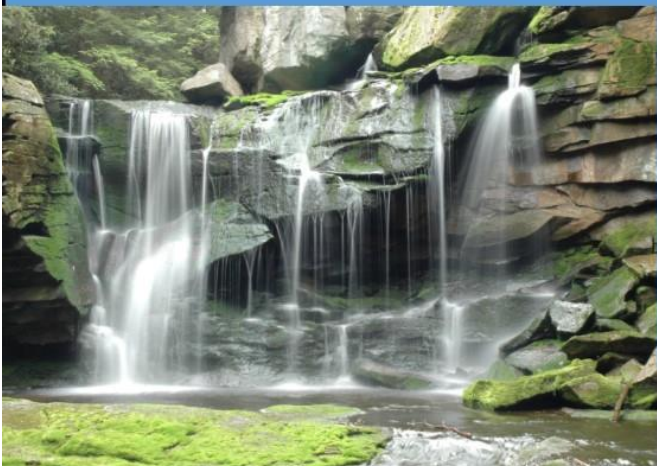




West Virginia Statewide Standard
Hazard Mitigation Plan Update
2018





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1. INTRODUCTION

DISASTER MITIGATION ACT OF 2000 **44 Code of Federal Regulations**

§201.4(c)(6): The plan must be formally adopted by the State prior to submittal to [FEMA] for final review and approval.

§201.4(c)(7): The plan must include assurances that the State will comply with all applicable Federal statutes and regulations in effect with respect to the periods for which it receives grant funding, in compliance with 44 CFR 13.11(c). The State will amend its plan whenever necessary to reflect changes in State or Federal laws and statutes as required in 44 CFR 13.11(d).

1.A. Purpose of the State Hazard Mitigation Plan

The *2018 West Virginia Statewide Standard Hazard Mitigation Plan Update* provides statewide guidance to reduce loss and prevent injury from natural hazards. It reflects an amalgamation of goals, objectives, and strategies developed by the West Virginia Division of Homeland Security and Emergency Management (WVDHSEM), with input from the general citizenry and representatives from all levels of government. The process of mitigation planning is integrated with parts of other planning activities, such as continuity of operations plans, community strategic plans, and the West Virginia Emergency Operations Plan (WVEOP). This encourages a holistic effort to reduce risk and better respond to disasters throughout the State.

1.B. Federal Authorities

In October 2000, the United State Congress recognized that the Nation as a whole was ill-prepared to handle the risks and damages associated with natural hazards by adopting the *Disaster Mitigation Act of 2000* (DMA 2000; Public Law (PL) 106-390). The law amended the existing *1988 Robert T. Stafford Disaster Relief and Emergency Assistance Act*, defining language for 44 Code of Federal Regulations (CFR) Section 201.4. DMA 2000 reinforced the importance of mitigation planning, emphasizing planning before disasters occur. It set an initial standard for the Hazard Mitigation Plan. The standard was further defined by the Federal Emergency Management Agency (FEMA) on February 26, 2002. FEMA published an Interim



Rule that modified §201 and §206 in the *Federal Register*; the Final Rule was published in October 2009. The Guidance and Standard Plan Crosswalk were revised on November 4, 2006 and further updated to include requirements for 90-10 Federal funding for the Severe Repetitive Loss (SRL) and Flood Mitigation Assistance (FMA) grant programs in January 2009. Most recently, the *Biggert-Waters Flood Insurance Reform Act of 2012* restructured many of the Hazard Mitigation Assistance (HMA) grant programs, including the consolidation of SRL and Repetitive Flood Claims Programs into the FMA program. For more detail on these changes, refer to the portion of Section 1.2.2 that addresses the *Biggert-Waters Flood Insurance Reform Act of 2012*. These changes were reflected in the *2013 Hazard Mitigation Assistance Unified Guidance*.

Mitigation planning is specifically addressed at the State and local levels under the *Stafford Act*, Section 322 (42 USC 5165). Adherence to the requirements and criteria set forth in Section 322 of the Act qualifies West Virginia to utilize disaster-related assistance, including Categories C through G of the Public Assistance Program, an essential component of disaster recovery.

Since 2004, West Virginia has been eligible to receive non-emergency *Stafford Act* assistance and Federal mitigation pre-disaster assistance by maintaining an approved Standard Statewide HMP compliant with 44 CFR §201.4 and related FEMA mitigation planning guidance.

The following identifies and describes Federal regulations that have an impact on mitigation and mitigation planning in the United States.

1.C. Disaster Mitigation Action of 2000

Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 USC 5165) was enacted under Section 104 of the DMA 2000, PL 106-390. It was signed into law on October 10, 2000. The intent of DMA 2000 was to facilitate cooperation between State and local authorities. It encourages and rewards local and State disaster planning in advance of disasters in order to promote sustainability of communities and services as a strategy to improve disaster resistance. This enhanced pre-disaster planning effort is intended to support State and local governments' efforts to articulate accurate, targeted, and prioritized needs for hazard mitigation that will reduce exposure to natural hazards. This effort is intended to support timely funding allocation to encourage effective risk reduction strategies and projects.

1.D. The Code of Federal Regulation and the Stafford Act

1.D.1. 44 CFR PART 201

On February 26, 2002, FEMA promulgated 44 CFR § 201.1 *et seq.* in order to implement DMA 2000. The Interim Final Rule was amended several times to address standard and enhanced State



plans during 2007. Guidance for local plans was published on March 28, 2012. In addition, guidance for the FMA Program (44 CFR § 201.4 *et seq.*) requires amendment of State plans per a new crosswalk for these programs issued on January 14, 2008. The rule addresses State mitigation planning, and specifically in 44 CFR § 201.3 (c) identifies the States' mitigation planning responsibilities, which include:

- Prepare and submit to FEMA a Standard Statewide HMP following criteria established in 44 CFR § 201.4 as a condition of receiving *Stafford Act* assistance (except emergency assistance).
- For consideration for 20% Hazard Mitigation Grant Program (HMGP) funding, prepare and submit an Enhanced State Mitigation Plan in accordance with 44 CFR § 201.5, which must be reviewed and updated, if necessary, every three years from the date of the approval of the previous plan.
- Review and if necessary, update the Standard State Mitigation Plan by November 1, 2004, and every three years from the date of approval of the previous plan in order to continue program eligibility.
- Make available the use of up to the seven percent of HMGP funding for planning in accordance with 44 CFR § 206.434. See 44 CFR § 201.3 (c).

44 CFR § 201.4, Standard State Mitigation Plans, lists the required elements of State Hazard Mitigation Plans. Under 44 CFR § 201.4 (a), by November 1, 2004, States were required to have an approved Standard State HMP that met the requirements of the regulation to receive *Stafford Act* assistance. The planning process, detailed in 44 CFR § 201.4 (b), includes coordination with other State agencies, appropriate Federal agencies, and interested groups. Guidance for State standard and enhanced plans and local and multi-jurisdictional plans has been updated several times to incorporate changes from the Katrina Reform Act, new Unified Hazard Mitigation Assistance Grant Programs, and "lessons learned" through the first cycle of State and local mitigation planning. Current State standard plan guidance and the State plan crosswalk were used in preparing the 2013 West Virginia HMP update.

44 § 201.4 (c), Plan Content, identifies the following elements that must be included in a Statewide Standard HMP:

1. A description of the planning process used to develop the plan;
2. Risk assessments that provide the factual basis for activities proposed in the strategy portion of the mitigation plan;



3. A Mitigation Strategy that provides the state's blueprint for reducing losses identified in the risk assessment;
4. A section describing Coordination of Local Mitigation Planning;
5. A Plan Maintenance Process, including a method and schedule for monitoring, evaluating and revising the plan; a system for monitoring implementation of mitigation strategies and projects; and a system for reviewing progress in achieving goals, objectives and strategies as well as project implementation;
6. A Plan Adoption Process for formal adoption by the State prior to submittal to FEMA for final review and approval; and
7. Assurances that the State will comply with all applicable Federal statutes and regulations in effect with respect to grant funding periods, in compliance with 44 CFR 13.11(c). The state must amend its plan whenever needed to reflect changes in state or federal laws and statutes as required by 44 CFR 13.11(d).
8. Revisions to plans per guidance issued January 14, 2008 must include a program strategy for state eligibility for 90% federal funding for the Severe Repetitive Loss Program for FY 2008 and the Flood Mitigation Assistance Program for FY 2009. Plan revisions must in compliance with 44 CFR 201.4.

1.D.2. 44 CFR PART 206

On February 26, 2002, FEMA also changed 44 CFR Part 206 in order to implement DMA 2000 (See 67 *Federal Register* 8844 [February 26, 2002]). Changes to 44 CFR Part 206 authorize HMGP funds for planning activities and increase the amount of HMGP funds available to States that develop an Enhanced Mitigation Plan. FEMA amended Part 206 in 2006 following the passage of the *Katrina Reform Act*, which restored HMGP funding to 15 percent of eligible disaster recovery costs for States with approved Standard Mitigation Plans (SMPs).

1.D.3. 44 CFR PART 206.400

(a) As a condition of the receipt of any disaster assistance under the *Stafford Act*, the applicant shall carry out any repair or construction to be financed with the disaster assistance in accordance with applicable standards of safety, decency, and sanitation and in conformity with applicable codes, specifications and standards.

(b) Applicable codes, specifications, and standards shall include any disaster resistant building code that meets the minimum requirements of the National Flood Insurance Program (NFIP) as well as being substantially equivalent to the recommended provisions of the National Earthquake Hazards Reduction Program (NEHRP). In addition, the applicant shall comply with any requirements necessary in regard to Executive Order 11988, Floodplain Management, Executive



Order 12699, Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction, and any other applicable Executive orders.

(c) In situations where there are no locally applicable standards of safety, decency and sanitation, or where there are no applicable local codes, specifications and standards governing repair or construction activities, or where the Regional Administrator determines that otherwise applicable codes, specifications, and standards are inadequate, then the Regional Administrator may, after consultation with appropriate State and local officials, require the use of nationally applicable codes, specifications, and standards, as well as safe land use and construction practices in the course of repair or construction activities.

(d) The mitigation planning process that is mandated by section 322 of the *Stafford Act* and 44 CFR part 201 can assist State and local governments in determining where codes, specifications, and standards are inadequate, and may need to be upgraded.

1.E. Post-2010 Federal Policy Updates

1.E.1. Biggert-Waters Flood Insurance Reform and Modernization Act of 2012

On July 6, 2012, the *Biggert-Waters Flood Insurance Reform and Modernization Act of 2012*, was signed into law. It represents significant changes to fundamental operation and management of the NFIP. Many policyholders will see revised flood insurance rates that more accurately reflect the actuarial rate, or true flood risk, of their insured property. These measures were inserted into the law to help financially stabilize the NFIP. Furthermore, these provisions change how Flood Insurance Rate Maps (FIRM) updates impact policyholders through increased premiums resulting from more accurate predictions of risk. The legislation also eliminated RFC, and SRL programs, while incorporating elements of these programs into FMA. These changes were reflected in the *2013 Hazard Mitigation Assistance Unified Guidance*.

1.E.2. Sandy Recovery Improvement Act of 2013

On January 29, President Obama signed the *Sandy Recovery Improvement Act of 2013*. The Act sets out certain reconstruction and grant administrative standards that apply to the States that received the Sandy Presidential Declaration of Disaster. Some implications of the Act could be seen in general revised FEMA HMA Guidance, scheduled for release during summer 2013, and other Federal recovery funds. For example, requirements to complete HMGP and Community Development Block Grant (CDBG) projects funded by the Sandy Act could eventually extend to the programs at large through issuance of new guidance, which would impact West Virginia.



The Federal Hurricane Sandy Rebuilding Task Force has also announced that all Sandy-related rebuilding projects funded by the supplemental spending bill must meet a single uniform flood risk reduction standard. The standard is informed by the best science and best practices, including assessments taken following Hurricane Sandy. It brings the Federal standard into alignment with many existing State and local standards and takes into account the increased risks in the Sandy-affected region caused by extreme weather events, sea level rise, and other impacts of climate change.

The standard applies to the rebuilding of structures that were substantially damaged during the storm and will be repaired or rebuilt with Federal funding. As a result, the new standard will require owners of residential, commercial, or infrastructure projects who are applying for Federal dollars to plan for increased flood risk.

Requirements derived from the *Sandy Recovery Improvement Act of 2013* do not retroactively affect Federal aid that was previously given to property owners and communities in Sandy-impacted areas. Moving forward, the Federal standard applies to substantial rebuilding projects (i.e., when damage exceeds 50 percent of the value of the structure) that will rely on Federal funding.

The programs which received funding in the supplemental bill and will be impacted by this standard include:

- U.S. Department of Housing and Urban Development (HUD): Community Development Block Grant Disaster Recovery Program: Construction and reconstruction projects funded by Social Services Block Grants and Head Start.
- FEMA: HMGP and Public Assistance Program.
- U.S. Environmental Protection Agency (EPA): The State Revolving Fund (SRF) programs.
- U.S. Department of Transportation (DOT): Federal Transit Administration's Emergency Relief Program, as well as some Federal Railroad Administration and Federal Highway Administration projects.

1.E.3. Memorandum: Cost Effectiveness & Determinations for Acquisitions/Elevations

Projects applying for mitigation grant funding under the HMA programs must prove that they are cost effective. The cost-effectiveness determination process traditionally utilizes the FEMA Benefit-Cost Analysis software, and requires assessment of the costs of the project in comparison to the projected reduction in damages due to the project's implementation (benefits). This



assessment process can be challenging depending upon the nature of the project and availability of data.

In order to simplify this process, FEMA issued the memorandum titled “Cost Effectiveness Determinations for Acquisitions and Elevations in Special Flood Hazard Areas”, signed on August 15, 2013 by Roy E. Wright, Deputy Associate Administrator for Mitigation from FEMA’s Risk Reduction Division (see Appendix H). This memorandum states that if the cost of an acquisition or elevation project is less than \$276,000 or \$175,000 respectively, then the project is determined to be cost effective. This purpose of this memorandum is to reduce the burden on applicants to develop Benefit Cost Analyses (BCA) as part of the application process.

The cost of elevation and acquisition in West Virginia, however, tends to be lower than the national average. As a result, many projects that have not historically been eligible might now meet this requirement. It also means that there are likely to be more projects that meet all of the eligibility requirements than there are HMA funding opportunities.

In order to address these challenges, WVDHSEM is reconsidering how it will address prioritization of funding of mitigation projects. While this funding strategy has not been finalized, WVDHSEM is considering providing Federal mitigation grant funds for elevation and acquisition projects on a first-come, first-serve basis, assuming all other eligibility criteria are met, or potentially still running a BCA on the project and awarding funding based on those that are considered most cost-effective. More information will become available as WVDHSEM finalizes its prioritization strategy.

1.F. Mitigation Planning in West Virginia

Requirement 44 CFR §201.4(c)(6): The plan must be formally adopted by the State prior to submittal to [FEMA] for final review and approval.

The Standard Statewide HMP is the result of the systematic evaluation of the nature and extent of vulnerability to the effects of natural and man caused hazards present in the State of West Virginia and includes the actions needed to minimize future vulnerability to those hazards. It sets forth the policies, procedures, and philosophies that are used to establish and implement hazard mitigation activities within the state. Effective and consistent implementation of this plan is crucial to the hazard mitigation program and the state’s efforts to reduce or eliminate the threat of future disasters. Overall administration of the hazard mitigation program shall be the responsibility of the WVDHSEM. The State will officially adopt the 2018 Standard Statewide HMP update upon FEMA review and receipt of Approval Pending Adoption (APA) status. A draft execution letter is currently included.



This Plan is the result of efforts from stakeholders, staff and a variety of technical advisors to provide a document that fully describes a plan that meets the requirements for an HMP. The following plan addresses natural and human made hazards and important attributes across the State.

1.G. West Virginia Authority, Assurance, and Adoption

1.G.1. Authority

Both the 2010 and 2013 updates to the HMP adhere to the West Virginia Code § 15-5 Public Safety. In Code § 15-5, the West Virginia legislature declared that it is necessary to establish and implement comprehensive emergency management plans to ensure the State's preparedness for disasters. In addition, legislation states that:

“to establish and implement comprehensive homeland security and emergency management plans to deal with such disasters and large-scale threats. It is further declared to be the purpose of this article and the policy of the state that all homeland security and emergency management funds and functions of this state be coordinated to the maximum extent with the Secretary of the Department of Military Affairs and Public Safety and with the comparable functions of the federal government including its various departments and agencies, of other states and localities and of private agencies of every type, so that the most effective preparation and use may be made of the nation's and this state's manpower, resources and facilities for dealing with any disaster or large-scale threat that may occur.” (West Virginia Code § 15-5-1(4))

Under West Virginia Code § 15-5-5(2), the Governor is empowered with the authority to prepare, implement, integrate, and coordinate comprehensive plans and programs for the purpose of providing emergency services in West Virginia.

To prepare and implement a comprehensive plan and program for the provision of emergency services in this state, such plan and program to be integrated into and coordinated with comparable plans of the federal government and of other states to the fullest possible extent, and to coordinate the preparation of such plans and programs by the political subdivisions of this state, such plans to be integrated into and coordinated with the state plan and program to the fullest possible extent. (West Virginia Code § 15-5-1(2))

This excerpt allows for the development of more streamlined and holistic approach to emergency management and recovery. Beyond planning, the Governor, by the statute of West Virginia Code § 15-5-5(3), can authorize to preparatory steps in advance of events.

In accordance with such state plan and program, to procure supplies and equipment, to institute training and public information programs, to take all other



preparatory steps including the partial or full mobilization of emergency services organizations in advance of actual disaster and to insure the furnishing of adequately trained and equipped emergency services personnel in time of need. (West Virginia Code § 15-5-5(3))

Furthermore, the Governor is empowered to authorize studies and surveys to verify the capabilities of the State to provide emergency services and to plan as seen in *West Virginia Code § 15-5-5(4)*, cited below:

To make such studies and surveys of industries, resources and facilities in this state as may be necessary to ascertain the capabilities of the state for providing emergency services and to plan for the most efficient emergency use thereof. (West Virginia Code § 15-5-5(4)).

The studies contained in this hazard mitigation plan have been undertaken pursuant to this authority and to Executive Order 18-03. Many of the recommendations contained in this plan are made in concert with the West Virginia Code § 15-5-20(a), which states:

In addition to disaster prevention measures as included in the state, local, regional and inter-jurisdictional disaster plans, the Governor shall consider on a continuing basis steps that could be taken to prevent or reduce the harmful consequences of disasters. At his or her direction, and pursuant to any other authority and competence they have, state agencies, including, but not limited to, those charged with responsibilities in connection with floodplain management, stream encroachment and flow regulation, weather modification, fire prevention and control, air quality, public works, land use and land-use planning and construction standards, shall make studies of disaster prevention-related matters. The Governor, from time to time, shall make such recommendation to the Legislature, political subdivisions and other appropriate public and private entities as may facilitate measures for prevention or reduction of the harmful consequences of disasters. (West Virginia Code § 15-5-20(a))

This alignment of the plan with West Virginia Code allows the hazard mitigation planning process to aid in reaching State goals.

The West Virginia Code, Chapter 15 Public Safety, §15-5-3, creates the WVDHSEM, which supersedes the Office of Emergency Services. This law establishes that emergency services organizations and operations will be structured around the existing constitutional government. The Governor retains control of and provides “general direction” to “the office of emergency services” for the State. West Virginia Code §15-5-3(a) authorizes the Governor to appoint, with Senate approval, a Director of the WVDHSEM within the West Virginia Department of Military Affairs and Public Safety (WVDMAPS).



The State organization for emergency operations includes:

1. The Governor and immediate staff.
2. The Secretary of WVDMAPS and staff.
3. The West Virginia Division of Homeland Security and Emergency Management (WVDHSEM) and State Emergency Operations Center (SEOC).
4. State departments and agencies assigned emergency responsibilities or having the capability to provide needed assistance in an emergency situation.
5. The State Legislature by concurrent resolution of the Senate and House of Delegates to declare a State of Emergency to exist or to be terminated.
6. Personnel from selected Federal agencies and participating public/private organizations.
7. Local governments. Each political subdivision is required to have an emergency services organization. Locally available manpower, materials, equipment, and facilities are to be identified in each local WVEOP. Non-affected localities can be expected to provide assistance when requested.
8. Federal agencies upon request within their statutory authority.
9. Non-governmental organizations.

West Virginia Code §§ 15-5, et seq. - *The Emergency Planning and Community Right-to-Know Act of 1986*, P.L. 99-499, enacted by the United States Congress and signed into law on October 17, 1986, has two primary objectives:

- To require states and local communities to develop comprehensive emergency response plans; and
- To establish a program for the collection and dissemination to the public of information on certain hazardous chemicals and toxic chemicals in their communities.

1.G.2. Assurances

As a condition of approval of a State hazard mitigation plan by the FEMA Regional Administrator, 44 CFR § 201.4(c)(7) requires that the plan contain certain assurances. The State must assure that it will comply with Federal statutes and regulations that pertain to grant funding, and will amend the plan to reflect changes in pertinent State or Federal laws.



Accordingly, under the authorities provided in WV Code § 15-5-1, *et seq.*, and Executive Order No. 18-03, the WV Division of Homeland Security and Emergency Management, pledges that it will continue to:

- Comply with all applicable Federal statutes and regulations in effect with respect to the periods for which it receives grant funding, in compliance with 44 CFR 13.11(c); and
- Amend this plan whenever necessary to reflect changes in State or Federal laws and statutes as required in 44 CFR 13.11(d).

1.G.3. Adoption

The plan serves as the *West Virginia Hazard Mitigation Plan* and is formally adopted by the Governor of West Virginia. See attached letter in Appendix I.

1.G.4. Emergency Management Accreditation Program

The Emergency Management Accreditation Program (EMAP) is the voluntary assessment and accreditation process for state and local government programs responsible for coordinating prevention, mitigation, preparedness, response, and recovery activities for natural and human-caused disasters. Accreditation is based on compliance with national standards.

The WVDHSEM is working through the process to become EMAP accredited.

1.H. Overview of the Plan

Section 1 provide an Introduction to the hazard mitigation plan. It includes information related to Federal and State laws, regulations, and policies supporting mitigation planning. In addition, it provides details related to assurance and the adoption of the plan. It includes with information related to the Emergency Management Accreditation Program.

Section 2 contains basic information related to the demographics of West Virginia. This State Profile provides foundational information to better understand the conditions which exist in the state.

Section 3 provides a summary of the process used to develop the 2018 Statewide Standard Hazard Mitigation Plan Update. This specifically includes information related to describing the process used to develop the plan, explaining which stakeholders were involved in the plan update, and other factors related to review/update the plan.

Section 4 provides a detailed examination of the Hazard Identification and Risk Assessment process used in the 2018 Update. The section begins with a review of past disasters and



2018 WV Statewide Standard Hazard Mitigation Plan Update

declarations. It also includes a review of the methodology used to rate the hazards. For the purpose of the 2018 plan update, the following hazards will be reviewed: flooding, landslides/subsidence, high winds/severe storms, winter weather, wildfire, dam/levee failure, drought, and earthquakes. The analysis for each of the 8 hazards the following information is provided: a summary of the hazard, a listing of historical occurrences, a county-level risk probability, and a review of potential impacts on critical facilities.

Section 5 describes the connection between the state hazard mitigation plan and the plans developed by the Regional Planning and Development Councils. This includes both details on the status of local plans and information related to the support provided to the PDCs to maintain approved hazard mitigation plans.

Section 6 is focused on outlining the hazard mitigation strategies developed by the state to address identified hazards. The 2018 update changed the method in which the mitigation strategies are identified, and this document explains the process of moving from 2013 approach to the new method. It also describes the prioritization method used in evaluating mitigation strategies.

Section 7 describes the process for making sure that the plan is properly maintained and updated.

The appendices provide supportive information to better understand details documented in the plan.



2. PLANNING PROCESS

Disaster Mitigation Act of 2000 **44 Code of Federal Regulations**

Requirement §201.4(c)(1): *The State plan must include a description of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how other agencies participated.*

Does the plan provide a narrative description of how the new or updated plan was prepared?

1. Does the new or updated plan indicate who was involved in the current planning process?
2. Does the new or updated plan indicate how other agencies participated in the current planning process?
3. Does the updated plan document how the planning team reviewed and analyzed each section of the plan?
4. Does the updated plan indicate for each section whether or not it was revised as part of the update process?

Requirement §201.4(b): *The [State] mitigation planning process should include coordination with other State agencies, appropriate Federal agencies, interested groups, and ...*

Does the new or updated plan describe how Federal and State agencies were involved in the current planning process?

1. Does the new or updated plan describe how interested groups (e.g., businesses, non-profit organizations, and other interested parties) were involved in the current planning process?
2. Does the updated plan discuss how coordination among Federal and State agencies changed since approval of the previous plan?

Requirement §201.4(b): *The State mitigation planning process should] be integrated to the extent possible with other ongoing State planning efforts as well as other FEMA mitigation programs and initiatives.*

Does the new or updated plan describe how the State mitigation planning process is integrated with other ongoing State planning efforts?

Does the new or updated plan describe how the State mitigation planning process is integrated with FEMA mitigation programs and initiatives?

2.A. Introduction

Mitigation planning is a critical component for a successful emergency management program. A comprehensive mitigation plan forms the foundation for a community's long-term strategy to reduce disaster losses, protect lives and property, and break the repetitive cycle of disaster damages, injuries and loss of life. A core assumption of hazard mitigation is that a pre-disaster investment can significantly reduce the demand for post-disaster assistance. Further, the adoption of mitigation actions enables local residents, businesses and industries to more quickly recover from a disaster, getting the economy back on track sooner and with less interruption.



The benefits of mitigation planning go beyond reducing hazard vulnerability. Measures such as the acquisition or regulation of land in known hazard areas can help achieve multiple community goals, such as preserving open space, maintaining environmental health, and enhancing recreational opportunities. It creates a framework for risk-based decision making that will continue to not only protect the current infrastructure and populations, but prevent future generations and development from being significantly impacted by natural hazards.

This chapter details the planning process for the completing the *2018 Statewide Standard Hazard Mitigation Plan Update*. The process spanned nearly a year prior to plan adoption. It included meetings between representatives of various Federal, State, and local agencies and involved the review of existing programs, plans, policies, statutes, and historical hazard data. The planning team reviewed this information in the early stages of plan development and remained supportive throughout the planning process in order to better inform decisions on potential mitigation actions.

This plan identifies a multitude of natural and human-caused hazards and considers ways to reduce vulnerability in West Virginia. It encompasses a range of life and property-saving hazard mitigation initiatives in the categories of mitigation coordination, structural and non-structural retrofitting, floodplain management, public safety, and emergency preparedness. Both short-term and long-term hazard mitigation measures are identified in order to help all state and local agencies allocate resources in a responsible manner to provide for the public safety, public health, and general welfare of all the people in West Virginia.

2.B. Overview of the Planning Process

In January of 2017, the West Virginia Military Authority (WVMA) was tasked to complete the 2018 plan update. Initial meetings between the WVMA and WVDHSEM began in early March 2017. Many of these meetings were used to determine the scope of work and to develop a schedule of updates. The primary focus of the early work of the WVMA was to revise elements of the old plan, develop new mitigation initiatives to include, update existing mitigation goals and strategies, and to develop a standard risk assessment methodology.

An update team was assembled in May 2017 drawing upon several employees of the WVMA. This group began regular weekly meetings to discuss the updating process, develop contacts, meet with agencies and sources, and review updated elements of the plan. The role of the planning team was to collect and assemble necessary data from local, state, and federal agencies.

To help facilitate the planning process, the WVMA planning team conducted meetings with county personnel, representatives of state agencies and other stakeholders. This plan has taken into account many years of mitigation experience, and a variety of mitigation projects, from West Virginia and other states. It has taken advantage of the collective mitigation knowledge of



many State, Federal, and Local officials, as well as representatives from both the public and private sectors, and is designed as one component to help safeguard the citizens of the State of West Virginia.

The approach for receiving input from the public, private and state agency/department stakeholders was to reach out via email, conference call, site visit, as well as, communication via data sharing to facilitate draft reviews and collection of comments.

Below is a summary of the planning process tasks as established by the planning team.

- Kick-off Meeting
- Data Collection
- Local/Regional Plan upload and evaluation
- Hazard Identification and Risk Assessment data collection and analysis
- HIRA review and development of goals, strategies, and projects
- Capability assessment update
- Draft Final Plan
- Draft Plan Sections submitted for review
- Final Plan Submittal and Review
- Plan Adoption Support
- Plan Distribution

Beginning in early 2018 staff of the WVDHSEM began interacting with the WVMA staff to transition the plan development back to WVDHSEM. Following a detailed FEMA review of the work product completed by the WVMA, WVDHSEM had to assign numerous staff members to get the plan development process back on track. This involved re-working elements of the hazard identification methodology, re-assessing impacts of hazards on critical facilities and state assets, and enhancing information related to recommended mitigation strategies.

2.C. Planning Team

Critical to the development of the plan was the participation and contributions of more than two dozen representatives of State and Federal agencies, nonprofit organizations, and representatives of institutions of higher education. These participants provided critical information related to the identification of threats, assessment of disaster impacts, and development of mitigation measures.

The core mitigation planning team coordinated the involvement of other stakeholders and managed the review process. Planning team members, agency partners, and other stakeholders



were able to review and submit revisions. The planning team then reviewed submitted information and then consolidated pertinent information. The first phase of the update process was comprised of team members hired by the WV Military Authority. The second phase of the process was primarily coordinated by employees of the WV Division of Homeland Security and Emergency Management.

Team Member	Agency	Primary Role
Col. Randall Isom	WV Military Authority	Project Director
Amy S. Pauley	WV Military Authority	Technical Writer, Research
Gary Kidd	WV Military Authority	Technical Writer
Lonnie Bryson	WV DHSEM	Planning support (new planner)
Brian M. Penix	WV DHSEM	State Hazard Mitigation Officer
Kelli Batch	WV DHSEM	Grant/Planning support
Nuvia E. Villamizar	WV DHSEM	GIS support
David L. Phillips	WV DHSEM	GIS support
Doug W. Cummings	WV DHSEM	Planning support
Matt McCullough	FEMA	Planning, technical support

Table 1 – Mitigation Planning Team Members

2.C.1. Milestones and Timeframe

The West Virginia Hazard Mitigation Planning Team was the driving force in the development of the 2018 update. One of the tasks of the planning team was to pull together relevant stakeholders and to review pertinent planning documents (such as the WV Emergency Operations Plan, local hazard mitigation plans, and previous versions of the state hazard mitigation plan).

The planning team determined the methodology used for the update and acquired, reviewed, and processed the data used to evaluate each of the hazards. This information was then used to develop the necessary maps, tables, and charts for the plan update.

In addition, the planning team reviewed local hazard mitigation plans and previous versions of the state plan to determine which hazards to evaluate. Initially, the draft plan included both natural and human-caused hazards. Upon review of available information, and specific FEMA requirements, the planning team decided to limit the focus strictly on natural hazards.

Over the course of the planning period, the WV Hazard Mitigation Planning Team conducted meetings to accomplish the following activities:



Date	Milestone
January 2017	WVMA assigned project to complete the 2018 update
March 2017	Identification of deliverables, assigning of staff to project
May 2017	Formation of planning team, identification of stakeholders
June-August 2017	Review of local hazard mitigation plans
September 2017	Consolidation of PDC hazards into a state-wide hazard list; reviewed information related to previous hazards
November 2017	Meeting with EMA directors to collect hazard information
December 2017	Develop of methodology to determine vulnerability rates for counties, PDCs, and state
January 2018	Ranking of hazards, develop charts, collect hazard information
February 2018	Review with WVDHSEM. WVDHSEM takes over project management
March 2018	Hazard assessment/write-ups
April-May 2018	Review/edits elements of the plan
June 2018	Submission of draft plan to FEMA. Address feedback
July 2018	Update plan based upon FEMA review
August 2018	Edits, review, weekly calls with FEMA to discuss progress
September 2018	Consolidation of plan. FEMA on-site visits

Table 2 – Project Milestones

2.C.2. Stakeholder Engagement

The process to engage stakeholders includes components related both to developing the hazard mitigation plan (included the development of hazard mitigation strategies) and the completion of grant application to fund specific mitigation projects (i.e. demolition, acquisition, installation of generators).

2.D. State Agency Involvement

State agencies are often the primary stakeholders related to addressing threats and developing mitigation strategies. The majority of the representatives of the state agencies were engaged in the process through emails and individual meetings. This involvement was used to determine overall threats and on-going programs designed to address highest priority threats. The state agency representatives also provided critical information necessary to complete the assessments of the various hazards.



State Agency	Primary Area of Support
WV Conservation Agency	Information related to dam safety
WV Board of Risk and Insurance Management	Information related to facilities/structures covered by BRIM policies
WV Department of Agriculture	Farm and drought information
WV Department of Commerce	Information related to State Resiliency Office
WV Department of Education	Information related to school programs
WV Department of Environmental Protection	Information related to dam safety
WV Department of Health and Human Resources	Information related to health and social services
WV Department of Transportation	Landslide/subsidence related to roads and related to other infrastructure
WV Division of Forestry	Wildfire information
WV Division of Homeland Security & Emergency Management	GIS support, programmatic lead, emergency management program
WV Division of Natural Resources	Information related to natural resource impacts
WV Geological and Economic Survey	Hazard assessment, economic information, data for assessments
WV Housing Development Fund	Housing, infrastructure, and related programs
WV Intelligence Fusion Center	Infrastructure information, threat assessments
WV Public Service Commission	Information regarding utilities, telecommunications, related infrastructure
WV State Fire Marshal	Building code information, fire information
WV Voluntary Organizations Active in Disasters	Coordination of activities with non-profit stakeholders
WVU GIS Technical Center	GIS support, TIEF/TIEL development

Table 3 – State Agencies and Involvement

As part of the outreach to the state agency stakeholders, the list of 2013 mitigation strategies was provided to the representatives of each state agency. They were asked to provide updates and clarifications to the details of the strategy. This allowed the state agency representatives to vet the key elements of the plans.



2.E. Federal Agency Involvement

The primary role of Federal agencies is to provide technical support to the programs in West Virginia. This includes working close with the U.S. Army Corps of Engineers (USACE) and the Silver Jackets program. The Silver Jackets teams are collaborative inter-agency teams continuously working together to reduce flood risk at the state level. Through the Silver Jackets program, the USACE, the Federal Emergency Management Agency (FEMA) and additional federal, state and local agencies, provide a unified approach to addressing the state's priorities. It is essential to learn from one another and apply this knowledge to reduce the risk of flooding and other natural disasters in the state, and enhance response and recovery efforts when such events do occur. The current goals include:

- Facilitate strategic life-cycle flood risk reduction;
- Create or supplement a continuous mechanism to collaboratively solve state-prioritized issues and implement or recommend those solutions;
- Improve processes, identifying and resolving gaps and counteractive programs;
- Leverage and optimize resources;
- Improve and increase flood risk communication and present a unified interagency message; and
- Establish close relationships to facilitate integrated post-disaster recovery solutions.

Additional Federal agencies engaged in the develop of the 2018 Update include: the Federal Emergency Management Agency, National Oceanic Atmospheric Administration

2.F. Stakeholder Involvement

The purpose of mitigation planning is to protect the people and their property from harm. Public involvement in the planning process is vital to the success of a mitigation plan. Inclusion of representatives from local government, businesses and nonprofit organizations, and the public is an important part of the process. Their input provides realistic perspectives of how they are impacted by various hazards, as well as how the actions developed by West Virginia impact them. Furthermore, outreach to stakeholders ideally engenders both confidence in the ability of the government to make meaningful decisions, as well as consideration of the risks facing each person and community. Holistic participation is necessary for the plan to develop the ongoing mitigation movement across the State.

Other State, regional, local, business, non-profit, and other interested stakeholders were encouraged to participate in the planning process through a series of regional outreach meetings. The meetings outlined the objectives of the mitigation plan, current analysis results, and draft



mitigation strategies. Stakeholders provided comments relevant to their individual communities that were then integrated into the plan where appropriate.

2.F.1. Emergency Management Council Conference

Information was also collected from county and local stakeholders at the 2017 Emergency Management Council Conference. During the presentation information was shared related to mitigation activities associated with the 2016 flooding event. This allowed members of the Hazard Mitigation Planning Team to directly interact with representative of majority of the County Emergency Management agency in the state.

2.F.2. Planning Development Councils

Information was also directly shared with members of the regional Planning and Development Councils. This included providing basic outreach related to the status of plans and the planning process. In addition, information related to best practices was shared on a case-by-case basis. Given existing staffing shortages in WVDHSEM, these activities were not carried out with all PDCs. Following some recent the hiring of additional staff within WVDHSEM, it is anticipated that this will be fully implemented starting in 2019.

2.F.3. Additional Outreach

Additional information was collected from the emergency management stakeholders through targeted emails and meetings held at various conferences. Representatives from non-governmental agencies, private sector partners, and other stakeholders through a variety of emails, meetings, conferences, and other methods. This includes engaging representatives of the American Red Cross, the Salvation Army, the WV Floodplain Management Association, numerous religious-based organizations, the Appalachian Center for Independent Living, and a variety of other groups.

2.F.4. Post-disaster Public Meetings

In addition, WVDHSEM mitigation staff also participates in post-disaster public mitigation meetings. While the primary focus is to discuss the grant application process, these meetings also allow the mitigation staff the chance to collect additional information which can be used in developing/modifying mitigation strategies.

2.G. Regional Coordination

Since the enactment of the *Disaster Mitigation Act of 2000*, every county in West Virginia has submitted a FEMA-approved hazard mitigation plan. In 2010, West Virginia's 55 counties were



organized into twelve Planning and Development Council Regions. Jefferson County retained their Local Hazard Mitigation Plan (LHMP).

The local hazard identification, risk analyses, and vulnerability assessments provided estimates of potential property losses throughout the State. Based on the information in these assessments, each region identified a list of hazard mitigation measures and provided an action plan on their implementation.

In accordance with federal regulations, LHMPs must be reviewed and updated every five years for jurisdictions to be eligible for pre- and post-disaster federal mitigation funding. The State provides technical assistance and guidance to the local community prior to the plan update and submittal to FEMA. Upon approval by FEMA, the LHMP must be adopted by each participating jurisdiction. Any governing body choosing not to adopt the LHMP will be ineligible to apply directly for disaster assistance. In some instances, eligible county governments may apply for mitigation funding on the behalf of their non-adopting jurisdictions.

The WVDHSEM has assisted local jurisdiction in completing their approved mitigation plans by assisting them in acquiring Hazard Mitigation Grant Program (HMGP) or Pre-Disaster Mitigation (PDM) funding to prepare and write their plans. These local plans are at different stages in the update and renewal process, depending upon when their initial LHMP was approved (see Table 4 – Regional Mitigation Plan Status).

PDC Region	Plan Status	Funding Source
1	1/31/2022	FEMA-4071-DR-0003 (\$50,900)
2	APA	FEMA-4220-DR-0003 (\$60,000)
3	5/22/2022	FEMA-4210-DR-0017 (\$51,000)
4	2/21/2022	FEMA-4071-DR-0003 (\$50,900)
5	12/4/2021	FEMA-4071-DR-0003 (\$50,900)
6	APA	FEMA-4221-DR-0004 (\$71,110)
7	APA	FEMA-4210-DR-0017 (\$61,800)
8	Expired	FEMA-4219-DR-0006 (\$60,536)
9	2/28/2022	FEMA-4210-DR-0013 (\$50,900)
10	9/28/2022	FEMA-4093-DR-0006 (\$50,900)
11	APA	FEMA-4219-DR-0005 (\$17,207)
Jefferson	Expired	FEMA-4273-DR-0005 (\$60,000)
WV HMP		PDM 2016 (\$250,000)

Table 4 – Regional PDC Mitigation Plan Status



2.H. Future Enhancements

A variety of obstacles and challenges affected the planning process used to support the 2018 Statewide Standard Hazard Mitigation Plan Update. Issues related to awarding a contract with consulting agencies being delayed in state purchasing to quickly developing an alternative planning approach using the WVMA personnel to the completing the plan review/update have all affected the flow of the planning process and the update timeline.

The members comprising the final planning team developed a series of recommendations to be implemented during future revisions to the Hazard Mitigation Plan. These recommendations include:

- Assign WVDHSEM Mitigation Planner as the lead in future updates. This should be the individual's primary responsibility during the update process.
- Initiate a long-term, continuous planning process. This process would involve a planning cycle that is constantly reviewing and updating elements of the plan.
- Form a core WVDHSEM Hazard Mitigation Planning Team. This should include the Mitigation Planner, GIS personnel, WVDHSEM operations representative, and other key personnel.
- Develop a workflow process to align activities of WVDHSEM and the State Resiliency Office (SRO).
- Conduct regional meetings to engage stakeholders in the planning process. These meetings would focus on the process used by the Regional Planning and Development Councils.
- Conduct regional meetings specifically targeting emergency management personnel. These would be based on the WVDHSEM Homeland Security Regions. These meetings would be focused on the completion of the THIRA and collecting information related to updating the state-level HIRA.
- Develop recommended planning process documents and flowcharts. This would involve reviewing local plans, mitigation plans from other states, and other relevant plans to determine best practices for stakeholder engagement.



3. STATE PROFILE

The mountainous topography of West Virginia contributes greatly to the hazards threatening the state. A review of its early history shows that development occurred primarily along rivers. Steep inclines and rocky terrain discouraged development on the mountainsides and resulted in the establishment of cities and towns in the valleys. Heavy rains, which commonly occur in West Virginia, often result in flooding in those same valleys. As such, it is not surprising that flooding is the most frequent and devastating disaster threatening West Virginia.

Long before the arrival of European settlers, West Virginia served as fertile farmland and hunting ground for Native Americans. The State was part of the British Virginia Colony and was a part of the Commonwealth of Virginia prior to secession from Virginia and the Confederacy during the Civil War. West Virginia was separated from Virginia and admitted to the Union as a state on June 20, 1863.

3.A. Political Subdivisions

West Virginia is divided into 55 separate counties, approximately 100 incorporate municipalities, and numerous unincorporated towns. The capital of West Virginia is Charleston with a population of 47,929, according to Census data in 2017.



Figure 1 – Counties in West Virginia



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County	Area (Sq Miles)
Hancock	82.61
Brooke	89.21
Ohio	105.82
Pleasants	130.1
Taylor	172.77
Jefferson	209.64
Morgan	229.07
Wirt	232.51
Tyler	256.29
Calhoun	279.25
Cabell	281.02
Marshall	305.43
Marion	308.74
Doddridge	319.72
Berkeley	321.14
Mineral	327.83
Gilmer	338.5
Barbour	341.06
Clay	341.9
Putnam	345.67
Upshur	354.64
Wetzel	358.06
Monongalia	360.06
Summers	360.46
Wood	366.26
Lewis	384.9
Harrison	416.01
Tucker	418.92
Mercer	418.99
Mingo	423.11
Mason	430.75
Lincoln	437.04
Ritchie	451.99



County	Area (Sq Miles)
Logan	453.74
Jackson	464.35
Monroe	472.75
Grant	477.37
Roane	483.56
Wyoming	499.45
Boone	501.54
Wayne	505.98
Braxton	510.81
McDowell	533.46
Webster	553.47
Hardy	582.31
Raleigh	605.35
Hampshire	640.25
Nicholas	646.82
Preston	648.81
Fayette	661.55
Pendleton	696.05
Kanawha	901.59
Pocahontas	940.28
Greenbrier	1019.57
Randolph	1039.68

Table 5 – Geographic Size of Counties

Randolph County is the largest county in the state by area at 1,040 square miles and Hancock is the smallest at 83 square miles. The majority of the counties in West Virginia are small in size, 40 of the 55 counties are less than 500 square miles in size.

3.B. Regional Planning & Development Councils

The 1971 Regional Planning & Development Act and reenacted West Virginia Code, Chapter 8, Article 25, mandated that West Virginia be divided into 11 regions to serve as "development districts" to more effectively utilize funding resources and maximize small communities' chances of attracting funds from federal, state, and local organizations to foster community and cooperation throughout the state.



The Regional Planning and Development Councils (PDCs) focus on expansion and improvement of: water and sewer facilities, infrastructure, transportation, employment, industry, small business development, housing, health care, education, and recreation. By coordinating closely with our affiliates in the region, we promote stability, growth, and progress in West Virginia, especially assisting local jurisdictions too small to maintain staff for grant writing and planning.

The PDCs offer local jurisdictions innovative solutions to growth-related problems by identifying and prioritizing goals; creating proactive strategies to realize these objectives; applying for funding packages; soliciting engineers, architects, attorneys, bond counsel, accountants, and other consultants, as needed, for each endeavor; and administering the projects to ensure funding is properly managed and all program guidelines are followed.

To accomplish these tasks, the PDCs provide a multitude of services, varied by Council, including grant writing, labor compliance, Section 3 and Title VI adherence, 5G solicitation assistance, workforce development, intergovernmental reviews, census report updates, public and governmental engagement strategies, environmental reviews, financial administration, drawdowns, account maintenance, income surveys, mapping capabilities, aging services and programs, revolving loan funds that assist new and expanding businesses, and a wealth of programmatic knowledge.

For the purpose of the *2018 Statewide Standard Hazard Mitigation Plan Update*, the PDC were responsible for the development of the local hazard mitigation plans. It is also important to note that Jefferson County has elected to develop their own hazard mitigation plan separate from the Region 9 PDC.



Figure 2 – Regional Planning and Development Councils

3.C. Homeland Security Regions

The West Virginia Division of Homeland Security and Emergency Management breaks the state into 6 regions for managing and implementing programs. In each of these Homeland Security Regions, WVDHSEM has an Area Liaison to coordinate activities. These regions are the primary conduit for the engagement of emergency management agencies, first responders, and related stakeholders in preparedness programs.

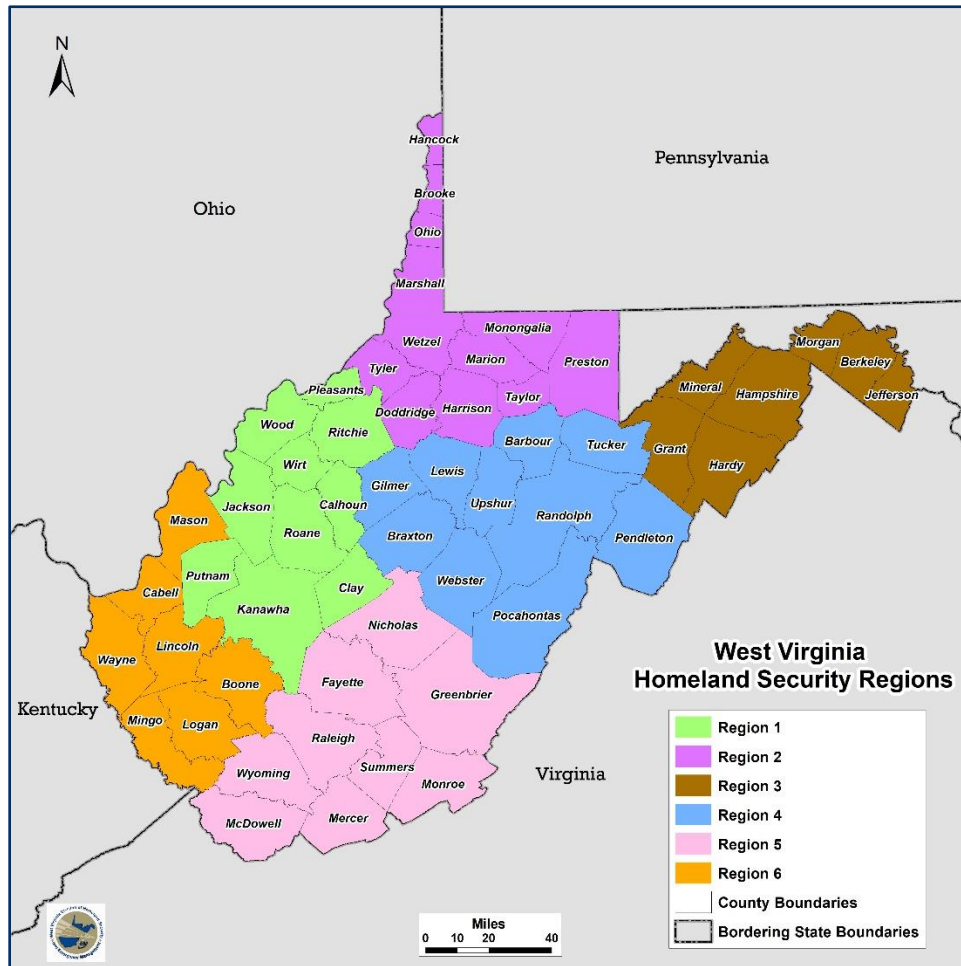


Figure 3 – WV Homeland Security Regions

3.D. Topography

West Virginia is situated in the Appalachian mountain range and much of the State has a mountainous terrain (see Figure 4). West Virginia lies within two divisions of the Appalachian Highlands. Most of the eastern panhandle, which is crossed by the Allegheny Mountains, is in the Ridge and Valley region. The remainder, or more than two-thirds of the state, is part of the Allegheny Plateau, to the west of a bold escarpment known as the Allegheny Front, and tilts toward the Ohio River. The mean elevation of West Virginia is 1,500 ft (458 m), higher than any other state east of the Mississippi River. Its highest point, Spruce Knob, is 4,861 ft (1,483 m) above sea level. Major lowlands lie along the rivers, especially the Potomac, Ohio, and Kanawha. A point on the Potomac River near Harpers Ferry has the lowest elevation, only 240 ft (73 m) above sea level. The Appalachian Mountain range dominates the entire state.

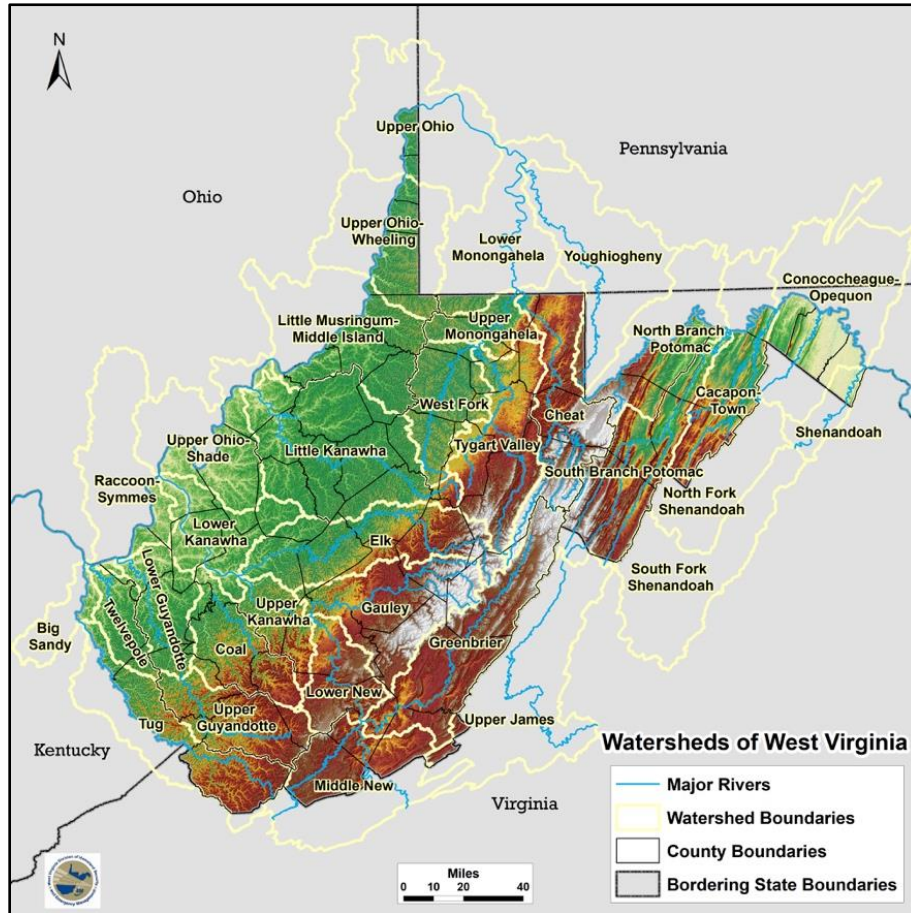


Figure 4 – Shaded Relief Watershed Map of West Virginia

West Virginia has 32 watersheds divided according to the United States Geological Survey (USGS). Rivers and streams in the eastern portion of the State generally drain into the Atlantic Ocean, while rivers and streams in the western sections of the State drain in the Mississippi River. Major watersheds include the Shenandoah, Cheat, James, Kanawha, Monongahela, New, Ohio, Potomac, Shenandoah, and Youghiogheny.

3.E. Demographics

West Virginia’s demographics are a major factor in the risk posed by natural hazards. The 2017 U.S. Census Bureau population of West Virginia was 1,815,857. West Virginia is the 37th largest state by population with over 1.8 million residents. “West Virginia’s median age, at 41.3



years, is higher than the nation's, at 37.2 years"¹, this makes West Virginia's population particularly vulnerable to hazards because the population is composed of senior citizens. "West Virginia is dependent on net migration (the annual difference between those moving into the state and those leaving) for overall population gains. Success in generating more in-migrants than out-migrants often requires strong economic performance, which has proven difficult for West Virginia in recent decades."²

Kanawha County, which includes the Charleston metropolitan area, remains the most populous county in the state with just over 183,000 people (which is approximately 10% of the entire population of WV). Berkeley County, which is located in the Eastern panhandle, has the second highest population at just under 115,000. Monongalia County has the third highest population at 105,000 but can see its population grow during the WVU school year and during WVU home football games.

¹ Hammond, George W. "Demography." e-WV: The West Virginia Encyclopedia. 27 March 2013. Web. 14 March 2017.



