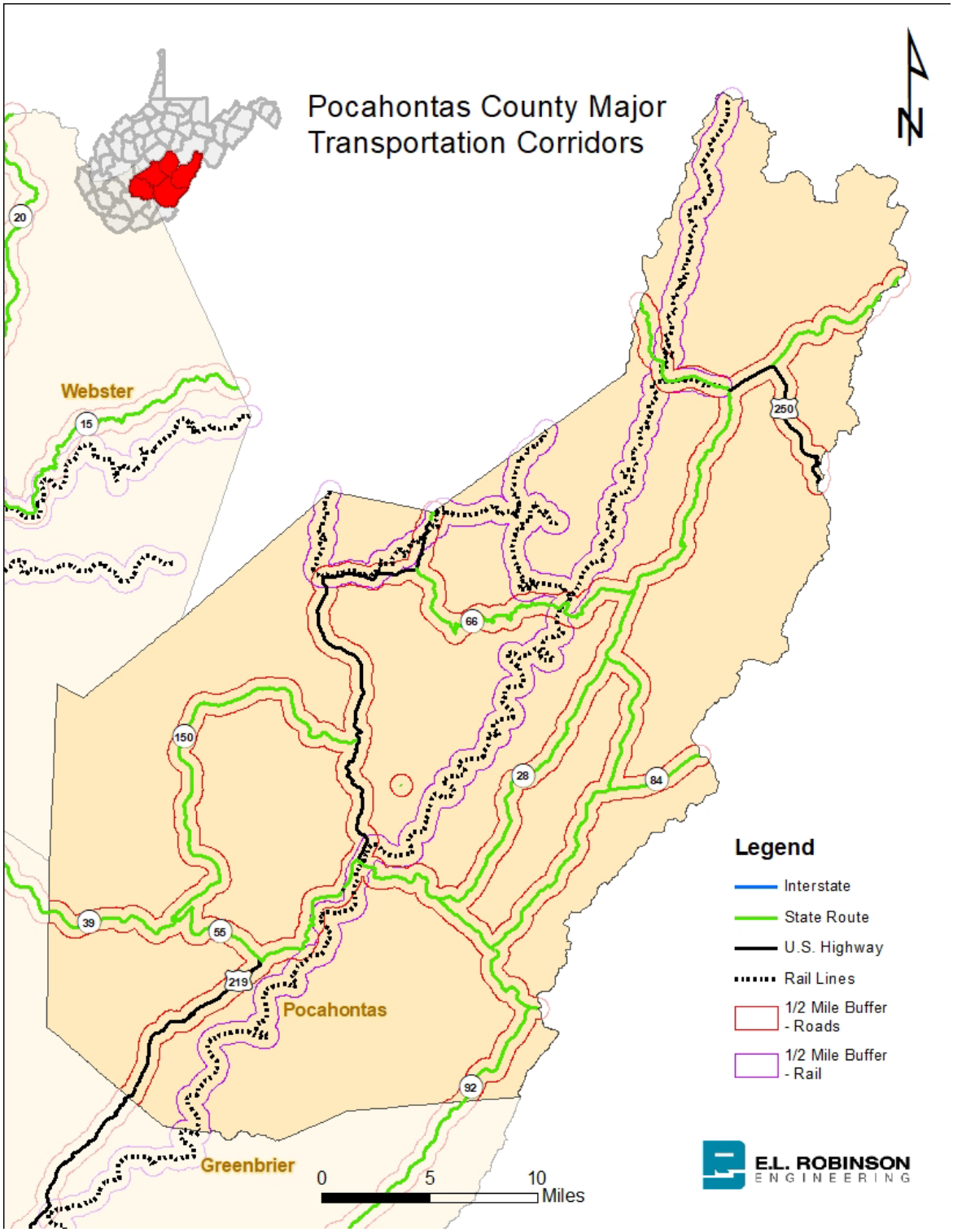
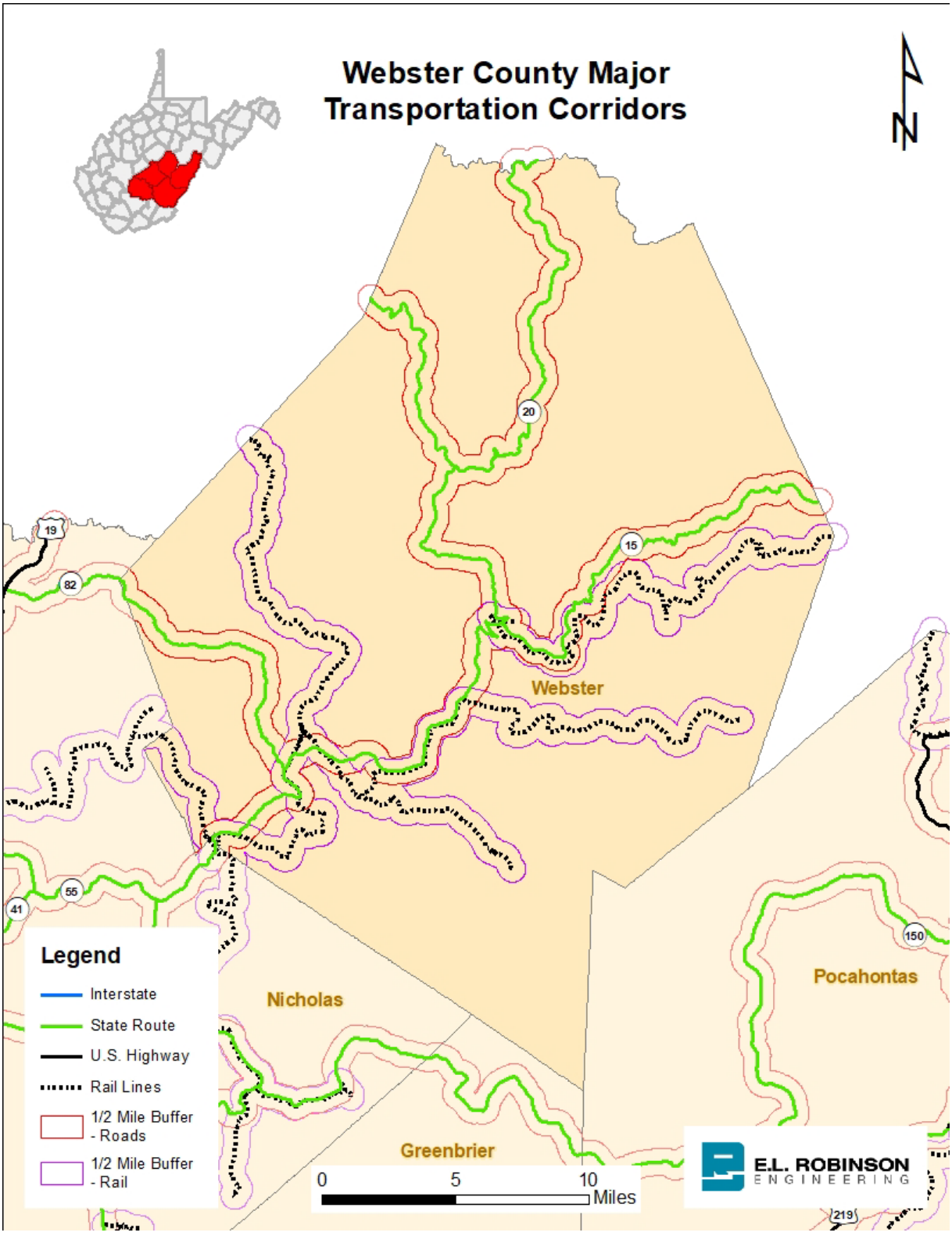


Figure 2.2.31: Transportation Map of Webster County



MASS MOVEMENTS (LAND SLIDES AND SIMILAR)

Period of Occurrence	**Anytime, particularly after heavy rains.**
Number of Events	7
Warning Time	None
Potential Impacts	Loss of life, and property damage.
Cause Injury or Death	Potential to cause injury or death.
Potential Facility Shutdown	Hours to days.

Hazard Profile

Landslides are naturally occurring phenomena that can happen almost everywhere in West Virginia, especially on steep slopes. In its most basic form, a landslide is the movement of soil or rock down a slope. Landslides become hazardous to people and property when they happen in an area where development has occurred, causing losses. Many landslides have relatively little impact on people or property, such as minor road damage, tree throws, or tilting of fences and walls. However, severe landslide damage can topple buildings, destroy roads, disrupt utilities, and cause critical injuries or death. [66]

Landslides are the most destructive geological hazard in the hilly regions. For systematic landslide mitigation and management, landslide evaluation and hazard zonation are required. Over the past few decades several techniques have been developed that can be used for landslide evaluation and zonation. These techniques can broadly be classified into qualitative and quantitative approaches. Qualitative approaches include geomorphological analysis and heuristic techniques whereas quantitative approaches include statistical, artificial intelligence and deterministic techniques.

Landslides

Landslides occur when areas of relatively dry rock, soil or debris move uncontrollably down a slope. Landsides may be localized or massive in size and can move quickly. Disruption and damage from landslides are common in areas where linear infrastructure like roads and rail lines have been installed across the slope of a hillside.

Mudflows

Mudflows are water saturated “rivers” of earth, rock, and debris. Mudflows develop when water rapidly accumulates in the material, such as during heavy rainfall or rapid snowmelt. Mudflows can develop and move quickly, giving little to no warning.

Rockfalls

Rockfalls occur when rocks or other materials detach from a slope or cliff and descend in a freefall, rolling or bouncing. Rockfalls can occur naturally, through faults and seismic activity, or as a product of human activity, such as blasting.

[66] W.V. Region 4 Landslide Risk Assessment – February 10, 2022.
https://data.wvgis.wvu.edu/pub/ra/state/cl/landslide/reports/Landslide_Risk_Assessment_Report_Region_4.pdf

Land 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. The primary cause of land subsidence is human activity such as mining and the extraction of groundwater or petroleum.

Expansive Soils

Expansive soils are soils or soft rocks that will swell or shrink depending on their moisture content. The swelling and shrinking action can cause extensive damage to transportation routes, such as highways and rail line, and structures that are built over these areas.

Karst

Karst refers to above ground features (topography) and below ground void features as well as surface-to-subsurface features like sinkholes caused by the dissolution of rock. As rainwater percolates through the soil, it can become more acidic, dissolving calcium carbonate in rock. This dissolution creates elaborate openings and passages in the ground such as sink holes, karst windows, vertical shafts, and cave passages. Karstic terrain can create soil instability, soil collapse, rock collapse, sinkholes and other surface level dangers for humans and property. Human activity can exacerbate or "set off" karst hazards through construction and excavation, alteration of ground level, or seismic-level vibrations.

Location & Spatial Extent

Karst Formations

Karst and associated caves have long been known as a feature in Southwest West Virginia. Greenbrier County is identified in the state plan as one of the Karst Waters Institute's top 10 endangered areas. Additionally, parts of Greenbrier and Pocahontas counties have been identified by the West Virginia Mapping Panel as having particular environmental significance.[67]

The subsidence assessment focuses on areas vulnerable to collapse resulting from geologic formations prone to dissolution. It does not include areas underlain by coal, which can be subject to abandoned mine collapse, or urban areas where failed underground infrastructure can lead to sinkholes. NCEI ranking parameters and risk mapping was not developed for karst because no events were recorded in the database. A high percentage of karst geology in a jurisdiction does not necessarily mean that the whole locality is at high risk for land subsidence.

Areas of karst occur throughout the eastern tier of counties in the State, including the Eastern Panhandle. However, the Karst Waters Institute recognized Greenbrier County as one of the top 10 endangered areas. The West Virginia Mapping Panel has identified four quadrangles in Greenbrier, Pocahontas and Monroe Counties as having particular environmental significance. [68]

The following table shows the total miles of road that are prone to high/medium slope failure risk. The table also shows the rank of landslide susceptibility within the state. Fayette County has about 96 miles of road that is susceptible to high/medium probability of landslides. Greenbrier County has almost 110 miles, Nicholas County has about 46 miles, Pocahontas County has 119 miles, and Webster County has nearly

[67] Caves and karst of the Greenbrier Valley in West Virginia, William B. White, (2018)
[68] W.V. State Hazard Mitigation Plan 2018 Update

105 miles of road prone to high/medium risk for slope failure. Counties were ranked for slope failure risk based on the number of miles that are at risk. Several Region 4 counties rank in the Top 20 for highest number of road miles at risk from landslides in the state. Of all 55 counties, Fayette County ranks 19th, Greenbrier 12th, Nicholas 41st, Pocahontas 11th, and Webster 18th. In each county, most of the at-risk roads are in unincorporated areas.

Figure 2.2.32: Road Length Susceptible to High/Medium Risk of Landslide WV Region 4[69]

Community Name	County	Roads Total (miles)	Roads Total (miles)- High/Medium Risk	Rank[1]
Fayette County*	FAYETTE	917.8	88.7	22
Ansted	FAYETTE	10.5	1.5	28
Fayetteville	FAYETTE	23	1.3	33
Gauley Bridge	FAYETTE	9.7	0.3	100
Meadow Bridge	FAYETTE	2.6	0	189
Montgomery**	FAYETTE	6.8	0.3	100
Mount Hope	FAYETTE	11	0.3	100
Oak Hill	FAYETTE	50.4	2.4	17
Pax	FAYETTE	4.4	0.2	127
Smithers**	FAYETTE	8.8	0	189
Thurmond	FAYETTE	1.2	1	45
	FAYETTE	**1042.6**	**95.8**	**19**
Greenbrier County*	GREENBRIER	1077	107	12
Alderson**	GREENBRIER	4.5	0.1	155
Falling Springs	GREENBRIER	2.2	0.3	100
Lewisburg	GREENBRIER	24.6	0.2	127
Quinwood	GREENBRIER	3.9	0.1	155
Rainelle	GREENBRIER	7.2	0.3	100
Ronceverte	GREENBRIER	9.1	1.6	27
Rupert	GREENBRIER	3.5	0	189
White Sulphur Springs	GREENBRIER	15	0.4	85
	GREENBRIER	**1145.6**	**109.9**	**12**
Nicholas County*	NICHOLAS	707.6	44	42
Richwood	NICHOLAS	10.3	1.4	31
Summersville	NICHOLAS	26.9	0.9	45
	NICHOLAS	**744.8**	**46.3**	**41**
Pocahontas County*	POCAHONTAS	688.2	114.3	11
Durbin	POCAHONTAS	5.1	1	39
Hillsboro	POCAHONTAS	3.2	0	189
Marlinton	POCAHONTAS	31.2	3.7	9
	POCAHONTAS	**727.7**	**119**	**11**
Webster County*	WEBSTER	476.4	104.1	17
Addison	WEBSTER	4.8	0.4	85
Camden-On-Gauley	WEBSTER	2	0.1	155
Cowen	WEBSTER	4.7	0	189
	WEBSTER	**487.9**	**104.6**	**18**

*Unincorporated Community
**Split Community
[1] Group Rank on Community Type: County, Unincorporated, Incorporated

[69] W.V. Region 4 Landslide Risk Assessment – February 10, 2022.
https://data.wvgis.wvu.edu/pub/ra/state/cl/landslide/reports/Landslide_Risk_Assessment_Report_Region_4.pdf

The following table shows the total count of primary structures in high/medium landslide susceptibility areas. Total asset values were then derived from the 2021 tax assessment database. Each county was ranked for the number of primary structures and the total asset values in high/medium susceptibility areas. Fayette County has a total of 305 primary structures with a total appraisal value of $17,653,817 that are in high/medium susceptibility areas. Greenbrier County has 281 primary structures with total appraisal value of $61,943,791 in high/medium susceptibility areas. Nicholas County has 282 primary structures with a total appraisal value of $5,033,059 in high/medium susceptibility areas. Pocahontas County has 219 primary structures with a total appraisal value of $18,129,847 in high/medium susceptibility areas. Webster County has 214 primary structures with a total appraisal value of $1,795,466 in high/medium susceptibility areas. Fayette County ranked 32nd, Greenbrier 35th, Nicholas 34th, Pocahontas 42nd, and Webster 43rd for total number of at-risk structures in WV counties. For the value of total assets at high or medium risk of landslides, Fayette County ranks 23rd, Greenbrier 6th, Nicholas 46th, Pocahontas 21st, and Webster 51st. Fayette, Greenbrier, and Pocahontas counties have significantly higher rankings for total asset value at risk than for the total number of structures at risk. This may be due to higher property values in these counties. [70]

[70] W.V. Region 4 Landslide Risk Assessment – February 10, 2022.
https://data.wvgis.wvu.edu/pub/ra/state/cl/landslide/reports/Landslide_Risk_Assessment_Report_Region_4.pdf

Table 2.2.24: Structures Susceptible to High/Medium Risk Landslide[71]

Community Name	County	Total Count	Total Value	Ranking(Count)[1]	Ranking(Value)[1]
Fayette County*	FAYETTE	199	$14,529,677	36	21
Ansted	FAYETTE	9	$156,783	104	119
Fayetteville	FAYETTE	7	$378,400	118	86
Gauley Bridge	FAYETTE	21	$343,850	56	90
Meadow Bridge	FAYETTE	0	$0	195	191
Montgomery**	FAYETTE	2	$7500	164	189
Mount Hope	FAYETTE	7	$129,600	118	127
Oak Hill	FAYETTE	46	$1,886,606	36	35
Pax	FAYETTE	0	$0	195	191
Smithers**	FAYETTE	1	$500	178	190
Thurmond	FAYETTE	15	$228,400	75	102
	FAYETTE	**305**	**$17,653,817**	**32**	**23**
Greenbrier County*	GREENBRIER	228	$60,296,899	32	3
Alderson**	GREENBRIER	3	$62,700	151	155
Falling Springs	GREENBRIER	0	$0	195	191
Lewisburg	GREENBRIER	10	$553,130	94	71
Quinwood	GREENBRIER	0	$0	195	191
Rainelle	GREENBRIER	3	$11,700	151	187
Ronceverte	GREENBRIER	24	$458,740	53	79
Rupert	GREENBRIER	0	$0	195	191
White Sulphur Springs	GREENBRIER	15	$595,121	75	67
	GREENBRIER	**281**	**$61,943,791**	**35**	**6**
Nicholas County*	NICHOLAS	180	$3,498,959	40	44
Richwood	NICHOLAS	85	$755,000	23	60
Summersville	NICHOLAS	17	$779,100	69	58
	NICHOLAS	**282**	**$5,033,059**	**34**	**46**
Pocahontas County*	POCAHONTAS	213	$17,920,547	34	18
Durbin	POCAHONTAS	1	$26,500	178	180
Hillsboro	POCAHONTAS	0	$0	195	191
Marlinton	POCAHONTAS	5	$182,800	129	111
	POCAHONTAS	**219**	**$18,129,847**	**42**	**21**
Webster County*	WEBSTER	188	$1,608,440	38	50
Addison	WEBSTER	14	$75,227	78	149
Camden-On-Gauley	WEBSTER	8	$73,700	111	150
Cowen	WEBSTER	4	$38,100	139	171
	WEBSTER	**214**	**$1,795,466**	**43**	**51**

*Unincorporated Community
**Split Community
[1] Group Rank on Community Type: County, Unincorporated, Incorporated

[71] W.V. Region 4 Landslide Risk Assessment – February 10, 2022.
https://data.wvgis.wvu.edu/pub/ra/state/cl/landslide/reports/Landslide_Risk_Assessment_Report_Region_4.pdf

The following table shows detailed risk of slope failure based on different occupancy classes. For most Region 4 counties, the Residential occupancy class has the highest total replacement cost in high/medium landslide susceptibility areas. Commercial occupancy class is mostly second, followed by Other occupancy class structures. Replacement costs for the Other occupancy class should be ignored as some government and other property values do not get incorporated in the statewide assessment database, resulting in lower value of at-risk structures.

Fayette County is the only county in Region 4 where Commercial replacement costs exceed Residential replacement costs. There are 33 Commercial structures with a total replacement cost of $10,257,782 and 210 Residential structures with replacement costs of $6,969,372. There are also 62 Other occupancy class structures at high/medium risk of landslides. The unincorporated areas of Fayette County have the highest structure counts and corresponding replacement values in all occupancy classes. Meadow Bridge, Montgomery, and Pax have no at-risk structures.

Greenbrier County has a total of 207 structures in the Residential occupancy class with replacement costs of $59,810,011, followed by 62 Other structures, and 12 Commercial structures with replacement costs of $1,622,746. The unincorporated areas of Greenbrier County have the highest structure counts and corresponding replacement values in all occupancy classes. Falling Springs, Quinwood, and Rupert have no at-risk structures.

Nicholas County has a total of 183 structures in the Residential occupancy class with replacement costs of $3,273,458, followed by 86 Other structures, and 13 Commercial structures with replacement costs of $1,357,154. The unincorporated areas of Nicholas County have the highest structure counts and corresponding replacement costs in all occupancy classes. Richwood has the second highest Residential structure count, but Summersville has the second highest Residential replacement costs in the county.

Pocahontas County has a total of 169 structures in the Residential occupancy class with replacement costs of $17,007,600, followed by 49 Other structures, and 1 Commercial structure with a replacement cost of $212,894. The unincorporated area of Pocahontas County has the highest structure counts and corresponding replacement values and is the only community with at-risk structures in the Commercial or Other occupancy classes. There are no at-risk structures in Hillsboro.

Webster County has a total of 139 structures in the Residential occupancy class with replacement costs of $1,498,622, followed by 70 Other structures, and 5 Commercial structures with replacement costs of $181,683. The unincorporated areas of Webster County have the highest structure counts and corresponding replacement values in all occupancy classes. Camden-On-Gauley is the only community with no Commercial structures at risk, although Addison and Cowen have only 1 each.

Table 25: Types of Structures Susceptible to High/Medium Risk Landslide [72]

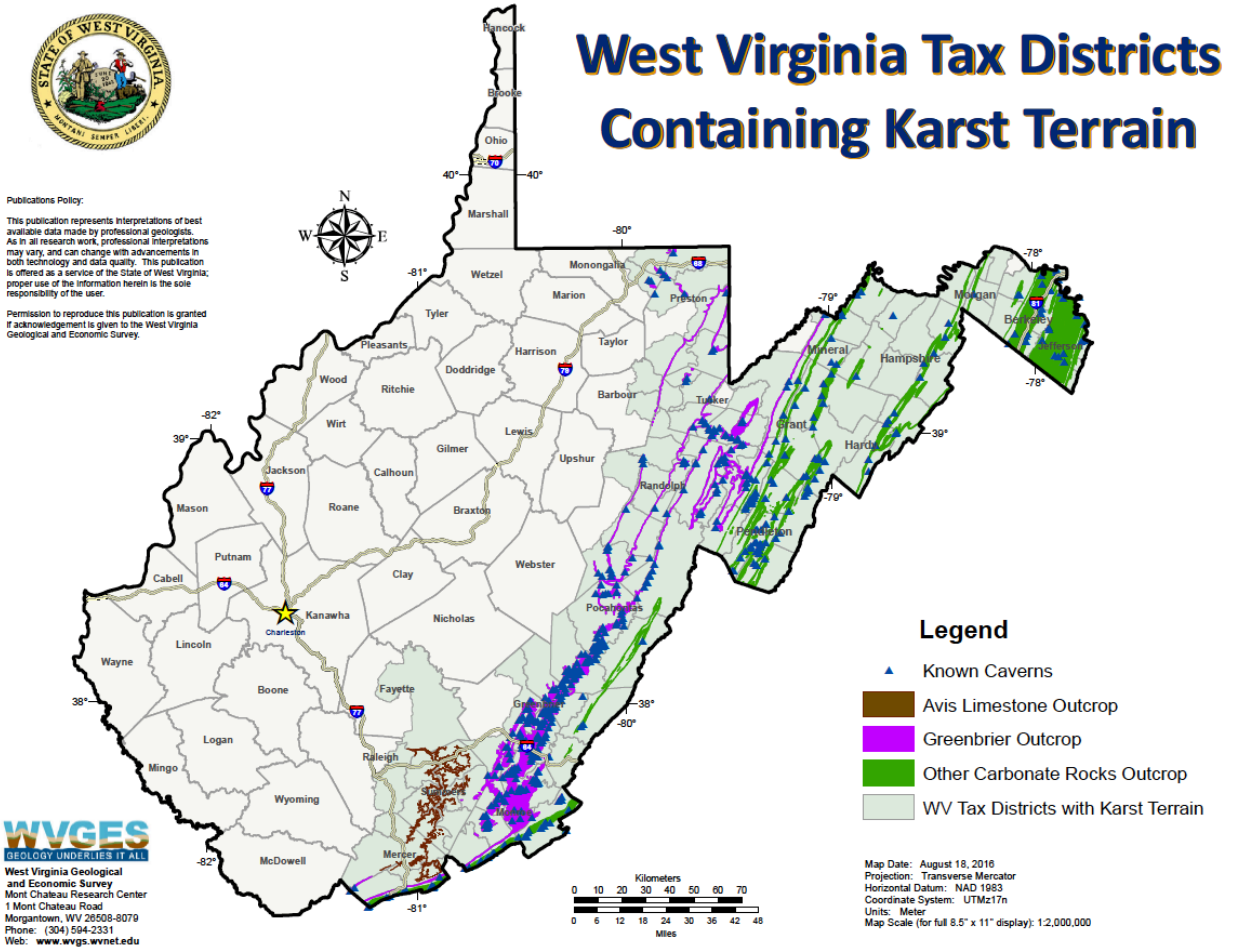
[72] W.V. Region 4 Landslide Risk Assessment – February 10, 2022.
https://data.wvgis.wvu.edu/pub/ra/state/cl/landslide/reports/Landslide_Risk_Assessment_Report_Region_4.pdf

Community Name	County	RESIDENTIAL OCCUPANCY CLASS		COMMERCIAL OCCUPANCY CLASS		OTHER OCCUPANCY CLASS	
		High/Medium Susceptibility		High/Medium Susceptibility		High/Medium Susceptibility	
		Residential count	Residential-value	Commercial count	Commercial value	Other count	Other value***
Fayette County*	FAYETTE	135	$4,418,189	21	$9,874,027	43	$237,462
Ansted	FAYETTE	5	$120,633	3	$36,150	1	$0
Fayetteville	FAYETTE	5	$330,100	1	$48,300	1	$0
Gauley Bridge	FAYETTE	19	$343,650	0	$0	2	$200
Meadow Bridge	FAYETTE	0	$0	0	$0	0	$0
Montgomery**	FAYETTE	0	$0	0	$0	0	$0
Mount Hope	FAYETTE	4	$98,100	1	$31,500	2	$0
Oak Hill	FAYETTE	33	$1,537,000	7	$267,806	6	$81,800
Pax	FAYETTE	0	$0	0	$0	0	$0
Smithers**	FAYETTE	1	$500	0	$0	0	$0
Thurmond	FAYETTE	8	$121,200	0	$0	7	$107,200
	FAYETTE	**210**	**$6,969,372**	**33**	**$10,257,782**	**62**	**$426,662**
Greenbrier County*	GREENBRIER	167	$58,333,720	7	$1,477,146	54	$486,033
Alderson**	GREENBRIER	1	$28,200	0	$0	0	$0
Falling Springs	GREENBRIER	0	$0	0	$0	0	$0
Lewisburg	GREENBRIER	5	$448,730	3	$104,400	2	$0
Quinwood	GREENBRIER	0	$0	0	$0	0	$0
Rainelle	GREENBRIER	3	$11,700	0	$0	0	$0
Ronceverte	GREENBRIER	17	$400,640	2	$41,200	5	$16,900
Rupert	GREENBRIER	0	$0	0	$0	0	$0
White Sulphur Springs	GREENBRIER	14	$587,021	0	$0	1	$8,100
	GREENBRIER	**207**	**$59,810,011**	**12**	**$1,622,746**	**62**	**$511,033**
Nicholas County*	NICHOLAS	100	$1,780,408	10	$1,331,404	70	$387,147
Richwood	NICHOLAS	69	$723,950	3	$25,750	13	$5,300
Summersville	NICHOLAS	14	$769,100	0	$0	3	$10,000
	NICHOLAS	**183**	**$3,273,458**	**13**	**$1,357,154**	**86**	**$402,447**
Pocahontas County*	POCAHONTAS	163	$16,798,300	1	$212,894	49	$909,353
Durbin	POCAHONTAS	1	$26,500	0	$0	0	$0
Hillsboro	POCAHONTAS	0	$0	0	$0	0	$0
Marlinton	POCAHONTAS	5	$182,800	0	$0	0	$0
	POCAHONTAS	**169**	**$17,007,600**	**1**	**$212,894**	**49**	**$909,353**
Webster County*	WEBSTER	122	$1,336,628	3	$156,650	63	$115,161
Addison	WEBSTER	10	$74,493	1	$733	3	$0
Camden-On-Gauley	WEBSTER	5	$73,700	0	$0	3	$0
Cowen	WEBSTER	2	$13,800	1	$24,300	1	$0
	WEBSTER	**139**	**$1,498,622**	**5**	**$181,683**	**70**	**$115,161**

*Unincorporated Community
**Split Community
***Other occupancy class value is underreported as assessment value may be absent in assessment database.

The West Virginia Geological and Economic Survey lists the following tax districts as containing karst.

Fayette	Greenbrier	Nicholas	Pocahontas	Webster
New Haven	Anthony Creek Blue Sulphur Falling Springs Fort Springs Frankford Irish Corner Lewisburg White Sulphur Williamsburg	*None*	Edray Greenbank Huntersville Little Levels	*None*

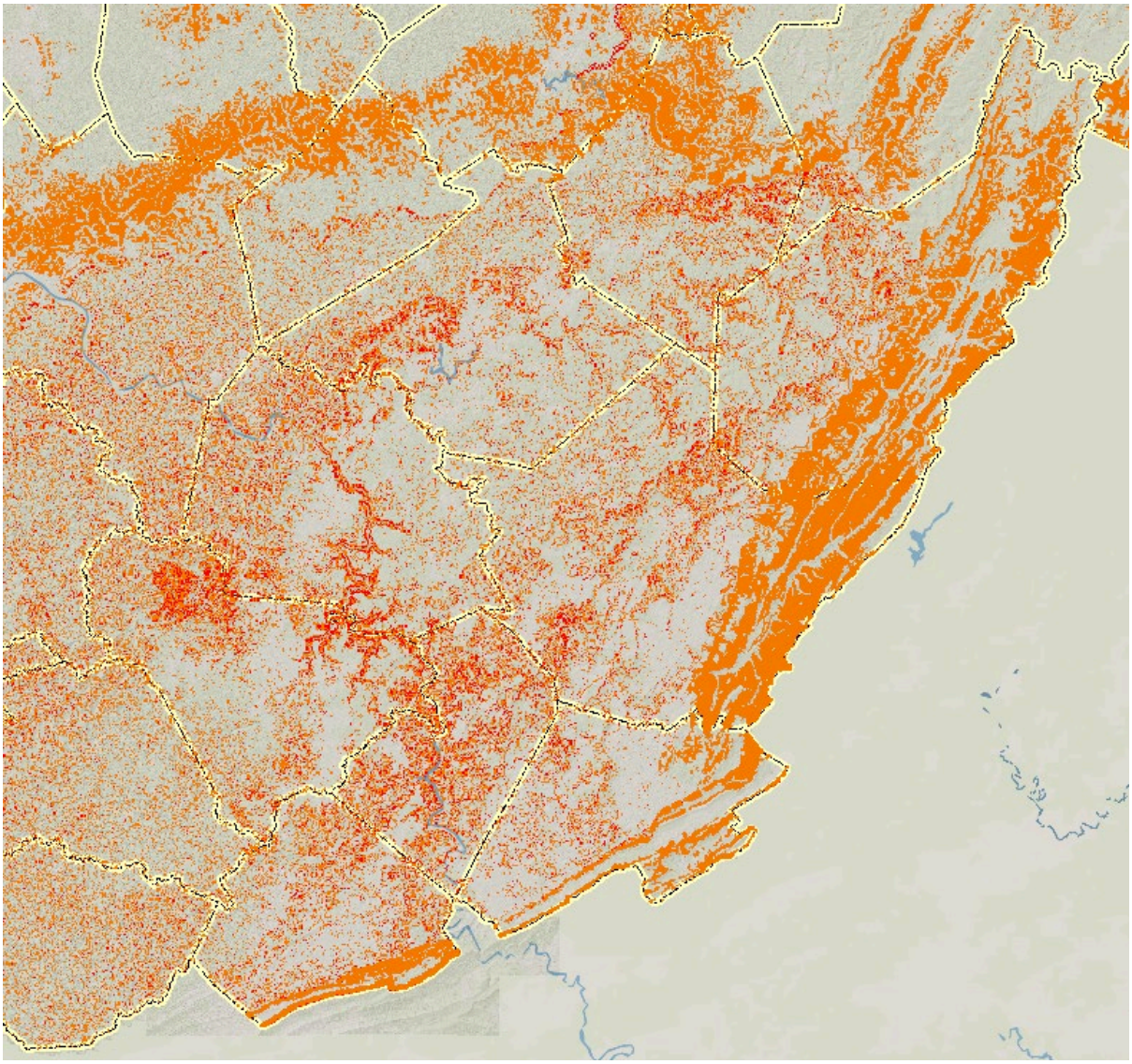


Other Mass Movements

The geography of the region also leaves it susceptible to other types of mass movements. Areas with steep terrain (15% or higher) carry risks of landfalls, mud flows and rock falls, while the highest elevations can

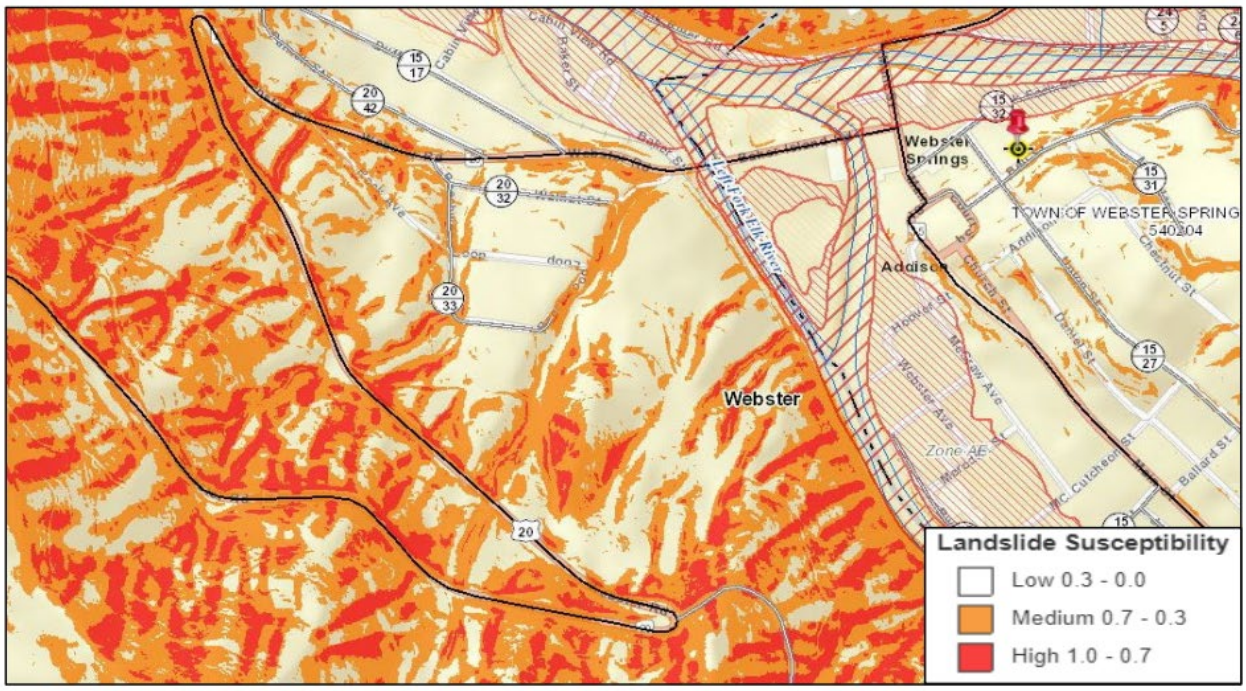
carry the risk of avalanches in the winter and early spring. However, the 2018 West Virginia Statewide Hazard Mitigation Plan Update categorizes all five counties in Region 4 PDC as low risk for landslide. It also determines the monetary cost of possible or worst-case scenario as $550M. The map below shows that landslide vulnerability is prevalent throughout the region, though not uniform.

Figure 2.2.33: Landslide Vulnerability Throughout WV Region 4[73]



[73] WV Landslide Tool

Figure 2.2.34: Landslide Susceptibility in an Unincorporated Area near Addison, WV in Webster County[74]



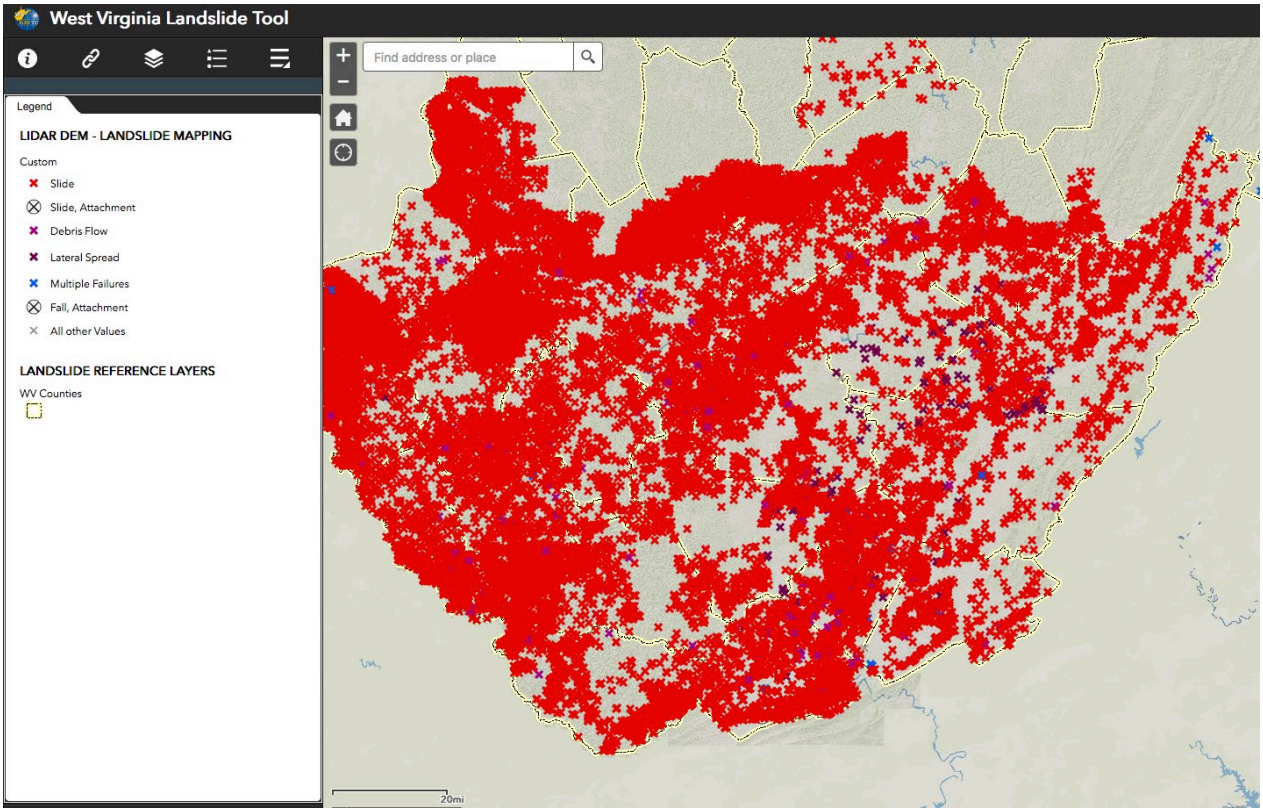
Historical Occurrence

The number and significance of mass movements depends to some degree on data source. One incident resulted in $5,000 in property damage, and one person was killed in a 2015 debris flow. Data from the NCEI indicates two events.

Date	County	Time	Type	Death	Injury	Property Damage ($)
4/15/2007	Greenbrier	9:00	Debris Flow	0	0	$5,000
3/10/2015	Greenbrier	14:45	Debris Flow	1	0	$5,000

[74] WV Landslide Tool

The West Virginia Landslide Tool developed by the WV GIS Technical Center describes many landslides and other mass movements



The US Geological Survey (USGS) Landslide Inventory lists the following landslides. The data has been compiled below and supplemented with local news reports.

July 25, 2018

Rockslide closed both lanes of Route 60 at the Kanawha-Fayette County line.

May 13, 2017

Landslide on Route 61 outside of Montgomery, Fayette, and Kanawha Counties.

May 12, 2017

Heavy rain caused a mudslide to close Westbound lane of Route 60 near Smithers, Fayette County. WV Metro News)

June 24, 2016

Richwood, Nicholas County experienced a landslide caused by severe flooding.

Rockslide and landslide accompany flooding in Richwood (Photo by Andy Brown, Charleston Gazette-Mail)

March 10th, 2015

One woman was killed in Ronceverte, in Greenbrier County when a tree carried by a landslide smashed into her car. Greenbrier County Emergency Management stated that mudslides were more likely to happen due to all the rain and snow melt (KWWL, 2015.)

July 13th, 2015

A large landslide covered a section of WV Highway 82 approximately 2.6 miles east of Birch River, in Nicholas County. The WV Division of if Highways estimated that they removed 5,000 tons of material from the roadway over two days. The road was closed from Monday, July 17th through the following Friday evening. (WOWK-TV)

Landslide and rockslide across WV Route 82 (Photo by Collin Lawler, Channel 13 News, WOWK-TV)[75]

Two landslides occurred in Webster County. One at the intersection of Route 15 and Route 20 in Diana. Another landslide occurred at Elk Road and Route 20.

March 13, 2010

Multiple slides in the Glade Creek area of New River Gorge National River in Webster County because of rain-induced flooding resulted in road and campground closures (Glade Creek Campground, Grandview Sandbar Campground). "There's about a 30-foot gap between the bridge [over Glade Creek] and the parking lot that needs to be filled," said James Minor, facility manager for the New River Gorge, according to a USGS report.

Loss Estimate

As demonstrated in the hazard profile, mass movements can consist of any number of events. Some may form quickly and other more gradually occurring, but either can cause serious and costly damage to structures and infrastructure.

Vulnerability & Risk Assessment

Social Vulnerability

There are no specific considerations for social vulnerability and its relevance for mass movement.

[75] WOWK News – Charleston News

Critical Facilities Vulnerability

Above ground and below ground infrastructure can be disrupted by mass movements, with linear infrastructure like roads and utility lines being particularly vulnerable. The weakest link in the chain becomes self-evident when a sewer line breaks or an electric pole line collapse.

Buildings throughout the region are at risk and critical facilities are included. The 2018 West Virginia Statewide Standard HMP Update lists the number of crucial facilities that are located in Karst zones in the state. In Greenbrier County there are twenty-four of these facilities:

- Four law enforcement facilities
- Ten fire stations
- One hospital
- Eight K-12 schools
- One Emergency Operations Center (EOC)

Pocahontas County, also identified as being at risk, has eight facilities located in Karst zones:

- Two law enforcement facilities
- Three fire station
- Three K-12 schools

Probability of Future Occurrence of the Hazard

Given the range of causes of mass movements and the observed evidence of mass movement causing conditions, Region 4 can expect the risk to continue. The probability is Likely, 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years. To the extent that mass movements in the Region are produced by extreme precipitation, these mass movements can be expected to increase as climate change raises the probability of more extreme precipitation events.

Vulnerability Assessment Conclusions

For the most part, mass movements in Region 4 have produced very localized damages and disruptions, although landslides along high-volume traffic routes and along primary routes can magnify impacts from physically small movements. In a recently published Landslide Risk Assessment performed by the West Virginia Emergency Management Division they offer insight into necessary steps moving forward. To address landslide susceptibility at a sub-county scale, geotechnical evaluations should be performed by professional engineers or geologists. For site-specific investigations, local officials, developers, and property owners should consult slope-stability experts, such as certified professional engineers and qualified geologists. Site-specific evaluations for landslide susceptibility can only be provided by performing detailed site-specific geotechnical studies, including bedrock and soil analyses, core description, physical testing, and slope-stability analyses.[76]

[76] W.V. Region 4 Landslide Risk Assessment – February 10, 2022.
https://data.wvgis.wvu.edu/pub/ra/state/cl/landslide/reports/Landslide_Risk_Assessment_Report_Region_4.pdf

Identified Data Limitations

Landslide occurrences are well catalogued thanks to the WV landslide tool. Further analysis of structure vulnerability based on soil classification, soil properties, slope and hazard occurrence would provide more detailed landslide risk assessments which were beyond the scope of this plan.