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West Virginia (County)	2010	Population Estimate (as of July 1, 2018)						
	Census	2011	2012	2013	2014	2015	2016	2017
Barbour	16,589	16,598	16,869	16,863	16,902	16,970	16,720	16,497
Berkeley	104,169	105,608	106,824	108,335	110,026	111,497	113,270	114,920
Boone	24,629	24,408	24,356	24,089	23,708	23,241	22,795	22,349
Braxton	14,523	14,530	14,449	14,382	14,400	14,366	14,341	14,237
Brooke	24,069	23,828	23,691	23,604	23,382	23,200	22,707	22,443
Cabell	96,319	96,506	96,819	96,895	96,514	96,462	95,669	94,958
Calhoun	7,627	7,638	7,596	7,551	7,559	7,465	7,367	7,307
Clay	9,386	9,334	9,208	9,140	8,882	8,876	8,843	8,764
Doddridge	8,202	8,247	8,295	8,546	8,467	8,696	8,583	8,560
Fayette	46,039	45,910	45,850	45,549	45,152	44,687	44,102	43,521
Gilmer	8,693	8,744	8,741	8,615	8,489	8,287	8,128	8,005
Grant	11,937	11,897	11,818	11,755	11,632	11,666	11,643	11,670
Greenbrier	35,480	35,705	35,849	35,769	35,522	35,541	35,494	35,287
Hampshire	23,964	23,787	23,680	23,490	23,439	23,318	23,343	23,471
Hancock	30,676	30,603	30,435	30,358	30,228	29,950	29,621	29,448
Hardy	14,025	13,947	13,834	13,933	13,915	13,764	13,731	13,717
Harrison	69,099	69,307	69,105	68,916	68,671	68,514	68,280	67,811
Jackson	29,211	29,303	29,264	29,176	29,126	29,164	29,172	28,976
Jefferson	53,498	54,292	54,513	54,819	55,448	55,911	55,848	56,338



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West Virginia (County)	2010	Population Estimate (as of July 1, 2018)						
	Census	2011	2012	2013	2014	2015	2016	2017
Kanawha	193,063	192,081	192,132	191,415	190,212	188,119	186,097	183,293
Lewis	16,372	16,436	16,450	16,478	16,438	16,422	16,292	16,226
Lincoln	21,720	21,575	21,616	21,462	21,532	21,292	21,096	20,825
Logan	36,743	36,446	36,303	35,919	35,235	34,419	33,644	32,925
McDowell	22,113	21,726	21,314	20,907	20,329	19,704	19,139	18,456
Marion	56,418	56,649	56,727	56,651	56,722	56,690	56,477	56,337
Marshall	33,107	32,904	32,796	32,617	32,332	32,184	31,705	31,190
Mason	27,324	27,290	27,193	27,120	27,121	27,047	26,909	26,801
Mercer	62,264	62,502	62,360	61,842	61,686	61,038	60,494	59,753
Mineral	28,212	28,030	27,859	27,664	27,531	27,366	27,322	27,222
Mingo	26,839	26,567	26,159	25,971	25,696	25,278	24,677	24,127
Monongalia	96,189	98,668	100,478	101,883	102,951	103,940	104,771	105,030
Monroe	13,502	13,550	13,502	13,521	13,609	13,574	13,477	13,402
Morgan	17,541	17,435	17,409	17,393	17,456	17,433	17,583	17,686
Nicholas	26,233	26,201	26,247	25,934	25,702	25,510	25,291	25,043
Ohio	44,443	44,192	43,981	43,722	43,226	42,950	42,598	42,035
Pendleton	7,695	7,536	7,470	7,375	7,229	7,103	6,987	6,996
Pleasants	7,605	7,576	7,535	7,518	7,589	7,503	7,512	7,512
Pocahontas	8,719	8,821	8,698	8,676	8,649	8,571	8,518	8,456



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West Virginia (County)	2010	Population Estimate (as of July 1, 2018)						
	Census	2011	2012	2013	2014	2015	2016	2017
Preston	33,520	33,661	33,900	33,683	33,920	33,805	33,711	33,679
Putnam	55,486	56,033	56,445	56,497	56,634	56,606	56,692	56,792
Raleigh	78,859	79,273	79,164	78,728	78,139	77,335	76,259	75,022
Randolph	29,405	29,424	29,390	29,532	29,316	29,165	28,962	28,785
Ritchie	10,449	10,311	10,249	10,147	10,078	10,086	9,942	9,774
Roane	14,926	14,799	14,677	14,606	14,590	14,372	14,128	14,043
Summers	13,927	13,857	13,835	13,594	13,331	13,130	13,004	12,993
Taylor	16,895	16,928	16,968	16,987	17,098	16,923	16,947	16,930
Tucker	7,141	7,127	7,077	7,079	7,053	7,087	7,041	6,915
Tyler	9,208	9,100	9,035	8,989	9,067	8,935	8,958	8,795
Upshur	24,254	24,263	24,435	24,596	24,655	24,695	24,610	24,465
Wayne	42,481	42,158	41,849	41,806	41,491	41,187	40,680	40,153
Webster	9,154	9,124	8,981	8,833	8,757	8,648	8,575	8,372
Wetzel	16,583	16,381	16,356	16,124	15,970	15,793	15,641	15,437
Wirt	5,717	5,755	5,774	5,839	5,791	5,805	5,770	5,794
Wood	86,956	86,865	86,593	86,502	86,451	86,304	85,718	85,104
Wyoming	23,796	23,455	23,207	22,938	22,576	22,173	21,753	21,210

Table 6 – Annual Estimates of Residential Population (2010-2017)

<https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>

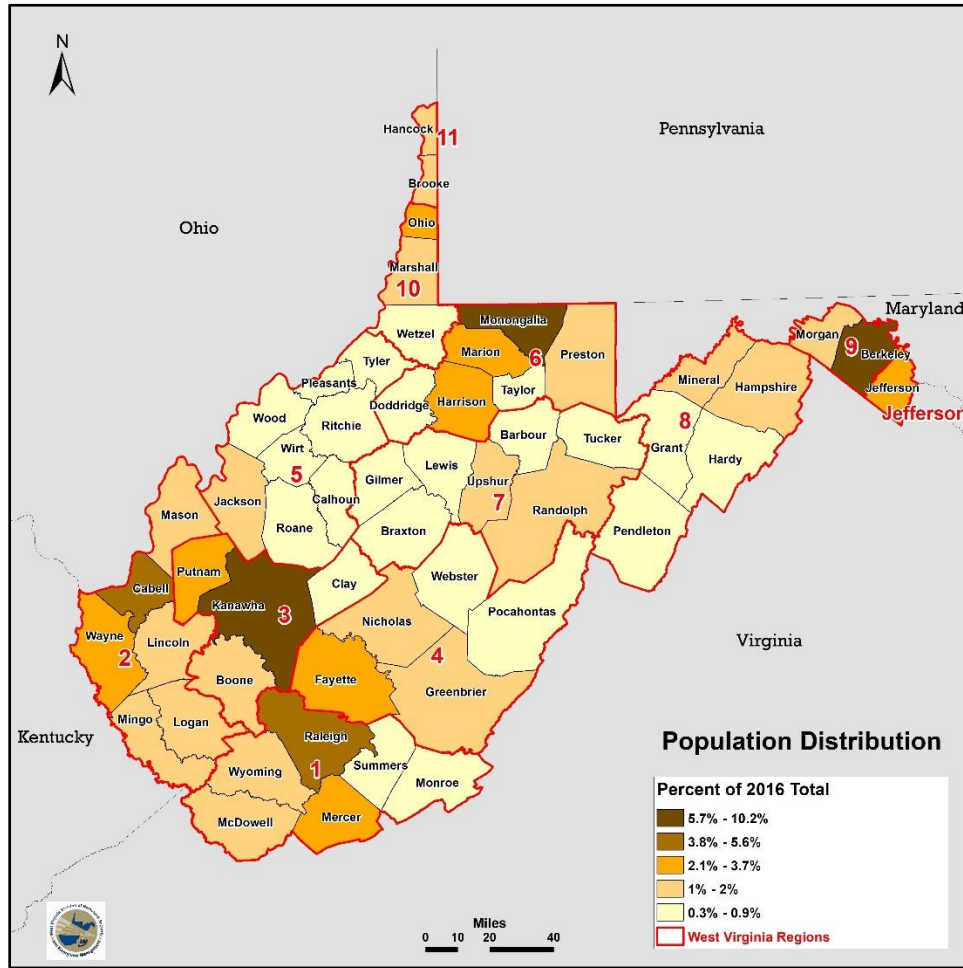


Figure 5 – Population Distribution Map of WV

The State’s population is densest in three population clusters: one cluster centered on the Charleston metropolitan area; another in the Panhandle, an outgrowth of the Washington, DC, metropolitan area; and a third in the area near the Pennsylvania border, near the southern extent of the Pittsburgh metropolitan area.

West Virginia remains a rural state with mostly small cities with relatively low population densities. Pocahontas is the least density county with just under 9 people per square mile. Ohio County is the most densely population county with just under 400 people per square mile. The average population density is 95 people per square mile.



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County	Density (per sq. mile)
Barbour	48.36978831
Berkeley	357.8501588
Boone	44.56075288
Braxton	27.8714199
Brooke	251.5749355
Cabell	337.9047755
Calhoun	26.16651746
Clay	25.63322609
Doddridge	26.77342675
Fayette	65.7864107
Gilmer	23.64844904
Grant	24.44644615
Greenbrier	34.6096884
Hampshire	36.65911753
Hancock	356.470161
Hardy	23.55618142
Harrison	163.0032932
Jackson	62.40120599
Jefferson	268.7368823
Kanawha	203.299726
Lewis	42.15640426
Lincoln	47.65010068
Logan	72.56358267
Marion	59.77845436
Marshall	184.4514291
Mason	72.40858967
McDowell	50.23994301
Mercer	142.6119955
Mineral	83.03693988
Mingo	57.02299638
Monongalia	291.7013831
Monroe	28.34902168
Morgan	77.2078404



County	Density (per sq. mile)
Nicholas	38.71710831
Ohio	397.2311472
Pendleton	10.05100208
Pleasants	57.74019985
Pocahontas	8.993065895
Preston	51.90887933
Putnam	164.2954263
Raleigh	123.9316098
Randolph	27.68640351
Ritchie	21.62437222
Roane	29.0408636
Summers	36.04560839
Taylor	97.99154946
Tucker	16.5067316
Tyler	34.31659448
Upshur	68.98545003
Wayne	79.35689158
Webster	15.12638445
Wetzel	43.11288611
Wirt	24.91935831
Wood	232.359526
Wyoming	42.46671338

Table 7 – Population Density by WV Counties

Population in West Virginia followed the national trend from 1900 to 1950 with the population increasing to 2 million. This period of growth is followed by a population decline from 1950 to 1970 due to the displacement of miners in the coal industry by mechanization. Population increased again in 1980 through 2000 and stabilized yielding a 2.5 percent increase through the 20th century. The U.S. Census Bureau projects a reversal of the recent trend of population growth and a gradual decline in the State’s population to near 1.7 million by 2030.

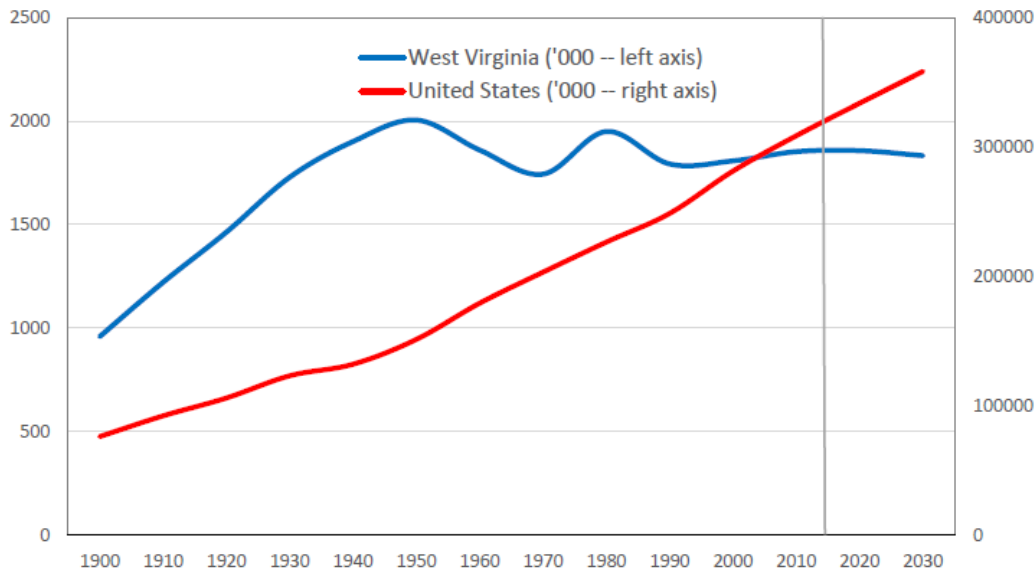


Figure 6 – Population Trends, US and WV

Population growth and development trends are important factors when considering the risk or the damage posed by an emergency or natural disaster. Development in hazard-prone areas should be undertaken with full knowledge of potential threats. Overall, the land use information compiled for this plan and in the local plans shows similar trends. In the 2013 plan, Kanawha County was identified as experiencing a large surge in population and development, however, that is no longer the case. As of the 2108 plan, Berkeley County had a population increase of approximately 10,800, followed by Monongalia County with over 8,800 more residents. The largest loss of population occurred in Kanawha County by dropping 9,770 people. Since 2010, only 10 counties in WV experienced a net population growth.

Drastic increases or decreases in population should prompt consideration of the WV Hazard Mitigation Planning Team to engage the PDCs to consider how the population change affects mitigation strategies and infrastructure. Specifically, regions with large population increases should consider how increased demand for land use might force new residents and/or businesses to move into higher risk areas. In addition, regions with large decreases might want to evaluate how this effects essential services such as OES, Hospitals, Fire Departments, Police Departments and Schools. It might also effect economic drivers such as loss of businesses due to lack employees and loss of customer base.

Between 2010 and 2018, only 3 of the 11 PDCs experienced an overall population growth. Region 9 (Berkeley and Morgan) had the largest population growth with an increase in over 10,896 people. The largest decreased occurred in Region 1 with a drop of over 13,000 people.



PDC Region	2017 Population	Population Change	Percentage Change
Region 1	200,836	-13,625	-6.78%
Region 2	239,789	-11,637	-4.85%
Region 3	271,198	-11,366	-4.19%
Region 4	120,679	-4,946	-4.10%
Region 5	167,305	-4,394	-2.63%
Region 6	288,347	8,024	2.78%
Region 7	115,130	-1,847	-1.60%
Region 8	112,524	-3,985	-3.54%
Region 9	132,606	10,896	8.22%
Region 10	88,662	-5,471	-6.17%
Region 11	22,443	-1,626	-7.25%
Jefferson	56,338	2,840	5.04%

Table 8 – Regional Population Changes (2010 to 2017)

3.F. Social Vulnerability

Vulnerability is broadly defined as the potential for loss. It not only applies to landscapes and buildings, but to people as well. The vulnerability of people is termed “social vulnerability” and describes the vulnerability of populations before an event occurs. This pre-existing condition is based on the characteristics of the population and where they live. By determining the most vulnerable populations and identifying what characteristics make them vulnerable, preparedness and recovery programs for hazards may be designed to minimize the impacts on these vulnerable populations. There is no broad consensus as to exactly which characteristics determine vulnerability. For the purposes of this plan, discussion is limited to factors such as income, employment status, age, housing occupancy, and race. Persons with one or more of the following characteristics are generally considered to be less able to recover from a disaster should one occur than the general population: limited financial resources; those under 5 or over 65 years of age; non-white; or those living in renter occupied housing.



Age and Sex	
Persons under 5 years, percent	5.4%
Persons under 18 years, percent	20.4%
Persons 65 years and over, percent	19.4%
Female persons, percent	50.5%
Race and Hispanic Origin	
White alone, percent(a)	93.6%
Black or African American alone, percent(a)	3.6%
American Indian and Alaska Native alone, percent(a)	0.2%
Asian alone, percent(a)	0.8%
Native Hawaiian and Other Pacific Islander alone, percent(a)	0.01%
Two or More Races, percent	1.7%
Hispanic or Latino, percent(b)	1.6%
White alone, not Hispanic or Latino, percent	92.2%

Table 9 – WV Demographic Information

- Median Age is 41.9 years old. 53 of 55 counties are above the National Average
- Household income is \$42,644, placing 54 of 55 counties below the National Average.
- Poverty Rate in 53 of 55 counties are above the National Average.
- The Unemployment Rate in July 2018, was 5.4% which means that 52 of 55 counties remain above the National Average of 3.9%.



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County	Median Household Income
Barbour County	\$36,733
Berkeley County	\$57,148
Boone County	\$39,783
Braxton County	\$38,092
Brooke County	\$46,265
Cabell County	\$37,760
Calhoun County	\$39,384
Clay County	\$33,639
Doddridge County	\$39,381
Fayette County	\$37,846
Gilmer County	\$37,286
Grant County	\$38,703
Greenbrier County	\$40,026
Hampshire County	\$32,177
Hancock County	\$40,316
Hardy County	\$39,840
Harrison County	\$44,845
Jackson County	\$40,949
Jefferson County	\$69,753
Kanawha County	\$46,528
Lewis County	\$37,827
Lincoln County	\$36,232
Logan County	\$37,262
Marion County	\$46,430
Marshall County	\$44,464
Mason County	\$37,322
McDowell County	\$25,206
Mercer County	\$37,255
Mineral County	\$36,156
Mingo County	\$32,441



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County	Median Household Income
Monongalia County	\$47,060
Monroe County	\$53,394
Morgan County	\$43,234
Nicholas County	\$39,901
Ohio County	\$41,986
Pendleton County	\$37,035
Pleasants County	\$45,191
Pocahontas County	\$36,026
Preston County	\$45,221
Putnam County	\$56,640
Raleigh County	\$41,533
Randolph County	\$40,308
Ritchie County	\$40,850
Roane County	\$34,144
Summers County	\$35,620
Taylor County	\$44,371
Tucker County	\$43,529
Tyler County	\$38,674
Upshur County	\$42,240
Wayne County	\$38,311
Webster County	\$29,982
Wetzel County	\$39,446
Wirt County	\$38,101
Wood County	\$43,944
Wyoming County	\$35,469

Table 10 – Median Income by County



3.G. Land Use and Development

Land use planning and management is vital to reducing and mitigating damages. West Virginia has enacted a variety of statutes and regulations that are intended to shape how land is utilized in order to maximize public safety, mitigate damage to private and publicly owned infrastructure and thereby ensure economic growth and increase efforts to preserve natural resources. The people of the State face many challenges when it comes to ensuring the best use of the State's land and water resources.

While flooding and landslides are the most common hazards facing the state, mitigation strategies must be developed for all hazards. A primary task is to identify appropriate properties for various types of development and conservation. In some cases, it is appropriate to place voluntary conservation easements to protect the residential properties. It is vital to encourage sustainable development in appropriate areas of local communities.

Many communities must address dilapidated buildings and historical development within floodplains and at risk for other hazards, and determine how to best promote residential, business and recreational areas to best contribute to the economy and the community. Care must be taken when considering future development and building projects, historical perspective must be taken into consideration for future construction and development to support mitigation efforts moving forward.

Despite efforts to modernize and upgrade sanitation facilities, many residences and businesses still dispose of human waste directly into rivers and streams without adequate treatment while others utilize antiquated wastewater treatment systems that result in harmful discharges. These existing issues result in significant public sanitation issues during floods and droughts. It is vital to mitigate damage to public infrastructure and facilities.

Over the last 5 years the state has sought to mitigate hazards through mitigation strategies such as deed restrictions which have affected the demographics of certain areas with respect to infrastructure and population. The state continues to consider new building locations for facilities based upon potential hazards.

Looking forward to the next five years, the interaction must be developed with the State Resiliency Office (SRO) to include all partner organization in support overall mitigation strategies related to land use. For instance, the SRO should work with state, county, and local agencies for the development of consistent guidelines regarding building codes which integrate mitigations measures.



3.G.1. Cropland

Effective land use planning is a central component of any hazard mitigation program. Existing and planned land use patterns greatly influence a community’s hazard vulnerability. Consequently, future land use decisions should be directed toward creating a more disaster-resistant environment. Changes in urban and agricultural land cover highlight areas within the State that should be included in long-term comprehensive plans.

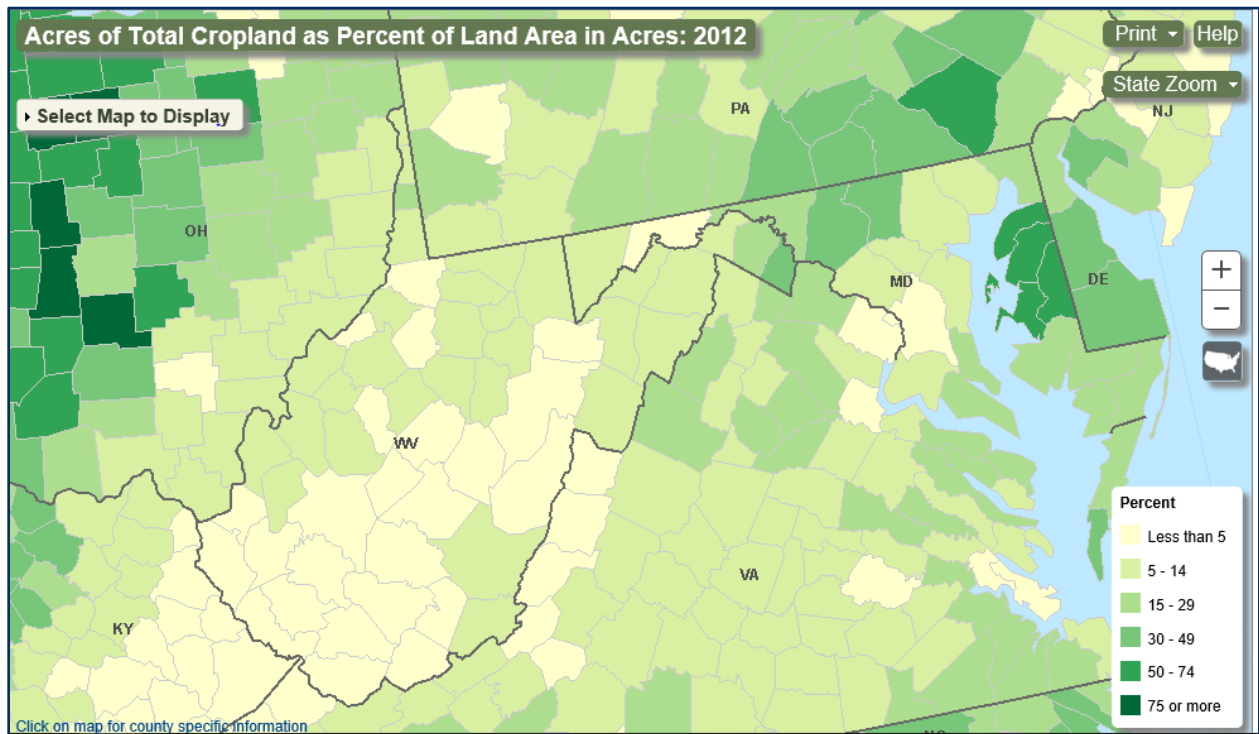


Figure 7 – Acres of Total Cropland (2012)³

3.G.2. Regional Land Use Overview

The following table provides a general overview of land use in each PDC Region.

³ https://www.nass.usda.gov/Publications/AgCensus/2012/Online_Resources/Ag_Census_Web_Maps/index.php



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PDC	County	Summary of Population Trends and/or Land Use Changes
Region 1	McDowell County	McDowell County is economically depressed but continues to operate as efficiently as possible given statewide economic setbacks. Undergoing company cutbacks and mine closings. High unemployment rate. Development is non-existent, and all indicators suggest that no development will occur anytime soon.
	Mercer County	Development in Athens and Matoaka is nonexistent. Development in Bluefield is minimal. General land use is comprised of residential and commercial properties, with a very limited amount developed for industrial use. The majority of industrial properties are owned and operated by a major railroad corporation, with a large portion of these sites comprising rail yards and lines that traverse the city. Bramwell officials are seeking to increase development and tourism potential. Unfortunately, such expansion requires tremendous resources and is slow to come to fruition. Oakvale has seen no recent development.
	Monroe County	Largely agricultural and its industries are small-farm or forest-oriented. The nearest major commercial airports in the State are outside the county in Bluefield and Beckley. Scheduled development projects are continued expansion of the Goodrich Plant and the extension of water service into the southeastern quadrant of the county. If existing trends were to continue, then it is expected that the county population would show some increase in the coming decade with growth occurring outside the 100-year floodplain.
	Raleigh County	Largely semi-urban, with I-77 and I-64 forming the growth axes. Light-intensity urban land use is predominant around Beckley. Natural resources such as coal and timber act as linchpin industries. Scheduled development projects include airport industrial park expansion, new housing at Glad Springs. New sewage treatment plant for Crab Orchard PSD. Raleigh County has shown relatively impressive growth in the last couple of years. It is strongly expected that the county population will continue to increase in the coming decade. All of this growth is expected to happen outside the special flood hazard area. Growth is also expected along the proposed Coalfields Expressway.



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PDC	County	Summary of Population Trends and/or Land Use Changes
	Summers County	Summers County and the City of Hinton are viable regions that continue to operate as efficiently as possible given recent statewide economic setbacks. The City of Hinton benefits seasonally from tourists flows coming to the Bluestone Lake and the downriver fishing and whitewater rafting ventures. Hinton is planning to increase tourist potential by developing scenic river walks, mountain bike paths, and new lodging facilities.
	Wyoming County	Largely rural. Very limited road access and very limited developable land. However, the area enjoys low cost of living, abundant recreational opportunities, and good rail infrastructure. Scheduled development projects include John D. Rockefeller IV Industrial Park, Eastern Wyoming Water System, and Mullens Senior Citizen Housing. Construction of the Coalfields Expressway, Shawnee Highway and King Coal Highway is expected to give the biggest boost to growth in the county. However, if existing trends continue, it is expected that the county population would show a slight decline.
Region 2	Cabell County	Cabell County is mostly hilly terrain, with low lying areas around rivers and streams, setting the stage for both headwater and backwater flooding, as well as storm run-off and flash floods.
	Lincoln County	Lincoln County is a largely rural county with only a handful of incorporated towns. The continued growth and development along Corridor G and the presence of the Hatfields and McCoy Trail offer numerous opportunities in the county.



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PDC	County	Summary of Population Trends and/or Land Use Changes
	Logan County	Dense residential development is centered in or near the Logan County municipalities due to the availability of developable land. Other residential properties are sparsely located throughout the balance of the county. Commercial development in Logan County is concentrated primarily along US 119. Other commercial development exists in the Town of Chapmanville and the City of Logan. The Logan County Development Authority lists three sites targeted for industrial development: Earl Ray Tomblin Industrial Park (Holden), Three Mile Curve (Dabney), and McDonald Airfield (Taplin).
	Mason County	Mason County enjoys a diversified land use. Areas along the Ohio River are largely industrial. Several commercial and "light industrial" areas are concentrated in the municipalities of Point Pleasant, Mason, and New Haven. Sparse commercial development also exists throughout the balance of the county, along roadways. The southern portions of the county contain several agricultural areas, especially along the Kanawha River and US 35. Newer residential development is taking place along the WV 62 corridor near Point Pleasant, Mason, and New Haven. Residential, commercial, and agricultural trends are expected to remain the same, as are industrial trends. Several sites for new industrial development have been targeted. Most are located just north of Point Pleasant along WV 62. Another is located south of Gallipolis Ferry along WV 2, and another is located along US 33 in the northern portion of the county near Letart.
	Mingo County	Mingo County has a number of sites available for commercial and light industrial development. The Air Transportation Park, Belo Industrial Park, and the Wood Products Industrial Park are large, fully supported developments within the county. The King Coal Highway Project should help meet the growing demand for adequate transportation routes.
	Wayne County	Wayne County is the westernmost county in the state. Part of the county are very rural and remote, and the other portion of the county is part of the greater Huntington metro area.



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PDC	County	Summary of Population Trends and/or Land Use Changes
Region 3	Boone County	Boone has several coal related employers, and the largest employers in the county are coal producers/transporters. Over 90 percent of the land area in the county is woodland. The timber industry has been growing in the county for the past several years, bringing along with it those businesses that service is such as trucking and sawmills. Because much of the county's development is occurring in the municipalities along the major roadways, land use decisions and building codes may have to be amended when considering the potential for flooding in these areas. Many grants have been secured to develop water and sewer lines throughout the county.
	Clay County	Specialized Land Use Designation: Wallback Wildlife Management Area
	Kanawha County	There are five locations of industrial and business development in the Charleston-Kanawha County area. These locations provide room for various companies who seek to expand their market in WV and surrounding States. Water and sewer development continues around Kanawha County. Charleston is experiencing growth in the technical and medical fields. Several new businesses have opened in these fields.
	Putnam County	Several industrial parks and many retail shopping centers. Largely residential, serving Charleston and Huntington commuters. Putnam County has seen an increase in employment in its industrial parks.
Region 4	Fayette County	The economy of all five counties is driven by government and the hospitality industry. Education and retail trade industries are consistently strong in all counties. All five counties have space available for development, primarily commercial/business but also some space for industrial development. In Fayette County, much of this land is available along I-64. All counties have Economic Development Authorities that work to bring development and jobs to the counties. In many instances, the premier developable areas in Nicholas County are located in or near flood hazard areas. As part of the mitigation planning process, local
	Greenbrier County	



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PDC	County	Summary of Population Trends and/or Land Use Changes
	Nicholas County	<p>leaders are continuing to look at flood mitigation options to guide not only commercial and industrial development, but also residential development. All counties are largely rural and are located in a mountainous region. Thus, potential for development is somewhat limited. The topography drives development to flatter areas that are often in or near floodplains. Local floodplain development regulations carefully balance the needs for economic development and growth in the employment sector with a basic responsibility to buffer potential and existing businesses from the effects of hazards. The I-64 corridor through southern Fayette County and Greenbrier County is seeing more commercial and industrial development. Denser residential development is likely to continue near municipalities and along roadways. Primary sites for development are the business parks. Targeted development areas include: government and industrial development near the new National Guard Armory in Glen Jean, Wolf Creek Business Park in Oak Hill, and commercial development south of Fayetteville on US 19.</p>
	Pocahontas County	
	Webster County	
Region 5	Calhoun County	<p>The terrain is largely responsible for differences in development between counties that are adjacent to the Ohio River (Jackson, Pleasants, Tyler, and Wood) and those that lie in the more rugged interior (Calhoun, Ritchie, Roane, and Wirt). Elevation varies from 570 feet along the Ohio River to 1,300 feet in the eastern portion of the region. Much of the interior is above 1,000 feet with few areas for development. The region is also close to several major national metropolitan centers that are experiencing a period of positive growth and redevelopment, such as Columbus, Cleveland, and Cincinnati, Ohio, and Pittsburgh, Pennsylvania. With over half of the U.S. population within a day's drive of the Ohio Valley, the region is well positioned to attract, retain, and grow businesses.</p>
	Jackson County	
	Pleasants County	
	Ritchie County	
	Roane County	
	Tyler County	
	Wirt County	
Wood County		



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PDC	County	Summary of Population Trends and/or Land Use Changes
Region 6	Doddridge County	<p>Most of the region could be considered rural even though the I-79 corridor is rapidly developing. All counties indicate that most the commercial and industrial development in their counties is located in or near municipalities. The oil and gas industry is expanding and its development in Region 6 has been more rapid than in any other area of the State. Significant changes in land use are not expected. The residential areas in the county have experienced a slight population increase as indicated by Census 2005 estimates. Doddridge County, is working hard to spur economic development, as are many counties in West Virginia. However, some of this developable land lies within the floodplain. The county and municipal governments may have to consider revising building codes and creating zoning ordinances to control floodplain development. Doddridge County continues to explore possibilities for development along U.S. Route 50, a four-lane divided highway. Agricultural land makes up a large portion of the total land cover in Preston County. Small- to medium-size farms are prominent in the northern and southern portion of the county. Generally, commercial and industrial development is expected to continue along major transportation routes. The White Oaks and Charles Pointe area in Bridgeport at Exit 124 off I-79 is continuing to grow rapidly now that the new United Hospital Center is complete. Targeted development areas include the Doddridge County Industrial Park.</p>
	Harrison County	
	Marion County	
	Monongalia County	
	Preston County	
	Taylor County	



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PDC	County	Summary of Population Trends and/or Land Use Changes
Region 7	Barbour County	In many instances, the premier developable areas in Barbour County are located in or near flood hazard areas. As a result, Philippi has adopted a floodplain management ordinance that allows it to meet minimum standards for the National Flood Insurance Program (NFIP).
	Braxton County	Though development in the Special Flood Hazard Area (SFHA) is acceptable in meeting the minimum standard for their NFIP local Floodplain Management Ordinance, the county has expressed interest in developing a comprehensive program on floodplain management. They will be developing better mapping and enter Braxton County Hazard Mitigation Plan Risk Assessment into a Cooperating Technical Partnership (CTP) with FEMA to help create a Digital Flood Insurance Rate Map (DFIRM). This will be the basis for better land use and development to better protect property owners and lessen the chance of property loss due to future flood disasters.
	Gilmer County	New development is occurring in corridors along four-lane highways in Region 7. Recent development on Route 92 near Davis. New residential/second home construction and development is occurring and is projected to boom once Corridor H is complete. This project should also boost the development of Parsons, Thomas, and Davis at some point in the future.
	Lewis County	
	Randolph County	
	Tucker County	
Upshur County		



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PDC	County	Summary of Population Trends and/or Land Use Changes
Region 8	Grant County	<p>All five counties are largely rural and located in a mountainous region, leaving limited potential for development. Most commercial and industrial development is located in or near the municipalities. Significant changes in land use are not expected. Pendleton County will receive a Shelter trailer with equipment with the capability to shelter 100 people, a Pet Sheltering trailer with equipment to care for 75 pets, and a Comfort Station Trailer. All five counties have available space for development, primarily commercial/business but also some industrial development. Several development sites have been established along the primary roadways throughout the region. Most recent development has been infrastructure projects such as the City of Romney's wastewater improvement project, the City of Keyser's water treatment plan, and the Town of Franklin's wastewater improvement project. Denser residential development is likely to occur near municipalities and along roadways. A number of educational projects are planned for the entire region, including the Potomac Highland Early Childhood Center and the Potomac State College Lab Science Building. The PDC has indicated that the primary sites for development are the business parks. Specific sites targeted for development by the county are provided in the Region 8 plan.</p>
	Hampshire County	
	Hardy County	
	Mineral County	
	Pendleton County	



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PDC	County	Summary of Population Trends and/or Land Use Changes
Region 9	Berkeley County	<p>Currently, the sewer and water systems within the region are at or nearing capacities. The current rate of residential growth throughout the region and the general deterioration of some of the system results in a constant demand upon the service providers to find financial resources for upgrades, extensions, and additional capacity. Furthermore, the environmental issues regulating the Shenandoah watershed basin and discharge issues on the Potomac River will require improved water treatment throughout the region. Industrial land is mostly owned by the US Silica Company. The region has seen significant development in recent years as a part of the National Capital Region. Potential for development is likely to continue. Proximity to I-81 and I-70 has helped to drive this development. All counties indicate that most the commercial and industrial development in their counties is located in or near the municipalities. Berkeley and Morgan Counties have available space for development, primarily commercial/business but also some industrial development. Infrastructure projects occurring in the region include widening of I-81 and Route 9. These two projects, once completed, will improve the safety of travel and enhance the region's economic development potential.</p> <p>Berkeley and Morgan Counties have available space for development, primarily commercial/business but also some industrial. Newly approved growth is and will continue to be concentrated in the southern area of the region, especially in the Timer Ridge and Rock Gap districts. Detailed description of land use and population trends is included in Appendix III of the Regional Plan.</p>
	Morgan County	



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PDC	County	Summary of Population Trends and/or Land Use Changes
Region 10	Marshall County	<p>Most of the development in the planning area is located along the Ohio River. All of the municipalities can be said to have a regular trend of development (commercial and industrial) along SR 2 and the Ohio River. All three counties have available space for development, primarily commercial/business, but also some space for industrial development. The Highlands commercial area surrounding Cabelas continues to grow at a rapid pace. Denser residential development is likely to continue to occur near municipalities and along roadways. The plan includes a list of areas targeted for development in the planning region. All three counties are seeing growth in the oil and natural gas industry.</p>
	Ohio County	
	Wetzel County	
Region 11	Brooke County	<p>Both counties are largely rural but contain significant industrial areas. Most commercial and industrial development is located in or near the municipalities. Several development sites have been established along primary roadways. Significant changes in land use are not expected. The City of Weirton is developing land use for new homes out of the hazard areas. Browns Island is being developed for industrial use (currently it is a hazardous area). A number of development projects are occurring in the region, ranging from infrastructure upgrades to commercial developments. A list of targeted development areas can be found in the regional plan. Both Brooke and Hancock Counties have seen an increase in oil and natural gas exploration activities. Much of this development is occurring in rural areas.</p>
	Hancock County	

Table 11 – PDC Population Trends



3.H. Weather

The climate of West Virginia is a humid subtropical climate in some of the lower elevations, primarily in the southwestern portion of the state (including Huntington and Charleston), and in parts of the Eastern Panhandle east of the Appalachians. Hot, humid summers and milder winters are normal. The rest of the state generally has a humid continental climate (Koppen climate classification *Dfa*, except *Dfb* at the higher elevations) with warm to hot, humid summers and cool to cold winters, increasing in severity with elevation. Some southern highland areas also have a mountain temperate climate (Koppen *Cfb*) where winter temperatures are more moderate and summer temperatures are somewhat cooler.

In the Eastern Panhandle and the Ohio River Valley temperatures are warm enough to see and grow subtropical plants. Average January temperatures range from around 26°F (-4°C) near the Cheat River to 41°F (5°C) along sections of the border with Kentucky. July averages range from 67°F (19°C) along the North Branch Potomac River to 76°F (24°C) in the western part of the state. It is cooler in the mountains than in the lower sections of the state.

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. Slightly more than half the rainfall occurs from April to September. Dense fogs are common in many valleys of the Kanawha section, especially the Tygart Valley. West Virginia is also one of the cloudiest states in the nation, with the cities of Elkins and Beckley ranking 9th and 10th in the U.S. respectively for the number of cloudy days per year (over 210). 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 but may persist for weeks in the higher mountain areas. An average of 34 inches (86 cm) of snow falls annually in Charleston. Average snowfall in the Allegheny Highlands can range up to 180 inches (460 cm) per year. Severe weather is somewhat less prevalent in West Virginia than in most other eastern states, and it ranks among the least tornado-prone states east of the Rockies.

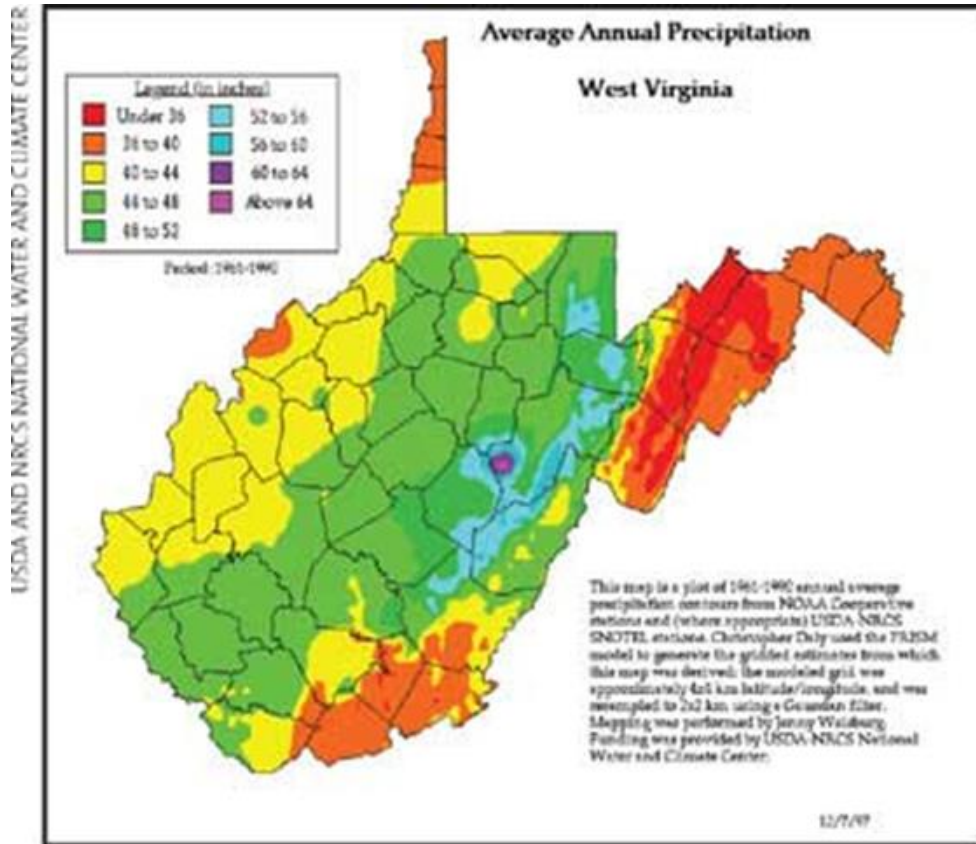


Figure 8 – Average Annual Precipitation Trends



4. HAZARD IDENTIFICATION AND RISK ANALYSIS

Disaster Mitigation Act of 2000

44 Code of Federal Regulations

§201.4(c)(2): Risk assessments that provide the factual basis for activities proposed in the strategy portion of the mitigation plan. Statewide risk assessments must characterize and analyze natural hazards and risks to provide a statewide overview. This overview will allow the State to compare potential losses throughout the State and to determine their priorities for implementing mitigation measures under the strategy, and to prioritize jurisdictions for receiving technical and financial support in developing more detailed local risk and vulnerability assessments.

The risk assessment shall include the following:

§201.4(c)(2)(i): An overview of the type and location of all natural hazards that can affect the State, including information on previous occurrences of hazard events, as well as the probability of future hazard events, using maps where appropriate;

§201.4(c)(2)(ii): An overview and analysis of the State's vulnerability to the hazards described in this paragraph (c)(2), based on estimates provided in local risk assessments as well as the State risk assessment. The State shall describe vulnerability in terms of the jurisdictions most threatened by the identified hazards, and most vulnerable to damage and loss associated with hazard events. State owned critical or operated facilities located in the identified hazard areas shall also be addressed;

§201.4(c)(2)(iii): An overview and analysis of potential losses to the identified vulnerable structures, based on estimates provided in local risk assessments as well as the State risk assessment. The State shall estimate the potential dollar losses to State owned or operated buildings, infrastructure, and critical facilities located in the identified hazard areas.

§201.4(d): Plan must be reviewed and revised to reflect changes in development, progress in statewide mitigation efforts, and changes in priorities.



Emergency Management Accreditation Program

4.1.1: The Emergency Management Program identifies the natural and human-caused hazards that potentially impact the jurisdiction using multiple sources. The Emergency Management Program assesses the risk and vulnerability of people, property, the environment, and its own operations from these hazards.

4.1.2: The Emergency Management Program conducts a consequence analysis for the hazards identified in Standard 4.1.1 to consider the impact on the following:

- (1) public;**
- (2) responders;**
- (3) continuity of operations including continued delivery of services;**
- (4) property, facilities, and infrastructure;**
- (5) environment;**
- (6) economic condition of the jurisdiction; and**
- (7) public confidence in the jurisdiction's governance.**

4.1.3: The Emergency Management Program has a method and schedule for evaluation, maintenance, and revision of its Hazard Identification, Risk Assessment (HIRA) and Consequence Analysis identified in Standard 4.1.1.

4.A. Introduction

In developing the comprehensive 2018 Statewide Standard Hazards Mitigation Plan Update, the first step involved the identification of hazards threatening the State and to determine the extent the risks posed to lives and property. Finally, based on the history of occurrences and property values, the vulnerability assessment and loss estimates elaborate on the potential impacts of hazards that pose the highest risks.

Significant hazards have been evaluated for their impact on the State on a comparative basis using Geographic Information Systems (GIS) and separately for each hazard. This allows for comparison among counties of the relative exposures to hazards and sets the groundwork for local hazard mitigation plan updates. It should be noted that the ranking and analysis in this plan is in terms of relative risk to other jurisdictions in the State. All the hazards addressed in this plan are relative only to the jurisdictions in West Virginia.

While flooding is the most prevalent hazard, a variety of both natural and technological hazards threaten the State. To ensure a comprehensive risk assessment, the State decided not to disqualify a hazard without conducting a preliminary hazard identification and risk assessment. Hazards



were classified as being related to weather, geological in nature or other types of hazards. Local plans were evaluated to make sure that the hazards they addressed were also included as part of this revision.

4.B. Historical Considerations

Historically, flooding has caused the most damage to West Virginia and its citizens. Recent disasters have focused the attention of West Virginia's citizens and government officials on the resultant human, economic, and environmental impacts.

4.B.1. Federal Disaster Declarations

Local and State governments share the responsibility for protecting their citizens and for providing assistance when a disaster occurs. In cases where the response and recover to a disaster is beyond the capabilities of State and local government, the federal government is able to provide assistance. The Robert T. Stafford Disaster Relief and Emergency Assistance Act was enacted to support State and local governments and their citizens when disasters overwhelm their capabilities and resources. This law, as amended, established a process for requesting and obtaining a Presidential Disaster Declaration, defines the type and scope of help available from the Federal Government, and sets the conditions for obtaining assistance.

4.B.1.a Disaster Background Information

Federal disasters and emergencies are defined as follows (FEMA, 2006):

- A **Major Disaster** could result from a hurricane, earthquake, flood, tornado or major fire, which the President determines warrants supplemental federal aid. The event must be clearly more than State or local governments can handle alone. If declared, funding comes from the President's Disaster Relief Fund, which is managed by FEMA, and disaster aid programs of other participating federal agencies.
- An **Emergency Declaration** is more limited in scope and without the long-term federal recovery programs of a Major Disaster Declaration. Generally, federal assistance and funding are provided to meet a specific emergency need or to help prevent a major disaster from occurring.
- A **Presidential Disaster Declaration** could result from a hurricane, earthquake, flood, tornado, major fire or other event which the President determines warrants supplemental Federal aid. The event must be undoubtedly more than the state or local governments can handle alone. If declared, funding comes from the President's Disaster Relief Fund, which is managed by FEMA, and disaster aid programs of other participating federal agencies.



The steps to a Presidential Disaster Declaration are as follows:

- Local governments respond, supplemented by neighboring communities through mutual aid agreements and volunteer agencies. If overwhelmed, the local government requests aid from the State;
- The State responds with state resources, such as its response team, the National Guard and other state agencies;
- A Rapid Needs Assessment (RNA) which focuses on lifesaving needs, imminent hazards, and critical lifelines is performed, usually within the first 24 hours of an event;
- An Initial Damage Assessment (IDA) is performed by the local government, which evaluates damages to residences, businesses, and public infrastructure (i.e., roads, bridges, public utilities, etc.);
- IDAs determine if there is sufficient damage to warrant a Joint Preliminary Damage Assessment (PDA) which consists of local, state, and federal staff verifying the IDAs to determine if enough damage exists to warrant federal recovery assistance;
- A Major Disaster Declaration is requested from the Governor to FEMA Region III which evaluates the request and provides recommendations to the President based on the RNA and PDAs and the type of federal assistance requested;
- Depending on the nature of the disaster and the type of assistance being requested, a Presidential declaration could be approved within hours or may take weeks;
- A Presidential Declaration can also be approved prior to an event (i.e. hurricane or significant winter storm) if it anticipated that the damage will be severe in order to pre-position resources; and
- Federal funds for post disaster Hazard Mitigation Grant Program projects based on 15% of the Stafford Act disaster recovery assistance that is provided to the jurisdictions statewide.

4.B.1.b **Federally Declared Disasters in West Virginia**

During the past decade, West Virginia has experienced 22 events warranting Presidential Disaster Declarations. These disasters had significant impacts as West Virginia, and its residents were forced to bear the majority of the costs of clean up and restoration of services. Disasters impact the State through death and injury; loss of residences, property, and possessions; lost wages and business revenue; and the immeasurable psychological and sociological costs to



disaster victims and their families. In considering the economic costs of disasters in West Virginia, it is important to recognize that small to medium-sized businesses, which provide nearly 80 percent of the jobs in an average community, are at high risk for failure after a disaster.

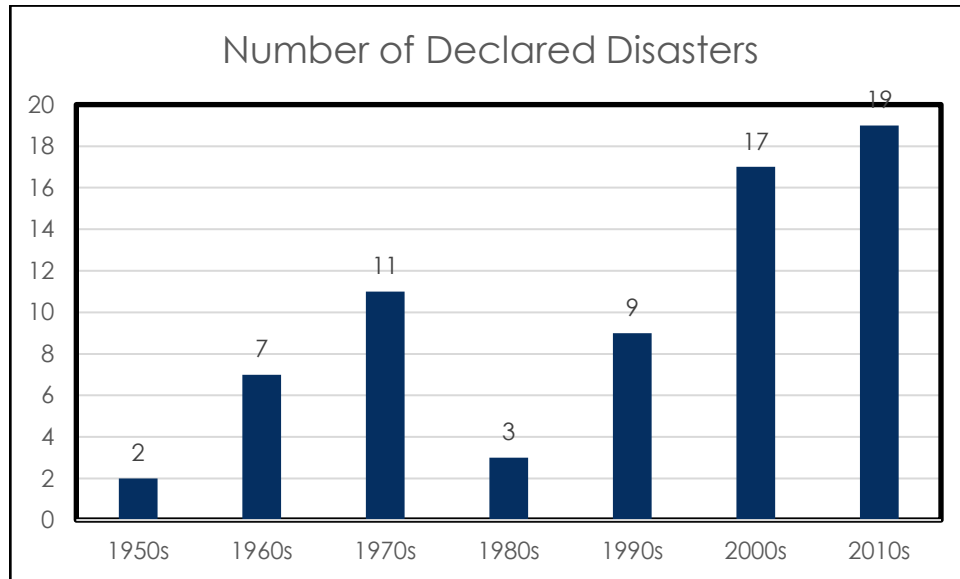


Figure 9 – Number of Declared Disasters by Decade

An important source for identifying hazards that can affect the State is the record of Federal disaster declarations. According to FEMA, since 1953 there have been 68 disaster declarations, five emergency declarations, and two fire management assistance declarations for West Virginia.

A brief summary of selected declared disasters is highlighted below:

- Between July 28 and July 29, 2017, a series of severe storms, flooding, landslides, and mudslides events occurred in Doddridge, Harrison, Marion, Marshall, Monongalia, Ohio, Preston, Randolph, Taylor, Tucker, Tyler, and Wetzel Counties (DR 4331).
- Multiple rounds of storms hit portions of West Virginia between June 22 and June 29, 2016. Flash flooding on small streams turned into river flooding. A historic and record setting flood occurred along portions of the Elk and Gauley Rivers in central West Virginia. A total of 23 deaths were linked with this disaster. Clay, Fayette, Greenbrier, Jackson, Kanawha, Lincoln, Monroe, Nicholas, Pocahontas, Roane, Summers, Webster Counties were all designated counties (DR 4273).
- During the period of July 10-14, 2015, severe storms, straight-line winds, flooding, landslides, and mudslides occurred in Braxton, Clay, Lincoln, Logan, Nicholas, Roane,



Webster, and Wood Counties. The heaviest measured rain was 3.37 inches from Sutton. Webster Springs observed 3.06 inches, and Criagsville 2.45 inches (DR 4236),

- Starting on April 13, 2015 and lasting for two days, a series of storms moved into West Virginia resulting in severe storms, flooding, landslides, and mudslides in Cabell, Calhoun, Greenbrier, Jackson, Pleasants, Roane, Summers, and Wirt Counties (DR 4221).
- Between April 8 to April 11, 2015, a series of thunderstorms moved into northern West Virginia. Areas experienced brief wind gusts of 40 to 50 mph. Minor flooding was reported. Braxton, Brooke, Doddridge, Gilmer, Jackson, Lewis, Marshall, Ohio, Pleasants, Ritchie, Tyler, and Wetzel Counties were affected by this storm (DR 4220).
- During the period of April 3-5, 2015, severe storms settled over the southwestern counties of West Virginia. Rain totals of upwards of three inches fell in parts of Boone, Cabell, Lincoln, Logan, Mingo, and Wayne Counties. These severe storms led to flooding, landslides, and mudslides. There was one fatality directly associated with this storm (DR 4219).
- Starting on March 3, 2015 a severe winter storm transitioned from heavy snows to rains. Many small streams began to flood. A series of severe winter storm, flooding, landslides, and mudslides affected areas in Barbour, Boone, Braxton, Cabell, Doddridge, Gilmer, Harrison, Jackson, Kanawha, Lewis, Lincoln, Logan, Marshall, McDowell, Mingo, Monongalia, Putnam, Raleigh, Ritchie, Roane, Summers, Tyler, Upshur, Wayne, Webster, Wetzel, Wirt, Wood, and Wyoming Counties (DR 4210).
- An emergency declaration for Hurricane Sandy on October 29, 2012, followed by a disaster declaration (DR 4093) on November 27, 2012, included 18 West Virginia counties. This unusual storm brought wind gusts of greater than 50 miles per hour (mph) to much of the eastern half of the State and heavy, wet snowfall to higher elevations. Some of the highest elevations in the eastern portions of the State recorded over 2 feet of snow. The combination of heavy snow and wind brought down trees and power lines, knocking out power to thousands across the State. At least six deaths in the State were attributed to this so-called superstorm.
- On June 29, 2012, storms developed over the Midwest during the late morning hours, strengthening and consolidating into a nearly solid line west of Chicago. The line grew in size, extending a couple of hundred miles long and was oriented from northeast to southwest. The line of storms raced southeastward through the Midwest and into the Ohio Valley during the afternoon at speeds of over 50 mph. The line held together, barreling through West Virginia during the early evening hours. The line produced widespread



damage as wind gusts reached over 80 mph in some locations. Trees and power lines were downed, leaving power and communication outages that impacted millions of people from Illinois to Virginia and that lasted in some cases over a week. The outages occurred during a particularly hot and humid period when daily high temperatures in the State ranged from the upper 90s into the lower 100s. The closure of gas stations and grocery stores led to significant inconvenience and in some instances shortages of fuel and food. Governor Earl Ray Tomblin declared a State of Emergency immediately after the event (DR 4071).

- West Virginia experienced severe storms, flooding, tornadoes, landslides, and mudslides throughout February and March 2012 (DRs 4059 and 4061). Widespread flooding occurred in Marion, Preston, Taylor, Harrison, Wayne, Logan, Mingo, and Lincoln Counties. An outbreak of tornadoes occurred from the Tennessee and Ohio Valleys and through western portions of West Virginia on March 2, 2012. Eleven counties were declared disasters as a result of the February events and three for the March events.
- Numerous communities in southern West Virginia were hit by severe storms, flash flooding, mudslides and landslides starting on June 12, 2010, and continued for several days. Flooding came in two waves, with the first affecting areas from Dingess to Holden over to Neibert in the late afternoon. The second wave struck in the evening and severely impacted the Man area, where hundreds of structures were damaged. Some of the damage was due to the rapid rise of the Guyandotte River, which crested around 16 feet. Logan, McDowell, Mingo and Wyoming Counties were included in this disaster (DR 1918).
- A crippling winter storm that struck West Virginia December 18-20, 2009, produced a heavy, wet snowfall in the southern coal field counties and through the mountains. Totals of 1 to 2 feet were common in these areas (DR 1881).
- The rain began in Mingo and Logan Counties around midnight May 31, 2004, and continued for several days. Wilkinson, Monaville, and other communities along Island Creek south of Logan, as well as Belo along Pigeon Creek, were hit hard on May 31. The storm stalled over the head of Pigeon Creek late on June 4, resulting in damage in Pie, Musick Bottom and Varney. A storm on June 13 resulted in more damage in North Matewan, and sent rocks streaming out of Warm Hollow above Matewan. Other Mingo and Logan communities were hit hard during the storms as well. Mt. Gay, Holden, Riffe Branch, Duncan Fork, Parsley Bottom, Ragland, Delbarton, Elk Creek, and Chattoe all sustained serious damage (DR 1522).
- During November 11-30, 2003, severe storms, flooding, and landslides took place in southern West Virginia. Rains of 1.75 to 2.5 inches fell in about a 12-hour period, causing many small streams to flood and close roads during the morning hours. In Logan



County, rains of 2.5 to 4.75 inches fell November 11-12. Repetitive showers formed, as dew points of 60° to 65° fed the system from Kentucky. The heaviest rain rates came toward the end of this prolonged period, with rates peaking around an inch per hour. South of the showers, across Logan and Mingo Counties, the heavy rain was more sudden, the result of the last shot of enhanced rain during the late afternoon. The heaviest rain totals ran west to east, from Wayne County and southern Cabell County, through northern Lincoln County, central Kanawha County, southern Clay County, and into central Nicholas County. Branchland's rain total was 4.7 inches, Hamlin measured 4.4 inches, and Mount Nebo measured 3.8 inches. The 3.66 inches at Charleston was the fifth heaviest 24-hour total on record for any month of the year. In Kanawha County, 44 homes were destroyed, 150 had major damage, and 88 homes had minor damage. Several private bridges were also destroyed. This event initiated a Federal disaster. Rains continued to fall during the month of November, resulting in more damage. The Kanawha River crested in Charleston at its 30-foot flood stage on the 20th; the first time since 1955 that flood stage had been reached in Charleston. Twenty-seven counties were declared eligible for Individual Assistance and 33 for Public Assistance during the November storms (DR 1500).

- Thunderstorm cells developed and intensified on the north side of a large complex of showers on June 11, 2003. Rains of 2.5 to 3.5 inches fell in a narrow corridor from the Fort Hill section of Charleston on the northeast toward Big Chimney, Pinch, and Elkview. Severe flash flooding occurred. Flooding was seen along such waterways as Magazine Branch, Sugar Creek, Woodward Branch, Mink Shoal Run, Coopers Creek, Indian Creek, Pinch Creek, and Blue Creek. This flood was the initial event, that when combined with additional flash flooding in June, prompted a Federal Disaster Declaration. Severe storms, flooding and landslides took place in southern West Virginia during June 11-15, 2003. Fifteen counties were declared eligible for Individual Assistance and 16 for Public Assistance during the June storms (DR 1474).
- During November of 2002, there was a State Disaster declaration for tornado damages in Jackson County. For recovery after this event, the State provided over \$200,000 in individual assistance, and approximately \$30,000 in Small Business Administration (SBA) loans was arranged.
- On May 2, 2002 devastating flood waters once again passed through portions of southern West Virginia, and surrounding areas. Four counties were designated for Individual Assistance (McDowell, Mercer, Mingo, and Wyoming) and five for Public Assistance (McDowell, Mercer, Mingo, Logan and Wyoming) (DR 1410).
- A series of floods and mudslides during the spring and summer of 2001 resulted in property losses in 24 counties. The disaster-designated counties include Boone, Cabell,



Calhoun, Clay, Doddridge, Fayette, Greenbrier, Kanawha, Lincoln, Logan, Marion, Mason, McDowell, Mercer, Mingo, Nicholas, Preston, Putnam, Raleigh, Roane, Summers, Taylor, Wayne, and Wyoming (DR 1378).

- In September 1996, Hurricane/Tropical Storm Fran moved across eastern West Virginia. This resulted in a disaster declaration for 10 of the State's counties. The effects were heavy, with 6 to 15 inches of rainfall in a brief period along the eastern portion of the State and from 1 to 2 inches of rainfall in the interior. Localized flash flooding was also common because of the storm. West Virginia property damages were estimated at \$40 million. Two deaths were attributed to this storm. A man in Grant County drove a tractor into flood waters and was swept away, as was a young man in an automobile in Pendleton County (DR 1137).
- The April 4-5, 1977, flood in southern West Virginia was the result of a tropical maritime air mass that produced widespread rainfall and intense convective thunderstorms. At the time, it was the most destructive flood in the State's history. Rainfall estimates for the 4-day storm exceeded 15 inches along the West Virginia- Virginia border. The area affected included the Tug Fork and Guyandotte River; communities along the Tug Fork from Welch to Fort Gay were inundated by 20 to 25 feet of water. The small communities of Matewan, Thacker, and Lobata were completely inundated⁴ (DR 3052).

⁴ USGS Water-Supply Paper 2375. National Water Summary 1988-89—Floods and Droughts: West Virginia Floods and Droughts. <http://md.water.usgs.gov/publications/wsp-2375/wv/index.html>



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Disaster Number	Year	Incident Period	Declaration Date	Disaster Types	Counties Declared
21	1954	4-Aug	4-Aug	Flood	Unknown
67	1957	31-Jan	31-Jan	Flood	Unknown
117	1961	23-Jul	23-Jul	Floods	Unknown
125	1962	9-Mar	9-Mar	Severe Storms, High Tides, Flooding	Unknown
147	1963	13-Mar	13-Mar	Severe Storms, Flooding	Unknown
165	1964	20-Mar	20-Mar	Severe Storms, Flooding	Unknown
224	1967	13-Mar	13-Mar	Flooding	36
278	1969	3-Sep	3-Sep	Severe Storms, Flooding	3
279	1969	24-Sep	24-Sep	Severe Storms, Flooding	1
323	1972	27-Feb	27-Feb	Heavy Rains, Flooding	7
344	1972	3-Jul	3-Jul	Tropical Storm Agnes	15
349	1972	23-Aug	23-Aug	Heavy Rains, Flooding	4
416	1974	29-Jan	29-Jan	Severe Storms, Flooding	5
426	1974	11-Apr	11-Apr	Severe Storms, Flooding	4
481	1975	12-Sep	12-Sep	Heavy Rains, Flooding	2
531	1977	7-Apr	7-Apr	Severe Storms, Flooding	11
569	1978	14-Dec	14-Dec	Severe Storms, Flooding	5
628	1980	15-Aug to 22-Aug	15-Aug	Severe Storms, Flooding	14
706	1984	15-May	15-May	Severe Storms, Flooding	4
753	1985	3-Nov to 7-Nov	7-Nov	Severe Storms, Flooding	30
1060	1995	23-Jun to 28-Jun	12-Jul	Severe Storm, Heavy Rains, Flooding, Mudslides	3
1084	1996	6-Jan to 12-Jan	13-Jan	Blizzard	55
1096	1996	19-Jan to 2-Feb	25-Jan	Flooding	28
1115	1996	15-May to 10-Jun	23-May	Flooding	17
1132	1996	18-Jul to 31-Jul	14-Aug	Flooding	10
1137	1996	5-Sep to 8-Sep	11-Sep	Hurricane Fran	10
1168	1997	28-Feb to 15-Mar	7-Mar	Severe Storms/Flooding	16
1229	1998	26-Jun to 27-Jul	1-Jul	Severe Storms, Flooding and Tornadoes	21
1319	2000	18-Feb to 22-Feb	28-Feb	West Virginia Winter Storm	26
1378	2001	15-May to 4-Sep	3-Jun	Severe Storms & Flooding	24
1410	2002	2-May to 20-May	5-May	Severe Storms, Flooding, and Landslides	8
1455	2003	15-Feb to 28-Mar	14-Mar	Severe Winter Storms	50
1474	2003	11-Jun to 15-Jul	21-Jun	Severe Storms, Flooding and Landslides	14



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1496	2003	18-Sep to 30-Sep	23-Sep	Hurricane Isabel	10
1500	2003	11-Nov to 30-Nov	21-Nov	Severe Storms, Flooding, and Landslides	34
1522	2004	27-May to 28-Jun	7-Jun	Severe Storms, Flooding, and Landslides	24
1536	2004	22-Jul to 1-Sep	6-Aug	Severe Storms, Flooding, and Landslides	4
1558	2004	16-Sep to 27-Sep	20-Sep	Severe Storms, Flooding, and Landslides	20
1574	2005	4-Jan to 25-Jan	1-Feb	Severe Storms, Flooding, and Landslides	6
1696	2007	14-Apr to 18-Apr	1-May	Severe Storms, Flooding, Landslides, and Mudslides	18
1769	2008	3-Jun to 7-Jun	19-Jun	Severe Storms, Tornadoes, Flooding, Mudslides, and Landslides	12
1838	2009	3-May to 8-Jun	15-May	Severe Storms, Flooding, Mudslides, and Landslides	11
1881	2010	18-Dec to 20-Dec	2-Mar	Severe Winter Storm and Snowstorm	15
1893	2010	12-Mar to 9-Apr	29-Mar	Severe Storms, Flooding, Mudslides, and Landslides	6
1903	2010	5-Feb to 11-Feb	23-Apr	Severe Winter Storms and Snowstorms	17
1918	2010	12-Jun to 29-Jun	24-Jun	Severe Storms, Flooding, Mudslides, and Landslides	4
4059	2012	2-Feb to 5-Mar	16-Mar	Severe Storms, Tornadoes, Flooding, Mudslides, and Landslides	11
4061	2012	15-Mar to 31-Mar	22-Mar	Severe Storms, Flooding, Mudslides, and Landslides	3
4071	2012	29-Jun to 8-Jul	23-Jul	Severe Storms and Straight-line Winds	47
4093	2012	29-Oct to 8-Nov	27-Nov	Hurricane Sandy (Winter Impacts)	18
4132	2013	13-Jun to 13-Jun	26-Jul	Severe Storms and Flooding	2
4210	2015	3-March to 14-March	31-March	Severe Winter Storms, Flooding, Landslides, and Mudslides	33
4219	2015	3-April to 5-April	14-May	Severe Storms, Flooding, Landslides, and Mudslides	6
4220	2015	8-April to 11-April	18-May	Severe Storms, Flooding, Landslides, and Mudslides	12



Disaster Number	Year	Incident Period	Declaration Date	Disaster Types	Counties Declared
4221	2015	13-April to 15-April	21-May	Severe Storms, Flooding, Landslides, and Mudslides	8
4236	2015	10-July to 14-July	7-Aug	Severe Storms, Straight-line Winds, Flooding, Landslides, and Mudslides	9
4273	2016	22-June to 29-June	25-Jun	Severe Storms, Flooding, Landslides, and Mudslides	18
4331	2017	28-July to 29-July	18-August	Severe Storms, Flooding, Landslides, and Mudslides	12

Table 12 – Federally Declared Major Disaster Declarations

Disaster Number	Year	Incident Period	Declaration Date	Disaster Types	Counties Declared
3021	1977	19-Jan		Drought	55
3052	1977	24-Aug		Severe Storms, Landslides, and Flooding	55
3051	1977	24-Aug		Drought	55
3109	1993	13-Mar to 17-Mar	17-Mar	Severe Snowfall and Winter Storm	55
3221	2005	29-Aug to 1-Oct	5-Sep	Hurricane Katrina Evacuation	55
3345	2012	2-Jun to 10-Jul	30-Jun	Severe Storms	55
3358	2012	29-Oct to 8-Nov	29-Oct	Superstorm Sandy	55
3366	2014	9-Jan to 20-Jan	10-Jan	Chemical Spill	

Table 13 – Federally Declared Emergency Declarations

Disaster Number	Year	Incident Period	Declaration Date	Disaster Types	Counties Declared
2392	2001	16-Nov to 30-Nov	16-Nov	Trough and Smoke Hole Fire Complexes	12
2391	2001	16-Nov to 30-Nov	16-Nov	Southwest Complex Fire	55

Table 14 – Federally Declared Fire Management Assistance Declarations



The following counties have experienced 20 or more declared disasters:

1. Mingo County (31)
2. Lincoln County (30)
3. Logan County (30)
4. Kanawha County (27)
5. Wyoming County (26)
6. Raleigh County (25)
7. Wayne County (25)
8. Cabell County (25)
9. Boone County (23)
10. Greenbrier County (23)
11. Clay County (22)
12. Jackson County (22)
13. McDowell County (22)
14. Nicholas County (22)
15. Mercer County (22)
16. Braxton County (21)
17. Gilmer County (21)
18. Lewis County (21)
19. Roane County (21)
20. Wetzel County (21)
21. Fayette County (20)
22. Pocahontas County (20)
23. Summers County (20)
24. Tucker County (20)
25. Webster County (20)



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Year	Disaster Number	Disaster Types	HMGP Funding Amount	Eligible Counties	Open Period of Availability
2013	4132	Severe Storm Flooding	\$666,546	All	18 months from Declaration
2015	4210	Severe Storm Landslide/Mudslide	\$6,460,520	All	12 months from Declaration Plus 2 extensions
2015	4219	Severe Storms, Flooding, Mudslides, and Landslides	\$2,187,815	All	12 months from Declaration Plus 2 extensions
2015	4220	Severe Storms, Tornadoes, Flooding, Mudslides, and Landslides	\$1,417,720	All	12 months from Declaration
2015	4221	Severe Storms, Flooding, Mudslides, and Landslides	\$1,568,756	All	12 months from Declaration
2015	4236	Severe Storms, Straight Line Winds, Flooding, Landslide, and Mudslide	\$1,813,088	All	12 months from Declaration
2016	4273	Severe Storms, Flooding, Mudslides, and Landslides	\$69,667,251	All	12 months from Declaration Plus 3 extensions
2017	4331	Severe Storms, Flooding, Mudslides, and Landslides	\$3,050,948	All	12 months from Declaration
2018	4359	Severe Storms, Flooding, Mudslides, and Landslides	Unknown	All	Application period still open
2018	4378	Severe Storms, Flooding, Mudslides, and Landslides	Unknown	All	Application period still open

Table 15 – HMGP Funds by Disaster



4.B.2. National Center for Environmental Information

One of the primary data sets used to determine risk probability was the National Centers for Environmental Information (NCEI) Storm Data. The NCEI database is published by the National Oceanic and Atmospheric Administration (NOAA) and contains information on storms and weather phenomena that have caused loss of life, injuries, significant property damage, and/or disruption to commerce.

The NCEI database provides information about events from 1951 to 2018. For the purposes of the 2018 Statewide Standard Hazard Mitigation Plan Update, the county in which the event occurred was of primary interest, and the NCEI has provided this data in two methods:

- County Name – Event listed as individual record for each county in which it occurred
- Zone – Event listed by the zone or multiple zones, which contain multiple counties.

NCEI is known to have spotty recording of geological hazards (i.e., earthquake, landslide, karst). In the absence of better data, it was decided to proceed with the records available in NCEI for these events. In all cases NCEI records for these events are significantly under-reported during West Virginia's past. Efforts were made to contact agencies dealing with each hazard to see if better data sources of historical accounts were available. To date, comprehensive digital databases do not exist for these hazards.

4.B.3. State and Critical Facility Analysis

The analysis of State facility and critical facility vulnerability was completed using two major sources of facility data: (1) West Virginia State Owned and Insured Structures provided by the West Virginia Board of Risk and Insurance Management and (2) the critical facility database built from datasets provided from various State and national sources. Many of the buildings in the West Virginia State-owned structures dataset are critical to disaster preparedness and response, although not all State-critical facilities are in the BOR database. For example, many privately owned buildings and structures (hospitals, power plants, certain industrial facilities, etc.) are critical to societal function, especially during emergencies and disasters. Thus, critical facilities data collection extended to a broader array of critical facilities than would be available through the BOR. However, assembly of a robust critical facilities database will be an ongoing effort.



4.B.3.a **Critical Facilities**

There is currently no single, standardized critical facility dataset for West Virginia; various plans have used different datasets, based upon the geographic and subject-matter scope of each plan. This plan uses various data sources to best describe each critical facility. For the purposes of this update, analysis is limited to the following broad categories:

Offices of Emergency Services – The Office of Emergency Services, or Emergency Management Agency, is the primary coordinating entity for each jurisdiction. In many cases this location serves as the Emergency Operations Center for the jurisdiction. Several of these locations also are the 911-Centers.

Law Enforcement Departments – This dataset includes locations of Federal, State, local, and special jurisdiction law enforcement agencies, including but not limited to, municipal police, county sheriffs, State police, school police, park police, railroad police, Federal law enforcement agencies, departments within non-law enforcement Federal agencies charged with law enforcement (e.g., U.S. Postal Inspectors), and cross-jurisdictional authorities (e.g., Port Authority Police).

Fire Departments – This dataset contains the location of fire stations. Fire Departments not having a permanent location are included, in which case their location has been depicted at the city/town hall or at the center of their service area if a city/town hall does not exist. This dataset includes those locations primarily engaged in forest or grasslands firefighting, including fire lookout towers if the towers are in current use for fire protection purposes. This dataset includes both private and governmental entities. Firefighting training academies are also included.

Hospitals – This dataset contains the location of all hospitals in West Virginia. The hospital dataset includes major medical facilities, surgical centers, and major VA hospitals.

Schools – This dataset contains a complete listing of public Pre-Kindergarten through 12th-grade schools in West Virginia.



Region	OES	Police Departments	Fire Departments	Hospitals	Public Schools (K-12)	Total
Region 1	6	45	72	8	92	223
Region 2	7	37	68	10	95	217
Region 3	5	42	70	9	111	237
Region 4	5	34	49	6	55	149
Region 5	8	26	47	6	68	155
Region 6	7	39	77	8	89	220
Region 7	7	27	45	5	55	139
Region 8	6	22	45	3	48	124
Region 9	2	7	16	3	41	69
Region 10	3	20	41	6	35	105
Region 11	1	6	10	2	10	29
Jefferson	1	7	8	1	17	34
	58	312	548	67	716	1,701

Table 16 – Critical Facilities by PDC Region

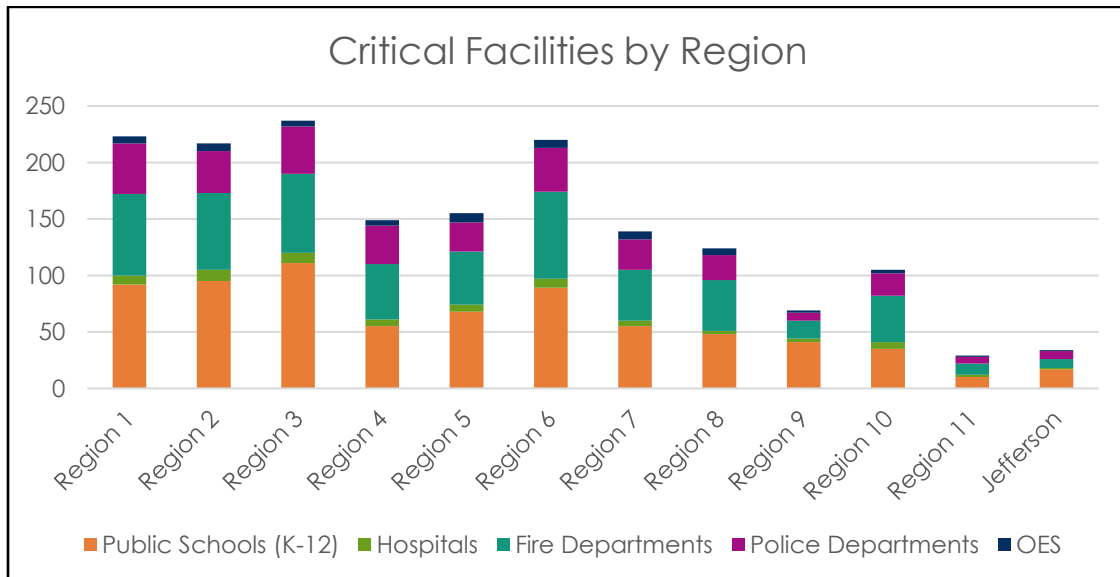


Figure 10 – Critical Facilities by Region



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County	OES	Police Departments	Fire Departments	Hospitals	Public Schools (K-12)	Total
Barbour	1	5	3	1	9	19
Berkeley	1	3	12	2	33	51
Boone	1	6	8	1	13	29
Braxton	1	6	7	1	8	23
Brooke	1	6	10	2	10	29
Cabell	2	7	13	6	26	54
Calhoun	1	2	3	1	4	11
Clay	1	2	3	0	6	12
Doddridge	1	2	5	0	4	12
Fayette	1	13	15	2	18	49
Gilmer	1	4	5	0	3	13
Grant	1	2	5	1	5	14
Greenbrier	1	8	15	1	13	38
Hampshire	1	4	8	1	11	25
Hancock	1	5	10	0	8	24
Hardy	1	3	4	0	6	14
Harrison	2	10	20	2	26	60
Jackson	1	4	6	1	13	25
Jefferson	1	7	8	1	17	34
Kanawha	2	27	49	7	69	154
Lewis	1	3	6	1	6	17
Lincoln	1	4	8	0	8	21
Logan	1	6	12	1	18	38
Marion	1	12	21	1	22	57
Marshall	1	7	15	1	13	37
Mason	1	6	8	1	11	27
McDowell	1	12	16	1	11	41
Mercer	1	10	15	3	27	56
Mineral	1	6	12	1	14	34
Mingo	1	7	14	1	11	34
Monongalia	1	7	15	3	21	47



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County	OES	Police Departments	Fire Departments	Hospitals	Public Schools (K-12)	Total
Monroe	1	4	6	0	5	16
Morgan	1	4	4	1	8	18
Nicholas	1	5	7	1	15	29
Ohio	1	8	14	4	14	41
Pendleton	1	2	6	0	4	13
Pleasants	1	3	2	0	5	11
Pocahontas	1	3	7	1	5	17
Preston	1	5	12	1	10	29
Putnam	1	7	10	1	23	42
Raleigh	1	11	19	3	30	64
Randolph	1	3	13	1	16	34
Ritchie	1	4	5	0	6	16
Roane	1	3	6	1	5	16
Summers	1	3	8	1	5	18
Taylor	1	3	4	1	6	15
Tucker	1	3	4	0	3	11
Tyler	1	2	4	1	3	11
Upshur	1	3	7	1	10	22
Wayne	1	7	13	1	21	43
Webster	1	5	5	1	4	16
Wetzel	1	5	12	1	8	27
Wirt	1	1	1	0	3	6
Wood	1	7	20	2	29	59
Wyoming	1	5	8	0	14	28
	58	312	548	67	716	1,701

Table 17 – Critical Facilities by County

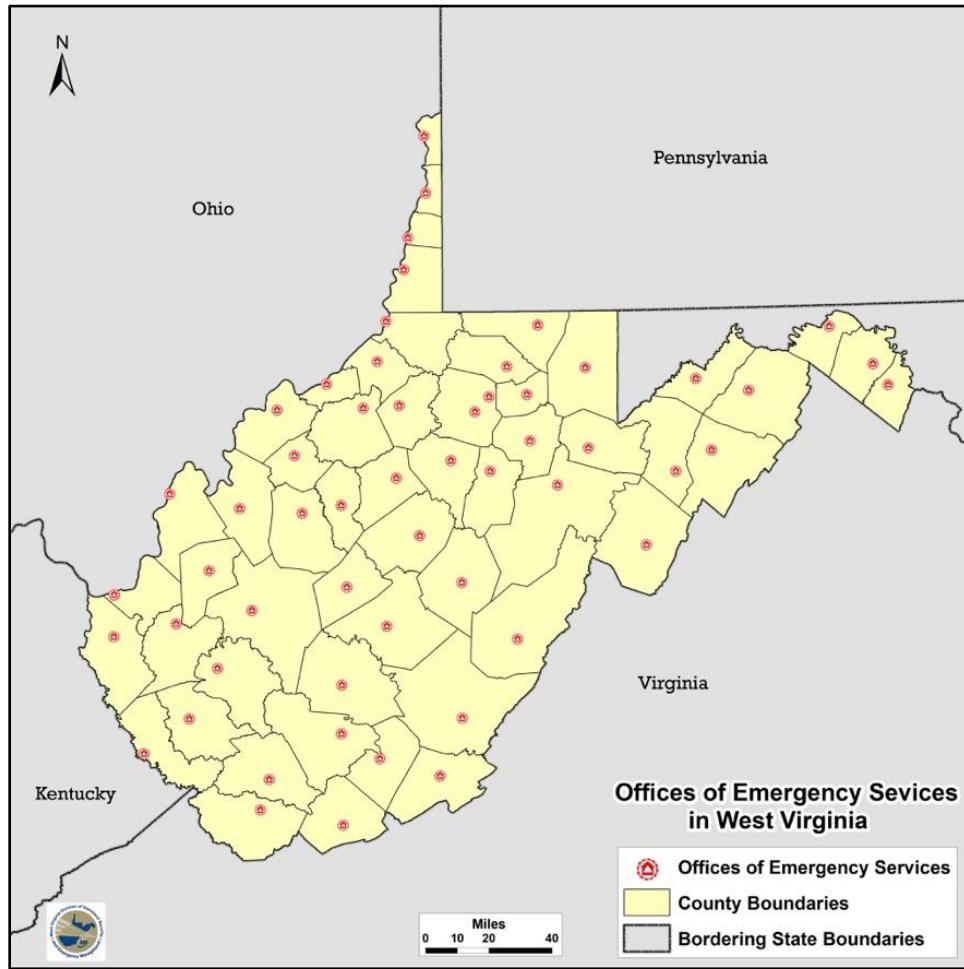


Figure 11 – Offices of Emergency Services in WV

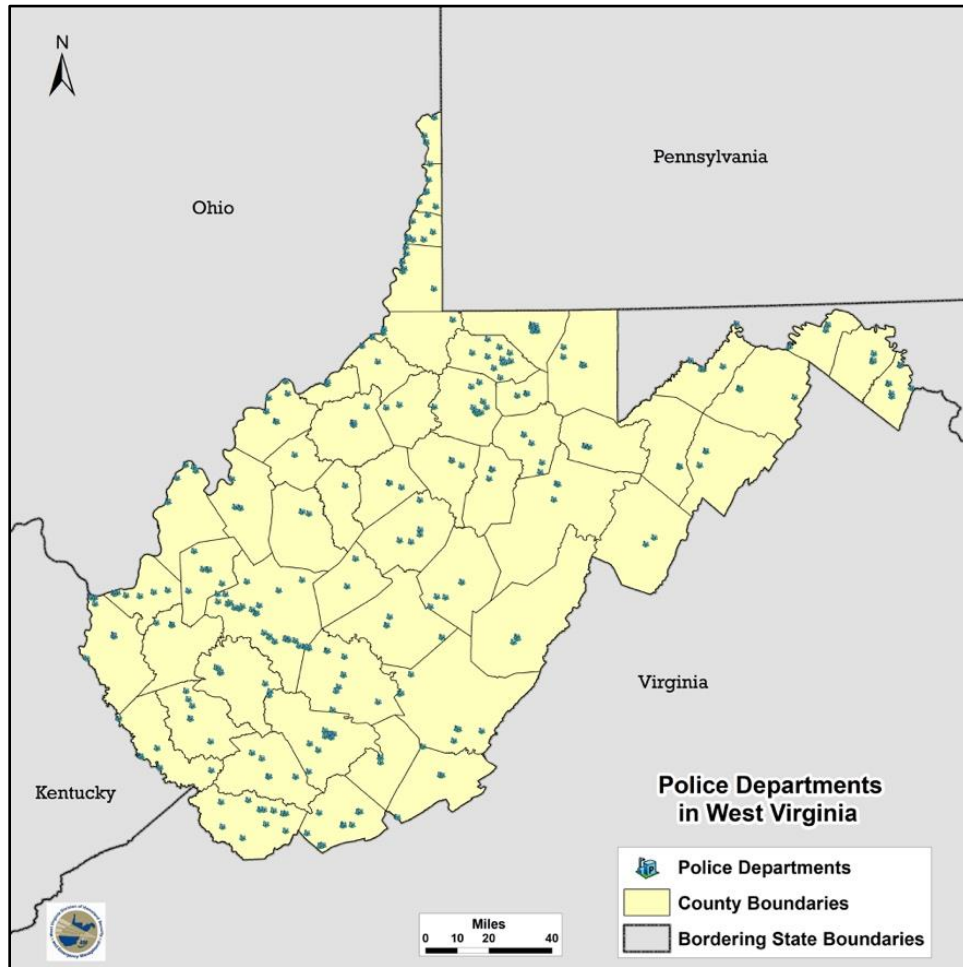


Figure 12 – Police Departments in WV

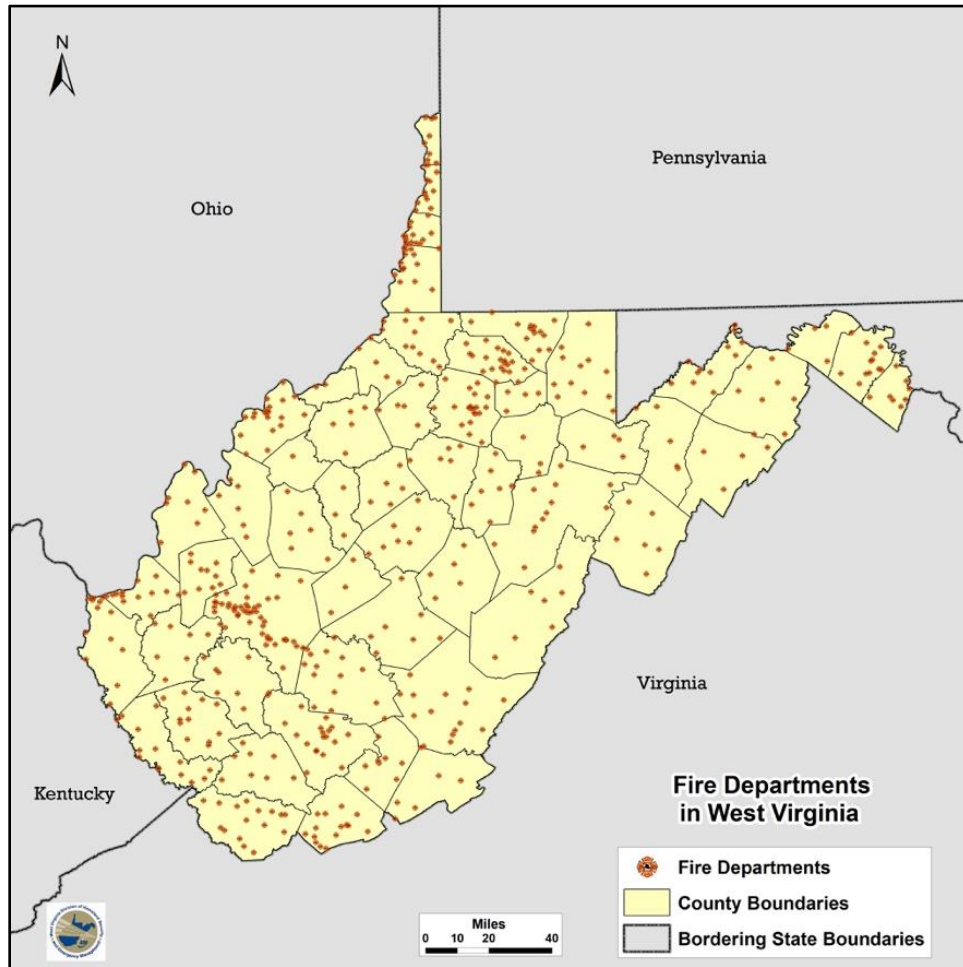


Figure 13 – Fire Departments in WV



Figure 14 – Hospitals in WV

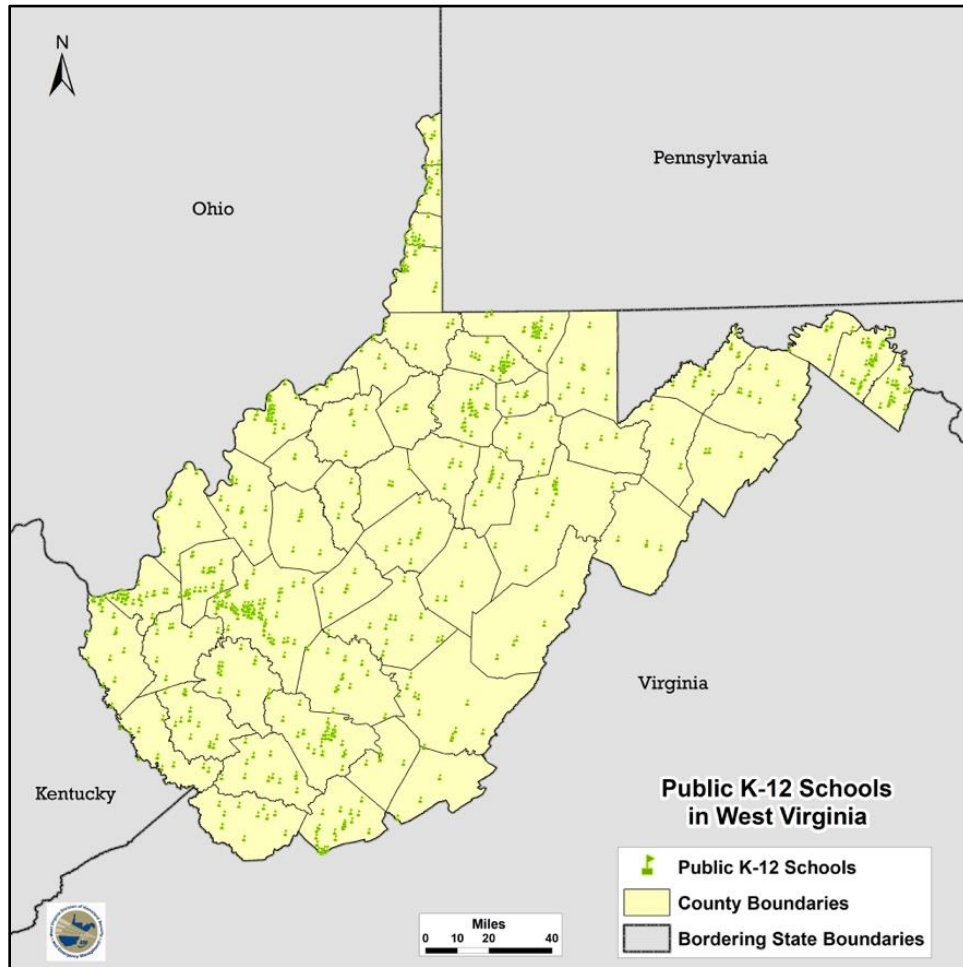


Figure 15 – Public Schools (K-12) in WV

Although not a complete representation of all the possible types of critical facilities, this data is a good representation of facility locations in the State.



Facility Type	Data Source	Date Created	Number of Facilities
OES	WVDHSEM	2017	58
Law Enforcement	WVDHSEM	2017	312
Fire Departments	WVDHSEM, WV State Fire Marshal	2017	548
Hospitals	WVDHSEM, WVOHFLAC	2017	71
Schools, Pre-K thru 12	WVDHSEM, WV Safe Schools	2017	712

Table 18 – Critical Facility Dataset Information



4.B.3.c **Board of Risk Database**

The most comprehensive source of State facility information is found in the database maintained by the West Virginia Board of Risk and Insurance Management (BRIM). This database stores facilities information for over 15,000 records. The majority attributes in this database are provided by the submitting agency and have not been verified by BRIM. Building stock is valued at over \$18 billion, with contents valued at over \$2.9 billion.

The following information is a summary of the BRIM database related to structures classified as “Buildings”:

- **County with Most BRIM Buildings:** Kanawha County 1,265 buildings covered by BRIM. These structures account for over \$2,100,000,000 in building value and an additional \$504,000,000 in contents over a total of over \$2.6 Billion.
- **Agency with Most BRIM Buildings:** The West Virginia Division of Natural Resources (State Parks) represents 1,547 structures, accounting for nearly \$340 Million in building value and \$38 Million in content value. These buildings have a total value of approximately \$378 Million.
- **Agency with the Highest Building Value:** West Virginia University has a total of 639 covered buildings in the BRIM database. These buildings have a total value of over \$3.2 Billion.



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County	Number of Buildings	Building Value	Content Value	Total Value
Barbour	98	\$79,608,585	\$15,246,071	\$94,854,656
Berkeley	354	\$491,487,145	\$67,447,500	\$558,934,645
Boone	53	\$23,332,497	\$5,881,300	\$29,213,797
Braxton	113	\$101,655,904	\$15,768,599	\$117,424,503
Brooke	49	\$11,011,390	\$3,156,200	\$14,167,590
Cabell	627	\$1,495,221,065	\$147,500,863	\$1,642,721,928
Calhoun	25	\$39,931,446	\$6,780,576	\$46,712,022
Clay	36	\$50,401,475	\$7,003,710	\$57,405,185
Doddridge	44	\$60,773,389	\$5,103,850	\$65,877,239
Fayette	326	\$372,959,365	\$43,708,153	\$416,667,518
Gilmer	149	\$162,988,597	\$22,448,982	\$185,437,579
Grant	80	\$48,081,262	\$12,892,139	\$60,973,401
Greenbrier	266	\$374,151,859	\$66,975,501	\$441,127,360
Hampshire	184	\$221,033,604	\$26,434,719	\$247,468,323
Hancock	143	\$143,070,101	\$21,427,290	\$164,497,391
Hardy	135	\$124,829,947	\$20,879,835	\$145,709,782
Harrison	261	\$665,875,045	\$98,789,715	\$764,664,760
Jackson	140	\$154,461,794	\$39,125,813	\$193,587,607
Jefferson	271	\$832,696,465	\$88,816,710	\$921,513,175
Kanawha	1,265	\$2,107,194,336	\$504,731,751	\$2,611,926,087
Lewis	139	\$115,371,992	\$21,805,364	\$137,177,356
Lincoln	92	\$121,374,563	\$14,365,825	\$135,740,388
Logan	204	\$395,631,069	\$62,072,458	\$457,703,527
Marion	298	\$672,536,202	\$70,967,946	\$743,504,148
Marshall	230	\$306,599,612	\$74,178,089	\$380,777,701
Mason	152	\$188,262,948	\$24,060,779	\$212,323,727
McDowell	181	\$270,866,300	\$38,827,520	\$309,693,820
Mercer	300	\$486,452,321	\$60,622,461	\$547,074,782
Mineral	169	\$221,767,005	\$22,556,049	\$244,323,054
Mingo	277	\$232,774,741	\$38,192,205	\$270,966,946
Monongalia	427	\$2,506,224,386	\$543,652,819	\$3,049,877,205
Monroe	88	\$95,130,847	\$11,420,090	\$106,550,937
Morgan	154	\$109,065,002	\$17,459,783	\$126,524,785



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County	Number of Buildings	Building Value	Content Value	Total Value
Nicholas	139	\$89,798,710	\$28,097,127	\$117,895,837
Ohio	222	\$558,585,321	\$72,917,964	\$631,503,285
Pendleton	89	\$58,377,939	\$8,965,300	\$67,343,239
Pleasants	56	\$81,117,210	\$16,905,251	\$98,022,461
Pocahontas	312	\$129,530,576	\$39,384,612	\$168,915,188
Preston	247	\$451,632,483	\$62,793,422	\$514,425,905
Putnam	252	\$386,495,601	\$78,793,825	\$465,289,426
Raleigh	473	\$893,114,149	\$116,932,468	\$1,010,046,617
Randolph	250	\$252,871,312	\$38,695,312	\$291,566,624
Ritchie	76	\$15,950,829	\$3,820,720	\$19,771,549
Roane	84	\$99,837,108	\$6,892,559	\$106,729,667
Summers	201	\$83,976,435	\$11,981,125	\$95,957,560
Taylor	114	\$114,765,517	\$14,135,085	\$128,900,602
Tucker	222	\$134,644,176	\$21,098,007	\$155,742,183
Tyler	79	\$15,132,478	\$1,688,449	\$16,820,927
Upshur	134	\$45,784,332	\$10,668,191	\$56,452,523
Wayne	268	\$300,569,061	\$48,987,839	\$349,556,900
Webster	141	\$32,883,293	\$5,137,215	\$38,020,508
Wetzel	60	\$12,318,367	\$3,554,189	\$15,872,556
Wirt	35	\$15,784,800	\$3,404,985	\$19,189,785
Wood	264	\$203,021,314	\$39,504,065	\$242,525,379
Wyoming	169	\$138,313,177	\$22,348,286	\$160,661,463
Total	11,217	\$17,397,326,447	\$2,877,006,661	\$20,274,333,108

Table 19 – BRIM-covered Facilities

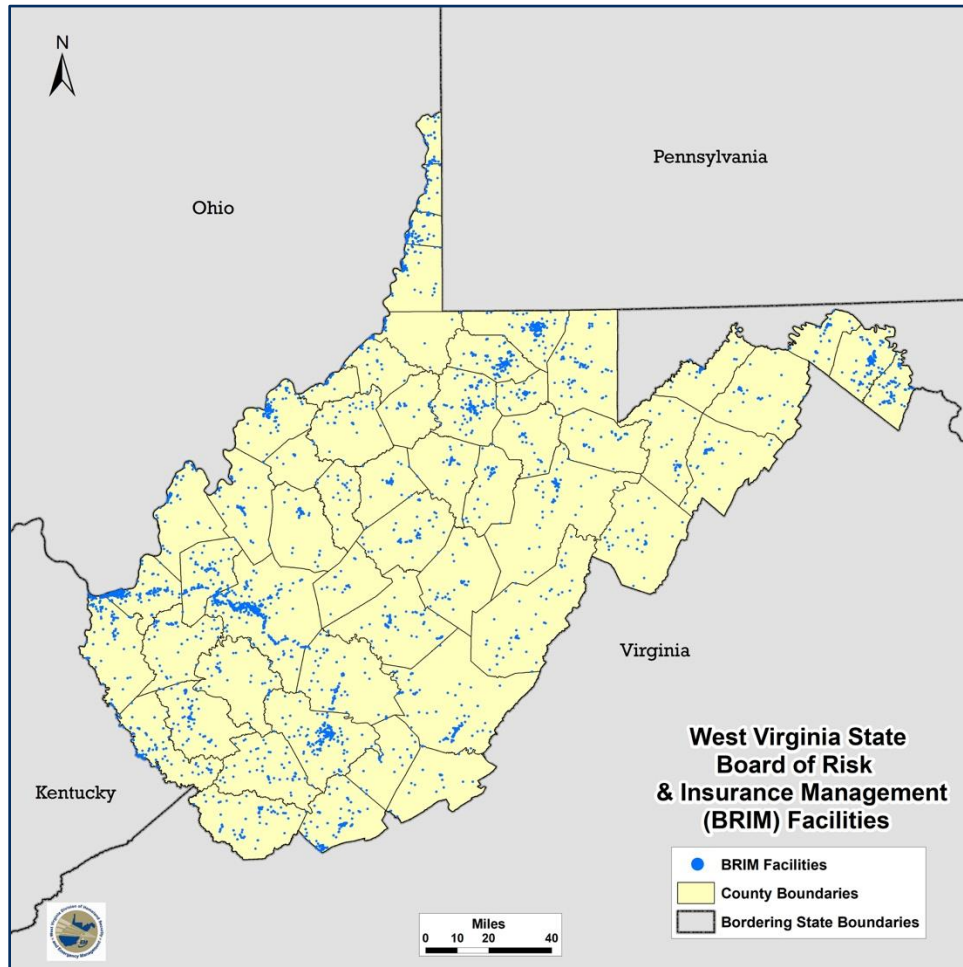


Figure 16 – BRIM Covered Facilities

4.B.3.d Facility Analysis

Each individual hazard includes analysis results in the risk assessment section for State-owned and critical facilities. When hazard data was available, facilities were intersected with hazard specific data to determine the building's risk zone. The analysis methodology is described in full detail in these sections; tables are used to represent the number of facilities in each risk category.

Potential dollar loss and/or exposed building value of State facilities was compiled for some of the hazards. Agencies with a large number of structures or building value in the high-risk hazard areas are noted in each section. These agencies and buildings are an excellent starting point for assessing the need for specific mitigation action items. In-depth analysis could not be completed for the critical facilities because of the lack of building-specific details, as previously discussed.



4.B.3.e **Recommended Enhancements**

The next version of the WV Statewide Standard Hazard Mitigation Plan Update will contain an expanded list of critical facilities. The list will potentially include:

- Emergency Operations Centers (included in 2018 update)
- Law Enforcement Departments (included in 2018 update)
- Fire Departments (included in 2018 update)
- Hospitals (included in 2018 update)
- Schools (included in 2018 update)
- 911 Centers
- Jails/Correctional Facilities
- Emergency Medical Services
- Health Departments
- Colleges/Universities
- Nursing Homes
- Primary Care Centers
- Private Schools
- Public Libraries
- Court Houses

Additional meetings will also be held with BRIM to determine options for enhancing the spatial accuracy of the data contained in the BRIM database.

4.C. **Hazard Identification Methodology**

To complete the State's risk assessment, data was collected from a variety of sources. The assessment began with a thorough review of the 2013 WVSHMP. To better understand how threats face all jurisdiction in the state, additional quantitative data sources were used. Sources included national and state databases, published materials, expert interviews, and raw data from a number of State and Federal agencies.

A detailed discussion related to the integration of local hazard mitigation plans is found in later in this chapter. While the local plans were a valuable source for qualitative data, the various approaches to reporting data made it difficult to develop statewide assessments.

In order to assess the vulnerability of different jurisdictions to the hazards, data on past occurrences of damaging hazard events was gathered. To compare the distribution of events between different hazards, the same data sources were used when possible to create hazard



profile maps. Crucial information used to analyze past hazard events and to rank hazards came from the NCEI Storm Events database.

The following subsections include the results of the Hazard Identification and Risk Assessment (HIRA) process. The process used to identify the hazards that impact West Virginia and available data sources were reviewed and endorsed by WVDHSEM in March 2017.

Evaluation of each hazard for continued inclusion began. Several hazards were removed as stand-alone hazards, and placed in with other hazards. Hazard research started with identifying and profiling the hazards, assessing risk, providing vulnerability analysis, and estimating potential losses.

4.C.1. Hazard Assessment and Ranking Methodology

This section describes the concepts underlying the hazard identification and risk assessment process, and the methods used for the hazard ranking methodology. The risk assessment has been structured to identify hazards in this section in accordance with 44 CFR §201.4(c)(2)(i). The Hazard Ranking Methodology uses a structured assessment to identify a Risk Rating score. Seven areas of assessment contribute to the score.

Geographic Area Impacted refers to the extent of the area affected. The score ranges from 0 (No Area Impacted) to 4 (Over 75% of Area Impacted). Flooding, for instance, frequently affects large areas of the state and would therefore receive a 4 (over 75% of the state regularly experiences flooding events). Likewise, Public Health and Infectious Disease impacts people directly, but has no geographic extent, and would receive a score of 0.

Property Damage is determined using available damages and estimates of damage. The scores range from 0 (No Property Damage) to 4 (Property Damage Occurred Regionally). Damage assessments are available from a variety of sources, including PDC LHMPs. Wildfire received a score of 1 since the extent of damage was limited to relatively small amounts of acreage and losses were based on lost revenue from forests. Earthquakes can have a large impact if they are strong and centered under a structure, but historically, there has been little damage, so it gets a score of 1.

Population Vulnerability references susceptibility to a hazard. Scores range from 0 (No Population Affected) to 4 (Regional Population Affected). Regional vulnerability includes population and aggregated building values, and the net numbers of local critical facilities impacted by a potential hazard. For this report, vulnerability is summarized in the form of intensity and damage data developed from an analysis of historical hazard impacts. Public health and disease outbreaks can affect large portions of the population,



and warrant a score of 4; whereas lightning may only affect one or two, and receive a score of 1.

State Infrastructure Damages relate to damages to state infrastructure such as roads, bridges, water systems, and other critical infrastructure. Scoring ranges from 0 (No Infrastructure Damage) to 4 (Over 75% of Infrastructure Damaged). Information used to complete this analysis was primarily from historical damage. When historical damages are not available, HAZUS and Board of Risk and Insurance Management values substituted for actual damages.

Deaths or Injuries are considered from 2000 to 2016 for most hazards. Scores range from 0 (No Death or Injury) to 4 (More than 10 Deaths between 2000-2016). Natural Resource Extraction hazard receives a score of 4 based on the number of deaths due to mining accidents.

History of Occurrence takes into account the years 2000 to 2016 as a base period. Scores range from 1 (Unknown) to 5 (More than 10). Some of the Regional plans report occurrence as events per year, which was also considered in determining a score. History of Occurrence is a multiplier.

Regional HMP Ranking assigns a score based on each region's own evaluation. If a region ranks a hazard as low, but the State ranks the same hazard as high, a compromise will assign the hazard a score of 3. If both the region and the State rank a hazard as high, a score of 5 will be added to the overall score.



Hazard Ranking Scoring		
Geographic Area Impacted	No Area Impact	0
Percentage of the area impacted by the event	Less than 25%	1
	26% to 50%	2
	51% to 75%	3
	Over 75%	4
Property Damage	No Property Damage	0
Property damage that can occur in the area by the event	Localized Damage	1
	Municipality Damage	2
	County Damage	3
	Regional Damage	4
Population Vulnerability	No Population Affected	0
Population affected in the area by the event	Localized Population Affected	1
	Municipality Population Affected	2
	County Population Affected	3
	Regional Population Affected	4
State Infrastructure Damage	No Infrastructure Damage	0
State Infrastructure Damage that can occur in the area by the event	Less than 25%	1
	26% to 50%	2
	51% to 75%	3
	Over 75%	4
Death or Injury	No Death or Injury	0
Percentage of the area impacted by the event	1 to 4 people	1
	5 to 7 people	2
	8 to 10 people	3
	More than 10 people	4
History of Occurrence	Unknown	1
Number of Times Event has Occurred	1 to 4	2
	5 to 7	3
	8 to 10	4
	More than 10	5
Regional HMP Ranking	Unranked	0
Number of Times Event has Occurred	Low	1
	Medium	3
	High	5

Table 20 – Hazard Ranking Methodology Calculation Table



The ranking methodology reliability varies from hazard to hazard due to the nature of the available data and is rated on a scale of zero (0) through four (4).

These scores are multiplied by future occurrence value of 1-5 to determine the overall risk. The summed value (vulnerability x probability of occurrence = risk) is added together at a regional level for each hazard separately, permitting comparison between regions for each hazard type. The following table ranks the risks for the state as a whole. In each hazard analysis section, a breakout of regional scores will be provided.

	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

Probability in this plan probability is the likelihood of a hazard occurring and is defined in terms of low, medium, or high. The method for determining the probability of a hazards occurrence is based on the scores determined using the Hazard Ranking Methodology. Figure 17 describes the risks and probability in terms of low, medium, or high.



For the 2018 update, Risk is defined as “the probability of a specific hazard occurrence”⁵. Due to the relatively steady rate at which the identified hazards occur, historic frequency of events will be used. However, a major drawback to this method is biases, incomplete reporting and failure to request state agencies and departments to collect data for hazard analysis. Every effort was made to reduce the possibility of inaccurate projections. To eliminate as much inaccuracies as possible, this plan models are calibrated to historical data. Examples of such models include flood maps depicting 100 and 500-year floodplains, karst susceptibility maps based on geologic conditions, fire risk, and many others.

Risk Rating	Rating Score
Low	0-15
<p>A hazard with an LOW rating is expected to have little to no impact upon the region and state. The hazard poses minimal health and safety consequences to the residences, and is expected to cause little to no property damage. The occurrence of a hazard with an LOW is rare; however, due to other factors such as climate change and geographical location it is still possible for such a hazard to occur and even cause significant damage based upon the magnitude of the event.</p>	
Medium	16-30
<p>A hazard with a MEDIUM rating is expected to have a moderate impact upon the region and state. The hazard poses minor health and safety consequences with minor injuries expected and few to no fatalities. The hazard may cause some property damages and few to no fatalities. The hazard may cause some property to be damaged or destroyed.</p>	
High	31 or Greater
<p>A hazard with a HIGH rating is expected to have a significant impact upon region and state. The hazard poses high health and safety consequences with numerous injuries and fatalities possible. The hazard is expected to cause some property to be damaged or destroyed.</p>	

Figure 17 – Risk Rating Scores

4.C.2. Identified Hazards

There are 8 hazards considered in the 2018 West Virginia Statewide Standard Hazard Mitigation Plan Update. These natural hazards were selected based upon historical occurrence and

⁵ D. Okrent. “Comment on Societal Risk.” *Science*, Vol. 208, 1980, pp. 372-375.



recommendation of relevant subject matter experts. The hazards evaluated for the 2018 update include:

- Flood;
- Landslide and Land Subsidence;
- Severe Storms (including High Winds, Thunderstorm, Tornado and Lightning/Hail);
- Winter Weather;
- Wildfire;
- Dam and Levee Failure;
- Drought and Extreme Heat; and
- Earthquake.

Using the development Each hazard is evaluated by geographic area, property damage, population vulnerability, state infrastructure damage, death or injuries, historical occurrence and Local Hazard Mitigation Plan (LHMP) ranking.

4.C.3. Incorporation of Local Plan Data

Local hazard rankings are highly variable related to the ranking of overall hazards and for determining the monetary damages associated with each hazard.

4.C.3.a Determining Risk Level at County Level

One of the challenges associated with rolling up plans from the individual PDCs is that not all of the same hazards were assessed by each of the PDCs. The WV Hazard Mitigation Planning Team reviewed the regional PDCs and recorded specified hazard rankings. These regional ranks were only element of the overall state hazard assessment.



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	Flood	Landslide	Severe Storms	Winter Weather	Wildfire	Dam Failure	Drought	Earthquake
Barbour	High	High	Medium	High	High	Medium	Medium	Low
Berkeley	High	Low	High	High	Medium	Medium	Medium	Low
Boone	High	High	High	High	Low	Low	Medium	Low
Braxton	High	High	Medium	High	High	Medium	Medium	Low
Brooke	High	Medium	Medium	Medium	Low	Medium	Low	Low
Cabell	High	Medium	Medium	Medium	Medium	Low	Medium	--
Calhoun	High	Medium	High	Medium	Low	Low	Low	Low
Clay	High	High	High	High	Low	Low	Medium	Low
Doddridge	High	--	High	High	--	Low	Low	Low
Fayette	High	Low	High	High	N/A	Low	Low	Low
Gilmer	High	High	Medium	High	High	Medium	Medium	Low
Grant	High	Low	High	Medium	N/A	Low	Low	Low
Greenbrier	High	Low	High	High	N/A	Low	Low	Low
Hampshire	High	Low	High	Medium	N/A	Low	Low	Low
Hancock	High	Medium	Medium	Medium	Low	Medium	Low	Low
Hardy	High	Low	High	Medium	N/A	Low	Low	Low
Harrison	High	--	High	High	--	Low	Low	Low
Jackson	High	Low	High	High	Low	Low	Low	Low
Jefferson	High	Medium	High	High	High	High	Medium	Medium
Kanawha	High	High	High	High	Low	Low	Medium	Low
Lewis	High	High	Medium	High	High	Medium	Medium	Low
Lincoln	High	Medium	Medium	Medium	High	Low	Medium	--
Logan	High	Medium	Medium	Medium	High	Low	Medium	--
Marion	High	--	High	High	--	Low	Low	Low
Marshal	High	Low	Medium	High	Low	Medium	Low	Low
Mason	High	Medium	Medium	Medium	High	Low	Medium	--
McDowell	High	Medium	Low	Medium	Medium	Low	N/A	Low
Mercer	High	Medium	Low	High	High	Low	N/A	Low
Mineral	High	Low	High	Medium	N/A	Low	Low	Low
Mingo	High	Medium	Medium	Medium	High	Low	Medium	--
Monongalia	High	--	High	High	--	Low	Low	Low
Monroe	High	Medium	Low	High	High	Medium	N/A	Medium
Morgan	High	Low	High	High	Medium	Medium	Medium	Low



	Flood	Landslide	Severe Storms	Winter Weather	Wildfire	Dam Failure	Drought	Earthquake
Nickolas	High	Low	High	High	N/A	Low	Low	Low
Ohio	High	Low	Medium	High	Low	Medium	Low	Low
Pendleton	High	Low	High	Medium	N/A	Low	High	Low
Pleasants	High	Low	High	Medium	Low	Low	Low	Low
Pocahontas	High	Low	High	High	N/A	Low	Low	Low
Preston	High	--	High	High	--	Low	Low	Low
Putnam	High	High	High	High	Low	Low	Medium	Low
Raleigh	High	Medium	Low	Medium	Medium	Low	N/A	Low
Randolph	High	High	Medium	High	High	Medium	Medium	Low
Ritchie	High	Low	High	Medium	Low	Low	Low	Low
Roane	High	Low	High	High	Medium	Low	Low	Low
Summers	High	Low	Low	High	Medium	Low	N/A	Low
Taylor	High	--	High	High	--	Low	Low	Low
Tucker	High	High	Medium	High	High	Medium	Medium	Low
Tyler	High	Low	Medium	Medium	Low	Low	Low	Low
Upshur	High	High	Medium	High	High	Medium	Medium	Low
Wayne	High	Medium	Medium	Medium	High	Low	Medium	--
Webster	High	Low	High	High	N/A	Low	Low	Low
Wetzel	High	Low	Medium	High	Low	Medium	Low	Low
Wirt	High	Medium	Medium	Medium	Low	Low	Low	Low
Wood	High	Low	High	High	Medium	Low	Low	Low
Wyoming	High	High	Low	High	High	N/A	N/A	Low

Table 22 – County-Level Hazard Ranking from the PDCs

4.C.3.b Determining Monetary Cost of Hazards

An additional challenge related to the scattered approach of having the PDCs evaluate monetary cost associated with each hazard is that each PDC has its own set of criteria to develop monetary loss values. These criteria were not consistent during the 2013 State plan update and this was the case with the 2018 plan update. This variability does not lend itself to comparison of relative loss values for each hazard in the statewide plan. To fully utilize the local plan efforts, West Virginia will need to develop standardized procedures for estimating losses. One continued goal of the State plan update is to standardize the data analysis process so that future State and local plan updates are consistent and utilize comparable methodologies.



Region	Flood	Landslide/ Subsidence	Severe Storms	Winter Storm	Wildfire	Dam Failure	Drought	Earthquake
1	\$686 M	\$288.5M				\$10.6 M		
2	\$1.8 B	\$1.4 B	\$2 B	\$1.8 B	\$2.9 B	\$2.1 B	\$391 M	
3	[\$857K- 1.8M]		\$1.3 M	[\$360K]	[\$12.5K]	\$262M		\$878M
4	[\$152M]	\$550M	\$12.5 M	[\$334M]	\$2.3B	\$177M	[\$346K]	
5	[\$50M]		\$30 M	[\$8.6M]				
6	[\$21M]		\$12.8 M	[\$308M]			[\$0]	
7	[\$21.6M]	[\$1.5M]	\$3 M	[\$3M]			\$450K	
8	{ \$187M}	\$114K/yr	\$5.5 M	\$2.7K/event	\$1M			
9	[\$8M]	\$114M	\$1 M	\$199M	\$4.5B		[\$1M]	
10	[\$65M]	\$820M	\$7.6 B	[\$65K]	\$208M	\$1.2B	\$8M	
11	[\$62M]	[\$1.8M/yr]	\$689 K	[\$36K]	[\$0]	[\$0]	[\$0]	[\$0]
Jefferson	\$12M	\$571K- \$8.5M	\$1.6 M	\$4.6M	\$15M			\$12.5B
Possible or worst-case scenario by Region [\$ Actual Losses]								

Table 23 – Monetary Cost of Hazard by County

Local plans document loss estimation based upon a variety of criteria. Loss estimates are not calculated using the same methodology for each plan and therefore should not be compared. Loss estimation methodology will need to be standardized in order to compare and use local plan vulnerability results.

In lieu of a comprehensive local loss estimate, local plan rankings can be used as a starting point for determining which hazards are considered the greatest threat to jurisdictions, and therefore inferring the hazards that will result in the most damages. Local hazard rankings have been factored into the statewide hazard ranking and as a result integrate local risk assessment information to the extent possible.



4.C.4. Determining High Risk Counties

Utilizing the develop risk methodology, the WV Hazard Mitigation Planning Team scored each county by hazard. This generated a score which was used to determine the level of risk. High risk counties were identified by one of two different methods. One approach identified counties which in the high range of the Risk Rating Score. The second method was used for the hazards that did not generate counties with high risk rankings. In those cases, counties that ranked as a medium were used in those cases.