PANDEMIC

Period of Occurrence	Anytime.
Number of Events	Five
Warning Time	Variable, days to months.
Potential Impacts	Loss of life, disruptions.
Cause Injury or Death	Potential to cause injury or death.
Potential Facility Shutdown	Minor to widespread.

A pandemic is defined as an epidemic occurring worldwide, or over a very wide area, crossing international boundaries and usually affecting a large number of people. A pandemic result when a virus mutates from an animal to a strain that can be passed to humans. Humans have no immunity to these new strains, making them especially deadly. The strain may ultimately mutate to a form where it can be passed from human-to-human. Given the lack of immunity, the virus spreads quickly and can have devastating effects on the population. When the virus spreads globally, it is deemed a pandemic.

The World Health Organization (WHO) constantly monitors influenza cases throughout the world and has implemented a six-phase system:

- **Phase 1**: No new influenza virus has been found in people or animals.

- **Phase 2:** an animal influenza virus circulating among domesticated or wild animals is known to have caused infection in humans and is therefore considered a potential pandemic threat.

- **Phase 3:** an animal or human-animal influenza reassortant virus has caused sporadic cases or small clusters of disease in people but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks. Limited human-to-human transmission may occur under some circumstances, for example, when there is close contact between an infected person and an unprotected caregiver. However, limited transmission under such restricted circumstances does not indicate that the virus has gained the level of transmissibility among humans necessary to cause a pandemic.

- **Phase 4**: Is characterized by verified human-to-human transmission of an animal or human-animal influenza reassortant virus able to cause "community-level outbreaks". The ability to cause sustained disease outbreaks in a community marks a significant upwards shift in the risk of a pandemic. Any country that suspects or has verified such an event should urgently consult with WHO so that the situation can be jointly assessed, and a decision made by the affected country if implementation of a rapid pandemic containment operation is warranted. Phase 4 indicates a

significant increase in risk of a pandemic but does not necessarily mean that a pandemic is a forgone conclusion.

- **Phase 5**: is characterized by human-to-human spread of the virus into at least two countries in one WHO region. While most countries will not be affected at this stage, the declaration of Phase 5 is a strong signal that a pandemic is imminent and that the time to finalize the organization, communication, and implementation of the planned mitigation measures is short.

- **Phase 6**: the pandemic phase, is characterized by community level outbreaks in at least one other country in a different WHO region in addition to the criteria defined in Phase 5. Designation of this phase will indicate that a global pandemic is under way

- **Post-Peak Period**: Levels of pandemic influenza in most countries have dropped below peak levels.

- **Possible New Wave:** Level of pandemic influenza activity in most counties rising again.

- **Post-Pandemic Period**: Levels of influenza activity have returned to levels seen for seasonal influenza.

Pandemics are also known to occur in waves. For example, initial wave of infected persons may be those first to contract the virus. These people may subsequently pass it to health officials or family members. For this reason, the duration of pandemic outbreaks tends to last weeks or even months.

Location & Spatial Extent

Pandemics are global in nature. However, they may start anywhere. The WV Region 4 PDC chose to analyze this hazard given the current and on-going COVID-19 Public Health Emergency.

All populations should be considered at risk to pandemic. Buildings and infrastructure while not directly impacted by the virus/pathogen could be indirectly impacted if people are not able to operate and maintain them due to illness. Many buildings could potentially be shutdown, at least temporarily, as a result. Employers may initiate work from home procedures for non-essential workers in order to help stop infection. Commerce activities, and thus the economy, may suffer greatly during this time.

Historical Occurrences[77]

Several pandemics have been reported throughout history. A short history of the flu/Spanish Flu was collected from The Historical Text Archive and is described below.

The first known pandemic dates back to 430 B.C. with the Plague of Athens. It reportedly killed a quarter of the population over four years due to typhoid fever. In 165-180 A.D., the Antonine Plague killed nearly 5 million people. Next, the Plague of Justinian (the first bubonic plague pandemic) occurred from 541 to 566. It killed 10,000 people a day at its peak and resulted in a 50 percent drop in Europe's population.

[77] National Institutes of Health https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7874133/

Since the 1500s, influenza pandemics have occurred about three times every century or roughly every 10-50 years. The Black Death devastated European populations in the 14th century. Nearly a third of the population (20-30 million) was killed over six years. From 1817 to present, seven Cholera Pandemics have impacted to the world and killed millions. Perhaps most severe, was the Third Cholera Pandemic (1852-1959) which started in China. Isolated cases can still be found in the Western U.S. today. There were three major pandemics in the 20th century (1918-1919, 1957-1958, and 1968-1969). The most infamous pandemic flu of the 20th century, however, was that of 1918-1919. Since the 1960s, there has been two pandemics, the 2009 H1N1 influenza and SARS-CoV-2 (COVID-19). The pandemics of the 20th and 21st centuries that impacted the United States are detailed below.

1918 Spanish Flu: This was the most devastating flu of the 20th century. This pandemic spread across the world in three waves between 1918 and 1919. It typically impacted areas for around twelve weeks and then would largely disappear. However, it would frequently reemerge several months later. Worldwide, approximately 50 million persons died and over a quarter of the population was infected. Nearly 675,000 people died in the United States. The illness came on suddenly and could cause death within a few hours. The virus impacted those aged 15 to 35 especially hard. The movement of troops during World War I is thought to have facilitated the spread of the virus.

1957 Asian Flu: It is estimated that the Asian Flu caused 2 million deaths worldwide. Approximately 70,000 deaths were in the U.S. However, the proportion of people impacted was substantially higher than that of the Spanish Flu. This flu was characterized as having much milder effects than the Spanish Flu and greater survivability. Similar to other pandemics, this pandemic has two waves. Elderly and infant populations were more likely to succumb to death. This flu is thought to have originated from a genetic mutation of a bird virus.

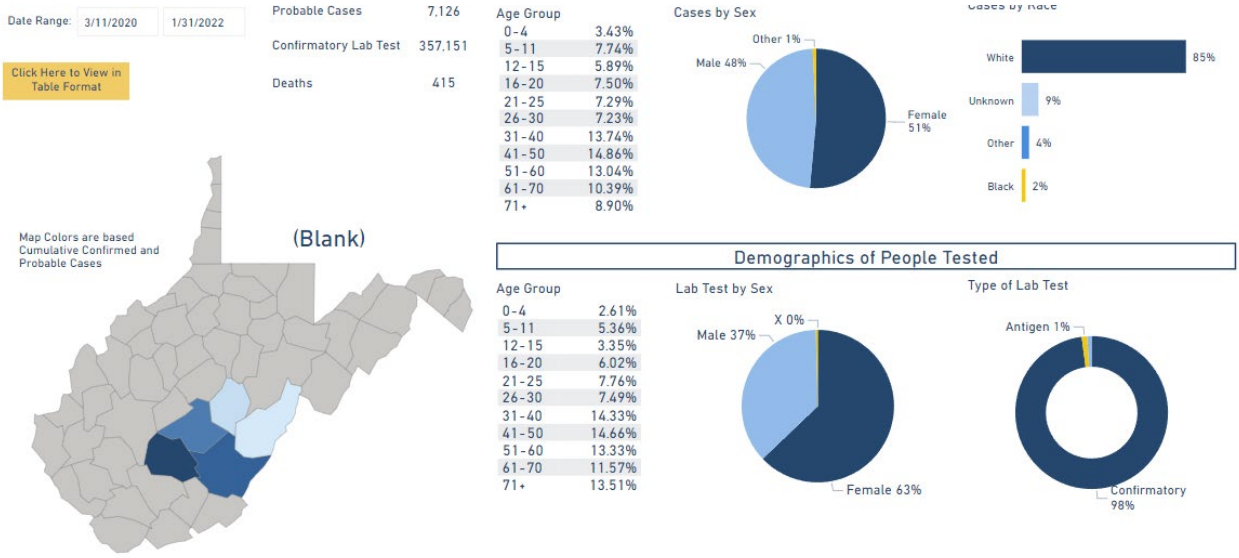
1968 Hong Kong Flu: The Hong Kong Flu is thought to have caused one million deaths worldwide. It was milder than both the Asian and Spanish influenza viruses. It was similar to the Asian Flu, which may have provided some immunity to the virus. It had the most severe impact on elderly populations.

2009 H1N1 Influenza: This flu was derived from human, swine, and avian virus strains. It was initially reported in Mexico in April 2009. On April 26, the U.S. government declared H1N1 a public health emergency. A vaccine was developed and over 80 million were vaccinated which helped minimize the impacts. The virus had mild impacts on most of the population but did cause death (usually from viral pneumonia) in high-risk populations such as pregnant women, obese persons, indigenous people, and those with chronic respiratory, cardiac, neurological, or immunity conditions. Worldwide, it is estimated that 43 million to 89 million people contracted H1N1 between April 2009 and April 2010, and between 8,870 and 18,300 H1N1 cases resulted in death.

2020 SARS-CoV-2 (COVID-19): Coronavirus Disease 2019 (COVID-19) was declared as pandemic by the World Health Organization on March 11th, 2020, mainly due to the speed and scale of the transmission of the disease. Before that, it started as an epidemic in mainland China with the focus being firstly reported in the city of Wuhan, Hubei province on February 26th. The etiologic agent of COVID-19 was isolated and identified as a novel coronavirus, initially designated as 2019-nCoV. Later, the virus genome was sequenced and because it was genetically related to the coronavirus outbreak responsible for the SARS outbreak of 2003, the virus was named as severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) by the International Committee for Taxonomy of Viruses.

As of February 2022, the COVID-19 pandemic has resulted in over 156 million confirmed cases and over 5.6 million deaths globally, with 75.3 million confirmed cases and 889,000 deaths in the United States alone. It has also sparked fears of an impending economic crisis and recession. Social distancing, self-isolation and travel restrictions have led to a reduced workforce across all economic sectors and caused many jobs to be lost. Schools closed down, and the need for commodities and manufactured products had decreased. In contrast, the need for medical supplies had significantly increased. The food sector also faced increased demand due to panic-buying and stockpiling of food products. No industry or sector was left untouched by COVID-19.

Figure 2.2.35: WV Region 4 COVID-19 Cumulative Data as of 2/2/2022[78]



In the WV Region 4 planning area, as of 2/2/2022, there have been 55,368 confirmed cases of COVID-19, with 388 total deaths reported.

Agriculture - A global crash in demand from hotels and restaurants saw prices of agricultural commodities drop by 20%

Petroleum & Oil - During a meeting at the Organization of the Petroleum Exporting Countries (OPEC) in Vienna on March 6th, 2020, a refusal by Russia to slash oil production triggered Saudi Arabia to retaliate with extraordinary discounts to buyers and a threat to pump more crude. Saudi, regarded as the de facto leader of OPEC, increased its provision of oil by 25% compared to February – taking production volume to an unprecedented level. This caused the steepest one-day price crash seen in nearly 30 years

Education - COVID-19 has affected all levels of the education system, from pre-school to post-secondary education. Different countries introduced various policies, ranging from complete closure in Germany, Italy, and the United States to targeted closure in the United Kingdom for all but the children of workers in key industries.

Finance Industry - COVID-19 has affected communities, businesses and organizations globally, inadvertently affecting the financial markets and the global economy. Uncoordinated governmental

[78] W.V. Department of Health & Human Resources: https://dhhr.wv.gov/COVID-19/Pages/default.aspx

responses and lockdowns have led to a disruption in the supply chain. In China, lockdown restrictions significantly reduced the production of goods from factories, while quarantine and self-isolation policies decreased consumption, demand and utilization of products and services.

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that all of the WV Region 4 planning area has a probability level of unlikely (less than 1 percent annual probability) for future pandemic events. The massive increase in globalization and connectivity has meant that a virus can spread from one side of the world to another in mere hours. In 2020, people around the world were as used to hopping on an international flight as they were catching a bus or a train. Air travel makes it possible for someone to travel halfway across the globe in less time than it takes for many diseases to incubate, making it extremely difficult to prevent their spread. In 1990, 1 billion people travelled by air, a number that has since increased to more than 4.2 billion in 2018. While pandemics are still relatively rare, the ease of international travel, coupled with climate change, and urbanization increases the probability of more frequent pandemics.

Loss Estimates

There are no readily available records of economic losses due to previous pandemics that impacted the WV Region 4 planning area. While at the time of this current plan update, we are still under a FEMA Major Disaster Declaration, it will likely take years, if not decades to fully realize the economic losses incurred during the COVID-19 pandemic.

Vulnerability & Risk Assessment

Social Vulnerability

Evidence suggests that epidemics and pandemics can have significant social and political consequences, creating clashes between states and citizens, eroding state capacity, driving population displacement, and heightening social tension and discrimination.

Critical Facilities

While a virus itself cannot damage infrastructure directly, it can do so indirectly by impacting the people who maintain the infrastructure. Buildings may deteriorate or become inoperable due to lack of preventative maintenance; a small fire may spread further causing more extensive damage because there was a lack of fire personnel, etc.

Vulnerability Assessment Conclusion[79]

Preparing for a pandemic is challenging because of a multitude of factors, many of which are unique among natural disasters. Pandemics are rare events, and the risk of occurrence is influenced by anthropogenic changes in the natural environment. In addition, accountability for preparedness is diffuse, and many of the countries at greatest risk have the most limited capacity to manage and mitigate pandemic risk.

[79] Madhav N, Oppenheim B, Gallivan M, et al. Pandemics: Risks, Impacts, and Mitigation. In: Jamison DT, Gelband H, Horton S, et al., editors. Disease Control Priorities: Improving Health and Reducing Poverty. 3rd edition. Washington (DC): The International Bank for Reconstruction and Development / The World Bank; 2017 Nov 27. Chapter 17. Available from: https://www.ncbi.nlm.nih.gov/books/NBK525302/ doi: 10.1596/978-1-4648-0527-1_ch17

Unlike most other natural disasters, pandemics do not remain geographically contained, and damages can be mitigated significantly through prompt intervention. As a result, there are strong ethical and global health imperatives for building capacity to detect and respond to pandemic threats, particularly in countries with weak preparedness and high spark and spread risk. Investments to improve pandemic preparedness may have fewer immediate benefits, particularly relative to other pressing health needs in countries with heavy burdens of endemic disease. Therefore, characterizing pandemic risk and identifying gaps in pandemic preparedness are essential for prioritizing and targeting capacity-building efforts.

Identified Data Limitations

Pandemic data was pulled from a variety of sources, including historical records. While we are currently experiencing a worldwide pandemic caused by the COVID-19 virus there exists too much data now to fully process. This will take years or even decades.

RIVERINE EROSION

West Virginia's 31,000 miles[80] of streams and rivers and the floodplains and upland areas adjacent to these waters have great economic, social, cultural, and environmental value. These corridors contain complex ecosystems that encompass the land, plants, animals, and stream networks. Rivers and streams perform a number of important functions, including carrying water and sediment, storing water in wetlands and floodplains, and providing habitat for aquatic and terrestrial plants and animals. For these and other reasons, protecting streams is important.

Stable stream channels maintain their shape by slowly eroding the outside of a meander bend while depositing sediment on the inside bend. Unaltered streams located in large, flat floodplains have more meanders than steep streams without floodplains. Whatever the channel form, most unaltered streams have alternating, regularly spaced, deep and shallow areas called pools and riffles.

Hazard Profile

Naturally stable floodplain stream channels are typically sinuous with varying channel depths and stream banks low enough to periodically allow large storm flows to overflow onto the floodplain in response to significant storm events. The natural meandering and varying channel depths dissipate the energy of the water and reduce stream bank erosion. Floodplains also dissipate water energy during high flows, spreading shallow water over a wide area.

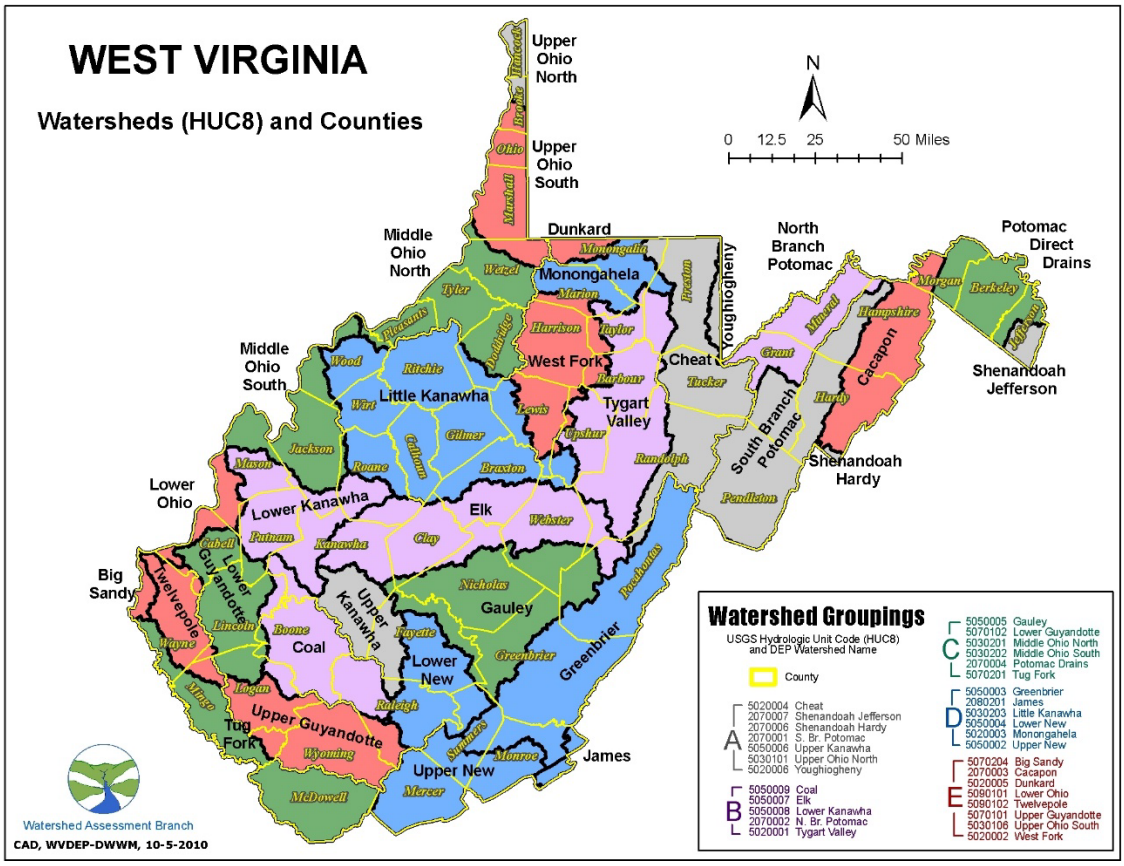
Bank height and steepness are the most important indicators of stream bank stability. When stream banks are too high and steep, soil erodes from the bank. Bank height is related to factors such as bank slope, soil types, vegetation cover, and location along the channel. However, once a critical bank height is reached, erosion likely will occur regardless of the other factors.

Management practices that reduce stream bank erosion and sedimentation and protect riparian (on the bank of a river, stream, or other body of water) vegetation can help maintain critical stream channel features. Vegetation slows the flow of water and reduces erosion of the banks. Overall, streams with a mature, diverse riparian buffer are the most stable over time.

[80] West Virginia Conservation Agency https://www.wvca.us/flood/pdf/12_Appendix_F_Environmental_Impacts_of_Flooding.pdf

Many streams in West Virginia have been straightened and dredged for agriculture, development, and flood control. Straight streams have a steeper gradient than meandering streams which often results in channel incision. Incision is an erosion process that lowers the streambed elevation until it reaches bedrock or other resistant materials. Incision increases stream bank heights and disconnects the stream from the original floodplain. In channels with steeper slopes and higher banks, high volumes of water cause significant stream bank erosion.

Figure 2.2.36: Major Watersheds in West Virginia[81]



Historical Occurrences

There are no recorded riverine erosion events.

Location & Spatial Extent

Federal regulations recognize erosion hazards, but they are non-binding, providing little more than encouragement. The bottom line is that FEMA lacks the funds to accurately map inundation-based risk across the country, much less map riverine erosion areas. It's safe to assume that all of the rivers and streams of the WV Region 4 Planning Area are susceptible to riverine erosion.

We know that the dredging, channelization, levees and dams built in the name of flood control have changed river sediment regimes, often exacerbating channel erosion and deposition processes (Thorne et

[81] West Virginia Department of Environmental Protection: https://dep.wv.gov/WWE/getinvolved/sos/Pages/Watersheds.aspx

al. 1997). We know that natural geo-fluvial processes and river channel evolution are not only beneficial to ecosystem recovery and health (Schiff et al. 2008), but if strategically promoted upstream may enhance natural floodplain function and reduce inundation damages downstream. We also understand that riverine erosion can:

- occur on lands outside the mapped 100-year floodplain limits
- occur during flows that are much less than the 100-year peak; and
- result in loss of not only a structure, but the land under it, ergo there is no chance to rebuild.[82]

Probability of Future Occurrences

There is no recorded history of significant riverine erosion occurring in the WV Region 4 Planning Area, however, Region 4 contains the Greenbrier River, Gauley River, and the Lower New River watersheds, thus the likelihood of occurrence is rated as "likely".

Loss Estimates

There are no readily available records of riverine erosion events to compile accurate loss estimate figures.

Vulnerability & Risk Assessment

Social Vulnerability

Flooding in general causes significant risk to populations where it occurs. Riverine erosion may eventually lead to flooding events in areas not previously susceptible to such events.

Critical Facilities

As with vulnerabilities to populations, critical facilities previously built-in areas not susceptible to flooding events may eventually be susceptible due to riverine erosion and climate change.

Vulnerability Assessment Conclusion

Climate Change

There has been an observed change in heavy precipitation across several measures and multiple time periods in the eastern US.[83] Climate change models predict increased frequency and intensity of precipitation events in the eastern US, with an overall trend towards more precipitation. As discussed in the flooding section, it is intuitive and reasonable to expect increases in extreme precipitation leading to higher stream flow and flooding, and in turn riverine erosion. However, the relationships are complex. Furthermore, the literature does not adequately cover the connection between climate change and riverine erosion, instead focusing on climate change fueled run-off and *soil* erosion as co-contributors to

[82] Barr, R.C., Beik, S., Fuller, J., Johnson, T., Kline, M., McIntosh, M., Pfeiffer, R., & Walker, T.H. (2016) ASFPM Riverine Erosion Hazards White Paper. ASFPM Riverine Erosion Hazards Working Group

[83] **Easterling**, D.R., K.E. Kunkel, J.R. Arnold, T. Knutson, A.N. LeGrande, L.R. Leung, R.S. Vose, D.E. Waliser, and M.F. Wehner, 2017: Precipitation change in the United States. In: *Climate Science Special Report*: Fourth National Climate Assessment, Volume I [Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 207-230, doi: 10.7930/J0H993CC.

water quality declines. A 2016 White Paper on Riverine Erosion by the Association of State Floodplain Managers is speculative in the one section linking climate change and riverine erosion.

Chaotic weather patterns resulting from accelerating changes in climate may dramatically change the peak discharge and frequency of large storm events and thereby have the potential to affect the degree and rate of riverine erosion. Changes in flood and erosion hazards can and should be anticipated.[84]

The Fourth National Climate Assessment mentions river erosion only in the Alaska chapter and only alongside coastal erosion. And while climate change will increase precipitation, that precipitation along with a longer growing season and greater carbon dioxide may spur increases in riverine vegetation, reducing the risk of riverine erosion.

Identified Data Limitations

Riverine erosion is a newer concept that isn't widely studied in all jurisdictions, and as such, data is difficult to source.

TERRORISM

Period of Occurrence	Anytime
Number of Events	None in WV Region 4
Warning Time	None
Potential Impacts	Loss of life and severe property damage
Cause Injury or Death	Potential to cause injury or death
Potential Facility Shutdown	Hours to days, or more

Hazard Profile

Terrorism is defined in the United States by the Code of Federal Regulations as: "the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives." [85] Academic literature identifies some overarching political goals that terrorism seeks to achieve, including spreading anxiety and alarm among immediate victims, families, and the public; eliminating opponents and destroying symbolic targets; and generating direct damage on society, such as affecting business confidence. In the following sections, some general background information about terrorism is presented prior to the county's hazard identification and risk assessment findings.

There are two general types of terrorist groups: network and hierarchical. The type of organization a group adopts largely depends on how long the group has existed. More recently developed groups tend to organize or adapt to the possibilities of the network model. Older, more established groups lean toward

[84] Barr, Richard C. *et al.*/ ASFPM Riverine Erosion Hazards Working Group, ASFPM Riverine Erosion Hazards White Paper, February, 2016. https://floodready.vermont.gov/sites/floodready/files/documents/ASFPMRiverineErosionWhitePaperFeb2016.pdf, Accessed February 23, 2022

[85] U.S. Code of Federal Regulations. 23 C.F.R. Section 0.85

the hierarchical structure and are often more associated with violence of a political nature.[86] Terrorist acts can be committed by large, formally organized groups with terrorist cells in different parts of the world, or they can originate from smaller groups or individuals from a small city or domestic "homegrown" location. In the United States, terrorists that are "homegrown" do not belong to a defined group, may operate very effectively "under the radar," and may pose the biggest threat initially at the local level.

Table 2.2.26: U.S. Department of Homeland Security Critical Infrastructure Sectors

- Agriculture and Food
- Banking and Finance
- Chemical
- Commercial Facilities
- Communications
- Critical Manufacturing
- Dams
- Defense Industrial Base
- Emergency Services
- Energy
- Government Facilities
- Healthcare and Public Health
- Information Technology
- National Monuments and Icons
- Nuclear Reactors, Materials, and Waste
- Postal and Shipping
- Transportation Systems
- Water

Historical Occurrences

Perhaps the most notable terrorist incident in recent memory was the attacks on the World Trade Center and Pentagon on September 11, 2001. These events resulted in more than an estimated 3,000 deaths and caused destruction of many buildings including both World Trade Center buildings. Prior to this, in 1995, the bombing of the federal office building in Oklahoma City was one of the most devastating attacks on U.S. soil, causing more than 150 deaths and damage to more than 200 buildings.

Although there have been no recorded incidents of a major terror attack occurring in the region since the last plan update and prior, there have been several instances where attacks were thwarted or discovered in advance. These kinds of events are indicative of the fact that future terror threats could impact the region.

Additionally, it is possible that locally targeted terrorist incidents could occur in the future and there are several facilities/events in the region that could be potential targets.

Location & Spatial Extent

A terror threat could potentially occur at any location in the region. However, the very definition of a terrorist event indicates that it is most likely to be targeted at a critical or symbolic resource/location/event. Ensuring and protecting the continuity of critical infrastructure and key resources (CIKR) of the United States is essential to the Nation's security, public health and safety, economic vitality, and way of life. CIKR includes physical and/or virtual systems or assets that, if damaged, would have a detrimental impact on national security, including large-scale human casualties, property destruction, economic disruption, and significant damage to morale and public confidence.

[86] Terrorism Research. *Terrorist groups.* Retrieved December 27, 2011, from http://www.terrorism-research.com/groups/

Probability of Future Occurrences

The region has had no recorded major terrorist events. However, given the historic attempts to carry out attacks that were thwarted and the existence of government complexes, notable structures, and significant landmarks, there is a possibility that a terrorist incident might occur. Due to few recorded incidents against the region, the probability of future occurrences of a terrorist attack is unlikely (less than 1 percent annual probability).

Vulnerability & Risk Assessment

Social Vulnerability

A terrorist attack could cause widespread panic or disruption to public services, cause deaths and injuries, and leave a sense of unease.

Critical Facilities

Depending on the nature of the attack, there could be damage to critical facilities and infrastructure either directly or indirectly.

Vulnerability Assessment Conclusion

While any terrorist attack could cause significant disruption to public services, and cause damage to critical facilities, there is little risk to the WV Region 4 planning area based on historical research of previous occurrences.

Identified Data Limitations

No historical records of previous terrorism events were found for the WV Region 4 area.

THUNDERSTORM (Wind, Hail, Lightning)

Period of Occurrence	Anytime, but primarily March – October
Number of Events (1996-2021)	777
Warning Time	Minutes to hours
Potential Impacts	Loss of life and severe property damage
Cause Injury or Death	Potential to cause injury or death
Potential Facility Shutdown	Hours to days, or more

Hazard Profile

THUNDERSTORM / HIGH WIND

Thunderstorms can produce a variety of accompanying hazards including wind (discussed here), hail, and lightning. Although thunderstorms generally affect a small area, they are very dangerous may cause substantial property damage.

Three conditions need to occur for a thunderstorm to form. First, it needs moisture to form clouds and rain. Second, it needs unstable air, such as warm air that can rise rapidly (this often referred to as the "engine" of the storm). Third, thunderstorms need lift, which comes in the form of cold or warm fronts, sea breezes, mountains, or the sun's heat. When these conditions occur simultaneously, air masses of varying temperatures meet, and a thunderstorm is formed. These storm events can occur singularly, in lines, or in clusters. Furthermore, they can move through an area very quickly or linger for several hours.

According to the National Weather Service, more than 100,000 thunderstorms occur each year, though only about 10 percent of these storms are classified as "severe." A severe thunderstorm occurs when the storm produces at least one of these three elements: 1) hail of three-quarters of an inch, 2) a tornado, or 3) winds of at least 58 miles per hour.

Downbursts are also possible with thunderstorm events. Such events are an excessive burst of wind in excess of 125 miles per hour. They are often confused with tornadoes. Downbursts are caused by down drafts from the base of a convective thunderstorm cloud. It occurs when rain-cooled air within the cloud becomes heavier than its surroundings. Thus, air rushes towards the ground in a destructive yet isolated manner. There are two types of downbursts. Downbursts less than 2.5 miles wide, duration less than 5 minutes, and winds up to 168 miles per hour are called "microbursts." Larger events greater than 2.5 miles at the surface and longer than 5 minutes with winds up to 130 miles per hour are referred to as "macrobursts."

Although wind damage associated with thunderstorms is normally minor, the extent to which the WV Region 4 Planning area could be affected by high winds is not insignificant. As an example of the intensity of winds that the region may experience, a thunderstorm on record in southern Greenbrier County indicated damage associated with 80 kts, which equates to 92 mile per hour straight line winds and a Number 12 on the Beaufort Scale. In this scenario, building damage would be significant, power lines downed, trees uprooted, and loss of life possible.

HAILSTORM

Hailstorms are a potentially damaging outgrowth of severe thunderstorms. Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until they develop to a sufficient weight and fall as precipitation. Hail typically takes the form of spheres or irregularly shaped masses greater than 0.75 inches in diameter. The size of hailstones is a direct function of the size and severity of the storm. High velocity updraft winds are required to keep hail in suspension in thunderclouds. The strength of the updraft is a function of the intensity of heating at the Earth's surface. Higher temperature gradients relative to elevation above the surface result in increased suspension time and hailstone size. Thunderstorms in southeastern West Virginia during the afternoon June 16th, 1998, produced hail up to 3 inches in diameter and damaging winds. Thunderstorm winds on the 16th downed trees in Rainelle and seven miles west of Matoaka and knocked down trees and tore the roof off a barn two miles south of Frankford. Thunderstorms produced hail up to 3 inches in diameter damaging automobiles, breaking out windows, and damaging roofs in Clintonville, Alta, and Frankford. [87]

Table 2.2.27: Torro Hailstorm Intensity Scale

	Intensity Category	Typical Hail Diameter (mm)*	Probable Kinetic Energy, J-m2	mm to inch conversion (inches)	Typical Damage Impacts
H0	Hard Hail	5	0-20	0 - 0.2	No damage
H1	Potentially Damaging	5-**15**	>20	0.2 - 0.6	Slight general damage to plants, crops
H2	Significant	10-**20**	>100	0.4 - 0.8	Significant damage to fruit, crops, vegetation
H3	Severe	20-**30**	>300	0.8 - 1.2	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-**40**	>500	1.0 - 1.6	Widespread glass damage, vehicle bodywork damage
H5	Destructive	30-**50**	>800	1.2 - 2.0	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-**60**		1.6 - 2.4	Bodywork of grounded aircraft dented; brick walls pitted
H7	Destructive	50-**75**		2.0 - 3.0	Severe roof damage, risk of serious injuries
H8	Destructive	60-**90**		1.6 - 3.5	(Severest recorded in the British Isles) Severe damage to aircraft bodywork
H9	Super Hailstorms	75-**100**		3.0 - 3.9	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

[87] National Centers for Environmental Information

H10	Super Hailstorms	>100			Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

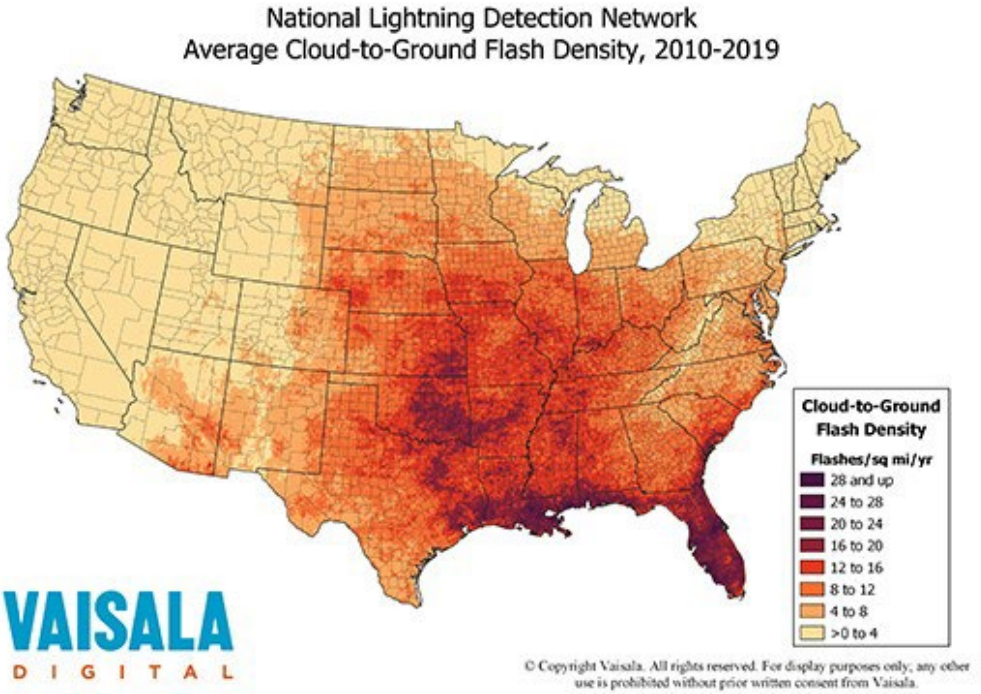
LIGHTNING

Lightning is a discharge of electrical energy resulting from the buildup of positive and negative charges within a thunderstorm, creating a "bolt" when the buildup of charges becomes strong enough. This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Lightning rapidly heats the sky as it flashes but the surrounding air cools following the bolt. This rapid heating and cooling of the surrounding air causes the thunder which often accompanies lightning strikes. While most often affiliated with severe thunderstorms, lightning may also strike outside of heavy rain and might occur as far as 10 miles away from any rainfall.

Lightning strikes occur in very small, localized areas. For example, they may strike a building, electrical transformer, or even a person. According to FEMA, lightning injures an average of 300 people and kills 80 people each year in the United States. Direct lightning strikes also have the ability to cause significant damage to buildings, critical facilities, and infrastructure largely by igniting a fire. Lightning is also responsible for igniting wildfires that can result in widespread damages to property.

Figure below shows the Vaisala's U.S. National Lightning Detection Network which indicates the average flash density per foot per square kilometer per year.

Figure 2.2.37: Lightning Flash Density in the United States



Location & Spatial Extent

THUNDERSTORM / HIGH WIND / STRONG WIND

A thunderstorm event is an atmospheric hazard, and thus has no geographic boundaries. It is typically a widespread event that can occur in all regions of the United States. However, thunderstorms are most common in the central and southern states because atmospheric conditions in those regions are favorable for generating these powerful storms. It is assumed that the WV Region 4 planning area has uniform exposure to an event and the spatial extent of an impact could be large.

The following Beaufort scale is an empirical measure for the intensity of the wind associated with windstorms.

Table 2.2.28: Beaufort Wind Scale

Beaufort Scale					
NUMBER	WIND SPEED (MPH)	DESCRIPTION	WAVE HEIGHT (FT)	SEA CONDITIONS	LAND CONDITIONS
0	<1	Calm	0	Flat	Calm. Smoke rises vertically
1	1-3	Light air	0.33	Ripples without crests.	Wind motion visible in smoke.
2	3-7	Light breeze	0.66	Small wavelets.	Wind felt on exposed skin. Leaves rustle.
3	8-12	Gentle breeze	2	Large wavelets.	Leaves and smaller twigs in constant motion.
4	13-17	Moderate breeze	3.3	Small waves.	Dust and loose paper rise. Small branches begin to move.
5	18-24	Fresh breeze	6.6	Moderate (1.2 m) longer waves. Some foam and spray.	Small trees sway.
6	25-30	Strong breeze	9.9	Large waves with foam crests and some spray.	Large branches in motion. Whistling heard in overhead wires. Umbrella use difficult.
7	31-38	High wind, Moderate Gale, Near Gale	13.1	Sea heaps up and foam begins to streak.	Whole trees in motion. Effort needed to walk against the wind.
8	39-46	Fresh Gale	18	Moderately high waves with breaking crests forming spindrift. Streaks of foam.	Twigs broken from trees. Cars veer on road.

9	47-54	Strong Gale	23	High waves (6-7 m) with dense foam. Wave crests start to roll over. Considerable spray.	Larger branches break off trees, and some small trees blow over. Construction/temporary signs and barricades blow over. Damage to circus tents and canopies.
10	55-63	Whole Gale/Storm	29.5	Very high waves. The sea surface is white and there is considerable tumbling.	Trees uprooted. Considerable structural damage.
11	64-72	Violent storm	37.7	Exceptionally high waves.	Widespread vegetation and structural damage.
12	≥73	Hurricane-force	≥46	Huge waves. Sea is completely white with foam and spray. Air is filled with driving spray, reduced visibility.	Massive and widespread damage to structures.

HAILSTORM

Hailstorms frequently accompany thunderstorms, so their locations and spatial extents coincide. It is assumed that the WV Region 4 planning area is uniformly exposed to severe thunderstorms; therefore, all areas of the region are equally exposed to hail which may be produced by such storms.

LIGHTNING

Lightning occurs randomly, therefore it is impossible to predict where and with what frequency it will strike. It is assumed that all of the WV Region 4 planning area is uniformly exposed to lightning.

Table 2.2.29: Thunderstorm Wind Events in the WV Region 4 Planning Area[88]

Wind Events				
County	**# of Events**	**Deaths**	**Injuries**	**Property damage ($)**
Fayette	114	0	10	$3,627,500
Greenbrier	161	1	2	$1,979,050
Nicholas	76	0	0	$2,518,000
Pocahontas	45	0	1	$1,090,000
Webster	84	0	0	$1,577,000
Total	498	1	13	$10,867,550

[88] For this plan update Thunderstorm events includes Thunderstorm Wind, High Wind, and Strong Wind events.

2.2.30: Hailstorm Events in the WV Region 4 Planning Area

Hailstorms				
County	# of Storms	Deaths	Injuries	Property damage ($)
Fayette	75	0	0	$390,000
Greenbrier	86	0	0	$215,000
Nicholas	48	0	0	$84,000
Pocahontas	27	0	0	$7,000
Webster	42	0	0	$27,000
Total	278	0	0	$723,000

Table 2.2.31: Lightning Events in the WV Region 4 Planning Area

Lightning			
County	Death	Injury	Property Damage ($)
Fayette	1	11	$16,000
Greenbrier	0	0	$8,000
Nicholas	0	0	$50,000
Pocahontas	0	0	$0
Webster	0	0	$0
Total	1	11	$74,000

Since 1955, thunderstorm wind events have killed one, and injured thirteen people and cost over $10 million in property damage, annualized this amount to $164,659 in property damages ($10,867,550 / 66 years). Between 1997 and 2021, lighting strikes have killed one person and injured 11 in region 4, while causing $74,000 in property damage, annualized that is $3,083 ($74,000 / 24 years). Since 1966, hailstorm events have caused $723,000 in property damages, annualized that is $13,145 in property damage ($723000 / 55 years). The NCEI only has records of storms where there was potentially damaging winds or lightning strikes. Thunderstorms are common throughout the spring and summer months that may be strong enough to down trees and power lines. Residences and businesses in Region 4 may incur damage from these smaller storms that is not accurately reflected in the historical data.

Vulnerable Populations

There are populations within Region 4 that may have more difficulty dealing with the secondary effects of thunderstorm winds, power loss being chief among these. The elderly and institutionalized are particularly susceptible to power loss. Many of the elderly, and those who are in nursing homes / long term care facilities, rely on supplemental oxygen. This is typically supplied by condensers, with a reserve of bottled

oxygen for travelling and for emergencies. This reserve supply will most likely only last a few days at the most. Long term outages, like those faced in the Derecho of 2012, can easily surpass these oxygen reserves, placing the elderly and those in long term care facilities without generators at significant risk.

The map below shows the thunderstorm risk map overlaid onto the elderly social vulnerability layer, to identify census tracts with the highest percentages of elderly that will be the highest risk population in this scenario. The map identifies three census tracts in the highest category: two in Greenbrier County and one in Nicholas County. In these tracts, over 22% of the population is over the age of 65.

Historical Occurrences

Thunderstorm
February 29th, 2012

A warm front crossed the region during the afternoon of the 29th, and then a cold front approached the area during the evening. Numerous showers and storms developed in association with both of these fronts. Some of the storms increased to severe levels and produced damaging winds. Thunderstorms winds blew a tree over onto a truck that was traveling past the coal mine on Anjen Road. An occupant of the truck sustained a minor injury (NCEI).

June 29th, 2012

The "Derecho" of June 29th, 2012, affected all five counties within Region 4 as well as the entire state of West Virginia and surrounding states. A strong line of storms combined with abnormally high temperatures struck the area, severely damaging a number of structures. The wind associated with this event reached over 60 mph, resulting in widespread power outages as trees fell on transmission lines and utility poles were damaged. This event alone caused a reported $7.255 million in reported property damage, making it the single most expensive events in the study time frame and accounting for 75% of the reported property damage caused by thunderstorm wind in Region 4 since 1990 according to NCEI records. Events like this are rare but demonstrate the potential that thunderstorms have to cause significant structural damage havoc (NOAA).

June 1st, 2015

Thunderstorms formed during the afternoon along a front and strong temperature contrast across southern West Virginia. A few had downpours with local rain of 1 to 1.5 inches in an hour. After a dry month of May most areas needed the rain. However, a downpour in the city of Beckley caused poor drainage street flooding. Lightning struck a tree near where 3 teenage boys were fishing on a small residential pond. The location is off of Elverton Road and near the Bridge Haven Golf Course. One boy died, the 2 others were injured (NCEI).

Historical Occurrences

Hailstorms

June 16th, 1998

Thunderstorms in southeastern West Virginia during the afternoon of the 16th produced hail up to 3 inches in diameter and damaging winds. Property damages in Greenbrier County reached $200,000 or more (NCEI).

April 7th, 2006

Well south of a cold front, severe thunderstorms moved through the southern coal fields of West Virginia. The time frame was late on a Friday afternoon and into the early evening. As this complex moved through Fayette and Raleigh Counties, large hail again occurred. Hail as big as golf balls fell around Beckley and Grandview. One major insurance company reported about 450 claims, mostly vehicular hail damage (NCEI).

May 26th, 2011

Severe thunderstorms developed on the afternoon of May 26th in a very unstable air mass across southeast West Virginia. These storms were primarily large hail producers. Large hail was reported in and around Lewisburg from a variety of sources. Hail sizes ranged from about 1 to 2 inches in diameter (NCEI).

Loss Estimates

Loss estimates for thunderstorm winds and for lighting can be calculated using historical occurrences and losses. The probability of a thunderstorm wind event occurring is 4.6, meaning that an estimated 4.6 events will occur each year. The average property damage per a thunderstorm wind event is found by dividing the total property damage figure in the table above by the number of events, which equals an average of $32,796 per event. For hailstorms, the probability is that on average there will be 5 hailstorm events to occur annually, with an estimated $2,600 per event.

The worst-case scenario (WCS) is also based on historical research. The worst (in property damage terms) thunderstorm wind event occurred on June 29th, 2012 in Fayette County and caused $3 million in damage. The worst property damage lightning event occurred in Nicholas County on May 5th, 1998 and caused $50,000 in damage. The worst life safety lighting event occurred on June 1st, 2015, when a lightning strike in Fayette County killed one and injured two.

Probability of Future Occurrences

Thunderstorm / High Wind

From 1955 through 2021 there were on average 7.54 Thunderstorm wind events each year. Given the high number of previous events, it is certain that thunderstorm events, including straight-line wind events, will occur in the future. This results in a probability level of highly likely (100 percent annual probability) for the entire WV Region 4 Planning Area.

Hailstorm

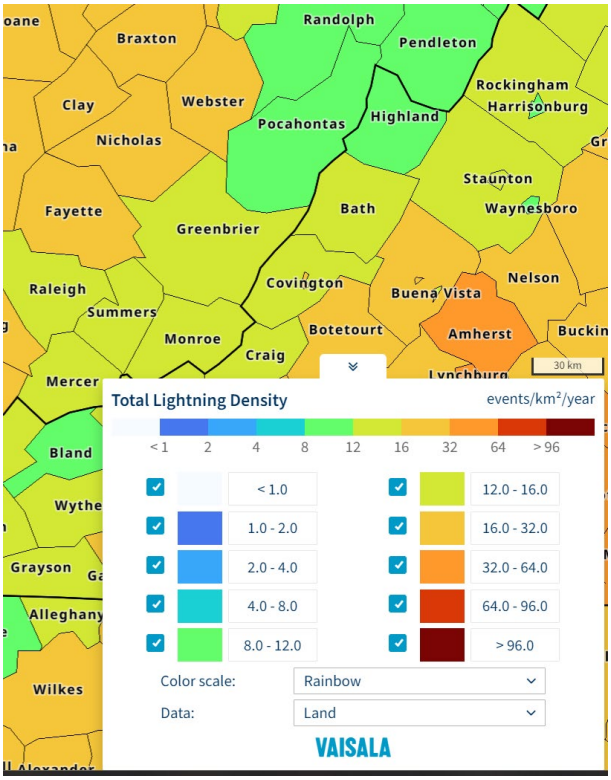
Based on historical occurrence information, it is assumed that the probability of future hail occurrences is highly likely (100 percent annual probability). Since hail is an atmospheric hazard, it is assumed that the WV Region 4 Planning Area has equal exposure to this hazard. It can be expected that future hail events will continue to cause minor damage to property and vehicles throughout the region.

Lightning

Although there was not a high number of historical lightning events reported in the WV Region 4 Planning Area via NCEI data, it is a regular occurrence accompanied by thunderstorms. In fact, lightning events will assuredly happen on an annual basis, though not all events will cause damage. According to Vaisala's U.S. National Lightning Detection Network (NLDN), Region 4 is located in an area of the country that experienced an average of 16 lightning flashes per square kilometer per year. Therefore, the probability of

future events is highly likely (100 percent annual probability). It can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the region.

Figure 2.2.38: Vaisala's Lightning Density Map of the WV Region 4 Planning Area[89]



Vulnerability & Risk Assessment

Social Vulnerability

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[89] Vaisala's Interactive Global Lightning Density Map: https://interactive-lightning-map.vaisala.com/

Critical Facilities

Severe storms could cause significant damage to critical infrastructure. The entire planning area should be considered at risk.

Vulnerability Assessment Conclusion

One important part of mitigating severe weather is forecasting and warning so people can prepare. Communities can be notified of approaching severe thunderstorms and take action to seek shelter or get out of the path of the storm. Important community structures and critical facilities should have their electric and roof systems evaluated for vulnerability to hail and lightning. Electronic systems should be unplugged once warning of a thunderstorm has been issued.

Identified Data Limitations

Data was obtained from the NCEI and Vaisala's Lightning Detection Network. This data shouldn't be considered all-inclusive as it is without doubt that additional events have gone unreported. For example, lightning events are usually only triggered when major damage results.

TORNADOES

Hazard Profile

Tornadoes are typically associated with the strongest thunderstorms and can cause tremendous damage. A tornado is a narrow, violently rotating column of air that extends from a thunderstorm to the ground. Because wind is invisible, it is hard to see a tornado unless it forms a condensation funnel made up of water droplets, dust, and debris.

Tornadoes are historically very difficult to predict. The storms that may produce a tornado can be forecasted, but not every storm with that potential will spawn a tornado and predicting where and when that will happen is incredibly difficult. Historical trends show that some areas of the country, such as the Midwest plain states, have a higher probability of tornado occurrence. However, they can and have struck in many other areas.

Period of Occurrence	Anytime, primarily between March and August
Number of Events (1961-2021)	14
Warning Time	Seconds to Minutes
Potential Impacts	Loss of life and severe property damage. Infrastructure damage
Cause Injury or Death	Potential to cause injury or death
Potential Facility Shutdown	Hours to days or more

Tornadoes are measured on the Enhanced Fujita Scale (EF Scale) which categorizes these events based on wind speed. There are six categories in the EF Scale, from EF0 through EF5. An EF0 tornado will cause some minor damage, while an EF5 is considered to cause massive destruction. The following graphic developed

by the Insurance Institute for Business & Home Safety and State Farm shows the wind scales and the damaged expected in each category.

Historical Occurrences

According to the National Center for Environmental Information (NCEI), there have been 14 Tornadoes recorded in West Virginia Region 4 since 1961. The table below shows the number of reported events broken down by county and their impacts.

Table 2.2.32: Tornado Events in the WV Region 4 Planning Area

County	Total	Deaths	Injuries	Property Damage ($)	Crop Damage ($)
Fayette	3	1	8	$2,775,000	$0
Greenbrier	7	0	3	$3,102,500	$0
Nicholas	4	0	3	$258,500	$15,000
Pocahontas	0	0	0	$0	$0
Webster	0	0	0	$0	$0
Total	14	1	14	$6,136,000	$15,000

These events have been responsible for one reported death and fourteen reported injuries in the region while causing over $6 million in reported damages. One of these events, in the early morning hours of April 4th, 1974, traveled over 11 miles and caused extensive damage in both Fayette and Greenbrier counties. The most recent event began in Nicholas County on June 21, 2016, and crossed over into Greenbrier County. This EF1 tornado caused $50,000 in property damage with no reported injuries or deaths.

The table below shows the breakdown of these events by EF scale. The tornado of 1974 which affected Fayette and Greenbrier counties is the only EF3 on record, and the strongest recorded tornado to strike the region.

Table 2.2.33: Breakdown of Tornado Events by Intensity in the WV Region 4

EF Scale	Total
0	2
1	5
2	4
3	2
4	0
5	0
Unknown	1
Total	**14**

April 4th, 1974

Early in the morning of April 4, 1974, and F3 tornado impacted Raleigh, Fayette, and Greenbrier counties. The funnel stayed on the ground for over 32 miles according to the NCEI records and was reported to be over 30 yards in diameter. The event began in northeastern Raleigh County and moving east until crossing into Fayette County. The funnel crossed the width of southeastern Fayette County, directly causing 8 injuries and 1 fatality before crossing into Greenbrier County. Another 3 injuries were reported in Greenbrier County before the funnel dissipated north of the unincorporated community of Williamsburg. According to NCDC records, this event caused $5 million in property damage in Fayette and Greenbrier Counties (NCDC, 2016).

June 22nd, 1990

In the afternoon of June 22nd, 1990, a tornado touched down in the area near Hillsdale in Monroe County and moved north into Greenbrier County. The funnel continued for approximately a mile in Greenbrier County and was reported to be approximately 150 yards in diameter. The event did not result in any injuries or fatalities but did cause a reported $250,000 in property damage (NCEI, 2016).

April 27th, 2011

North of Richwood, in Nicholas County, a brief tornado skipped along the mountainside and the Cranberry River Valley on April 27th, 2011. This was along Forest Road 76. Trees were blown down as well as snapped off above the ground. Maximum wind gusts near 110 mph were estimated by the survey team. One camper and a few trucks were damaged by fallen trees (NCEI, 2016).

June 21st, 2016

Scattered thunderstorms formed during the late morning and early afternoon across extreme southern Ohio, northern Kentucky, and central and southern West Virginia. This was in the muggy summer air, south of a slow-moving cold front. The thunderstorms formed into a broken line by 1500E. Closer to the surface front, a few additional cells formed in northern West Virginia during the evening hours. This tornado developed in Nicholas County, WV from near the Cherry Hill Country Club and tracked southeast before crossing into northern Greenbrier County at approximately 1505 EST near Summit Lake Campground. The EF-1 tornado crossed County Road 3915 and Highway 55 before lifting. The maximum wind speed was

estimated at 107 mph by a National Weather Survey team. The damage swath consisted mostly of hardwood trees that were downed and snapped along Country Club Road approximately 3 miles northeast of Richwood. There were also wooden utility poles that were snapped, along with some shingle damage to 1 home. The tornado and tree damage continued into Greenbrier County just south of Summit Lake. (NCEI, 2022)

Location and Spatial Extent

Tornadoes have the ability to impact the entire region, they are the result of thunderstorms, which frequently occur throughout the region. All 5 Counties within the Region IV Planning District are at risk of being impacted by tornadoes.

Figure 2.2.39: Tornadoes from 1950 – 2019 to Impact the WV Region 4 Planning Area[90]

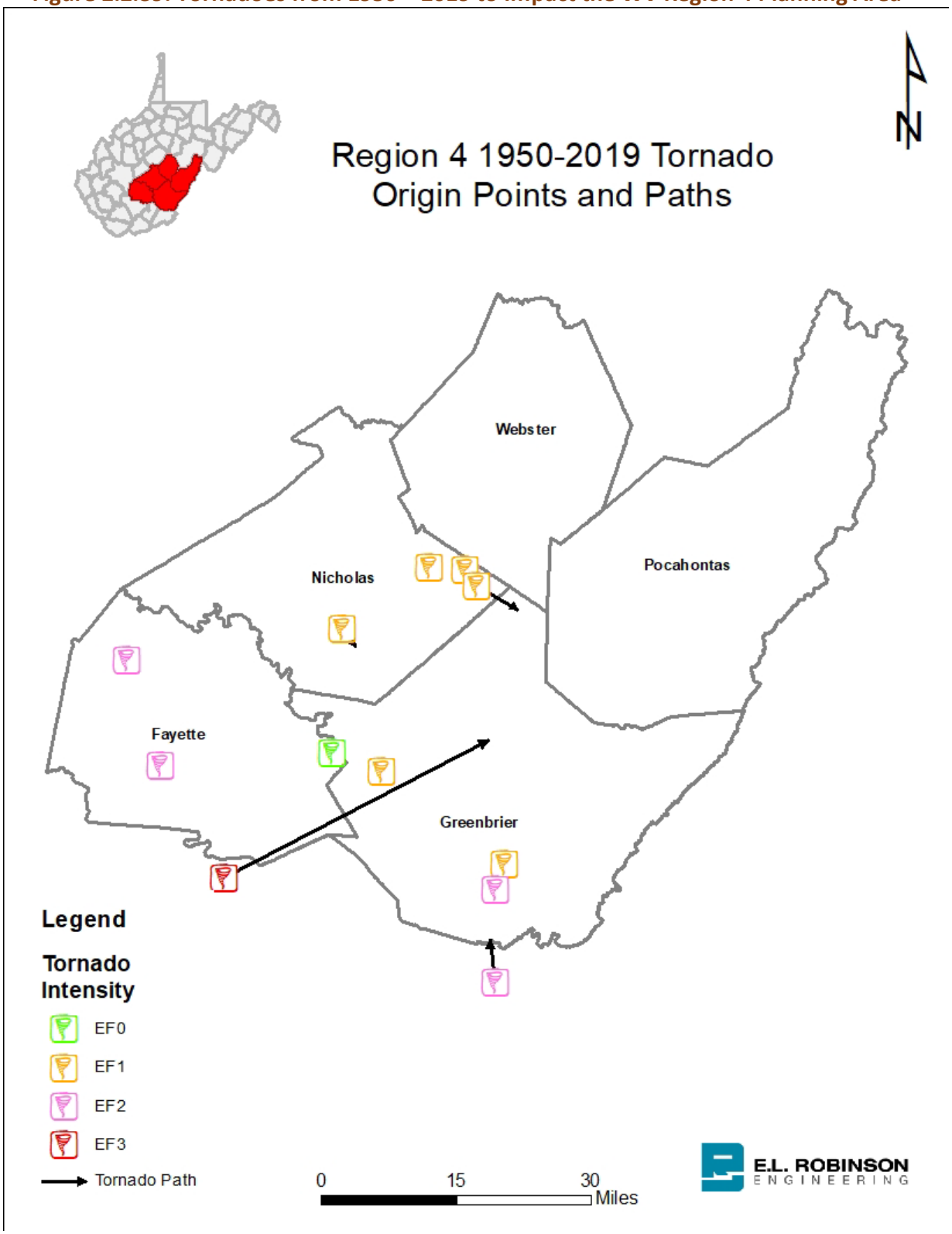


Table 2.2.34: Enhanced Fujita Scale

	Description	Wind Speeds (mph)
EF0	Minor or no damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.	65-85
EF1	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.	86-110
EF2	Considerable damage. Roofs torn off well-constructed houses; foundations of frame houses shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.	111-135
EF3	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations badly damaged.	136-165
EF4	Extreme damage. Well-constructed and whole frame houses completely leveled; cars and other large objects thrown, and small missiles generated.	166-200
EF5	Total destruction of buildings. Strong framed, well-built houses leveled off foundations and swept away; steel-reinforced concrete structures are critically damaged; tall buildings collapse or have severe structural deformations; some cars, trucks, and train cars can be thrown approximately one file.	>200

Probability of Future Occurrences

Given the fact that the entire region is at risk of tornadoes and the high number of previous thunderstorm events, it is certain that a tornado event will occur again in the future. This results in a probability level of highly likely for the entire WV Region IV Planning Area. Estimated future losses for tornado events can be obtained through the historical research. On average, there are 0.23 tornado events in parts of region IV every year (14 events /61 years.) Based on this, there will be one tornado event every 4-5 years. On

average, tornado events cause $438,285 in property damage, so this amount of damage can be estimated to occur every 4-5 years.

Vulnerability & Risk Assessment

Social Vulnerability

Structures that are less sturdy will be more vulnerable to damage from wind events such as Tornadoes. Tornadoes will cause a proportionally larger amount of damage when occurring in areas that have a high percentage of these structures, which includes mobile home. By overlaying the tornado risk map onto the social vulnerability data, it is possible to identify areas where this is most likely to occur. The graphics on the Risk Maps section below show the tornado hazard risk map layered over mobile home data for region IV. There are two census tracts where over 28% of homes are mobile homes, and three census tracts where the percentage is over 23%. Four of these tracts fall within Nicholas County, with the remaining tract being in Fayette County.

Critical Facilities

Due to the difficulty in predicting future tornado paths planning for future events is mostly based on historical trends and identifying areas that are particularly at risk. Structures in Fayette, Greenbrier and Nicolas Counties would be most at risk, while structures in Pocahontas and Webster have a much-reduced risk. According to Haddow, Bullock, & Coppola, Tornadoes follow a path of least resistance, leaving those who live in valleys with the greatest exposure. Structures that are built of lightweight materials such as newer homes and mobile homes have the highest risk since even a low scale tornado can cause significant damage to these structures.

Identified Data Limitations

Historical tornado occurrences and damage information were able to be obtained from the National Centers for Environmental Information (NCEI) and their Storm Events Database.

WILDFIRE

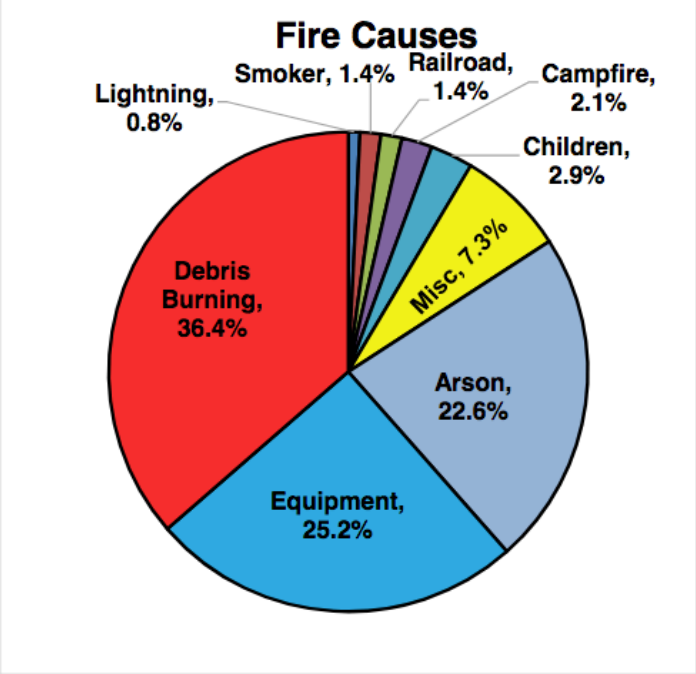
Hazard Profile

Period of Occurrence	Primarily between October and December
Number of Fires (2017-2021)	2,144
Warning Time	Hours to Days
Potential Impacts	Loss of life and severe property damage. Infrastructure damage
Cause Injury or Death	Potential to cause injury or death
Potential Facility Shutdown	Hours to days or more

A wildfire is an uncontrolled burn of wildlands and managed lands, often as a result of human activity. In West Virginia, debris burning is the most common cause of wildfires.[91] The West Virginia Division of

[91] https://commerce.wv.gov/october-1-is-the-start-of-fall-fire-season-west-virginia-residents-urged-to-follow-burning-guidelines/, Accessed February 14, 2022

Forestry relates the 99% of all wildfires in West Virginia are caused by humans. The leading cause of wildfires is debris burning followed by equipment sparks (mainly power transmission lines) and purposeful setting of wildfires, according to the West Virginia State Forest Action Plan. Additionally, mining refuse disposal areas on corporate properties can "go unnoticed or unreported for several hours or days."[92]



Causes of Fire across West Virginia[93]

The main statutory wildfire season is October 1 to December 31st, based on the prevalence of drying leaf litter. A second spring season was recently added from March 1 to May 31st. While there are significant year to year differences, the Division of Forestry reports thousands of acres burn annually.[94]

Table 2.2.35: Number of Fires and Number of Acres Burned by Wildfire Annually

Year	Number of Fires	Acres Burned
2021 (Jan-Jun)	550	4,210
2020	371	1,776
2019	408	3,307
2018	457	5,803
2017	358	3,403

While some natural wildfires are environmentally beneficial – exposing soil to sunlight to allow seedling establishment - fewer than 1% of fires are naturally occurring. West Virginia's natural coal resources also

[92] West Virginia State Forest Action Plan 2020, *p. 177*
[93] West Virginia State Forest Action Plan 2020, *p. 175*
[94] https://wvforestry.com/west-virginia-forestry-crews-respond-to-a-new-season-of-wildfires/, *West Virginia Forestry crews respond to a new season of wildfires.* Accessed February 14, 2022

mean that there are coal seam fires which can burn for years and have the potential to ignite fires naturally in wooded areas, however, this is not a significant cause of fires.

Large uncontrolled fires can lead to loss of wildlife habitats, natural resources, soil erosion and degraded water quality. Wildfire can damage and destroy local residences, infrastructure, and utilities, as well as local critical facilities if not controlled in a timely manner.

The National Fire Danger Rating System (NFDRS) is the current system in use for rating and classifying the potential danger of fire. The NFDRS tracks the effects of previous weather events on both dead and live fuel loads and adjusts accordingly based on future or predicted weather conditions. These complex relationships and equations are computed, and the outputs are expressed in terms that users can quickly and easily understand. The current NFDRS is used by all federal and most state agencies to assess fire danger conditions.

The following table depicts the NFDRS, from the US Forest Service's Wildland Fire Assessment System

Table 2.2.36: National Fire Danger Rating System

Rating	Basic Description	Detailed Description
CLASS 1: Low Danger (L) COLOR CODE: **Green**	Fires not easily started	Fuels do not ignite readily from small firebrands. Fires in open or cured grassland may burn freely a few hours after rain, but wood fires spread slowly by creeping or smoldering and burn in irregular fingers. There is little danger of spotting.
CLASS 2: Moderate Danger (M) COLOR CODE: **Blue**	Fires start easily and spread at a moderate rate	Fires can start from most accidental causes. Fires in open cured grassland will burn briskly and spread rapidly on windy days. Woods fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel – especially draped fuel -- may burn hot. Short-distance spotting may occur but is not persistent. Fires are not likely to become serious and control is relatively easy.
CLASS 3: High Danger (H) COLOR CODE: **Yellow**	Fires start easily and spread at a rapid rate	All fine dead fuels ignite readily, and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly and short-distance spotting is common. High intensity burning may develop on slopes or in concentrations of fine fuel. Fires may become serious and their control difficult, unless they are hit hard and fast while small.
CLASS 4: Very High Danger (VH) COLOR CODE: **Orange**	Fires start very easily and spread at a very fast rate	Fires start easily from all causes and immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop high-intensity characteristics - such as long-distance spotting - and fire whirlwinds when they burn into heavier fuels. Direct attack at the head of such fires is rarely possible after they have been burning more than a few minutes.

Rating	Basic Description	Detailed Description
CLASS 5: Extreme (E) COLOR CODE: **Red**	Fire situation is explosive and can result in extensive property damage	Fires under extreme conditions start quickly, spread furiously, and burn intensely. All fires are potentially serious. Development into high intensity burning will usually be faster and occur from smaller fires than in the Very High Danger class (4). Direct attack is rarely possible and may be dangerous, except immediately after ignition. Fires that develop headway in heavy slash or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions, the only effective and safe control action is on the flanks, until the weather changes or the fuel supply lessens.

Location and Spatial Extent

A growing problem related to wildfire is human expansion into areas of previously untouched wildlands, known as the wildland-urban interface. Fires in these areas can quickly threaten homes, leading to increased property losses and increased threat of injuries and fatalities. While West Virginia has seen a reduction in *industrial* human activity in wildlands and managed lands, many communities and homes are in the wildland-urban interface[95]

The National Centers for Environmental Information (NCEI) tracks wildfire events across the country and has four wildfires listed for Region 4 between 1999 and 2022. Three of these fires occurred in Fayette County and one occurred in Nicholas County. No deaths, injuries, or property damage were noted for any of the four fires. However, the NCEI is only listing what it considers to be significant events.

Small brush and undergrowth fires most likely happen with much more frequency throughout Region 4. These fires, those smaller, still require time and effort by local firefighters, and possibly by the Division of Forestry, depending on the size and ease of access. According to local fire department representatives, these fires are typically extinguished before they become a major threat and are typically located in rural areas, rather than in the urban-wildland interface.

The maps below from the 2020 West Virginia State Forest Action Plan identify significant variation in the number of fires and the number of acres burned across the Region.

[95] West Virginia State Forest Action Plan 2020, *p. 178*

Figure 2.2.40: Wildfires by County in West Virginia

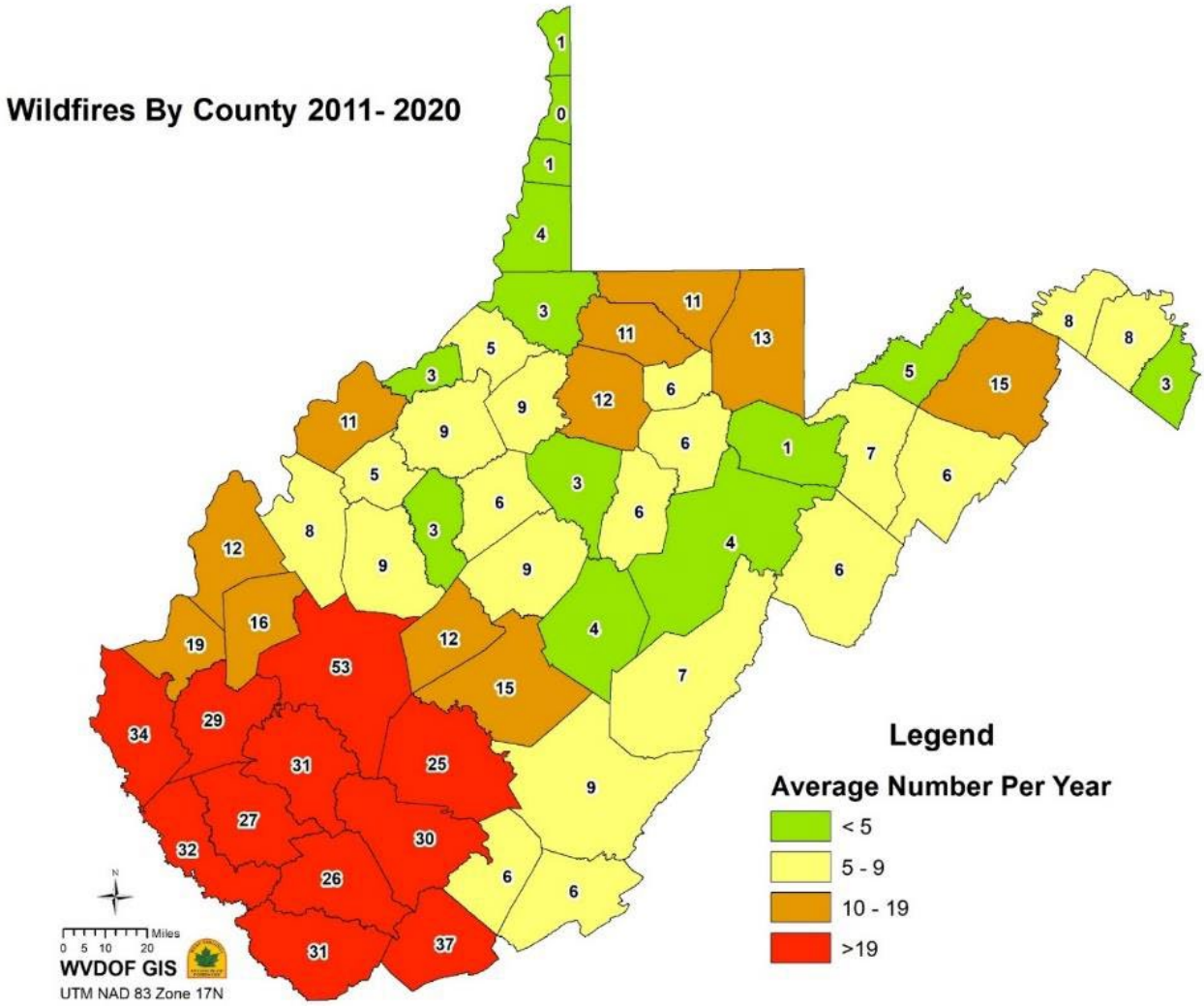
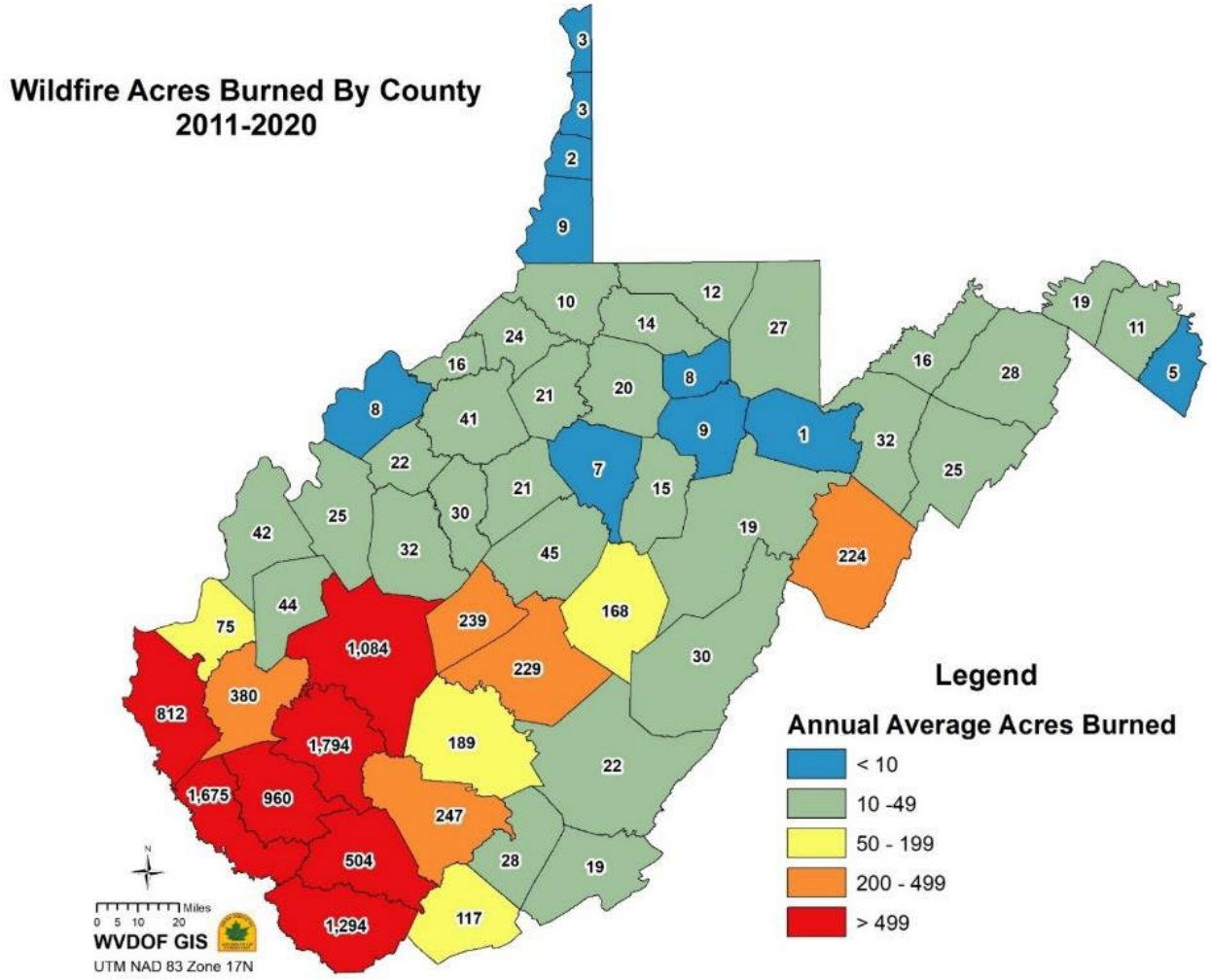
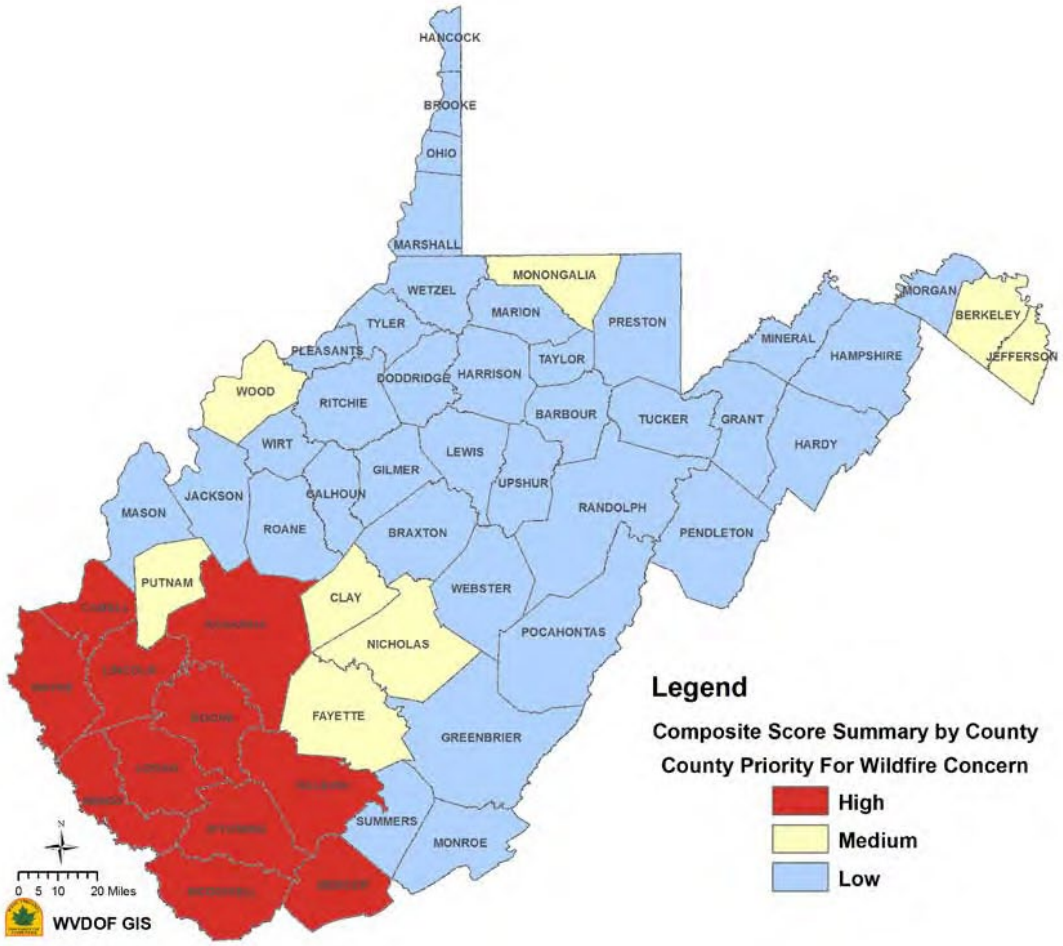


Figure 2.2.41: Wildfire Acres Burned in West Virginia 2011-2020



The 2011-2020 figures are consistent with county-based risk described in the previous iteration of the 2020 plan, the West Virginia Statewide Forest Resource Assessment 2010. That document prioritized fire resources based on occurrences, topography, and wildland-urban interface concerns. Greenbrier, Pocahontas and Webster were designated "low" concern, while Fayette and Nicholas were designated "medium" concern. In sum, we can say that the county-level wildfire risk has been consistent for the past 20 years.

Figure 2.2.42: Priority Areas of Wildfire Concern in West Virginia



Priority areas of wildfire concern from the 2010 West Virginia Statewide Forest Resource Assessment based on composite overlay of fire occurrence 1999-2009 and other factors.[96]

Historical Occurrences

There have not been wildfires in West Virginia, or Region 4, which reach the scale of those seen in the western reaches of the country. While smaller brush and wildland fires may occur, they rarely have a large impact on the region.

In December 2021, a brush fire in New River Gorge consumed more than 150 acres and took several days to contain.[97]

According to NCEI, only 4 wildfires have occurred in the Region. The information below is taken from NCEI.

[96]West Virginia Statewide Forest Resource Assessment 2010, *p. 380*
[97] https://woay.com/crews-continue-to-battle-new-river-gorge-brush-fire/, Comer, Jacob *New River Gorge brush fire three days into burning* December 1, 2021. Accessed February 14, 2022

April 21-23, 2014 – A brush fire along the steep north slope of the New River Gorge just upstream of the New River Bridge and Fern Creek consumed over 100 acres. Personnel from the Mt Hope Fire Department, National Park Service, and the Midewin Illinois Hotshots were used to control the fire. A few hiking trails in the park were closed.

November and December 2001 – The season peaked in November, forcing Governor wise to declare a statewide fire ban. Rain at the end of the month eased conditions, but a few fires continued into December, restricting visibility in the valleys.

November 1999 - Fires set by arsonists burned 38,000 acres during a 15-day episode, including in Fayette and Nicholas Counties. NCEI's database provides more staggering statistics

> *Total acreage affected during the whole autumn fire season was around 75,000 acres from over 800 fires. The state used 400 National Guard troops in 4 one-week rotations. The state also used 2 small tanker aircrafts. The state was seeking money from FEMA to recoup part of its firefighting cost. The state estimated the brush and forest fires cost them approximately $300 per acre burned.*

An interesting 107-year fire chronology of the New River Gorge near Fayetteville using tree rings found that fires declined starting in the 1950s, corelating with the Nuttallburg mine, post office, and train depot closures.[98] As human activity declined – specifically mining and steam-driven locomotion - the sources of ignition were also removed. Larger fire events were recorded in the study location in 1946, 1953 and 1970 that "despite the size…the presence of fire-scarred survivors indicates low-intensity events."[99] The largest fire year in Fayette County was 1952 when nearly 16,000 hectares were burned by more than 100 fires.[100]

Loss Estimates

There has been no property damage reported as a result of a wildfire to the NCEI database. Without historical damage figures, calculating a numerical loss estimate for structure or crops is not feasible.

Vulnerability & Risk Assessment

Vulnerable Populations
Vulnerable populations are no more susceptible to wildfires than other groups, however, a secondary hazard – smoke – can have significant impacts on the elderly, young people, those working outside, and people with chronic health conditions.

Critical Facilities
Large numbers of structures in Region 4 are considered to be in the "wildland – urban interface." These structures, surrounded by undeveloped fields and forested areas, are most at risk from wildfire activity.

Probability of Future Occurrences

Because so many wildfires in West Virginia are ignited by human activity, infrastructure state of good repair and funding for education and enforcement are the best indicators of the probability of future

[98] https://doi.org/10.3375/043.030.0311, Maxwell, R. Stockton, and Hicks, Ray R. *Fire History of a Rimrock Pine Forest at New River Gorge National River, West Virginia*, Natural Areas Journal, 30(3), 2010 : 305-311. Downloaded on February 10, 2022
[99] *ibid*
[100] *ibid*

occurrences. The annual probability of future occurrences of wildfires in the WV Region 4 planning area is highly likely.

Climate change will certainly impact the growth of vegetation, species composition of West Virginia forests, including invasive species, precipitation regimes and timing, all of which will change when and how wildfires impact the Region.[101] Pests like gypsy moths and beech bark disease which damage trees will leave forests more susceptible to burns. While the eastern US, including West Virginia, has experienced, and is expected to experience more precipitation, not less, a shorter winter with less precipitation falling as snow will likely change the timing of the fire season.

Vulnerability Conclusions

Wildfires continue to be a minor hazard for Region 4. Many mitigating actions can be undertaken, as outlined in the State Forest Action Plan. With the help of WV DOF, jurisdictions can create Community Wildfire Protection Plans (CWPP).

Many actions are simple, such as establishing fuel breaks. It is the simplest and most cost-effective wildfire mitigation for buildings, with the WV Division of Forestry recommending a 30-foot-wide minimum around all structures and 75 feet for homes built in pine forests.[102]

Data Limitations

Wildfire data is limited by a lack of damage estimates and the obvious gap between NCEI database of events, and the number of events recorded by the WV Division of Forestry. Furthermore, the data does not address the history or impact of wildfire smoke on normal activity.

WINTER STORMS

Period of Occurrence	Primarily between December and February
Number of Events (1996-2021)	2,144
Warning Time	Days to a week
Potential Impacts	Loss of life and severe property damage.
Cause Injury or Death	Potential to cause injury or death
Potential Facility Shutdown	Hours to days, or more

A winter storm can range from a moderate snow over a period of a few hours to blizzard conditions with blinding wind-driven snow that lasts for several days. Events may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Some winter storms might be large enough to affect several states, while others might affect only localized areas. Occasionally, heavy snow might also cause significant property damages, such as roof collapses on older buildings.

[101] Central Appalachians Forest Ecosystem Vulnerability Assessment and Synthesis: A Report from the Central Appalachians Climate Change Response Framework Project, US Forest Service General Technical Report NRS-146. February, 2015.
[102] https://wvforestry.com/pdf/protect.pdf, *Wildfire is the enemy of your forest home.* Accessed February 14, 2022

The National Centers for Environmental Information (NCEI) compiles data on a number of different types of winter weather events. Included in this hazard profile are blizzards, ice storms, heavy snow, winter storms and winter weather. Winter storms make it extremely difficult and hazardous to travel and can lead to widespread utility outages.

The NCEI defines these events as follows:

- **Blizzard:** A winter storm which produces the following conditions for 3 hours or longer: (1) sustained winds or frequent gusts 30 knots (35 mph) or greater, and (2) falling and/or blowing snow reducing visibility frequently to less than 1/4 mile, on a widespread or localized basis.

- **Ice Storm:** Ice accretion meeting or exceeding locally/regionally defined warning criteria (typical value is 1/4 or 1/2 inch or more), on a widespread or localized basis.

- **Heavy Snow:** Snow accumulation meeting or exceeding locally/regionally defined 12 and/or 24 hour warning criteria, on a widespread or localized basis. This could mean such values as 4, 6, or 8 inches or more in 12 hours or less; or 6, 8, or 10 inches in 24 hours or less.

- **Winter Storms:** A winter weather event which has more than one significant hazard (i.e., heavy snow and blowing snow; snow and ice; snow and sleet; sleet and ice; or snow, sleet and ice) and meets or exceeds locally/regionally defined 12 and/or 24-hour warning criteria for at least one of the precipitation elements, on a widespread or localized basis.

- **Winter Weather:** A winter precipitation event that causes a death, injury, or a significant impact to commerce or transportation but does not meet locally/regionally defined warning criteria. A Winter Weather event could result from one or more winter precipitation types (snow, or blowing/drifting snow, or freezing rain/drizzle), on a widespread or localized basis (National Weather Service Instruction 10-1605).

Historical Occurrences

Winter weather events are the most frequently occurring hazard in all of the counties within Region 4, as illustrated in the table to the right. As the table shows, of the five types of events, heavy snow is the most common while blizzards are a rare event.

The table below breaks the total storms down by county while showing the amount of property damage each county has sustained from winter weather. Winter weather events are the second most costly hazard type that occurs within Region 4. As the table shows, the total property loss reported to the NCEI between 1996 and 2021 is nearly $24 million. Winter storms can encompass the majority of the region or can be limited to any given area within the region. Theoretically every structure and type of infrastructure in the region is at risk. Due to their frequency, many of these weather events are considered part of everyday life in the wintertime and are not considered dangerous.

Table 2.2.37: Total Property Damage from Winter Weather Events in WV Region 4

County	Property Loss ($)
Fayette	$7,037,000
Greenbrier	$200,000
Nicholas	$9,410,000
Pocahontas	$1,015,000
Webster	$5,975,000
Total	$23,637,000

Table 2.2.38: Winter Storm Event Totals for the WV Region 4 Planning Area

Type	Total
Blizzard	5
Ice Storm	24
Heavy Snow	307
Winter Storm	75
Winter Weather	146
Total	504

While the residents of Region 4 are most probably fairly well adapted to living with this hazard, complacency can be dangerous when storms that are larger and more powerful than the norm come through the area.

Location & Spatial Extent

Severe winter storms are generally large enough to affect the entire planning area. NOAA's National Centers for Environmental Information is now producing the Regional Snowfall Index (RSI) for significant snowstorms that impact the eastern two thirds of the U.S. The RSI ranks snowstorm impacts on a scale from 1 to 5, similar to the Fujita scale for tornadoes or the Saffir-Simpson scale for hurricanes.

The RSI differs from these other indices because it includes population. RSI is based on the spatial extent of the storm, the amount of snowfall, and the juxtaposition of these elements with population. Including population information ties the index to societal impacts. Currently, the index uses population based on the 2000 Census.