In Table 24 the counties were either identified as having a high vulnerability or not. Specific counties ranked as high are evaluated under each of the respective hazards.



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County Name	Flooding	Landslides	Severe Storms	Winter Weather	Wildfire	Dam Failure	Drought	Earthquake
Barbour	High	High	--	High	High	--	--	--
Berkeley	High	--	High	High	--	--	--	--
Boone	High	High	--	High	--	--	--	--
Braxton	High	High	--	High	High	--	--	--
Brooke	High	--	--	--	--	--	--	--
Cabell	High	--	--	--	--	--	--	--
Calhoun	High	--	--	--	--	--	--	--
Clay	High	High	--	High	--	--	--	--
Doddridge	High	--	--	High	--	--	--	--
Fayette	High	--	High	High	--	--	--	--
Gilmer	High	High	--	High	High	--	--	--
Grant	High	--	--	--	--	--	--	--
Greenbrier	High	--	High	High	--	--	--	--
Hampshire	High	--	--	--	--	--	--	--
Hancock	High	--	--	--	--	--	--	--
Hardy	High	--	--	--	--	--	--	--
Harrison	High	--	--	High	--	--	--	--
Jackson	High	--	--	High	--	--	--	--
Jefferson	High	--	--	High	High	High	--	High
Kanawha	High	High	--	High	--	--	--	--
Lewis	High	High	--	High	High	--	--	--
Lincoln	High	--	--	--	High	--	--	--
Logan	High	--	--	--	High	--	--	--
Marion	High	--	--	High	--	--	--	--
Marshall	High	--	--	High	--	--	--	--
Mason	High	--	--	--	High	--	--	--
McDowell	High	--	--	--	--	--	--	--
Mercer	High	--	--	High	High	--	--	--
Mineral	High	--	--	--	--	--	--	--



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County Name	Flooding	Landslides	Severe Storms	Winter Weather	Wildfire	Dam Failure	Drought	Earthquake
Mingo	High	--	--	--	High	--	--	--
Monongalia	High	--	--	High	--	--	--	--
Monroe	High	--	--	High	High	--	--	High
Morgan	High	--	High	High	--	--	--	--
Nicholas	High	--	High	High	--	--	--	--
Ohio	High	--	--	High	--	--	--	--
Pendleton	High	--	--	--	--	--	High	--
Pleasant	High	--	--	--	--	--	--	--
Pocahontas	High	--	High	High	--	--	--	--
Preston	High	--	High	High	--	--	--	--
Putnam	High	High	--	High	--	--	--	--
Raleigh	High	--	--	--	--	--	--	--
Randolph	High	High	--	High	High	--	--	--
Ritchie	High	--	--	--	--	--	--	--
Roane	High	--	--	High	--	--	--	--
Summers	High	--	--	High	--	--	--	--
Taylor	High	--	--	High	--	--	--	--
Tucker	High	High	--	High	High	--	--	--
Tyler	High	--	--	--	--	--	--	--
Upshur	High	High	--	High	High	--	--	--
Wayne	High	--	--	--	High	--	--	--
Webster	High	--	High	High	--	--	--	--
Wetzel	High	--	--	High	--	--	--	--
Wirt	High	--	--	--	--	--	--	--
Wood	High	--	High	High	--	--	--	--
Wyoming	High	High	--	High	High	--	--	--

Table 24 – High Risk Hazards by County



For the purposes of compliance with the *Disaster Mitigation Act* (DMA) as further specified by Final Rule 44 CFR Section 206.401(c)(2)(i), this Plan addresses the hazards in the above hazard identification subsection. Additional hazards may be added or more comprehensively addressed during future plan updates as their respective significance emerges.

4.C.5. Recommended Methodological Enhancements

One consideration for improving future hazard mitigation plans is the development of baseline list of hazards to be evaluated. A challenge related to the current update process is that not all regional PDCs evaluated the same hazards. To overcome this obstacle, WVDHSEM will recommend that all PDCs evaluate a certain set of hazards and then provide them an opportunity to evaluate additional hazards based upon regional threat assessments if needed. This would also all the consistent group of similar hazards into a larger, more encompassing category (i.e. evaluating all of the component hazard of severe storms as one hazard and not breaking out into wind, hail, tornado, etc). WVDHSEM recognizes that this will take time to realize this change as the PDCs are on different update cycles.

The next plan update will include a more data driven methodology for ranking the hazards. A critical piece of this approach will be the reliance on more concrete data and less subjective components.

In order to include additional data as part of the revised methodology, a hazard mitigation planning team will evaluate existing data, review historical disaster information, interview relevant subject matter experts and other stakeholders, to develop a methodological tool for identifying and ranking hazards.

A more detailed analysis will take place in future updates as WVDHSEM implements the new Total Exposure in a Flood (TEIF) and Total Exposure in a Landslide (TEAL) analysis tools. Over the next three years, statewide risk assessments for Landslides and Flooding will improve dramatically. West Virginia University has proposed a WV Statewide Multi-Hazard Risk Assessment for all 55 counties and 277 communities in West Virginia. TEIF and TEAL, they will assess risk at the building or structure level and more precisely determine exposure to hazard damages.

The goal of this assessment is to

- develop a standardized, comprehensive building exposure inventory that includes critical facilities and state-owned properties;
- create a statewide parcel file for hazard identification and risk assessments;
- standardize the data analysis process so that future local and state plan updates are consistent and utilize comparable methodologies;



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- conduct a statewide HAZUS Level 2 flood risk analysis with more accurate local building inventories (user-defined facilities), effective DFIRM floodplains, and high-resolution elevation data;
- and build a statewide landslide incident database for improving landslide susceptibility assessments.

All flood risk data and flood visualization will be shared with the local communities, and published on federal and state geo-platforms such as the Risk MAP View of the WV Flood Tool (www.mapwv.gov/Flood), and interactive web map application named the WV Landslide Tool (www.mapwv.gov/Landslide). Developing a repository of high-quality reference data layers will result in more accurate risk assessments for communities.



4.D. Flood

Historically, flooding has affected each of the 32 major watersheds and 55 counties within the State. Federally declared flood disasters are far too common in the Mountain State. Many communities across West Virginia are suffering from the recent effects of the June 2016 flood, as well as lingering impacts from previous floods. Previously robust communities in the southern portion of the State are now suffering declining local economies and populations due to macro-economic factors beyond their ability to control or influence. Additionally, repeated flood damage to city infrastructures has been exasperated by decreased tax revenues that resulted in negative effects from postponed maintenance and flood associated repairs. Repeated damage from flooding has affected the infrastructure of several communities, resulting in systems that are now in need of major repairs, and upgrades that require relocation of major components of the systems.

Two types of flooding occur in West Virginia. They can occur separately, or simultaneously.

- Flash Flood – a flood event occurring with little or no warning where water levels rise at an extremely rapid rate. Steep terrain and numerous narrow valleys contribute to higher water levels and destructive flow speed.
- Riverine Flooding – Riverine flooding occurs when an increase in water volume within a river channel causes an overflow onto the surrounding floodplain. Riverine flooding tends to rise slowly, incrementally, and impacts can be delayed downstream for days.

4.D.1. Background Information

4.D.1.a National Flood Insurance Program

Floodplain management begins at the community level with operation of a community program of corrective and preventative measures for reducing flood damage. These measures take a variety of forms; for inclusion in the NFIP, communities adopt their flood hazards maps and the community Flood Insurance Study (FIS). In addition, a FEMA-compliant floodplain management ordinance that regulates activity in the floodplain is adopted and enforced.

The Pew Charitable Trusts⁶ found that flooding is the fastest-growing and most costly type of natural disaster across the country and the National Flood Insurance Program (NFIP) is nearly

⁶ National Flood Insurance Program Needs Reform to Better Prepare for the Future, 16 June 2016
<<http://www.pewtrusts.org/en/research-and-analysis/fact-sheets/2016/06/national-flood-insurance-program-needs->



\$25 billion in debt. The Federal Emergency Management Agency found that eight weather events in the U.S. have cost more than \$13 billion in property losses. Current FEMA is working to institute a disaster deductible program. In order to offset for that approach, West Virginia is starting the process to become Emergency Management Accreditation Program (EMAP) certified. This certification will reduce the deductible that the State of West Virginia will pay after a disaster.

A study conducted by The Rand Corporation⁷ found the number of homes with flood insurance is significantly lower in rural communities with 500 or fewer homes in the Special Flood Hazard Area (SFHA), communities where less than 50% of the homes are in the SFHA, and communities that do not experience coastal flooding. West Virginia has 1,010,819 addressable structures and 101,928 non-addressable structures, for a total of 1,112,747 structures. Statewide, 9% of those structures are in the effective 100-year floodplains, and 14% are in both the 100-year and 500-year floodplains. Effectively, 99,520 to 159,804 structures are located in SFHAs.

There are 16,332 National Flood Insurance Program policies in effect in West Virginia, which is roughly 16% of the structures in the SFHA. The number of NFIP policies has decreased from approximately 21,000 (in 2013). This drop can be attributed to buyouts, elevating properties, and other mitigation efforts.

reform-to-better-prepare-for-the-future>.

⁷ The National Flood Insurance Program's Market Penetration Rate Estimates and Policy Implications, 2006; Lloyd Dixon, Noreen Clancy, Seth A. Seabury, Adrian Overton.



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Region	# of Policies
1	1,602
2	2,539
3	3,944
4	1,501
5	1217
6	1,118
7	1,202
8	742
9	361
10	1,422
11	447
Jefferson	237
	16,332

Table 25 – NFIP Policies

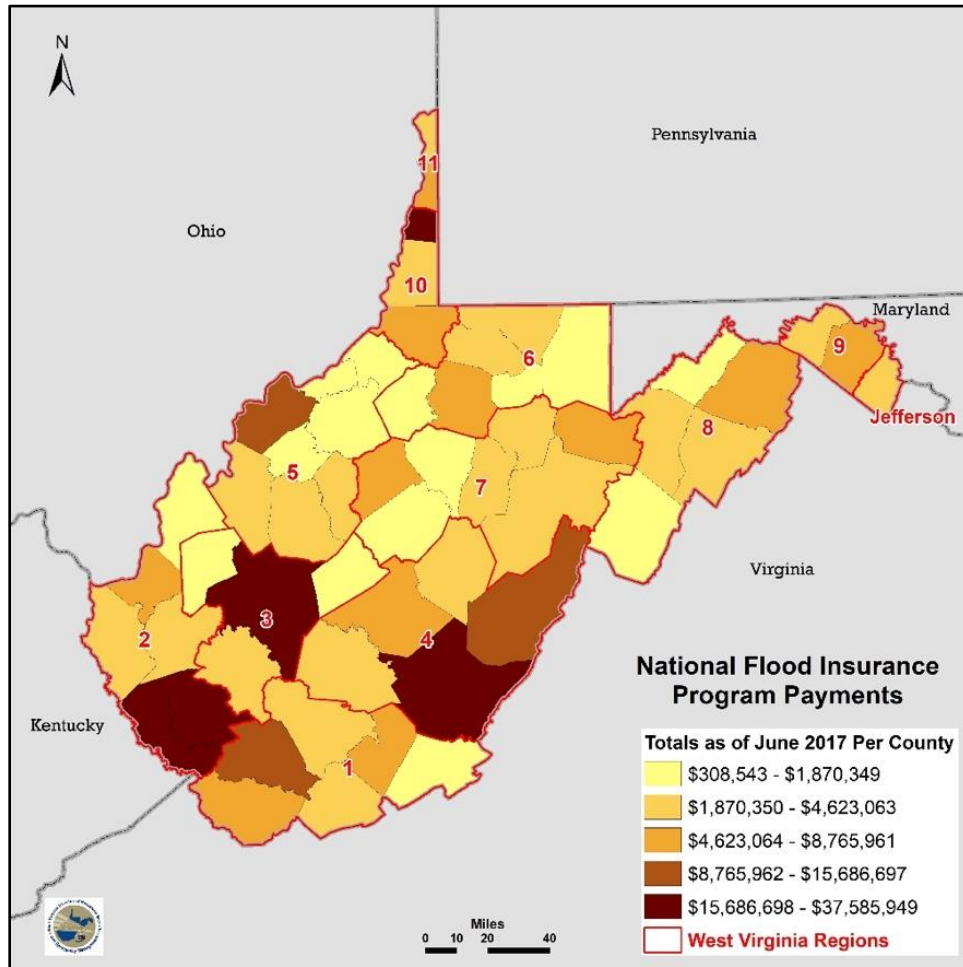


Figure 18 – NFIP Payments by County

4.D.1.b Repetitive Loss and Severe Repetitive Loss Properties

Many flood-insured properties have had more than one claim. A property that is currently insured for which two or more NFIP losses (occurring more than ten days apart) of at least \$1,000 each have been paid within any 10-year period since 1978 is defined as a “repetitive loss property” in the NFIP program.

Currently, more than 3,100 properties are listed as Repetitive Loss Properties. More than \$145 million has been paid on those claims in West Virginia. A total of 51 properties have been listed as Severe Repetitive Loss properties. Over \$5.5 million have been paid for SRL properties.



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Name	Number of Properties	Number of Losses	Total Contents Paid	Total Building Paid	Total Paid
BARBOUR	58	138	\$430,911	\$1,555,349	\$1,986,260
BERKELEY	80	219	\$960,198	\$3,284,327	\$4,244,525
BOONE	56	150	\$426,819	\$1,226,124	\$1,652,943
BRAXTON	6	15	\$31,212	\$118,921	\$150,134
BROOKE	76	174	\$264,210	\$2,448,014	\$2,712,223
CABELL	71	198	\$617,863	\$2,684,814	\$3,302,678
CALHOUN	30	84	\$329,192	\$855,244	\$1,184,436
CLAY	5	11	\$42,696	\$257,823	\$300,518
DODDRIDGE	4	11	\$76,927	\$63,575	\$140,502
FAYETTE	27	65	\$67,983	\$542,224	\$610,208
GILMER	55	177	\$1,278,874	\$1,800,159	\$3,079,033
GRANT	16	32	\$246,589	\$550,081	\$796,670
GREENBRIER	38	96	\$676,002	\$2,597,320	\$3,273,322
HAMPSHIRE	56	119	\$476,741	\$1,995,973	\$2,472,714
HANCOCK	32	72	\$175,421	\$1,027,855	\$1,203,276
HARDY	11	22	\$140,714	\$257,243	\$397,957
HARRISON	86	248	\$872,729	\$1,946,578	\$2,819,307
JACKSON	33	85	\$338,514	\$1,155,917	\$1,494,432
JEFFERSON	23	57	\$225,108	\$854,332	\$1,079,440
KANAWHA	240	661	\$1,420,185	\$10,930,460	\$12,350,645
LEWIS	19	42	\$198,740	\$282,480	\$481,220
LINCOLN	35	100	\$799,203	\$1,719,241	\$2,518,444
LOGAN	296	860	\$11,494,272	\$9,578,942	\$21,073,215
MARION	22	77	\$1,304,408	\$793,037	\$2,097,445
MARSHALL	60	145	\$368,437	\$1,453,545	\$1,821,981
MASON	14	54	\$174,685	\$741,683	\$916,368
MCDOWELL	91	205	\$551,166	\$1,952,880	\$2,504,046
MERCER	60	152	\$223,420	\$1,290,228	\$1,513,648
MINERAL	23	63	\$146,261	\$687,128	\$833,389
MINGO	100	240	\$2,041,445	\$3,789,048	\$5,830,493
MONONGALIA	37	101	\$316,509	\$855,126	\$1,171,636
MONROE	0	0	\$0	\$0	\$0
MORGAN	44	100	\$342,316	\$1,668,096	\$2,010,411



Name	Number of Properties	Number of Losses	Total Contents Paid	Total Building Paid	Total Paid
NICHOLAS	15	35	\$733,746	\$1,111,657	\$1,845,403
OHIO	496	1284	\$2,633,221	\$12,282,533	\$14,915,754
PENDLETON	6	15	\$5,952	\$35,784	\$41,736
PLEASANTS	7	22	\$36,601	\$213,957	\$250,558
POCAHONTAS	82	230	\$3,697,828	\$4,766,428	\$8,464,256
PRESTON	10	22	\$90,969	\$181,168	\$272,137
PUTNAM	34	111	\$296,704	\$1,326,310	\$1,623,013
RALEIGH	51	125	\$675,865	\$1,185,507	\$1,861,372
RANDOLPH	90	269	\$717,779	\$2,446,189	\$3,163,967
RITCHIE	5	13	\$25,969	\$56,066	\$82,035
ROANE	20	50	\$233,500	\$644,006	\$877,507
SUMMERS	22	58	\$192,172	\$879,019	\$1,071,191
TAYLOR	5	13	\$62,309	\$161,611	\$223,920
TUCKER	51	119	\$2,952,017	\$1,743,964	\$4,695,980
TYLER	4	8	\$3,751	\$33,917	\$37,667
UPSHUR	69	170	\$259,272	\$1,124,791	\$1,384,063
WAYNE	33	87	\$318,381	\$718,360	\$1,036,740
WEBSTER	18	45	\$110,566	\$386,385	\$496,952
WETZEL	61	147	\$172,968	\$2,145,634	\$2,318,602
WIRT	9	19	\$55,687	\$107,828	\$163,514
WOOD	130	437	\$1,572,992	\$6,910,081	\$8,483,073
WYOMING	98	268	\$1,714,777	\$4,638,166	\$6,352,942
Totals	3,120	8,320	\$43,622,774	\$104,063,127	\$147,685,901

Table 26 – Number of Non-Mitigated RL Properties

Residential SRL properties have received priority for mitigation funding through the *Bunning-Bereuter-Blumenauer Reform Act* (Public Law 108-264) and the more recent overriding law, the *Biggert-Waters Flood Insurance Reform Act* of 2012. The primary goal of the SRL Program has been to reduce excessive flood claim payments and reliance on the National Flood Insurance Fund (NFIF) for flood relief when mitigation is an option. Residential SRL properties are single-family structures consisting of one to four residences that have flood insurance that:

- Have incurred flood related damages on four or more separate occasions with the amount of each claim exceeding \$5,000 and the cumulative amount of the total claims paid exceeding \$20,000; or



- Have a cumulative amount of the claims exceeds the value of the property, when at least two separate claim payments have been made.

At least two losses must have occurred within a 10-year time span; claims must be more than 10 days apart. The SRL program was consolidated into the Flood Mitigation Assistance (FMA) program, which now allows mitigation funding for RL properties at a 90/10 cost share.

Name	Number of Properties	Number of Losses	Total Contents Paid	Total Building Paid	Total Paid
BERKELEY	5	20	\$91,581	\$461,862	\$553,443
CABELL	3	15	\$38,170	\$192,086	\$230,257
GILMER	2	13	\$47,202	\$78,048	\$125,250
HAMPSHIRE	3	6	\$23,980	\$134,627	\$158,608
HARRISON	1	7	\$40,631	\$80,170	\$120,801
JEFFERSON	2	8	\$82,716	\$142,975	\$225,691
KANAWHA	3	15	\$100,505	\$471,369	\$571,874
LINCOLN	1	11	\$0	\$303,247	\$303,247
LOGAN	3	15	\$112,319	\$285,403	\$397,722
MARION	1	7	\$10,714	\$53,889	\$64,603
MARSHALL	1	4	\$3,500	\$48,962	\$52,462
MONONGALIA	1	7	\$14,313	\$44,652	\$58,965
MORGAN	1	2	\$8,800	\$32,504	\$41,304
OHIO	4	19	\$55,519	\$225,594	\$281,113
POCAHONTAS	4	21	\$69,313	\$373,053	\$442,366
PUTNAM	4	20	\$47,217	\$409,749	\$456,966
RANDOLPH	1	23	\$2,904	\$104,930	\$107,834
ROANE	1	4	\$0	\$65,691	\$65,691
SUMMERS	2	7	\$19,209	\$114,050	\$133,259
WOOD	8	56	\$354,952	\$1,044,120	\$1,399,072
Totals	51	280	\$1,123,547	\$4,666,982	\$5,790,528

Table 27 – Severe Repetitive Loss Properties

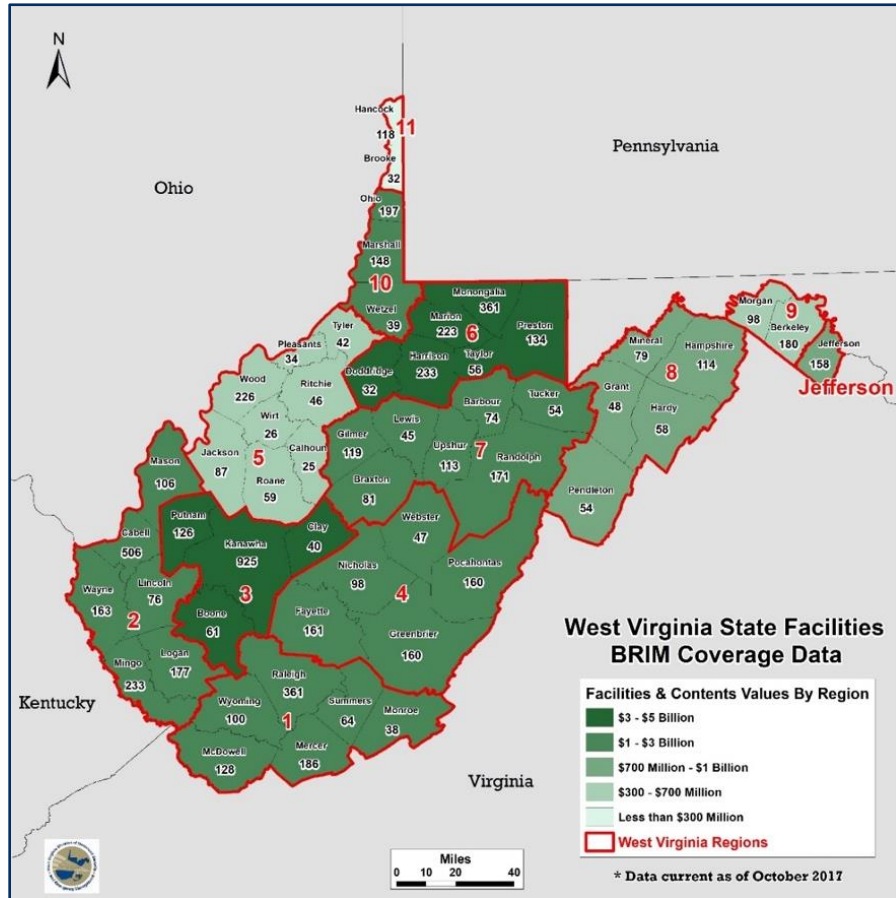


Figure 19 – Facility Coverage and Loss Risk

4.D.1.c NFIP Community Rating System Participation

West Virginia has joined in the NFIP Community Rating System (CRS) to increase awareness and participation in developing flood resiliency policies and priorities. The NFIP CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements.

As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS:

- Reduce flood damage to insurable property;
- Strengthen and support the insurance aspects of the NFIP, and
- Encourage a comprehensive approach to floodplain management.



Nearly 3.6 million policyholders in 1,444 communities participate in the CRS by implementing local mitigation, floodplain management, and outreach activities that exceed the minimum NFIP requirements. Although CRS communities represent only 5 percent of the over 22,000 communities participating in the NFIP, more than 69 percent of all flood insurance policies are written in CRS communities.

The CRS uses a Class rating system that is similar to fire insurance rating to determine flood insurance premium reductions for residents. CRS Classes are rated from Class 9 to Class 1. Today, most communities enter the program at a CRS Class 9 or Class 8 rating, which entitles residents in Special Flood Hazard Areas (SFHAs) to a 5 percent discount on their flood insurance premiums for a Class 9 or a 10 percent discount for Class 8. As a community engages in additional mitigation activities, its residents become eligible for increased NFIP policy premium discounts. Each CRS Class improvement produces a 5 percent greater discount on flood insurance premiums for properties in the SFHA.

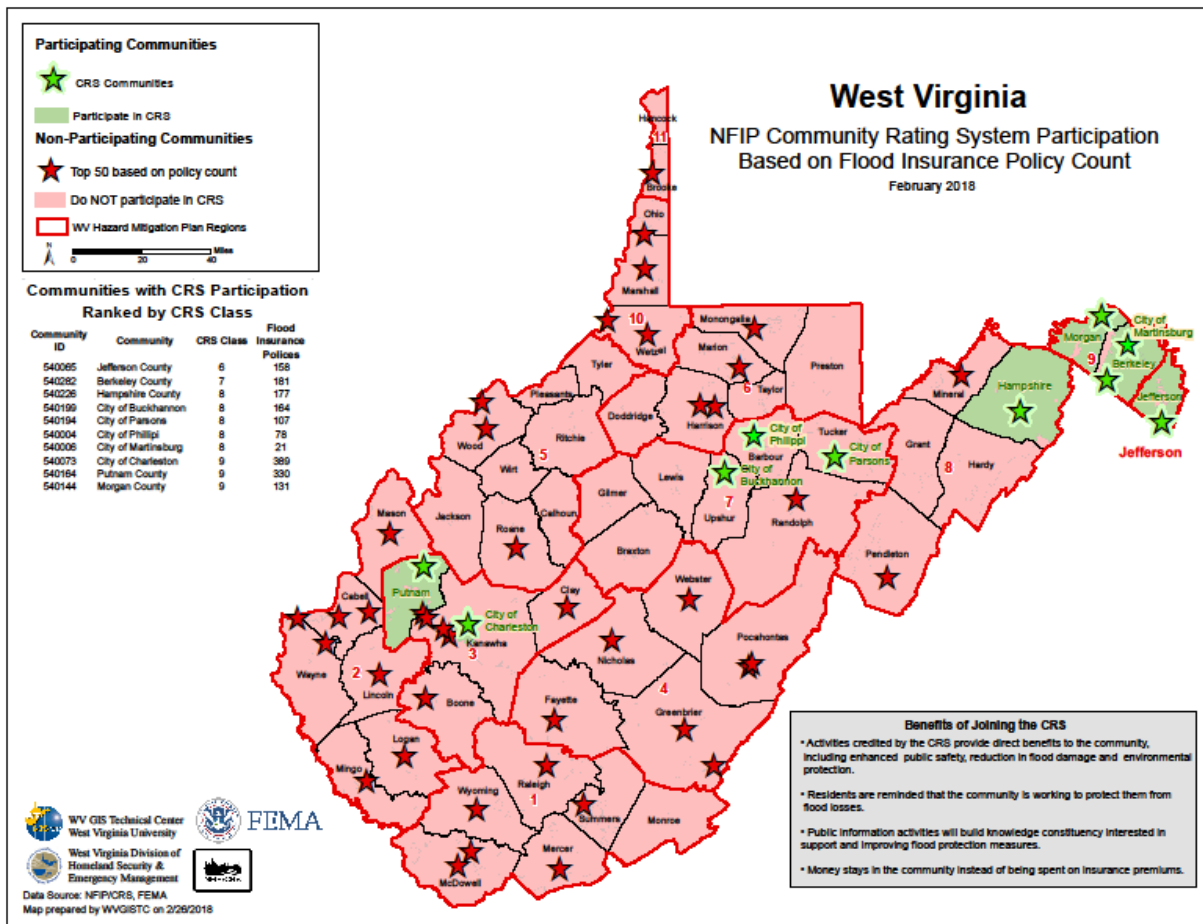


Figure 20 -- WV NFIP Community Rating System



4.D.2. Historical and Notable Events

The National Centers for Environmental Information (NCEI) has recorded 2302 flood events in the database between January 1993 and July 2017. Flood events include both riverine and flash flooding. Property damages estimated by NCEI were close to \$1.8 billion. There have been 103 deaths and 21 injuries associated with these events. Since 1954, flooding has resulted in 30 of the 68 Federal Disaster Declarations in West Virginia. Hurricanes and severe storms occurring anytime during the year, often lead to flooding, and they account for 25 of the 68 declarations.

Some of the notable flooding events in West Virginia include:

June 1998 (Flash Flooding): Three consecutive nights of thunderstorms resulted in flooding that destroyed approximately 240 homes, damaged nearly 500 more and lead to two deaths in Kanawha County.

February 2000 (Flash Flooding): 2-5 inches of rainfall within an 18-hour period produced flash flooding over western and northern portions of the State. At least 35 homes were destroyed, 350 houses, mobile homes and businesses sustained major damage, and three fatalities were recorded.

September 2004 (Riverine): The remnants of Hurricane Ivan produced rainfall totals ranging from 3 to 8 inches over the northern Panhandle. Rivers and streams were already running high from rain produced in association with Hurricane Frances just 8 days earlier. A Federal Disaster was declared and one fatality occurred.

June 2010 (Flash Flood and Riverine): Numerous communities in southern West Virginia were hit by severe storms, flash flooding, mudslides and landslides for several days. Some of the damage was due to the rapid rise of the Guyandotte River.

February & March 2012 (Riverine): Widespread flooding occurred in Marion, Preston, Taylor, Harrison, Wayne, Logan, Mingo, and Lincoln Counties. Severe thunderstorms near the Route 50 corridor crossed northern West Virginia. Precipitation totals of 1.5 to 2.5 inches were common in 24-hour periods.

June 2016: This flood was the result of 8 to 10 inches (200 to 250 mm) of rain falling over a period of 12 hours, resulting in a flood tied for seventh among deadliest floods in West Virginia history. It is also the deadliest flash flood event in the United States since the 2010 Tennessee floods. The National Weather Service reported that this rainfall qualified as a 1,000-year event for parts of Fayette, Nicholas, and Greenbrier Counties. Rainfall totals included 7.53 in in Rainelle and the two-day accumulations in White Sulphur Springs reached 9.17 in. Record-high and near-record-high waters were reported along the Greenbrier River. Ronceverte recorded a



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level of 23.3 ft over flood stage. Summerville Lake increased by 43.5 billion gallons between 8 am on June 23 and noon on June 24.

July 2017: A total of eight counties experienced flooding due to heavy rainfall over the area. Some flooding had occurred the week before, and rivers were already running high. In Marshall County, at McMechen, they measured 5.56 inches of rain in an hour, and the Cheat River, in Preston County, crested at 21.53 feet.



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Date	Location	Deaths	Property Damages	Description
6/28/1998	Western & Central WV	2	\$22.9 Million	Three consecutive nights of thunderstorms left western and northern counties with wind damage and flooding. Total rains were 6 to 10 inches across portions of Wood, Jackson, and northern Kanawha Counties, with 5 inches further northeast, into the Middle Island Creek basin. Serious flash flooding occurred. Two people were killed in Kanawha County along Little Sandy Creek in the Frame vicinity. A Federal disaster declaration for individual and public assistance was declared for 15 counties in West Virginia. Nearly 500 homes had major damage, the most from Kanawha and Ritchie Counties. Around 100 dwelling had minor water damage. These figures included mobile homes, many of which were located in areas most susceptible to stream flooding.
2/18/2000	Western WV	3	\$7.1 Million	A warm front surged north during the morning of the 18th, dropping a half inch to an inch of rain. Low pressure extended from southern Ohio on down the entire length of the Ohio River during that afternoon. Rain amounts of 2 to 4 inches in 18 hours were common from a Huntington-Charleston-Elkins line on the northwest. In West Virginia, 24 counties were under a state of emergency declared by Governor Underwood; 19 of them fell within this region of the State. Later, on the 28th, President Clinton declared a federal disaster declaration for 20 counties, 17 of which are within this section of West Virginia. The 17 counties included Barbour, Braxton, Cabell, Calhoun, Doddridge, Gilmer, Harrison, Jackson, Kanawha, Lewis, Mason, Putnam, Ritchie, Roane, Tyler, Upshur, and Wirt.
7/8/2001	Wyoming, McDowell, Fayette	1	\$190 Million	Repetitive showers and thunderstorms moved rapidly across the southern coal fields, from the late morning hours to the early evening. A few reports of large hail and gusty winds were received, but the major problem was the severe flash flooding in McDowell County. The heaviest rain rates were on the order of 1.5 to 2 inches an hour. A woman and her daughter drowned after escaping their vehicle. The flooding in McDowell County destroyed 197 homes, while 703 homes had major damage. Numerous vehicles were also destroyed. Nine schools and five fire departments sustained damage. The school damage was estimated at over 4 million dollars. About a dozen separate water systems were damaged and shut down. Mingo County was also included in the Federal disaster declaration, with 85 homes destroyed and 44 homes with major damage.



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Date	Location	Deaths	Property Damages	Description
5/2/2002	McDowell, Mingo, Buchanan	2	\$85 Million	Repetitive showers and thunderstorms moved rapidly across the southern coal fields. A few reports of large hail and gusty winds were received, but the major problem was the severe flash flooding in McDowell County. The heaviest rains were on the order of 2.5 to 5 inches, in a west-to-east corridor from northern Buchanan County, Virginia, through central McDowell County. As a result, many more streams in McDowell County were flooded Residents around Avondale's Crane Creek and in the hollows around Coalwood were especially hard hit, both from the rising streams and the water flowing off timbered hillsides.
5/2/2002	McDowell	2	\$101.3 Million	One death occurred along the Milam Fork in McGraws. Water rose vertically about 12 to 14 feet on this stream. Destruction to homes, bridges, and roads was widespread along the Laurel Fork, including such communities as Ravencliff, Sabine, Glen Fork, Jesse, and Matheny. A vertical rise of 20 to 25 feet occurred around Matheny. At the junction of the Clear Fork and the Laurel Fork, the low sections of Oceana were flooded. Around 200 single-family homes and mobile homes were destroyed in Wyoming County. Approximately, 550 homes and mobile homes had major damage. The State condemned at least 365 structures. Around 230 single family homes and mobile homes were destroyed in McDowell County. Approximately, 700 dwellings had major damage. The State condemned around 280 structures. As many as 14,000 homes lost power, with the most in Fayette and Wyoming Counties. Railroad beds were washed-out or undermined. Vulnerable spots were where railroad tracks crossed small streams running down from adjacent slopes. In a 3- to 6-hour period, rains of 3 to 5.5 inches were common within that band. Maximum rain rates were 1.5 to 2.5 inches per hour.
9/17/2004	Statewide		\$110.2 M	Hurricane Ivan and Tropical Storm Jeanne remnants crossed West Virginia resulting in flooding and large amounts of rain.
12/10/2007	Cabell, Wayne	1	\$35 K	Several periods of rain occurred from the 7th into the 10th. A strong frontal zone with surface dew points in the 55° to 60° range south of the front and embedded heavier showers moved across Wayne, Cabell, and Putnam Counties. Rains over a 12- to 18-hour period were on the order of 1.5 to 2.25 inches. Johns Branch near Milton flooded roads. Some of the flooding was caused by debris and leaves collecting in many of the culverts. A 2- year-old woman stalled her car on the adjacent road, got out of the vehicle, and was later found about a quarter mile away, washed up against a culvert. Other flooding occurred along Fudges Creek around Ona in Cabell County. In Wayne County, Krout Creek flooded Spring Valley Road.



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Date	Location	Deaths	Property Damages	Description
5/4/2009	Braxton, Gilmer, Calhoun, Harrison, Lewis, Monongalia, Marion, Preston	1	\$464 K	<p>A front was stretched out east to west near the southern border of West Virginia. The axis of the heaviest rain fell from southern Wayne County on the northeast, through western Kanawha County, southern Roane County, southern Calhoun County, then through Gilmer, Lewis, and Harrison Counties. The rain totals in this maximum were mostly 2 to 2.9 inches in a 6- to 12- hour period. Serious stream flooding occurred along the West Fork of the Little Kanawha River in Calhoun County. Schools were canceled in a few counties. River flooding resulted along the Little Kanawha River downstream of Burnsville through Glenville to Grantsville. The West Fork River also flooded as it flowed north through Harrison County. A 34-year-old woman was killed when a 70-foot tree smashed through the middle of her mobile home. Emergency responders were slowed by water over roads.</p>
3/13/2010	Raleigh, Fayette, Kanawha, Boone, Nicholas, Wyoming	2	\$6.3 Million	<p>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. A widespread 2 to 4 inches of water resided in the snow pack, with some ridge tops exceeding 6 inches of water in the snow. Major small stream flooding was widespread in Raleigh and Fayette Counties. There were two direct fatalities from Raleigh County. Flooding of less severity occurred in Kanawha, Nicholas, Boone, and Wyoming Counties. A 59-year-old woman was swept away and drowned while attempting to walk through flood waters of Maple Fork. A swift-water rescue boat on Beaver Creek struck something in the water and capsized, throwing three firefighters into the water. A 32-year-old male firefighter was swept away and later found along Piney Creek.</p> <p>Approximately 29 homes were destroyed in Raleigh County and major damage occurred to an additional 34 homes.</p>



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Date	Location	Deaths	Property Damages	Description
7/25/2010	Boone, Harrison, Taylor, Barbour, Kanawha	1	\$107 K	Thunderstorms moved through north central counties of West Virginia during the early afternoon. This was south of a cold front with plenty of instability and surface dew points in the lower 70s. New storms formed further to the west and southwest during the afternoon. Repetitive showers and thunderstorms were seen mainly across Wayne, Lincoln, and Boone Counties during the late afternoon and into the early evening. There were two specific rounds of training showers. Rain rates of 1.0 in 30 minutes and 1.5 to 1.75 inches in an hour were measured by a few of the automatic rain gauges. A 41-year-old man was clearing debris from a private culvert and was sucked into the culvert drain on Price Branch, his body was later found in Little Coal River near Dansville.
4/16/2011	Jackson, Putnam, Wayne, Lincoln	1	\$50K	Showers and thunderstorms moved north during the overnight hours, ahead of an approaching cold front. Just prior to the frontal passage, training showers affected southern Wayne County on north through parts of Lincoln, Putnam, and Jackson Counties with rain amounts of 1 to 1.5 inches in 3 to 4 hours. Minor flash flooding occurred under the repetitive showers during the morning. One elderly man drove into high water in Jackson County and drowned.
4/3/2015	Wayne	1	\$450K	<p>Numerous streams overflowed and blocked roads. This included the areas near Newcomb Creek, Lynn Creek, Lick Creek, Cove Creeks, and Mill Creek. Some homes near Kiahsville were impacted. A few homes along Mill Creek were flooded. Small private bridges were washed out. Road culverts were damaged. A couple of vehicles were found in Mill Creek. A 62-year-old woman tried to walk out of Rowe Hollow in the Amilda vicinity. She was going to attend a Good Friday evening service at the neighborhood church. The water was about knee deep. Neighbors were shocked to see her try to walk through the water with her umbrella. She fell down. The water in the road washed her down the road. She could not straighten up. She was swept away and drowned. Her body was found in the East Fork of Twelvepole Creek.</p> <p>A rain gauge along Mill Creek measured 2.25 inches in 3 hours during the early evening with a 24-hour total of 3.6 inches.</p>



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Date	Location	Deaths	Property Damages	Description
6/23/2016	Greenbrier, Jackson, Kanawha	23	\$102 Million	One of the deadliest storms to hit West Virginia. This included deaths related to both flashflood and riverine flooding. A total of 16 people died in Greenbrier County, 6 in Kanawha County, and 1 in Jackson County. The two days prior to the event were quite wet as several rounds of thunderstorms traversed the area with rainfall of roughly 1 to 2 inches across much of the area. Radar and rain gauge measurements showed as much as 8 to 10 inches (perhaps higher locally) fell in a band across central Greenbrier County. The bulk of the rain fell in less than 12 hours between 600 AM and 600 PM. Multiple rounds of convection resulted in wind damage and flooding. Flash flooding on small streams turned into river flooding. A historic and record setting flood occurred along portions of the Elk and Gauley Rivers in central West Virginia.
7/14/2016	Cabell	1	500K	Water rose rapidly on several local streams and creeks resulting in roadway blockages and homes surrounded. The hardest hit area was along Green Valley Road where 50 homes sustained damage from high water. The public witnessed a car drive rapidly into flooded waters along Green Valley Road. After assisting the driver and one passenger out of the vehicle, they called 911. Rescuers were unable to get the second passenger out, before the vehicle floated away. A 56-year old woman drowned in the vehicle.

Table 28 – Disasters with Associated Fatalities



4.D.3. Risk Assessment

4.D.3.a Introduction

During the past 30 years, the Federal Government has shifted focus from flood “control” to flood “management.” The primary impetus for this shift is continuing flood losses experienced during the latter half of the 20th Century and the first decade of the present century. The goal of flood management is to prevent loss of life and damage to public and private property by reducing the effects of flood damage and forming effective plans for recovery and rehabilitation. The change from flood control to flood management resulted in revisions and improvements to Federal policies. One major impetus was flood hazard mapping. The development of SFHA maps was the first comprehensive attempt to identify flood hazard risk in the Nation’s floodplains.

4.D.3.b Probability

A 100-year flood is not a flood that occurs every 100 years. In fact, the 100-year flood has a 26-percent chance of occurring during a 30-year period, the typical length of many mortgages. The 100-year flood is a regulatory standard used by Federal agencies, States, and NFIP-participating communities to administer and enforce floodplain management programs. The 100-year flood is also used by the NFIP as the basis for insurance requirements nationwide.

Flood Recurrence Interval	Annual Chance of Occurrence
10-yr	10.0%
50-yr	2.0%
100-yr	1.0%
500-yr	0.2%

Table 29 – Annual Probability of Floods

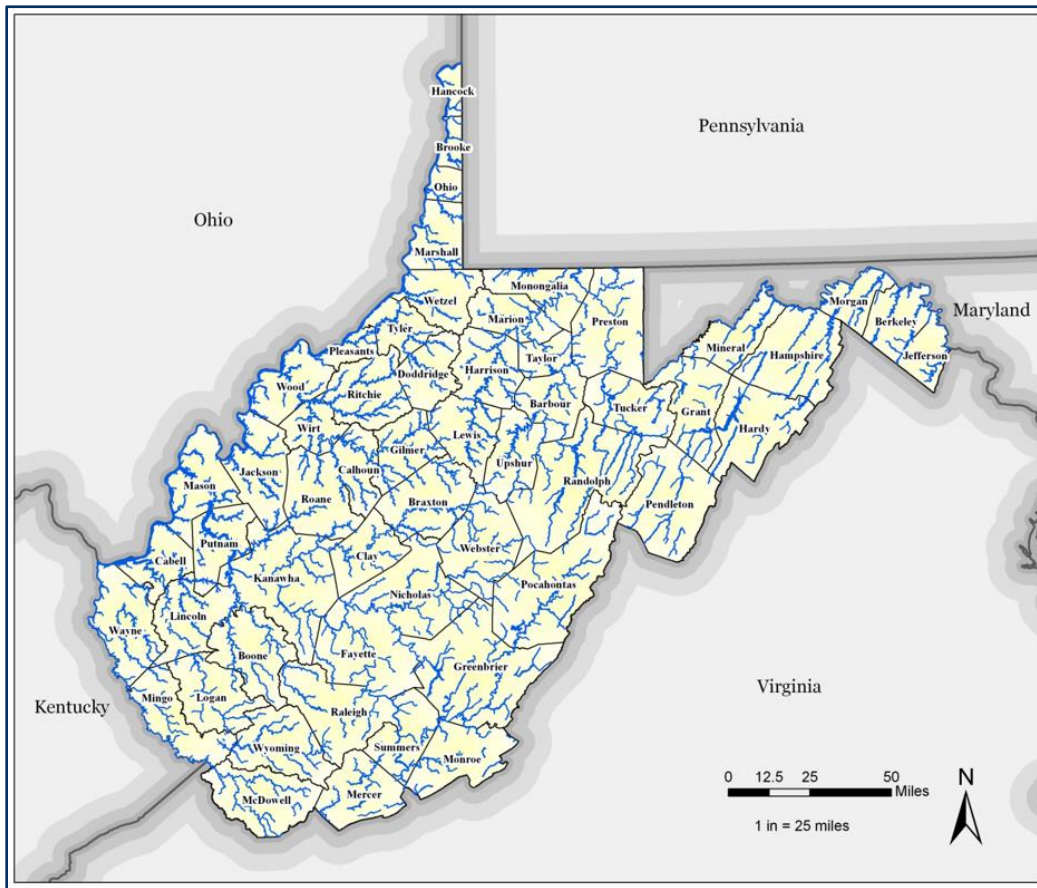


Figure 21 -- HAZUS 100-Year Floodplain

4.D.3.c Impact and Vulnerability

Populations and property are extremely vulnerable to flooding. Homes and business may suffer damage and be susceptible to collapse due to heavy flooding. Floodwaters can carry chemicals, sewage, and toxins from roads, factories, and farms; therefore, any property affected by the flood may be contaminated with hazardous materials. Debris from vegetation and man-made structures may also be hazardous following a flood. In addition, floods may threaten water supplies and water quality and initiate power outages.

West Virginia NCEI records show that 65 deaths have occurred since 1996 as a result of flooding.



4.D.3.d **Annualized Loss**

Using the National Centers for Environmental Information (NCEI) it is possible to determine the projected annual number of events and the annualized cost associated with the hazard. See Appendix B for a completing listing of annualized events and associated costs.

County	Events	Number of Annualized Events	Property Damage	Crop Damage	Total Cost	Annualized Cost
Kanawha	71	3.380952381	\$100,263,000	\$0	\$100,263,000	\$4,774,428.57
Marshall	69	3.285714286	\$11,447,000	\$0	\$11,447,000	\$545,095.24
Marion	68	3.238095238	\$7,108,000	\$0	\$7,108,000	\$338,476.19
Monongalia	64	3.047619048	\$2,465,000	\$0	\$2,465,000	\$117,380.95
Preston	64	3.047619048	\$573,000	\$0	\$573,000	\$27,285.71
Harrison	60	2.857142857	\$6,460,000	\$0	\$6,460,000	\$307,619.05

Table 30 -- Annualized Flood Events and Damages

National Flood Insurance Payments made in West Virginia reflect the statewide effect of flooding. PDC Region 2 and 10 had the highest total payments made by Region (see Table 31). Payments and property losses indicate a higher portion of payments occurred in Region 2 and 10. Since some regions are smaller, average payments can be used to assess vulnerability. Regions 2, 4 and 9 have higher average costs to infrastructure than the rest of the state.



Region	Building Payments	Contents Payments	Total Payments	Average Payment	Losses	Properties
1	\$9,945,799	\$3,357,400	\$13,303,198	\$14,334	808	322
2	\$19,038,257	\$15,386,034	\$34,424,291	\$19,541	1,527	546
3	\$13,269,439	\$2,092,179	\$15,361,618	\$16,895	925	334
4	\$9,404,015	\$5,286,126	\$14,690,140	\$25,380	471	180
5	\$9,650,735	\$2,583,917	\$12,234,653	\$12,761	700	237
6	\$3,895,765	\$2,702,471	\$6,598,236	\$12,064	466	163
7	\$9,071,853	\$5,868,804	\$14,940,657	\$15,185	930	348
8	\$3,507,185	\$1,012,103	\$4,519,287	\$17,278	249	111
9	\$4,703,712	\$1,264,683	\$5,968,395	\$24,649	306	122
10	\$15,666,997	\$3,142,753	\$18,809,750	\$11,565	1556	613
11	\$3,381,637	\$439,630	\$3,821,267	\$14,669	239	105
Jefferson	\$834,159	\$222,180	\$1,056,338	\$12,567	54	22
			\$145,727,832		8,231	3,103

Table 31 – NFIP Payments (as of August 2017)

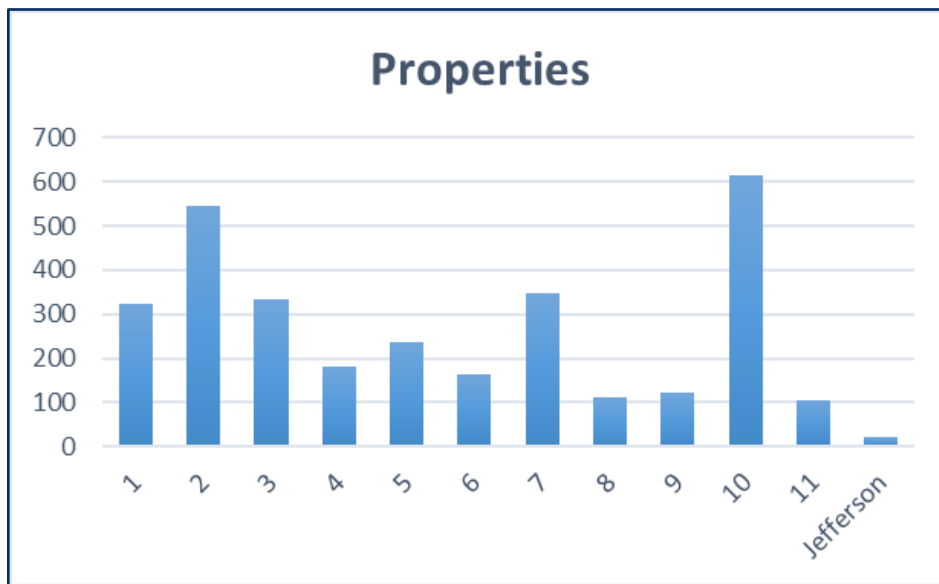


Figure 22 – Properties Impacted (1978-2017)



Figure 23 – Total Monetary Losses (1978-2017)

4.D.3.e Hazard Ranking

Flooding has traditionally been the most common and the most devastating hazard facing West Virginia.

Local Hazard Ranking

Based upon a review of the regional local hazard mitigation plans, the following map shows the ranks for flood hazard risks. All counties in West Virginia were ranked as having a high level of risk for flooding.

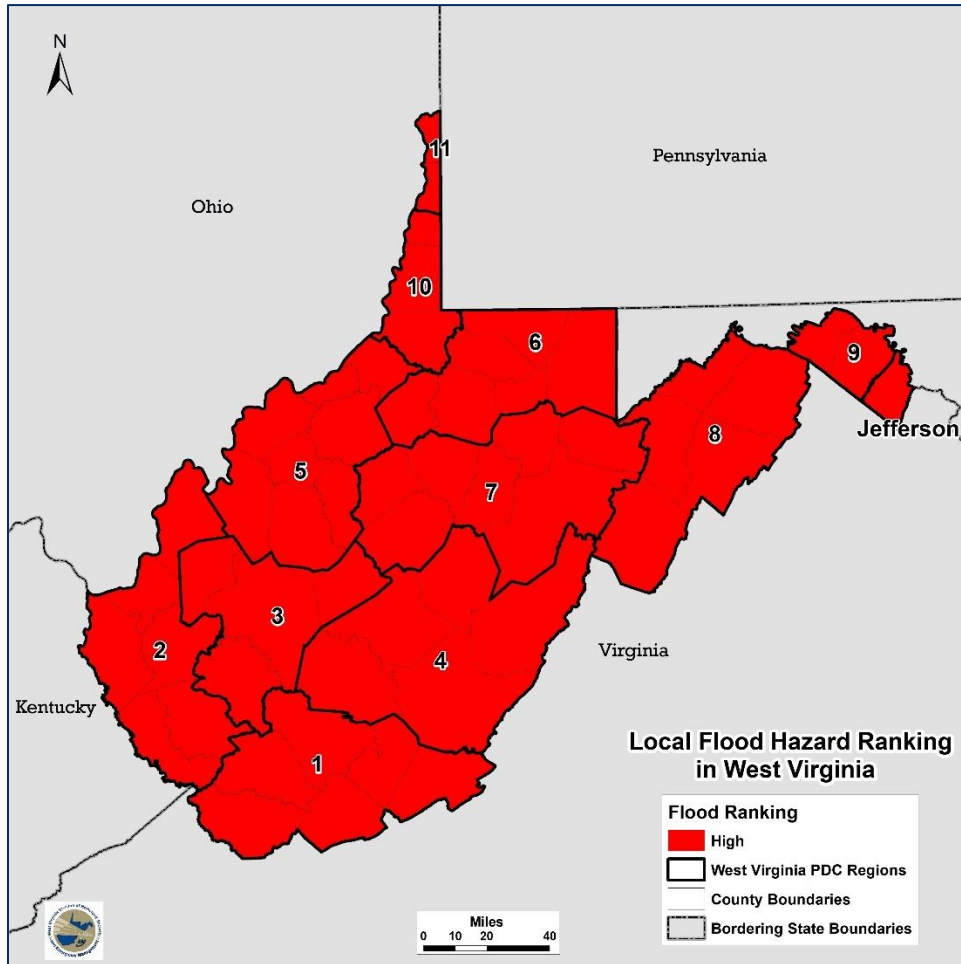


Figure 24 – Local Flood Hazard Ranking

State Hazard Ranking

Utilizing the methodology established for the *2018 WV Statewide Standard Hazard Mitigation Plan Update*, the vulnerability for Flooding (Flashfloods and Riverine Flooding) was calculated at county level. The Hazard Ranking Methodology uses a structured assessment to identify a Risk Rating based upon seven areas:

- Geographic Area Impacted
- Property Damage
- Population Vulnerability
- State Infrastructure Damages
- Deaths or Injuries
- History of Occurrence
- Regional HMP Ranking



All counties in West Virginia were ranked as having a high level of risk for flooding.

4.D.3.f Critical Facility Risk

Critical facility points were intersected with the FEMA FIRMs to determine each facility’s flood zone location. This simplified approach was used due to limited spatial and attribute data for critical facilities. Loss estimations were not calculated for critical facilities; with better location and attribute analysis this could be completed for State and critical facilities.

As shown in Table 32, there are 224 critical facilities in the FEMA 100-year floodplain. Fire departments have the highest number of facilities in the floodplain, followed by schools and law enforcement facilities. With many schools serving as potential shelters in many Emergency Operation Plans (EOPs), evaluations should be conducted to determine the best mitigation alternatives for these buildings.