Table 2.2.39: Regional Snowfall Index - NOAA

CATEGORY	RSI VALUE	DESCRIPTION
1	1–3	Notable
2	3–6	Significant
3	6–10	Major
4	10–18	Crippling
5	18.0+	Extreme

Historical Occurrences

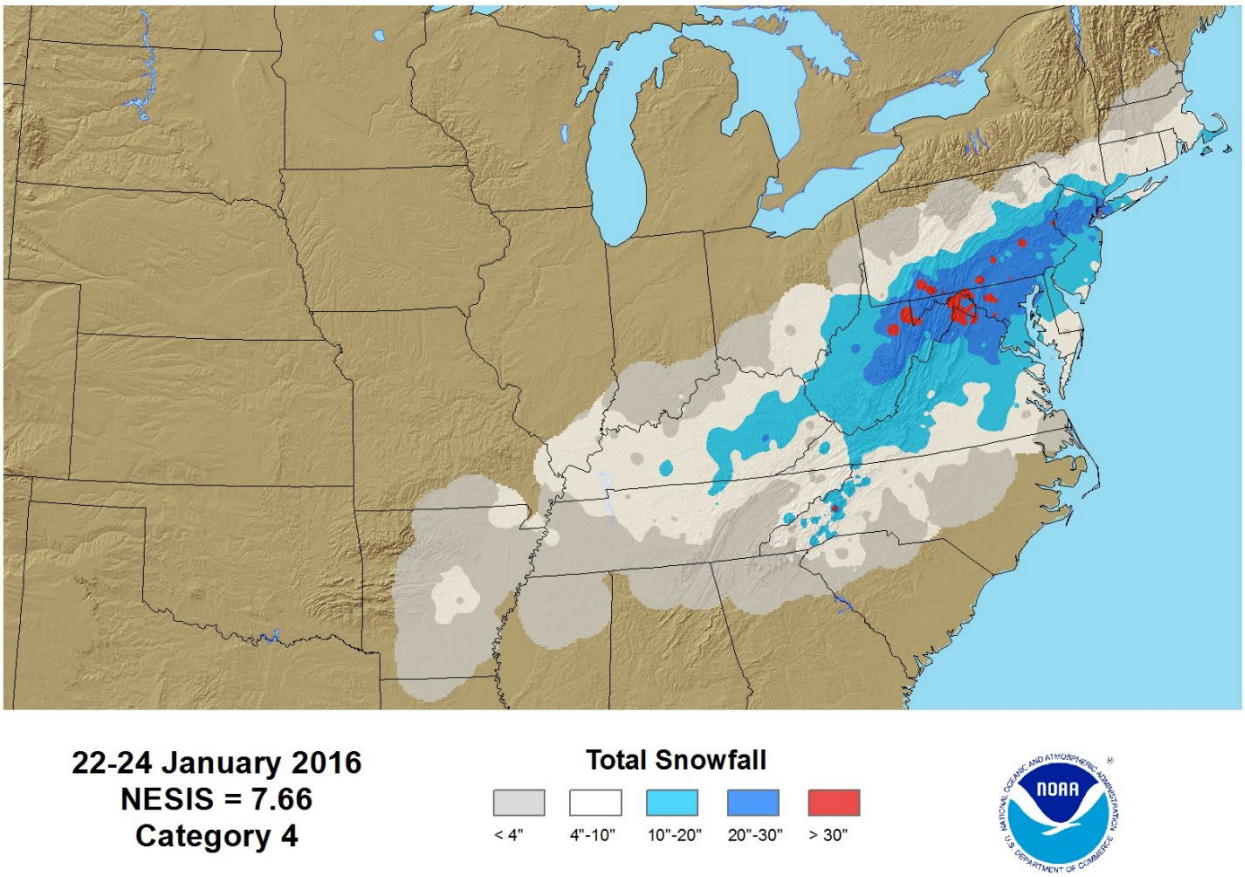
December 18th, 2009
Snow amounts ranged from 18 to 31 inches across the county, with the highest totals in the northwest near Quinwood. All forms of travel were extremely hazardous for the duration of the storm.

October 29th-31st, 2012
The remnants of Hurricane Sandy, dubbed "Superstorm Sandy," impacted the mid-Atlantic portion of the eastern seaboard in late October 2012. In West Virginia the storm manifested as a fall blizzard, dropping large amounts of snow across the state. The NCEI event details state that areas of Nicholas, Pocahontas and Webster counties had snow accumulations upwards of 40 inches. Over $14 Million in property damages were reported in Region 4 (NCEI, 2016).

February 21st, 2015
In Pocahontas County, twenty-four inches of snow fell in the Snowshoe area and other parts of the county, eventually causing a reported $50k in property damage (NCEI, 2016). The Pocahontas Times detailed that the "atrocious snowstorm," which occurred on February 21st, 2015, cost the Town of Marlinton more than $25,000 in snow removal costs (Pocahontas Times, 2015).

January 22nd-24th, 2016
Over the weekend of January 22nd to the 24th, 2016, Winter Storm "Jonas" impacted the Region 4 area along with the rest of West Virginia and neighboring states. The Fayette Tribune reported ten inches of snow across Fayette and Nicholas counties on the first day of the storm and a total of up to 30 inches over the entirety of the storm (Fayette Tribune, 2016). It was also reported on January 22nd that Mon Power had 287 customers without power in Greenbrier County (Fayette Tribune, 2016).

Figure 2.2.43: RSI January 22-24, 2016, Winter Storm[103]



Probability of Future Occurrences

Winter storm events will continue to occur in the WV Region 4 planning area. Based on historical information, the probability is highly likely (100 percent annual probability).

Loss Estimates

Loss estimates for winter weather events can be obtained through the historical research. On average, there are 20.16 winter weather events in Region 4 every year (504 events / 25 years.) These storms will cause, on average, and estimated $46,898 in property damage per an event. Cumulatively, winter storms will cause an estimated $945,480 in annualized property damage.

[103] NOAA National Centers for Environmental Information – Climate Monitoring

Vulnerability & Risk Assessment

Social Vulnerability

According to the NOAA National Severe Storms Laboratory (NSSL), winter weather indirectly and deceptively kills hundreds of people in the United States every year, primarily from automobile accidents, overexertion, and exposure. Winter storms are often accompanied by strong winds creating blizzard conditions with blinding wind driven snow, drifting snow, extreme cold temperatures, and dangerous wind chill. Winter storms are considered deceptive killers because most deaths and other impacts or losses are indirectly related to the storm. People can die in traffic accidents on icy roads, of heart attacks while shoveling snow, or of hypothermia from prolonged exposure to cold.

There are populations within Region 4 that may have more difficulty dealing with the secondary effects of winter weather events, power loss being chief among these. The elderly and institutionalized are particularly susceptible to power loss. Many of the elderly, and those who are in nursing homes / long term care facilities, rely on supplemental oxygen. This is typically supplied by condensers, with a reserve of bottled oxygen for travelling and for emergencies. This reserve supply will most likely only last a few days at the most. Long term outages can easily surpass these oxygen reserves, placing the elderly and those in long term care facilities without generators at significant risk.

Critical Facilities

Full functionality of critical facilities such as police, fire, and medical services is essential for response during and after a winter storm event. These critical facility structures are largely constructed of concrete and masonry; therefore, these should undergo only minimal structural damage from severe winter storm events. Because power interruption can occur, backup power is recommended for critical facilities and infrastructure.

The entire WV Region 4 planning area is vulnerable to severe winter storms with wind and light snow or ice. The severity of winter storms may vary from mild impacts to an extremely dangerous storm that can bring wind, snow and ice that can both create whiteout conditions, hazardous to safety, and impacts to structures and infrastructure. A severe winter storm in the WV Region 4 planning area would have the following types of impacts:

- Overwhelm local capabilities to handle disruptions to emergency services, traffic, communications, and electric power when snow and ice-laden branches fall across power lines and interrupt service
- School and business closures, as well as disruptions in transportation systems, electric power, telecommunications, and emergency services
- Residents potentially running out of basic supplies, including food and fuel
- Livestock suffer from severe cold and lack of feed
- Building roof systems fail due to snow loading in extreme cases

Vulnerability Assessment Conclusion

Severe winter storms have been and will continue to be a threat to the economic and social well-being of the counties that make up the WV Region 4 planning area. Disruptions of emergency and other essential services are the main threats to the people and property. One important part of mitigating severe weather

is forecasting and warning so people can prepare. Communities can prepare for winter storms by stocking sand and salt to improve road conditions, advising people to stay home or to use caution if they must go out, and recommending that people stock up on food, water, batteries, and other supplies. Future Development should take into consideration the effects of winter storms, including excessive snow loading on roofs. Interior piping that is not insulated or protected can burst causing damage.

Identified Data Limitations

Data was sourced from the NCEI. It shouldn't be considered all-inclusive as events or damages may have gone under or unreported.

Conclusions on Hazard Vulnerabilities

The results of this vulnerability assessment are useful in at least three ways:

- Improving our understanding of the risk associated with the natural hazards in the WV Region 4 planning area through better understanding of the complexities and dynamics of risk, how levels of risk can be measured and compared, and the myriad of factors that influence risk. An understanding of these relationships is critical in making balanced and informed decisions on managing the risk.

- Providing a baseline for policy development and comparison of mitigation alternatives. The data used for this analysis presents a current picture of risk in the WV Region 4 planning area. Updating this risk "snapshot" with future data will enable comparison of the changes in risk with time. Baselines of this type can support the objective analysis of policy and program options for risk reduction in the region.

- Comparing the risk among the natural hazards addressed. The ability to quantify the risk to all these hazards relative to one another helps in a balanced, multi-hazard approach to risk management at each level of governing authority. This ranking provides a systematic framework to compare and prioritize the very disparate natural hazards that are present in the WV Region 4 planning area. This final step in the risk assessment provides the necessary information for local officials to craft a mitigation strategy to focus resources on only those hazards that pose the most threat to the WV Region 4 counties.

Exposure to hazards can be an indicator of vulnerability. Economic exposure can be identified through values for improvements (buildings), and social exposure can be identified by estimating the population exposed to each hazard. This information is especially important for decision-makers to use in planning for evacuation or other public safety related needs.

The types of assets included in these analyses include all building types in the participating jurisdictions. Specific information about the types of assets that are vulnerable to the identified hazards is included in each hazard subsection (for example all building types are considered at risk to the winter storm hazard and commercial and residential are at risk to repetitive flooding, etc.).

The table presents a summary of annualized loss for each hazard in the WV Region 4 planning area. Due to the reporting of hazard damages primarily at the county level, it was difficult to determine an accurate annualized loss estimate for each municipality. Therefore, an annualized loss was determined through the damage reported through historical occurrences at the county level. These values should be used as an

additional planning tool or measure risk for determining hazard mitigation strategies throughout the region.

Table 2.2.40: Annualized Loss for the WV Region 4 Planning Area

Hazard	Fayette County	Greenbrier County	Nicholas County	Pocahontas County	Webster County
Flood-related Hazards					
Dam Failure	Negligible	Negligible	Negligible	Negligible	Negligible
Flood	$2,199,560	$1,757,982	$1,287,240	$194,060	$492,700
Riverine Erosion	Negligible	Negligible	Negligible	Negligible	Negligible
Winter Storm	$279,400	$8,000	$356,400	$38,800	$223,000
Fire-related Hazards					
Drought	Negligible	Negligible	Negligible	Negligible	Negligible
Wildfire	Negligible	Negligible	Negligible	Negligible	Negligible
Geologic Hazards					
Earthquake	Negligible	Negligible	Negligible	Negligible	Negligible
Mass Movement	Negligible	Negligible	Negligible	Negligible	Negligible
Thunderstorm Related					
Thunderstorm / High Wind	$55,196	$31,920	$57,409	$36,406	$37,928
Hail	$7,358	$5,119	$1,527	$140	$675
Lightning	$666	$800	$2,173	$0	$0
Tornado	$46,250	$52,593	$4,787	$0	$0
Other Hazards					
Extreme Temperature	$1,800	$200	$2,120	$1,800	$1,800
HAZMAT Incident	$740,625	$16,398	$1,292	$14,878	$4,640
Pandemic	Negligible	Negligible	Negligible	Negligible	Negligible
Terrorism	Negligible	Negligible	Negligible	Negligible	Negligible
Total Annualized Losses	**$3,330,855**	**$1,873,012**	**$1,712,948**	**$286,084**	**$760,743**

**In this table, the term "Negligible" is used to indicate that no records of dollar losses for the particular hazard were recorded. This could be the case either because there were no events that caused dollar damage or because documentation of that particular type of event is not well kept. Annualized losses were calculated based on the total number of years of reporting and damage totals.*

2.3 ANALYZE DEVELOPMENT TRENDS

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

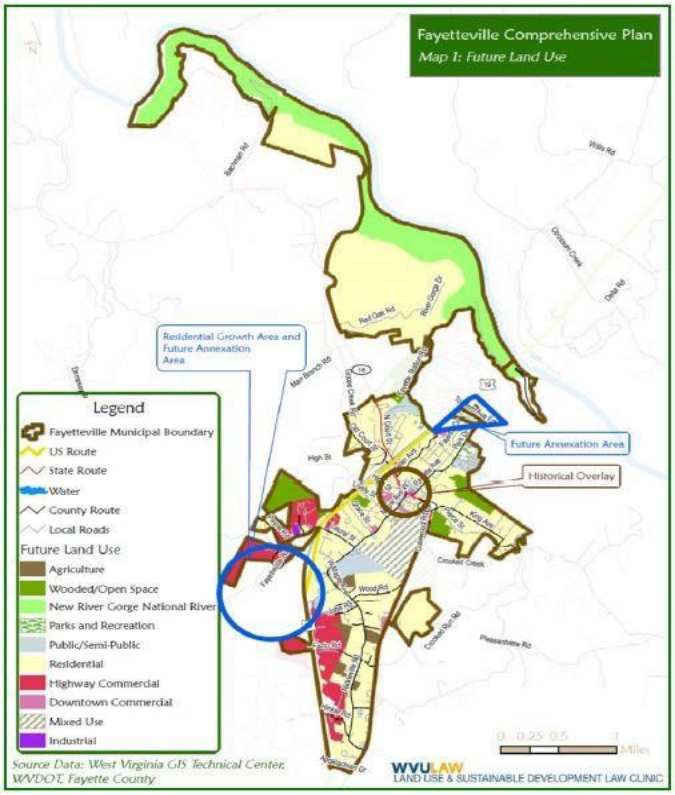
All five of the counties in Region 4 are largely rural in nature, with less than a third (31%) of the total population residing within municipal boundaries. The five counties are generally considered to be mountainous, which is limitation for development of non-natural resource-based industry. Compounding this, the open flat land that there is in the region is generally located near rivers and creeks, placing much of the area in or near floodplains. Local floodplain management officials and development regulations, which will be discussed in more detail in the flooding hazard profile, have to carefully balance the economic development and growth needs of the region with the responsibility to protect existing and potential businesses from the effects of flooding.

The corridor between Summersville and Oak Hill (along U.S. 19, Appalachian Corridor L) has been heavily developed with residential and retail establishments. A number of recreational areas, including Summersville Lake, the New River Gorge Bridge, New River National Park, and Hawks Nest State Park, are located near this corridor. This makes tourism, especially during the summer months, a major industry in the area. The Interstate 64/77 corridor through western Fayette County and southern Greenbrier County has seen more commercial and industrial growth than other areas.

The Fayette County Comprehensive Plan was adopted in 2011 and is being revised in 2022. The current plan is divided into four planning districts: Danese/Meadow Bridge, New Haven, Plateau, and Valley. The Plateau Planning District is the center of development attention in Fayette County, due to its inherent flatness. This land is ideal for development and is in short supply within Fayette County and, which is also true throughout much of Region 4.

In the Town of Fayetteville's Comprehensive Plan one of the goals listed is to "encourage sound land use decisions and preserve open space, historical and scenic resources, community character, and provide for clean air and water." One of the numerous objectives to accomplish this is to simplify and improve land zoning within the town. The plan outlines future land use classifications: Agriculture, Wooded/Open Space, New River Gorge National River, Parks and Recreation, Public/Semi-Public land, Highway Commercial, Downtown Commercial, Mixed Used, and Industrial.

The new Zoning Map identifies two annexation areas. The first is on the north end of the town along U.S. 19. The second is identified as a residential growth area and is located on the southwest part of the town, also along US 19. The image to the left, taken from the Fayetteville Comprehensive Plan, shows future land uses and annexations.



Oak Hill, also located in Fayette County, updated their 1968 comprehensive plan in 2012. This update outlines three goals related to land use:

- Promote logical, efficient, and well-organized land use patterns that reduce conflicts among users.
- Guide and promote attractive, sustainable growth.
- Balance environmental sustainability and commercial growth by emphasizing the important role the environment will play in the future of the city.

In order to meet these goals, the land use section lays out a number of recommendations. These recommendations include, among others, the concentrating of commercial development in existing commercial corridors, resisting development in floodplains, and balancing corridor development along U.S. Route 19 with infill development and redevelopment in Oak Hill's central business district.

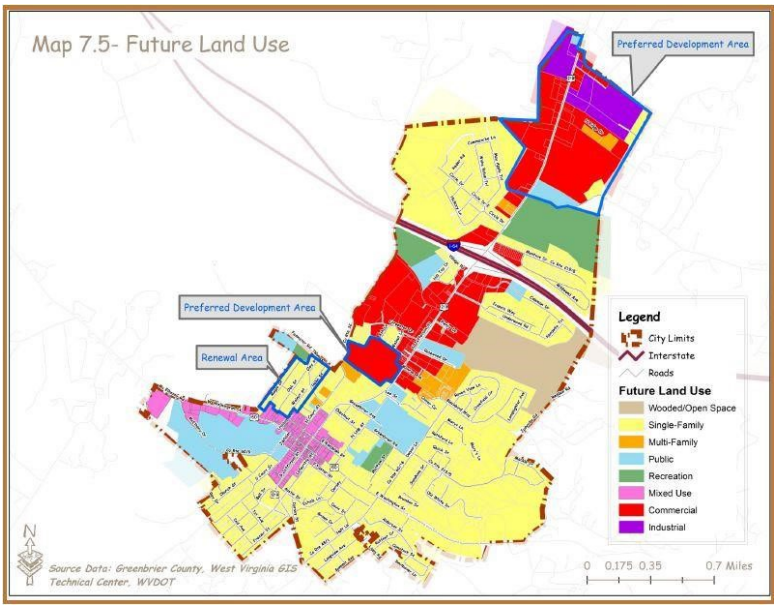
The Greenbrier County Comprehensive Plan adopted in September of 2014 and is in revision in 2022, discusses a policy of focused growth within Greenbrier County. This policy would focus growth into specific areas and zones that have (or can be made to have) adequate resources and services to support growth. A primary goal of the focused growth policy is to encourage development while maintaining the County's natural resources, environmental integrity, and cultural and historic heritage. The basic economy of Greenbrier County is driven by agriculture, natural resources, tourism, education, and medical facilities. The county has a limited ability to attract major industrial and manufacturing firms without significant state government support.

Also included in the comprehensive plan is the identification of designated growth areas. These growth areas are the areas most suited for commercial, industrial, dense residential and public utilities and facilities to encourage cost effective development.

- **Greenbrier East Designated Growth Area**: Located on Route 92 north of White Sulfur Springs.
- **Greenbrier Central –** North Designated Growth Area: Located on Route 219 between the northern boundary of Lewisburg and the Greenbrier Valley Airport.
- **Greenbrier Central – South Designated Growth Area:** Located on the Route 219 corridor between Lewisburg and Ronceverte. This includes Fairlea, the north portion of Davis-Stuart, and the lands between 219 and Houfnagle Road.
- **Greenbrier West Development Area:** Located on the U.S. 60 corridor from Sam Black to Rainelle, including the I-64 Interchange and the towns of Rainelle, Rupert, and Quinwood and the villages of Charmco, McRoss, Hines, Crawley, and Route 20 south of Rainelle.

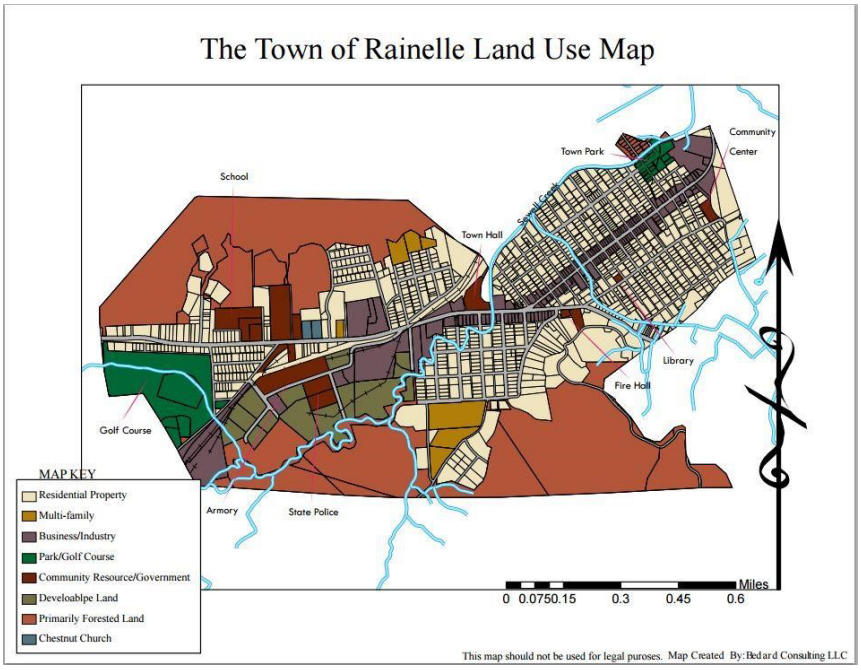
The map to the right shows the various designated growth areas in Greenbrier County based on their descriptions in the comprehensive plan.

In addition to the Greenbrier County Comprehensive Plan, two of the municipalities (Lewisburg and Rainelle) have comprehensive plans. The City of Lewisburg Comprehensive Plan was adopted in late 2015 and is still the most recent plan as of 2022. It features a section on land use planning. Currently there is a small amount of industrial development within the city limits. This development is located along U.S. 19, which is where large scale commercial development is also centered.



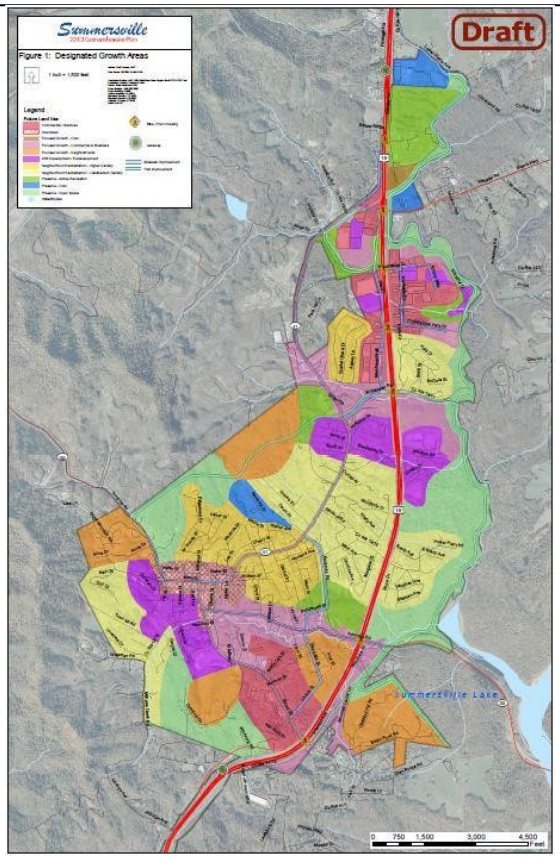
The comprehensive plan also identifies two areas of preferred development within the city limits. The first is the north end of the city limits and contains a mixture of zoning uses, though the two dominant zones are industrial and commercial. The second area is a commercially zoned area in the central-west portion of the city. The plan also identifies a renewal area just southwest of the second development area which is zone as single family. Renewal areas are identified as slums or other blighted areas that are targeted for elimination or renewal through plans and programs. The image above, which was taken from the comprehensive plan, shows the various future land use designations and preferred development areas.

The Town of Rainelle, which is 1.1 square miles, adopted a comprehensive plan in 2013, which includes analyzation of current land use and future development goals. The majority of commercial and business uses in the town are located along U.S. 60. Rainelle does have several acres of developable land that is zoned commercial on the southwestern side of the town. The area is relatively flat, has been cleared of trees and undergrowth, and has limited infrastructure. Residential development opportunities exist north of the town park; however, this land is currently forested and has no supporting infrastructure built. Other than these two areas both commercial and residential development is limited to individual lots throughout the town, which may already have structures built or be partitions from larger lots. The image above shows the Rainelle land use map and identifies areas of developable land. The image to the left shows the areas that the Town proposed to annex in 2013. Both images are from the comprehensive Plan.



The remaining three counties (Nicholas, Pocahontas, and Webster) do not currently have county wide comprehensive plans at the time of this review in 2022.

The City of Summersville, in Nicholas County, does have a comprehensive plan, approved in May of 2013 and is in revision as of 2020. The current plan includes a growth management framework with a number of goals related to future development. The City aims to concentrate new development in identified growth areas rather than allowing random development along roadway corridors. These focused growth areas are identified in the zoning map and include areas focused on civic development, commercial & business development, and neighborhoods. The image to the right shows the various designated growth areas within Summersville, taken from the comprehensive plan.



As this section has shown, a number of jurisdictions within Region 4 have plans that outline future land use planning efforts. These plans typically outline areas of future and targeted development and growth. Some of these areas will be more vulnerable for certain hazards based on where they are located.

The Region 4 Planning and Development Council's (PDC) mission is to "strategically and effectively plan for and facilitate the comprehensive development of Fayette, Greenbrier, Nicholas, Pocahontas, and Webster Counties" (Comprehensive Economic Development Strategy [CEDS] 2020 Update). The Region 4 Annual Report for 2020 Update details over 150 projects that have been supported by the PDC in an attempt to bring new and additional development to the area. A large number of these involve improvements to local public water and sewer systems, installing generators, expansion of broadband in the region while in conjunction with the WV Broadband Enhancement Council and the West Virginia Office of Broadband to either extend and improve the service they provide (Region 4 Planning and Development Council Proposed PDC Project Priorities Cost Benefit).

3.0 CAPABILITY ASSESSMENT

This section of the plan discusses the capability of the West Virginia PDC Region 4 to implement hazard mitigation activities.

What is a capability assessment?

The purpose of conducting a capability assessment is to determine the ability of the region and local jurisdictions to implement comprehensive mitigation strategies and identify potential opportunities for establishing specific mitigation policies, programs, or projects. It is important to establish which goals, objectives, and actions are feasible based on an understanding of the organizational capacity of those agencies tasked with their implementation. A capability assessment helps determine which mitigation actions are practical, and likely to be implemented over time, given a local government's planning and regulatory framework, level of administrative and technical support, number of fiscal resources, and current political climate.

A capability assessment has two primary components: 1) an inventory of a local jurisdiction's relevant plans, ordinances, or programs already in place and 2) an analysis of its capacity to carry them out. Careful examination of local capabilities will detect any existing gaps, shortfalls, or weaknesses with ongoing government activities that could hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability. A capability assessment also highlights the positive mitigation measures already in place or being implemented at the local government level, which should continue to be supported and enhanced through future mitigation efforts

Conducting the Capability Assessment

To gather the necessary information to complete the capability assessment a capability survey was distributed to all participating jurisdictions. This survey compiled information on a variety of "capability indicators" such as existing local plans, policies, programs, or ordinances that contribute to the region's ability to implement hazard mitigation actions. Other indicators included information related to the region's fiscal, administrative, and technical capabilities, such as access to local budgetary and personnel resources for mitigation purposes. The current political climate, an important consideration for any local planning or decision-making process, was also evaluated with respect to hazard mitigation.

Capability Assessment Findings

The following table identifies the types of plans, policies, and other local capabilities that enable or constrain the implementation of hazard mitigation efforts in the jurisdictions comprising Region 4. Planning and regulatory capability is based on the implementation of plans, ordinances, and programs that demonstrate a local jurisdiction's commitment to guiding and managing growth, development, and redevelopment in a responsible manner while maintaining the general welfare of the community. It includes emergency response and mitigation planning, comprehensive land use planning, and transportation planning; the enforcement of zoning or subdivision ordinances and building codes that regulate how land is developed and structures are built; as well as protecting environmental, historic, and cultural resources in the community. Although some conflicts can arise, these planning initiatives

generally present significant opportunities to integrate hazard mitigation principles and practices into the local decision-making process.

This assessment is designed to provide a general overview of the key planning and regulatory tools and programs that are in place or under development for Region 4 along with their potential effect on loss reduction. This information will help identify opportunities to address existing gaps, weaknesses, or conflicts with other initiatives in addition to integrating the implementation of this Plan with existing planning mechanisms where appropriate.

Table 3.1 below provides a summary of the relevant local plans, ordinances, and programs already in place or under development for Region 4.

Administrative & Technical Capability

The ability of a local government to develop and implement mitigation projects, policies, and programs is directly tied to its ability to direct staff time and resources for that purpose. Administrative capability can be evaluated by determining how mitigation-related activities are assigned to local departments and if there are adequate personnel resources to complete these activities. The degree of intergovernmental coordination among departments will also affect administrative capability for the implementation and success of proposed mitigation activities.

Technical capability can generally be evaluated by assessing the level of knowledge and technical expertise of local government employees, such as personnel skilled in using Geographic Information Systems (GIS) to analyze and assess community hazard vulnerability. The Capability Assessment Survey was used to capture information on administrative and technical capability through the identification of available staff and personnel resources, results of which can be seen in Table 3.2.

Education & Outreach

A key element in hazard mitigation is promoting a safer, more disaster-resilient community through education and outreach activities and/or programs. Successful outreach programs provide data and information that improves the overall quality and accuracy of important information for citizens to feel better prepared and educated with mitigation activities. These programs enable the individual communities and the region as a whole to maximize opportunities for the implementation of activities through greater acceptance and consensus of the community.

Region 4 has existing education and outreach programs to implement mitigation activities, as well as communicate risk and hazard-related information to its communities. Specifically, focusing on advising repetitive loss property owners of ways they can reduce their exposure to damage by repetitive flooding remains a priority for the entire region.

Table 3.1: Relevant Plans, Ordinances, and Programs

Planning / Regulatory Tool	*Pocahontas County*	*Webster County*	*Fayette County*	*Greenbrier County*	*Nicholas County*	*Montgomery*	*Mount Hope*	*Oak Hill*	*Smithers*	*Lewisburg*	*Ronceverte*	*White Sulphur Springs*	*Summersville*	*Ansted*	*Fayetteville*	*Gauley Bridge*	*Meadow Bridge*	*Pax*	*Thurmond*	*Alderson*	*Quinwood*	*Rainelle*	*Renick*	*Rupert*	*Richwood*	*Durbin*	*Hillsboro*	*Marlinton*	*Camden-on-Gauley*	*Cowen*	*Webster Springs*
Hazard Mitigation Plan[1]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Comprehensive Land Use Plan	N	Y	Y	Y	N	N	N	Y	N	Y	N	N	Y	N	Y	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N
Floodplain Management Plan	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Open Space Management Plan (or Parks & Rec/ Greenway Plan)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Stormwater Management Plan/ Ordinance	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Natural Resource Protection Plan	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Flood Response Plan	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
Emergency Operations Plan	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

[1] All counties and municipalities are covered by Region 4 Hazard Mitigation Plan.

Planning / Regulatory Tool	*Pocahontas County*	*Webster County*	*Fayette County*	*Greenbrier County*	*Nicholas County*	*Montgomery*	*Mount Hope*	*Oak Hill*	*Smithers*	*Lewisburg*	*Ronceverte*	*White Sulphur Springs*	*Summersville*	*Ansted*	*Fayetteville*	*Gauley Bridge*	*Meadow Bridge*	*Pax*	*Thurmond*	*Alderson*	*Quinwood*	*Rainelle*	*Renick*	*Rupert*	*Richwood*	*Durbin*	*Hillsboro*	*Marlinton*	*Camden-on-Gauley*	*Cowen*	*Webster Springs*
Continuity of Operations Plan	Y	Y	N	Y	Y	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Evacuation Plan	Y	Y	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y
Disaster Recovery Plan	Y	Y	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y
Capital Improvements Plan	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Economic Development Plan	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Historic Preservation Plan	N	N	N	Y	N	N	N	N	N	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Flood Damage Prevention Ordinance	N	Y	N	Y	N	N	N	N	N	Y	Y	Y	N	N	N	N	N	N	N	N	Y	Y	Y	Y	N	N	N	N	Y	Y	Y
Floodplain Regulations	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Zoning Ordinance	N	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	N	Y	N	Y	N	Y	Y	N	N	Y	N	N	Y
Subdivision Ordinance	N	N	N	Y	N	N	N	N	N	Y	Y	Y	N	N	N	N	N	N	N	Y	Y	Y	Y	N	N	N	N	N	N	N	N
Unified Development Ordinance	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Post-Disaster Redevelopment Ordinance	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Planning / Regulatory Tool	*Pocahontas County*	*Webster County*	*Fayette County*	*Greenbrier County*	*Nicholas County*	*Montgomery*	*Mount Hope*	*Oak Hill*	*Smithers*	*Lewisburg*	*Ronceverte*	*White Sulphur Springs*	*Summersville*	*Ansted*	*Fayetteville*	*Gauley Bridge*	*Meadow Bridge*	*Pax*	*Thurmond*	*Alderson*	*Quinwood*	*Rainelle*	*Renick*	*Rupert*	*Richwood*	*Durbin*	*Hillsboro*	*Marlinton*	*Camden-on-Gauley*	*Cowen*	*Webster Springs*
Building Code	N N	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Fire Code	N	N	Y	Y	N	Y	Y	Y	Y	N	N	N	N	Y	Y	Y	Y	Y	Y	N	N	N	N	N	Y	N	N	N	N	N	N
National Flood Insurance Program (NFIP)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
NFIP Community Rating System	N	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Planning Commission	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Building Department	N	N	N	Y	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Table 3.2: Relevant Staff & Personnel Resources

Staff / Personnel Resource	Pocahontas County	Webster County	Fayette County	Greenbrier County	Nicholas County	Montgomery	Mount Hope	Oak Hill	Smithers	Lewisburg	Ronceverte	White Sulphur Springs	Summersville	Ansted	Fayetteville	Gauley Bridge	Meadow Bridge	Pax	Thurmond	Alderson	Quinwood	Rainelle	Renick	Rupert	Richwood	Durbin	Hillsboro	Marlinton	Camden-on-Gauley	Cowen	Webster Springs
Planners with Knowledge of land development / land management practices	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Engineers or professionals trained in construction practices related to buildings and/or infrastructure	N	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N N	N	N	N	N	N	N	N
Planners or engineers with an understanding of natural and/or human-caused hazards	N	N	N	Y	N	N	N	N	N	N N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Emergency Manager	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Floodplain Manager	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Land Surveyors	N	N	Y	Y	N	Y	Y	Y	Y	N	N	N	N	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N

Staff / Personnel Resource	***Pocahontas County***	***Webster County***	***Fayette County***	***Greenbrier County***	***Nicholas County***	***Montgomery***	***Mount Hope***	***Oak Hill***	***Smithers***	***Lewisburg***	***Ronceverte***	***White Sulphur Springs***	***Summersville***	***Ansted***	***Fayetteville***	***Gauley Bridge***	***Meadow Bridge***	***Pax***	***Thurmond***	***Alderson***	***Quinwood***	***Rainelle***	***Renick***	***Rupert***	***Richwood***	***Durbin***	***Hillsboro***	***Marlinton***	***Camden-on-Gauley***	***Cowen***	***Webster Springs***
Staff with education or expertise to assess the community's vulnerability to hazards	N	Y	N	Y	N	N	N	N	N	Y	Y	Y	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N	N	N	N	Y	Y	Y
Personnel skilled in GIS and/or HAZUS	Y	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	N	N	N
Resource development staff or grant writers	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Table 3.3: Education & Outreach

Education & Outreach	Pocahontas County	Webster County	Fayette County	Greenbrier County	Nicholas County	Montgomery	Mount Hope	Oak Hill	Smithers	Lewisburg	Ronceverte	White Sulphur Springs	Summersville	Ansted	Fayetteville	Gauley Bridge	Meadow Bridge	Pax	Thurmond	Alderson	Quinwood	Rainelle	Renick	Rupert	Richwood	Durbin	Hillsboro	Marlinton	Camden-on-Gauley	Cowen	Webster Springs
Local citizen groups or Non-profit organizations focused on environmental protection, emergency preparedness, access, and functional needs populations, etc.	Y	Y	N	Y	Y	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y
Ongoing public education or information program (responsible water use, fire safety, household preparedness, environmental education)	Y	N	N	Y	Y	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	N	N	N

Education & Outreach	***Pocahontas County***	***Webster County***	***Fayette County***	***Greenbrier County***	***Nicholas County***	***Montgomery***	***Mount Hope***	***Oak Hill***	***Smithers***	***Lewisburg***	***Ronceverte***	***White Sulphur Springs***	***Summersville***	***Ansted***	***Fayetteville***	***Gauley Bridge***	***Meadow Bridge***	***Pax***	***Thurmond***	***Alderson***	***Quinwood***	***Rainelle***	***Renick***	***Rupert***	***Richwood***	***Durbin***	***Hillsboro***	***Marlinton***	***Camden-on-Gauley***	***Cowen***	***Webster Springs***
Natural Disaster or safety-related school program	N	N	N	Y	N	Y	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N
Storm Ready Certification	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Firewise Communities certification	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Public/Private partnership initiatives addressing disaster-related issues	Y	Y	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y

4.0 ACTION PLAN

4.1 LOCAL HAZARD MITIGATION GOALS

§201.6(c)(3)(i)	The hazard mitigation strategy shall include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

A key component in this section is the development of goals and objectives that counties and municipalities can use to both develop and prioritize projects. These goals will generally line up with one or more specific hazards identified in the risk assessment. Those that are not hazard specific are referred to as "Misc."

Goals and objectives have been developed at the regional level with the input of the Hazard Mitigation Steering Committee and member jurisdictions.

- Goals are general statements of what the region would like to accomplish in reference to some hazard
- Objectives support these goals by identifying more specific aims. The Planning and Development Council (PDC) consultant led the Mitigation Steering Committee through an activity to identify regional-level goals

The committee selected 4 broad goals. The goals are presented in the table below. Committee members wanted to preserve the flexibility offered by broad goals yet wanted to provide direction to the many other stakeholders in the individual jurisdictions.

Individual participating jurisdictions selected strategies, which are specific mitigation projects and based on the regional goals and objectives. The PDC consultant interfaced individually with participating jurisdictions to generate specific projects for those jurisdictions. Such timing allowed the consultant to ensure specific projects were consistent with regional goals. The consultant provided the master project list to the PDC and Mitigation Steering Committee.

Goals
1. Reduce impacts, damages, and effects from hazards identified in the mitigation plan including flooding, dam failure, drought, hazardous materials, mass movement, pandemic/epidemic, riverine erosion, terrorism, thunderstorms, tornado, wildfire, and winter weather through robust local hazard mitigation planning and mitigation strategy implementation
2. Strengthen partnerships and leverage existing resources and capabilities to identify, assess, and reduce the impact of natural hazards.

3.	Reduce the Region's long-term vulnerability to natural hazards through actions designed to ensure long-term resiliency.
4.	Promote public awareness of natural hazard risks and public action to reduce the long-term risks.

During the completion of this update, Region 4, and the rest of the country, continue to experience the on-going COVID-19 pandemic. To ensure that the response and recovery from this pandemic was captured in the plan update, pandemic/epidemic was included as a new hazard. To address this hazard within the mitigation strategies all 5 counties included 2 new mitigation actions:

- Maintain a stockpile of PPE for use during a pandemic/epidemic event
- Development or update a pandemic/epidemic response plan

In addition, riverine erosion was identified as a new hazard due to the on-going streambank erosion and sedimentation that was raised as a concern throughout the planning process. To address this hazard within the mitigation strategies all 5 counties included 2 new mitigation actions:

- Conduct an analysis of streambanks within the county to identify potential future flooding issues
- Soil stabilization and stream restoration along streambanks that are currently eroding

With the 2016 flood still prevalent in the minds of the counties, flood mitigation projects were still included as mitigation actions, which include acquisition, relocation, and/or demolition.

4.2 PROJECT IMPLEMENTATION

§201.6(c)(3)(ii)	[The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

§201.6(c)(3)(iii)	[The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

This portion of the action plan builds on the regional goals and objectives that have been developed. Each action below is listed with a timeframe, primary coordinator, support agencies, potential funding source (and cost estimate), and its status. Actions are also categorized by six different types of mitigation projects.

1. Prevention

2. Property protection
3. Natural resource protection
4. Structural projects
5. Emergency service
6. Public education and awareness

It is important to note that the cost estimates are tentative and meant as a starting point for research on project feasibility. More specifically, these cost estimates are only ranges of probable project costs; all figures are approximations. At the time the implementation of any strategy is considered, a full cost estimate should be sought prior to securing funding. The benefit-cost review was emphasized in the prioritization process. Mitigation actions were evaluated by their pros and cons, which are represented as costs and benefits.

4.3 PROJECT STATUS

Hazard mitigation projects will fall into one of five status categories. These categories are completed, canceled, on-going, and new. The PDC consultant interfaced with representatives from the Mitigation Steering Committee as well as the individual jurisdictions participating in the planning process to update the status of their projects as listed in the previous version of the hazard mitigation plan. Representatives frequently believed their existing project list to be valid; in those cases, the consultant updated the status to "On-going" and the project remained in the active action plan.

- **Completed**: The project, as it is written, has been completed in its entirety. Any reporting and/or paperwork has been closed out
- **Canceled**: The project no longer aligns with local priorities or has been deemed unfeasible and is being removed from the plan
- **On-going**: The project has been started; work is currently being completed on the project and it is not anticipated to be done by the completed of the HMP update
- **Deferred**: The project has not started since the last plan update but is anticipated to begin during this plan update period
- **New**: The project is a newly conceived/developed project that was not included in prior versions of the HMP

County Name	New Strategies	Deferred Strategies	On-Going Strategies	Completed Strategies	Canceled Strategies
Fayette County & Municipalities	21	13	15	11	5
Greenbrier County & Municipalities	28	10	19	12	7

Nicholas County & Municipalities	12	8	27	2	0
Pocahontas County & Municipalities	28	16	22	2	2
Webster County & Municipalities	10	3	5	1	1

4.4 PROJECT PRIORITIZATION

The planning team evaluated and prioritized the mitigation actions for the community to implement. The benefit-cost review was emphasized in the prioritization process. Mitigation actions were evaluated by their pros and cons, which are represented as costs and benefits.

The jurisdictions were asked to assign a high, medium, or low designation to each mitigation action. The high, medium, and low rankings are a qualitative assessment based on priorities in respective communities. The priority designation was given based on a scoring of 1 – 5 for each project. The resulting designation was then given based on the total score.

Priority Designation	Total Score
High Priority	30 – 40 Points
Medium Priority	20 – 30 Points
Low Priority	0 – 20 Points

The evaluation criteria utilized included:

- Cost-effectiveness
    - Do the action benefits outweigh the costs of implementation?
- Life safety protection
    - How effectively will the action protect lives and prevent injuries?
- Property protection
    - How significant will the action be at eliminating or reducing damage to structures and infrastructure?
- Technical feasibility
    - Is the mitigation action technically feasible? Is it a long-term solution?
- Political support
    - Does the public support the mitigation action? Is there the political will to support it?

- Implementation capability within the jurisdiction
    - Does the community have the authority to implement the action? Does the community have the personnel and administrative capabilities to implement the action and maintain it?
- Environmental impact
    - What are the potential environmental impacts? Will it comply with environmental regulations?
- Social Impact
    - Will the proposed action adversely affect one segment of the population? Will the action disrupt established neighborhoods, break up voting districts, or cause the relocation of lower income people?

Project Prioritization Matrix

PROJECT CRITERIA →											
Cost Effectiveness											
Life Safety Protection											
Property Protection											
Technical Feasibility											
Political Support											
Implementation Capability											
Environmental Impact											
Social Impact											
TOTAL											

POCAHONTAS COUNTY MITIGATION STRATEGIES												
Project #	**Hazard**	**Project Priority**	**Mitigation Goal**	**Strategy**	**Status Update from 2016 Plan**	**Status Update**	**Primary Coordinator**	**Support Agencies**	**Mitigation Type**	**Estimate Cost**	**Possible Funding Source**	**Estimated Date of Completion**
Pocahontas 1	Flooding	H	3	Review and Update floodplain ordinances to ensure full compliance with NFIP standards	Continuing to ensure compliance with NFIP	**on-going**	Pocahontas County Floodplain Manager	Pocahontas County Commission, PCOEM	Prevention	< $10,000	Local Funding	2027
Pocahontas 2	Flooding	H	3,4	Educate local government representatives about the NFIP and its requirements. This project may include the facilitation of public forums to encourage questions regarding NFIP	Continuing to educate local government agencies on NFIP requirements	**on-going**	Pocahontas County Floodplain Manager	Pocahontas County Commission, PCOEM	Public Education and Awareness	< $10,000	Local Funding	2027
Pocahontas 3	Flooding	H	2	Coordinate with appropriate agencies to obtain updated NFIP policy-holder information within Pocahontas County	Continuing to coordinate with local governments to maintain updated NFIP policy holder info	**on-going**	Pocahontas County Floodplain Manager	Pocahontas County Commission, PCOEM	Prevention	< $10,000	Local Funding	2027
Pocahontas 4	Flooding	M	2	Coordinate with FEMA to maintain an updated list of repetitive loss properties throughout Pocahontas County and municipalities therein	Continuing to communicate with FEMA to maintain an updated RL Property list	**on-going**	Pocahontas County Floodplain Manager	PCOEM	Prevention	< $10,000	Local Funding	2027
Pocahontas 5	Flooding	M	3	Input repetitive loss properties into a GIS database for use in future mitigation activities		**deferred**	PCOEM	WVDHSEM, FEMA	Prevention	< $10,000	Local Funding	2027
Pocahontas 6	Flooding	M	1,3	As funds become available, undertake buyout, elevation, and reconstruction projects to lessen the number of repetitive loss properties. This project also includes non-RL properties. As part of this process, hold a series of meetings with property owners to identify specific project areas and to gauge interest in project participation	County is working on 1 buyout project	**on-going**	Pocahontas County Floodplain Manager	Pocahontas County Commission, PCOEM	Prevention	Approx. $64,000 per property	FEMA HMA Grants	2027
Pocahontas 7	Flooding	M	1,2,3	Coordinate with WVDOH to repair or install culverts to alleviate backup onto roads during high volume rain incidents		**deferred**	PCOEM	WVDOH	Emergency Services	$50,000 per culvert installation	Local Funding	2027
Pocahontas 8	Drought	L	1	Develop bulk portable water system that can be moved where it is needed during severe drought conditions		**deferred**	PCOEM	Municipal Town Councils	Emergency Services	< $25,000	Local Funding	2027
Pocahontas 9	Drought	H	1,2	Coordinate with local fire departments to haul water for disaster clean-up efforts		**deferred**	PCOEM	Local VFDs	Emergency Services	< $10,000	Local Funding	2027
Pocahontas 10	Thunderstorms, Tornado, Wind Events	H	4	Promote the NWS "Storm Ready" Project	Continuing public outreach with NWS	**on-going**	PCOEM	Pocahontas County Commission, PCOEM	Prevention	< $20,000	Local Funding	2027
Pocahontas 11	Mass Movement	H	1,2	Work with the WV Division of Forestry to coordinate to promote re-seeding after extraction occurs in the timber industry		**deferred**	Pocahontas County Commission	WV Division of Forestry	Prevention	< $20,000	WVDOF	2027
Pocahontas 12	Winter Weather	H	1,2	Coordinate with the DVOH and/or private contractors to ensure that snow can be quickly cleared from major thoroughfares		**deferred**	PCOEM	WVDOH	Emergency Services	< $10,000	Local Funding	2027
Pocahontas 13	Hazardous Materials	H	2,3	Complete a commodity flow study		**new**	LEPC	PCOES	Prevention	$5,000	SERC Grant	2027
Pocahontas 14	Terrorism	M	1	Compile a list of potential targets for international terrorism throughout Pocahontas County. This list should not only be sites, but also scenarios. Further, the list should be kept secure.		**deferred**	PCOEM	Pocahontas County LEPC	Emergency Services	< $10,000	Local Funding	2027
Pocahontas 15	Terrorism	H	1,2	Coordinate with local law enforcement providers (and potentially representatives from community assets) to monitor for suspicious persons or groups throughout the county	On-going coordination with local law enforcement	**on-going**	Pocahontas County Sheriff	PCOEM, Municipal Police Departments, WV State Police	Emergency Services	< $10,000	Local Funding	2027

POCAHONTAS COUNTY MITIGATION STRATEGIES												
Project #	**Hazard**	**Project Priority**	**Mitigation Goal**	**Strategy**	**Status Update from 2016 Plan**	**Status Update**	**Primary Coordinator**	**Support Agencies**	**Mitigation Type**	**Estimate Cost**	**Possible Funding Source**	**Estimated Date of Completion**
Pocahontas 16	Miscellaneous	H	1,2	Develop an alternative communications plan that utilizes local fire departments and their ability to communicate by radio should telephone service be interrupted.	County has put in base stations in all FDs	**on-going**	Frontier Communications	Local VFDs, Pocahontas County 911, PCOEM	Emergency Services	< $10,000	Local Funding	2027
Pocahontas 17	Miscellaneous	M	1,2	Develop a relationship with Frontier Communications ensure common expectations between the company and local resources during emergency incidents.		**new**	Frontier Communications	PCOEM	Emergency Services	< $10,000	Local Funding	2027
Pocahontas 18	Miscellaneous	H	3	Inventory residences and businesses throughout the county utilizing propane for heating. Partner with propane providers to Explain the potential for propane leaks and/or explosions and educate residents/business owners on how to safeguard their assets from damage	Southern States provide education to their customers	**on-going**	PCOEM	Pocahontas County LEPC	Public Education and Awareness	< $15,000	Local Funding	2027
Pocahontas 19	Miscellaneous	H	1	Compile a general list of the types of incidents that could occur in Pocahontas County and result in mass casualties		**deferred**	Pocahontas Memorial Hospital	PCOAM, Local VFDs	Emergency Services	< $10,000	Local Funding	2027
Pocahontas 20	Miscellaneous	H	2,4	Enlist local civic organizations to assist in the creation of emergency preparedness displays for use in libraries, during festivals or other gatherings, civic group meetings, etc. Examples include Basic hazard awareness, animals in disasters, business continuity planning, children's safety, and hazard information targeting tourists		**deferred**	PCOEM	Local 4-H Clubs, Pocahontas County Convention and Visitors Bureau, Local Businesses, Civic Organizations, Farm Bureau, Pocahontas LEPC	Public Education and Awareness	Up to $200 a piece	Local Funding	2027
Pocahontas 21	Miscellaneous	H	1	Update and maintain a call list to alert business owners and critical facilities of potential threats so that appropriate preventive actions can be taken	have a stakeholder email list developed	**on-going**	PCOEM	Pocahontas County 911	Emergency Services	< $10,000	Local Funding	2027
Pocahontas 22	Miscellaneous	H	2	Send pre-canned news releases to media outlets for more rapid dissemination during emergency incidents, include enough media outlets to ensure coverage of the majority of the county		**deferred**	PCOEM	Pocahontas County LEPC, Local Media Outlets	Public Education and Awareness	< $10,000	Local Funding	2027
Pocahontas 23	Miscellaneous	H	2,4	Coordinate with the Pocahontas Times, Allegheny Mountain Radio, and other county organizations with internet websites to include links to such emergency sources as the NWS (for info about rain, river gauges, and weather warnings) etc.	included in LEPC	**on-going**	PCOEM	Pocahontas Times	Public Education and Awareness	< $10,000	Local Funding	2027
Pocahontas 24	Miscellaneous	H	1,3	Review and update the Pocahontas County Emergency Operations plan and include participation from municipalities in planning process	County reviews and updates 3 sections per year	**on-going**	PCOEM	Local First Responders	Emergency Services	Up to $5,000 if a contractor is used	EMPG, HSGP, HMEP, Local Funding	2027
Pocahontas 25	Miscellaneous	H	2	Encourage municipalities to either adopt the county emergency operations plan or develop their own plan that is fully consistent with the county plan		**deferred**	PCOEM	Pocahontas County Commission	Emergency Services	Up to $5,000 if a contractor is used	EMPH, HSGP, Local Funding	2027
Pocahontas 26	Miscellaneous	M	1,2	Encourage local shipping companies and critical facilities to develop a "Critical supply transportation plan" to ensure that the necessary supplies and/or materials they need to operate can be delivered during emergency threats		**deferred**	Pocahontas LEPC	PCOEM	Emergency Services	< $10,000	Local Funding	2027

POCAHONTAS COUNTY MITIGATION STRATEGIES												
Project #	**Hazard**	**Project Priority**	**Mitigation Goal**	**Strategy**	**Status Update from 2016 Plan**	**Status Update**	**Primary Coordinator**	**Support Agencies**	**Mitigation Type**	**Estimate Cost**	**Possible Funding Source**	**Estimated Date of Completion**
Pocahontas 27	Miscellaneous	H	1,2	Coordinate with the American Red Cross to determine suitable shelter sites and create agreements for the use of those facilities during emergencies	County has 3 primary shelters identified	**on-going**	Local Chapter if ARC	PCOEM	Emergency Services	< $10,000	Local Funding	2027
Pocahontas 28	Miscellaneous	H	1,3	Undertake Source Water Protection planning measures following state guidelines	County participates with municipalities on source water protection	**on-going**	Municipal Water Providers, Local PSDs	PCOEM	Prevention	< $20,000	Local Funding	2027
Pocahontas 29	Pandemic	M	1	Maintain a stockpile of PPE for use during a pandemic/epidemic event		**new**	PCOEM	Health Department, Hospital	Prevention	< $20,000	Local /State Funding	2027
Pocahontas 30	Pandemic	H	1	Develop a pandemic/epidemic response plan		**new**	PCOEM	LEPC	Prevention	Up to $5,000 if a contractor is used	EMPG, HSGP, Local Funding	2027
Pocahontas 31	Riverine Erosion	H	3	Conduct an analysis of streambanks within the County to identify potential future flooding issues		**new**	County Floodplain Manager	PCOEM	Prevention	< $5,000	Local Funding	2027
Pocahontas 32	Riverine Erosion	H	1,3	Soil stabilization and stream restoration along streambanks that are currently eroding		**new**	County Floodplain Manager	PCOEM	Structural Projects	$50,000 per streambank	FEMA HMA Grants	2027
Pocahontas 33	Flooding	H	2	Develop consistent working relationships with the floodplain managers		**new**	PCOEM	Floodplain Managers	Prevention	< $5,000	Local Funding	2027
Pocahontas 34	Flooding	H	2	Input dilapidated/abandoned structures into a GIS database for use in future mitigation activities		**new**	Floodplain manager	PCOEM	Prevention	< $5,000	Local Funding	2027
Pocahontas 35	Flooding	H	4	Public education and outreach on the adverse effects of channelizing streams		**new**	Floodplain manager	PCOEM	Prevention	< $10,000	Local Funding	2027
Pocahontas 36	Flooding	H	1,3	Project scoping for flood mitigation where needed and feasible. Possible locations include Knapp Creek, Stoney Creek, Big Springs Fork, Beaver Creek, Thorny Creek, Greenbrier River		**new**	PCOEM	Floodplain Managers	Property Protection	< $5,000	BRIC	2027
Pocahontas 37	Miscellaneous	M	1,4	Provide electronic roadside message boards with remote update capabilities by OEM		**new**	PCOEM	WVDOH	Prevention	< $25,000	Local Funding	2027
Pocahontas 38	Miscellaneous	H	1	Provide roadside and streamside video cameras with remote access by 911 To be monitored by OEM		**new**	PCOEM	WVDOH	Prevention	< $15,000	Local Funding	2027
Pocahontas 39	Flooding & Mass Movement	H	1,2,3	Work with agencies / universities to identify areas of high risk related to slope stability		**new**	PCOEM	USDA/WVU	Prevention	< $30,000	Local Funding	2027
Pocahontas 40	Miscellaneous	H	2	Work with law enforcement, emergency medical services and Pocahontas County Board of Education to enhance information flow and rapid response capabilities during and active shooter situation		**new**	PCOEM	Law Enforcement / PCBOE	Emergency Services	< $10,000	Local Funding	2027
Pocahontas 41	Miscellaneous	M	1	Continue to enhance emergency radio communication across the county through SIRN tower development and radio purchases		**new**	PCOEM	Telecommunications Providers	Emergency Services	< $10,000	Local Funding	2027
Pocahontas 42	Miscellaneous	M	1,3	Support countywide installation of broadband internet to enhance emergency communications. Cell service is extremely limited due to presence of the National Radio Quiet Zone.		**new**	Pocahontas County Broadband Council	PCOEM	Emergency Services	< $10,000	Local Funding	2027
Pocahontas 43	Miscellaneous	H	1	Research the feasibility of a mobile pet shelter for the County		**new**	PCOEM	Humane Society/USDA	Emergency Services	< $10,000	Local Funding	2027
Pocahontas 44	Miscellaneous	H	2	Outreach to tourism business leaders regarding the importance of hazard awareness, emergency operation		**new**	PCOEM	PCCVB	Public Education and Awareness	< $10,000	PCCVB	2027

POCAHONTAS COUNTY MITIGATION STRATEGIES												
Project #	**Hazard**	**Project Priority**	**Mitigation Goal**	**Strategy**	**Status Update from 2016 Plan**	**Status Update**	**Primary Coordinator**	**Support Agencies**	**Mitigation Type**	**Estimate Cost**	**Possible Funding Source**	**Estimated Date of Completion**
				plans, and preparation for their businesses and clients								
Pocahontas 45	Miscellaneous	H	2,4	Identify volunteer groups (e.g., Pocahontas Trails) interested in being trained to support first responders during incident response		**new**	PCOEM	Pocahontas County Commission	Emergency Services	< $5,000	Local Funding	2027
Pocahontas 46	Miscellaneous	H	4	Provide outreach and education to promote community participation in first responder volunteer organizations		**new**	PCOEM	Local VFD/Paramedics	Emergency Services	< $10,000	Local Funding	2027
Pocahontas 47	Miscellaneous	H	1	Assess and provide a damage reporting process for the public to use during and following events		**new**	PCOEM	Floodplain Managers	Public Education and Awareness	< $10,000	Education grant funding may exist if approached as a citizen science project.	2027
Pocahontas 48	Miscellaneous	H	1	Place emergency call boxes on remote sections of primary roads where cell phone reception is absent and unlikely to be provided in the future		**new**	PCOEM	WVDOH	Emergency Services	< $25,000	Local Funding	2027
Pocahontas 49	Miscellaneous	H	1	Install generators at critical facilities as needed		**new**	PCOEM	Pocahontas County Commission	Emergency Services	Up to $80,000 per generator	FEMA HMA Grants	2027
Pocahontas 50	Miscellaneous	H	1	Utilize GIS to locate water and sewer lines		**new**	Region 4 PDC	Pocahontas Co Commission	Structural Projects	$250,000	CDBG-MIT Planning Grant	2027
Pocahontas 51	Flooding	H	3	Relocation of OES Building due to flooding		**new**	POES	Pocahontas Co Commission	Structural Projects	$4,500,000.00	CDBG-MIT	2027
Durbin 1	Flooding	L	3	Review and update the floodplain ordinance to ensure full compliance with the NFIP standards	Continuing to ensure compliance with NFIP standards	**on-going**	Durbin Floodplain Manager	Durbin Town Council	Prevention	< $10,000	Local Funding	2027
Durbin 2	Flooding	L	2	Coordinate with appropriate agencies to obtain updated NFIP policy-holder information with Durbin	continuing to coordinate with WVU to obtain latest NFIP data	**on-going**	Durbin Floodplain Manager	Durbin Town Council	Prevention	< $10,000	Local Funding	2027
Durbin 3	Flooding	H	1,3	Design and construct a sewage treatment plant out of the floodplain	city is working to replace sewage system, but plant currently remains in the floodplain	**on-going**	Durbin Town Council	Region 4 PDC	Structural Projects	$500,000 to $2.5M	CDBG, WV Infrastructure & Jobs Development Council, USDS, FEMA HMA Grants	2027
Durbin 4	Flooding	M	2,3	Coordinate with FEMA to maintain an updated list of repetitive loss properties throughout Durbin	Continuing coordination with FEMA to maintain updated RL Property list	**on-going**	Durbin Floodplain Manager	PCOEM	Prevention	< $10,000	Local Funding	2027
Durbin 5	Miscellaneous	H	1	Either adopt the County EOP or develop a town specific EOP that is fully consistent with the county plan		**deferred**	Durbin Town Council	PCOEM	Emergency Services	Up to $5,000 if a contractor is used	EMPG, HSGP, Local Funding	2027
Durbin 6	Miscellaneous	H	1	Purchase of a generator for the sewage treatment plant		**new**	Durbin Town Council	PCOEM	Emergency Services	Up to $80,000, plus installation costs	FEMA HMA Grants	2027
Durbin 7	Flooding	H	1	Installation of a culvert at the town park, Durbin Fairgrounds, to mitigate flooding and provide safety for residents		**new**	Durbin Town Council	PCOEM	Structural Projects	Up to $200,000	FEMA HMA Grants	2027
Hillsboro 1	Thunderstorms, Tornado, Wind Events	M	1	Promote any new construction and/or roof remodeling at the municipal level to be designed to withstand 90mph		**deferred**	Hillsboro Town Council	PCOEM	Prevention	Little to no additional funding	Local Funding	2027
Hillsboro 2	Miscellaneous	H	2	Either adopt the County EOP or develop a town specific EOP that is fully consistent with the county plan		**deferred**	Durbin Town Council	PCOEM	Emergency Services	Up to $5,000 if a contractor is used	EMPG, HSGP, Local Funding	2027
Hillsboro 3	Miscellaneous	M	1	Purchase and install generators for water pumps providing the municipal water supply and for operation of the municipal water treatment plant during power outages		**new**	Hillsboro Town Council	PCOEM	Emergency Services	< $10,000	Local Funding	2027

POCAHONTAS COUNTY MITIGATION STRATEGIES												
Project #	**Hazard**	**Project Priority**	**Mitigation Goal**	**Strategy**	**Status Update from 2016 Plan**	**Status Update**	**Primary Coordinator**	**Support Agencies**	**Mitigation Type**	**Estimate Cost**	**Possible Funding Source**	**Estimated Date of Completion**
Marlinton 1	Flooding	H	3	Review and update the floodplain ordinance to ensure full compliance with the NFIP standards	Continuing to ensure compliance with NFIP standards	**on-going**	Marlinton Floodplain Manager	PCOEM	Prevention	< $10,000	Local Funding	2027
Marlinton 2	Flooding	H	2,4	Educate town council members and residents about the NFIP and its requirements. This project may include the facilitation of public forums to encourage questions regarding the NFIP	Continuing education outreach to town council and residents regarding NFIP and its requirements	**on-going**	Marlinton Floodplain Manager	PCOEM	Public Education and Awareness	< $10,000	Local Funding	2027
Marlinton 3	Flooding	H	2	Coordinate with appropriate agencies to obtain updated NFIP policy-holder information with Marlinton	Continuing to obtain updated NFIP-policy holder info	**on-going**	Marlinton Floodplain Manager	PCOEM	Prevention	< $10,000	Local Funding	2027
Marlinton 4	Flooding	M	2,3	Coordinate with FEMA to maintain an updated list of repetitive loss properties throughout Marlinton	Continuing to obtain updated NFIP-policy holder info	**on-going**	Marlinton Floodplain Manager	PCOEM	Prevention	< $10,000	Local Funding	2027
Marlinton 5	Miscellaneous	H	1	Either adopt the County EOP or develop a town specific EOP that is fully consistent with the county plan		**deferred**	PCOEM	Marlinton Town Council	Emergency Services	Up to $5,000 if a contractor is used	EMPG, HSGP, Local Funding	2027
Marlin Run No. 1 Dam Marlinton 6	Flooding	L	1,3	Development mitigation projects to include rehabilitation of high hazards dams, including dam planning activities, design and engineering, and other structural and non-structural measures.		**new**	POEM	WV Dam Safety	Prevention	>$50,000	FEMA Grants; Dam Safety Grants	2027
Marlinton 7	Flooding	H	1	Storm water System improvements to Reduce Flooding		**new**	Town Council	Region 4 PDC	Prevention	$8,655,040	CDBG-MIT	2027
Seebert Watoga Lake Dam 1	Flooding	L	1,3	Development mitigation projects to include rehabilitation of high hazards dams, including dam planning activities, design and engineering, and other structural and non-structural measures.		**new**	POEM	WV Dam Safety	Prevention	>$50,000	FEMA Grants, Dam Safety Grants	2027

NICHOLAS COUNTY MITIGATION STRATEGIES												
Project #	**Hazard**	**Project Priority**	**Mitigation Goal**	**Strategy**	**Status Update from 2016 Plan**	**Status Update**	**Primary Coordinator**	**Support Agencies**	**Mitigation Type**	**Estimate Cost**	**Possible Funding Source**	**Estimated Date of Completion**
Nicholas 1	Miscellaneous	H	4	Purchase and redistribute the booklet *Getting Ready: A Family Emergency Guide* prepared by the State of West Virginia and FEMA's Getting Ready Guide	Continuing to distribute the booklet	**on-going**	NCOES	Nicholas County Commission	Public Education and Awareness	< $10,000	Local Funding	2027
Nicholas 2	Flooding	H	2,3	Continue to train and recertify the county Floodplain Coordinator to assist citizens in complying with the floodplain ordinances	Floodplain managers participate in continuous training	**on-going**	NCOES	Nicholas County Floodplain Managers	Public Education and Awareness	< $10,000	Local Funding	2027
Nicholas 3	Flooding	M	3	Continue to update the GIS data layer of flood maps on the county mapping database to identify floodplain areas of Nicholas County	County has met with GIS team, to remap county roads	**on-going**	NCOES	Nicholas County Assessor	Public Education and Awareness	< $10,000	Local Funding	2027
Nicholas 4	Flooding	H	2	Continue working with municipalities to update floodplain ordinances adopted prior to 1987	County has mutual aid agreement with Summersville, County will provide floodplain manager	**on-going**	NCOES	Nicholas County Floodplain Managers	Prevention	< $10,000	Local Funding	2027
Nicholas 5	Flooding	H	2	Continue training the county and municipal development officials on NFIP Requirements	Continuing to education county and municipal officials on NFIP	**on-going**	NCOES	Nicholas County Floodplain Managers	Public Education and Awareness	< $10,000	Local Funding	2027

NICHOLAS COUNTY MITIGATION STRATEGIES												
Project #	**Hazard**	**Project Priority**	**Mitigation Goal**	**Strategy**	**Status Update from 2016 Plan**	**Status Update**	**Primary Coordinator**	**Support Agencies**	**Mitigation Type**	**Estimate Cost**	**Possible Funding Source**	**Estimated Date of Completion**
Nicholas 6	Flooding	H	1,3	As funds become available, undertake buyout, elevation, reconstruction projects to lessen the number of repetitive loss properties	had 1 buyout property	**on-going**	NCOES	Nicholas County Commission	Prevention	Approx. $85,000 per property	FEMA HMA Grants	2027
Nicholas 7	Miscellaneous	M	3	Continue to review all comprehensive plans to ensure that designated growth areas are not in hazard areas. If they are, build mitigation measures into development plans	Continuing to review all plans to ensure growth is not in hazard areas	**on-going**	NCOES	Nicholas County Economic Development, Region 4 PDC	Prevention	< $10,000	Local Funding	2027
Nicholas 8	Miscellaneous	M	3	Continue to review all capital improvement plans to ensure that infrastructure improvements are not directed towards hazardous areas. If they are, build mitigation measures into plans.	Continuing to review all plans to ensure growth is not in hazard areas	**on-going**	NCOES	Nicholas County Economic Development, Region 4 PDC	Prevention	< $10,000	Local Funding	2027
Nicholas 9	Miscellaneous	H	1,2	Coordinate with county emergency services personnel to participate in exercises of simulated biological and hazardous materials incidents to practice response efforts	have had several exercises, coordinated with WVU, county, and local hospitals. County attended training with LEPC, received a grant for training and exercises	**on-going**	NCOES	Nicholas County LEPC	Emergency Services	Up to $10,000 if a contractor is used	EMPG, SHSG, HMEP, SERC, Local Funding	2027
Nicholas 10	Miscellaneous	M	1,3	Maintain updates to plans that detail specific actions to be taken when weather events such as ice, snow, flooding, etc. strike. Plans should include who is responsible for such actions	county continuously updating plans	**on-going**	NCOES	Nicholas County LEPC, Emergency Service Providers	Emergency Services	Up to $5,000 a piece, if a contractor is used	EMPG, SHSG, HMEP, SERC, Local Funding	2027
Nicholas 11	Miscellaneous	H	1	Purchase and install permanent Generators for critical facilities	County looking at 2 permanent generators. Craigsville FD, emergency shelter in Gilboa, owned by FD	**on-going**	NCOES	Nicholas County Commission	Structural Projects	Up to $80,000, including installation	FEMA HMA Grants	2027
Nicholas 12	Miscellaneous	H	1	Purchase Mobile generators and install hookups for these generators at critical facilities	County has several mobile generators, will work with PDC to obtain additional generators	**on-going**	NCOES	Nicholas County Commission	Structural Projects	Up to $80,000, including installation	FEMA HMA Grants, EMPG, Local Funding	2027
Nicholas 13	Pandemic	M	1	Develop a pandemic/epidemic response plan		**NEW**	NCOES	Nicholas County Health Department, Municipal Ems	Emergency Services	< $15,000	Local Funding	2027
Nicholas 14	Riverine Erosion	H	3	Conduct an analysis of streambanks within the County to identify potential future flooding issues		**NEW**	NCOES	Nicholas County Commission	Structural Projects	< $30,000	FEMA HMA Grants	2027
Nicholas 15	Riverine Erosion	H	1,3	Soil stabilization and stream restoration along streambanks that are currently eroding, including Cherry and Birch River		**NEW**	NCOES	Nicholas County Commission	Structural Projects	< $50,000 per streambank	FEMA HMA Grants	2027
Nicholas 16	Pandemic	M	1	Maintain a stockpile of PPE for use during a pandemic/epidemic event		**NEW**	NCOES	Nicholas County Commission	Emergency Services	< $20,000	Local or State Funding	2027
Nicholas 17	Hail, Thunderstorms, Tornados, Wind, Winter Weather	H	1,2	Coordinate any warning systems with the Nicholas County Board of Education to enhance protection to students and faculty under threat of severe weather.	Continuously coordinating with the Board of Education on hazard warnings	**on-going**	Mayor, City Recorder, City Council, Chief of Police, NCBOE, Staff Designees	NCOES	Public Education and Awareness	< $10,000	Local Funding	2027
Nicholas 18	Flooding	M	3	Continue to train and recertify the county Floodplain Coordinator to assist citizens in complying with the floodplain ordinances	Training available to floodplain managers	**on-going**	Summersville Floodplain Manager, Summersville Code Official	NCOES	Prevention	< $10,000	Local Funding	2027
Nicholas 19	Misc.	H	1	Install generators at critical facilities as needed		**new**	NCOES	Nicholas County Commission	Emergency Services	Up to $80,000 per generator	FEMA HMA Grants	2027
Rock Camp Branch Dam Nicholas 20	Flooding	L	1,3	Development mitigation projects to include rehabilitation of high hazards dams, including dam planning		**new**	NOEM	WV Dam Safety	Prevention	>$50,000	FEMA Grants, Dam	2027

NICHOLAS COUNTY MITIGATION STRATEGIES												
Project #	**Hazard**	**Project Priority**	**Mitigation Goal**	**Strategy**	**Status Update from 2016 Plan**	**Status Update**	**Primary Coordinator**	**Support Agencies**	**Mitigation Type**	**Estimate Cost**	**Possible Funding Source**	**Estimated Date of Completion**
				activities, design and engineering, and other structural and non-structural measures.							Safety Grants	
Crooked Run Creek Dam Nicholas 21	Flooding	L	1,3	Development mitigation projects to include rehabilitation of high hazards dams, including dam planning activities, design and engineering, and other structural and non-structural measures.		**new**	NOEM	WV Dam Safety	Prevention	>$50,000	FEMA Grants, Dam Safety Grants	2027
Nicholas 22	Miscellaneous	H	1	Utilize GIS to locate water and sewer lines		**new**	Region 4 PDC	Nicholas County Commissioners	Structural	$250,000.00	CDBG-MIT	2027
Indian Rocks Park Dam Craigsville 1	Flooding	L	1,3	Development mitigation projects to include rehabilitation of high hazards dams, including dam planning activities, design and engineering, and other structural and non-structural measures.		**new**	NOEM	WV Dam Safety	Prevention	>$50,000	FEMA Grants, Dam Safety Grants	2027
Craigsville 2	Flooding	H	1,3		Water Plant Relocation from the Flood Plain	**new**	Craigsville PSD	Region 4 PDC	Prevention	$3,325,000	CDBG-MIT	2027
Sugar Camp Branch Coal Refuse Disposal Facility Drennen 1	Flooding	L	1,3	Development mitigation projects to include rehabilitation of high hazards dams, including dam planning activities, design and engineering, and other structural and non-structural measures.		**new**	NOEM	WV Dam Safety	Prevention	>$50,000	FEMA Grants, Dams Safety Grants	2027
Rockcamp Branch Refuse Disposal Facility Gilboa 1	Flooding	L	1,3	Development mitigation projects to include rehabilitation of high hazards dams, including dam planning activities, design and engineering, and other structural and non-structural measures.		**new**	NOEM	WV Dam Safety	Prevention	>$50,000	FEMA Grants, Dam Safety Grants	2027
Campbells Creek Slurry Impoundment Port Amherst 1	Flooding	L	1,3	Development mitigation projects to include rehabilitation of high hazards dams, including dam planning activities, design and engineering, and other structural and non-structural measures.		**New**	NOEM	WV Dam Safety	Prevention	>$50,000	FEMA Grants, Dam Safety Grants	2027
Richwood 1	Miscellaneous	M	3	Continue to review all community and economic development plans to ensure that designated growth areas are not in hazard areas. If they are, build mitigation measures into plans/	Continuing to review all plans to ensure growth is not in hazard areas	**on-going**	Town Council	Region 4 PDC, Nicholas County Economic Development, Nicholas County Commission	Prevention	< $10,000	Local Funding	2027
Richwood 2	Flooding	M	1	Raise Route 39 from GoMart to Bridge Ave	Mayor had productive meetings with WVDOT	**deferred**	Town Council	WVDOT	Structural Projects	< $1M	FEMA HMA Grants, State Funding, Local Funding	2027
Richwood 3	Severe Weather	L	1	Bury Utility Lines		**deferred**	Town Council	Local Power Company	Structural Projects	$1M - $5M	Local Funding	2027
Richwood 4	Miscellaneous	M	3	Develop Emergency Response Plan Police/Fire/Etc.		**deferred**	Town Police and Fire Chiefs	Town Council	Emergency Services	< $25,000	Local Funding	2027
Richwood 5	Miscellaneous	M	3	Develop Green spaces into parks/ playgrounds/ Fair grounds/ fitness trails/Etc.		**deferred**	Town Council	WVDEP	Natural Resource Protection	<$250,000	Local Funding	2027
Richwood 6	Flooding	M	1,3	Work to restore Stream Corridors		**deferred**	Town Council	WVDOT	Prevention	< $1M	FEMA HMA Grants, State Funding,	2027

NICHOLAS COUNTY MITIGATION STRATEGIES												
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											Local Funding	
Richwood 7	Flooding	M	1,3	Separate Storm Water / Sewer systems	working on getting new WTTP and updating water lines	**on-going**	Town Council	WVDOT	Prevention	$1M to $5M	FEMA HMA Grants	2027
Richwood 8	Flooding	H	1,3	Relocate Wastewater Treatment Plant out of the Floodplain	still in bid process	**on-going**	Town Council	WVDOT	Structural Projects	$5M	FEMA HMA Grants	2027
Richwood 9	Miscellaneous	H	1	Install fixed generators at critical facilities		**deferred**	Town Council	NCOES	Structural Projects	Up to $80,000, including installation	FEMA HMA Grants	2027
Richwood 10	Flooding	H	1,3	Construct flood walls/dykes/abatements where needed and feasible		**deferred**	Town Council	WVDOT	Property Protection	$1M to $5M	FEMA HMA Grants	2027
Richwood 11		H	1,3	Identification of locations in need of flood mitigation		**new**	Town Council	NCOES	Structural Project	< $15,000	FEMA HMA Grants	2027
Richwood 12	Flooding	H	1	Periodically clear local rivers of debris and other impediments.	this is completed after heavy rain periods, working to restore streams to condition before 2016 flood	**on-going**	Town Council	WVDOT	Prevention, Natural Resource Protection	<10,000 per occurrence	Local Funding	2027
Richwood 13	Flooding	H	1	Soil stabilization and stream restoration along streambanks that are currently eroding, Cherry River		**new**	Town Council	NCOES	Structural Project	<$50,000 per streambank	FEMA HMA Grants	2027
Richwood 14	Miscellaneous	H	1	Rehabilitate Green Street Lift Station		**new**	Town Council	Region 4 PDC	Structural Project	$10,000,000.00	CDBG-MIT	2027
Summersville 1	Hail, Thunderstorms, Tornados, Wind, Winter Weather	M	2	Continue to coordinate with the NWS daily to monitor imminent severe weather.	Continuing to coordinate with the NWS	**on-going**	Mayor, City Recorder, City Council, Chief of Police, Staff Designees	NCOES	Public Education and Awareness	< $10,000	Local Funding	2027
Summersville 2	Miscellaneous	H	3	Develop written policies to define goals, mitigate natural disasters, and establish long-term goals	Currently redoing comprehensive emergency plan, working with WVU.	**on-going**	Local Citizens, Mayor, City Recorder, City Council Planning Commission	NCOES	Emergency Services	< $10,000	Local Funding	2027
Summersville 4	Miscellaneous	M	3,4	Continue to improve mitigation training and provide public information to citizens of Summersville and surrounding areas before, during, and after emergency incidents.	Continuing mitigation education outreach	**on-going**	Mayor, City Recorder, City Council, Chief of Police, SCTV, Local Radio, Staff Designees	NCOES	Public Education and Awareness	< $10,000	Local Funding	2027
Summersville 6	Flooding	H	3	Continue to keep local ordinances and codes updated and enforce the regulations consistent with current laws	Continuing to keep ordinances and codes updated	**on-going**	Summersville Code Official	NCOES	Prevention	< $10,000	Local Funding	2027
Summersville 7	Flooding	L	3	Continue to encourage and recommend building with proper flood resistant construction techniques	Continuing to encourage recommended building techniques	**on-going**	Summersville Code Official	NCOES	Prevention	< $10,000	Local Funding	2027
Summersville 8	Winter Weather	M	1	Continue to maintain and upgrade current snow removal capabilities throughout the city	Continuing to maintain snow removal capabilities	**on-going**	Street Department Manager	NCOES	Emergency Services	< $10,000	Local Funding	2027
Summersville 9	Wind	M	1,4	Continue to develop programs to keep trees from threatening lives, property, and infrastructure during severe windy weather		**deferred**	City Forestry Council	NCOES, Mon Power Company	Prevention	< $10,000	Local Funding	2027
Summersville 10	Hazardous Materials	M	1,2	To coordinate with City/County First Responders for training exercises of simulated chemical/hazardous materials incidents.	have had several exercises, coordinated with WVU, county, and local hospitals	**on-going**	Mayor, City Recorder, City Council, City Police, City Fire Department	NCOES, WVSP, NCSD, EMS, HAZMAT Team	Emergency Services	< $15,000	Local Funding	2027
Summersville 11	Miscellaneous	H	1	Continue to identify and install backup power to critical facilities, including emergency shelter sites such as the Summerville Conference Center	City has installed back-up power at the wastewater treatment plant and water treatment plant	**on-going**	Mayor, City Recorder, City Council Planning Commission	NCOES	Structural Projects	< $100,000	FEMA HMA Grants, Local Funding	2027

NICHOLAS COUNTY MITIGATION STRATEGIES												
Project #	**Hazard**	**Project Priority**	**Mitigation Goal**	**Strategy**	**Status Update from 2016 Plan**	**Status Update**	**Primary Coordinator**	**Support Agencies**	**Mitigation Type**	**Estimate Cost**	**Possible Funding Source**	**Estimated Date of Completion**
Summersville 12	Miscellaneous	H	1	Continue to provide emergency shelters at the Nicholas County Senior Center and SVFD	Emergency shelters at these locations are still available	**on-going**	Mayor, City Recorder, City Council, City Staff	NCOES	Emergency Services	< $100,000	Local Funding	2027
Summersville 13	Pandemic	M	1	Maintain a stockpile of PPE for use during a pandemic/epidemic event		**new**	City Superintendent	Summersville EM, Nicholas County Health Department	Emergency Services	< $20,000	Local Funding	2027
Summersville Dam - Dike 1 Summersville 14	Flooding	L	1,3		Development mitigation projects to include rehabilitation of high hazards dams, including dam planning activities, design and engineering, and other structural and non-structural measures.	**new**	NOEM	WV Dam Safety	Prevention	>$50,000	FEMA Grants, Dam Safety Grants	2027
Summersville Dam – Dike 2; Summersville 15	Flooding	L	1,3		Development mitigation projects to include rehabilitation of high hazards dams, including dam planning activities, design and engineering, and other structural and non-structural measures.	**new**	NOEM	WV Dam Safety	Prevention	>$50,000	FEMA Grants, Dam Safety Grants	2027
Summersville 16	Flooding	H	1,3		Storm water improvements to Reduce Flooding	**new**	Town Council	Region 4 PDC	Prevention	$1,042,350	CDBG-MIT	2027
Summersville Dam Swiss 1	Flooding	L	1.3		Development mitigation projects to include rehabilitation of high hazards dams, including dam planning activities, design and engineering, and other structural and non-structural measures.	**new**	NOEM	WV Dam Safety	Prevention	>$50,000	FEMA Grants, Dam Safety Grants	2027
Wilderness PSD 1	Miscellaneous	H	1		Relocate Drinking Water Intake	**new**	Wilderness PSD		Structural Project	$999,000.00	CDBG-MIT	2027

GREENBRIER COUNTY MITIGATION STRATEGIES												
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Greenbrier 1	Flooding	M	2,3	Work with the WVDOH to design road construction to be at the 100-year base flood elevation or higher		**deferred**	WVDOH Local Division	GCEMA	Structural Projects	Up to $5M per project	Local Funding	2027
Greenbrier 2	Flooding	M	2,3	work with municipal public works divisions to potential have new road construction bult to the 100-year base flood elevation		**new**	WVDOH Local Division	GCEMA	Structural Projects	Up to $5M per project	Local Funding	2027
Greenbrier 3	Flooding	H	3	Maintain a database of all at risk structures in floodways and floodplains and distribute information to homeowners and businesses on the importance of purchasing flood insurance and flood proof techniques to protect their homes and businesses	New preliminary flood map approval process should address new and existing at-risk structures. Would like confirmation that added at-risk areas are aware of the flood map changes.	**on-going**	Greenbrier County Floodplain Manager	Municipal Public Works Departments and GCEMA	Prevention	< $10,000	Local Funding	2027
Greenbrier 4	Flooding	H	3,4	ensure finalized flood maps are distributed to high-risk flood maps, distribute info on where to access flood database, utilizing existing public education campaigns		**new**	GCEMA	Floodplain Manager	Prevention	< $10,000	Local Funding	2027
Greenbrier 5	Flooding	M	3,4	Establish an ongoing project of mitigation training for public officials and private	Mitigation education and training continuously made available	**on-going**	Greenbrier County	Municipal Public Works	Public Education	< $20,000	Local Funding	2027

GREENBRIER COUNTY MITIGATION STRATEGIES												
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				businesses and citizens, and local realtors of Greenbrier County			Floodplain Manager	Departments and GCEMA	and Awareness			
Greenbrier 6	Flooding	H	3,4	Continue to make informational pamphlets available to Greenbrier County citizens and realtors that promote buying flood insurance.	Informational pamphlets are continuously distributed	**on-going**	Greenbrier County Floodplain Manager	GCEMA	Public Education and Awareness	< $10,000	Local Funding	2027
Greenbrier 7	Flooding	H	2,3	Continue to make permitting necessary (that is consistent with local floodplain ordinances) before any new construction is allowed. Identify staffing augmentation needed for the Floodplain Manager's/Code Officials Offices.		**new**	Greenbrier County Floodplain Manager	Greenbrier County Commission	Prevention	$20,000 to $25,000	FEMA HMA Grants (BRIC C&CB)	2027
Greenbrier 8	Flooding	M	2	Provide opportunities for the leaders in Greenbrier County to participate in FEMA (and/or other agency) proactive programs		**deferred**	Greenbrier County Floodplain Manager	GCEMA	Public Education and Awareness	< $15,000	Local Funding	2027
Greenbrier 9	Flooding	H	1,3	Continue to apply for FEMA HMA funds for acquisitions, elevations, relocations, or reconstructions of identified at risk repetitive loss, non-repetitive loss, or substantial damaged properties in Greenbrier County	Since 2016 flood, 45 additional homes acquired/demoed, 1 elevated and 4 new constructions	**on-going**	GCEMA	Greenbrier County Commission, Greenbrier County Floodplain Manager	Prevention	Approx. $71,300 per property	FEMA HMA Grants	2027
Greenbrier 10	Winter Weather	M		Continue to enhance and upgrade current snow removal capabilities throughout the county, coordinate with state and municipalities	Continuing to maintain snow removal capabilities	**on-going**	WVDOH, WVDOT	City Maintenance Personnel	Emergency Services	Up to $50,000 per equipment purchase	Local/State Funding	2027
Greenbrier 11	Winter Weather	H	1,3	Develop and implement programs to coordinate mitigation activities to reduce risk to public infrastructure from severe storms		**deferred**	Utility companies, PSD's	GCEMA	Prevention	< $10,000	Local Funding	2027
Greenbrier 12	Flooding	M	1,3	Develop and implement programs to coordinate mitigation activities to reduce risk to hospitals from water contamination issues		**new**	DHHR	GCEMA	Prevention	< $30,000	DHHR	2027
Greenbrier 13	Winter Weather	M	4	Increase public awareness of the severe storm mitigation activities that the public can undertake	Advertising and word of mouth continues to garner new applications since the 2016 flood, but no public meetings have been held due to COVID	**on-going**	GCEMA	Greenbrier County, LEPC	Public Education and Awareness	Up to $2,500 for the production and development of materials	FEMA EMPG, HMA Grants, SERC, Local Funding	2027
Greenbrier 14	Winter Weather	M	2,4	Promote enrollment in the County Mass Notification System (NIXLE)	Continuing to advertisement notification system	**on-going**	GCEMA	National Weather Service (NWS)	Public Education and Awareness	< $10,000	Local Funding	2027
Greenbrier 15	Winter Weather	H	2,3	Map and publicize locations around the county that have the highest incidences of extreme storms	New flood mapping preliminary info to county and municipalities	**on-going**	GCEMA	Greenbrier County, LEPC	Public Education and Awareness	< $10,000	Local Funding	2027
Greenbrier 16	Thunderstorms/ Winter Weather/ Flooding	H	2	Continue to coordinate with the Blacksburg NWS office daily to improve readiness for imminent severe weather	Continuously coordinating with the NWS	**on-going**	GCEMA	National Weather Service (NWS)	Public Education and Awareness	< $10,000	Local Funding	2027
Greenbrier 17	Drought	M	1	Identify and maintain backup water supplies for citizens	Several BWA's in last year and water was available for purchase locally and state provided pallets of water also for distribution	**on-going**	PSD's, water systems, municipalities	GCEMA	Prevention	< $20,000	Local Funding	2027
Greenbrier 18	Miscellaneous	M	1,2	Coordinate with Appalachian Electric Power (AEP), to clear trees and other debris from electric lines throughout the county		**new**	Utility Company, AEP	GCEMA	Prevention	< $10,000	Agency Funded	2027
Greenbrier 19	Miscellaneous	H	1,2	Develop a database of special needs populations which require electric power for life support equipment and		**deferred**	GCEMA	Committee on Aging, Health, Clinics, VFDs	Emergency Services	< $15,000	Local Funding	2027