	OES	Law Enforcement	Fire Departments	Hospitals	Schools	Total
Number of Facilities	7	44	109	1	63	224

Table 32 – Number of Critical Facilities within 100-Year Floodplain

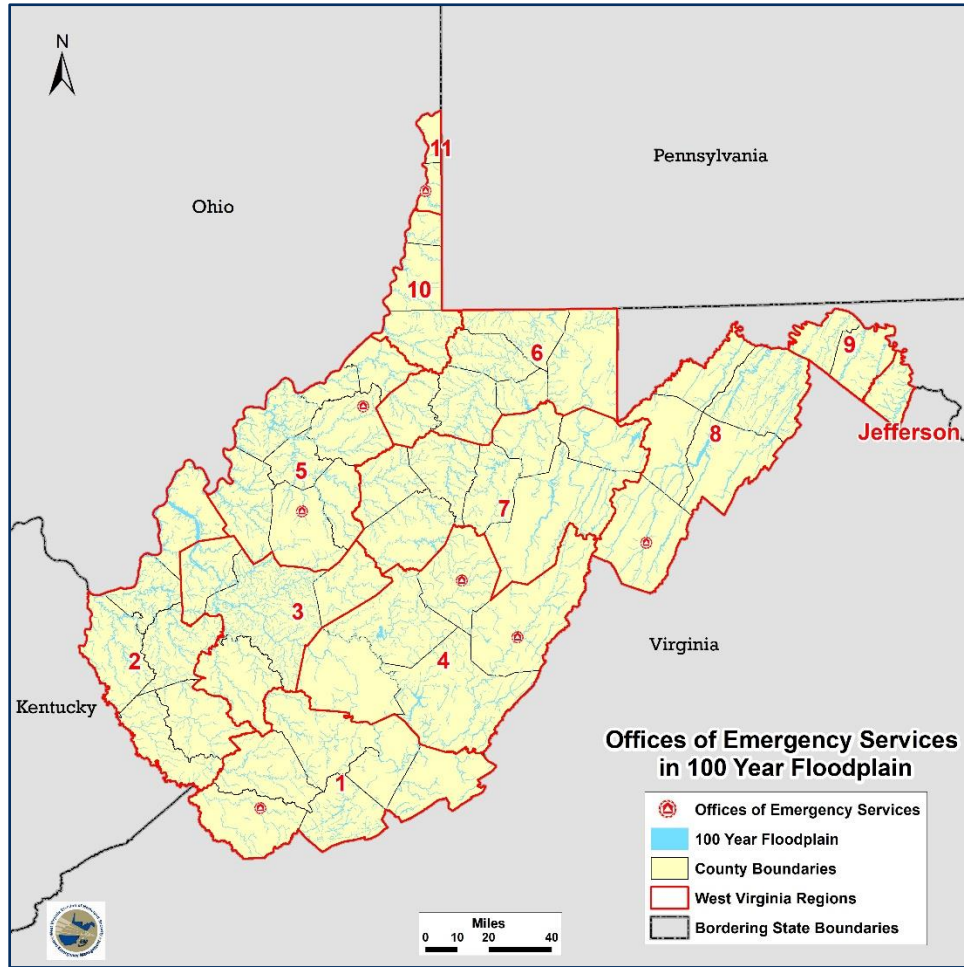


Figure 25 – OES Facilities in 100-Year Floodplain

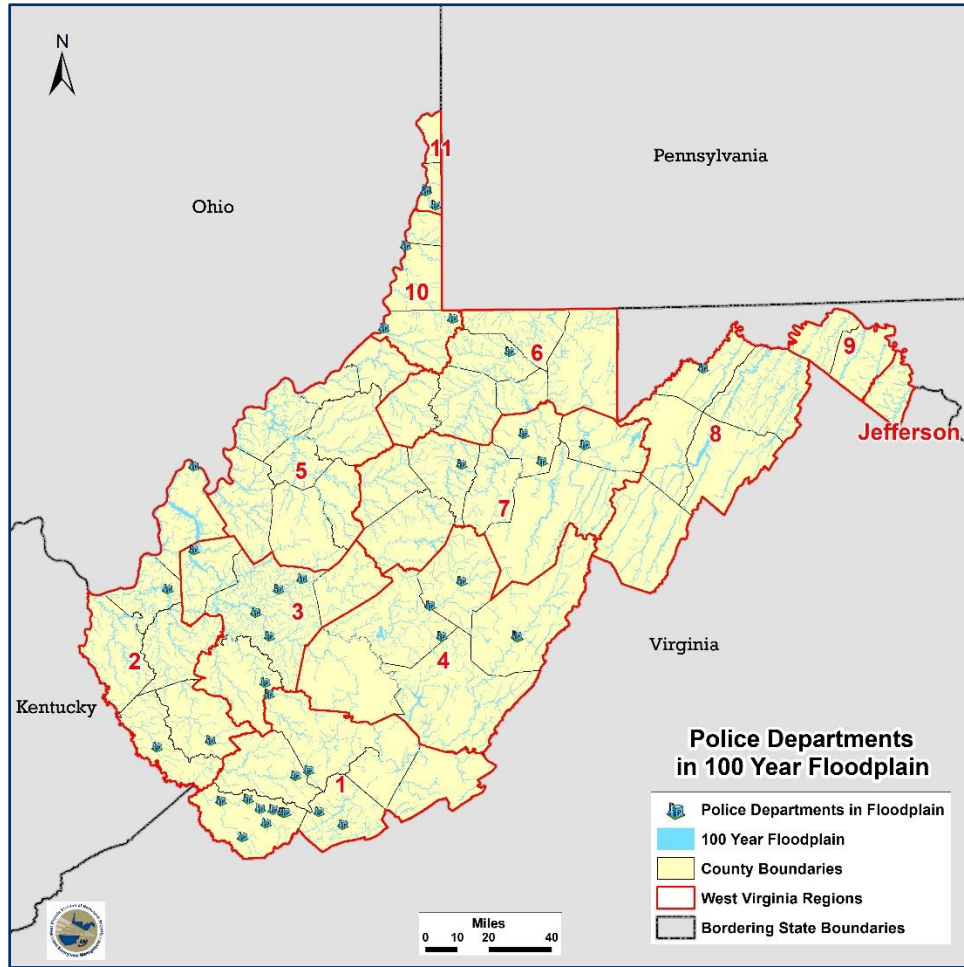


Figure 26 – Police Departments in 100-Year Floodplain

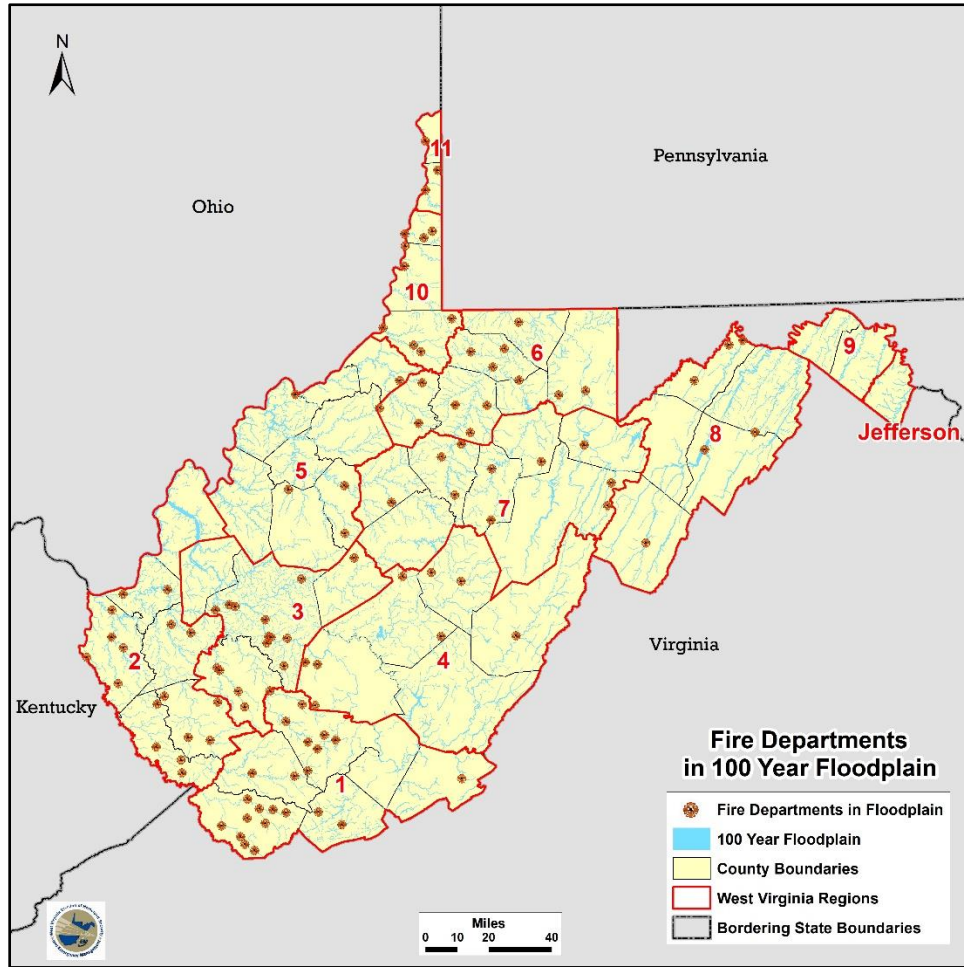


Figure 27 – Fire Departments in 100-Year Floodplain

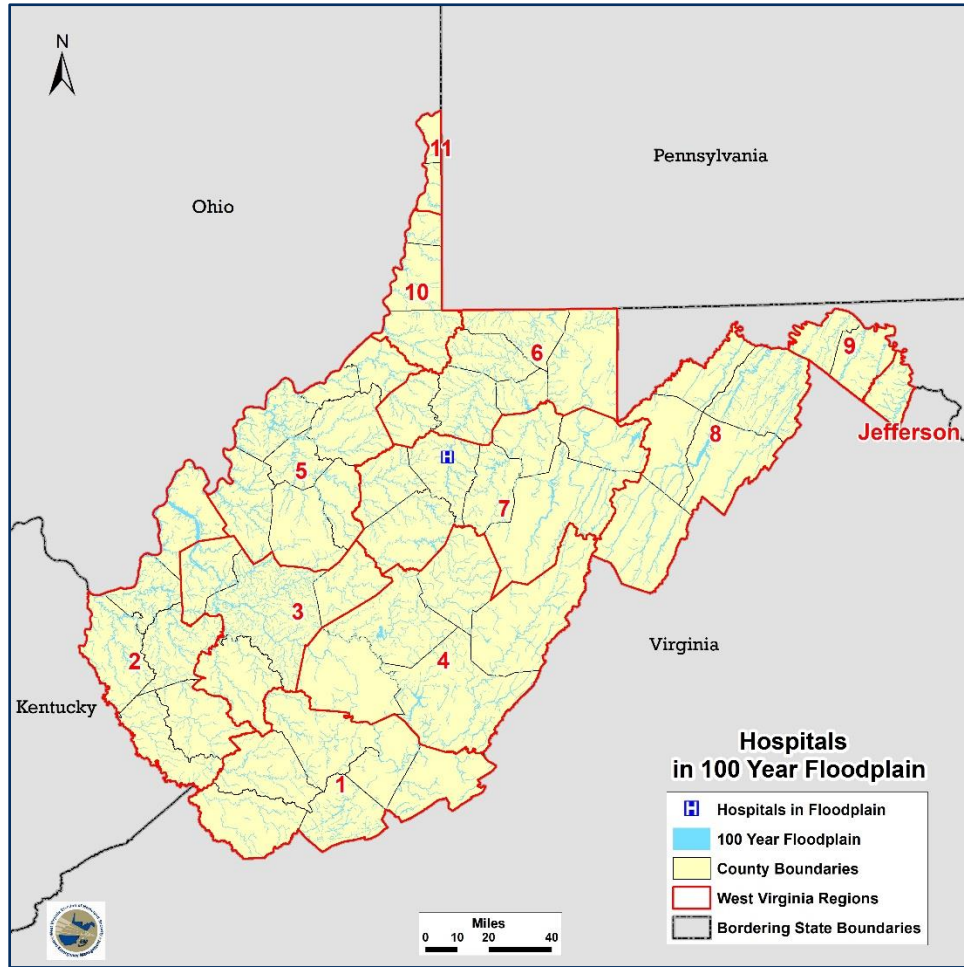


Figure 28 – Hospitals in 100-Year Floodplain

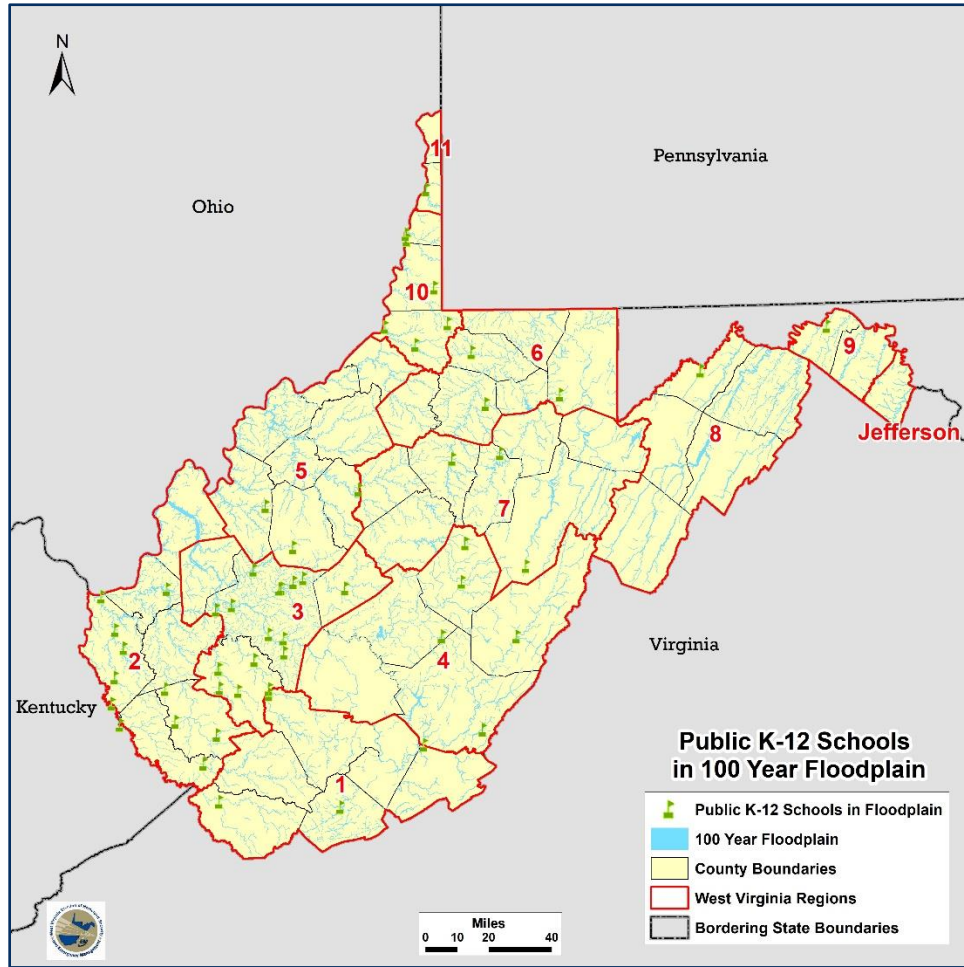


Figure 29 – Public Schools (K-12) in 100-Year Floodplain

Kanawha, McDowell, Boone, and Wayne Counties have the highest number of critical facilities in the 100-year floodplain.

County	Number of Facilities
Kanawha	24
McDowell	20
Boone	13
Wayne	11

Table 33 – Counties with Most Critical Facilities in 100-Year Floodplain



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County	OES	Law Enforcement	Fire Departments	Hospitals	Schools	Total
Barbour	0	2	1	0	0	3
Berkeley	0	0	0	0	0	0
Boone	0	1	5	0	7	13
Braxton	0	0	0	0	0	0
Brooke	1	4	2	0	2	9
Cabell	0	1	2	0	1	4
Calhoun	0	0	2	0	1	3
Clay	0	0	1	0	1	2
Doddridge	0	0	3	0	0	3
Fayette	0	0	3	0	0	3
Gilmer	0	0	1	0	0	1
Grant	0	0	0	0	0	0
Greenbrier	0	0	0	0	2	2
Hampshire	0	0	0	0	0	0
Hancock	0	0	1	0	0	1
Hardy	0	0	2	0	0	2
Harrison	0	0	3	0	2	5
Jackson	0	0	0	0	1	1
Jefferson	0	0	0	0	0	0
Kanawha	0	4	10	0	10	24
Lewis	0	1	3	1	1	6
Lincoln	0	0	2	0	0	2
Logan	0	1	4	0	3	8
Marion	0	1	4	0	1	6
Marshall	0	1	2	0	1	4
Mason	0	1	0	0	0	1
McDowell	1	8	10	0	1	20
Mercer	0	2	2	0	1	5
Mineral	0	1	3	0	3	7
Mingo	0	1	4	0	2	7
Monongalia	0	0	1	0	0	1
Monroe	0	0	1	0	0	1
Morgan	0	0	0	0	1	1
Nicholas	0	2	2	0	2	6
Ohio	0	0	3	0	3	6



County	OES	Law Enforcement	Fire Departments	Hospitals	Schools	Total
Pendleton	1	0	1	0	0	2
Pleasants	0	0	0	0	0	0
Pocahontas	1	2	1	0	1	5
Preston	0	0	2	0	1	3
Putnam	0	1	0	0	0	1
Raleigh	0	2	7	0	1	10
Randolph	0	0	2	0	1	3
Ritchie	1	0	0	0	0	1
Roane	1	0	1	0	1	3
Summers	0	0	0	0	0	0
Taylor	0	0	0	0	0	0
Tucker	0	2	1	0	0	3
Tyler	0	0	1	0	0	1
Upshur	0	0	2	0	1	3
Wayne	0	0	5	0	6	11
Webster	1	2	2	0	2	7
Wetzel	0	3	4	0	3	10
Wirt	0	0	0	0	0	0
Wood	0	0	1	0	0	1
Wyoming	0	1	2	0	0	3
Total	7	44	109	1	63	224

Table 34 – Number of Critical Facilities within 100-Year Floodplain by County

4.D.3.g BRIM-covered Facilities

Utilizing the BRIM data there are two different ways to determine the number of facilities potentially impacted by a flooding event. One way is to use the flood zone classification listed as a field in the actual BRIM data. The second method is to run the entire BRIM dataset through geo-coding and addressing matching to determine a spatial location. However, this approach is limited because not all the addresses in the BRIM dataset can be accurately geo-coded.

The limitation of using the BRIM-report data is that it is a self-reported field and is not verified using geo-location. Recent computer modelling has better defined the flood zone classifications and has increase accuracy of placing structures in proper flood zone classifications, but these changes have not integrated into the BRIM dataset. The information



reported in the dataset used for this analysis was provided by the insured (i.e. owner of the BRIM policy).

Using the Flood Zone data field contained within the BRIM information all records can be sorted into Zone A (100-year), Zone B (500-year), Zone C (Minimal), or into one of another non-specific classification (unknown, not eligible, or N/A).

Flood Zone	Number of Structures	Total Building Value	Total Contents Value	Total Value at Risk
Zone A (100-Year)	106	\$154,114,302	\$26,545,300	\$180,659,602
Zone B (500-Year)	316	\$398,475,264	\$69,231,713	\$467,706,977
Zone C (Minimal)	1,231	\$3,714,923,522	\$641,025,375	\$4,355,948,897
N/A*	12,687	\$13,916,157,500	\$2,193,045,599	\$16,109,203,099

Table 35 – Value of BRIM-Covered Facilities in Flood Zones

*Includes records which are unknown and Not Eligible.

Less than 1% of the total facilities are located in the 100-year floodplain, just over 2% are in the 500-year floodplain, and 8% in Zone C.

Using the BRIM reported classification, a total of 106 structures are listed as being in the 100-year Floodplain (Zone A). Table 36 shows the building value and the content value for the structures located within the 100-year Floodplain in each county.



County	Number of Records	Building Value	Content Value	Total Value
Barbour	2	\$370,000.00	\$141,300.00	\$511,300.00
Brooke	2	\$1,000,000.00	\$140,000.00	\$1,140,000.00
Cabell	15	\$3,688,348.00	\$168,000.00	\$3,856,348.00
Hampshire	5	\$968,000.00	\$0.00	\$968,000.00
Hardy	2	\$10,800,000.00	\$1,755,500.00	\$12,555,500.00
Jackson	1	\$0.00	\$48,000.00	\$48,000.00
Jefferson	4	\$10,714,000.00	\$1,488,133.00	\$12,202,133.00
Kanawha	5	\$6,990,807.00	\$2,246,157.00	\$9,236,964.00
Lewis	5	\$1,434,951.00	\$669,110.00	\$2,104,061.00
Logan	2	\$308,116.00	\$100,400.00	\$408,516.00
Marshall	2	\$380,000.00	\$24,500.00	\$404,500.00
Mason	1	\$0.00	\$325,000.00	\$325,000.00
Mercer	17	\$31,731,897.00	\$4,902,300.00	\$36,634,197.00
Mineral	2	\$542,000.00	\$469,000.00	\$1,011,000.00
Mingo	6	\$33,632,800.00	\$4,429,300.00	\$38,062,100.00
Morgan	7	\$3,748,656.00	\$210,300.00	\$3,958,956.00
Nicholas	1	\$213,955.00	\$32,500.00	\$246,455.00
Ohio	2	\$18,469,807.00	\$2,003,000.00	\$20,472,807.00
Pocahontas	1	\$8,000,000.00	\$2,000,000.00	\$10,000,000.00
Preston	7	\$9,480,846.00	\$595,000.00	\$10,075,846.00
Randolph	1	\$145,000.00	\$45,000.00	\$190,000.00
Summers	1	\$1,121,100.00	\$1,750,000.00	\$2,871,100.00
Tyler	1	\$250,000.00	\$75,000.00	\$325,000.00
Upshur	2	\$3,956,026.00	\$1,620,000.00	\$5,576,026.00
Wayne	1	\$12,000.00	\$1,500.00	\$13,500.00
Wetzel	3	\$5,520,253.00	\$1,025,900.00	\$6,546,153.00
Wood	6	\$590,740.00	\$132,000.00	\$722,740.00
Wyoming	2	\$45,000.00	\$148,400.00	\$193,400.00
	106	\$154,114,302	\$26,545,300	\$180,659,602

Table 36 – BRIM Dataset Records in 100-Year Floodplain

The BRIM provided data also contains a field related to basements. Since much of the flooding in West Virginia occurs in basements, this provides some idea of potential loss. Structures with



basements account for 11% of the structures located in the 100-year floodplain, 18% of the 500-year structures, and 14% of the Zone C properties.

County	Number of Buildings	Total Building Value	Total Content Value	Total Value at Risk
Barbour	1	\$0	\$81,300	\$81,300
Jefferson	2	\$10,169,000	\$1,478,578	\$11,647,578
Lewis	3	\$827,896	\$542,110	\$1,370,006
Mingo	2	\$20,000,000	\$2,314,000	\$22,314,000
Preston	1	\$1,255,416	\$120,000	\$1,375,416
Wetzel	1	\$0	\$65,900	\$65,900
Wood	2	\$122,400	\$36,000	\$158,400
	12	\$32,374,712	\$4,637,888	\$37,012,600

Table 37 – Value of BRIM-Covered Facilities with Basements

Not all counties have structures listed in the BRIM database. Mercer County (17) and Cabell County (15) have the most facilities in Zone A. Mingo County has the highest overall value in buildings in Zone A with over \$38,000,000 in building and content value.

The second method for using the BRIM data requires geo-coding and then using a geographic information system (GIS) to determine which BRIM records spatially intersect with mapped floodplains. One of the issues with this approach is that not all BRIM data can be properly geo-coded.

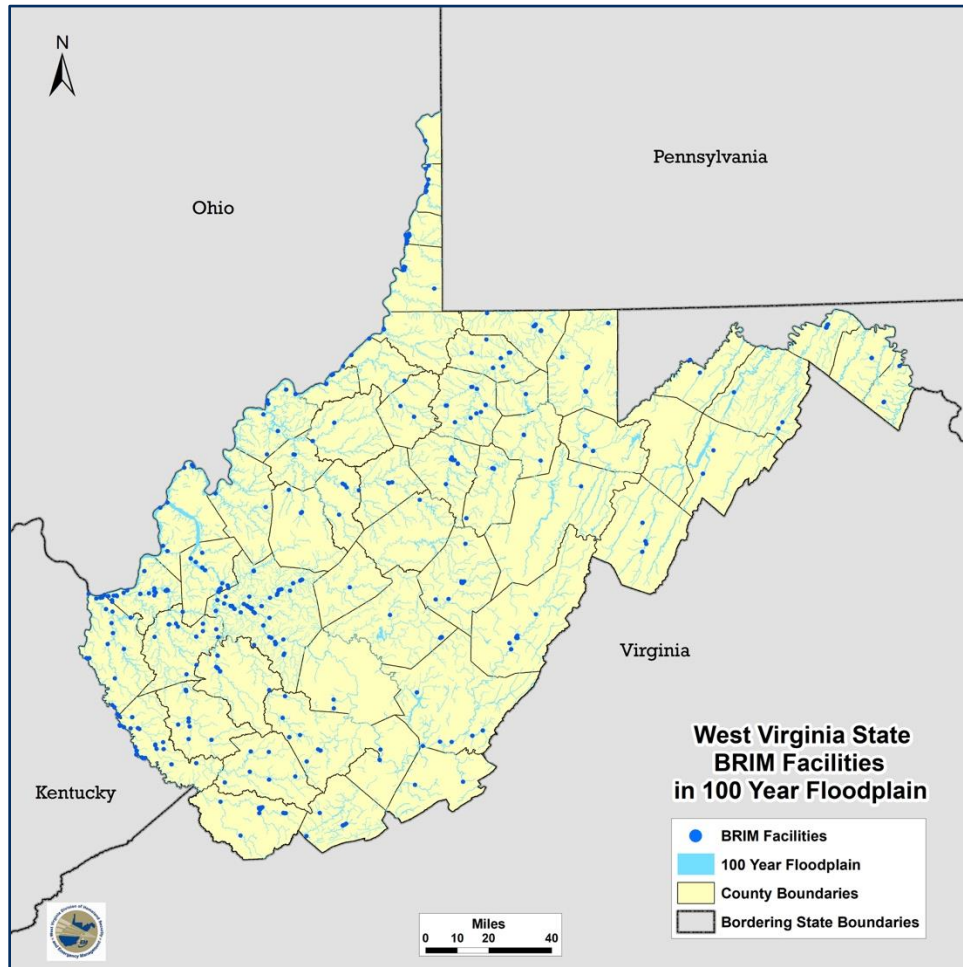


Figure 30 – BRIM-Covered Facilities in Flood Zones

4.D.4. Future Conditions

Annual precipitation is projected to increase for West Virginia over this century with those increases mostly in the winter and spring. The number and intensity of extreme precipitation events are also projected to increase. As temperatures are projected to increase, more rain will likely fall during heavy rain events. Very heavy precipitation events – the heaviest one percent of heavy rain events – now drop 67 percent more rain in the Northeast and 31 percent more in the Midwest than they did 50 years ago.

These events will likely lead to greater flood risk. La Niña conditions cause above average precipitation and below average temperatures in West Virginia. Recent climate studies show that rain events are becoming more frequent, with increasing rainfall amounts occurring in shorter periods of time. Warm air has the capacity to hold more water than cold air, and if the current trend of rising temperature continues, then this increases the probability and frequency of future



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heavy rainfall events. As a result, areas that already experience flooding are likely to experience more frequent flooding, and areas that have been historically less susceptible to flooding will face an increased risk.⁸

⁸ <https://downloads.globalchange.gov/usimpacts/pdfs/climate-impacts-report.pdf>



4.E. Landslides and Subsidence

4.E.1. Background Information

Sudden movement of surface land, vegetation and debris can have a negative impact on the surrounding infrastructure. Often, these events occur with little warning. Two types of movement most common in West Virginia are Landslides and Land subsidence (Karst).

4.E.1.a Landslides

Landslides are the downward movement of large volumes of surface materials under gravitational influences. Landslides are classified by the type of movement and type of materials. Types of movement include rotational, translational, block, falls, topples, debris flows, debris avalanche, earth flow, creep and lateral spreads⁹.

Landslide-susceptible terrain includes:

- Mountainous terrain with very steep slopes
- Areas of moderate relief suffering severe land degradation
- Areas of heavy precipitation events
- Areas covered with thick layers of finely grained soil deposits
- Areas subject to earthquake shaking

4.E.1.b Subsidence

Land subsidence is vertical earth movement resulting from increased stresses in the soil mass, or loss of shallow soil support. Rapid subsidence can be caused by undermining or failure of the underlying strata. Consolidation subsidence is a slower event.

Land subsidence occurs in two types of areas:

- Areas of abandoned mines
- Karst areas underlain by carbonate rocks (limestone and dolomite)

Geologic, physiographic and climatic factors affect the nature and occurrence of landslides in West Virginia. Geology and physiographic factors affecting the incidence of landslides include

⁹ USGS Fact sheet 2004-3072



folds, fractures, and faults in the underlying geologic formation. Steep areas with poor surface, and possibly subsurface, drainage, are particularly susceptible to landslides.

In West Virginia, karst topography exists in the eastern counties. The terrain in Greenbrier County is prone to karst topography. Rapid subsidence can also occur in developed areas as a result of subsurface erosion caused by leaking water lines, or changes in groundwater flow caused by pumping associated with dewatering excavations, especially in karst areas.

Slow subsidence is typically caused by consolidation in areas in which the soil stresses increase materially. Slow developing regional subsidence is often the result of excessive removal of groundwater, or petroleum that increases the effective stresses in subsurface soils. Slow developing, site-specific subsidence is often the result of construction structures or facilities over uncontrolled fills, including soils dumped loosely at convenient dumping locations, leveled deposits of mine spoil, highway construction spoil, head-of-hollow fills, covered sanitary landfills, etc.¹⁰

4.E.2. Historical and Notable Events

4.E.2.a Landslides

Most of West Virginia is susceptible to landslides. A comprehensive database documenting all landslide occurrences in the State is lacking. It is frequently included as a part of disaster declarations for flooding events.

March 1976. Landslides in the West Virginia University Arboretum occurred on March 26, 1976. The resulting slide was over 275 feet across with a slope of 60%. It covered the railroad tracks along the Monongalia River at the base of the WVU Arboretum.

November 1985. Following several days of heavy rains and building on the moisture associated with Hurricane Juan, historic flooding occurred in many parts of West Virginia. It was still the deadliest storm event, 38 people were killed statewide. Thousands of landslides were reported following the storm.

April 2007. A mudslide closed Route 12 between Alderson and Asbury. The slide also knocked down a power pole. An area of persistent, heavy rain developed on the northwest side of an area of low pressure that tracked from western North Carolina to eastern Virginia. Across Greenbrier County West Virginia, this rainfall amounted to 1.00 to 2.25 inches from late in the day on the

¹⁰ Homeowner's Guide to Geologic Hazards, West Virginia Geologic Survey, www.wvgs.wvnet.edu



14th into the early morning hours on the 15th. This amount of rain in a short period of time in an area with steep terrain, lead to flash flooding in parts of the county, including reports of mudslides.

March 2009. An abandoned underground mine in Coalburg Mountain near East Bank (Kanawha County) had filled with water. After a 4-day rainy period that saw 1.75 to 2 inches of rain fall, the mine blew out the side of the mountain during the predawn hours. Water gushed out of the mine and cascaded down the mountainside. Rocks and mud were picked up by the flowing current. Debris was deposited across roads and railroad tracks on the western end of the community. A parked dump truck was shoved over an embankment. A few homes were evacuated. Water and mud got into at least one garage and basement. Classes at East Bank Middle School were canceled. After a few hours, the water continued to drain, but with decreasing quantity. It took highway maintenance crews a week of work to reopen Route 61.

February 2012. Showers and thunderstorms with heavy rain developed on February 29, 2012. Two to three inches of rain were reported within only a few hours in addition to the rain earlier in the day with the passage of a warm front. Roads were made impassable by fast moving floodwaters and mudslides. Approximately 260 homes and business were impacted, with estimated damage to public property in Marion County being over \$550,000, in Monongalia County over \$500,000, and over \$850,000 in Preston County.

March 2015. Landslide gained worldwide attention. A portion of the manufactured slope at Yeager Airport collapsed and covered a roadway and several buildings. Rainfall was a trigger, although there were other mitigating factors.

July 2015. Part of WV 82 in Nicholas County was closed due to slides.

August 2015. West Virginia Department of Transportation reported that more than 70 roads in the State in more than 30 counties were closed as a result of severe storms and flash flooding.

June 2016. Intense multiple county flooding caused eight Interstate mudslides.

December 2016. US 250, in Marian County was closed for an extended period due to a steep slope slide.

Federally Declared Disasters 4059, 4061, 4210, 4219, 4220, 4221, 4236, 4273, 4331 and 4331 from 2012 through 2018, all include landslide or mudslide in the declaration.

4.E.2.b **Subsidence**

To date, there have been no Federal Declared Disasters or NCDC recorded events for karst related events. Land subsidence is very site-specific. Currently there is no comprehensive long-



term record of past events in West Virginia. For future revisions of this section, it is recommended that the WV Department of Transportation (WVDOT) be involved to determine areas where roads experience sinkholes to improve on the incidence reporting. Specifically, the SRO should coordinate activities with the WVDOT ensure that specific mitigation measures be developed to address subsidence threats and hazards.

4.E.3. Risk Assessment

4.E.3.a Introduction

The risks associated with both landslides and subsidence are normally directly linked to flooding events. Landslides can cause significant damage to highways, buildings, homes, and other structures that support a wide range of economies and activities. Landslides commonly coincide with other natural disasters. Expansion of urban development contributes to greater risk of damage by landslides.

The USGS recognizes six major impacts caused by landslides¹¹:

1. Damage in all 50 States, Puerto Rico, and the U.S. Virgin Islands
2. Costs of \$3.5 billion per year, in 2005 dollars, in damage repair
3. Cause of between 25 and 50 deaths in the United States annually
4. Reduction in real estate values and tourist revenue
5. Cause of lost human, industrial, agricultural, and forest productivity
6. Damage to the natural environment

Conditions that increase the risk of a landslide include heavy rain, snowmelt, and changes in groundwater level; seismic or volcanic activity may trigger landslides. Long-term climate change may result in an increase in precipitation, precipitation intensity, ground saturation, and a rise in groundwater level, reducing the shear strength and increasing the weight of the soil. Erosion may remove the toe and lateral support of certain areas, triggering potential landslides. Storms and sea level rise often exacerbate coastal erosion and landslides. Human activities triggering landslides are usually associated with construction and changes in slope and surface water and groundwater levels. Changes in irrigation, runoff and drainage can increase erosion and change groundwater levels and ground saturation.

The West Virginia Department of Transportation recently developed the Landslide Hazard Management System in West Virginia. They have completed phase 1 of their plan, which

¹¹ USGS Fact Sheet: FS-2005-3156: Landslide Hazards—A National Threat



included a literature review of landslide mapping in other State DOTs, developing an effective electronic field reconnaissance method and database, pilot testing and deploying a web-enabled, GIS-based landslide application in Region 2, and standardizing a landslide hazard-rating matrix.¹²

Hazard Rating Matrix Components:

- Potential Loss of life;
- Average Daily Traffic;
- Percent of Decision Sight Distance;
- Is this a certified emergency route;
- Impact to Road Structure and Adjacent Features;
- Expected Damage to Structures;
- Rate of Movement (inches/year);
- Amount of Surface Water (Hydrology);
- Detour Route Distance;
- Length of Landslide (feet);
- Vertical & Horizontal Displacement in Road (inches); and
- Annual Maintenance Cost.

Rapid-subsidence mitigation measures from an engineering perspective include:

- Filling known subsurface voids
- Supporting facility on competent rock
- “Dental work” to fill cracks, slots or solution channels in the rock surface
- Heavy compaction of surface soils to collapse soils above near surface voids
- Use of flexible connections between structures and underground utility lines
- Hydraulic barrier, such as recharge trenches, to minimize area impacts of large excavation dewatering.

¹²https://transportation.wv.gov/highways/programplanning/plan_conf/Documents/2013PC/Landside_Hazard_Mngmt_System_in_WV.pdf



Slow subsidence is more problematic because it is not apparent until years after the root-cause activity has started. Engineering strategies for mitigation include:

- Underpinning buildings with foundations bearing at a depth below the consolidating layer
- Avoid structural connections between main building and appurtenances such as entryways, canopies, etc.
- Use of flexible connections for all underground utilities.

Over the next three years, statewide risk assessments for Landslides and Flooding will improve dramatically. West Virginia University GIS Technical Center has proposed a West Virginia Statewide Multi-Hazard Risk Assessment for all 55 counties and 277 communities in West Virginia. Referred to as the Total Exposure in Floodplain (TEIF) and Total Exposure Area Landslide (TEAL), they will assess risk at the building or structure level and more precisely determine exposure to hazard damages.

The goal of this assessment is to:

- Develop a standardized, comprehensive building exposure inventory that includes critical facilities and state-owned properties;
- Create a statewide parcel file for hazard identification and risk assessments;
- Standardize the data analysis process so that future local and state plan updates are consistent and utilize comparable methodologies;
- Conduct a statewide HAZUS Level 2 flood risk analysis with more accurate local building inventories (user-defined facilities), effective Digital Flood Insurance Rate Map (DFIRM) floodplains, and high-resolution elevation data; and
- Build a statewide landslide incident database for improving landslide susceptibility

4.E.3.b **Probability**

Nearly all of West Virginia exists in a zone of high landslide incidence, and landslides pose a significant threat to West Virginians and their property. The probability of a landslide occurrence cannot be estimated based on statistical data, nor can the “safety factor” be calculated for any given slope based on geotechnical laboratory test or mathematical computations.

Conditions in West Virginia that contribute to the frequency of landslides include the mountainous terrain and the high average annual precipitation. Winter precipitation seeps into cracks and fissures in rock slopes and expands upon freezing, which frequently results in sliding and toppling failures. Precipitation throughout the year can raise the groundwater table, which tends to reduce slope stability; water seeps into soil rock boundary layers and reduces friction



between layers, resulting in translational or block slides; or increases the moisture content and weakens loose or unconsolidated soils, causing rotational failures or earth flows. Other factors also contributing to the occurrence of landslides including seismic activity and construction activities that increase surface runoff and erosion.

U.S. Geological Survey (USGS) rates nearly all of West Virginia as susceptible to landslides. The eastern side of the State was placed in the low incidence category. This does not mean that no landslides exist or that no areas are susceptible to landslides. Even areas in the lowest category may contain landslides unknown to the compilers or have an incidence of less than 1.5 percent. The possibility is great that more landslides than indicated exist statewide due to the scarcity of landslide information for many parts of the country.¹³

¹³ Radbruch-Hall, et al. Landslide Overview Map of the Conterminous United States, 1982. USGS Professional Paper 1183. <http://pubs.usgs.gov/pp/p1183>.

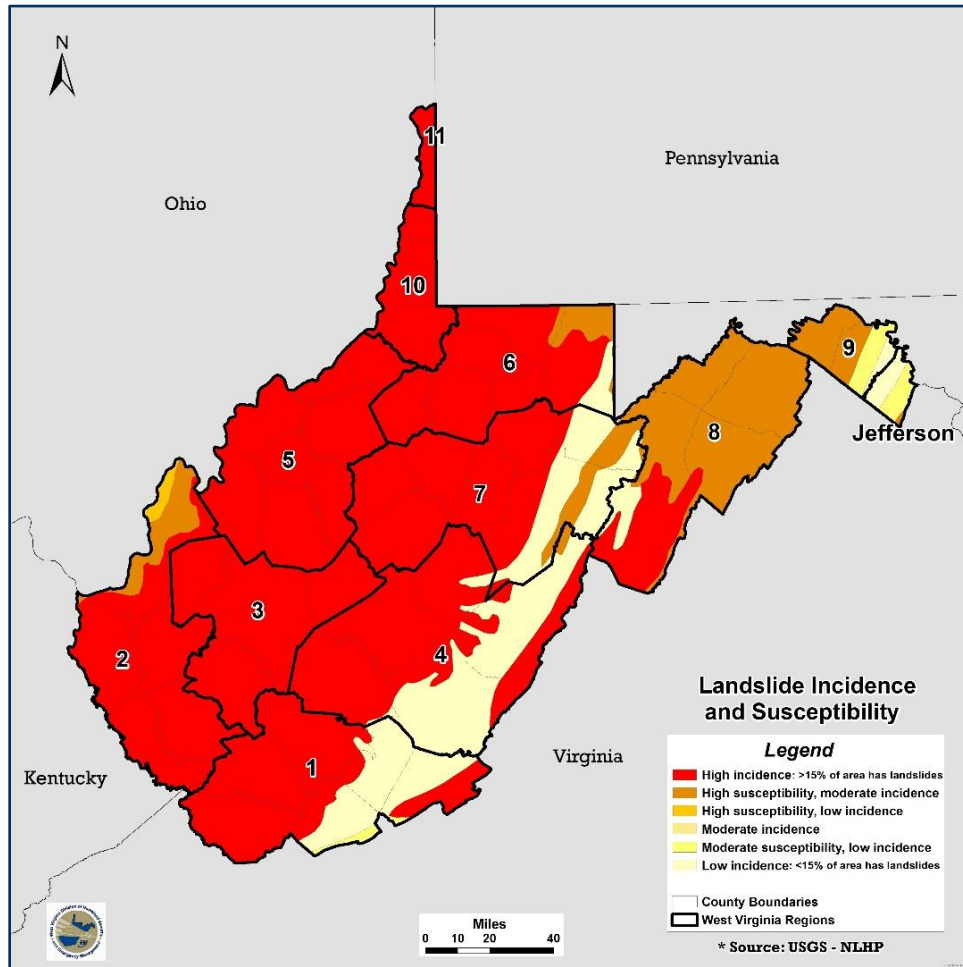


Figure 31 – Landslide Incidence and Susceptibility

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.

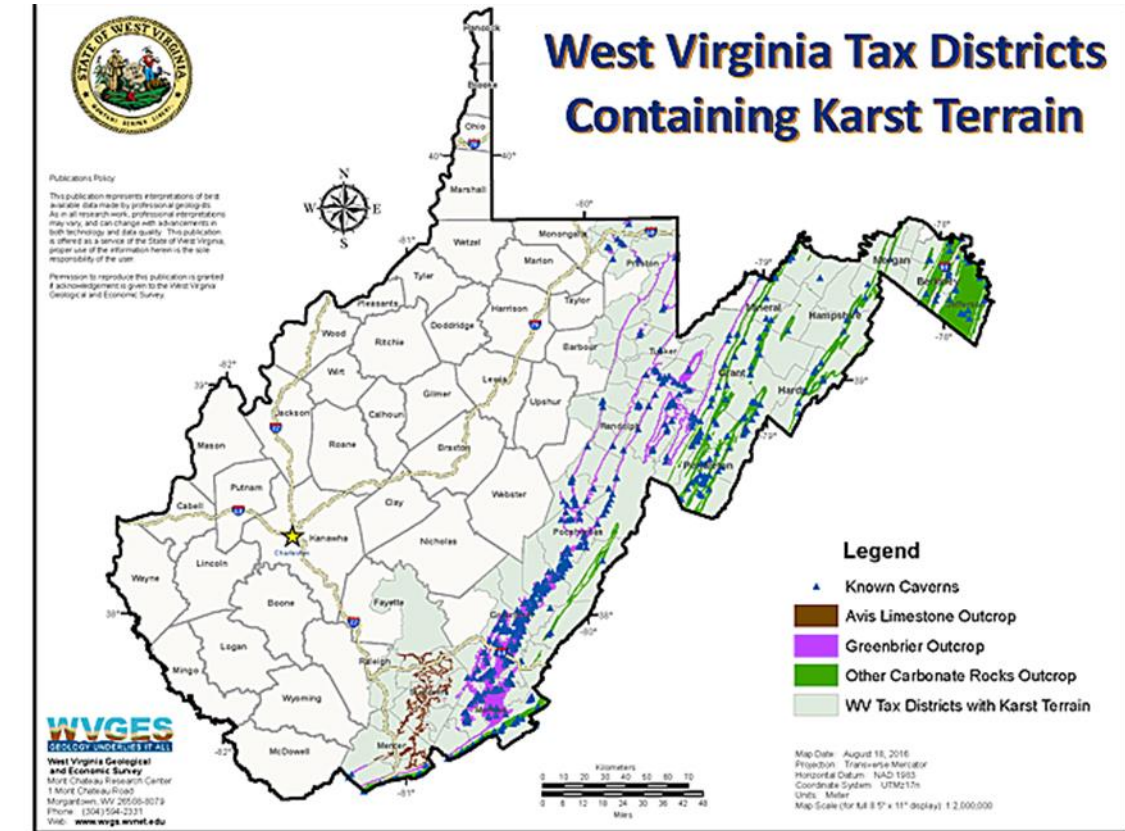


Figure 32 – Karst Terrain in WV

*Note that the data is at a national scale and is not intended for site-specific research

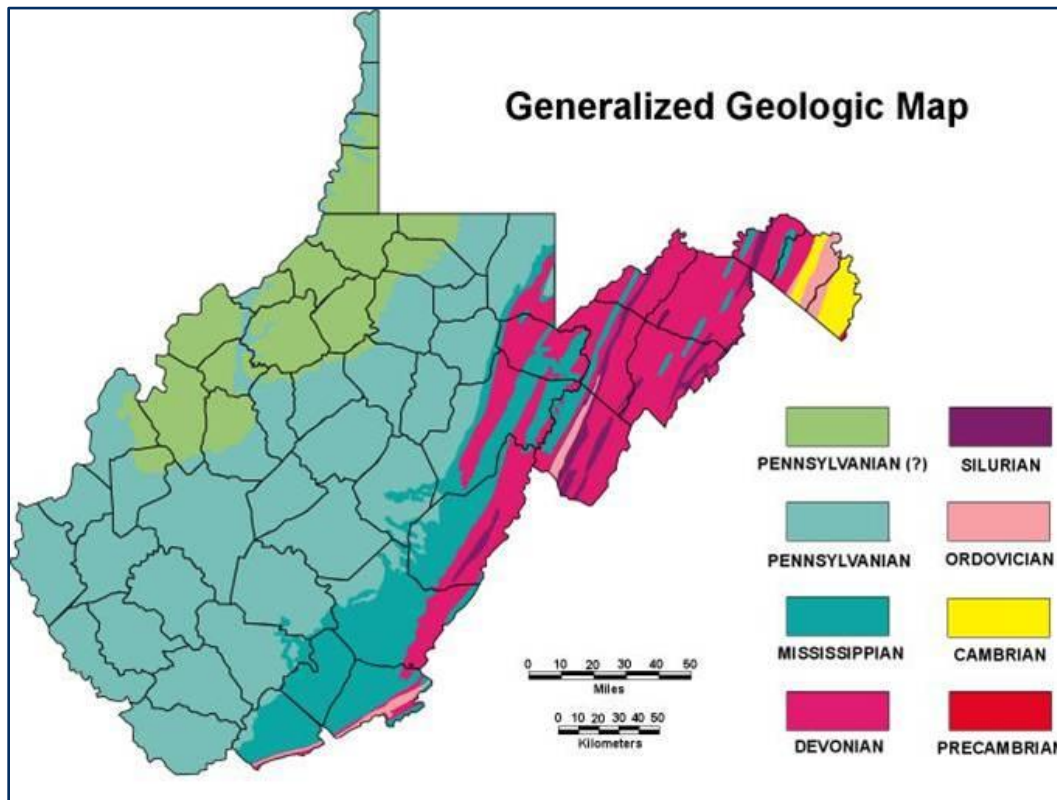


Figure 33 – Geologic map of West Virginia

Limestone formations of Cambrian, Ordovician, and Mississippian age underlie the karst regions. These formations typically indicate areas of carbonate rocks and recorded occurrences of subsidence activity. In Figure 33, areas with Cambrian, Devonian, Mississippian and Ordovician contain more karst topography, and are more susceptible to subsidence.

4.E.3.c **Impact and Vulnerability**

This assessment focuses on areas that may be susceptible to landslides likely to occur based on past incidence. The assigning of any area to the lowest incidence or susceptibility category should not be construed to mean that no landslides exist or that no areas are susceptible to landslides. Even areas in the lowest category may contain landslides unknown to the compilers or have an incidence of less than 1.5 percent. The possibility is great that more landslides than



indicated exist statewide (except for the highest category), due to the scarcity of landslide information for many parts of the country.¹⁴

The USGS divides landslide risk into six categories. These six categories were grouped into three, broader categories to be used for the risk analysis and ranking; geographic extent is based off of these groupings. These categories include:

High Risk

- High susceptibility to landsliding and moderate incidence.
- High susceptibility to landsliding and low incidence.
- High landslide incidence (more than 15% of the area is involved in landsliding).

Moderate Risk

- Moderate susceptibility to landsliding and low incidence.
- Moderate landslide incidence (1.5 - 15% of the area is involved in landsliding).

Low Risk

- Low landslide incidence (less than 1.5 % of the area is involved in landsliding).

Landslide is a major geological hazard in West Virginia. From the 1976 WVGES report on Landslide and Slide-Prone Areas, it was estimated that annual costs exceed \$10 million not including unreported damage to homes, land, and property. Damages have not been included in this ranking because of the lack of reliable available data.

HAZUS county reports provided residential, commercial, industrial, agricultural, religious, government and education building counts. To determine which facilities are at risk for land subsidence, HAZUS reports were intersected with USGS karst geology information.

For each county with a high risk of land subsidence, both the total building exposure, and the government and education facility building exposure were calculated. The results of this analysis indicate 1,703 buildings in West Virginia are at risk for subsidence, with a combined building value at risk of over \$11 Billion. Approximately 13% of State critical facilities are in regions with some karst geology. Schools represent the majority of those critical facilities. Critical facilities had a combined building value around \$270 Million.

¹⁴ Radbruch-Hall, et al. Landslide Overview Map of the Conterminous United States, 1982. USGS Professional Paper 1183. <http://pubs.usgs.gov/pp/p1183/pp1183.html>



4.E.3.d **Annualized Events and Costs**

The NCEI website does not track specific damages associated with landslides or subsidence. However, a review of recent declared disasters for flooding all include damages associated with landslides and subsidence.

One method to determine potential loss is using the BRIM data and the including of coverage for underground mine subsidence.

PDC Region	Building Value	Content Value	Total Value
Region 1	\$801,709,175	\$86,122,444	\$887,831,619
Region 2	\$66,355,111	\$29,058,911	\$95,414,022
Region 3	\$508,390,229	\$62,205,114	\$570,595,343
Region 4	\$12,808,752	\$1,629,630	\$14,438,382
Region 5	\$14,349,887	\$1,495,546	\$15,845,433
Region 6	\$409,027,954	\$29,585,458	\$438,613,412
Region 7	\$74,020,899	\$11,900,086	\$85,920,985
Region 8	\$23,399,359	\$1,847,950	\$25,247,309
Region 9	\$5,000	\$3,000	\$8,000
Region 10	\$101,262,642	\$15,512,278	\$116,774,920
Region 11	\$1,766,448	\$62,120	\$1,828,568
Jefferson	\$24,244	\$0	\$24,244
Total	\$2,013,119,700	\$239,422,537	\$2,252,542,237

Table 38 – BRIM Values for Underground Subsidence Coverage

Loss estimates were not calculated for karst due to lack of historical data for events and damages, scale of available mapping, and the lack of probabilities of future occurrences.



4.E.3.e Hazard Rankings

Utilizing the methodology established for the *2018 WV Statewide Standard Hazard Mitigation Plan Update*, the vulnerability for Landslides and Subsidence was calculated at both a state level and a regional level (using PDC regions).

Local Hazard Mitigation Plan Ranking

While each PDC developed its own methodology to rank the hazards, a county-level ranking provides useful information to gain an understanding the hazard at a local level.

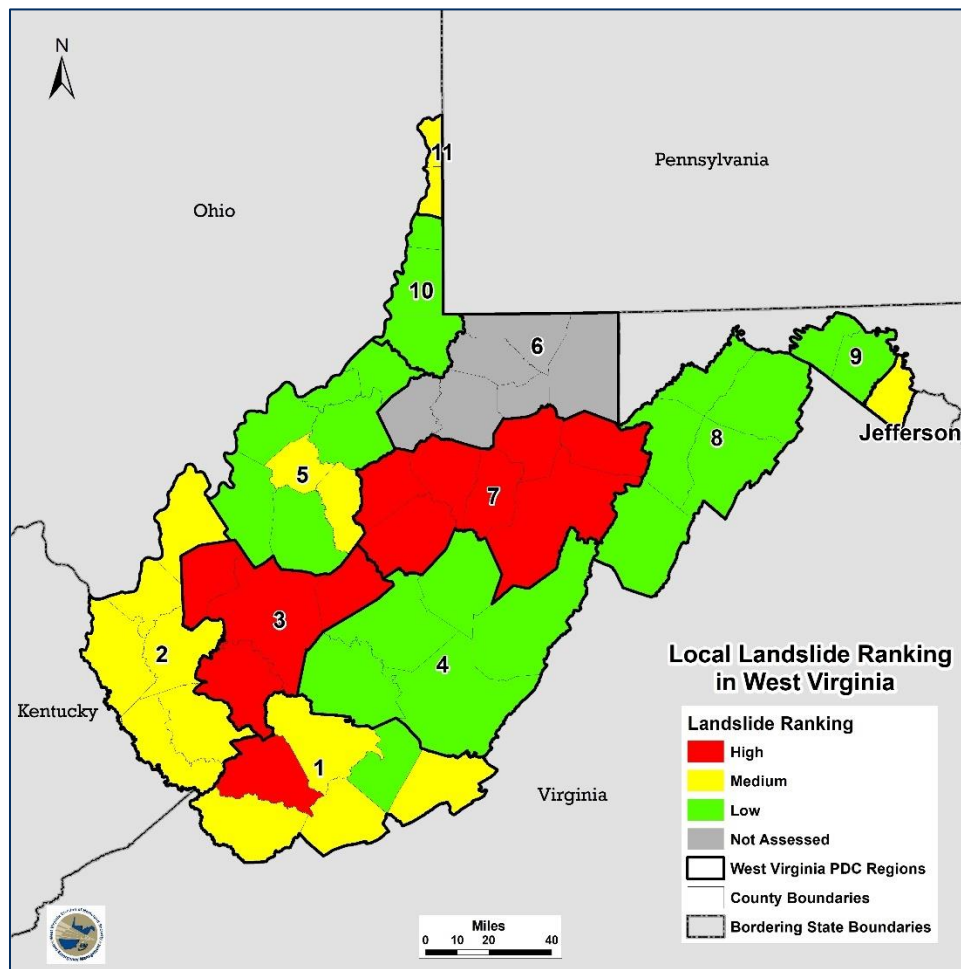


Figure 34 – Local Landslide/Subsidence Hazard Ranking



State Hazard Mitigation Plan Ranking

The Hazard Ranking Methodology uses a structured assessment to identify a Risk Rating based upon seven areas:

- Geographic Area Impacted
- Property Damage
- Population Vulnerability
- State Infrastructure Damages
- Deaths or Injuries
- History of Occurrence
- Regional HMP Ranking

According to the hazard mitigation ranking methodology a total of 12 counties were ranked as having a high vulnerability for landslides/subsidence.

Region	Counties with High Risk Level
PDC Region 1	Wyoming
PDC Region 3	Boone
PDC Region 3	Clay
PDC Region 3	Kanawha
PDC Region 3	Putnam
PDC Region 7	Barbour
PDC Region 7	Braxton
PDC Region 7	Gilmer
PDC Region 7	Lewis
PDC Region 7	Randolph
PDC Region 7	Tucker
PDC Region 7	Upshur

Table 39 – High Risk Counties for Landslide/Subsidence Vulnerability



4.E.3.f **Critical Facility Risk**

Critical facility points were intersected with the counties considered to have a High vulnerability to landslides/subsidence. This is not to imply that the specific structures are at a high level of risk; however, this indicates that at a county level these facilities could be affected.

A total of three Planning Development Council Regions were ranked as having a high probability related to Landslides. PDC Region 3 (Boone, Clay, Kanawha, and Putnam) have the most critical facilities with nearly 240 being potentially impacted by landslides. Overall, the majority of the critical facilities in the areas with a high vulnerability are schools (180), followed by fire departments (123).