GREENBRIER COUNTY MITIGATION STRATEGIES												
Project #	**Hazard**	**Project Priority**	**Mitigation Goal**	**Strategy**	**Status Update from 2016 Plan**	**Status Update**	**Primary Coordinator**	**Support Agencies**	**Mitigation Type**	**Estimate Cost**	**Possible Funding Source**	**Estimated Date of Completion**
				coordinate sharing of special needs contacts								
Greenbrier 20	Miscellaneous	H	1	Perform an inspection of generators to determine replacement necessity at all tower sites and microwave links. Develop a generator replacement plan.		**new**	911 Center	GCEMA	Emergency Services	Up to $10,000 per generator	Local Funding	2027
Greenbrier 21	Hazmat	H	1	Update the commodity study, currently scheduled to be updated		**new**	LEPC	GCEMA	Prevention	Up to $10,000	SERC Funds	2027
Greenbrier 22	Hazmat	H	1,2	Continue training with Regional Response Team and county response team(s) to provide a fast and effective response to an incident.	Continuing to train with RRTs	**on-going**	GCEMA, WVDHSEM	Local VFDs	Emergency Services	< $25,000	WVEM SERC	2027
Greenbrier 23	Hazmat	H	1	Obtain additional hazmat supplies for VFDs		**new**	WVEM	GCHSEM	Prevention	< $30,000	WVEM SERC, LEPC	2027
Greenbrier 24	Miscellaneous	M	1,2	Coordinate with assets in the county to estimate losses more effectively from a disaster, County will coordinate with State for use of damage assessment software	County no longer has the ORION program, but the state now has a new damage assessment software program for use	**on-going**	GCEMA	WVDEM	Prevention	< $10,000	Local Funding	2027
Greenbrier 25	Dam Failure	M	2,3	Maintain a partnership with parties that are stakeholders in the monitoring and general condition of dams throughout Greenbrier County. Provide technical and manpower support to evaluate the status of these dams and report to the Core Planning Team on a yearly basis.	Have not met with the dam management team for 3 years	**deferred**	WV Conservation Agency	WVDEP, GCEMA	Prevention	< $10,000	Local Funding	2027
Greenbrier 26	Miscellaneous	H	1	Purchase and install generators at emergency shelter sites, or critical infrastructure sites like County EMS provider facilities	most emergency shelters have backup power	**new**	GCHSEM	Greenbrier County Commission	Emergency Services	Up to $100,000 per installation	FEMA HMA Grants	2027
Greenbrier 27	Miscellaneous	M	1,3	Replacing powerlines and poles in AEP services areas in the county	New AEP transmission line completed in Quinwood area	**on-going**	Service Electric	AEP	Structural Projects	$1M to $5M	AEP	2027
Greenbrier 28	Miscellaneous	M	1	Purchase of drone for post-disaster surveying, including streams and rivers		**new**	GCEMA	WVEM	Emergency Services	Unknown	Local Funding	2027
Greenbrier 29	Pandemic	H	1	Maintain a stockpile of PPE for use by first responders during a pandemic/epidemic event		**new**	GCEMA	DHHR	Emergency Services	< $20,000	DHHR	2027
Greenbrier 30	Pandemic	M	1,3	Develop a pandemic/epidemic response plan or adopt state pandemic response plan		**new**	DHHR	Greenbrier County Health Department	Emergency Services	< $20,000	DHHR	2027
Greenbrier 31	Riverine Erosion	H	1,3	Conduct an analysis of streambanks within the County to identify potential future flooding issues		**new**	WV Conservation Agency	GCEMA	Prevention	< $50,000	FEMA HMA Grants	2027
Greenbrier 32	Riverine Erosion	H	1,3	Soil stabilization and stream restoration along streambanks that are currently eroding		**new**	WV Conservation Agency	GCEMA	Prevention	$50,000 per streambank	FEMA HMA Grants	2027
Greenbrier 33	Misc.	H	1	Install generators at critical facilities as needed		**new**	GCOES	Greenbrier County Commission	Emergency Services	Up to $80,000 per generator	FEMA HMA Grants	2027
Greenbrier 34	Misc.	H	1	GIS mapping for Water and Sewer Lines		**new**	Pocahontas Co Commissioners	Region 4 PDC	Structural	$250,000.00	CDBG-MIT	2027
Alderson 1	Flooding	H	1,3	Investigate and implement strategies to reduce flood damages and loss in the Town of Alderson, including but not limited to acquisitions, elevations, relocation, and reconstructions of flood prone properties	11 structures have been raised/re-built above the floodplain in the last 3 years. Town is currently working with Mon Power and Monroe County Commission to fix a major flood issue that has been a problem for many years on the Monroe side, which should alleviate some flooding for some of the houses.	**on-going**	Alderson Floodplain Manager	Greenbrier County Floodplain Manager, GCEMA	Structural Projects	Approx. $80,000 per structure	FEMA HMA Grants, Local Funding	2027
Alderson 2	Flooding	H	1,3	Relocate Water Treatment Plant		**New**	Town Council	Region 4 PDC	Prevention	$8,304,000	CDBG-MIT	2027
Lewisburg 1	Drought	M	1	Identify and maintain backup water supplies for citizens		**deferred**	Lewisburg Public Works	GCEMA	Prevention	< $15,000	Local Funding	2027
Lewisburg 2	Flooding	H	1,3	Stormwater Improvements		**new**	City Council	Region 4 PDC	Prevention	$250,000	CDBG-MIT	2027

GREENBRIER COUNTY MITIGATION STRATEGIES												
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Sherwood Lake Dam Neola 1	Flooding	L	1,3	Development mitigation projects to include rehabilitation of high hazards dams, including dam planning activities, design and engineering, and other structural and non-structural measures.		new	GOEM	WV Dam Safety	Prevention	>$50,000	FEMA Grants, Dam Safety Grants	2027
Quinwood 1	Misc	L	4	Develop and distribute information to the Town's critical facilities describing the proper policies and procedures to be conducted in the event of a bomb threat.		deferred	Quinwood Town Council	GCEMA	Public Education and Awareness	< $10,000	Local Funding	2027
Quinwood 2	Flooding	M	1,3	Identify undersized and inadequate culverts and correct the problem, utilize cameras to identify additional drainage problems		New	Municipal Council	Engineering Consultants, Town Employees, Region 4 PDC	Structural Projects	$1M+ for upsizing culverts	FEMA HMA Grants, CDBG	2027
Quinwood 3	Flooding	M	1,3	As funds become available, undertake buyout, elevation, or reconstruction projects. As part of this process, hold a series of meetings with property owners to identify specific project areas and to gauge interest in project participation		New	Municipal Council	Fayette County Commission, Municipal Council, OEM	Prevention	Approx. $64,000 per property	FEMA HMA Grants	2027
Quinwood 4	Misc.	H	1	Install generators at critical facilities as needed		new	Municipal Council	Municipal Council	Emergency Services	Up to $80,000 per generator	FEMA HMA Grants	2027
Rainelle 1	Drought	H	1	Identify and maintain backup water supplies for citizens		deferred	Greenbrier County PSD #2	Rainelle Town Council, GCEMA	Prevention	< $10,000	Local Funding	2027
Rainelle 2	Misc.	H	1	Purchase and install generators at critical facilities	Three applications have been submitted for HMGP Funds. Ready to put EOI's or request for bids.	on-going	Rainelle Town Council	GCEMA	Structural Projects	Up to $80,000 per installation	FEMA HMA Grants	2027
Rainelle 3	Misc.	H	1,3	Stormwater Improvement to Reduce Flooding		new	Town Council	Region 4 PDC	Prevention	$9,955,000	CDBG-MIT	2027
Renick 1	Wildfire	L	4	Distribute an informational brochure including information on the burning ban and the leading causes of wildfires, as well as steps the public can take to avoid setting wildfires	Informational brochures are distributed throughout the year	on-going	Renick Town Council	GCEMA, Greenbrier County LEPC	Public Education and Awareness	Up to $2,500	FEMA HMA Grants, Local Funding	2027
Summit Lake Dam Richwood 1	Flooding	L	1,3	Development mitigation projects to include rehabilitation of high hazards dams, including dam planning activities, design and engineering, and other structural and non-structural measures.		new	GOEM	WV Dam Safety	Prevention	>$50,000	FEMA Grants, Dam Safety Grants	2027
Ronceverte 1	Miscellaneous	H	1	Purchase and install generators at critical facilities	One HMGP application has been submitted	on-going	Ronceverte City Council	GCHSEM	Structural Projects	Up to $80,000 per installation	FEMA HMA Grants	2027
Ronceverte 2	Flooding	H	1,3	Take steps to address flooding due to storm water		deferred	Ronceverte City Council	FEMA	Flood Mitigation	Unknown	FEMA HMA Grants, DOH	2027
Ronceverte 3	Flooding		1,2,3	Coordinate with the USACE Flood Wall Project to implement it for Ronceverte	A letter has been sent to the USACE to begin the project	on-going	Ronceverte City Council	USACE Region 4	Flood Mitigation	$54M	USACE, FEMA, WV Infrastructure Congressionnel Allocation	2027
Ronceverte	Flooding	H	1,3	Stormwater Improvements to Prevent Flooding		New	City Council	Region 4 PDC	Prevention	$8,900,000	CDBG-MIT	2027
Rupert 1	Flooding	H	1,3	Continue to apply for FEMA HMA funds for acquisitions, elevations, or relocations of repetitive loss properties in Rupert		deferred	Rupert City Council	GCEMA	Structural Projects	Approx. $80,000 per property	FEMA HMA Grants	2027
Dawson Dam Rupert 2	Flooding	L	1,3	Development mitigation projects to include rehabilitation of high hazards dams, including dam planning activities, design and engineering, and other structural and non-structural measures.		new	GOEM	WV Dam Safety	Prevention	>$50,000	FEMA Grants, Dam Safety Grants	2027

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Rupert 3	Flooding	H	1,3	Stormwater Improvements to reduce Flooding		new	Toen Council	Region 4 PDC	Prevention	$2,600,000	CDBG-MIT	2027
Howard Creek No. 12 Dam Tuckahoe 1	Flooding	L	1,3	Development mitigation projects to include rehabilitation of high hazards dams, including dam planning activities, design and engineering, and other structural and non-structural measures.		new	GOEM	WV Dam Safety	Prevention	>#50,000	FEMA Grants, Dam Safety Grants	2027
WHITE SULPHER SPRINGS 1	Hazmat	M	4	Make the public aware of the hazardous materials risk, what they can do if a spill occurs, and stress the importance of evacuation planning	Public outreach and education continuously happens throughout the year	on-going	Greenbrier County LEPC	White Sulphur Springs Fire Department, GCEMA	Public Education and Awareness	Up to $2,500	FEMA HMA Grants, Local Funding	2027
WHITE SULPHER SPRINGS 2	Miscellaneous	H	1	Purchase and install generators at critical infrastructure facilities. Generator needed at City Hall and Police Dept.		new	White Sulphur Springs City Council	GCHSEM	Structural Projects	Up to $80,000 per installation	FEMA HMA Grants	2027
WHITE SULPHER SPRINGS 3	Flooding	M	1,3	Small stream improvements/debris removal to prevent flooding of the banks in shallow areas		new	WV Conservation Agency	WVDEP, GCEMA	Natural Resource Protection	< $100,000	FEMA HMA Grants, Local Funding	2027
WHITE SULPHER SPRINGS 4	Flooding	H	1,3	Drain Inlets on Dry Creek Rd. to reduce roadway flooding.		new	WVDOH Local Division	WVDEP, GCEMA	Structural Projects	< $100,000	DOH Funding	2027
WHITE SULPHER SPRINGS 5	Miscellaneous	M	1	warming/cooling station needed at the city maintenance shop.		new	White Sulphur Springs City Council	GCEMA	Emergency Services	< $15,000	FEMA HMA Grants, Local Funding	2027
WHITE SULPHER SPRINGS 6	Flooding	H	1,3	Apply for FEMA HMA funds for acquisitions, elevations, or relocations of identified repetitive loss properties in White Sulphur Springs		new	White Sulphur Springs City Council	GCHSEM	Structural Projects	Approx. $80,000 per property	FEMA HMA Grants	2027
WHITE SULPHER SPRINGS 7	Flooding	H	1,3	Implement streambank enhancement and streambank stabilization at Howards Creek to mitigate flooding		new	White Sulphur Springs City Council	NRCS, USACE, USDA Soil Conservation, GCEMA	Natural Resource Protection	<$100,000	FEMA HMA Grants	2027
WHITE SULPHER SPRINGS 8	Flooding	H	1,3	Implement streambank enhancement and streambank stabilization at Wades Creek to mitigate flooding		new	White Sulphur Springs City Council	NRCS, USACE, USDA Soil Conservation, GCEMA	Natural Resource Protection	<$100,000	FEMA HMA Grants	2027
White Sulphur Springs 9	Flooding	H	1,3	Stormwater Improvements to reduce Flooding		New	White Sulphur Springs City Council	Region 4 PDC	Prevention	$2,980,000	CDBG-MIT	2027

FAYETTE COUNTY MITIGATION STRATEGIES												
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Fayette 2	Drought	M	1	Develop a plan to have "watering points" in those areas of the county not served by public water, so citizens can obtain water training during droughts	still need to draft and list the hazards for small water facilities (i.e., small municipalities)	on-going	FCOES	PSDs	Emergency Services	< $10,000	Local Funding	2027
Fayette 3	Wildfire	H	4	Promote awareness and enforcement of fire season laws	Fire education continuous throughout the year	on-going	County Commission	FCOES, West Virginia Division of Forestry (WVDOF)	Public Education and Awareness	< $10,000	Local Funding	2027
Fayette 4	Wildfire	H	4	Ensure public awareness of fire prevention practices, like safe clearing distance and debris management for homes in wooded areas	on-going through fire prevention week	on-going	County Commission	FCOES, WVDOF	Public Education and Awareness	< $10,000	Local Funding	2027
Fayette 5	Flooding	H	1,3	Develop a countywide storm water/drainage plan	continue to meet with watershed groups to discuss stream management activities	on-going	County Commission	Municipal Councils	Property Protection	$1,500 - $8,000	FEMA HMA Grants, CDBG, West Virginia Disaster Recovery Board	2027

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Fayette 6	Flooding	H	1,3	Enforce the floodplain ordinance for all new construction	continue to enforce floodplain ordinances	**on-going**	County Commission	County Floodplain Manager	Prevention	< $20,000	Local Funding	2027
Fayette 7	Flooding	L	1,3	Work with the WVDOH, WVDNR, WVDEP, Soil Conservation Services (SCS), etc., to develop a stream restoration, bank stabilization, and maintenance plan		**deferred**	County Commission	County Floodplain Manager, WVDOH, WVDNR, WVDEP, SCS	Natural Resource Protection	< $15,000	Local Funding	2027
Fayette 8	Flooding	H	1,2,3	Town of Pax, Whiteoak, Scarborough, Whipple, & Armstrong and Sugar Creek, identify streams currently being impacted by Streambank erosion and sediment filling. Work with identified municipalities to develop stream restoration mitigation projects.		**new**	County Commission	FCOES, County Resource Coordinator	Structural Project, Natural Resource	$10k-$50k	FEMA HMA Grants, EPA Funding	2027
Fayette 9	Flooding	M	4	Inform the public about debris programs. Pursue recycling, even if hauled to Raleigh or Kanawha Counties. Coordinate with WVDOH to ensure proper permitting regarding debris removal. Work with the WVDOH to expand its tire amnesty program. Inform the public of appliance pick-up ordinance.	Continuing to coordinate with WMA on debris programs	**on-going**	County Commission	Waste Management Authority	Public Education and Awareness	< $20,000	Local Funding	2027
Fayette 10	Flooding	H	3	Identify undersized and inadequate culverts and correct the problem		**deferred**	County Commission	Municipal Councils, WVDOH	Structural Projects	< $25,000	Local Funding	2027
Fayette 11	Flooding	M	3	Study wastewater issues related to flooding, stormwater, and public health		**deferred**	Fayette County Health Department	FCOES	Prevention	$5,000 - $8,000, contingent on use of consultants	FEMA HMA Grants, CDBG	2027
Fayette 12	Flooding	H	1,3	Continue to buy both repetitive and non-repetitive loss properties in the flood prone areas	10 additional buyouts since last plan update	**on-going**	County Commission	County Floodplain Manager	Prevention	Approx. $50,800 per structure	FEMA HMA Grants, NRCS	2027
Fayette 13	Flooding	H	2,3	Work toward meeting the requirements for increasing the rank in the Community Rating System (CRS)		**new**	County Commission	County Floodplain Manager, FCOES	Prevention	< $15,000	Local Funding, FEMA HMA Grants	2027
Fayette 14	Mass Movement	L	2,3	Enforcement and investigate possibility of enhancing Risk Management Plans (RMPs) for logging, mining, and gas operations		**deferred**	County Commission	FCOES, WV State Fire Marshal, WVDEP, and private entities	Emergency Services	< $10,000 per plan	Local Funding	2027
Fayette 15	Mass Movement	L	2	Conduct regular inspection of earthen impoundments with required reporting. Doing so may require coordination with property owners	receive reported from DEP when inspections are completed	**on-going**	WVDEP	N/A	Prevention	< $10,000	Local Funding	2027
Fayette 16	Mass Movement	H	1,2,3	Work with WVDOH to identify and prioritize areas prone to recurring slides. Develop plans to reduce risk and occurrence.		**deferred**	County Commission	WVDOH	Structural Projects	$1,000 - $3,000 each, contingent on the use of consultants	WVDOH, Local Funding	2027
Fayette 17	Wind	H	1	Reduce the impact to citizens due to power loss during severe storm events by investigating the feasibility of backup power for citizens in a special need's registry for special needs shelter locations		**new**	FCOES	WVVOAD, WVARC, WVDHSEM	Emergency Services	Up to $50,000	FEMA HMA Grants, Local Funding	2027
Fayette 18	Thunderstorms, Winter Weather, Wind	M	1	Reduce the impact of conventional communications by developing a local radio network (Citizen Band [CB] and amateur radio) and by knowledge and	trying to reboot and restart HAM radio network	**on-going**	FCOES	LEPC	Emergency Services	Up to $5,000	HMEP, Local Funding	2027

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				training in this area. Members can serve as contact points during hazard events.								
Fayette 19	Hazardous Materials	M	2,3	Support the LEPC in the development of a commodity flow plan	had a commodity flow study completed in 2016/17	**on-going**	LEPC	FCOES	Emergency Services	Up to $7,000	HMEP	2027
Fayette 20	Hazardous Materials	M	1	Increase oversight of hazardous chemicals within, used, and stored in Fayette County		**deferred**	WVSERC	FCOES, WVDHSEM	Emergency Services	< $10,000	Local Funding	2027
Fayette 21	Miscellaneous	H	1	Continue utilizing an early warning and alert system	County has begun utilizing the Nixle Mass warning system no longer using Nixle, using Swift 911 for reverse 911 calling	**on-going**	FCOES	LEPC	Emergency Services	Up to $100,000	HSGP	2027
Fayette 22	Miscellaneous	H	1	Develop a special needs registry for homebound/non-ambulatory and citizens with special physical or medical needs	identify strategy to complete a special needs registry, work with municipalities to complete registry	**on-going**	FCOES	WVDHSEM, WV 2-1-1	Emergency Services	< $20,000	Local Funding	2027
Fayette 23	Miscellaneous	M	1,3	Develop a more in-depth county asset list to better understand the value of structures within the county	WV Flood Tool, developing an in-depth list of assets	**on-going**	County Assessor	FCOES, WVU, WVHSEM	Emergency Services	< $10,000	Local Funding	2027
Fayette 24	Miscellaneous	L	1,3	Undertake Source Water Protection Planning measures following state guidelines		**deferred**	Municipal Water Providers, Local PSDs		Prevention	< $10,000	Local Funding	2027
Fayette 25	Pandemic/Epidemic	M	1	Maintain a stockpile of PPE for use during a pandemic/epidemic event through coordination with WVDHSEM		**NEW**	FCOES	DVHSEM	Emergency Services	< $20,000	Local Funding	2027
Fayette 26	Pandemic/Epidemic	H	1,2	Update PAN Plan that is in the County Emergency Plan		**NEW**	FCOES	County Health Department, WVHHR	Prevention	< $10,000	Local Funding	2027
Fayette 27	Riverine Erosion	H	3	Conduct an analysis of streambanks within the County to identify potential future flooding issues		**NEW**	County Commission	FCOES, Floodplain Managers, and Municipalities	Structural Projects	Up $100,000	FEMA HMA Grants, EPA Funding	2027
Fayette 28	Riverine Erosion	H	1,3	Soil stabilization and stream restoration along streambanks that are currently eroding		**NEW**	County Commission	FCOES, Floodplain Managers, and Municipalities	Structural Projects	< $50,000 per streambank	FEMA HMA Grants, EPA Funding	2027
Fayette 29	Misc.	H	1	Install generators at critical facilities as needed		**new**	FCOES	Fayette County Commission	Emergency Services	Up to $80,000 per generator	FEMA HMA Grants	2027
Fayette 30	Misc.	H	1	GIS Planning Grant for Water and Sewer Line Mapping		**New**	Fayette Co Commission	Region 4 PDC	Structural Project	$250,000.00	CDBG-MIT	2027
Ansted 1	Flooding	H	1	Identify undersized and inadequate culverts and correct the problem		**on-going**	Municipal Council	Engineering Consultants, Town Employees, Region 4 PDC	Structural Projects	$1M+ for upsizing culverts	FEMA HMA Grants, CDBG	2027
Ansted 2	Flooding	H	1	sycamore St., forloine St., school St. and college St., utilizing ARPA funding to complete some flood mitigation within the next 6 month		**NEW**	Municipal Council	Engineering Consultants, Town Employees, Region 4 PDC	Structural Projects	< $200,000	ARPA Funding	2027
Ansted 3	Miscellaneous	H	1,2	convert middlemen trail community center into an emergency shelter (safe room conversion, wind retrofit existing structure, and generators)		**NEW**	Municipal Council	FCOES	Structural Projects, Emergency Services	< $250,000	FEMA HMA Grants, CDBG	2027
Ansted 4	Misc.	H	1	Community Center Improvements for Sheltering		**new**	Town Council	Region 4 PDC	Emergency Services	$2,058,700	CDBG-MIT	2027
Fayetteville 1	Flooding	H	1,3	Identify undersized and inadequate culverts and correct the problem, utilize cameras to identify additional drainage problems	2 major projects completed last year, contracted A&E firm to identify stormwater assets	**NEW**	Municipal Council	Engineering Consultants, Town	Structural Projects	$1M+ for upsizing culverts	FEMA HMA Grants, CDBG	2027

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								Employees, Region 4 PDC				
Fayetteville 2	Flooding	H	1	Lively St. and Wiseman Ave. implement culvert and drainage improvements		**NEW**	Municipal Council	Engineering Consultants, Town Employees, Region 4 PDC	Structural Projects	$1M+ for upsizing culverts	FEMA HMA Grants, CDBG	2027
Fayetteville 3	Flooding	M	3	Study on Wolf Creek Dam, identify potential flooding impacts		**new**	Municipal Council	WVDEP, NRCS	Structural Projects	< $25,000	FEMA HMA Grants	2027
Fayetteville 4	Flooding	L	1,3	Potential Removal of Wolf Creek Dam to mitigate flooding impacts upstream and Downstream		**new**	Municipal Council	WVDEP, NRCS	Structural Projects	$1M+	TBD	2027
Hawks Nest Dam Gauley Bridge 1	Flooding	L	1,3	Development mitigation projects to include rehabilitation of high hazards dams, including dam planning activities, design and engineering, and other structural and non-structural measures.		**new**	FOEM	WV Dam Safety	Prevention	>$50,000	FEMA Grants, Dam Safety Grants	2027
Boley Lake Dam Glen Ferris 1	Flooding	L	1,3	Development mitigation projects to include rehabilitation of high hazards dams, including dam planning activities, design and engineering, and other structural and non-structural measures.		**new**	FOEM	WV Dam Safety	Prevention	>$50,000	FEMA Grants, Dam Safety Grants	2027
The Summit– Dam B Harvey 1	Flooding	L	1,3	Development mitigation projects to include rehabilitation of high hazards dams, including dam planning activities, design and engineering, and other structural and non-structural measures.		**new**	FOEM	WV Dam Safety	Prevention	>$50,000	FEMA Grants, Dam Safety Grants	2027
The Summit – Dam A Harvey 2	Flooding	L	1,3	Development mitigation projects to include rehabilitation of high hazards dams, including dam planning activities, design and engineering, and other structural and non-structural measures.		**New**	FOEM	WV Dam Safety	Prevention	>$50,000	FEMA Grants, Dam Safety Grants	2027
The Summit – Dam 1.2 Harvey 3	Flooding	L	1,3	Development mitigation projects to include rehabilitation of high hazards dams, including dam planning activities, design and engineering, and other structural and non-structural measures.		**new**	FOEM	WV Dam Safety	Prevention	>$50,000	FEMA Grants, Dam Safety Grants	2027
Meadow Bridge 1	Flooding	M	1,3	Identify undersized and inadequate culverts and correct the problem, utilize cameras to identify additional drainage problems		**New**	Municipal Council	Engineering Consultants, Town Employees, Region 4 PDC	Structural Projects	$1M+ for upsizing culverts	FEMA HMA Grants, CDBG	2027
Meadow Bridge 2	Flooding	M	1,3	As funds become available, undertake buyout, elevation, or reconstruction projects. As part of this process, hold a series of meetings with property owners to identify specific project areas and to gauge interest in project participation		**New**	Municipal Council	Fayette County Commission, Municipal Council, OEM	Prevention	Approx. $64,000 per property	FEMA HMA Grants	2027
Meadow Bridge 3	Misc.	H	1	Install generators at critical facilities as needed		**new**	Municipal Council	Municipal Council	Emergency Services	Up to $80,000 per generator	FEMA HMA Grants	2027
Montgomery 1	Flooding	H	1	Identify undersized and inadequate culverts and correct the problem		**deferred**	Municipal Council	Engineering Consultants, Town Employees, Region 4 PDC	Structural Projects	$1M+ for upsizing culverts	FEMA HMA Grants, CDBG	2027
Montgomery 2	Mass Movement	H	1,3	Identify solution for route 61 hillside sliding problem		**NEW**	Municipal Council	Engineering Consultants, Town Employees, Region 4 PDC	Structural Projects	< $500,000	FEMA HMA Grants	2027

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Plum Orchard Lake Dam Mossy 1	Flooding	L	1,3	Development mitigation projects to include rehabilitation of high hazards dams, including dam planning activities, design and engineering, and other structural and non-structural measures.		**new**	FOEM	WV Dam Safety	Prevention	>$50,000	FEMA Grants, Dam Safety Grants	2027
Mount Hope 1	Flooding	H	1	Identify undersized and inadequate culverts and correct the problem		**deferred**	Municipal Council	Engineering Consultants, Town Employees, Region 4 PDC	Structural Projects	$1M+ for upsizing culverts	FEMA HMA Grants, CDBG	2027
Oak Hill 1	Flooding	H	1	Identify undersized and inadequate culverts and correct the problem		**deferred**	Municipal Council	Engineering Consultants, Town Employees, Region 4 PDC	Structural Projects	$1M+ for upsizing culverts	FEMA HMA Grants, CDBG	2027
Oak Hill 2	Flooding	H	1,3	Stormwater Improvements to Reduce Flooding		**New**	City Council	Region 4 PDC	Prevention	$4,739,000	CDBG-MIT	2027
Pax 1	Flooding	H	1,3	Relocation of Town Hall from floodplain location to the former Pax Elementary School Building Complex and establish the former gym into a community center/disaster relief shelter	Proceedings are taking place to transfer property to the Town of Pax from the Pax Reunion Committee.	**on-going**	Mayor, Town Council	Fayette County Commission, Fayette County Building Authority	Structural Projects	$250,000	Request funds from granting agencies with additional funds supplementing from the General Fund	2027
Pax 2	Flooding	M	1,4	Establish an early warning system for flood waters to alert residents by signal of high water or possible flooding		**deferred**	Mayor, Town Council	WVDOT, Fayette County Commission, Fayette County Building Authority	Public Education and Awareness	< $50,000	FEMA HMA Grants	2027
Pax 3	Flooding	L	1	Establish an Emergency Access/Evacuation Road through town to isolated areas during flooding events or other hazards		**deferred**	Mayor, Town Council	WVDOT	Structural Projects	< $100,000	FEMA HMA Grants	2027
Pax 4	Flooding	H	1	Repair exposed sewer and water lines that are located within streams in the Town		**new**	Mayor, Town Council	FCOES	Structural Projects	< $150,000	FEMA HMA Grants	2027
Pax 5	Misc	H	1	Improve Water Intake		**new**	Town Council	Regio 4 PDC	Structural Project	$1,780,000	CDBG-MIT	2027
Smithers 1	Flooding	H	1,3	Identify undersized and inadequate culverts and correct the problem		**deferred**	Municipal Council	Engineering Consultants, Town Employees, Region 4 PDC	Structural Projects	$1M+ for upsizing culverts	FEMA HMA Grants, CDBG	2027
Smithers 2	Flooding	H	1,3	Identify solution for flooding, and mudslides/rockslides that occurs from Smithers Mountain (owned by a private coal mine)		**new**	Municipal Council	WVDEP	Structural Projects	< $1M	FEMA HMA Grants	2027
Smithers 3	Flooding	M	1,3	Concrete spillway results in flooding of homes, identify solution, coordinate with WVDOT		**new**	Municipal Council	WVDOT	Structural Projects	< $1M	FEMA HMA Grants	2027
Smithers 4	Flooding	H	1,3	Streambank restoration or flood mitigation along Smithers Creek		**new**	Municipal Council	WVDOT	Structural Projects	< $50,000	FEMA HMA Grants	2027
Smithers 5	Miscellaneous	H	1	Purchase an emergency back-up power solution for the entire Gateway building, the community shelter which homes vital critical services		**new**	Municipal Council	FCOES	Structural Projects	Up to $150,000 for generator, additional funding for installation	FEMA HMA Grants	2027
Thurmond 1	Flooding	M	1,3	Identify undersized and inadequate culverts and correct the problem, utilize		**New**	Municipal Council	Engineering Consultants, Town	Structural Projects	$1M+ for upsizing culverts	FEMA HMA Grants, CDBG	2027

FAYETTE COUNTY MITIGATION STRATEGIES												
Project #	**Hazard**	**Project Priority**	**Mitigation Goal**	**Strategy**	**Status Update from 2016 Plan**	**Status Update**	**Primary Coordinator**	**Support Agencies**	**Mitigation Type**	**Estimate Cost**	**Possible Funding Source**	**Estimated Date of Completion**
				cameras to identify additional drainage problems				Employees, Region 4 PDC				
Thurmond 2	Flooding	M	1,3	As funds become available, undertake buyout, elevation, or reconstruction projects. As part of this process, hold a series of meetings with property owners to identify specific project areas and to gauge interest in project participation		**New**	Municipal Council	Fayette County Commission, Municipal Council, OEM	Prevention	Approx. $64,000 per property	FEMA HMA Grants	2027
Thurmond 3	Misc.	H	1	Install generators at critical facilities as needed		**new**	Municipal Council	Municipal Council	Emergency Services	Up to $80,000 per generator	FEMA HMA Grants	2027
Cedar Branch Dam Thurmond 4	Flooding	L	1,3	Development mitigation projects to include rehabilitation of high hazards dams, including dam planning activities, design and engineering, and other structural and non-structural measures.		**new**	FOEM	WV Dam Safety	Prevention	>$50,000	FEMA Grants, Dam Safety Grants	2027
The Summit – Dam A1 Thurmond 5	Flooding	L	1,3	Development mitigation projects to include rehabilitation of high hazards dams, including dam planning activities, design and engineering, and other structural and non-structural measures.		**New**	FOEM	WV Dam Safety	Pevention	>$50,000	FEMA Grants, Dam Safety Grants	2027

WEBSTER COUNTY MITIGATION STRATEGIES												
Project #	**Hazard**	**Project Priority**	**Mitigation Goal**	**Strategy**	**Status Update from 2016 Plan**	**Status Update**	**Primary Coordinator**	**Support Agencies**	**Mitigation Type**	**Estimate Cost**	**Possible Funding Source**	**Estimated Completion Date**
Webster 1	Flooding	H	3	Institute stricter floodplain enforcement		**deferred**	Webster County Floodplain Manger	WCOES, Webster County Commission, FEMA	Prevention	< $10,000	Local Funding	2027
Webster 2	Flooding	H	2,3	Identify all Repetitive Loss and flood prone non-RL properties within the county and coordinate with owners who would like to participate in future elevation, buyout and retrofitting projects		**on-going**	Webster County Floodplain Manger	WCOES, Webster County Commission	Prevention	Approx. $47,500 per structure	FEMA HMA Grants	2027
Webster 3	Flooding	M	1,3	Clean waterways to prevent water from backing up and flooding certain areas	Elk River, debris in Gauley River	**on-going**	Municipal Public Works	WCOES, WVDOH	Natural Resource Protection	< $15,000 per occurrence	FEMA HMA Grants, State Funding, Local Funding	2027
Webster 4	Mass Movements	M	2	Coordinate with WVDOH implementing a plan of action to take when coordinating clean-up efforts	working relationship is maintained	**on-going**	WCOES	WVDOH, Municipal Public Works Partners	Emergency Services	Little to no additional funding	Local Funding	2027
Webster 5	Miscellaneous	M	1,2	Identify assets within the County for more accurate loss estimates and work with the private sector to make resources available in concert with the LEPC's resource manual	asset list not yet developed	**on-going**	Webster County LEPC	WCOES	Emergency Services	Up to $5,000 if a contractor us used	HMEP, Local Funding	2027
Webster 6	Miscellaneous	M	1,3	Undertake Source Water protection planning measures following state guidelines		**deferred**	WV American Water, Local PSDs	WCOES	Prevention	< $15,000	Local Funding	2027
Webster 7	Miscellaneous	H	1	Install generators at shelter sites, including backup shelter locations		**new**	WCOES	Webster County Commission	Emergency Services	Up to $80,000 per generator	FEMA HMA Grants	2027
Webster 8	Pandemic	M	1	Maintain a stockpile of PPE for use during a pandemic/epidemic event		**new**	WCOES	City of Webster Springs	Emergency Services	< $20,000	Local Funding	2027
Webster 9	Pandemic	H	1,3	Develop a pandemic/epidemic response plan		**new**	WCOES	Health Department	Emergency Services	< $10,000	EMPG, Local Funding	2027
Webster 10	Riverine Erosion	H	3	Conduct an analysis of streambanks within the County to identify potential future flooding issues		**new**	WCOES	City of Webster Springs	Natural Resource Protection	< $50,000	FEMA HMA Grants	2027
Webster 11	Riverine Erosion	H	1,3	Soil stabilization and stream restoration along streambanks that are currently eroding		**new**	WCOES	Webster County Commission	Structural Projects	< $50,000 per streambank	FEMA HMA Grants	2027

WEBSTER COUNTY MITIGATION STRATEGIES												
Project #	**Hazard**	**Project Priority**	**Mitigation Goal**	**Strategy**	**Status Update from 2016 Plan**	**Status Update**	**Primary Coordinator**	**Support Agencies**	**Mitigation Type**	**Estimate Cost**	**Possible Funding Source**	**Estimated Completion Date**
Webster 12	Misc.	H	1	Install generators at critical facilities as needed		**new**	WCOES	Webster County Commission	Emergency Services	Up to $80,000 per generator	FEMA HMA Grants	2027
Webster 13	Misc.	H	1	GIS Location of Water and Sewer Lines		**new**	Webster Co Commission	Region 4 PDC	Structural Project	$250,000	CDBG-MIT	2027
Webster 14	Flooding	H	1	Relocation of OES Office out of Floodplain		**new**	WOES	Webster County Commission	Structural Project	$4,000,000	CDBG-MIT	2027
Addison 1	Flooding	H	1,3	Stormwater Improvements to Reduce Flooding		**new**	Town Council	Region 4 PDC	Prevention	$4,388,000	CDBG-MIT	2027
Cowen 1	Mass Movements	H	2	Coordinate with local agencies to develop a plan of action for the identified landslide prone areas		**deferred**	Town Council	WCOES, WVDOH, Webster County Commission	Emergency Services	Up to $10,000 if a contractor is used	FEMA HMA Grants, Local Funding	2027
Cowen 2	Flooding	H	1	Stormwater Improvements to Reduce Flooding		**new**	Cowen PSD	Region 4 PDC	Prevention	$3,305,000	CDBG-MIT	2027
Camp Caesar Dam Gauley Mills 1	Flooding	L	1,3	Development mitigation projects to include rehabilitation of high hazards dams, including dam planning activities, design and engineering, and other structural and non-structural measures.		**new**	WOEM	WV Dam Safety	Prevention	>$50,000	FEMA Grants, WV Dam Safety Grants	2027
Camp Caesar 2	Flooding	H	1,3	Improvements to a high hazard dam		**new**	Webster County Commission	WV Dam Saftey	Prevention	$1,584,560	CDBG-MIT	2027
Webster Springs 1	Flooding	H	1,3	Clean waterways to prevent water from backing up and flooding certain areas	began A&E, $4.3M grant received for mitigating flooding and stormwater runoff in the Town, completed by end of 2023	**on-going**	Town of Addison	WCOES, Municipal Public Works Partners, WVDOH	Natural Resource Protection	$4.3M	FEMA HMA Grants, State Funding, Local Funding	2023
Webster Springs 2	Riverine Erosion	H	1,3	Streambank stabilization around city park and other critical infrastructure		**new**	Town Council	WCOES	Structural Projects	< $100,000	FEMA HMA Grants	2027
Camden-on-Gauley 1	Flooding	M	1,3	Identify undersized and inadequate culverts and correct the problem, utilize cameras to identify additional drainage problems		**New**	Municipal Council	Engineering Consultants, Town Employees, Region 4 PDC	Structural Projects	$1M+ for upsizing culverts	FEMA HMA Grants, CDBG	2027
Camden-on-Gauley 2	Flooding	M	1,3	As funds become available, undertake buyout, elevation, or reconstruction projects. As part of this process, hold a series of meetings with property owners to identify specific project areas and to gauge interest in project participation		**New**	Municipal Council	Fayette County Commission, Municipal Council, OEM	Prevention	Approx. $64,000 per property	FEMA HMA Grants	2027
Camden-on-Gauley 3	Misc.	H	1	Install generators at critical facilities as needed		**new**	Municipal Council	Municipal Council	Emergency Services	Up to $80,000 per generator	FEMA HMA Grants	2027

This section contains those projects that have been listed as either Completed or Canceled. The projects are grouped by county and have the project number assigned to them in the previous HMP update, where applicable.

COMPLETED AND CANCELED MITIGATION STRATEGIES FROM THE 2016 PLAN UPDATE									
Project #	**Hazard**	**Strategy**	**Status Update**	**Status Update**	**Primary Coordinator**	**Support Agencies**	**Mitigation Type**	**Estimate Cost**	**Possible Funding Source**
Pocahontas 19	Miscellaneous	Coordinate with Frontier Communications as they update their emergency planning to ensure common expectations between the		**canceled**	Frontier Communications	PCOEM	Emergency Services	Little to no additional funding	N/A

COMPLETED AND CANCELED MITIGATION STRATEGIES FROM THE 2016 PLAN UPDATE

Project #	Hazard	Strategy	Status Update	Status Update	Primary Coordinator	Support Agencies	Mitigation Type	Estimate Cost	Possible Funding Source
		company and local resources during emergency incidents.							
Pocahontas 31	Miscellaneous	Coordinate with such agencies as the ARC, WVDHSEM, USDHS, to post-incident relocation and recovery		canceled	PCOEM	Local Chapter of the ARC, WVDHSEM, USDHS	Emergency Services	Little to no additional funding	Local Funding
Pocahontas 4	Flooding	Coordinate with FEMA to maintain an updated list of repetitive loss properties throughout Pocahontas County and municipalities therein	Pocahontas County has received an updated list of RL Properties from FEMA	completed	Pocahontas County Floodplain Manager	PCOEM	Prevention	Little to no additional funding	Local Funding
Pocahontas 12	Wildfires	Determine suitable locations for and consider the installation of dry hydrants throughout the County	a couple dry hydrants have been installed	completed	PCOEM	Local VFDs	Emergency Services	Up to $750 per hydrant	US Forest Service
Nicholas 2	Flooding	Continue to review and update floodplain ordinances to regulate development within the 100-year floodplain. Make sure the public is aware of requirements in the ordinances	County re-did floodplain ordinance, Commission has approved, to be posted to Website	completed	NCOES	Nicholas County Commission	Prevention	No significant additional funding	Local Funding
Richwood 13	Flooding	Repair as needed those sidewalks that serve as retaining walls.	main St. sidewalks are going be completely redone	completed	Town Council		Prevention, Structural Projects	Unknown	Local Funding
Greenbrier 8	Flooding	Determine feasibility of floodwalls or other structures to protect water treatment facilities from flooding		canceled	Municipal Public Works Departments, PSDs, Floodplain Manager	Municipal Councils, County Commission, Region 4 PDC	Structural Projects	Approx. $5,000 to $50,000+	FEMA HMA Grants, USACE, CDBG, Local Funding
Greenbrier 9	Flooding	Determine feasibility of floodwalls or other structures to protect wastewater treatment facilities from flooding		canceled	Municipal Public Works Departments, PSDs, Floodplain Manager	Municipal Councils, County Commission, Region 4 PDC	Structural Projects	Approx. $5,000 to $50,000+	FEMA HMA Grants, USACE, CDBG, Local Funding
Greenbrier 18	Winter Weather	Encourage/recommend electrical utilities to use underground construction methods where possible to reduce power outages from severe storms		canceled	Greenbrier County Planning	Utility Companies	Prevention	Should not require significant additional funds	Local Funding
Greenbrier 19	Winter Weather	Encourage/recommend improved building materials and techniques when rebuilding damaged property		canceled	Greenbrier County Commission, Planning Department	Greenbrier County Planning, Region 4 PDC	Prevention	Should not require significant additional funds	Local Funding
Greenbrier 22	Drought	Implement a water study and analyze the data to better help citizens during periods of drought		canceled	Greenbrier County Planning	GCEMA, Region 4 PDC	Natural Resource Protection	Up to $50,000 if contractor is used	FEMA HMA Grants, CDBG, Local Funding
Greenbrier 39	Miscellaneous	Undertake source water protection planning measures following state guidelines		canceled	Municipal Water Providers, Local PSDs	GCHSEM	Prevention	Unknown	
Greenbrier 40	Miscellaneous	Purchase and install generators at critical infrastructure locations to mitigate shutdowns due to extensive power outages (duplicate)	HMGP funding for generators installed at Rainelle VFD/Shelter, Rupert Community Center/Shelter, Clintonville	canceled	Municipal Water/WWTP Providers, Town Halls	GCHSEM, WVDHSEM	Prevention	Unknown	FEMA HMA Grants

COMPLETED AND CANCELED MITIGATION STRATEGIES FROM THE 2016 PLAN UPDATE

Project #	Hazard	Strategy	Status Update	Status Update	Primary Coordinator	Support Agencies	Mitigation Type	Estimate Cost	Possible Funding Source
			VFD/Ruritan Shelter. New application for WHITE SULPHER SPRINGS EMS and funded HSGP application for State Fair of WV						
Greenbrier 21	Thunderstorms	Coordinate warning system with the Greenbrier County Board of Education to enhance protection of students and faculty under threat of severe weather	Greenbrier BOE is enrolled in the County Mass Notification System and has been provided weather radios, plus the Transportation Manager is active in all State Hazard briefings	**completed**	GCEMA	Greenbrier County Board of Education	Public Education and Awareness	Requires no additional Funding	Local Funding
Greenbrier 24	Miscellaneous	Coordinate with the power company to clear trees and other debris from electric lines throughout the county	Tree clearing has been a power company priority recently and the outage reductions are proof that it works	**completed**	Utility companies, AEP, and First Energy		Prevention	Should not require significant additional funds	Local Funding
Greenbrier 27	Miscellaneous	Install repeaters as needed and maintain emergency generators at tower sites	All tower sites have generators, but replacements will be needed based upon age of each unit	**completed**	GCEMA, 911 Center		Emergency Services	Up to $50,000 depending on generator	HSGP, Local Funding through 911 Funds
Greenbrier 29	Hazmat	Conduct commodity flow studies to define the types of quantities and materials present or transiting through the county	commodity flow study needs updated as last was from 2015	**completed**	Greenbrier County LEPC	GCEMA	Emergency Services	Up to $5,000 if contractor is used	HMEP
Greenbrier 31	Hazmat	Work with the Regional Response Team and county response team(s) to provide a fast and effective response to an incident	Hazmat supplies have been provided to all County VFD's in the past but not recently. We did obtain significant HSGP funding for the RRT units in Greenbrier County for better/safer response.	**completed**	GCEMA, WVDHSEM	WV State Fire Marshal, SERC	Emergency Services	Currently partially funded	WVDHSEM SERC
Greenbrier 36	Miscellaneous	Purchase and install generators at emergency shelter sites (some which co-exist with fire departments) and critical facilities	HMGP funding for generators in 2019 installed at Rainelle VFD/Shelter, Rupert Community Center/Shelter, Clintonville VFD/Ruritan Shelter. $166,240 for gen sets from HMGP DR-4273/4331/4455	**completed**	GCHSEM	Greenbrier County Commission	Emergency Services	Up to $80,000 per installation	FEMA HMA Grants
Greenbrier 41	Miscellaneous	Purchase and install an Emergency Alert System for the State Fair of West Virginia due to the large public attendance and weather risks over an extensive unprotected area	APPROVED AND INSTALLED (DATE) CURRENTLY APPROVED FOR EMERGENCY GENERATOR FOR WV BUILDING	**completed**	State Fair of West Virginia	GCHSEM, WVDHSEM	Prevention	Unknown	DHS Grants
Greenbrier 42	Flooding	Install additional river and stream gauges in high-risk areas to gather critical flood data and provide rapid notification to residents, possibly by the installation of sirens or other alert methods	NEW STREAM GAUGES ON SEWELL CREEK (RAINELLE) & HOWARDS CREEK (WHITE SULPHER SPRINGS). NO FOCUS ON SIREN INSTALLATION	**completed**	WVDHSEM	GCHSEM	Prevention, Public Information and Awareness	Unknown	WVDHEM, FEMA HMA Grants
Alderson 2	Flooding	Study the feasibility of installing backflow prevention devices on outlets of storm drains that drain into the river	Town has installed backflow prevention on some of the major problem areas.	**completed**	Alderson City Council		Prevention		Local Funding
Rupert 1	Flooding	Continue to apply for FEMA HMA funds for acquisitions, elevations, or		**completed**	Rupert Floodplain Manager	Greenbrier Floodplain	Structural Projects	Approx. $71,300 per property	FEMA HMA Grants

COMPLETED AND CANCELED MITIGATION STRATEGIES FROM THE 2016 PLAN UPDATE									
Project #	**Hazard**	**Strategy**	**Status Update**	**Status Update**	**Primary Coordinator**	**Support Agencies**	**Mitigation Type**	**Estimate Cost**	**Possible Funding Source**
		relocations of the three (3) identified repetitive loss properties in Rupert				Manager, GCEMA			
Rupert 3	Miscellaneous	Purchase and install generators at critical facilities	NEW HMGP GENERATOR INSTALLED AT RUPERT WATER PLANT and the Rupert Community Building which serves as a shelter	**completed**	Rupert Town Council	GCEMA	Structural Projects	Up to $80,000 per installation	FEMA HMA Grants
WHITE SULPHER SPRINGS 2	Miscellaneous	Purchase and install generators at critical infrastructure facilities	generators installed at fire department and water treatment plant	**completed**	White Sulphur Springs City Council	GCEMA	Structural Projects	Up to $20,000 per installation	FEMA HMA Grants
Fayette 1	Drought	Develop an outreach program on water conservation and the value of water saving devices		**canceled**	Public Service Districts (PSDs)	FCOES	Public Education and Awareness	Should not require significant funding	Local Funding
Fayette 19	Mass Movement	Work with the WVDOH to develop an MOU with mining companies and contractors to clear impacted roadways		**canceled**	County Commission	WVDOH, Private Entities	Emergency Services	No additional funding needed	Local Funding
Fayette 20	Thunderstorms, Winter Weather, Wind	Reduce the impact to citizens due to power loss during severe storm events by investigating the feasibility of backup power for citizens in a special need's registry		**canceled**	FCOES	N/A	Emergency Services	No additional funding needed	Local Funding
Fayette 25	Hazardous Materials	Enhance public awareness		**canceled**	FCOES	LEPC	Public Education and Awareness	Up to $2,500	FEMA HMA Grants, HMEP, EMPG, Local Funding
Fayette 29	Miscellaneous	Replacing powerlines and poles around the county		**canceled**	Service Electric	AEP	Structural Projects	Being Handled by AEP	N/A
Fayette 13	Flooding	Work toward meeting the requirements for participation in the Community Rating System (CRS)	currently participating in CRS, ranked 9	**completed**	County Commission	County Floodplain Manager	Public Education and Awareness	Cost met by currently budgeted funds	Local Funding
Fayette 15	Flooding	Undertake buy out projects in Dunlop Watershed areas (i.e. the Dunlop Watershed Voluntary Buyout Program)		**completed**	FCOES	WVDHSEM, NCRS	Prevention	Up to $50,800 per house, up to 50 properties. Up to $2,540,000 total	FEMA HMA Grants, NRCS
Fayetteville 3	Miscellaneous	Develop more in-depth municipal asset list to better understand the value of structures within the town	values of properties available through Assessor's office, coordinate through WV Flood Tool	**completed**	Municipal Council	FCOES	Emergency Services	Part of regular operations	Local Funding
Gauley Bridge 1	Miscellaneous	Develop more in-depth municipal asset list to better understand the value of structures within the town		**completed**	Municipal Council	FCOES	Emergency Services	Part of regular operations	Local Funding
Meadow Bridge 4	Miscellaneous	Develop more in-depth municipal asset list to better understand the value of structures within the town		**completed**	Municipal Council	FCOES	Emergency Services	Part of regular operations	Local Funding
Montgomery 3	Miscellaneous	Develop more in-depth municipal asset list to better understand the value of structures within the town	values of properties available through Assessor's office, coordinate through WV Flood Tool	**completed**	Municipal Council	FCOES	Emergency Services	Part of regular operations	Local Funding

COMPLETED AND CANCELED MITIGATION STRATEGIES FROM THE 2016 PLAN UPDATE									
Project #	**Hazard**	**Strategy**	**Status Update**	**Status Update**	**Primary Coordinator**	**Support Agencies**	**Mitigation Type**	**Estimate Cost**	**Possible Funding Source**
Mount Hope 2	Miscellaneous	Develop more in-depth municipal asset list to better understand the value of structures within the town	values of properties available through Assessor's office, coordinate through WV Flood Tool	**completed**	Municipal Council	FCOES	Emergency Services	Part of regular operations	Local Funding
Oak Hill 2	Miscellaneous	Develop more in-depth municipal asset list to better understand the value of structures within the town	values of properties available through Assessor's office, coordinate through WV Flood Tool	**completed**	Municipal Council	FCOES	Emergency Services	Part of regular operations	Local Funding
Pax 1	Miscellaneous	Develop more in-depth municipal asset list to better understand the value of structures within the town	values of properties available through Assessor's office, coordinate through WV Flood Tool	**completed**	Municipal Council	FCOES	Emergency Services	Part of regular operations	Local Funding
Smithers 6	Miscellaneous	Develop more in-depth municipal asset list to better understand the value of structures within the town		**completed**	Municipal Council	FCOES	Emergency Services	Part of regular operations	Local Funding
Thurmond 1	Miscellaneous	Develop more in-depth municipal asset list to better understand the value of structures within the town	The U.S. Park Service has purchase everything except the town hall and the water plant	**completed**	Municipal Council	FCOES	Emergency Services	Part of regular operations	Local Funding
Webster 7	Miscellaneous	Install generators at shelter sites	Installed generators, main shelters have generators. Webster Springs new commercial construction requires backup generators	**completed**	WCOES		Structural Projects	Up to $80,000 each, including installation	FEMA HMA Grants
Camden on Gauley 1	Flooding	Identify culverts, storm drains, etc. that frequently back-up causing flash flooding		**canceled**	Town Council	WVDOH	Prevention	Identification will require little to no funds	Local Funding

5.0 PLAN MAINTENANCE

5.1 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.

5.1.1 Monitoring, Evaluating, and Updating the Plan

The Region 4 Planning and Development Council (Region 4 PDC) and the Steering Committee have established a method for the systematic and periodic review of this document. The Region 4 PDC and committee will monitor the performance of the plan in several ways (see below). Participating jurisdictions will also evaluate mitigation strategies as the chance to implement them arises.

As the plan is current for a five-year span, the Steering Committee will meet no later than the fourth year to conduct an overall review of the entire plan, its appendices, changes entered by the Master Copy of the plan. The Master Copy is where all additions, corrections and changes to the plan are made. This copy of the plan will be maintained by the Region 4 PDC. Based on the review, the plan will be brought up to date to reflect the most current information about the Steering Committee, the planning process, the most current hazard data, vulnerability analysis, mitigation strategy and plan maintenance processes. The plan update will be done by the PDC or by contractor under the guidance of the PDC.

Included is an annual review process so that the Region 4 PDC can ensure the proposed mitigation projects will remain eligible for funding through FEMA and that potential mitigation initiatives were being evaluated for implementation. This review process is carried out by the Region 4 PDC every year between full plan updates.

The formal updating process will consist of a series of meetings (either face-to-face or virtual) to review mitigation projects, hazard identification and risk assessment, and to compare the two. The effectiveness of any implemented mitigation strategies should also be determined.

The Steering Committee will evaluate the performance of the plan based on several criteria. For instance, the committee should consider revising mitigation strategies if it appears that the plan is failing according to one of the following measures.

- **Cost Effectiveness:** Is sufficient funding available to implement the project at a cost manageable by the local government? If not, is funding available? Will the costs of implementing the project be significantly less than the cumulative future costs potentially incurred by an uncorrected situation?

- **Property Protection:** How significant will the action be at eliminating or reducing damage to structures and infrastructure?

- **Life Safety:** How effectively will the action protect lives and prevent injuries?

- **Environmental Impacts:** Will implementing the project adversely affect the environment in any way? Will implementing the project benefit the environment?

- **Social Impacts:** Will the public perceive the project as positively lessening hazard-related losses? Will implementing the project adversely affect any segment of the population?

- **Legal Impacts:** Do your governmental organizations and/or partner agencies have the authority to implement the actions?

- **Political Impacts:** Will implementing the project create negative political issues?

- **Overall Feasibility:** Do local policies and capabilities currently allow for the implementation of the project? Are programs available to assist in funding the implementation of the project? Do local leaders agree that implementing the project will be beneficial to the community?

The monitoring of this plan also includes methods for ensuring that projects are successfully implemented and contribute to the achievement of the mitigation goals outlined in Section 3.0. Each project listed in this plan is accompanied by a series of 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.

Following a disaster declaration, the Region 4 Hazard Mitigation Plan will be revised as necessary to reflect lessons learned, or to address specific issues and circumstances arising from the event. It will be the responsibility of WV Region 4 to reconvene the Region 4 PDC and ensure the appropriate stakeholders are invited to participate in the plan revision and update process following declared disaster events.

5.1.2 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 4 PCD to the West Virginia Department of Homeland Security and Emergency Management (WVDHSEM) and to FEMA Region 3. Addendums that are approved by WVDHSEM and FEMA will be included in the plan and will not need to be adopted by resolution by the various municipalities within Region 4.

5.1.3 Implementation through Existing Programs

The members of the Steering Committee are leaders within the communities and agencies that they represent. They are often involved in the overall community, economic development, and capital improvements planning efforts of their jurisdictions. These individuals include (but are not limited to):

- Local government representatives (commissioners and mayors),
- Floodplain administrators, and
- Offices of emergency management personnel (from the county level).

As members with 'inside knowledge' of hazard mitigation, these individuals serve to integrate data, information, and (more generally) goals and actions from the hazard mitigation effort into these other localized plans. The steering committee elected to keep mitigation goals and objectives for the region general in nature. A broad goal, such as "Reduce the impact of flooding," allows for flexibility. Local stakeholders are able to creatively address flooding through a variety of different project types, in both minor and major ways.

Floodplain administrators, it should be noted, serve in a daily role as supporters of hazard mitigation. Through such roles as floodplain ordinance enforcement, these individuals advise the mitigation steering committee and other partners within the region as to the efforts that are working, those that need revision, etc. Further, floodplain administrators often coordinate field level mitigation decisions (e.g., permit approval, decisions to pursue community rating system status, etc.). In Greenbrier County, the county-level plans and permitting department also addresses compliance with floodplain ordinances, zoning issues, subdivision approval, zoning appeals, farmland protection, geographic information systems (GIS) and dilapidated buildings and neglected properties.

Additionally, hazard mitigation is integrated into other planning efforts for the region through the daily responsibilities of the Region 4 PDC staff. The PDC staff serves to both coordinate and support planning efforts throughout the region. Significantly, the PDC serves as the custodial agency for the region's Comprehensive Economic Development Strategy (CEDS). Hazard mitigation features in the CEDS document as a consideration for economic development in the region. Council staff also

supports individual county economic development authorities and other non-profit organizations that take an interest in the region. In such a role, the council staff is uniquely positioned to recommend and/or highlight mitigation issues through the conduct of those development efforts. In other areas, the council staff coordinates development efforts. The PDC frequently supports infrastructure development in the region. As an example, the PDC may be able to suggest the inclusion of such concepts as green infrastructure/low-impact development as parts of projects designed to address stormwater management.

Generally, a mix of jurisdiction-specific personnel and agencies serving multiple jurisdictions ensures that each specific jurisdiction in Region 4 aptly considers hazard mitigation.

- Jurisdiction-Specific Participants: County and municipal floodplain coordinators, local government representatives from every jurisdiction in the region on the regional council
- Participants Serving Multiple Jurisdictions: Region 4 PDC staff, county emergency managers (serve the municipalities within their county area), county-level economic development agencies

To date, local policies have not hindered hazard mitigation efforts. The jurisdictions participating in this planning process have used a variety of funding to complete mitigation projects in the past, including the Hazard Mitigation Grant Program, Homeland Security Grant Program, Emergency Management Performance Grant, Community Development Block Grant, and local funding. Local government policies and programs have supported the use of this funding and, thus, the implementation of mitigation projects. Further, all participating government jurisdictions have demonstrated a capability to successfully implement and administer mitigation projects.

5.1.4 Continued Public Involvement

The Region 4 PDC understands that the general public must be involved in the initial planning process, as well as the updates to the completed plan. As such, the Steering Committee will invite the public to participate as the plan is updated through attendance at future public and Core Committee meetings, distributing questionnaires, 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.

The PDC, at a minimum, will maintain file copies of the Hazard Mitigation Plan that are available for review and inspection during routine business hours. The PDC intends to log all comments received regarding the mitigation plan. Members of the public are invited to contact the PDC 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.

6.0 APPENDICES

6.1 APPENDIX 1: EVIDENCE OF PUBLIC AND STAKEHOLDER INVOLVEMENT

This appendix contains evidence that the public and participating jurisdictions engaged in the development of the hazard mitigation plan. It contains copies of sign-in sheets from meetings as well as copies of newspaper and/or other advertisements providing notice of those meetings. It also contains copies of Risk Assessment Survey announcements through traditional and social media.

WV Region IV Mitigation Strategy Meetings - 2022

The mitigation strategy meetings were held virtually to review and provide a status update to previous strategies and identify new strategies.

Nicholas, Pocahontas, & Webster County Mitigation Strategy Meeting – Attendance

February 7, 2022 – 12:00 pm EST

- Amy Lynn, ELR
- Jaime Baker, Region IV Planning
- Don McCourt, Mayor of Addison
- Gerald Dornburg, Mayor, Cowen
- John McGinnis, NCDHSEM, Nicholas County OES
- Bennie Cogar, Deputy Director Webster County OEM
- Kevin Stitzinger, EM Specialist Pocahontas County
- Robert Shafer, Mayor Summersville
- Sheena McClung, Nicholas County
- Mike O'Brien Pocahontas EM Director
- Brandon Kelly – Pocahontas County OES
- Amy Dinaldo, City of Richwood
- Annette Taylor, Nicholas County OES

Fayette County Mitigation Strategy Meeting – Attendance

February 4, 2022 – 11:30 am EST

- Amy Lynn, ELR
- Jamie Baker, Region IV PDC
- Matt Diederich, Superintendent Town of Fayetteville
- John Tuggle, Region 4 PDC
- Siobahn Wilson, Town of Ansted
- Steve Pridemore, Mayor, Town of Ansted
- Tiffany Cottle Fayette County EM office
- Greg Ingram, Mayor, City of Montgomery
- Anne Cavalier, Mayor of Smithers
- Bill Hannabass, City Manager, City of Oak Hill
- Kevin Walker, Fayette County Emergency Services

Greenbrier County Mitigation Strategy Meeting – Attendance

February 4, 2022 – 1:30 pm EST

- Paula Brown, Greenbrier County Emergency Management
- Valerie, Town of Rupert
- Kelly Banton, Greenbrier County Floodplain Manager

WV Region IV HMP Update Steering Committee and Public Meetings – 2021/22

Steering Committee Meeting 09/20/21

- Amanda Smarr – Reg 4 PDC
- Jamie Baker – Reg 4 PDC
- Zach Youngerman – EL Robinson
- Donna Ward – Reg 4 PDC
- Mark Boone – EL Robinson
- Betsy Morris - Reg 4 PDC
- Tim Keaton – State Hazard Mitigation Planner
- John McGinnis – Nicholas County Emergency Management
- Amy Lynn – EL Robinson
- Erin Buchannan – EL Robinson
- Annette Taylor – Nicholas County Flood Plain Manager
- Travis Copenhaver – Town of Alderson Mayor
- Michael O'Brien - Pocahontas County OES
- Matt McCullough – FEMA
- John Tuggle – Reg 4 PDC
- Chris Inscore – EL Robinson
- Sheena McClung – Nicholas County Flood Plain Manager
- Richard Rose – Webster County OES
- Casey Garnett – FEMA
- Paula Brown – Greenbrier County OES

Hazard Mitigation Meeting – 01/28/2022

- Jamie Baker – R4PDC
- Jimmy Gladwell – Recorder City of Richwood
- Annette Taylor – Nicholas County Flood Plain Manager
- Amy Lynn – EL
- Casey Garnett – FEMA
- Gail Siers – Mayor Town of Hillsboro
- Gerald Dornburg – Mayor Town of Cowen
- Tim Keaton – State Haz Mit
- Terri Kiser – Reg 4 PDC

- Michael O'Brien – Pocahontas County OES
- Amanda Smarr – Reg 4 PDC
- Erin Buchanan – EL
- Kevin Walker – Fayette County OES
- Betsy Morris – Reg 4 PDC
- Richard Rose – Webster County OES
- Cookie Comer – City of Summersville
- Lesley Taylor – Reg 4 PDC
- John McGinnis – Nicholas County OES
- Lina Guerrero – Reg 4 PDC
- Paula Brown – Greenbrier County OES
- Kristen Martin

Hazard Mitigation Meeting 01/31/2022

- Jamie Baker
- Tim Keaton
- Amy Lynn
- Lesley Taylor
- Siabhan Wilson – Town of Ansted
- Anne Cavalier – Town of Smithers Mayor
- Bill Hannabass – City of Oak Hill, City Manager
- Tiffany Cottle – Fayette County OES
- Barney Stinnett – City of Oak Hill
- Zach Youngerman
- Amanda Smarr
- Greg Ingram – City of Montgomery – Mayor

6.2 APPENDIX 2: SURVEYS

Two surveys were sent out to gather community input for this mitigation plan update.

- Risk Assessment Survey was sent out to the public to gauge their thoughts and opinions on hazards within the community.
- Capability Assessment was sent out to the steering committee members to assess their community's capabilities on hazard preparedness, response, recovery, and mitigation.

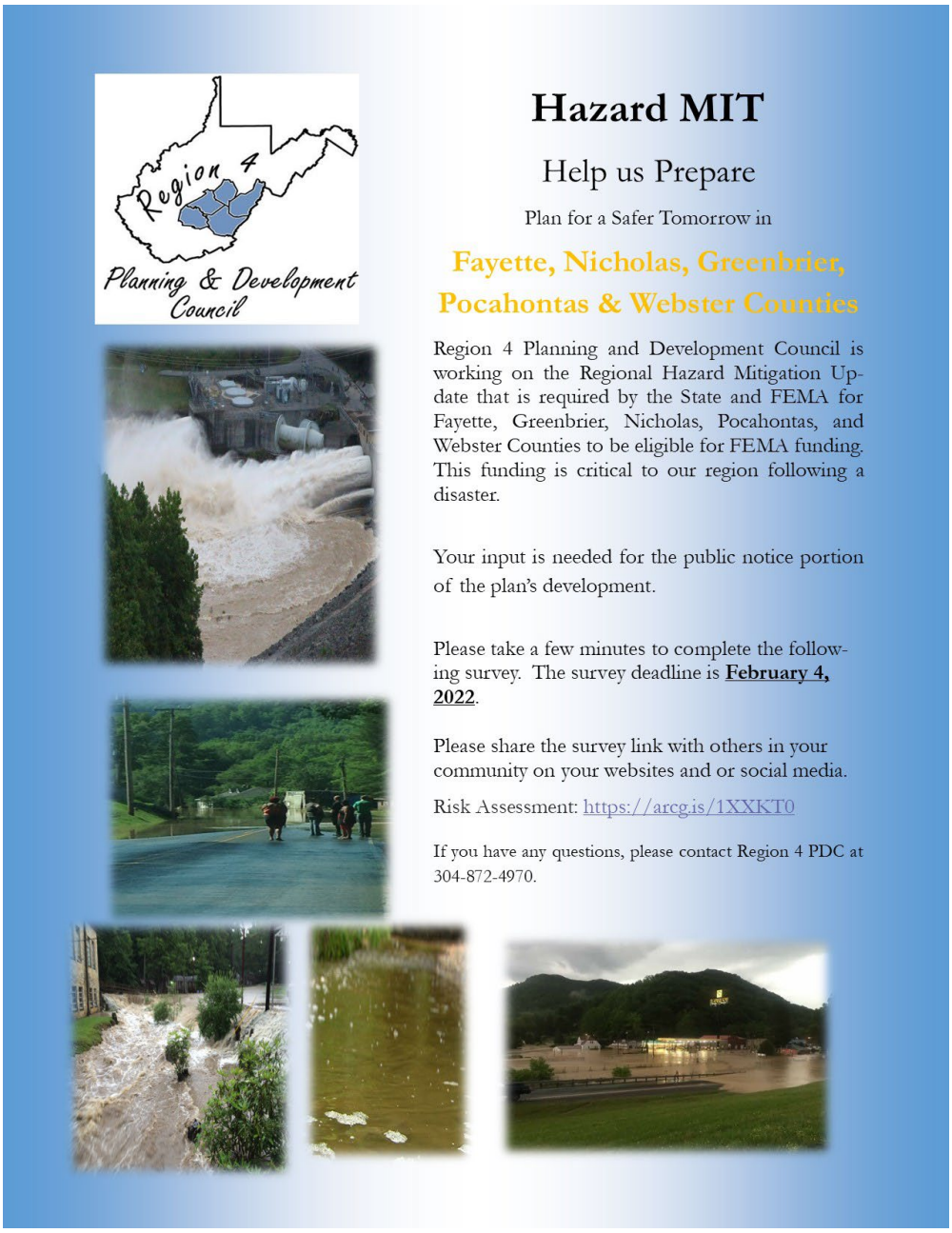


Figure 5.1 Digital Survey Flyer

Risk Assessment Survey_Region 4 PDC 2022

Thank you for taking time to anwer this survey and participating in the Region 4 PDC Hazard Mitigation planning process. This survey is designed to help the Region, and your communitiy, to gauge public perceptions of hazard vulnerability. The information you provide will help reduce vulnerability by guiding local leaders as they prioritize mitigation projects.

Hazard Information

What hazards do you believe exist in your community?

Please check all that apply

-Please Select-

What hazard do you believe poses the largest risk for your community?

You may click on a hazard event and drag it to the preferred ranking order.

- Earthquake
- Extreme Temperatures (Cold & Hot)
- Flooding
- Hailstorms
- Hazardous Materials
- Mass Movement (Landslides, Sinkholes, etc.)
- Terrorism
- Thunderstsorms

- Tornados
- Wildfire
- Wind
- Winter Storms
- Other
- Dam Failure
- Drought
- Pandemic/Epidemic

Reset

Other hazards that pose a risk

In the past 10 years, which hazards do you recall having occurred in your community?

Please check all that apply

-Please Select-

Please specify other hazards that have occurred in your community

255

Hazard Response

Think back to a recent hazard occurrence (any from questions 1 or 2). How would you rate your community's ability to handle the hazard event?

-Please Select-

During this event did you receive information or warnings from your local public officials/emergency management officials?

-Please Select-

Household Preparedness

Do you/does your household have a 72-hour kit?

http://www.ready.gov/build-a-kit

-Please Select-

Do you have homeowners/renters insurance?

-Please Select-

Does your insurance include flood insurance?

-Please Select-

If you live in a Special Hazard Area (SFHA), do you have floodplain insurance?

-Please Select-

Are you willing to spend your money on mitigation activities for your home?

-Please Select-

Have you preformed any improvements to your home to reduce your risk from a hazard?

-Please Select-

Please indiciate what improvements you have made:

Please choose as many as apply

-Please Select-

Other home improvements made

Demographic Information

Please indicate your age

Gender

-Please Select-

Please indicate your household income:

-Please Select-

Please indicate your level of education:

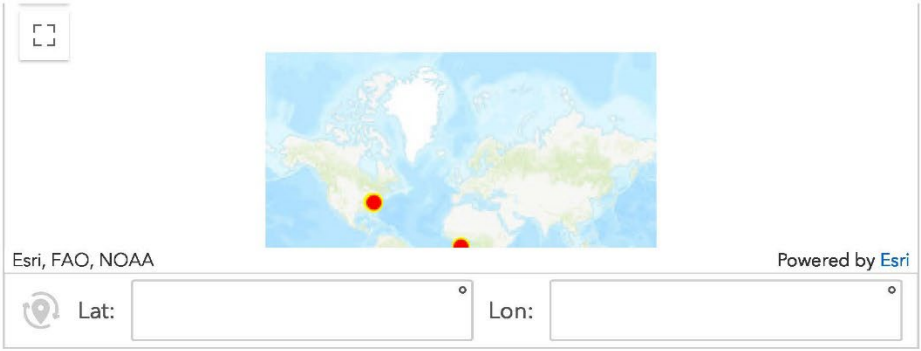
-Please Select-

ZIP Code

How long have you resided in your community?

-Please Select-

If you so choose please feel free to utilize the map to add a more exact location to correspond with your comments.



Please feel free to provide any additional comments

Submit

Planning / Regulatory Tool									
Hazard Mitigation Plan									
Comprehensive Land Use Plan									
Floodplain Management Plan									
Open Space Management Plan (or Parks & Rec/Greenway Plan)									
Stormwater Management Plan/Ordinance									
Natural Resource Protection Plan									
Flood Response Plan									
Emergency Operations Plan									
Continuity of Operations Plan									
Evacuation Plan									
Disaster Recovery Plan									
Capital Improvements Plan									
Economic Development Plan									
Historic Preservation Plan									
Flood Damage Prevention Ordinance									
Zoning Ordinance									
Subdivision Ordinance									
Unified Development Ordinance									
Post-Disaster Redevelopment Ordinance									
Building Code									
Fire Code									
National Flood Insurance Program (NFIP)									
NFIP Community Rating System									

Staff / Personnel Resource									
Planners with knowledge of land development / land management practices									
Engineers or professionals trained in construction practices related to buildings and/or infrastructure									
Planners or engineers with an understanding of natural and/or human-caused hazards									
Emergency Manager									

Floodplain Manager									
Land Surveyors									
Scientists familiar with the hazards of the community									
Staff with education or expertise to assess the community's vulnerability to hazards									
Personnel skilled in GIS and/or HAZUS									
Resource development staff or grant writers									

Education & Outreach								
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access, and functional needs populations, etc.								
Ongoing public education or information program (responsible water use, fire safety, household preparedness, environmental education)								
Natural Disaster or safety-related school program								
Storm Ready Certification								
Firewise Communities certification								
Public/Private partnership initiatives addressing disaster-related issues								
Other								

Jurisdiction	**Date Joined NFIP**	**Current Effective Map Date**	**NFIP Policies in Force**	**Insurance in Force**	**Closed Claims**	**Total Payments to Date**

6.3 APPENDIX 3: ASSET INVENTORY

Table 6.1: Fayette County Assets

Fayette County Assets	Address	Municipality	State	Zip	Asset Type	Dam	Drought	Earthquake	Flooding	Hail	Hazmat	Mass Movement	Terrorism	Thunderstorm	Tornado	Wildfire	Wind	Winter
Adventures On The Gorge	1 Ames Heights Road	Lansing	WV	25862	Economic	L	L	L	L	L	L	L	L	M	M	M	M	M
Altamont Hotel	110 Fayette Ave	Fayetteville	WV	25840	Historical	L	L	L	L	L	L	L	L	M	M	M	M	M
Ansted Center	P.O. Drawer 400	Ansted	WV	25812	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Ansted Certified Volunteer Fire Department	104 Page Street	Ansted	WV	25812	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Ansted Elementary School	118 Church Street	Ansted	WV	25812	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Ansted Middle School	118 Church Street	Ansted	WV	25812	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Ansted Police Department	104 Cemetery Street	Ansted	WV	25812	Critical	L	L	L	L	L	L	L	M	M	M	M	M	M
Ansted Town Hall	104 Cemetery Street	Ansted	WV	25812	Critical	L	L	L	L	L	L	L	M	M	M	M	M	M
Armstrong Creek VFD	County Road 61/24	Powellton	WV	25161	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M

Bank Of Glen Jean	Main St.	Glen Jean	WV	25846	Historical	L	L	L	H	L	L	L	L	M	M	M	M	M
Boomer Christian School	1 Church Street	Boomer	WV	25031	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Boomer Volunteer Fire Department	188 Park Road	Boomer	WV	25031	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Bridges	Region-Wide		WV		Special	L	L	L	H	L	M	L	M	M	M	M	M	H
Collins Middle School	601 Jones Avenue	Oak Hill	WV	25901	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Contentment	Along U.S. 60	Ansted	WV	25812	Historical	L	L	L	L	L	L	L	L	M	M	M	M	M
Danese Christian School	18459 Stanaford Road	Danese	WV	25831	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Danese Volunteer Fire Department	County Road 31	Danese	WV	25831	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Divide Elementary School	21 Divide Road	Lookout	WV		Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Fayette Continuous Care Center	100 Hresan Boulevard	Fayetteville	WV	25840	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Fayette County Courthouse	100 Court Street	Fayetteville	WV	25840	Critical	L	L	L	L	L	L	L	M	M	M	M	M	M
Fayette County Courthouse	Court St. Between Wiseman		WV		Historical	L	L	L	L	L	L	L	L	M	M	M	M	M

Fayette County Emergency Operations Center	200 West Maple Avenue	Fayetteville	WV	25840	Critical	L	L	L	L	L	L	L	M	M	M	M	M	M
Fayette County Sheriffs Department	100 North Court Street	Fayetteville	WV	25840	Critical	L	L	L	L	L	L	L	M	M	M	M	M	M
Fayette County Sheriffs Office - Smithers Detachment	72 Michigan Avenue	Smithers	WV	25186	Critical	L	L	L	L	L	L	L	M	M	M	M	M	M
Fayette Institute Of Technology	300 W Oyler Avenue	Oak Hill	WV	25901	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Fayetteville Elementary School	200 Wiseman Avenue	Fayetteville	WV	25840	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Fayetteville Fire Department	150 Lively Street	Fayetteville	WV	25840	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Fayetteville High School	515 W Maple Avenue	Fayetteville	WV	25840	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Fayetteville Police Department	125 North Court Street	Fayetteville	WV	25840	Critical	L	L	L	L	L	L	L	M	M	M	M	M	M
Fayetteville Town Hall	125 N Court Street	Fayetteville	WV	25840	Critical	L	L	L	L	L	L	L	M	M	M	M	M	M
Gatewood Elementary School	5094 Gatewood Road	Fayetteville	WV	25840	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M

Gauley Bridge Elementary School	140 Walnut Street	Gauley	WV		Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Gauley Bridge Police Department	95 Main Street	Gauley	WV		Critical	L	L	L	L	L	L	L	M	M	M	M	M	M
Gauley Bridge Railroad Station	Off Wv 16/39	Gauley	WV		Historical	L	L	L	L	L	L	L	L	M	M	M	M	M
Gauley Bridge Town Hall	278 Railroad Street	Gauley	WV		Critical	L	L	L	L	L	L	L	M	M	M	M	M	M
Gauley Bridge Volunteer Fire Department	314 Main Street	Gauley	WV		Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Gauley River Volunteer Fire Department	River Front Road	Swiss	WV	26690	Critical	L	L	L	H	L	L	L	L	M	M	M	M	M
General Ambulance Service Incorporated - Main Street Substation	1307 East Main Street	Oak Hill	WV	25901	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
General Ambulance Service Incorporated Station 1"	7002 Legend Highway	Oak Hill	WV	25901	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M

General Ambulance Service Incorporated Station 5	1300 Beards Fork Road	Robson	WV	25173	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
General Ambulance Service Incorporated Station 6"	521 Highland Avenue	Oak Hill	WV	25901	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Glen Ferris Inn	Us 60 Overlooking Kanawha		WV		Historical	L	L	L	H	L	L	L	L	M	M	M	M	M
Global Contact Services	101 Martin Dr. Mount Hope		WV		Economic	L	L	L	L	L	L	L	L	M	M	M	M	M
Halfway House	Off Old U.S. 60	Ansted	WV	25812	Historical	L	L	L	L	L	L	L	L	M	M	M	M	M
Hidden Valley Health Care	422 - 23rd Street	Oak Hill	WV	25901	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Hilltop Center	P.O. Box 125	Hilltop	WV	25855	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Hughart, Dr. John, House	Off Wv 41	Landisburg	WV		Historical	L	L	L	L	L	L	L	L	M	M	M	M	M
Jan Care Ambulance Service Incorporated Maintenance	106 Summerlee Avenue	Oak Hill	WV	25901	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Jan-Care Ambulance Service Incorporated -	316 Court Street	Fayetteville	WV	25840	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M

Jan-Care Ambulance Service Incorporated -	134 4th Avenue	Montgomery	WV	25136	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Jan-Care Ambulance Service Incorporated - Ansted	104 Page Street	Ansted	WV	25812	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Jan-Care Ambulance Service Incorporated - Gauley Bridge	322 Main Street	Gauley	WV		Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Jan-Care Ambulance Service Incorporated - Mount Hope	College Avenue	Mt. Hope	WV	25880	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Jan-Care Ambulance Service Incorporated - Oak Hill	Summerlee Avenue	Oak Hill	WV	25901	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Jan-Care Ambulance Service Incorporated - West End	408 Virginia Street	Oak Hill	WV	25901	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Jean Spadaro Juvenile Center	106 Martin Drive	Mt. Hope	WV	25880	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M

Kanawha Falls Psd Water Plant	362 Main Street	Gauley	WV		Critical	L	L	L	L	L	L	L	M	M	M	M	M	M
Kingston Mining Inc	600 Resource Dr. Scarbro		WV		Economic	L	L	L	L	L	L	L	L	M	M	M	M	M
Loup Creek Volunteer Fire Department	State Highway 61	Page	WV	25152	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Loup Creek Volunteer Fire Department -	State Highway 61	Montgomery	WV	25136	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Main Building	West Virginia Institute Of		WV		Historical	L	L	L	L	L	L	L	L	M	M	M	M	M
Meadow Bridge Elementary School	2725 Main Street	Meadow	WV		Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Meadow Bridge High School	870 Main Street	Meadow	WV		Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Meadow Bridge Volunteer Fire Department	State Highway 20	Meadow	WV		Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Midland Trail High School	26719 Midland Trail	Hico	WV	25854	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Montgomery City Hall	706 3rd Avenue	Montgomery	WV	25136	Critical	L	L	L	L	L	L	L	M	M	M	M	M	M
Montgomery General Elderly Care	P.O. Box 1010	Montgomery	WV	25136	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M

Montgomery General Hospital	401 6th Avenue	Montgomery	WV	25136	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Montgomery General Hospital, D/P	Washington St. & 6th Ave.	Montgomery	WV	25136	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Montgomery Police Department	706 3rd Avenue	Montgomery	WV	25136	Critical	L	L	L	L	L	L	L	M	M	M	M	M	M
Mount Hope City Hall	609 Main Street	Mt. Hope	WV	25880	Critical	L	L	L	L	L	L	L	M	M	M	M	M	M
Mount Hope Elementary School	408 Lincoln Street	Mt. Hope	WV	25880	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Mount Hope Police Department	609 Main Street	Mt. Hope	WV	25880	Critical	L	L	L	L	L	L	L	M	M	M	M	M	M
Mount Hope Volunteer Fire Department	428 Main Street	Mt. Hope	WV	25880	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Mount Olive Correctional	1 Mountainside Way	Mt. Hope	WV	25880	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Mountain View Christian School	2 Mountain View Road	Hilltop	WV	25855	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
New River Elementary School	262 Oyler Avenue	Oak Hill	WV	25901	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
New River Gorge National	104 Main Street	Glen Jean	WV	25846	Critical	L	L	L	H	L	L	L	M	M	M	M	M	M

River Ranger Station																		
Nuttall Volunteer Fire Department	United States Highway 60	Hico	WV	25854	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Oak Hill City Hall	100 Kelly Avenue	Oak Hill	WV	25901	Critical	L	L	L	L	L	L	L	M	M	M	M	M	M
Oak Hill High School	350 Oyler Avenue	Oak Hill	WV	25901	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Oak Hill Police Department	100 Kelly Avenue	Oak Hill	WV	25901	Critical	L	L	L	L	L	L	L	M	M	M	M	M	M
Oak Hill Railroad Depot	Jct. Of Virginia Ave. And		WV		Historical	L	L	L	L	L	L	L	L	M	M	M	M	M
Oak Hill Volunteer Fire Department	99 Virginia Street	Oak Hill	WV	25901	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Page-Vawter House	Rt. Box 20	Ansted	WV	25812	Historical	L	L	L	L	L	L	L	L	M	M	M	M	M
Pax Town Hall	99 Center Street	Pax	WV		Critical	L	L	L	L	L	L	L	M	M	M	M	M	M
Pax Volunteer Fire Department	122 Center Street	Pax	WV		Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Plateau Medical Center	430 Main Street	Oak Hill	WV	25901	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Plateau Medical Center, D/P	430 Main Street	Oak Hill	WV	25901	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M

Prince Brothers General Store--Berry Store	WV 41	Prince	WV	25813	Historical	L	L	L	L	L	L	L	L	M	M	M	M	M
Railways	Region-Wide		WV		Special	L	L	L	H	L	M	L	M	M	M	M	M	H
Residential	Region-Wide		WV		Special	L	L	L	H	L	L	L	L	M	M	M	M	H
River Expeditions	900 Broadway Avenue	Oak Hill	WV	25901	Economic	L	L	L	L	L	L	L	L	M	M	M	M	M
Roads	Region-Wide		WV		Special	L	L	L	H	L	M	L	M	M	M	M	M	H
Rosedale Elementary School	3950 Summerlee Road	Oak Hill	WV	25901	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Saints Peter & Paul Elementary School	123 Elmore Street	Oak Hill	WV	25901	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Smithers City Hall	518 Michigan Avenue	Smithers	WV	25186	Critical	L	L	L	L	L	L	L	M	M	M	M	M	M
Smithers Police Department	175 Michigan Avenue	Smithers	WV	25186	Critical	L	L	L	L	L	L	L	M	M	M	M	M	M
Smithers Volunteer Fire Department	175 Michigan Avenue	Smithers	WV	25186	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Thurmond Town Hall		Thurmond	WV	25901	Critical	L	L	L	L	L	L	L	M	M	M	M	M	M
Tyree Stone Tavern	123 James River and Kanawha Turnpike	Ansted	WV	25182	Historical	L	L	L	L	L	L	L	L	M	M	M	M	M
US DOI NPS	104 Main Street	Glen Jean	WV	25846	Critical	L	L	L	H	L	L	L	M	M	M	M	M	M

Valley Elementary School	75 Michigan Avenue	Smithers	WV	25186	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Valley High School	1 Greyhound Lane	Smithers	WV	25186	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Wal-Mart (Fayetteville)	100 Fayette Town Ctr	Fayetteville	WV	25840	Economic	L	L	L	L	L	L	L	L	M	M	M	M	M
West Virginia Division Of Forestry - Fayette County Field Office"	102 East Maple Avenue	Fayetteville	WV	25840	Critical	L	L	L	L	L	L	L	M	M	M	M	M	M

Table 6.2: Greenbrier County Assets

Greenbrier County Assets	Address	Municipality	State	Zip	Asset Type	Dam	Drought	Earthquake	Flooding	Hail	Hazmat	Mass Movement	Terrorism	Thunderstorm	Tornado	Wildfire	Wind	Winter
Alderson Bridge	219 S. Monroe St. Alderson	Alderson-Gbr	WV	24910	Historic	L	L	L	M	L	L	L	L	M	M	L	M	M
Alderson Community Center	317 Chestnut Ave E	Alderson-Gbr	WV	24910	Critical	L	L	L	L	L	L	L	L	M	M	L	M	M
Alderson ES	305 Elmwood AVE	Alderson-Gbr	WV	24910	Vulnerable	L	L	L	L	L	L	L	L	M	M	L	M	M
Alderson Senior Center	336 Alderson Cemetery	Alderson-Monroe Co	WV	24910	Vulnerable	L	L	L	L	L	L	L	L	M	M	L	M	M
Alderson Sewer Plant	180 Glen Ray Rd	Alderson-Monroe Co	WV	24910	Critical	L	L	L	M	L	L	L	M	M	M	L	M	M
Alderson Town Hall & Police Station	311 S Monroe St. Alderson	Alderson-Monroe Co	WV	24910	Critical	L	L	L	L	L	L	L	M	M	M	L	M	M
Alderson VFD/EMS	39 Railroad Ave	Alderson-Monroe Co	WV	24910	Critical	L	L	L	L	L	L	L	L	M	M	L	M	M
Alexander McVeight Miller House	356 E Hemlock Ave.	Alderson-Gbr	WV	24910	Historic	L	L	L	L	L	L	L	L	M	M	L	M	M
Argabrite House	504 Virginia St. Alderson	Alderson-Gbr	WV	24910	Historic	L	L	L	L	L	L	L	L	M	M	L	M	M
Dawson Dam	300 Lake View Dr W	Alderson-Gbr	WV	24910	Critical	L	L	L	L	L	L	L	M	M	M	L	M	M

FPC Alderson	1 Glen Ray Rd. Alderson	Alderson-Monroe Co	WV	24910	Vulnerable	L	L	L	L	L	L	L	M	M	M	L	M	M
Frontier Alderson	656 Maple Ave. W	Alderson-Gbr	WV	24910	Special	L	L	L	L	L	L	L	L	M	M	L	M	M
Tri-County VFD	195 Tri-County Fire Department Road	Alderson	WV	24910	Critical	L	L	L	L	L	L	L	L	M	M	L	M	M
Ferrellgas	272 Alta Heights Rd.	Asbury	WV	24916	Special	L	L	L	L	L	L	L	L	M	M	L	M	M
Amerigas Propane LP	38426 Midland Trail E	Caldwell	WV	24925	Special	L	L	L	L	L	L	M	L	M	M	L	M	M
Greenbrier West HS	278 Cavalier Drive	Charmco	WV	25958	Vulnerable	L	L	L	L	L	L	L	L	M	M	L	M	M
Burns Motor Freight	342 Burns Motor Frieght	Crawley	WV	24931	Special	L	L	L	L	L	L	L	L	M	M	L	M	M
Clintonville FD	18918 Midland Trail W	Crawley	WV	24931	Critical	L	L	L	L	L	L	L	L	M	M	L	M	M
Sam Black Church	15626 Midland Trail W	Smoot	WV	24977	Historic	L	L	L	L	L	L	L	L	M	M	L	M	M
U Save Propane	272 Gray Gables Rd.	Crawley	WV	24931	Special	L	L	L	L	L	L	L	L	M	M	L	M	M
Rupert ES & Western Greenbrier MS	315 Timberwolf Drive	Crawley	WV	24931	Vulnerable	L	L	L	L	L	L	L	L	M	M	L	M	M
Fairlea VFD	250 Third St. Fairlea	Lewisburg	WV	24901	Critical	L	L	L	L	L	L	M	L	M	M	L	M	M
Greenbrier Co. Emergency Ambulance	257 3rd St. Fairlea	Lewisburg	WV	24901	Critical	L	L	L	L	L	L	M	L	M	M	L	M	M

West Virginia State Fairgrounds	947 Maplewood Ave.	Lewisburg	WV	24901	Special	L	L	L	L	L	L	M	M	M	M	L	M	M
Frankford ES	21692 Seneca Trail N	Frankford	WV	24938	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
Frankford VFD	123 Water St E	Frankford	WV	24938	Critical	L	L	L	L	L	L	M	L	M	M	L	M	M
Frontier Communications (Frankford)	22010 Seneca Trail N	Frankford	WV	24938	Special	L	L	L	L	L	L	M	L	M	M	L	M	M
Blue Sulphur Springs Pavilion	8010 Blue Sulphur Spring Rd NOT VALID	Blue Sulphur Springs	WV	24910	Historic	L	L	L	L	L	L	M	L	M	M	L	M	M
Boxley Trucking	21073 Midland Trail W	Lewisburg	WV	24901	Special	L	L	L	L	L	L	M	L	M	M	L	M	M
Carnegie Hall	611 Church St	Lewisburg	WV	24901	Historic	L	L	L	L	L	L	M	L	M	M	L	M	M
Confederate Cemetery at Lewisburg		Lewisburg	WV	24901	Historic	L	L	L	L	L	L	M	L	M	M	L	M	M
David S. Creigh House	3931 Davis Stuart Road	Lewisburg	WV	24901	Historic	L	L	L	L	L	L	M	L	M	M	L	M	M
Davita Disalysis	9745 Seneca Trail S	Lewisburg	WV	24901	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
Fresenius Dialysis	1255 Maplewood Ave	Lewisburg	WV	24901	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
Frontier (Lewisburg)	473 Maplewood Ave.	Lewisburg	WV	24901	Special	L	L	L	L	L	L	M	L	M	M	L	M	M
Gov. Samuel Prince House	996 Court St. N	Lewisburg	WV	24901	Historic	L	L	L	L	L	L	M	L	M	M	L	M	M