PDC Region	County	OES	Police Departments	Fire Departments	Hospitals	Public Schools (K-12)
Region 1	Wyoming	1	5	8	0	14
Region 3	Boone	1	6	8	1	13
Region 3	Clay	1	2	3	0	6
Region 3	Kanawha	2	27	49	7	69
Region 3	Putnam	1	7	10	1	23
Region 7	Barbour	1	5	3	1	9
Region 7	Braxton	1	6	7	1	8
Region 7	Gilmer	1	4	5	0	3
Region 7	Lewis	1	3	6	1	6
Region 7	Randolph	1	3	13	1	16
Region 7	Tucker	1	3	4	0	3
Region 7	Upshur	1	3	7	1	10
		13	74	123	14	180

Table 40 – Critical Facilities in Landslide/Subsidence Vulnerability Areas

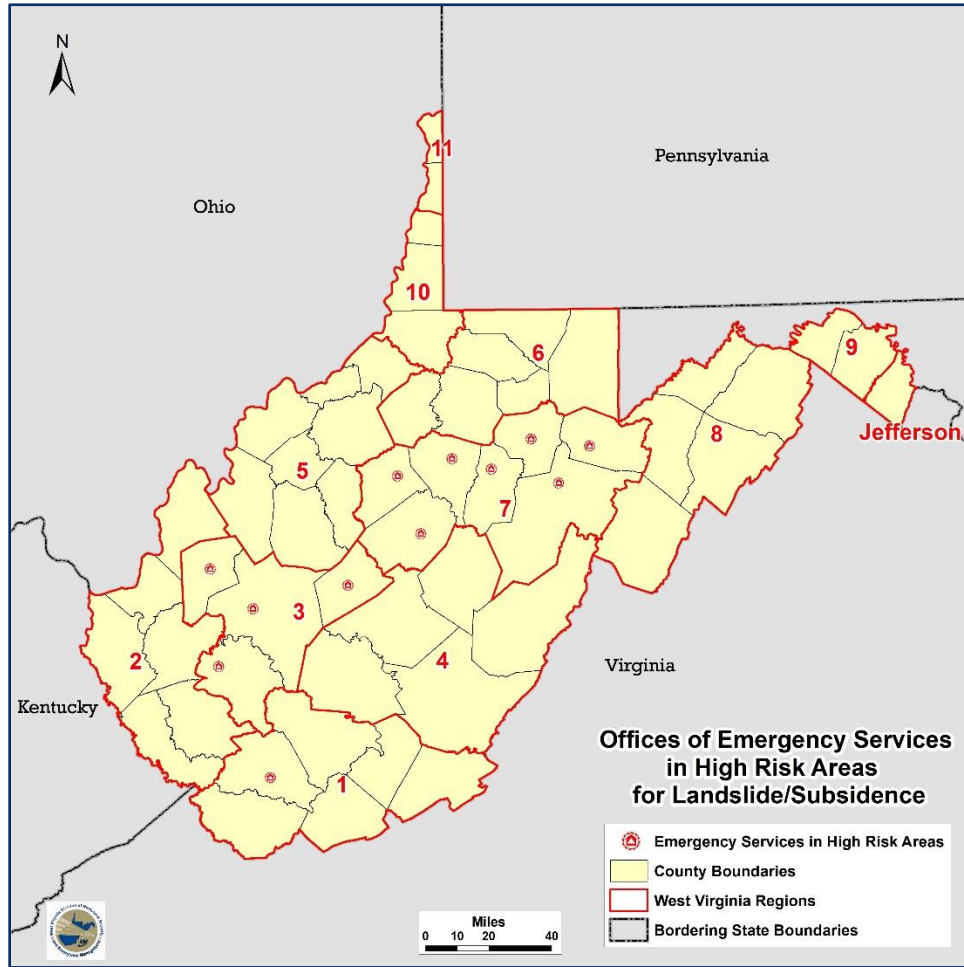


Figure 35 – OES in Landslide/Subsidence Vulnerability Areas

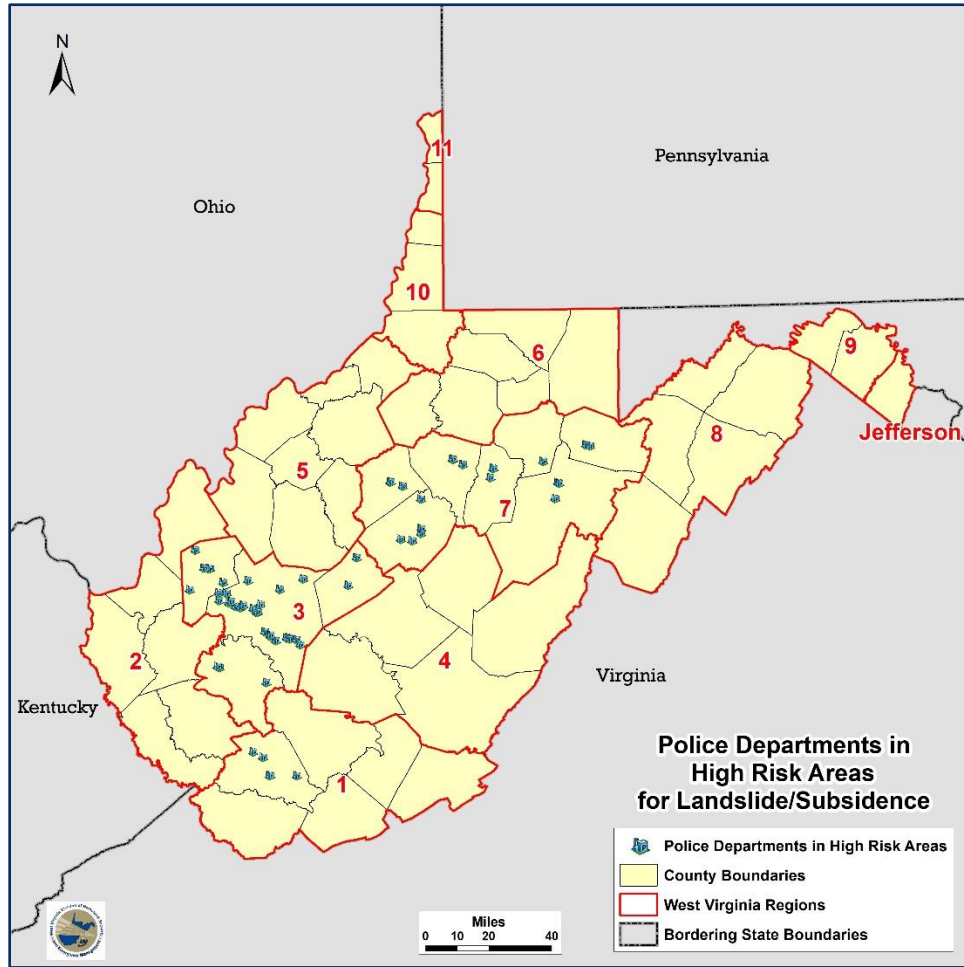


Figure 36 – Police Departments in Landslide/Subsidence Vulnerability Areas

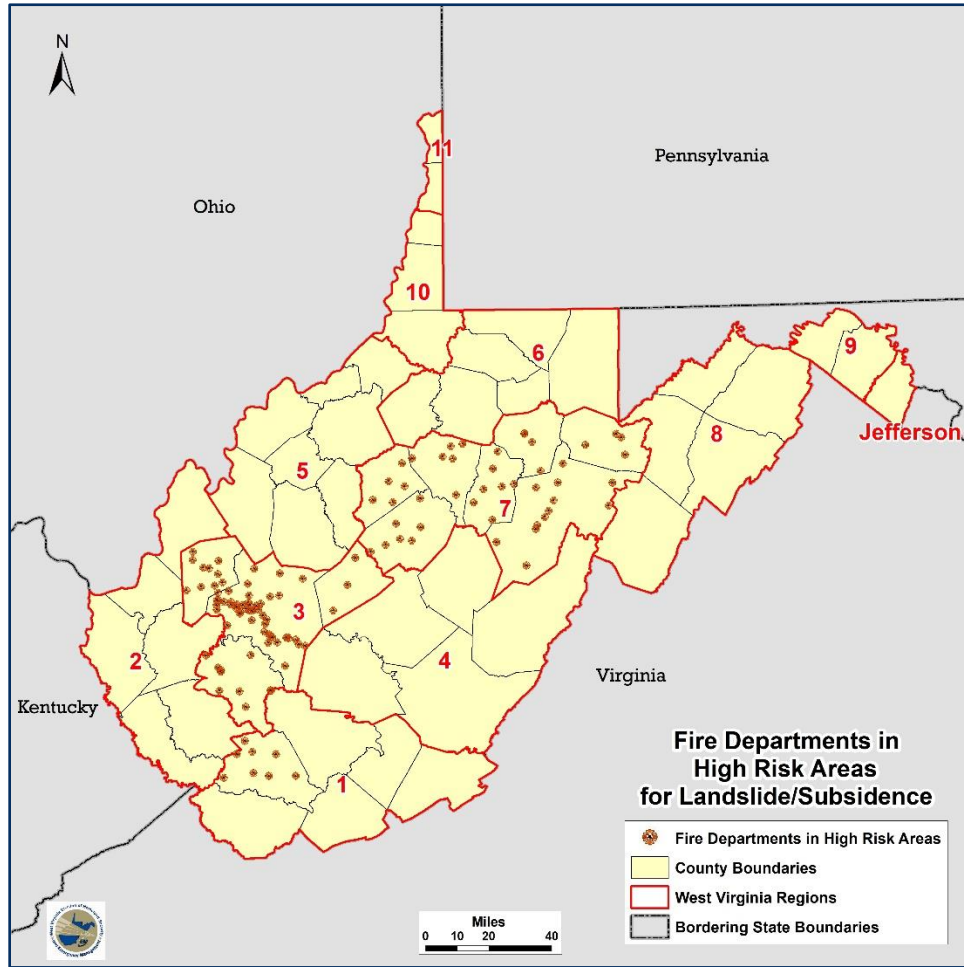


Figure 37 – Fire Departments in Landslide/Subsidence Vulnerability Areas

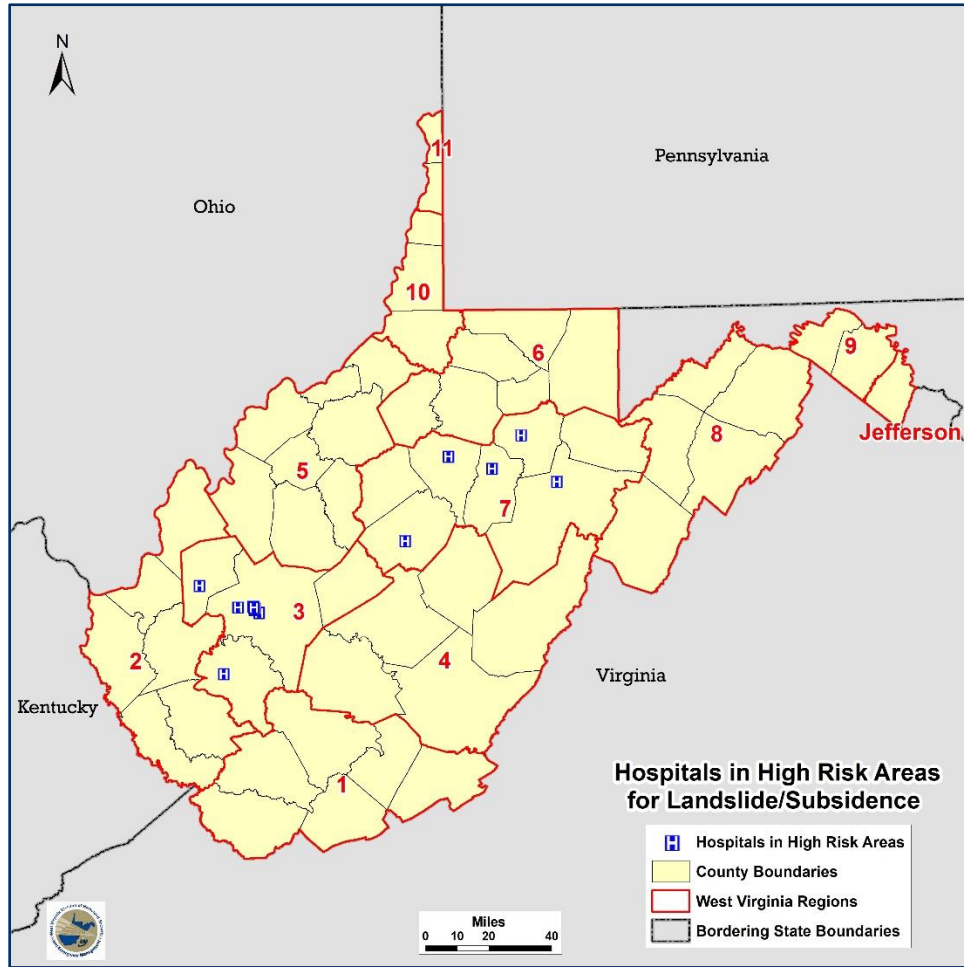


Figure 38 – Hospitals in Landslide/Subsidence Vulnerability Areas

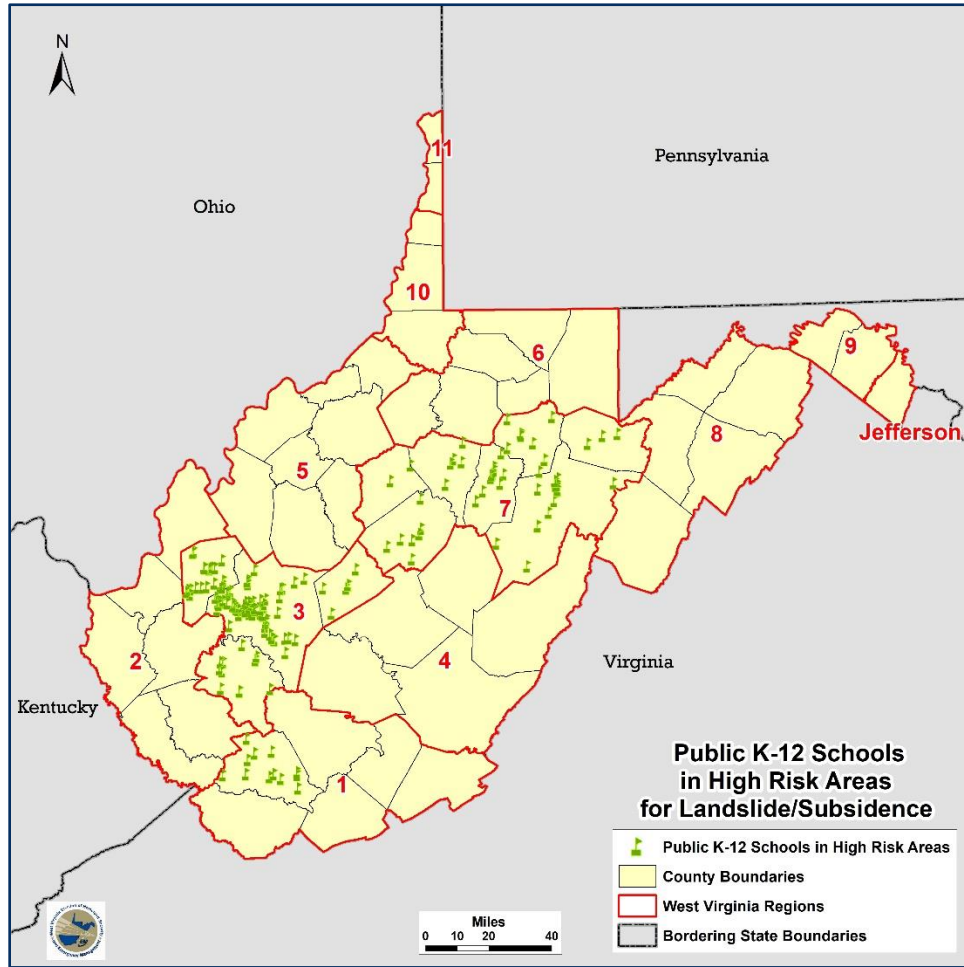


Figure 39 – Public Schools (K-12) in Landslide/Subsidence Vulnerability Areas



4.E.3.g **BRIM-covered Facilities**

Using the 12 counties identified as having a high level of risk for landslides, there are 3,883 BRIM-covered facilities at risk. Kanawha County (1,684) has the most in a single county. Region 3 (Boone, Clay, Kanawha, and Putnam) has the most in a single region with 2,217 covered facilities. The highest total building and content value is also Region 3 with over \$3.5 Million in total value.

PDC Region	County	Number of Records	Building Value	Content Value	Total Value
Region 1	Wyoming	233	\$143,371,389	\$23,402,286	\$166,773,675
Region 3	Boone	86	\$26,751,427	\$6,102,000	\$32,853,427
Region 3	Clay	60	\$53,222,125	\$7,139,670	\$60,361,795
Region 3	Kanawha	1,684	\$2,385,558,271	\$530,663,148	\$2,916,221,419
Region 3	Putnam	387	\$424,959,371	\$86,582,237	\$511,541,608
Region 7	Barbour	143	\$82,823,915	\$15,352,616	\$98,176,531
Region 7	Braxton	150	\$103,492,844	\$16,712,984	\$120,205,828
Region 7	Gilmer	220	\$166,120,106	\$23,444,927	\$189,565,033
Region 7	Lewis	183	\$118,721,318	\$23,109,189	\$141,830,507
Region 7	Randolph	324	\$261,934,725	\$39,244,112	\$301,178,837
Region 7	Tucker	255	\$138,792,086	\$21,347,107	\$160,139,193
Region 7	Upshur	158	\$46,564,382	\$11,764,991	\$58,329,373
		3,883	\$3,952,311,959	\$804,865,267	\$4,757,177,226

Table 41 – BRIM-Covered Facilities in Landslide/Subsidence Vulnerability Areas

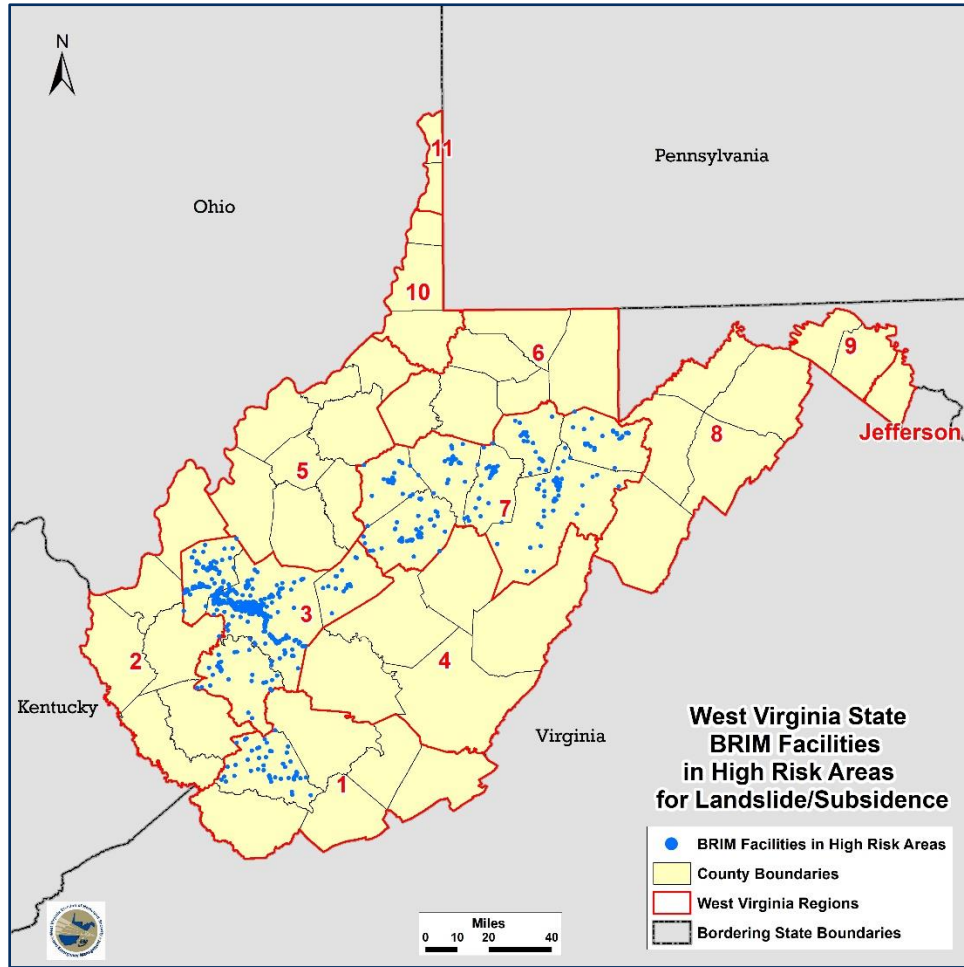


Figure 40 – BRIM-Covered Facilities in Landslide/Subsidence Vulnerability Areas

County Name	Customer Name	Number of Structures
Kanawha	KANAWHA COUNTY BOARD OF EDUCATION	358
Putnam	PUTNAM COUNTY BOARD OF EDUCATION	248
Tucker	PARKS, WEST VIRGINIA STATE CO DEPARTMENT OF NATURAL RESOURCES	165
Kanawha	CHARLESTON-KANAWHA HOUSING AUTHORITY	159
Kanawha	WEST VIRGINIA PARKWAYS AUTHORITY	109

Table 42 – BRIM-Covered Facilities Customer Name



4.E.4. Future Conditions

4.E.4.a Landslides

Given that the frequency and intensity of future rain events will increase, the stability of natural and engineered slopes will likely lead to more landslides. In most cases, this will be directly connected to flooding events. What is less clear, however, are the details of those consequences - the type, extent, magnitude, and direction of the changes in the stability conditions, and on the location, abundance, activity and frequency of landslides in response to the projected climate changes.

4.E.4.b Subsidence

Predicted rain events will also likely increase issues of subsidence related to damage to structures, including bridges and roadways, as well as failed water, sewer, gas, and culverts. As new large-scale road projects continue across the state it is critical that the WV Department of Transportation integrate subsidence mitigation measures in future road construction projects. In addition, mine subsidence continues to be a concern across the state.



4.F. Severe Storms

Wind and severe storms pose risks to West Virginia. High winds, thunderstorms, lightning, hail, tornadoes, and remnants of hurricanes can cover vast areas of the state quickly and without enough warning, leading to flooding, lightning initiated fires and significant structural damage.

4.F.1. Background Information

West Virginia wind events can produce damage often associated with tornadoes. In some instances, these events have been associated with weakening tropical weather systems, including downgraded tropical and sub-tropical storm systems. This section examines the risks associated with damaging wind events.

Since wind and severe storms cover a large category of events, this section is divided into four sections.

- Thunderstorms
- Lightning
- Hail
- Tornado & High Winds
- Hurricanes and Tropical Events

4.F.1.a Severe Storms

A thunderstorm forms from a combination of moisture, rapidly rising warm air, and a force capable of lifting air such as a warm or cold front, or a sea or lake-breeze. All thunderstorms contain lightning. Thunderstorms may occur singly, in clusters, or in lines. It is possible for several thunderstorms to affect one location in the course of a few hours, or for a single, slow-moving storm to affect one location for an extended period. Thunderstorms can contribute to other hazard events, such as flooding, strong straight-line winds, tornadoes, hail, and lightning, as well as the possibility of lightning-initiated fires.

Downburst winds, typically associated with thunderstorms, are “straight-line” winds that are distinguishable from tornadic activity by their pattern of destruction and debris. Downburst winds generally fall into two categories:

- Microburst: covers an area less than 2.5 miles in diameter
- Macroburst: covers an area at least 2.5 miles in diameter.



A Derecho is another widespread thunderstorm wind event. Derechos are associated with lines (squall lines) of fast-moving thunderstorms that might vary in length and have the potential to travel hundreds of miles. Winds in these types of events can rival those of “weaker” tornadoes with gusts of 80 to 100 mph.

Severe thunderstorm events produce one or more of the following:

- Winds of 58 mph or higher
- Hail 1 inch in diameter (quarter-sized) or larger
- Tornadoes.

4.F.1.b **Lightning Events**

In the United States, 75 to 100 Americans are struck and killed each year by lightning. According to a NOAA technical report, from 1959 through 2016, West Virginia experienced 26 deaths attributed to lightning (NOAA, 2017). West Virginia had 91,992 cloud-to-ground lightning flashes in 2017.¹⁵ Between 2008 and 2017, the average number of cloud-to-ground flashes was 165,219, down 15,000 from the year before. 2017 saw the fewest lightning-related deaths nationwide in the last decade.

4.F.1.c **Hail Events**

Hailstones are balls of ice caused by water droplets being caught in updrafts and transported to a level in the atmosphere that is below freezing. Hailstones can vary in size from small balls of less than 2 centimeters to hailstones as large as softballs. While thunderstorms with hail and lightning occur throughout the United States, they are most likely to occur in the central and southern states (FEMA, 1997a). NCEI data indicate that there were 1,613 hail events in West Virginia between 2000 and 2016, causing \$5000 in crop damage and \$4.83 million in property damage.

¹⁵ https://www.weather.gov/media/safety/08-17_Flash_Density_State.pdf



4.F.1.d Tornado and High Wind Events

Tornadoes, high winds, downbursts, wind erosion, and wind chill can harm people and damage property and infrastructure. Wind effects can include blowing debris, interruptions in elevated power and communications utilities, and intensification of the effects of other hazards related to inclement weather and severe storms.

Based on historical tornado and hurricane data, FEMA has determined maximum wind speeds for design of safe rooms. West Virginia is included in Wind Zone III (200 mph).

A tornado is “a rapidly rotating vortex or funnel of air extending ground-ward from a cumulonimbus cloud” (FEMA, 1997). They typically spawn from thunderstorms, hurricanes, and wildfires. While roughly 1,000 tornadoes a year are generated by thunderstorms, relatively few touchdown. As wind speeds increase, so does the level of destruction. The Fujita scale, introduced in 1971 by Dr. Ted Fujita, provided a way to characterize tornadoes based on the damage they produced and relating that damage to the fastest quarter-mile wind at the height of a damaged structure.

Fujita Scale			Enhanced Fujita Scale	
F Number	Fastest ¼ Mile (mph)	3 Second Gust (mph)	EF Number	3 Second Gust (mph)
0	40-72	45-78	0	65-85
1	73-112	79-117	1	86-110
2	113-157	118-161	2	111-135
3	158-207	162-209	3	136-165
4	208-260	210-261	4	166-200
5	261-318	262-317	5	Over 200

Table 43 – Fujita and Enhanced Fujita Scale

4.F.1.e Hurricanes and Tropical Events

Hurricanes and tropical depressions or events pose a danger from torrential rains, high winds, and storm surges in coastal areas. By the time a storm classified as a hurricane at the United States coastline arrives in West Virginia, it has most likely weakened into a tropical storm or depression. Tropical storms are defined as tropical cyclones with sustained winds from 39 to 73 mph, and depressions are characterized by sustained winds of less than 39 mph. Both are low-pressure systems formed over tropical oceans and are accompanied by torrential rains. These types of storms pose similar dangers as hurricanes, but with reduced threat from wind speeds.



4.F.2. Historical and Notable Events

4.F.2.a Severe Storms

February 11, 2009. A line of showers produced wind gusts of 70 to 85 mph that lifted and shifted the gym roof of the Twin Branch Pentecostal Christian Academy in McDowell County. The shifting caused the walls of the gym to collapse and resulted in one fatality.

June 29, 2012. Storms developed over the Midwest, then strengthened and consolidated into a solid line extending several hundred miles long. The line of storms raced southeastward at speeds exceeding 50 mph and barreled through West Virginia producing widespread damage with wind gusts of more than 80 mph. Outages impacted millions of people from Illinois to Virginia and lasted for more than a week in some areas during hot, humid weather in the upper 90s. Governor Earl Ray Tomblin declared a State of Emergency immediately after the event. Estimates of damages in the State were approximately \$55.7 million.

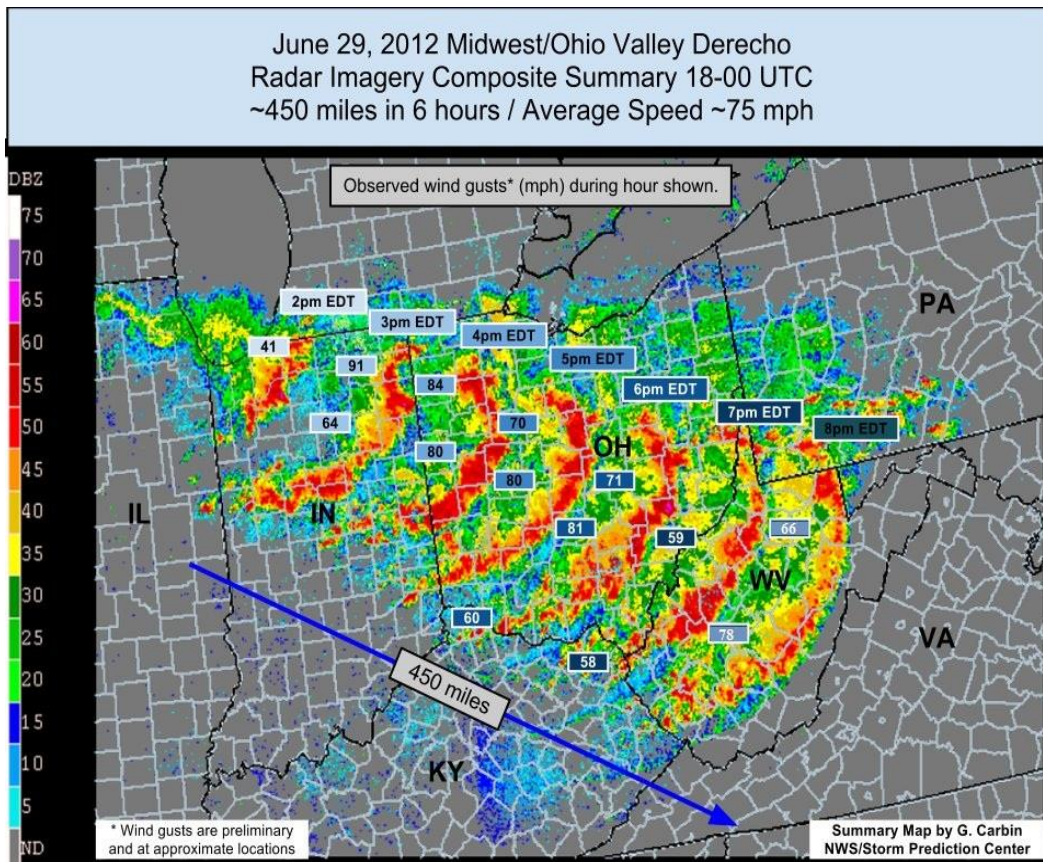


Figure 41 – June 2012 Derecho Event



July 2015. FEMA DR 4236 – Severe storms, straight-line winds, flooding, landslides and mudslides.

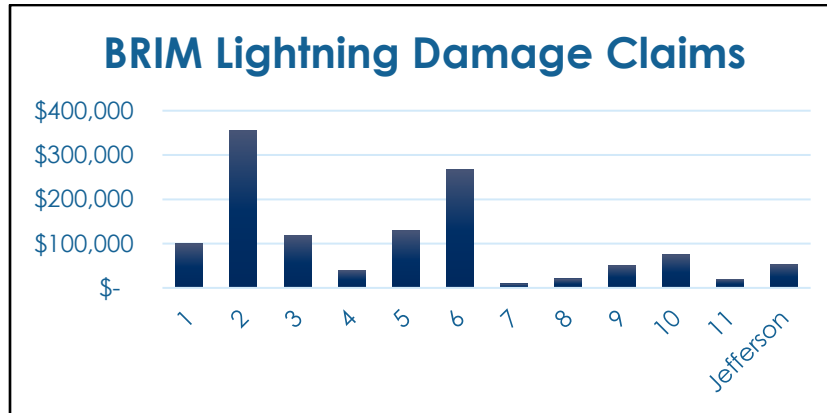


Figure 42 – BRIM Lightning Damage Claims (2013-2017)

4.F.2.b **Lightning Events**

June 11, 1995. Two deaths and one injury occurred, due to a lightning strike in Raleigh County.

August 1, 1995. A thunderstorm produced lightning that killed one person and injured another in Mason County.

August 17, 1997. Lightning is to blame for one death and approximately \$35,000 in damages in Harrison County.

July 25, 2005. One person died as a result of lightning in Kanawha County.

4.F.2.c **Hail Events**

June 24, 1992. A thunderstorm produced large hail that injured three in Calhoun County.

June 2, 1998. Kanawha County experienced approximately \$9 million in damages, from large hail. A rotating storm that had formed in southeast Ohio moved southeast through the Kanawha River Valley. Kanawha City section of Charleston received the most damage, mostly to vehicles.

April 23, 1999. \$2 million in damages was reported in Barbour County. The county emergency manager reported damage to 172 residences, mostly from hail.



August 30, 2006. Hail, the size of golf balls to tennis balls, fell on the West Side hills of Charleston, then across the Knollwood and Mink Shoals vicinity, to Coonskin Park and Capital High School. The swath of reported hail damage extended to Crede and Big Chimney.

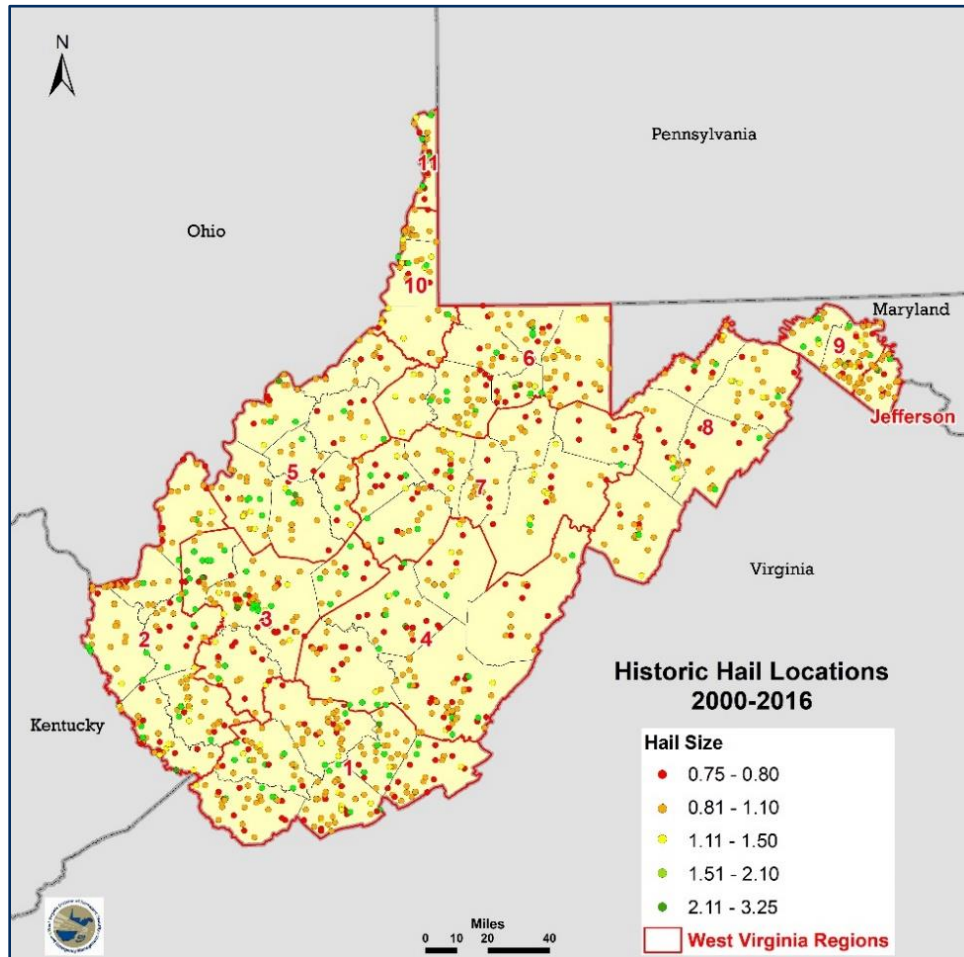


Figure 43 – Historic Hail Locations



Regions	Estimated Damages (NCEI) (2000-2016)	BRIM Claims (2013-2016)
1	\$245,000	\$534,687
2	\$247,000	\$476,719
3	\$534,000	\$572,811
4	\$11,100	\$140,433
5	\$337,000	\$302,383
6	\$436,000	\$2,451,624
7	\$302,000	\$391,284
8	\$23,000	\$7,710
9	\$760,000	\$317,464
10	\$0	\$76,466
11	\$0	\$30,646
Jefferson	\$0	\$7,047

Table 44 – Hail Damage

4.F.2.d Tornadoes and High Wind Events

According to NOAA, West Virginia experiences an average of two tornadoes a year (NCEI, 2012). “Tornado Alley,” which roughly includes portions of South Dakota, Nebraska, Kansas, Oklahoma, and Texas, is susceptible to tornadoes. This area of high susceptibility does not extend into West Virginia; however, West Virginia has experienced devastating tornadoes in its past.

June 23, 1944. A tornado struck Shinnston (Harrison County) killing at least 100 people and damaging a significant portion of the town.

June 19, 2008. A Presidential Disaster was declared for West Virginia from the effects of tornadoes, severe storms, flooding, mudslides, and landslides.

September 16, 2010. An EF-3 tornado packing winds of up to 160 mph crossed the Ohio River into Wood County near Belleville. One man was killed and 10 injured. Estimated damage reached \$1 million. At least 10 homes were destroyed and six others receiving major damage.

March 2, 2012. An EF-3 tornado moved from Kentucky, through Wayne County and continued into Lincoln County. Winds reached 138 mph, destroyed at least five homes and left about \$2



million in damages, but no injuries. An EF-2 tornado followed about three hours later and moved through Mingo County.

June 2014. Tornadoes touched down in four counties over the month causing \$385,000 in damage. Winds were estimated to reach between 90 and 105 mph.

Region	Damages	Crop Loss
1	\$8,155,400	\$200
2	\$10,651,010	\$0
3	\$189,014	\$0
4	\$9,282,900	\$100
5	\$15,164,000	\$0
6	\$9,511,500	\$0
7	\$7,715,500	\$0
8	\$82,400	\$40,600
9	\$679,000	\$31,400
10	\$2,458,700	\$0
11	\$2,017,200	\$0
Jefferson	\$679,500	\$11,500

Table 45 – Wind Damages (2000-2016)

Figure 44 shows the historical locations that tornadoes and severe wind storms have occurred in West Virginia between 2000 and 2016.

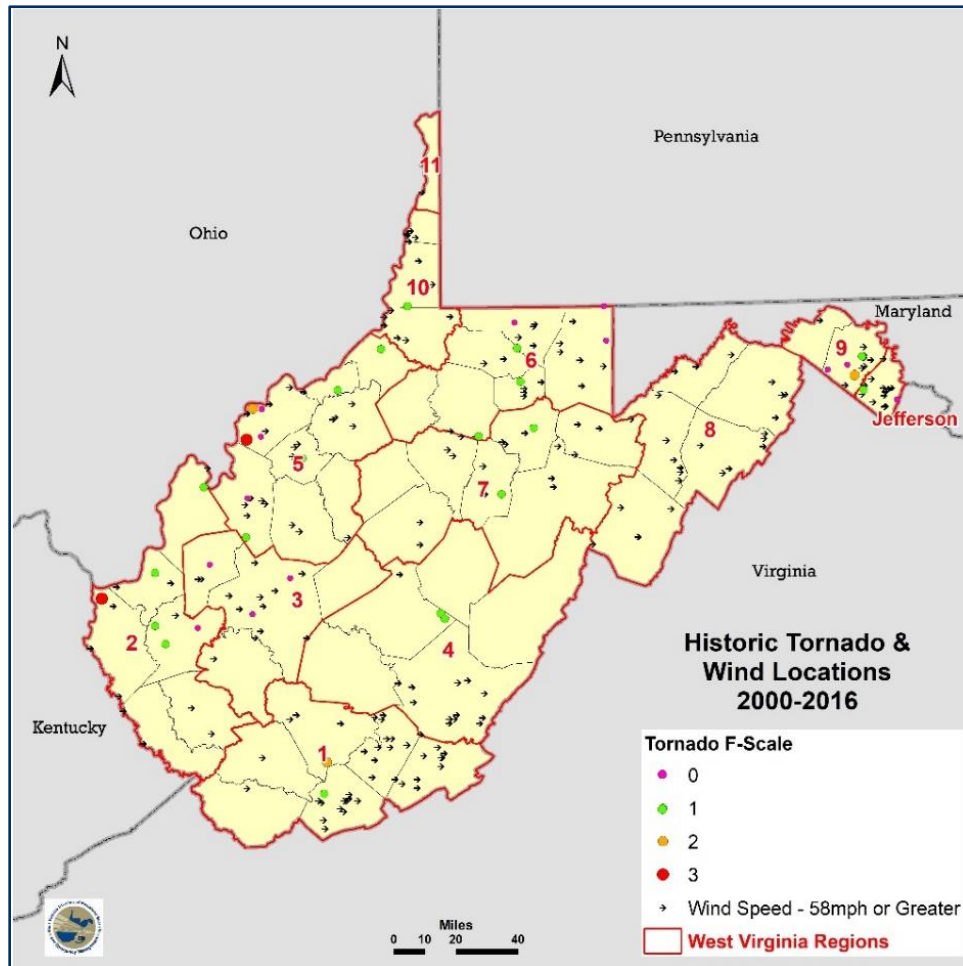


Figure 44 – Historic Tornado Location (2000-2016)

4.F.2.e **Hurricanes and Tropical Events**

July 3, 1972. Tropical Storm Agnes (DR 344)

September 11, 1996. Hurricane Fran (DR 1137)

September 23, 2003. Hurricane Isabel (DR 1496)

September 2005. Hurricane Katrina Evacuation (Emergency Declaration 3221)

October 29, 2012. Hurricane Sandy (Emergency Declaration 3358) The hurricane tracked along the East Coast and made landfall over the New Jersey coast. The hurricane transitioning into a non-tropical (extratropical or post-tropical) storm. The wind field associated with Hurricane



Sandy was unusually wide, with tropical-storm force winds extending for several hundred miles away from the storm’s center.

West Virginia was on the cold side of the storm, where much of the precipitation in the higher elevations fell as a heavy, wet snow. The combination of heavy snow and strong winds brought down trees and power lines and led to widespread power outages and significant disruption to travel. At least six deaths in West Virginia were attributed to the storm.

The Atlantic has been relatively quiet for several years and there have not been any recent hurricane related storms in West Virginia.

Figure 45 shows the paths of some of the major tropical systems that have passed through or near West Virginia. As shown, most of these major storms tracked across or nearest to the eastern portion of the State.

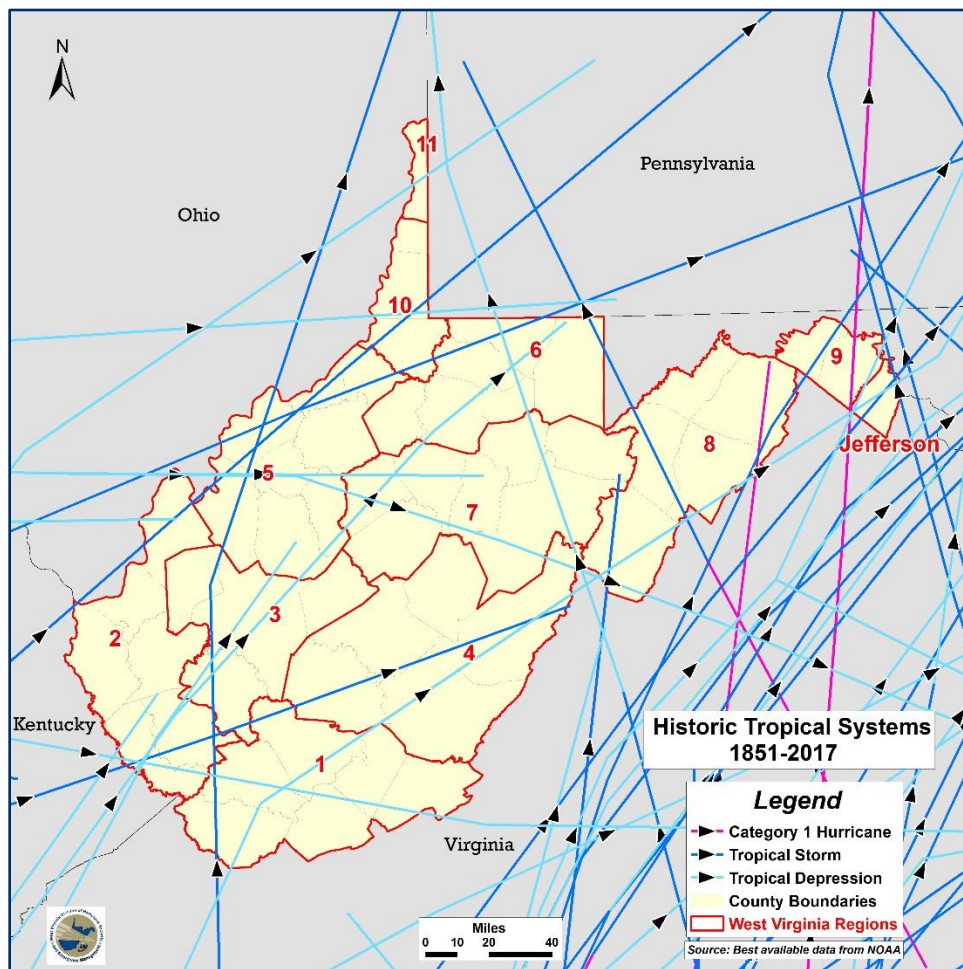


Figure 45 – Historic Hurricanes (1851-2017)



Category	Sustained Winds	Types of Damage Due to Hurricane Winds
1	74-95 mph	Very dangerous winds will produce some damage: Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
	64-82 kt	
	119-153 km/h	
2	96-110 mph	Extremely dangerous winds will cause extensive damage: Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
	83-95 kt	
	154-177 km/h	
3 (major)	111-129 mph	Devastating damage will occur: Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
	96-112 kt	
	178-208 km/h	
4 (major)	130-156 mph	Catastrophic damage will occur: Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
	113-136 kt	
	209-251 km/h	
5 (major)	157 mph or higher	Catastrophic damage will occur: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
	137 kt or higher	
	252 km/h or higher	

Table 46 – Saffir-Simpson Hurricane Wind Scale

The HAZUS 1000-year recurrence wind speed analysis shows that much of the southern/southwestern portion of the State can experience low-end Category I (75 mph) peak gusts, and Mercer County, in LHMP region 1, may have up to low-end Category II wind gusts (up to 97 mph). The central portions of the State were analyzed as experiencing up to tropical storm strength gusts of 39 – 73 mph, while the remainder of the State would theoretically see gusts of tropical depression strength (less than 39 mph). It should be noted that winds on ridge tops may be slightly higher than winds at lower elevations within decaying tropical weather systems.



4.F.3. Risk Assessment

4.F.3.a Introduction

Severe storms that include lightning, thunderstorms and hail are treated separately from tornados and tropical storms. Each has different probability depending on geographical area. Separate probability tables and maps were produced for each event and then were combined to identify a single overall vulnerability.

4.F.3.b Probability

Based on historical tornado and hurricane data, FEMA has produced a map (Figure 46) that depicts maximum wind speeds for design of safe rooms. West Virginia is included in Wind Zone III (200 mph).

West Virginia wind events can produce damage often associated with thunderstorms or tornadoes. In some instances, these events have been associated with weakening tropical weather systems, including downgraded tropical and sub-tropical storm systems. This section examines the risks associated with damaging wind events with emphasis on thunderstorms, tornadoes, and hurricanes.

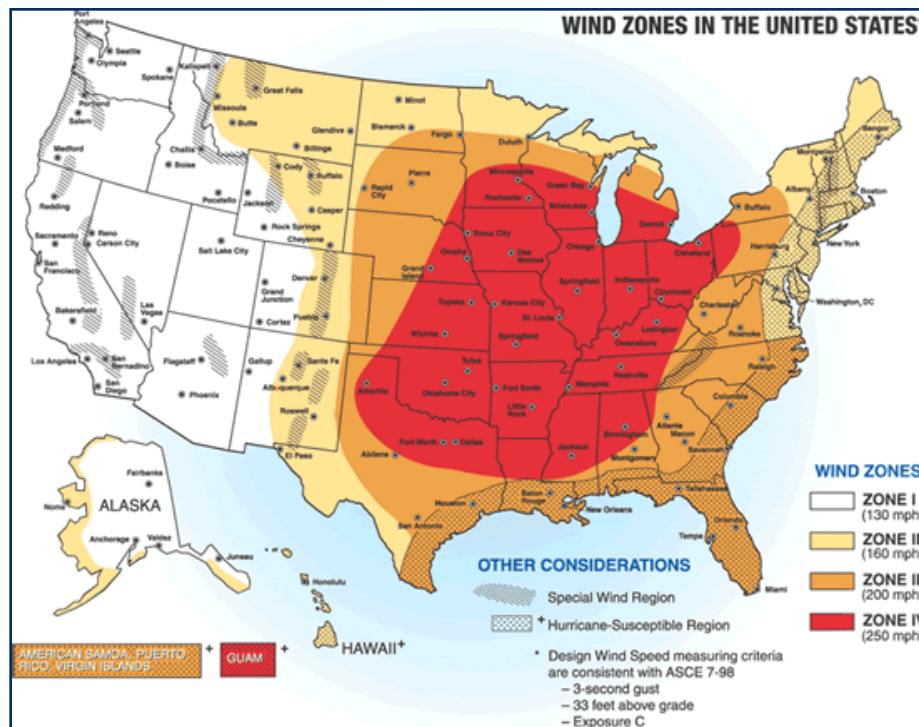


Figure 46 – FEMA Wind Zone in the United States



4.F.3.c **Impact and Vulnerability**

The impact of wind can be measured in financial terms (property and crop damage) as well as fatalities and injuries. Other factors, such as location, condition, and maintenance of trees also plays a significant role in determining vulnerability. Tornado vulnerability is based on building construction and standards, the availability of shelters or safe rooms, and advanced warning capabilities. Even well-constructed buildings are vulnerable to the effects of a stronger (generally EF-2 or higher) tornado. Due to the relatively low incidence and risk for tornado, traditional “Tornado Alley” mitigation methods such as tornado safe rooms may not be economically feasible in West Virginia.

In instances where tropical storms have tracked over the State, they have quickly moved out of the area and been significantly weakened. Risk from tropical storm events in West Virginia is somewhat higher in the southern counties and for properties in areas prone to flash flooding and areas susceptible to damage from high winds.

The flooding and high winds associated with hurricanes may also disrupt the distribution of gasoline, kerosene, diesel fuel, fuel oils, propane, and other petroleum products. This disruption could cause major problems for organizations and businesses that rely on such supplies. Additionally, such a disruption could affect backup power generation.

An indirect cost to West Virginia due to hurricanes is evacuation aid given to residents of other States directly hit by the events. A Federal Emergency declaration was declared for all West Virginia counties in September of 2005 to supplement its efforts to assist evacuees from areas struck by Hurricane Katrina. The State opened Camp Dawson in Pendleton County, and received approximately 323 evacuees at that location. Public Assistance was provided to the many State agencies providing aid to evacuees located at Camp Dawson as well as other locations across the State.



4.F.3.d **Annualize Events and Costs**

Severe storms annualized costs were derived from the NCEI database from 1996 to the end of 2017 for the hazard elements. For this assessment the following event types were consolidated:

- Hail
- Heavy Rain
- High Winds
- Hurricane
- Lightening
- Strong winds
- Thunderstorm
- Tornado
- Tropical Depressions
- Tropical Storm

The total number of identified events were determined for each county. Then an annualized occurrence was calculated by dividing the actual number of events by the total number of years (21). For each of the hazards the total property damage and crop damage values were also recorded for each county. An annualized potential cost for each county was calculated by dividing the total cost by the total number of years (21).

County	Events	Property	Crop	Annualized Events	Total Cost	Annualized Cost
Kanawha	445	\$28,693,000	\$0	21.19	\$28,693,000	\$1,366,333.33
Berkeley	252	\$1,319,000	\$195,000	12	\$1,514,000	\$72,095.24
Jefferson	217	\$2,585,000	\$112,500	10.33	\$2,697,500	\$128,452.38
Greenbrier	210	\$2,207,000	\$100	10	\$2,207,100	\$105,100.00
State	7,478	\$151,087,700	\$3,045,200	356.09	\$154,132,900	\$7,339,662

Table 47 – Annualized Events and Costs Associated with Severe Storms

4.F.3.e **Hazard Rankings**

Utilizing the methodology established for the *2018 WV Statewide Standard Hazard Mitigation Plan Update*, the vulnerability for Landslides and Subsidence was calculated at both a state level and a regional level (using PDC regions).

Regional County Rankings

While each PDC developed its own methodology to rank the hazards, a county-level ranking provides useful information to gain an understanding the hazard at a local level.

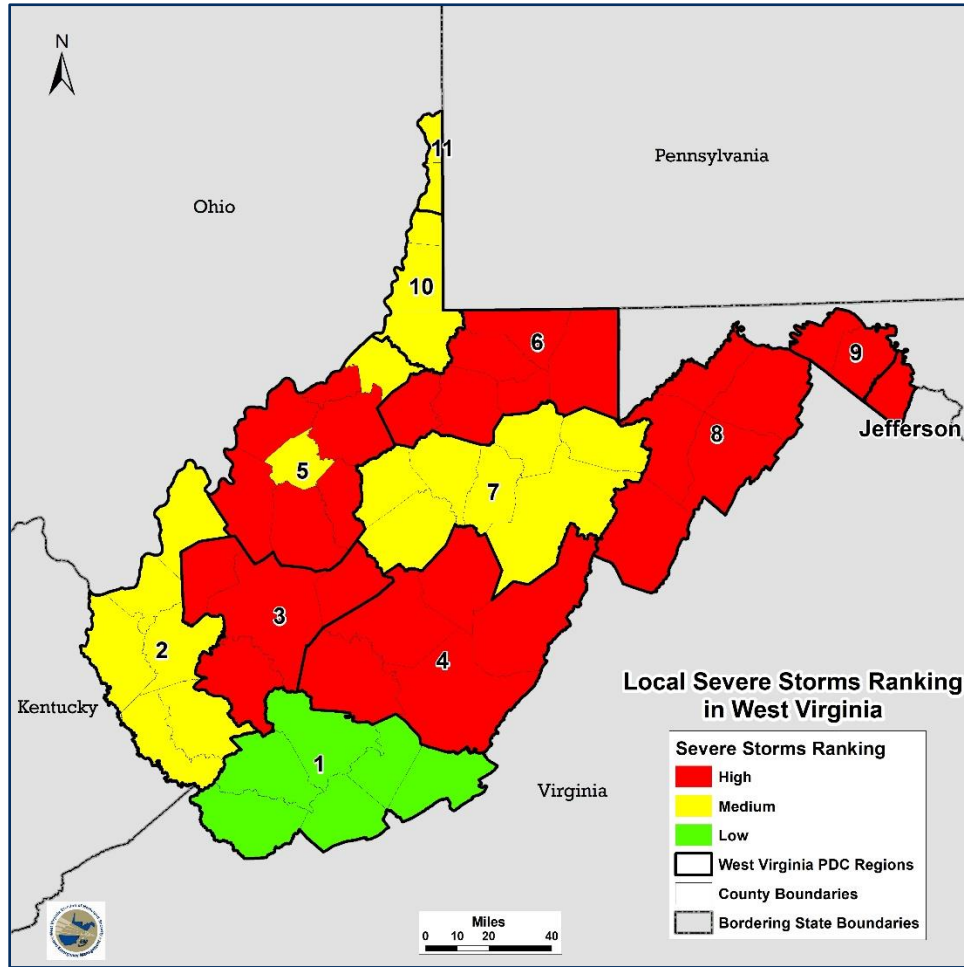


Figure 47 – Local Ranking for Severe Storms



State Ranking

The Hazard Ranking Methodology uses a structured assessment to identify a Risk Rating based upon seven areas:

- Geographic Area Impacted
- Property Damage
- Population Vulnerability
- State Infrastructure Damages
- Deaths or Injuries
- History of Occurrence
- Regional HMP Ranking

A total of nine counties were ranked as having a high risk level for Severe Storms.

Region	Counties with High Risk Level
PDC Region 4	Fayette
PDC Region 4	Greenbrier
PDC Region 4	Nicholas
PDC Region 4	Pocahontas
PDC Region 4	Webster
PDC Region 5	Wood
PDC Region 6	Preston
PDC Region 9	Berkeley
PDC Region 9	Morgan

Table 48 – Counties with High Severe Storms Vulnerability

4.F.3.f Critical Facilities

Critical facility points were intersected with the counties considered to have a High vulnerability to severe storms. This is not to imply that the specific structures are at a high level of risk; however, this indicates that at a county level these facilities could be affected. A total of nine counties were identified as having a high vulnerability.



PDC Region	County	OES	Police Departments	Fire Departments	Hospitals	Public Schools (K-12)
Region 4	Fayette	1	13	15	2	18
Region 4	Greenbrier	1	8	15	1	13
Region 4	Nicholas	1	5	7	1	15
Region 4	Pocahontas	1	3	7	1	5
Region 4	Webster	1	5	5	1	4
Region 5	Wood	1	7	20	2	29
Region 6	Preston	1	5	12	1	10
Region 9	Berkeley	1	3	12	2	33
Region 9	Morgan	1	4	4	1	8
Total		9	53	97	12	135

Table 49 – Critical Facilities in Counties with High Severe Storms Vulnerability

Critical facilities in four of the regional PDCs were rated as having a high vulnerability of Severe Storms. The most critical facilities are located in PDC Region 4 with a total of 149, followed by Region 9 with a total of 69 critical facilities. Schools account for the most of any type of critical facilities with 135, followed by fire departments at 97.