Greenbrier Co. Sheriff Office	920 Court St N	Lewisburg	WV	24901	Critical	L	L	L	L	L	L	M	M	M	M	L	M	M
Greenbrier County BOE	197 Chestnut St.	Lewisburg	WV	24901	Critical	L	L	L	M	L	L	M	M	M	M	L	M	M
Greenbrier County BOE Bus Garage	387 Judyville Rd	Lewisburg	WV	24901	Critical	L	L	L	M	L	L	M	M	M	M	L	M	M
Greenbrier County Courthouse	912 Court St N	Lewisburg	WV	24901	Critical	L	L	L	L	L	L	M	M	M	M	L	M	M
Greenbrier East HS	273 Spartan Lane	Lewisburg	WV	24901	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
Greenbrier Episcopal School	3100 Houfnaggle Rd	Lewisburg	WV	24901	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
Greenbrier Health Care Center	1115 Maplewood Ave	Lewisburg	WV	24901	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
Greenbrier Valley Airport	584 Airport Rd	Lewisburg	WV	24901	Critical	L	L	L	M	L	L	M	M	M	M	L	M	M
Hartland		Lewisburg	WV	24901	Historic	L	L	L	L	L	L	M	L	M	M	L	M	M
Herns Mill Covered Bridge		Lewisburg	WV	24901	Historic	L	L	L	L	L	L	M	L	M	M	L	M	M
James Withrow House		Lewisburg	WV	24901	Historic	L	L	L	H	L	L	M	L	M	M	L	M	M
John A. North House		Lewisburg	WV	24901	Historic	L	L	L	L	L	L	M	L	M	M	L	M	M
John Wesley Methodist Church	350 Foster Street	Lewisburg	WV	24901	Historic	L	L	L	L	L	L	M	L	M	M	L	M	M
Lewisburg Baptist Academy	246 Grand Avenue	Lewisburg	WV	24901	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
Lewisburg ES	492 Washington St. W	Lewisburg	WV	24901	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M

Lewisburg PD	119 Preston Blvd	Lewisburg	WV	24901	Critical	L	L	L	L	L	L	M	L	M	M	L	M	M
Lewisburg Town Hall	942 Washington St W	Lewisburg	WV	24901	Critical	L	L	L	L	L	L	M	M	M	M	L	M	M
Lewisburg VFD Stn 1	200 Foster St.	Lewisburg	WV	24901	Critical	L	L	L	L	L	L	M	L	M	M	L	M	M
Lewisburg VFD Stn 2	3673 Jefferson St N	Lewisburg	WV	24901	Critical	L	L	L	L	L	L	M	L	M	M	L	M	M
Lewisburg Water Plant	2539 Stonehouse Rd	Caldwell	WV	24925	Critical	L	L	L	M	L	L	M	M	M	M	L	M	M
Lowes (Lewisburg)	258 Gateway Blvd	Lewisburg	WV	24901	Special	L	L	L	L	L	L	M	L	M	M	L	M	M
Med Express	1560 Jefferson St N	Lewisburg	WV	24901	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
Morlunda	2169 Herns Mill Road	Lewisburg	WV	24901	Historic	L	L	L	L	L	L	M	L	M	M	L	M	M
Mt. Tabor Baptist Church	149 Foster St	Lewisburg	WV	24901	Historic	L	L	L	L	L	L	M	L	M	M	L	M	M
New River Community and Technical	653 Church St	Lewisburg	WV	24901	Economic	L	L	L	M	L	L	M	L	M	M	L	M	M
Old Stone Church	644 Church St	Lewisburg	WV	24901	Historic	L	L	L	L	L	L	M	L	M	M	L	M	M
Peyton Hospice Home	1265 Maplewood Ave	Lewisburg	WV	24901	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
Res-Care	650 Court St S	Lewisburg	WV	24901	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
Rhema Christian Center	3584 Davis Stuart Rd	Lewisburg	WV	24901	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M

Robert C Byrd Clinic	1464 Jefferson St N	Lewisburg	WV	24901	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
Seasons Genesis Healthcare	177 Holt Lane	Lewisburg	WV	24901	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
Spanforce Labor LLC	905 Washington St. W	Lewisburg	WV	24901	Economic	L	L	L	L	L	L	M	L	M	M	L	M	M
Stone Manse	1464 Stonehouse Road	Lewisburg	WV	24901	Historic	L	L	L	L	L	L	M	L	M	M	L	M	M
Stuart Manor	1999 Davis Stuart Road	Lewisburg	WV	24901	Historic	L	L	L	L	L	L	M	L	M	M	L	M	M
Supreme Court Library Building or North House Museum	814 Washington St W	Lewisburg	WV	24901	Historic	L	L	L	L	L	L	M	L	M	M	L	M	M
Tuckwiller Tavern		Lewisburg	WV	24901	Historic	L	L	L	L	L	L	M	L	M	M	L	M	M
Tuscawilla		Lewisburg	WV	24901	Historic	L	L	L	L	L	L	M	L	M	M	L	M	M
VA Clinic	228 Shamrock Ln	Ronceverte	WV	24970	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
Wal Mart (Lewisburg)	1976 Jefferson St. N	Lewisburg	WV	24901	Economic	L	L	L	L	L	L	M	L	M	M	L	M	M
WV Paving	21195 Midland Trail West	Lewisburg	WV	24901	Special	L	L	L	L	L	L	M	L	M	M	L	M	M
WV School of Osteopathic Medicine	400 Lee Street N	Lewisburg	WV	24901	Economic	L	L	L	L	L	L	M	L	M	M	L	M	M
WVSP-Lewisburg	381 GMS Drive	Lewisburg	WV	24901	Critical	L	L	L	L	L	L	M	M	M	M	L	M	M

Alexander W. Arbuckle House	861 Arbuckle Lane	Maxwelton	WV	24957	Historic	L	L	L	L	L	L	M	L	M	M	L	M	M
American Foam Technologies	473 McLaughlin Ln	Maxwelton	WV	24957	Special	L	L	L	L	L	L	M	L	M	M	L	M	M
Crosswinds Center (Crisis/Detox)	414 Industrial Park Rd	Maxwelton	WV	24957	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
Greenbrier County 911 Center	173 Arbuckle Ln	Maxwelton	WV	24957	Critical	L	L	L	M	L	L	M	M	M	M	L	M	M
Greenbrier County Economic Development-Rahall Technology &	804 Industrial Park Rd	Maxwelton	WV	24957	Economic	L	L	L	L	L	L	M	L	M	M	L	M	M
Greenbrier County OES	171 Arbuckle Ln	Maxwelton	WV	24957	Critical	L	L	L	L	L	L	M	M	M	M	L	M	M
Seneca Behavioral Health Services	804 Industrial Park Rd	Maxwelton	WV	24957	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
White Sulphur Springs EMS/Northern	465 McLaughlin Ln	Maxwelton	WV	24957	Critical	L	L	L	L	L	L	M	L	M	M	L	M	M
WV National Guard Readiness Center Lewisburg	635 Industrial Park Road	Maxwelton	WV	24957	Special	L	L	L	L	L	L	M	L	M	M	L	M	M
Crichton ES	133 School ST	Quinwood	WV	25981	Vulnerable	L	L	L	L	L	L	L	L	M	M	L	M	H
Greenbrier PSD II Crichton Water Plant	4457 Coalfield Trail	Quinwood	WV	25981	Critical	L	L	L	M	L	L	L	M	M	M	L	M	H

Quinwood Town Hall	129 School Street	Quinwood	WV	25981	Critical	L	L	L	L	L	L	L	M	M	M	L	M	H
Quinwood VFD	149 Amick St E	Quinwood	WV	25981	Critical	L	L	L	L	L	L	L	L	M	M	L	M	H
American Tower (AT&T)	621 Cavendish Rd	Rainelle Fayette Co	WV	25962	Special	L	L	L	L	L	L	L	L	M	M	L	M	M
Frontier (Rainelle)	301 Main St	Rainelle	WV	25962	Special	L	L	L	L	L	L	L	L	M	M	L	M	M
Greenbrier PSD II Sewer Treatment Plant-Rainelle	216 Snake Island Rd	Rainelle	WV	25962	Critical	L	L	L	M	L	L	L	M	M	M	L	M	M
Meadow Garden	276 Pennsylvania Ave	Rainelle	WV	25962	Vulnerable	L	L	L	L	L	L	L	L	M	M	L	M	M
Meadow River Hardwood Lumber	305 Snake Island Rd	Rainelle	WV	25962	Special	L	L	L	L	L	L	L	L	M	M	L	M	M
PFC Ralph E Pomeroy USARC	259 John Raine Dr.	Rainelle	Wv	25962	Special	L	L	L	L	L	L	L	L	M	M	L	M	M
Rainelle ES	643 Kanawha Avenue	Rainelle	WV	25962	Vulnerable	L	L	L	L	L	L	L	L	M	M	L	M	M
Rainelle Medical Center	176 Medical Center Dr	Rainelle	WV	25962	Vulnerable	L	L	L	L	L	L	L	L	M	M	L	M	M
Rainelle PD/Town Hall	1233 Kanawha Ave	Rainelle	WV	25962	Critical	L	L	L	L	L	L	L	M	M	M	L	M	M
Rainelle VFD	212 James River & Kanawha Tpke	Rainelle	WV	25962	Critical	L	L	L	L	L	L	L	L	M	M	L	M	M

Rainelle Water Plant	159 Ohio Ave	Rainelle	WV	25962	Critical	L	L	L	L	L	L	L	M	M	M	L	M	M
Suburban Propane	192 Twenty Third St.	Rainelle	WV	25962	Special	L	L	L	L	L	L	L	L	M	M	L	M	M
WVSP-Rainelle	354 John Raine Drive	Rainelle	WV	25962	Critical	L	L	L	L	L	L	L	H	M	M	L	M	M
Renick Town Hall	135 Church Lane	Renick	WV	24966	Critical	L	L	L	L	L	L	M	M	M	M	L	M	M
Renick VFD	27019 Seneca Trail N	Renick	WV	24966	Critical	L	L	L	L	L	L	L	L	M	M	L	M	M
Beech Ridge Energy LLC (Invenergy)	128 Coleman Rd.	Richwood	WV	26261	Special	L	L	L	L	L	L	L	L	M	M	L	M	H
Eastern Greenbrier MS	403 Knight Drive	Ronceverte	WV	24970	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
Elmhurst		Ronceverte	WV	24970	Historic	L	L	L	L	L	L	M	L	M	M	L	M	M
Fairlea Senior Center	150 Taylor Lane	Ronceverte	WV	24970	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
Greenbrier County Health Department	9109 Seneca Trail S	Ronceverte	WV	24970	Critical	L	L	L	L	L	L	M	L	M	M	L	M	M
Greenbrier County PSD I Sewer	9035 Seneca Trail South	Ronceverte	WV	24970	Critical	L	L	L	M	L	L	M	M	M	M	L	M	M
Greenbrier Physicians Clinic	1322 Maplewood Ave	Ronceverte	WV	24970	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
Greenbrier Valley Medical Center	1320 Maplewood	Ronceverte	WV	24970	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
Hokes Mill Covered Bridge		Ronceverte	WV	24970	Historic	L	L	L	L	L	L	M	L	M	M	L	M	M

Home Health Care Services	1647 Maplewood Ave	Ronceverte	WV	24970	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
Meadow River Lumber Building		Ronceverte	WV	24970	Historic	L	L	L	L	L	L	M	L	M	M	L	M	M
Mon Power/First Energy	9176 Seneca Trail S	Ronceverte	WV	24970	Special	L	L	L	L	L	L	M	L	M	M	L	M	M
Ronceverte ES	246 Ronceverte Elementary School Dr	Ronceverte	WV	24970	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
Ronceverte PD	206 Main St. W	Ronceverte	WV	24970	Critical	L	L	L	L	L	L	M	M	M	M	L	M	M
Ronceverte Town Hall	182 Main St W	Ronceverte	WV	24970	Critical	L	L	L	L	L	L	M	M	M	M	L	M	M
Ronceverte VFD	264 Ronceverte Ave	Ronceverte	WV	24970	Critical	L	L	L	L	L	L	M	L	M	M	L	M	M
Ronceverte Water Plant	330 River Rd	Ronceverte	WV	24970	Critical	L	L	L	M	L	L	M	M	M	M	L	M	M
Ronceverte WWTP	330 River Rd	Ronceverte	WV	24970	Critical	L	L	L	H	L	L	M	M	M	M	L	M	M
Seneca Trail Christian Academy	321 Trailblazer Dr	Ronceverte	WV	24970	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
Southern States COOP	608 Monroe Ave.	Ronceverte	WV	24970	Special	L	L	L	H	L	L	M	L	M	M	L	M	M
The Brier	979 Rocky Hill Road	Ronceverte	WV	24970	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
The Kroger Company	178 Red Oaks Shopping Ctr	Ronceverte	WV	24970	Economic	L	L	L	L	L	L	M	L	M	M	L	M	M
Autumn Way	411 Nicholas St	Rupert	WV	25984	Vulnerable	L	L	L	L	L	L	L	L	M	M	L	M	M

Coronado Coal LLC	4547 Anjean Road	Rupert	WV	25984	Economic	L	L	L	L	L	L	L	L	M	M	L	M	M
Meadow River Valley Assn(MRVA)	279 Church Street	Rupert	WV	25984	Vulnerable	L	L	L	L	L	L	L	L	M	M	L	M	M
Rupert Senior Center	284 Greenbrier St	Rupert	WV	25984	Vulnerable	L	L	L	L	L	L	L	L	M	M	L	M	M
Rupert Town Hall	528 Nicholas St	Rupert	WV	25984	Critical	L	L	L	L	L	L	L	M	M	M	L	M	M
Rupert VFD	217 Church St	Rupert	WV	25984	Critical	L	L	L	L	L	L	L	L	M	M	L	M	M
Rupert Water Plant	251 Cranberry Ave. Rupert	Rupert	WV	25984	Critical	L	L	L	M	L	L	L	M	M	M	L	M	M
Westrock Mead Westvaco Gauley Wood	11014 Midland Trail W	Rupert	WV	25984	Special	L	L	L	L	L	L	L	L	M	M	L	M	M
Deitz Farm		Smoot	WV	24977	Historic	L	L	L	L	L	L	L	L	M	M	L	M	M
Smoot ES	223 Smokie Lane	Smoot	WV	24977	Vulnerable	L	L	L	L	L	L	L	L	M	M	L	M	M
Smoot VFD	2181 Grassy Meadows Rd.	Smoot	WV	24977	Critical	L	L	L	L	L	L	L	L	M	M	L	M	M
Anthony Correctional Facility	313 Anthony Center Drive	White Sulphur Springs	WV	24986	Vulnerable	L	L	L	L	L	L	L	M	M	M	L	M	M
Anthony Creek VFD	12584 Pocahontas Trail	White Sulphur Springs	WV	24986	Critical	L	L	L	L	L	L	L	L	M	M	L	M	M
Blue Bend Fort Camp		White Sulphur Springs	WV	24986	Historic	L	L	L	L	L	L	L	L	M	M	L	M	M

Frontier (White Sulphur Springs)	345 Drewery Ave	White Sulphur Springs	WV	24986	Special	L	L	L	L	L	L	L	L	M	M	L	M	M
Great Barrell Company	546 Mountain House Dr	White Sulphur Springs	WV	24986	Economic	L	L	L	H	L	L	L	L	M	M	L	M	M
Greenbrier Hotel Corp/Greenbrier Resort	101 Main Street W	White Sulphur Springs	WV	24986	Special	L	L	L	L	L	L	L	L	M	M	L	M	M
Howard Creek Dam	4826 Tuckahoe Rd	White Sulphur Springs	WV	24986	Critical	L	L	L	L	L	L	L	M	M	M	L	M	M
James Wylie House	939 Main St. E	White Sulphur Springs	WV	24986	Historic	L	L	L	L	L	L	L	L	M	M	L	M	M
Oakhurst Links - Valley View Country Club	2640 Big Draft Rd	White Sulphur Springs	WV	24986	Historic	L	L	L	H	L	L	L	L	M	M	L	M	M
The Greenbrier Clinic	40823 Midland Trail E	White Sulphur Springs	WV	24986	Vulnerable	L	L	L	L	L	L	L	L	M	M	L	M	M
US Fish and Wildlife Service National Fish Hatchery System	1087 Main Street East	White Sulphur Springs	WV	24986	Special	L	L	L	L	L	L	L	M	M	M	L	M	M
School House Hotel	125 Schoolhouse Way	White Sulphur Springs	WV	24986	Special	L	L	L	L	L	L	L	L	M	M	L	M	M
White Sulphur Springs EMS	206 Bob White Lane	White Sulphur Springs	WV	24986	Critical	L	L	L	L	L	L	L	L	M	M	L	M	M
White Sulphur Springs ES	150 Reed St.	White Sulphur Springs	WV	24986	Vulnerable	L	L	L	L	L	L	L	L	M	M	L	M	M

White Sulphur Springs PD	585 Main St. W.	White Sulphur Springs	WV	24986	Critical	L	L	L	L	L	L	L	M	M	M	L	M	M
White Sulphur Springs Town Hall	589 Main St West.	White Sulphur Springs	WV	24986	Critical	L	L	L	L	L	L	L	M	M	M	L	M	M
White Sulphur Springs VFD	195 Bob White Lane	White Sulphur Springs	WV	24986	Critical	L	L	L	L	L	L	L	L	M	M	L	M	M
White Sulphur Springs WTP	1266 Big Draft Rd	White Sulphur Springs	WV	24986	Critical	L	L	L	M	L	L	L	M	M	M	L	M	M
White Sulphur Springs WWTP	267 John H. Bowling J rLn	White Sulphur Springs	WV	24986	Critical	L	L	L	H	L	L	L	M	M	M	L	M	M
Northern Greenbrier Clinic	6633 Shoestring Trail	Williamsburg	WV	24991	Vulnerable	L	L	L	L	L	L	M	L	M	M	L	M	M
Williamsburg Community Center/Shelter	6571 Shoestring Trail	Williamsburg	WV	24991	Critical	L	L	L	L	L	L	M	L	M	M	L	M	M
Williamsburg VFD	6571 Shoestring Trail	Williamsburg	WV	24991	Critical	L	L	L	M	L	L	M	L	M	M	L	M	M
Bridges	Region-wide		WV		Special	L	L	L	H	L	M	L	M	M	M	L	M	H
Railways	Region-wide		WV		Special	L	L	L	H	L	M	L	M	M	M	L	M	H
Residential	Region-wide		WV		Special	L	L	L	H	L	L	M	L	M	M	L	M	H
Roads	Region-wide		WV		Special	L	L	L	H	L	M	M	M	M	M	L	M	H

Table 6.3: Nicholas County Asset List

Nicholas County Assets	Address	Municipality	State	Zip	Asset Type	Dam	Drought	Earthquake	Flooding	Hail	Hazmat	Mass Movement	Terrorism	Thunderstorm	Tornado	Wildfire	Wind	Winter
Birch River Elementary School	379 Birch River Road	Birch River	WV	26610	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Birch River Fire Department	537 Firehouse Road	Birch River	WV	26610	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Beaver Mill	West Webster Rd.	Craigsville	WV	26205	Historical	L	L	L	L	L	L	L	L	M	M	M	M	M
Craigsville-Beaver-Cottle Volunteer Fire Department	18800 W Webster road	Craigsville	WV	26205	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Gauley River Elementary School	101 School Street	Craigsville	WV	26205	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Jan-Care Ambulance Service Incorporated - Craigsville	Richwood Road	Craigsville	WV	26205	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Nicholas County Career/Technical Center	215 Milam Additional Avenue	Craigsville	WV	26205	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Dixie Elementary School	1988 Dixie Highway	Dixie	WV	25059	Vulnerable	L	L	L	H	L	L	L	L	M	M	M	M	M

Mason--Drennen House	Jct. Of Wv 39 And Wv 129,	Drennen	WV	26667	Historical	L	L	L	H	L	L	L	L	M	M	M	M	H
Kesslers Cross Lane Volunteer Fire Service	State Highway 129	Kesslers Cross Lane	WV	26675		L	L	L	L	L	L	L	L	M	M	M	M	H
Halstead, Capt. John, Farm	9 whitewater rd	Kesslers Cross Lane	WV	26651	Historical	L	L	L	L	L	L	L	L					
Mount Lookout Elementary School	1946 Mt. Lookout Road	Mt. Lookout	WV	26678	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	H
Mount Nebo Elementary School	110 Schoolhouse Lane	Nebo	WV	26651	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Nettie Fire Department Incorporated	314 Leivasy Road	Nettie	WV	26681	Critical	L	L	L	L	L	L	L	L	M	M	M	M	H
Panther Creek Elementary School	10069 Canvas Nettie Road	Nettie	WV	26681	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	H
Quinwood Emergency Ambulance Incorporated	State Route 20	Nettie	WV	26681	Critical	L	L	L	L	L	L	L	L	M	M	M	M	H
Cherry River Elementary School	191 Riverside Drive	Richwood	WV	26261	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	H
Nicholas County Health Care Center	18 Fourth Street	Richwood	WV	26261	Vulnerable	L	L	L	H	L	L	L	L	M	M	M	M	H
Brock Hotel	1401 Webster Rd.	Summersville	WV	26651	Historical	L	L	L	L	L	L	L	L	M	M	M	M	M

Brown, Dr. Flavius, House	Old Wilderness Rd.	Summersville	WV	26651	Historical	L	L	L	L	L	L	L	L	M	M	M	M	M
Carden, James B., House	Turnpike Road	Summersville	WV	26651	Historical	L	L	L	L	L	L	L	L	M	M	M	M	H
Glade Creek Elementary	7950 Webster Road,	Summersville	WV	26651	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Hamilton, Martin, House	Turnpike Road	Summersville	WV	26651	Historical	L	L	L	L	L	L	L	L	M	M	M	M	H
Hookersville Muddlety Volunteer Fire Department	480 Hookersville Road,	Summersville	WV	26651	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Jan-Care Ambulance Service Incorporated - Summersville	1113 Broad Street	Summersville	WV	26651	Critical	L	L	L	L	L	L	L	L	M	M	M	M	M
Lowes (Summersville)	5200 Webster Road,	Summersville	WV	26651	Economic	L	L	L	H	L	L	L	L	M	M	M	M	M
New Life Christian Academy	899 Broad Street	Summersville	WV	25561	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Nicholas County Bank	800 Main St.	Summersville	WV	25561	Historical	L	L	L	L	L	L	L	L	M	M	M	M	M
Nicholas County BOE	400 Old Main Drive	Summersville	WV	26651	Economic	L	L	L	L	L	L	L	L	M	M	M	M	M
Nicholas County Courthouse	700 Main St.	Summersville	WV	26651	Critical	L	L	L	L	L	L	L	M	M	M	M	M	M
Nicholas County Courthouse	700 Main St.	Summersville	WV	26651	Historical	L	L	L	L	L	L	L	L	M	M	M	M	M
Nicholas County Emergency	511 Church St, L02	Summersville	WV	26651	Critical	L	L	L	L	L	L	L	M	M	M	M	M	M

Operations Center																		
Nicholas County High School	Main St.	Summersville	WV	26651	Historical	L	L	L	L	L	L	L	L	M	M	M	M	M
Nicholas County High School	30 Grizzle Lane	Summersville	WV	26651	Vulnerable	L	L	L	L	L	L	L	L	M	M	M	M	M
Nicholas County Sherriff	700 Main St	Summersville	WV	26651									M	M	M	M	M	M
Nicholas County Sherriff	700 Main st	Summersville	WV		Critical	L	L	L	L	L	L	L						
Columbia WV Inc.	242 Callahan Rd.	Tioga	WV	26691	Economic	L	L	L	L	L	L	L	L	M	M	M	M	M
Bridges	Region-wide		WV		Special	L	L	L	H	L	M	L	M	M	M	M	M	H
Railways	Region-wide		WV		Special	L	L	L		L	M	L	M	M	M	M	M	H

Table 6.4: Pocahontas County Assets

Pocahontas County Assets	Address	Municipality	State	Zip	Asset Type	Dam	Drought	Earthquake	Flooding	Hail	Hazmat	Mass Movement	Terrorism	Thunderstorm	Tornado	Wildfire	Wind	Winter
Interstate Hardwoods Co Inc	6954 Staunton Parkersburg Turnpike	Bartow	WV	24920	Economic	L	L	L	H	L	L	L	L	M	L	L	M	H
Post Office Bartow	6784 Staunton Parkersburg Turnpike	Bartow	WV	24920	Special	L	L	L	H	L	L	L	L	M	L	L	M	H
United States Department of Agriculture - Forest Service - Greenbrier Ranger District Office	7443 Staunton Parkersburg Turnpike	Bartow	WV	24920	Special	L	L	L	L	L	L	L	M	M	L	L	M	H
Camp Thornwood	170 Middle Mountain Rd	Bartow	WV	24920	Special	L	L	L	H	L	L	L	L	M	L	L	M	H
Post Office Buckeye	14333 Seneca Trail	Buckeye	WV	24924	Special	L	L	L	L	L	L	M	L	M	L	L	M	M
School - Board of Education	404 Old Buckeye Rd	Buckeye	WV	24924	Vulnerable	L	L	L	L	L	L	L	M	M	L	L	M	H
State Park - Cass Scenic Railroad State Park & Historic District	12363 Cass Rd	Cass	WV	24927	Historical	L	L	L	L	L	L	L	L	M	L	L	M	H

VFD Cass	10818 Cass Rd	Cass	WV	24927	Critical	L	L	L	L	L	L	L	L	M	L	L	M	H
Regional Asset(s) - Bridges	County-wide	County-wide	WV	x	Critical	L	L	L	H	L	M	M	M	M	L	L	M	H
Regional Asset(s) - Dams	County-wide	County-wide	WV	x	Critical	x	L	L	H	L	L	M	M	M	L	L	L	L
Regional Asset(s) - Railways	County-wide	County-wide	WV	x	Economic	L	L	L	H	L	M	M	M	M	L	L	M	H
Regional Asset(s) - Recreation and toursim economy assets, Trails, Recreation Areas, Campgrounds, etc.	County-wide	County-wide	WV	x	Economic	L	L	L	H	L	L	M	L	M	L	L	L	H
Regional Asset(s) - Residential	County-wide	County-wide	WV	x	Special	L	L	L	H	L	L	M	L	M	L	L	M	H
Regional Asset(s) - Roads	County-wide	County-wide	WV	x	Critical	L	L	L	H	L	M	M	M	M	L	L	M	H
School - Pocahontas County High School	271 Warrior Way	Dunmore	WV	24934	Vulnerable	L	L	L	L	L	L	L	L	M	L	L	M	M
Durbin and Greenbrier Valley Railroad	4781 Staunton Parkersburg Turnpike	Durbin	WV	26264	Economic	L	L	L	H	L	L	H	M	H	L	L	M	H

Pocahontas County Free Library Branch	4715 Staunton Parkersburg Turnpike	Durbin	WV	26264	Special	L	L	L	L	L	L	M	L	M	L	L	M	H
Post Office Durbin	4345 Staunton Parkersburg Turnpike	Durbin	WV	26264	Special	L	L	L	L	L	L	M	L	M	L	L	M	H
VFD Bartow-Frank-Durbin - Durbin Station	40 Fourth Ave	Durbin	WV	26264	Critical	L	L	L	L	L	L	M	L	M	L	L	M	H
Sewage Treatment Plant Durbin	296 Meadow LN	Durbin	WV	26264	Critical	L	L	L	L	L	L	M	M	M	L	L	M	H
Community Care of WV Green Bank Clinic & Pharmacy	4470 Potomac Highlands Trail	Green Bank	WV	24944	Critical	L	L	L	H	L	L	L	L	M	L	L	M	M
First Citizens Bank (Green Bank)	6718 Potomac Highlands Trail	Green Bank	WV	24944	Critical	L	L	L	L	L	L	L	L	M	L	L	M	H
Frontier Communications	6755 Potomac Highlands Trail	Green Bank	WV	24944	Critical	L	L	L	L	L	L	L	L	M	L	L	M	H
Pocahontas County Free Library Branch	5683 Potomac Highlands Trail	Green Bank	WV	24944	Special	L	L	L	L	L	L	L	L	M	L	L	M	H
Post Office Dunmore	242 Potomac Highlands Trail	Green Bank	WV	24934	Special	L	L	L	L	L	L	L	L	M	L	L	M	M

Post Office Green Bank	5314 Potomac Highlands Trail	Green Bank	WV	24944	Special	L	L	L	L	L	L	L	L	M	L	L	M	H
School - Green Bank Elementary and Middle	5917 Potomac Highlands Trail	Green Bank	WV	24944	Vulnerable	L	L	L	L	L	L	L	L	M	L	L	M	H
Senior Care - Pocahontas County Senior Center & Meals on Wheels	4500 Potomac Highlands Trail	Green Bank	WV	24944	Vulnerable	L	L	L	H	L	L	L	L	M	L	L	M	M
VFD Bartow-Frank-Durbin - Green Bank Station	4676 Potomac Highlands Trail	Green Bank	WV	24944	Critical	L	L	L	L	L	L	L	L	M	L	L	M	M
Green Bank Observatory	155 Observatory Rd	Green Bank	WV	24944	Special	L	L	L	L	L	L	L	L	M	L	L	M	H
Pocahontas County Free Library Branch	54 Third Street	Hillsboro	WV	24946	Special	L	L	L	L	L	L	L	L	M	L	L	M	M
Post Office Hillsboro	7559 Seneca Trail	Hillsboro	WV	24946	Special	L	L	L	L	L	L	L	L	M	L	L	M	M
School - Hillsboro Grade School	7724 Seneca Trail	Hillsboro	WV	24946	Vulnerable	L	L	L	L	L	L	L	L	M	L	L	M	M
State Park - Droop Mountain Battlefield State Park	683 Droop Mountain State Park Rd	Hillsboro	WV	24946	Historical	L	L	L	L	L	L	L	L	M	L	L	M	M
WV Dept. of Corrections - Denmar	4319 Denmar Road	Hillsboro	WV	24946	Vulnerable	L	L	L	L	L	L	L	M	M	L	L	M	M

Historic McNeel Mill	9905 Seneca Trail	Hillsboro	WV	24946	Historical	L	L	L	L	L	L	L	L	M	L	L	M	M
Historic Pearl S Buck Birthplace	8129 Seneca Trail	Hillsboro	WV	24946	Historical	L	L	L	L	L	L	L	L	M	L	L	M	M
VFD Hillsboro	7530 Seneca Trail	Hillsboro	WV	24946	Critical	L	L	L	L	L	L	L	L	M	L	L	M	M
Burns Motor Freight	18750 Seneca Trail	Marinton	WV	24954	Economic	L	L	L	L	L	L	M	L	M	L	L	M	H
Frank and Anna Hunter House	909 Seneca Trail	Marinton	WV	24954	Historical	L	L	L	L	L	L	L	L	M	L	L	M	M
Frontier Communications	916 3rd Ave	Marinton	WV	24954	Critical	L	L	L	H	L	L	L	M	M	L	L	M	M
Historic Marlinton Opera House	818 3rd Ave	Marinton	WV	24954	Historical	L	L	L	H	L	L	L	L	M	L	L	M	M
IGA Grocery	18838 Seneca Trail	Marinton	WV	24954	Special	L	L	L	L	L	L	M	L	M	L	L	M	H
Pocahontas Memorial Hospital	150 Duncan Rd	Marinton	WV	24954	Critical	L	L	L	L	L	L	L	L	M	L	L	M	M
Pocahontas Pharmacy	105 Duncan Rd	Marinton	WV	24954	Special	L	L	L	L	L	L	L	L	M	L	L	M	M
Pocahontas Times Inc	206 8th St.	Marinton	WV	24954	Historical	L	L	L	H	L	L	M	L	M	L	L	M	M
Post Office Marlinton	819 4th Ave	Marinton	WV	24954	Special	L	L	L	L	L	L	M	L	M	L	L	M	M
School - Marlinton Grade School	926 5th Ave	Marinton	WV	24954	Vulnerable	L	L	L	H	L	L	M	L	M	L	L	M	M
Senior Care - Pocahontas Center	5 Evertt Tibbs Rd	Marinton	WV	24954	Critical	L	L	L	H	L	L	M	L	M	L	L	M	M
Walgreens Pharmacy	19254 Seneca Trail	Marinton	WV	24954	Special	L	L	L	L	L	L	M	L	M	L	L	M	H

Water Treatment Plant Marlinton	1002 9th Ave	Marinton	WV	24954	Critical	L	L	L	H	L	L	M	M	M	L	L	M	M
Community Care of WV Marlinton Clinic	821 3rd Ave	Marlinton	WV	24954	Critical	L	L	L	H	L	L	L	L	M	L	L	M	M
Glades Building Supply	19456 Seneca Trail	Marlinton	WV	24954	Economic	L	L	L	H	L	L	L	L	M	L	L	M	M
Historic Marlinton Chesapeake & Ohio Railroad Depot	720 4th Ave	Marlinton	WV	24954	Historical	L	L	L	H	L	L	L	L	M	L	L	M	H
Marlinton Fire Rescue	709 2nd Avenue	Marlinton	WV	24954	Critical	L	L	L	H	L	L	L	L	M	L	L	M	M
Marlinton Motor Inn	21507 Seneca Trail	Marlinton	WV	24954	Economic	L	L	L	L	L	L	L	L	M	L	L	M	M
Pocahontas County 911/OEM Office	1008 Jury Street	Marlinton	WV	24954	Critical	L	L	L	H	L	L	L	M	M	L	L	M	M
Pocahontas County Courthouse & Jail	900 10th Avenue	Marlinton	WV	24954	Critical	L	L	L	H	L	L	L	M	M	L	L	M	M
Pocahontas County CVB	301 8th Street	Marlinton	WV	24954	Economic	L	L	L	H	L	L	L	L	M	L	L	M	M
Pocahontas County Family Resource Network	821 3rd Ave	Marlinton	WV	24954	Special	L	L	L	H	L	L	L	L	M	L	L	M	M
Pocahontas County Free Library McClintic Main Library	500 8th Street	Marlinton	WV	24954	Special	L	L	L	M	L	L	L	L	M	L	L	M	M

Pocahontas County Historical Society and Museum	17890 Seneca Trail	Marlinton	WV	24954	Historical	L	L	L	M	L	L	L	L	M	L	L	M	M
Pocahontas County Parks and Recreation Wellness Center	320 9th Street	Marlinton	WV	24954	Special	L	L	L	M	L	L	L	L	M	L	L	M	M
School - Marlinton Middle School	1 Copperhead Way	Marlinton	WV	24954	Vulnerable	L	L	L	H	L	L	M	L	M	L	L	M	M
Seneca Health Services	704 3rd Ave	Marlinton	WV	24954	Critical	L	L	L	H	L	L	L	L	M	L	L	M	M
Senior Care - Pocahontas County Senior Center & Meals on Wheels	20626 Seneca Trail	Marlinton	WV	24954	Vulnerable	L	L	L	L	L	L	L	L	M	L	L	M	M
Sewage Treatment Plant Marlinton	376 Stillwell Park rd	Marlinton	WV	24954	Critical	L	L	L	H	L	L	L	L	M	L	L	M	M
Southern States	719 3rd Ave	Marlinton	WV	24954	Economic	L	L	L	H	L	L	L	L	M	L	L	M	M
State Police Detatchment	16212 Seneca Trail	Marlinton	WV	24954	Critical	L	L	L	L	L	L	L	M	M	L	L	M	M
United States Department of Agriculture - Forest Service - Marlinton-White Sulpfur District Office	1627 Cemetery Road	Marlinton	WV	24954	Special	L	L	L	L	L	L	L	M	M	L	L	M	M
VFD Frost	217 Pocahontas HWY	Marlinton	WV	24954	Critical	L	L	L	H	L	L	M	L	M	L	L	M	M

Beckwith Lumber Company	34443 Seneca Trail	Slaty Fork	WV	24291	Economic	L	L	L	L	L	L	L	L	M	L	L	M	H
Post Office Slatyfork	35161 Seneca Trail	Slaty Fork	WV	26291	Special	L	L	L	L	L	L	L	L	M	L	L	M	H
Pocahontas County Free Library Branch	72 Snowshoe Drive	Slatyfork	WV	26291	Special	L	L	L	M	L	L	L	L	H	L	L	M	M
Snowshoe Mountain Resort	6099 Snowshoe Dr	Snowshoe	WV	26209	Economic	L	L	L	L	L	L	M	L	M	L	L	M	H
VFD Shavers Fork	150 Rescue Rd	Snowshoe	WV	26209	Critical	L	L	L	L	L	L	M	L	M	L	L	M	H

Table 6.5: Webster County Assets

Webster County Assets	Address	Municipality	State	Zip	Asset Type	Dam	Drought	Earthquake	Flooding	Hail	Hazmat	Mass Movement	Terrorism	Thunderstorm	Tornado	Wildfire	Wind	Winter
Camp Cesar	4868 Webster Road	Cowen	WV	26206	Economic	L	L	L	L	L	L	L	L	M	L	L	M	H
Cowen PSD Water Plant	7017 Webster Road	Cowen	WV	26206	Critical	L	L	L	M	L	L	L	M	M	L	L	M	H
Cowen VFD	90 Railroad Avenue	Cowen	WV	26206	Critical	L	L	L	L	L	L	L	L	M	L	L	M	H
Glade MS	25 Mill Street	Cowen	WV	26206	Vulnerable	L	L	L	L	L	L	L	L	M	L	L	M	H
ICG Eastern LLC	1101 Birch River Road	Cowen	WV	2606	Economic	L	L	L	L	L	L	L	L	M	L	L	M	H
Leslie Equipment Co.	6248 Webster Road	Cowen	WV	26206	Economic	L	L	L	L	L	L	L	L	M	L	L	M	H
Webster County Head Start	60 Railroad Avenue	Cowen	WV	26206	Vulnerable	L	L	L	L	L	L	L	L	M	L	L	M	H
Webster Nursing & Rehabilitation Center County Inc.	411 Erbacon Road	Cowen	WV	26206	Vulnerable	L	L	L	L	L	L	L	L	M	L	L	M	H
Diana VFD	55 Guardian Drive	Diana	WV	26217	Critical	L	L	L	L	L	L	L	L	M	L	L	M	H
ANR Coal-WV LLC	61 Brooks Run Road	Erbacon	WV		Economic	L	L	L	L	L	L	L	L	M	L	L	M	H

Erbacon VFD	4900 Erbacon Road	Erbacon	WV		Critical	L	L	L	L	L	L	L	L	M	L	L	M	H
Hacker Valley ES	11 School Loop Road	HackerValley	WV		Vulnerable	L	L	L	L	L	L	L	L	M	L	L	M	H
Hacker Valley VFD	4999 Hacker Valley Road	HackerValley	WV		Critical	L	L	L	L	L	L	L	L	M	L	L	M	H
Mollohan Mill	1505 Poling Road	HackerValley	WV	26222	Historical	L	L	L	H	L	L	L	L	M	L	L	M	H
Webster County HS	1 Highlander Drive	UpperGlade	WV		Vulnerable	L	L	L	L	L	L	L	L	M	L	L	M	H
K&M Sales	655 Point Mountain Road	Webster Springs	WV	26288	Economic	L	L	L	M	L	L	L	L	M	L	L	M	H
Morton House	130 Union Street	Webster Springs	WV	26288	Historical	L	L	L	L	L	L	L	L	M	L	L	M	H
Seneca Mental Health	70 Parcoal Road	Webster Springs	WV	26288	Vulnerable	L	L	L	L	L	L	L	L	M	L	L	M	H
The Jim C. Hamer Co.	111 Mill Run Road	Webster Springs	WV	26288	Economic	L	L	L	L	L	L	L	L	M	L	L	M	H
Webster County Commission of Senior Citizens, Inc.	148 S. Court Street	Webster Springs	WV	26288	Vulnerable	L	L	L	L	L	L	L	L	M	L	L	M	H
Webster County Memorial Hospital	324 Miller Mountain Drive	Webster Springs	WV	26288	Vulnerable	L	L	L	L	L	L	L	L	M	L	L	M	H
Webster County OES/911	210 Back Fork Street	Webster Springs	WV	26288	Critical	L	L	L	H	L	L	L	M	M	L	L	M	H
Webster County	2 Court Street	Webster Springs	WV	26288	Critical	L	L	L	L	L	L	L	M	M	L	L	M	H

Sheriff's Office																		
Webster Springs ES	318 River Drive	Webster Springs	WV	26288	Vulnerable	L	L	L	H	L	L	L	L	M	L	L	M	H
Webster Springs PD	146 McGraw Avenue	Webster Springs	WV	26288	Critical	L	L	L	L	L	L	L	M	M	L	L	M	H
Webster Springs PSD	38 Clean Water Lane	Webster Springs	WV	26288	Critical	L	L	L	H	L	L	L	M	M	L	L	M	H
Webster Springs VFD	55 McGraw Avenue	Webster Springs	WV	26288	Critical	L	L	L	L	L	L	L	L	M	L	L	M	H
WV American Water	520 Orchard Street	Webster Springs	WV	26288	Critical	L	L	L	H	L	L	L	M	M	L	L	M	H
Bridges	Region-wide		WV		Special	L	L	L	H	L	M	L	M	M	L	L	M	H
Craig Run East Fork Rock Shelter	Monongahela National Forest		WV		Historical	L	L	L	L	L	L	L	L	M	L	L	M	H
Laurel Run Rockshelter	Monongahela National Forest		WV		Historical	L	L	L	L	L	L	L	L	M	L	L	M	H
Railways	Region-wide	Region-wide	WV		Special	L	L	L	H	L	M	L	M	M	L	L	M	H
Residential	Region-wide	Region-wide	WV		Special	L	L	L	H	L	L	L	L	M	L	L	M	H
Roads	Region-wide	Region-wide	WV		Special	L	L	L	H	L	M	L	M	M	L	L	M	H

NFIP Survey Responses					
County	Fayette	Greenbrier	Fayette	Greenbrier	Webster
Municipality	Fayetteville	White Sulphur Springs	Ansted	Alderson	Camden
Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FRIM)/Digital Flood Insurance Rate Map (DFRIM)?	no	yes	yes	yes	yes
Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?		yes	yes	yes	yes
Has the municipality adopted the most current DFRIM/FRIM and FIS?	no	yes	yes	yes	no
State the date of adoption, if approved		10/26/2012	9/3/2010	9/27/1991	
Does the municipality support request for map updates?	no	yes	yes	yes	no
If so please explain how the municipality supports request for map updates.		LOMA OR LOMR	we use the online mapping system	new maps will be up dated in 2022	
Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	no	no	yes	no	no
Please specify how			if construction would be done in our small flood plain then we would pass on any survey or elevation information		

Does the municipality provide assistance with local floodplain determinations?	no	yes	yes	yes	no
Please specify how		WV Flood Tool	Would meet on a case by case basis	for building permits	
Does the municipality maintain a record of approved Letters of Map Change?	no	yes	yes	yes	yes
Please specify the responsible office		City Hall	Floodplain Manager	Town of Alderson	Town of Camden on Gauley Mayors office
Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	No	Yes	Yes	yes	yes
Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHAs)?		Yes	Yes	Yes	no
Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHAs)?		yes	yes	yes	no
Please specify the office responsible		Floodplain Manager	Zoning/building/flood plain manger	Town of Alderson	
Does the municipality obtain, review, and utilize any Base Flood Elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?		yes	yes	yes	yes

Please specify the office responsible		Floodplain Manager	zoning/building/flood plain manger	Town Of Alderson	Webster County Flood Managements
Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?		yes	yes	yes	yes
Please specify the office responsible		Floodplain Manager	zoning/building/flood plain manger	Town of Alderson	Camden on Gauley Mayors office
Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?		yes	yes	yes	no
Please specify the office responsible		Floodplain Manager	zoning/building/flood plain manger	Town of Alderson	
If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	no	yes	yes	yes	no
Please specify how		Before construction or renovations	zoning/building/flood plain manager	stop work orders	
Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include:	no	yes	no	yes	no

participation in the Community Rating System, Prohibition of production or storage of chemicals in SFHA, Prohibition of certain types of structures such as hospitals, nursing homes, and jails in SFHA, Prohibition of certain types of residential housing (manufactured homes) in SFHA, Floodplain ordinances that prohibit any new residential structures in SFHA					
Please specify activities		2ft above bfh		zoning ordinance	
Does the municipality educate community members about the availability and value of flood insurance?	No	Yes	Yes	Yes	yes
Please specify how			would provide information on a case by case basis	classes	
Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	No	Yes	Yes	Yes	no
Please specify how			would provide information as provided to us	classes	
Does the municipality provide general assistance to community members regarding insurance issues?	no	yes	yes	yes	no
Please specify how			would help on a case by case basis as needed	FEMA	

6.4 APPENDIX 4: CITATIONS

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6.5 APPENDIX 5: ADOPTING RESOLUTIONS

This appendix contains copies of the resolutions signed and adopted by each participating jurisdiction.