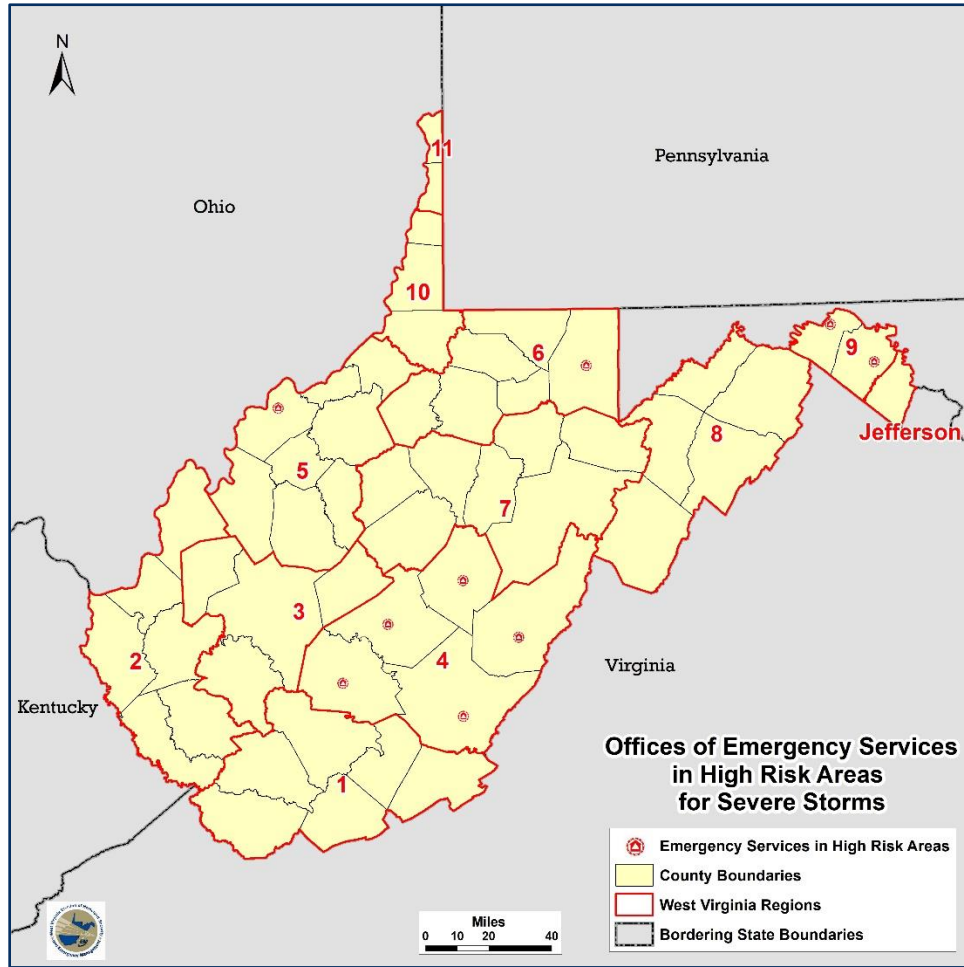


Figure 48 – OES in Counties with High Severe Storms Vulnerability

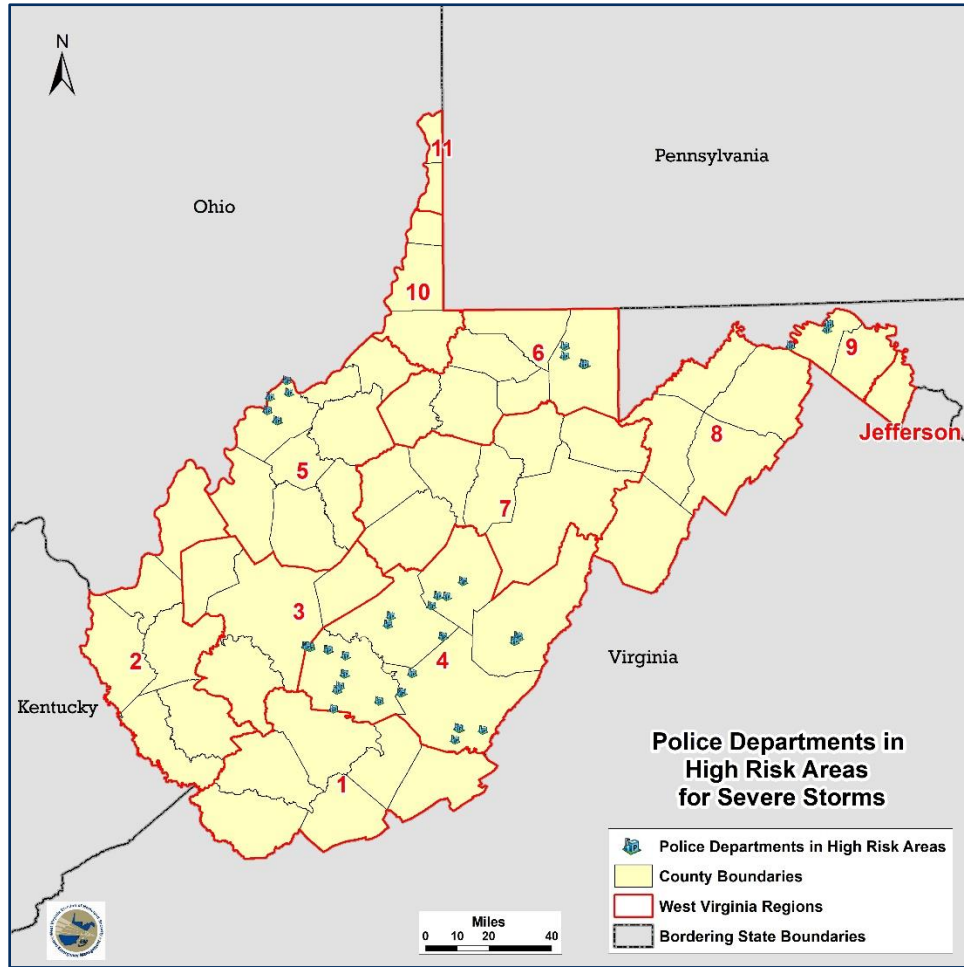


Figure 49 – Police Departments in Counties with High Severe Storms Vulnerability

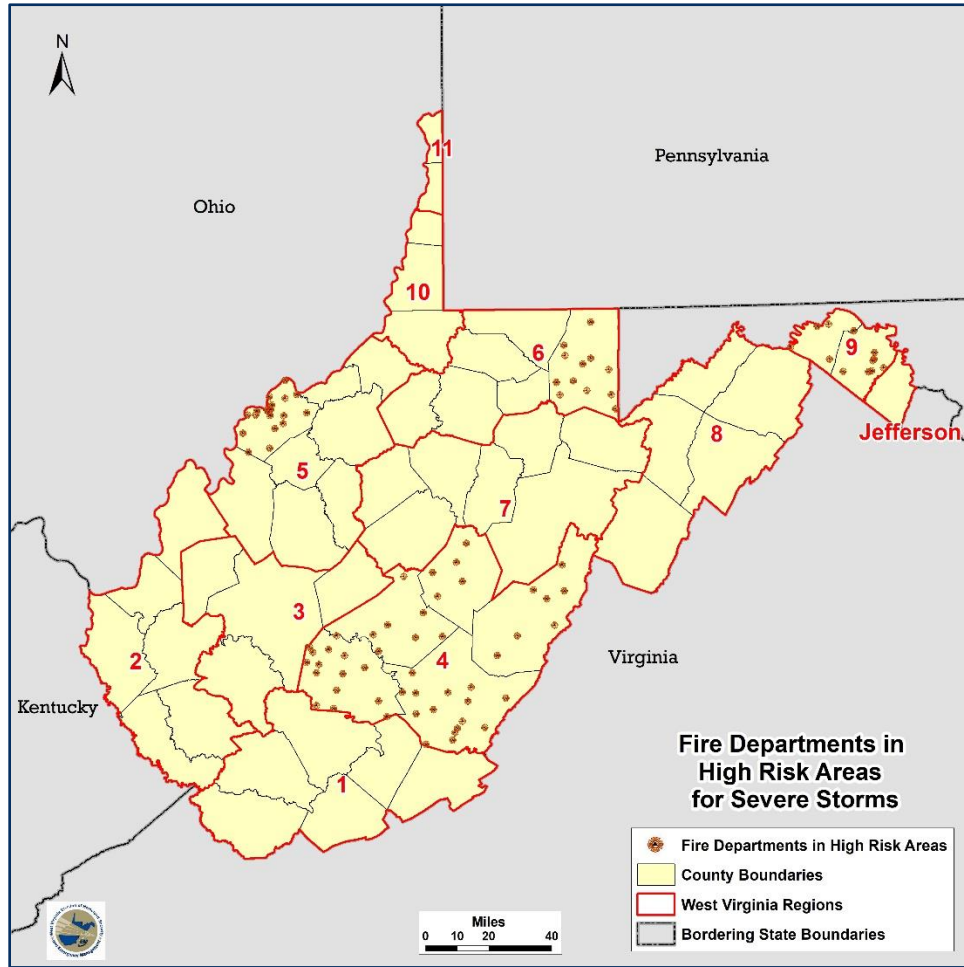


Figure 50 – Fire Departments in Counties with High Severe Storms Vulnerability

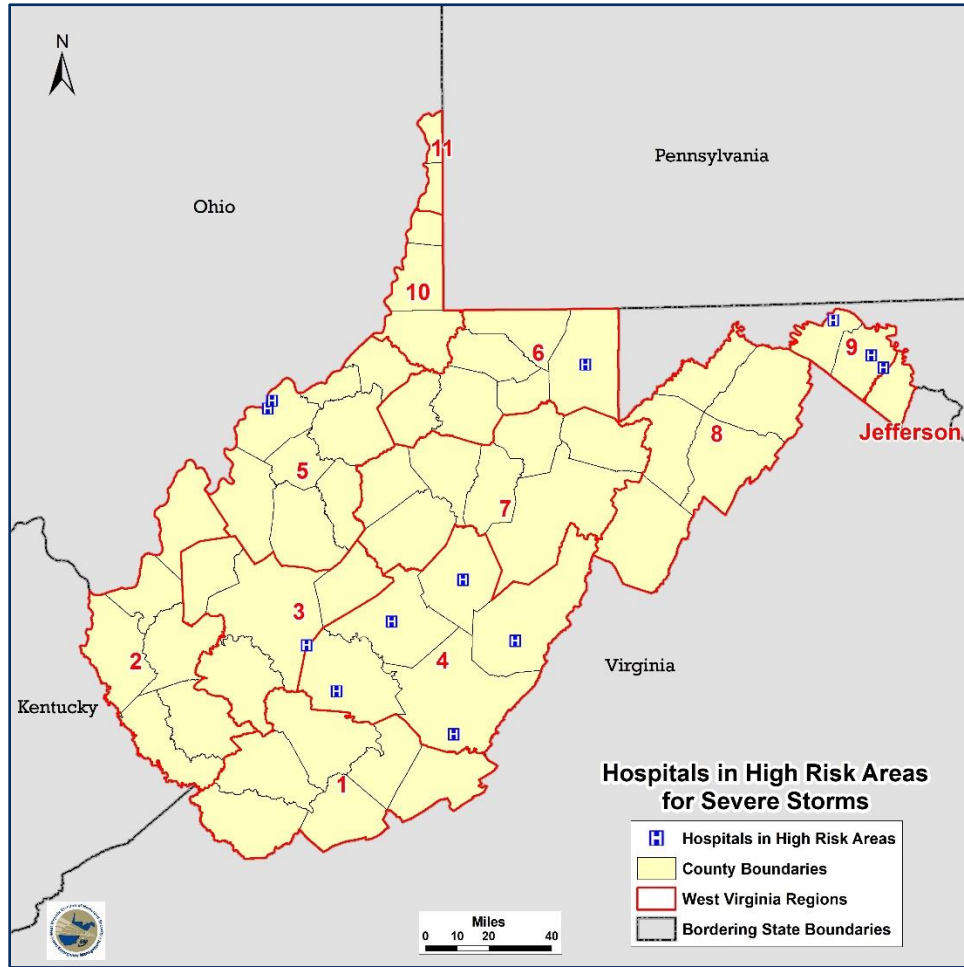


Figure 51 – Hospitals in Counties with High Severe Storms Vulnerability

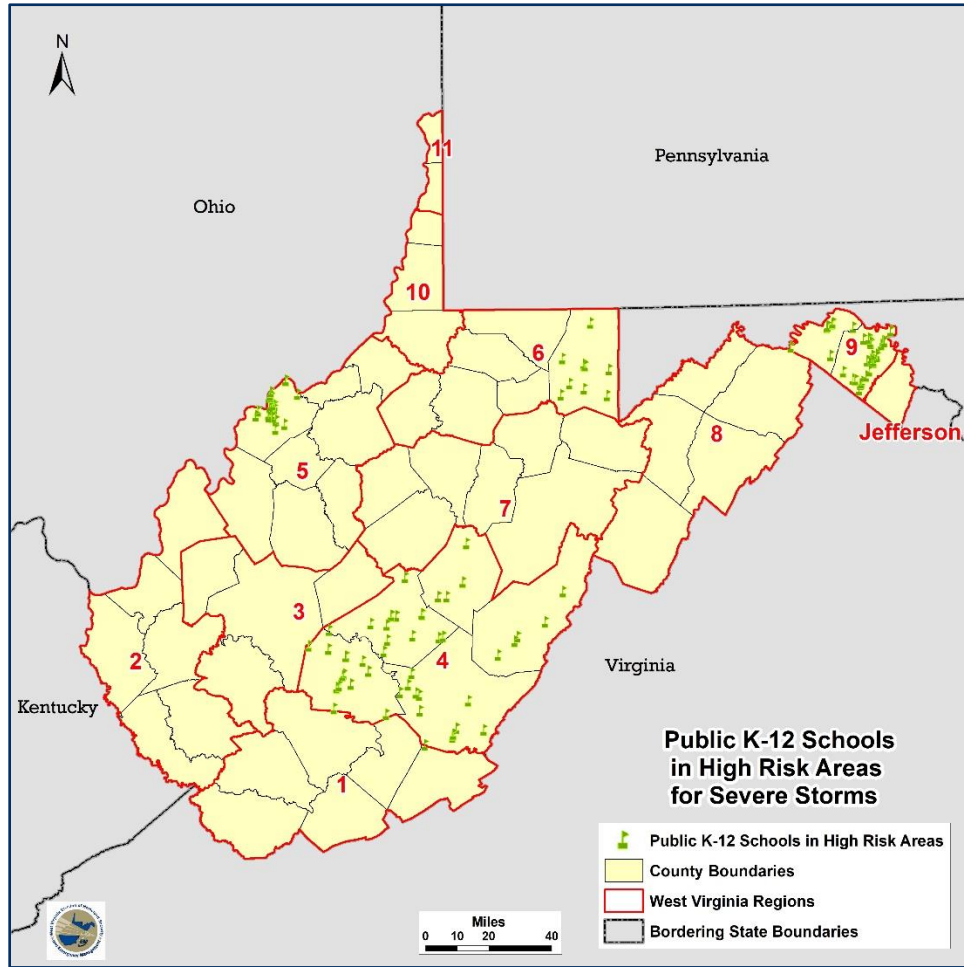


Figure 52 – Public Schools (K-12) in Counties with High Severe Storms Vulnerability



4.F.3.g **BRIM-covered Facilities**

Using the 9 counties identified as having a high level of risk for severe storms, there are 2,849 BRIM-covered facilities at risk. Berkeley County (423) has the most in a single county. Region 4 (Fayette, Greenbrier, Nicholas, Pocahontas, and Webster) has the most in a single region with 1,516 covered facilities. The highest total building and content value is also Region 4 with over \$1.3 Million in total value.

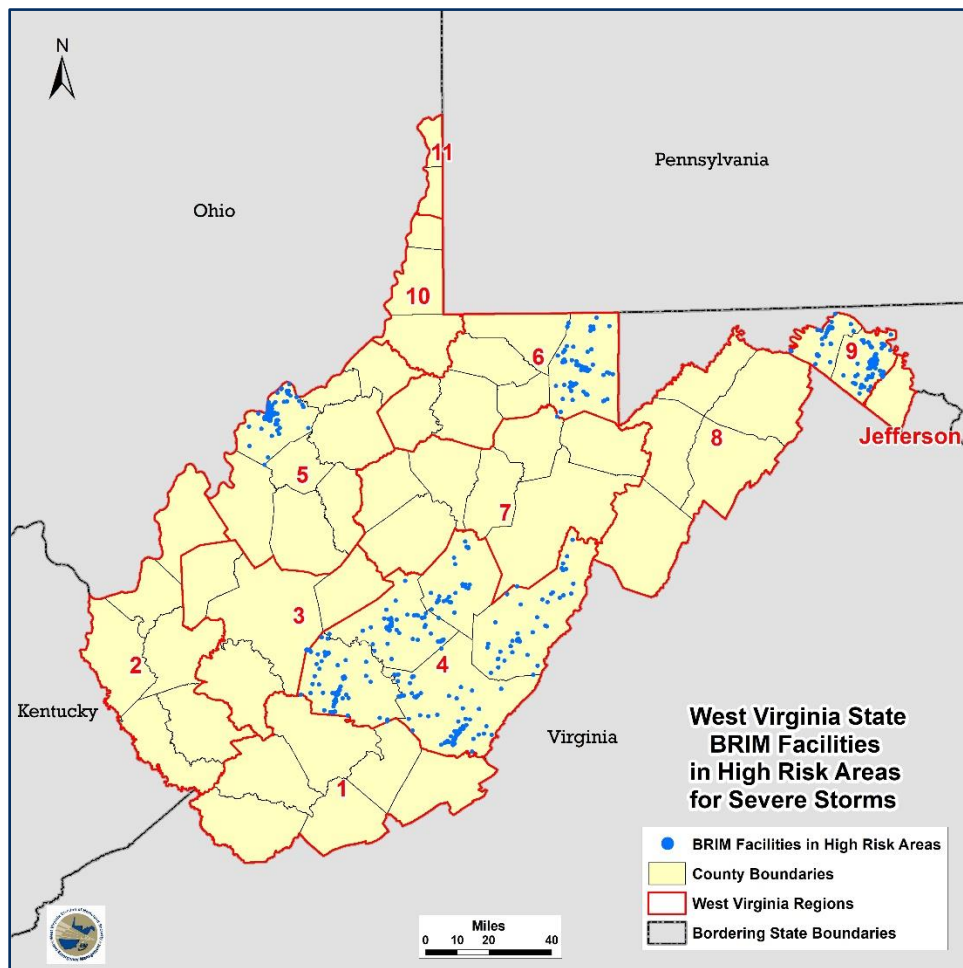


Figure 53 – BRIM-covered Facilities in Counties with High Severe Storms Vulnerability

Table 50 shows the number of BRIM structures by PDC and County. It also includes a total building value and content value associated with the BRIM structures in the high risk counties.



PDC Region	County	Number of Structures	Building Value	Content Value	Total Value
Region 4	Fayette	395	\$483,489,647	\$47,648,853	\$531,138,500
Region 4	Greenbrier	351	\$383,748,601	\$68,248,226	\$451,996,827
Region 4	Nicholas	176	\$93,168,790	\$29,479,233	\$122,648,023
Region 4	Pocahontas	420	\$139,119,442	\$40,521,677	\$179,641,119
Region 4	Webster	174	\$34,321,218	\$5,228,715	\$39,549,933
Region 5	Wood	357	\$213,204,369	\$39,981,060	\$253,185,429
Region 6	Preston	354	\$463,992,800	\$68,798,357	\$532,791,157
Region 9	Berkeley	423	\$494,019,392	\$68,981,900	\$563,001,292
Region 9	Morgan	199	\$110,278,443	\$18,006,783	\$128,285,226
		2,849	\$2,415,342,702	\$386,894,804	\$2,802,237,506

Table 50 – BRIM-covered Facilities in Counties with High Severe Storms Vulnerability

Table 51 shows the name associated with each BRIM policy in the high-risk counties. A complete list is located in Appendix C.

Customer Name	Count
PARKS, WEST VIRGINIA STATE C\O DEPARTMENT OF NATURAL RESOURCES	510
HIGHWAYS, DIVISION OF STATE OF WEST VIRGINIA	261
BERKELEY COUNTY BOARD OF EDUCATION ATTENTION: FINANCE OFFICE	199
ARMORY BOARD STATE OF WEST VIRGINIA	99
CORRECTIONS, DIVISION OF STATE OF WEST VIRGINIA	75
FAYETTE COUNTY BOARD OF EDUCATION	71
GREENBRIER COUNTY BOARD OF EDUCATION	70
POCAHONTAS COUNTY BOARD OF EDUCATION	68
NATURAL RESOURCES, DEPARTMENT OF STATE OF WEST VIRGINIA	67
MORGAN COUNTY BOARD OF EDUCATION	65
NICHOLAS COUNTY BOARD OF EDUCATION	58
PRESTON COUNTY BOARD OF EDUCATION	57
WEST VIRGINIA UNIVERSITY	56
ENVIRONMENTAL PROTECTION, DIVISION OF STATE OF WEST VIRGINIA	51
PARKERSBURG HOUSING AUTHORITY	51

Table 51 – BRIM Customers in High Severe Storm Vulnerability Counties



4.F.4. Future Conditions

NCEI historical trends lean toward an increase in precipitation over the next decade. An increase in tropical storm activity may increase the number and severity of thunderstorms and tropical storms in the state.

Based on a range of long-term global climate models under Intergovernmental Panel on Climate Change (IPCC) warming scenarios, it is likely that hurricanes in the Atlantic basin will become more intense, with stronger winds and heavier precipitation through the 21st century. Using an ensemble-mean of 18 climate models, IPCC A1B emissions scenario, and operational hurricane forecast models, one study showed a decrease in the total number of tropical storms and hurricanes, but an increase in the number of intense hurricanes, particularly Category 4 or 5 hurricanes. What impact this might have on West Virginia in the future remains uncertain.

It cannot be predicted where thunderstorms, tornadoes, lightning or hail may occur, therefore, it is assumed in this plan that all buildings and facilities are considered to be equally exposed to these hazards and could be impacted.



4.G. Winter Weather

4.G.1. Background Information

West Virginia experiences frequent hazardous winter weather events. Winter weather may include heavy snows (defined as more than 8 inches of accumulation in less than 24 hours), damaging ice, extreme cold, or a combination of these. Ice storms result from the accumulation of freezing rain, which most commonly occurs in a narrow band within a winter storm that is also producing heavy amounts of snow and sleet in other locations.

In the moderate climate of West Virginia, extreme cold usually involves temperatures below 0° Fahrenheit. Excessive cold may accompany winter storms, linger after the winter storm event, and occur without storm activity.

Vehicle accidents account for most of the injuries and deaths related to heavy snow. Casualties also occur due to overexertion while shoveling snow. The mountainous terrain, steep roadways and inexperience with snow combine to create hazardous conditions even within city boundaries.

Ice is a significant hazard if the surface temperature is at or below freezing and a layer of the atmosphere above the surface is warm enough for precipitation to fall as rain rather than snow. The greatest threat from ice storms is to essential utility and transportation systems. When it coats power and communications lines, trees, highways, bridges and other surfaces, the ice-weighted wires, antennae, and support structures can break and collapse. Downed trees and limbs can also damage lines and block transportation routes.

Significant icing events hinder delivery of emergency services and endanger the responders. If extreme cold conditions are combined with low, or no snow cover, the cold can better penetrate downward through the ground and potentially create problems for underground infrastructure as well. When utilities are affected, and heaters do not work, water and sewer pipes can freeze and even rupture. Finally, extensive damage to forests can affect timber values and create flammable woody debris, exacerbating wildfire vulnerability.

Extreme cold can lead to hypothermia and frostbite, which are both serious medical conditions. House fires and carbon monoxide poisoning are also possible as people use supplemental heating devices (wood, kerosene, etc. for heat, and fuel burning lanterns or candles for emergency lighting).

Heavy snow can bring a community to a standstill by obstructing and slowing transportation, knocking down trees and utility lines, and causing structural collapse in buildings not designed to withstand the weight of the snow. Excessive amounts of snow impact airports and roadways,



sometimes even closing them completely, stopping the flow of supplies and disrupting emergency and medical services.

Repair and snow removal costs from winter storms can be significant. A quick thaw or rain event after a heavy snow can cause substantial flooding, especially along small streams and in urban areas. The cost of snow removal, repairing damages, and the loss of business can have severe economic impacts on cities and towns.

4.G.2. Historical and Notable Events

There have been six Presidential Disaster Declarations and one Federal Emergency declaration for winter storm events (including Blizzard) in West Virginia. Other Hazard classifications can supersede a winter storm designation. A February 2000 winter storm was classified as a flooding event since assistance was provided primarily for flood damages.

October 2012. Hurricane Sandy brought strong wind and heavy snowfall to the State. Wind gusts greater than 50mph and heavy, wet snowfall in the higher elevations accumulating more than two feet in some areas. The combination of heavy snow and wind brought down trees and power lines knocking out power to thousands across the State and leading to at least six deaths. Reported damages exceeded \$14 million in Region 5, and over \$16 million combined in Regions 1, 2, 3 and 7.¹⁶

April 2007. While winter storms seem to hit with regularity every 1 to 3 years, this declaration was unique. The Secretary of Agriculture made a disaster declaration for freezing temperatures that covered three counties in Region 1, and one each in Region 4 and 8.

January 2016. Winter Storm Jonas crossed through at least six states, causing about \$850 million in damages. As a Category 4 for Crippling, it lived up to its ranking. Heavy snow shut down interstates, rail and bus lines, and airports. WVDOH had difficulty keeping up with the accumulation and residents were asked not to travel. Glengary, WV, in Jefferson County, recorded 42 inches of snow.

December 2016. Winter Storm Fortis descended on West Virginia. Region 4 estimated that the WVDOH spent \$1.2 million on snow removal wages, supplies and equipment. No Presidential Disaster or Federal Emergency Declarations were issued for this storm, but even western regions of the State accumulated 12 to 24 inches of snowfall.

¹⁶www.ncdc.noaa.gov/storm



March 2017. Winter storm Stella brought snow to Regions 1, 4, 7, 8, 9 and Jefferson, with the largest accumulations east of the mountains. The western half of West Virginia received little or no snow.

4.G.3. Risk Assessment

4.G.3.a Introduction

The county winter weather hazard rank is based on the NCEI Storm Events data parameters. Normal winter weather includes snow, blizzards and ice, but there are winter weather events that close schools, interrupt transportation, and cripple infrastructure. Some areas deal with excessive winter weather annually and tend to cope with the increased activity better than other areas. West Virginia can expect to experience nearly \$2.5 million in winter related damages annually (see Appendix B.3) and incur an average of \$48 million in snow removal costs. While the eastern sections of the State may more frequently experience winter weather events, other portions of the State, including the western sections, are certainly not immune to damaging winter weather.

4.G.3.b Probability

The mountains of West Virginia are characterized by some of the highest snowfall totals east of the Mississippi River with an annual average of 100 inches of snowfall. During the winter of 2009–2010, record amounts of snowfall (more than 200 inches) occurred, with over 100 inches falling in the month of February.

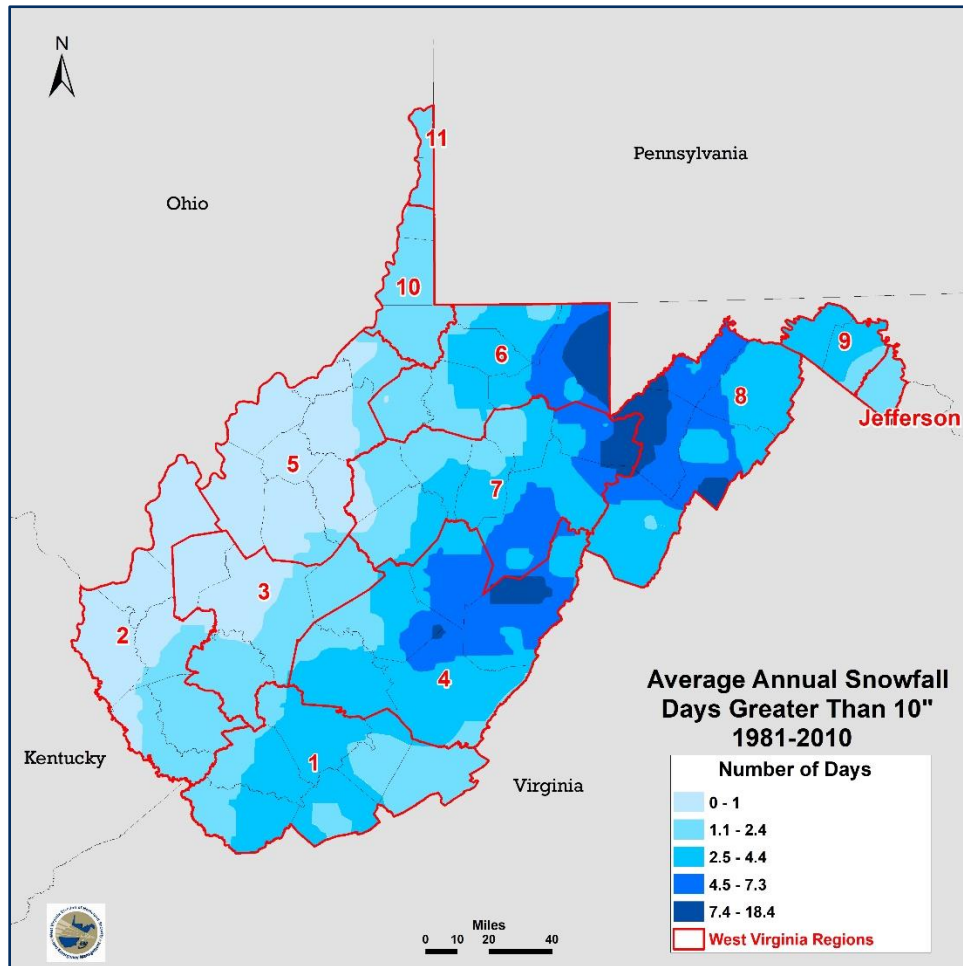


Figure 54 – Average Annual Snowfall

For the 2018 WV Statewide Standard Hazard Mitigation Plan Update, State facility data was overlaid with the average snowfall in inches data, in an effort to quantify vulnerability. The eastern portion of the State has more State facilities in areas receiving between 12 and 46 inches of snow annually.

4.G.3.c Impact and Vulnerability

Although the eastern portion of West Virginia has higher snowfall averages, costs are higher in the more populated counties. The costs also rise in areas unaccustomed to heavy snowfall or longer periods of freezing temperatures.

The impact of a winter storm is primarily measured in terms of the financial costs associated with preparing for, responding to, and recovering from the event. Much of the financial burden of winter storms falls onto transportation agencies and utility companies. For example, the West



Virginia Division of Highways (WVDOT) and local public works departments are responsible for roadway treatments that often commence prior to the onset of the winter storm and continue for as long as necessary after precipitation has ended. Costs vary considerably year to year, but West Virginia can expect an average of \$48 million per year.

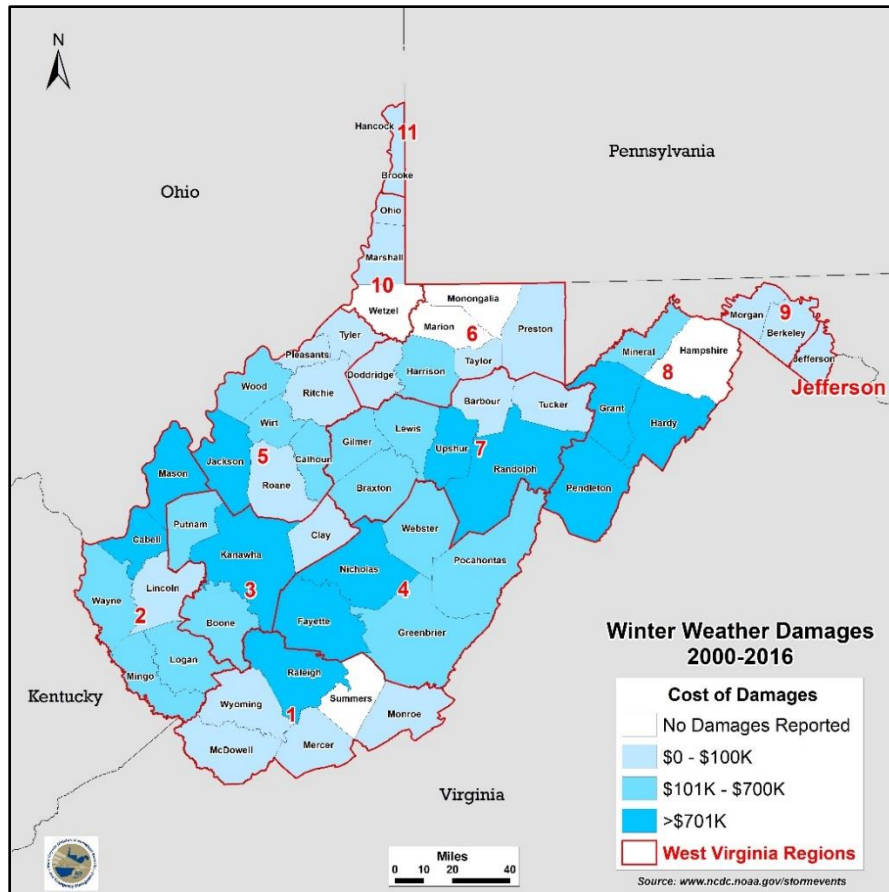


Figure 55 – Winter Weather Damages

Anticipating heavy winter storm activity helps jurisdictions, counties and regions plan and budget accordingly. Winter storms tend to isolate and immobilize residents, especially those with health problems, or electricity dependent situations.



4.G.3.d **Annualized Events and Costs**

Region	Annualized Events	Damages 2000-2016	Annualized Damages
1	16.25	\$1,178,000	\$73,625
2	9.7	\$1,741,000	\$108,812
3	7.75	\$4,073,500	\$32,850
4	25.4	\$8,259,500	\$516,218
5	15.5	\$6,885,000	\$430,312
6	19.9	\$426,000	\$26,625
7	29.4	\$8,621,000	\$538,812
8	57.9	\$7,447,000	\$465,438
9	13.75	\$27,000	\$1,688
10	2.4	\$5,000	\$313
11	2	\$4,000	\$250
Jefferson	6.5	\$2,000	\$125

Table 52 – Annualized Damages for Winter Weather Events

The National Centers for Environmental Information (NCEI) Storm Events database maintains a record of winter storm events and related damages, deaths, and injuries dating to 1993. The data show that on an annualized basis, the highest number of winter storm events by county approaches 10 events per year (Grant County) and the lowest event total is one event per year (Mason County). The data indicate that the higher elevations of the State, including the foothills, tend to experience more frequent winter weather events with the western portions of the state generally getting less, or less frequent snow events. Some of the higher elevations in the east see greater than 70 inches of snow on average each winter and may experience seven or more days annually where snowfall exceeds 10 inches. Assuming that long-term trends continue into the future, probability for winter weather events will continue to be highest in the eastern portions of West Virginia, particularly the higher elevations.

4.G.3.e **Hazard Risk**

The Hazard Ranking Methodology uses a structured assessment to identify a Risk Rating based upon seven areas:

- Geographic Area Impacted
- Property Damage



- Population Vulnerability
- State Infrastructure Damages
- Deaths or Injuries
- History of Occurrence
- Regional HMP Ranking

Utilizing the methodology established for the *2018 WV Statewide Standard Hazard Mitigation Plan Update*, the vulnerability for Winter Weather (including heavy snow, cold temperatures, ice storms) was calculated. A total of 35 counties were identified as having a high risk for Winter Weather.

Local Risk Ranking

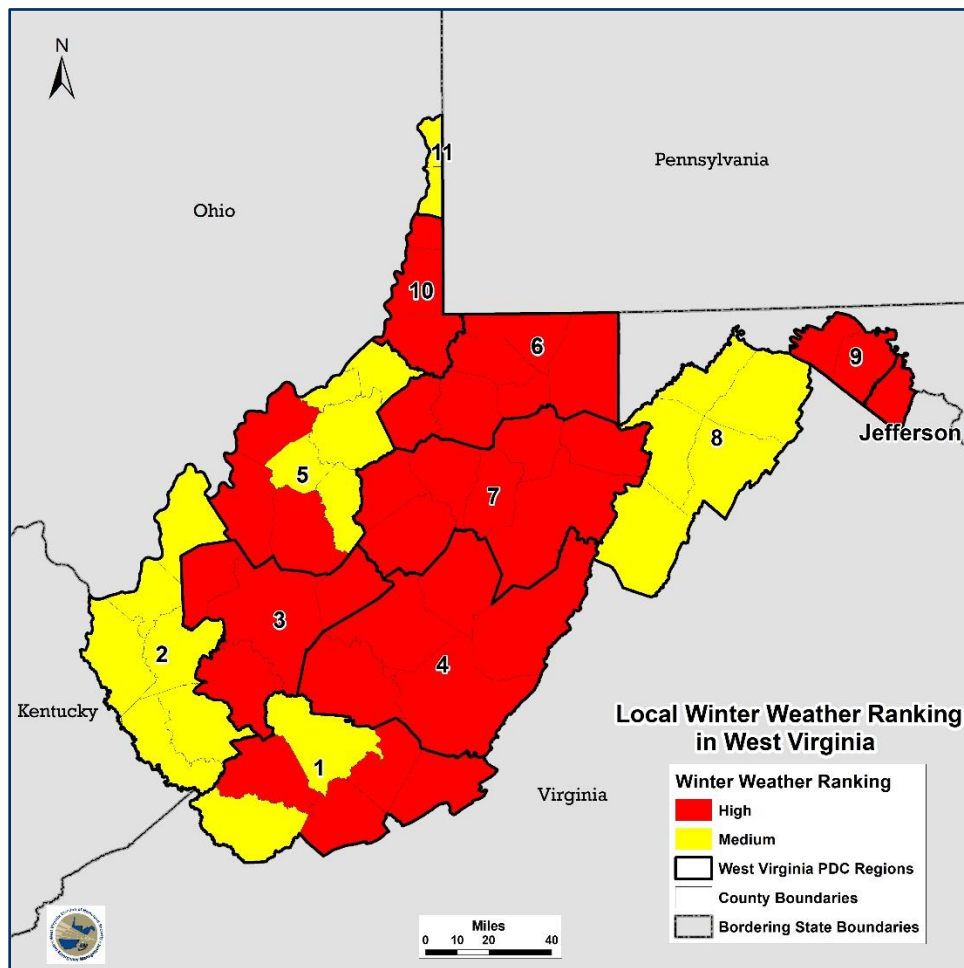


Figure 56 – Local Hazard Ranking



State Hazard Ranking

PDC Region	County Name
Region 1	Mercer
Region 1	Monroe
Region 1	Summers
Region 1	Wyoming
Region 3	Boone
Region 3	Clay
Region 3	Kanawha
Region 3	Putnam
Region 4	Fayette
Region 4	Greenbrier
Region 4	Nicholas
Region 4	Pocahontas
Region 4	Webster
Region 5	Jackson
Region 5	Roane
Region 5	Wood
Region 6	Doddridge
Region 6	Harrison

PDC Region	County Name
Region 6	Marion
Region 6	Monongalia
Region 6	Preston
Region 6	Taylor
Region 7	Barbour
Region 7	Braxton
Region 7	Gilmer
Region 7	Lewis
Region 7	Randolph
Region 7	Tucker
Region 7	Upshur
Region 9	Berkeley
Region 9	Morgan
Region 10	Marshall
Region 10	Ohio
Region 10	Wetzel
Jefferson	Jefferson

Table 53 – State Winter Weather Hazard Ranking Table



4.G.3.f **Critical Facilities**

Critical facility points were intersected with the counties considered to have a High vulnerability to winter weather events. This is not to imply that the specific structures are at a high level of risk; however, this indicates that at a county level these facilities could be affected.

PDC Region	County	OES	Police Departments	Fire Departments	Hospitals	Public Schools (K-12)
Region 1	Mercer	1	10	15	3	27
Region 1	Monroe	1	4	6	0	5
Region 1	Summers	1	3	8	1	5
Region 1	Wyoming	1	5	8	0	14
Region 3	Boone	1	6	8	1	13
Region 3	Clay	1	2	3	0	6
Region 3	Kanawha	2	27	49	7	69
Region 3	Putnam	1	7	10	1	23
Region 4	Fayette	1	13	15	2	18
Region 4	Greenbrier	1	8	15	1	13
Region 4	Nicholas	1	5	7	1	15
Region 4	Pocahontas	1	3	7	1	5
Region 4	Webster	1	5	5	1	4
Region 5	Jackson	1	4	6	1	13
Region 5	Roane	1	3	6	1	5
Region 5	Wood	1	7	20	2	29
Region 6	Doddridge	1	2	5	0	4
Region 6	Harrison	2	10	20	2	26
Region 6	Marion	1	12	21	1	22
Region 6	Monongalia	1	7	15	3	21
Region 6	Preston	1	5	12	1	10
Region 6	Taylor	1	3	4	1	6

Table 54 – Critical Facilities in Counties with High Winter Weather Vulnerability



PDC Region	County	OES	Police Departments	Fire Departments	Hospitals	Public Schools (K-12)
Region 7	Barbour	1	5	3	1	9
Region 7	Braxton	1	6	7	1	8
Region 7	Gilmer	1	4	5	0	3
Region 7	Lewis	1	3	6	1	6
Region 7	Randolph	1	3	13	1	16
Region 7	Tucker	1	3	4	0	3
Region 7	Upshur	1	3	7	1	10
Region 9	Berkeley	1	3	12	2	33
Region 9	Morgan	1	4	4	1	8
Region 10	Marshall	1	7	15	1	13
Region 10	Ohio	1	8	14	4	14
Region 10	Wetzel	1	5	12	1	8
Jefferson	Jefferson	1	7	8	1	17
		37	212	375	46	501

Table 55 – Critical Facilities in Counties with High Winter Weather Vulnerability

Critical facilities in 9 of the Regional PDCs were identified as having a high vulnerability for Winter Weather. A total of 1,171 critical facilities are located in the counties identified as having a high vulnerability. Just over 42% of the facilities are schools (501), followed by schools accounting for 32% (375) of the critical facilities. Region 3 accounts for 237 of the critical facilities for 20% of the total, followed by Region 6 with 220 (18%) critical facilities.

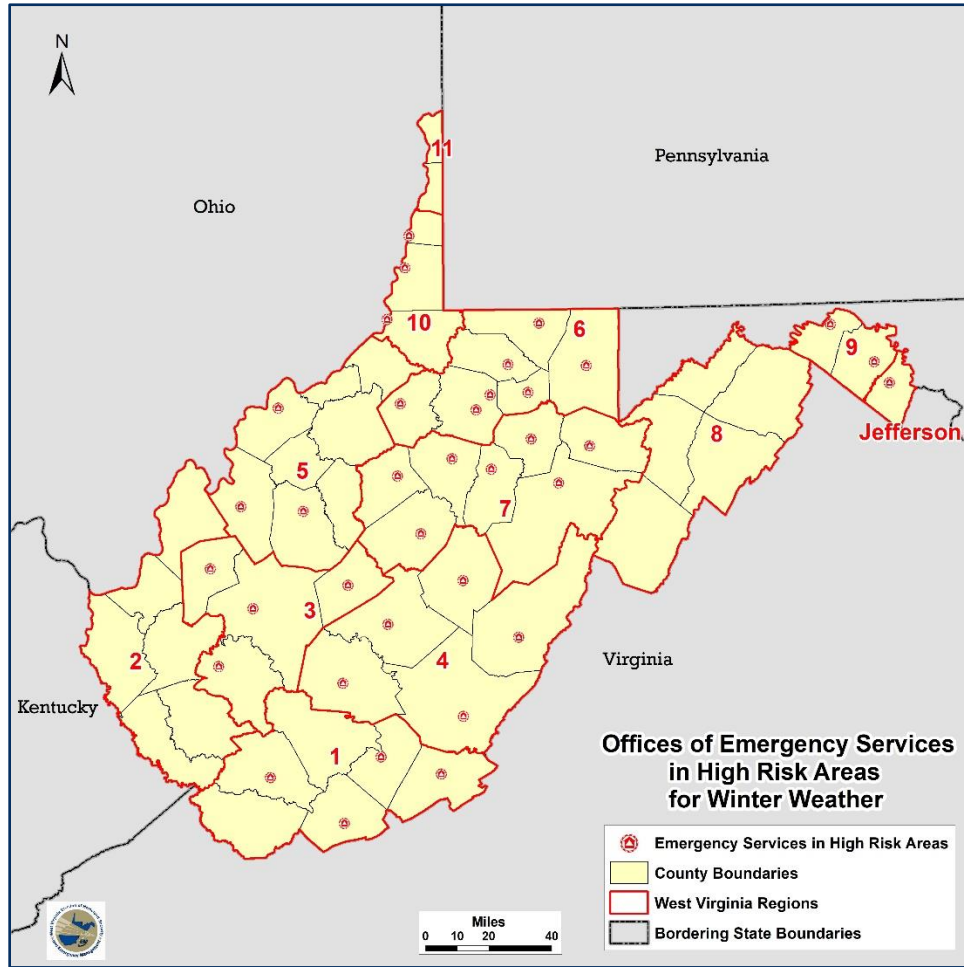


Figure 57 – OES in Counties with Winter Weather Vulnerability

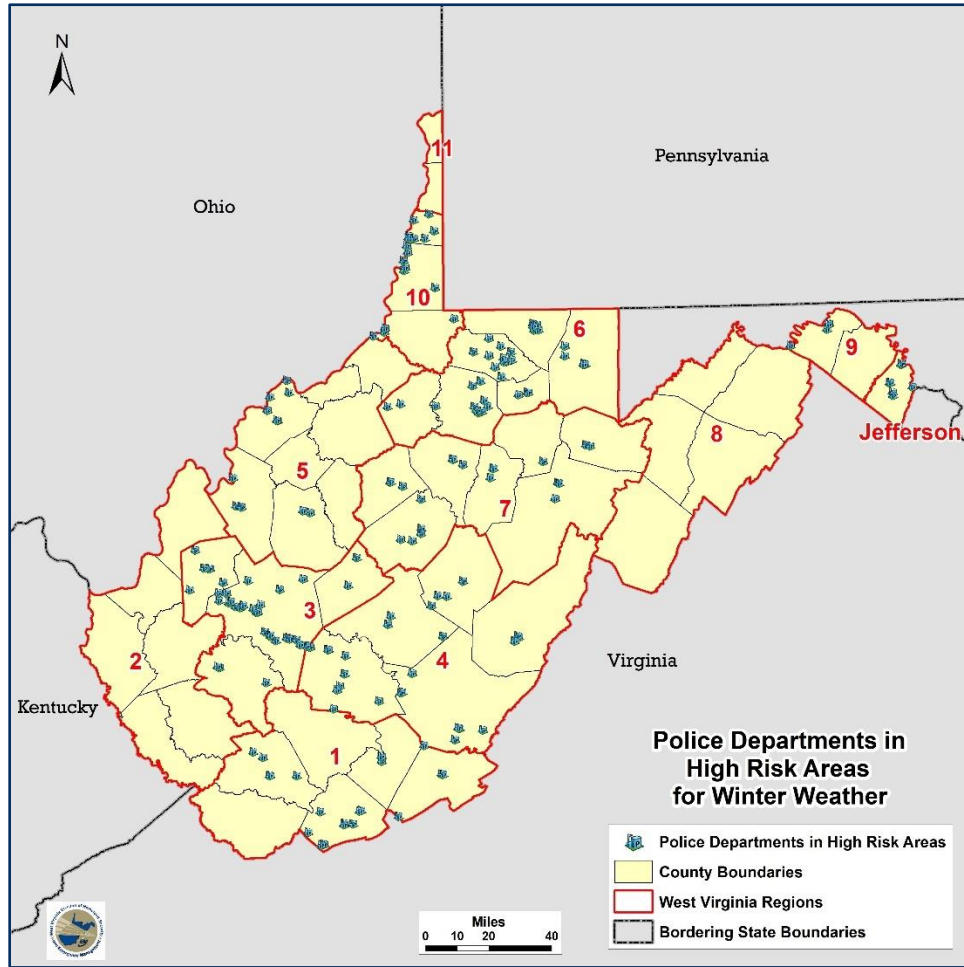


Figure 58 – Police Departments in Counties with Winter Weather Vulnerability

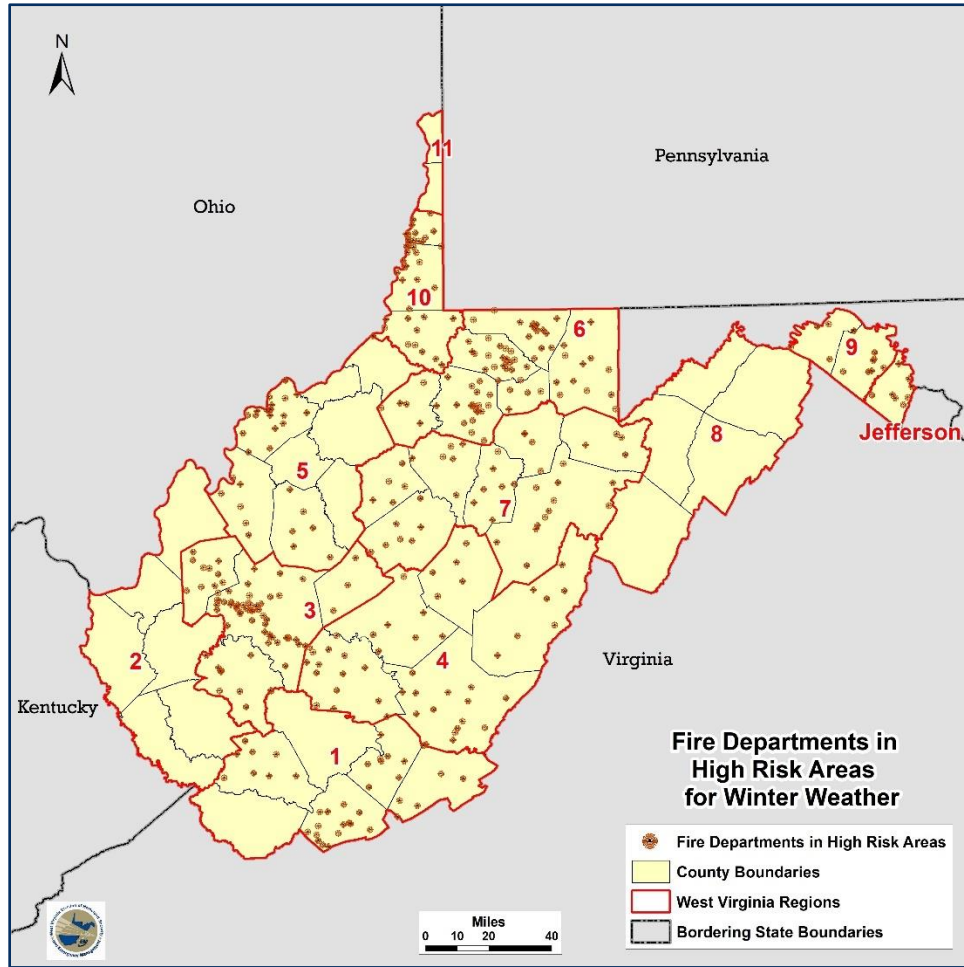


Figure 59 – Fire Departments in Counties with Winter Weather Vulnerability

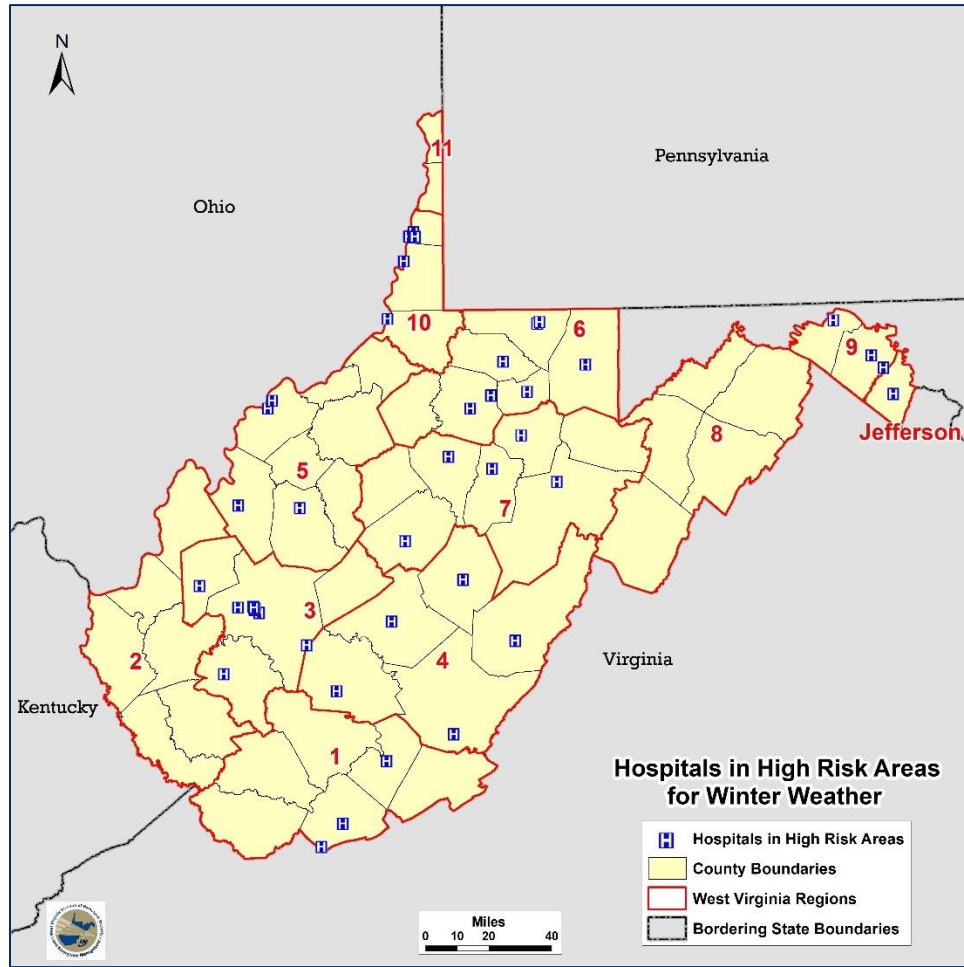


Figure 60 – Hospitals in Counties with Winter Weather Vulnerability

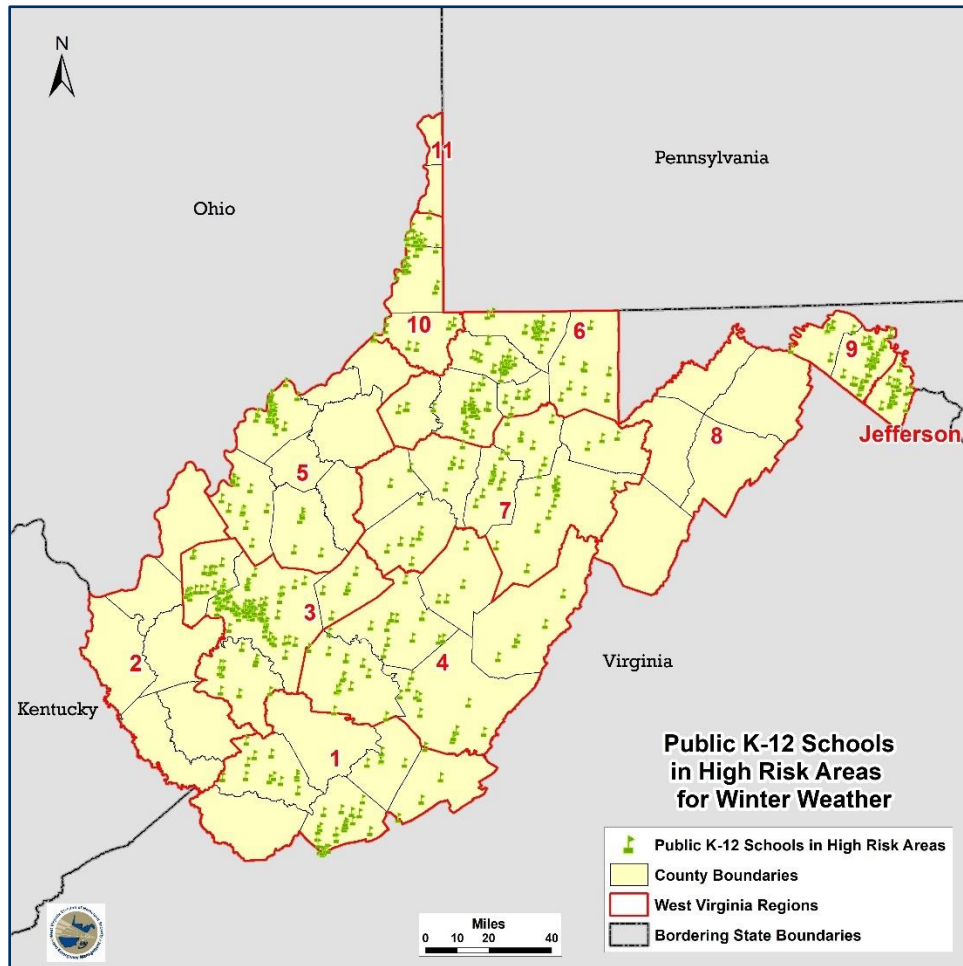


Figure 61 – Public Schools (K-12) in Counties with Winter Weather Vulnerability

4.G.3.g **BRIM-covered Facilities**

Using the 35 counties identified as having a high level of risk for severe storms, there are 10,436 BRIM-covered facilities at risk. Kanawha County (1,684) has the most in a single county. Region 3 (Boone, Clay, Kanawha, and Putnam) has the most in a single region with 2,217 covered facilities. The highest total building and content value is Region 6 (Doddridge, Harrison, Marion, Monongalia, Preston, and Taylor) with over \$5.4 Billion in total value.



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PDC Region	County	Number of Structures	Building Value	Content Value	Total Value
Region 1	Mercer	383	\$579,238,467	\$62,769,036	\$642,007,503
Region 1	Monroe	116	\$97,596,858	\$11,540,427	\$109,137,285
Region 1	Summers	264	\$87,035,012	\$12,346,125	\$99,381,137
Region 1	Wyoming	233	\$143,371,389	\$23,402,286	\$166,773,675
Region 3	Boone	86	\$26,751,427	\$6,102,000	\$32,853,427
Region 3	Clay	60	\$53,222,125	\$7,139,670	\$60,361,795
Region 3	Kanawha	1,684	\$2,385,558,271	\$530,663,148	\$2,916,221,419
Region 3	Putnam	387	\$424,959,371	\$86,582,237	\$511,541,608
Region 4	Fayette	395	\$483,489,647	\$47,648,853	\$531,138,500
Region 4	Greenbrier	351	\$383,748,601	\$68,248,226	\$451,996,827
Region 4	Nicholas	176	\$93,168,790	\$29,479,233	\$122,648,023
Region 4	Pocahontas	420	\$139,119,442	\$40,521,677	\$179,641,119
Region 4	Webster	174	\$34,321,218	\$5,228,715	\$39,549,933
Region 5	Jackson	184	\$160,243,419	\$41,206,273	\$201,449,692
Region 5	Roane	108	\$100,571,308	\$6,989,559	\$107,560,867
Region 5	Wood	357	\$213,204,369	\$39,981,060	\$253,185,429
Region 6	Doddridge	56	\$61,558,389	\$5,162,850	\$66,721,239
Region 6	Harrison	439	\$687,269,500	\$100,946,562	\$788,216,062
Region 6	Marion	355	\$677,188,392	\$72,122,844	\$749,311,236
Region 6	Monongalia	631	\$2,638,752,143	\$545,910,835	\$3,184,662,978
Region 6	Preston	354	\$463,992,800	\$68,798,357	\$532,791,157
Region 6	Taylor	175	\$119,529,205	\$14,425,585	\$133,954,790
Region 7	Barbour	143	\$82,823,915	\$15,352,616	\$98,176,531
Region 7	Braxton	150	\$103,492,844	\$16,712,984	\$120,205,828
Region 7	Gilmer	220	\$166,120,106	\$23,444,927	\$189,565,033
Region 7	Lewis	183	\$118,721,318	\$23,109,189	\$141,830,507
Region 7	Randolph	324	\$261,934,725	\$39,244,112	\$301,178,837
Region 7	Tucker	255	\$138,792,086	\$21,347,107	\$160,139,193
Region 7	Upshur	158	\$46,564,382	\$11,764,991	\$58,329,373
Region 9	Berkeley	423	\$494,019,392	\$68,981,900	\$563,001,292
Region 9	Morgan	199	\$110,278,443	\$18,006,783	\$128,285,226
Region 10	Marshall	279	\$310,230,709	\$77,783,453	\$388,014,162



PDC Region	County	Number of Structures	Building Value	Content Value	Total Value
Region 10	Ohio	274	\$569,867,894	\$75,473,559	\$645,341,453
Region 10	Wetzel	83	\$13,086,813	\$3,793,314	\$16,880,127
Jefferson	Jefferson	357	\$852,898,365	\$89,343,623	\$942,241,988
		10,436	\$13,322,721,135	\$2,311,574,116	\$15,634,295,251

Table 56 – BRIM-covered Facilities in Counties with High Winter Weather Vulnerability

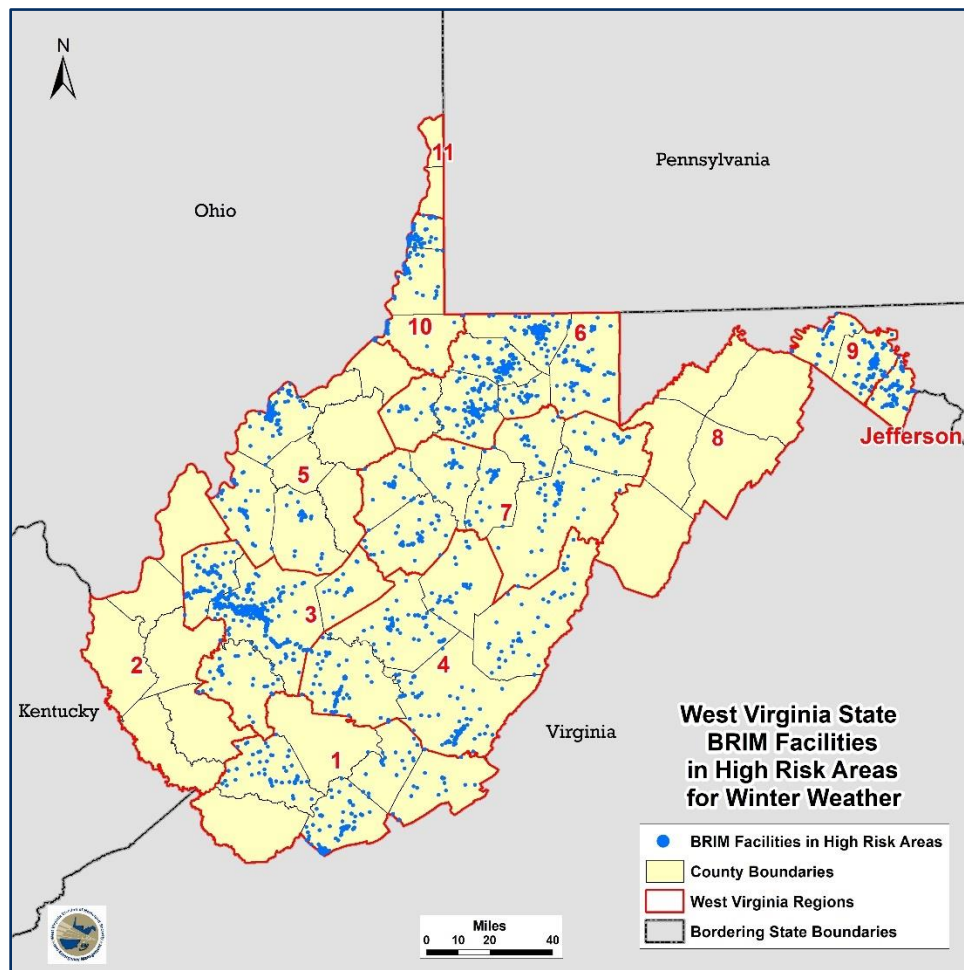


Figure 62 – Brim-covered Facilities in Counties with Winter Weather Vulnerability



4.G.4. Future Conditions

It is expected that as climate changes, more winter-season precipitation may fall as rain rather than snow in the future.¹⁷ This may benefit West Virginia through lowered future frequency of damaging snow and icing events. However, it could have negative implications for industries such as ski resorts, whose livelihoods depend on wintry weather and near or below freezing temperatures. Future plan updates should further investigate implications of climate change related to potential future changes in temperature, storm track and frequency, as well as lake-effect and other winter weather processes on the State.

¹⁷ Global Climate Change Impacts in the United States, Thomas R. Karl, Jerry M. Melillo, and Thomas C. Peterson, (eds.). Cambridge University Press, 2009.



4.H. **Wildfire**

4.H.1. **Background Information**

A wildfire is an uncontrolled burning in woodlands, grasslands, or brush. These commonly burn in excess of 50 acres. A non-wilderness fire is uncontrolled burning in residential or commercial development.

Wildfires commonly begin unnoticed and spread quickly through vegetative fuels. Wildfires in West Virginia have not affected large areas since the early 1960s, so fire as a hazard class is not as apparent a problem unless an unusually large fire occurs or we examine the cumulative effects of many fires.

West Virginia, dominated by hardwood forests, is the third most heavily forested state in the nation. The economic impact of the wood products industry in the State exceeds \$4 billion dollars annually. While this impact is large, it is not the only impact on the state from West Virginia's forests. Other forest-based activities generate billions of dollars of additional impacts. These activities include wildlife-associated recreation (hunting, fishing, wildlife watching), forest-related recreation (hiking, biking, sightseeing) and the gathering and selling of specialty forest products (ginseng, Christmas trees, nurseries, mushrooms, nuts, berries, etc.). West Virginia's forests also provide millions of dollars of benefits in improved air and water quality along with improved quality of life for West Virginia residents. The State's forests and mountains attract visitors and tourists from much of the Eastern United States. Wilderness wildfires put all this at risk and the impact to the State is tremendous.

Much of the State forests are in private ownership, which increases the difficulty for State education and management. Public lands include the Monongahela National Forest, which is controlled and monitored by the US Department of the Agriculture.

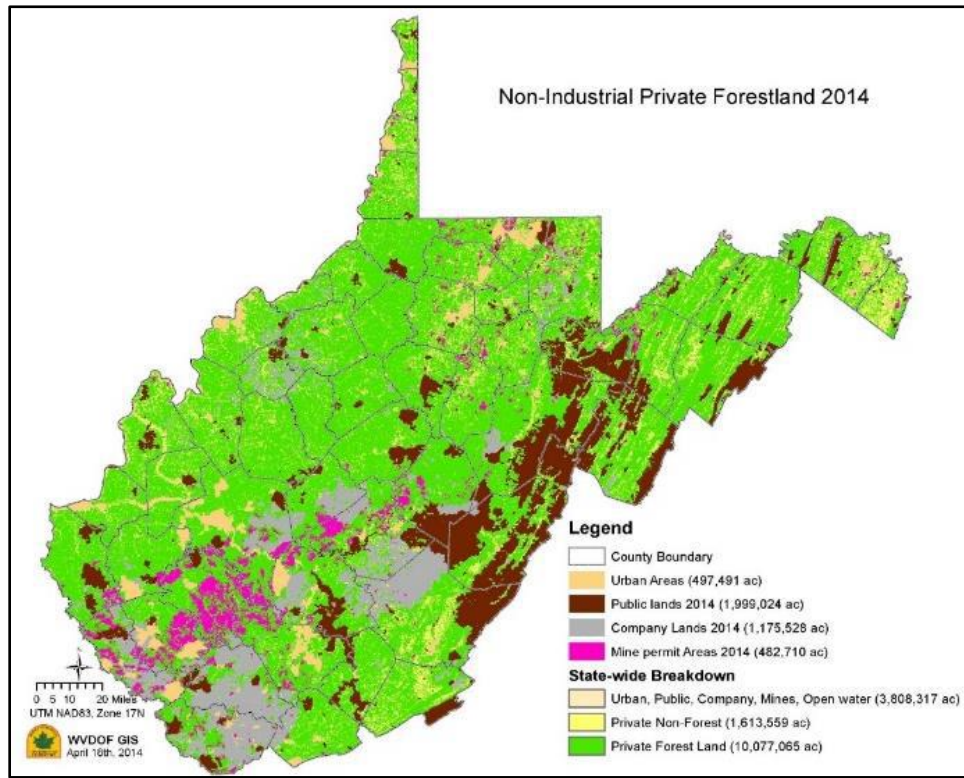


Figure 63 – Landcover of WV

4.H.2. Historical and Notable Events

Historically, wildfire devastated the State following extensive logging in the late 19th and early 20th centuries as logging operations supported the post-Civil War building boom. Numerous fires were sparked by narrow gage rail Shay engines used to transport logs out of the mountains.

In 1908, fires destroyed more than 1.7 million acres of forestland. Because of this devastation, the *West Virginia Reform Law* of 1909 was established to protect the States' only renewable resource, the forest. Today, the West Virginia Department of Forestry (WVDOF) is responsible for protecting nearly 12 million acres of forestland across West Virginia¹⁸.

November 16, 2001. Two incidents led to Federal Emergency declarations. Twelve counties were included in Fire Management Assistance declaration for the Trough-Smoke Hole Fire Complex and Southwest West Virginia Complex. McDowell, Wyoming, Raleigh and Mercer

¹⁸ WVDOF website.



from Region 1, Logan, Mingo, Wayne, Cabell and Lincoln from Region 2, Kanawha and Boone from Region 3 and Hardy from Region 8.

Boone, Logan, McDowell, Mingo, and Wyoming Counties also have the most (four) National Center for Environmental Information (NCEI) wildfire events recorded in the State since 1995. Kanawha and Raleigh Counties have three NCEI wildfire events recorded.

Few fires of any type are the result of natural causes in West Virginia. Statistics collected by the West Virginia State Fire Marshal Office (WVSFMO) show that arson or negligence cause most structural fires, and they top the list for wilderness fires as well. This plan does not address Urban or non-wilderness fires.

Human activities are the leading cause of wildfire incidents in West Virginia. Intentional setting of fires, debris burning and miscellaneous causes were responsible for the greatest number of reported wildfire incidents and acres burned.

Cause of Wildfire	Number of Fires (Spring 2016)	%
Campfire	7	1.65%
Children	12	2.82%
Debris Burning	144	33.88%
Equipment Use	118	27.76%
Incendiary	90	21.18%
Lightning	2	0.45%
Railroad	9	2.12%
Smoker	9	2.12%
Misc. Causes	34	8.00%

Table 57 – Wildlife by Cause (2016)

4.H.3. Risk Assessment

4.H.3.a Introduction

The risk associated with wildfire in West Virginia has not been formally quantified due to the lack of precise information on probability and impact. Based on information from WVDOF, two areas in the State have been identified as priority areas for the fire program.

An increased incidence of wildfires occurs in the southwestern portion of the State. WVDOF has referred to these counties as the “hot counties of the southern coalfields.” For the past decade, these counties accounted for more than 57% of the fires statewide and 95% of the acres



burned statewide.¹⁹ During the 2013 plan update, the “hot” counties in the southern part of the State continued to have the most acres burned. Incidences of fires and acres burned have been increasing in the Eastern Panhandle because of population growth and construction of homes in the wildland-urban interface.

4.H.3.b Probability

The WVDOF created composite maps of the highest priority areas in West Virginia shows highest priority areas for wildfire, overlaid with risk concerns represented by each region’s composite score.

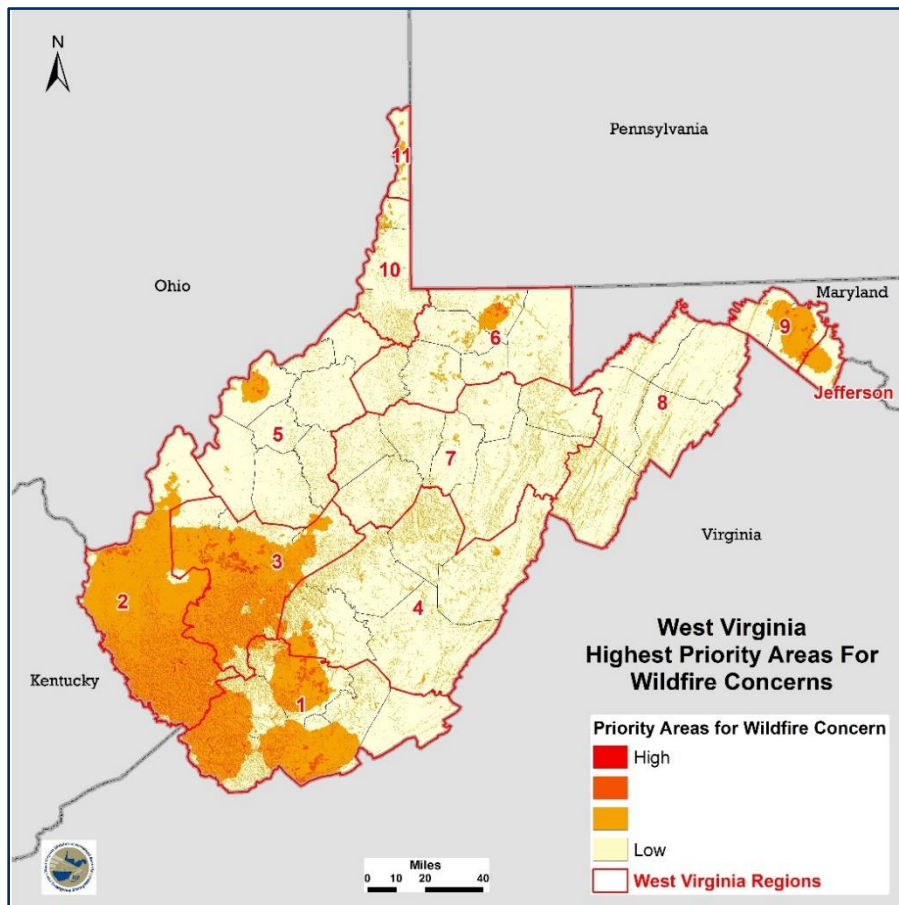


Figure 64 – Highest Priority Areas for Wildfire

¹⁹ Issues, Sub-Issues and Priority Area Identification – Issue 5: Wildfire Mgmt. Res. Protection/Public Safety WVDOF 2010



Between 2001 and 2016, there were 13,793 incidents of wildfire in West Virginia. The State averages 796 wildfires per year, consuming a yearly average of 17,897 total acres. Nearly 65% of these events have occurred in the spring season, but ironically, fall fires dominate the top eight fire occurrence years. This is due to fall season recreational and hunting activity in forested areas. 59% of these fires were due to negligence, while only two fires involved natural causes such as lightning. The southern part of the State continues to have the most acreage burned.

Using data provided by WVDOF and assuming a timber market value of \$300 per acre of timber burned, West Virginia can expect annualized damages of timber around \$5.4 million. WVDOF data separates forested and non-forested damages. Non-forest damages include infrastructure and vehicles, and averages \$186,000 per year.

Region	# of Fires	Total Acres
1	2,872	82,447
2	3,383	109,431
3	2,054	76,754
4	1,096	12,518
5	1,226	3,015
6	1,012	2,173
7	618	2,837
8	756	6,490
9	430	772
10	166	362
11	55	81
Jefferson	125	265

Table 58 – Number of Forest Fires (2001 - 2016)



4.H.3.d **Annualized Events and Costs**

Year	# Fires	Suppression Costs	Forest Acres
2001	1,837	\$249,768	94,223
2002	1,026	\$62,245	9,480
2003	658	\$59,160	8,311
2004	622	\$45,387	5,716
2005	765	\$82,774	15,091
2006	1,050	\$90,430	15,555
2007	846	\$97,351	7,098
2008	914	\$149,321	13,745
2009	981	\$156,362	15,043
2010	782	\$208,526	24,790
2011	488	\$73,157	5,546
2012	747	\$145,953	16,096
2013	690	\$135,761	10,295
2014	961	\$146,081	12,293
2015	690	\$144,517	16,602
2016	736	\$184,672	16,476
Total	13,793	\$2,031,465	286,358

Table 59 – Forest Fire Damage Information

Using Federal and State funds, and working with Federal, State and local authorities, WVDOF provides wildland-fire suppression services. Replacing most frontline vehicles was a first step in more reliable responses to wildfires. Replacement and restocking fire suppression equipment has been a priority, and 3,500 individuals received training in wildfire prevention methods.

WVDOF is also working with coal companies to locate and establish control lines on exposed coal seams that are burning. To date, all burning coal seams have been located and mapped. Mitigation measures have been installed on six of the most hazardous and critical seams, but land ownership transfers have delayed additional mitigation.

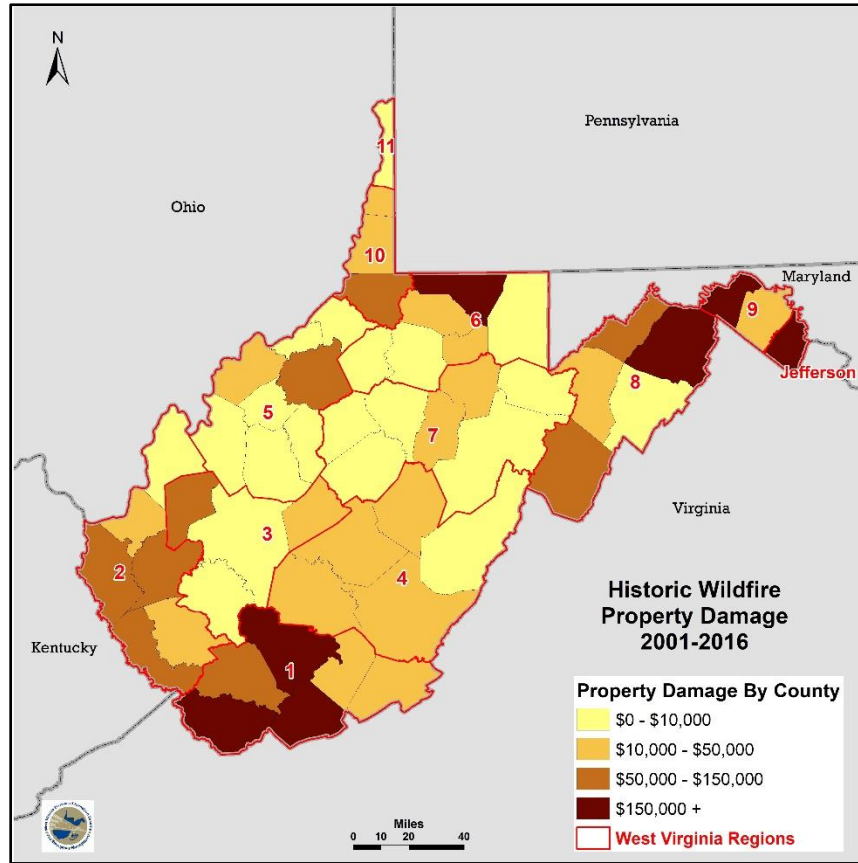


Figure 66 – Historic Wildfire Property Damage (2001-2016)

4.H.3.e **Hazard Rankings**

Local Hazard Mitigation Plan Ranking

While each PDC developed its own methodology to rank the hazards, a county-level ranking provides useful information to gain an understanding the hazard at a local level.

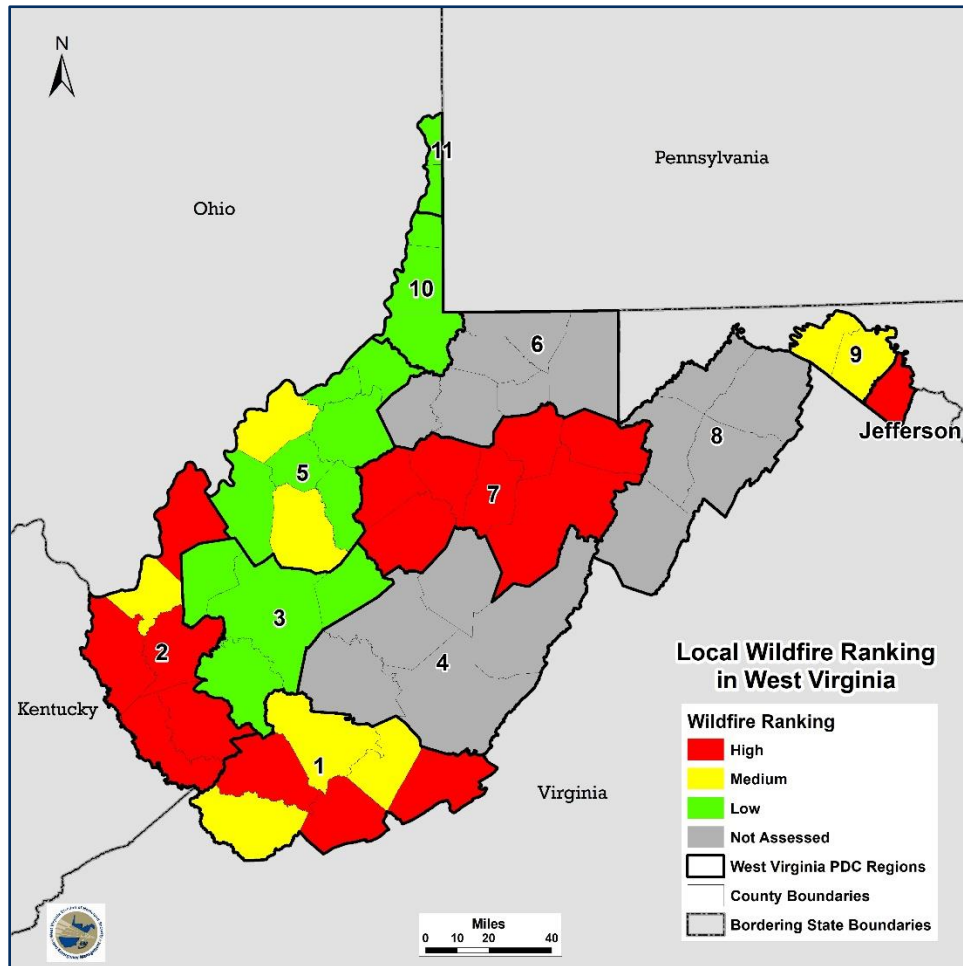


Figure 67 – Local Hazard Ranking for Wildfire

State Hazard Ranking

The Hazard Ranking Methodology uses a structured assessment to identify a Risk Rating based upon seven areas:

- Geographic Area Impacted
- Property Damage
- Population Vulnerability
- State Infrastructure Damages
- Deaths or Injuries
- History of Occurrence
- Regional HMP Ranking



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Utilizing the methodology established for the 2018 WV Statewide Standard Hazard Mitigation Plan Update, the vulnerability for Wildfire was calculated. A total of 16 counties were identified as having a high risk for Wildfire.

PDC Region	County Name
Jefferson	Jefferson
Region 1	Mercer
Region 1	Monroe
Region 1	Wyoming
Region 2	Lincoln
Region 2	Logan
Region 2	Mason
Region 2	Mingo
Region 2	Wayne
Region 7	Barbour
Region 7	Braxton
Region 7	Gilmer
Region 7	Lewis
Region 7	Randolph
Region 7	Tucker
Region 7	Upshur

Table 60 – Wildfire Probability and Ranking



4.H.3.f **Critical Facilities**

Critical facility points were intersected with the counties considered to have a High vulnerability to wildfire events. This is not to imply that the specific structures are at a high level of risk; however, this indicates that at a county level these facilities could be affected.

PDC Region	County	OES	Police Departments	Fire Departments	Hospitals	Public Schools (K-12)
Region 1	Mercer	1	10	15	3	27
Region 1	Monroe	1	4	6	0	5
Region 1	Wyoming	1	5	8	0	14
Region 2	Lincoln	1	4	8	0	8
Region 2	Logan	1	6	12	1	18
Region 2	Mason	1	6	8	1	11
Region 2	Mingo	1	7	14	1	11
Region 2	Wayne	1	7	13	1	21
Region 7	Barbour	1	5	3	1	9
Region 7	Braxton	1	6	7	1	8
Region 7	Gilmer	1	4	5	0	3
Region 7	Lewis	1	3	6	1	6
Region 7	Randolph	1	3	13	1	16
Region 7	Tucker	1	3	4	0	3
Region 7	Upshur	1	3	7	1	10
Jefferson	Jefferson	1	7	8	1	17
Total		16	83	137	13	187

Table 61 – Critical Facilities in Counties High Vulnerability for Wildfire

Critical facilities in four of the PDCs were identified as having a high vulnerability to wildfire. Just over 37% of the critical facilities are located in Region 2 (163 critical facilities), followed by Region 7 with 139. Approximately 43% of the critical facilities are schools (187), followed by fire departments (137).

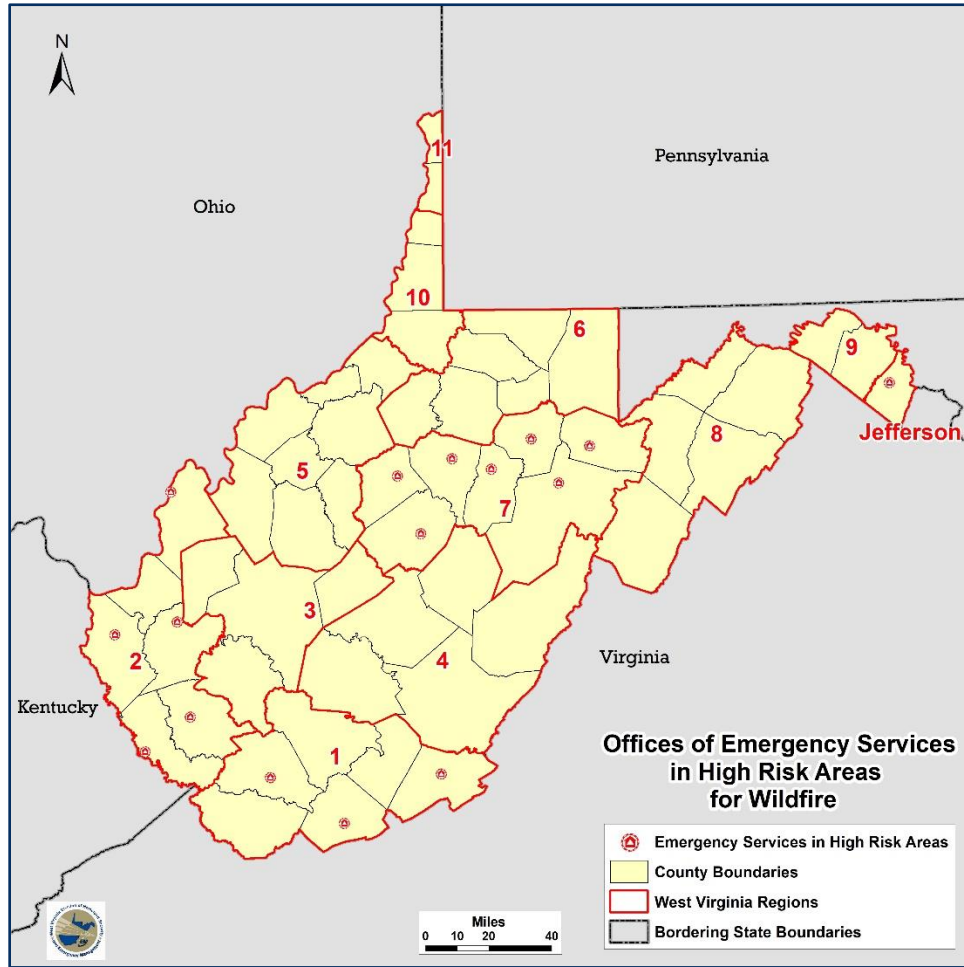


Figure 68 – OES in Counties with High Vulnerability for Wildfires

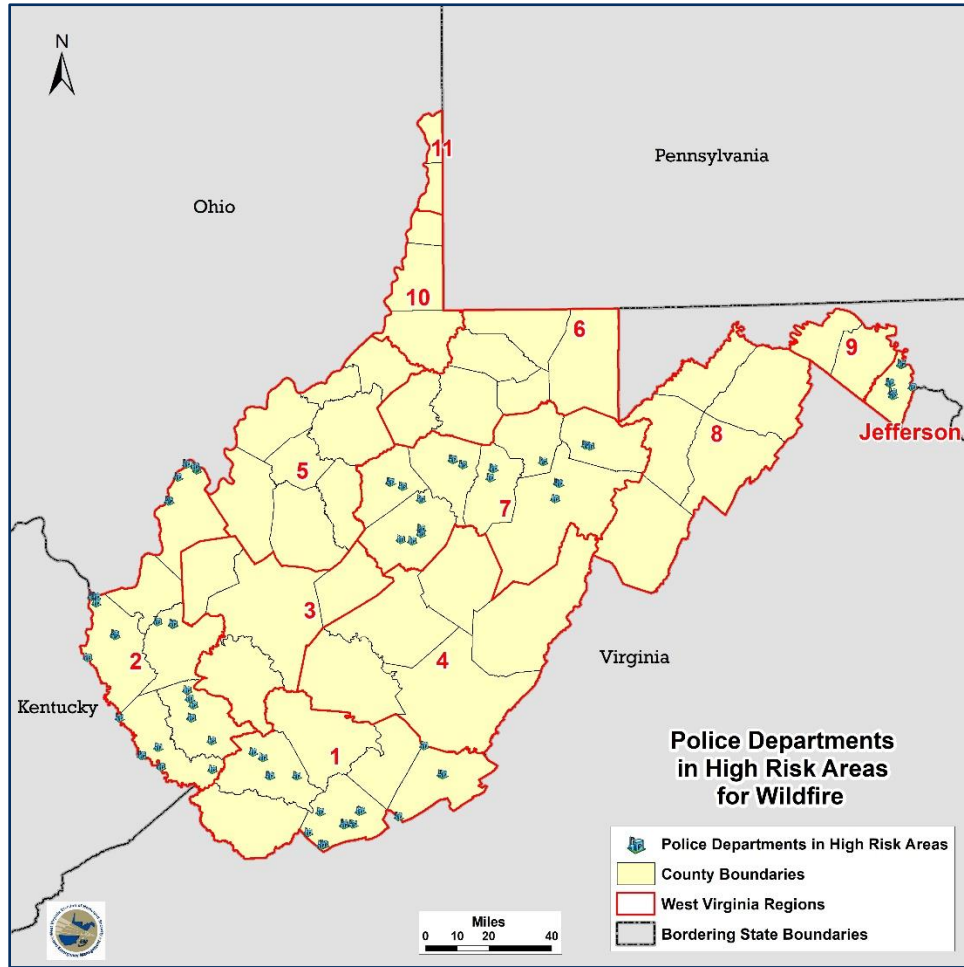


Figure 69 – Police Departments in Counties with High Vulnerability for Wildfires

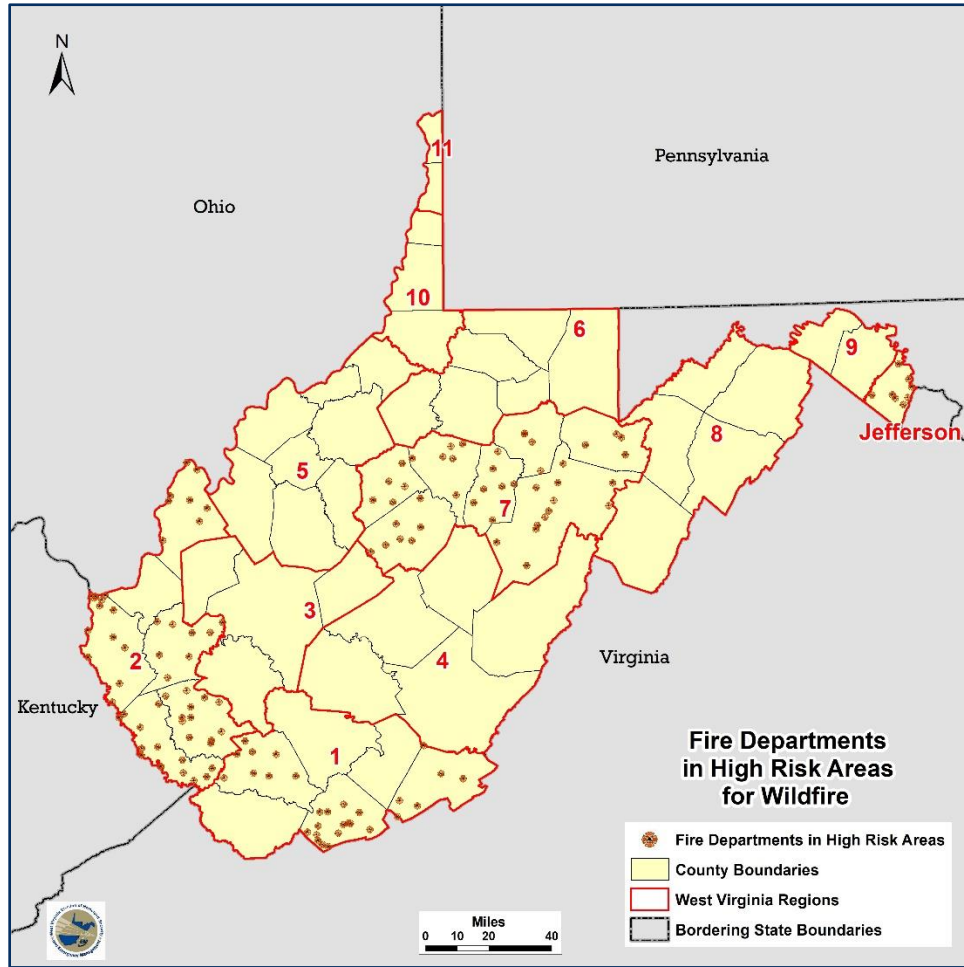


Figure 70 – Fire Departments in Counties with High Vulnerability for Wildfires

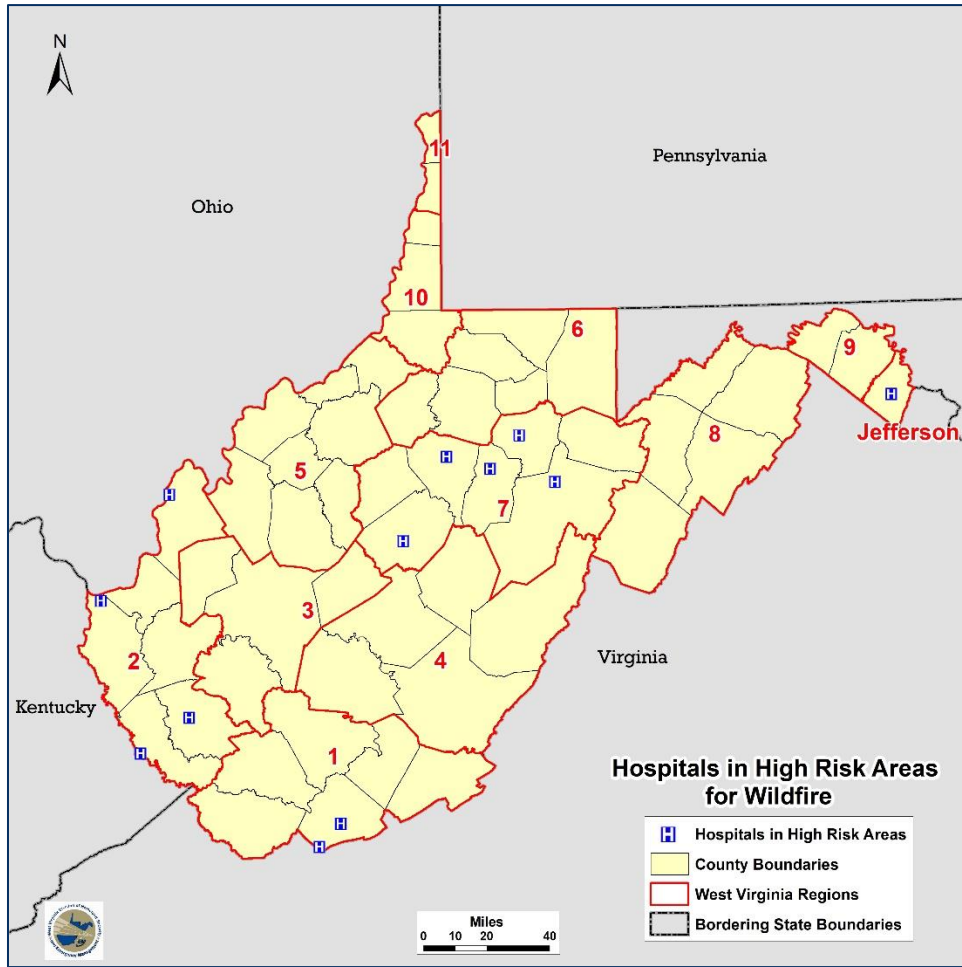


Figure 71 – Hospitals in Counties with High Vulnerability for Wildfires

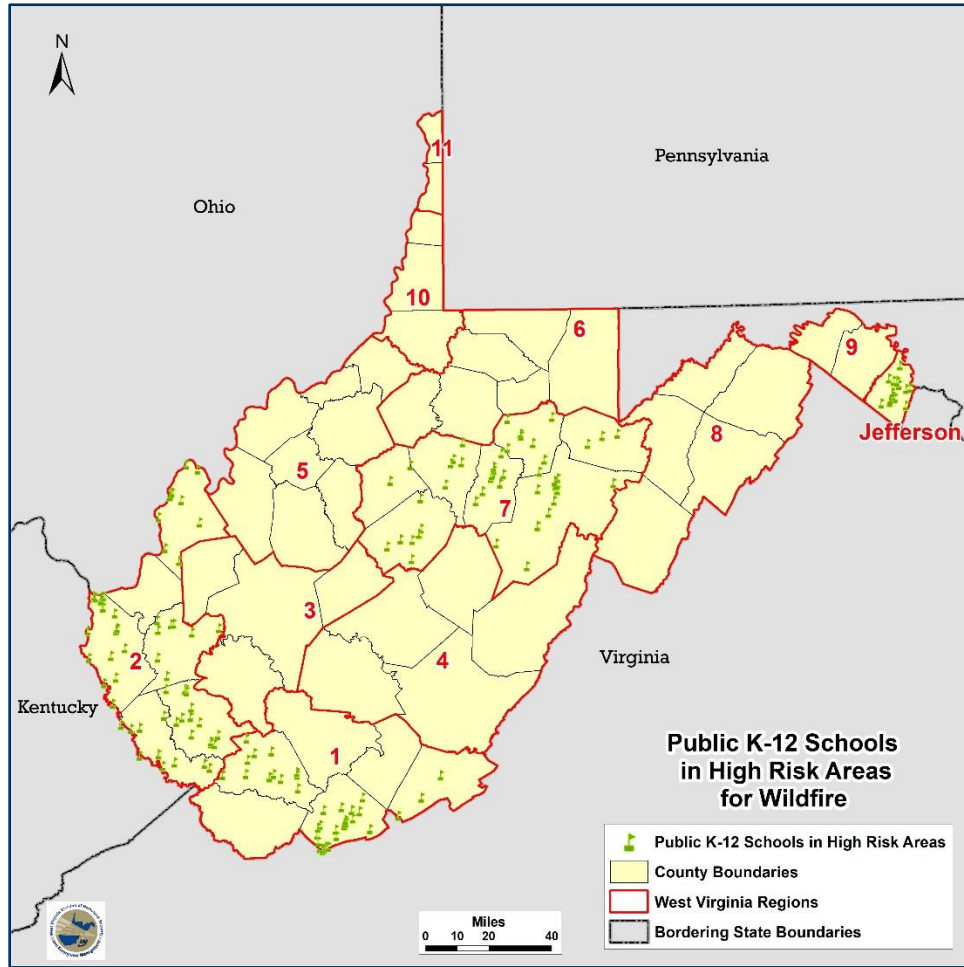


Figure 72 – Public Schools (K-12) in Counties with High Vulnerability for Wildfires



4.H.3.g **BRIM-covered Facilities**

Mingo County has the highest number of BRIM-covered structures (409) and Jefferson County has the highest total value of covered structures. While Jefferson accounts for only 9% of the total number of structures it accounts for over 21% of the total value.

PDC Region	County	Number of Structures	Building Value	Content Value	Total Value
Region 1	Mercer	383	\$579,238,467	\$62,769,036	\$642,007,503
Region 1	Monroe	116	\$97,596,858	\$11,540,427	\$109,137,285
Region 1	Wyoming	233	\$143,371,389	\$23,402,286	\$166,773,675
Region 2	Lincoln	133	\$125,299,755	\$14,787,325	\$140,087,080
Region 2	Logan	277	\$406,418,386	\$62,342,736	\$468,761,122
Region 2	Mason	280	\$193,894,465	\$25,683,479	\$219,577,944
Region 2	Mingo	409	\$246,821,761	\$39,013,924	\$285,835,685
Region 2	Wayne	373	\$308,640,381	\$50,654,068	\$359,294,449
Region 7	Barbour	143	\$82,823,915	\$15,352,616	\$98,176,531
Region 7	Braxton	150	\$103,492,844	\$16,712,984	\$120,205,828
Region 7	Gilmer	220	\$166,120,106	\$23,444,927	\$189,565,033
Region 7	Lewis	183	\$118,721,318	\$23,109,189	\$141,830,507
Region 7	Randolph	324	\$261,934,725	\$39,244,112	\$301,178,837
Region 7	Tucker	255	\$138,792,086	\$21,347,107	\$160,139,193
Region 7	Upshur	158	\$46,564,382	\$11,764,991	\$58,329,373
Jefferson	Jefferson	357	\$852,898,365	\$89,343,623	\$942,241,988
Total		3,994	\$3,872,629,203	\$530,512,830	\$4,403,142,033

Table 62 – BRIM-covered Facilities in Counties High Vulnerability for Wildfire

The most BRIM-covered facilities associated with counties having a high vulnerability to wildfire are located in Region 2. In addition, Region 2 has the highest Total Value of covered facilities.



PDC Region	Number of Structures	Building Value	Content Value	Total Value
Region 1	732	\$820,206,714	\$97,711,749	\$917,919,195
Region 2	1,472	\$1,281,074,748	\$192,481,532	\$1,473,557,752
Region 7	1,433	\$918,449,376	\$150,975,926	\$1,069,426,735
Jefferson	357	\$852,898,365	\$89,343,623	\$942,242,345
Total	3,994	\$3,872,629,203	\$530,512,830	\$4,403,146,027

Table 63 – BRIM-covered Facilities in Regions with High Vulnerability for Wildfire

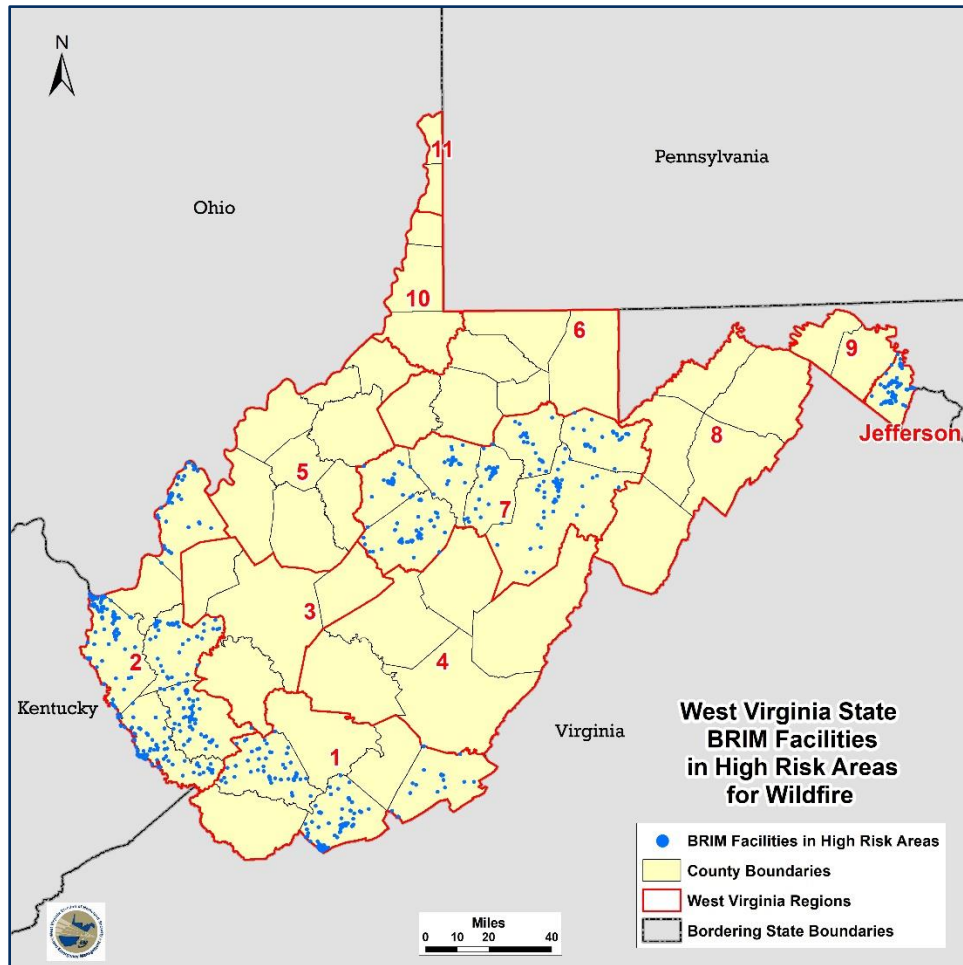


Figure 73 – BRIM-covered Facilities in Counties with High Vulnerability for Wildfires



Another approach is to analyze the Customer Names, or name of agency holding policy, to determine the at-risk facilities.

Customer Name	Number of Structures
PARKS, WEST VIRGINIA STATE C/O DEPARTMENT OF NATURAL RESOURCES	482
HIGHWAYS, DIVISION OF STATE OF WEST VIRGINIA	333
JEFFERSON COUNTY BOARD OF EDUCATION	166
MASON COUNTY BOARD OF EDUCATION	147
WAYNE COUNTY BOARD OF EDUCATION	134
NATURAL RESOURCES, DEPARTMENT OF STATE OF WEST VIRGINIA	133

Table 64 – Customer Name on BRIM-Covered Facilities

4.H.4. Future Conditions

The occurrence of wildfires depends largely on the amount of fuel, wind direction and speed, weather conditions, and the effectiveness of fire prevention measures. Further, the steep terrain and aspect of the slopes were major contributors to the fires becoming large in the Trough-Smokehole Wildfire Complex and the Southwest West Virginia Wildfire Complex.

In some cases, an increase in wildfires or acreage burned follows significant drought. Droughts in 1987, 1991 and 1999 had that effect. There were effects of drought visible during the 2001 fire season when 94,233 acres burned, the largest number of acres consumed since 2000.

Although forest fires cannot be predicted, foresters do predict fire hazard (fire danger) daily based on a calculated index of weather conditions, fuel moisture, and other factors. Since precipitation is predicted to increase through the next decade, wildfire occurrence may decrease as a result of the wetter seasons. Though the ground cover will be less flammable, the human component makes wildfire unpredictable.

4.I. Dam and Levee Failure

4.I.1. Background Information

The *West Virginia Dam Control and Safety Act* establishes regulations for dams in the State. Dams are barriers constructed to impound water for storage, flood control, power generation,



and/or stream navigation. Dams also impound hydraulically transported industrial waste including spoil or mine processing waste, or coal combustions waste of fly ash. The structures can vary greatly in size based on their purpose and area topography.

A levee is a structure, earthen or artificial, with a primary purpose of providing protection from flooding during seasonal high water, storm surges, precipitation and other weather events. Levees, in West Virginia, are maintained by the U.S. Army Corps of Engineers (USACE).

Dams and levees can pose a risk to communities if not designed, constructed, operated, and maintained properly. In the event of a catastrophic dam or levee failure, the energy the water released from even a small structure is capable of causing extensive property damage, injury, and potential loss of life. This is especially true in West Virginia where many communities lie along steep (or high) gradient streams and rivers within narrow valleys.

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*.

The National Inventory of Dams (NID) and the *West Virginia Dam Control and Safety Act* apply to dams that meet at least one of the following criteria:

- High hazard classification - loss of one human life is likely if the dam fails,
- Significant hazard classification - possible loss of human life and likely significant property or environmental destruction,
- Equal or exceed 25 feet in height and exceed 15 acre-feet in storage
- Equal or exceed 50 acre-feet storage and exceed 6 feet in height.

The *West Virginia Dam Control and Safety Act* excludes certain dams that otherwise meet the regulatory definition. The excluded dams are:

1. Federally-owned, operated and maintained
2. Farm-owned ponds constructed and used primarily for agricultural purposes
3. Road fill or other transportation structures

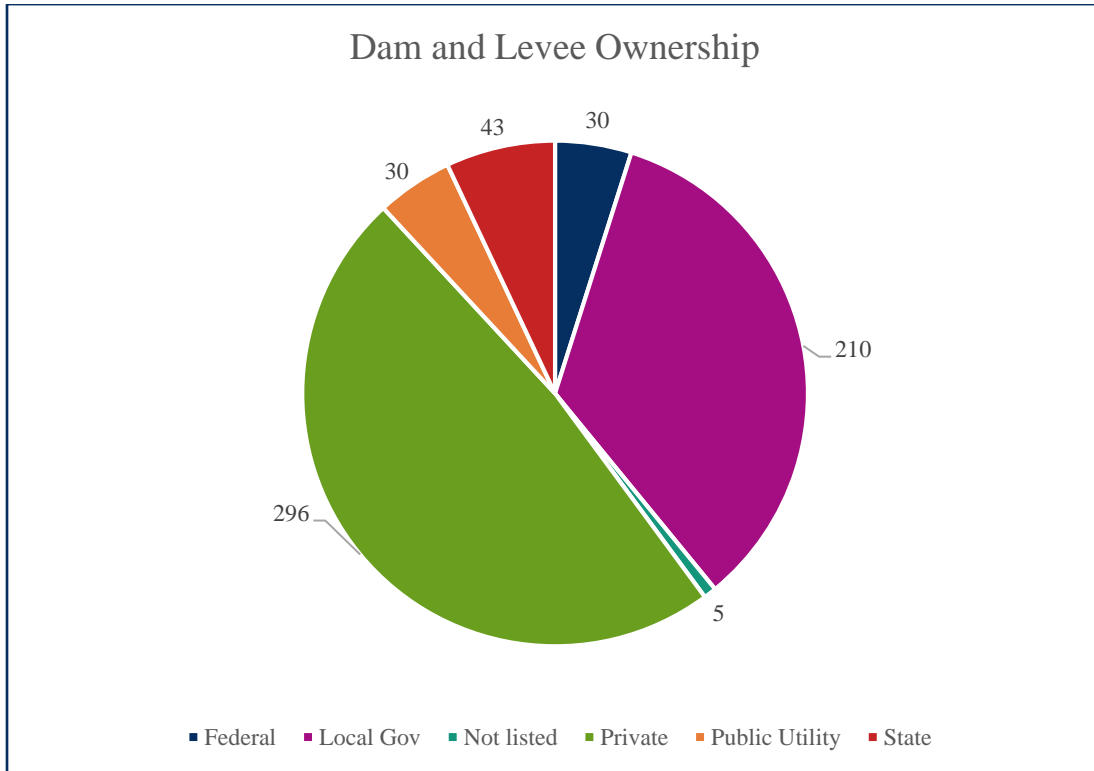


Figure 74 – Dam Ownership

The West Virginia Conservation Agency (WVCA) is responsible for more than 170 dams in the State. For each structure, the WVCA maintains a map of the area likely to be inundated should a failure occur, as well as the zones of evacuation.

State dams fall under the direction of the WV DEP. Construction, modification, or removal of a dam under state jurisdiction requires a Certificate of Approval. Upon receipt of an application, Dam Safety reviews the design of the engineering proposal. Safety standards set by the Dam Safety Rule must be met before the DWWM issues certificates. Annual renewal of Certificates helps to ensure that dams are maintained in a safe condition.

Of the dams listed in the National Dam Inventory database, the majority of the 614 dams have been built for primary flood control measures.

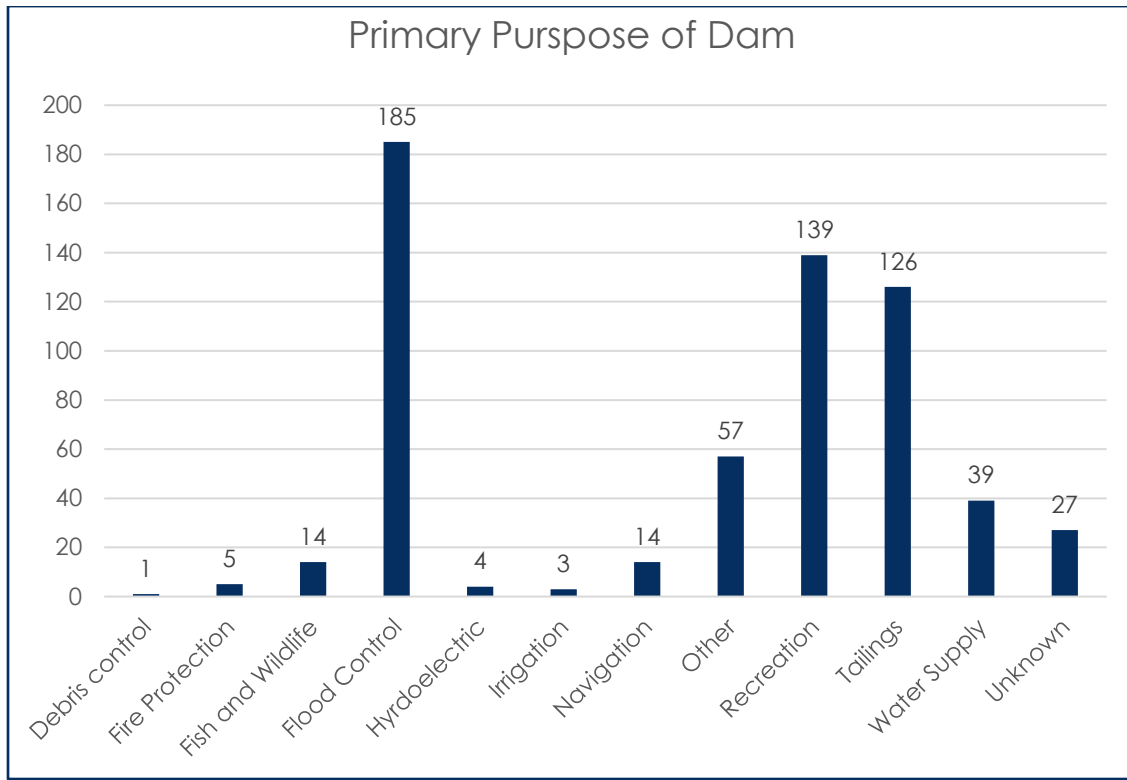


Figure 75 – Primary Purpose of Dams

4.1.2. Historical and Notable Events

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.

Since Congress passed the *Disaster Relief Act* in 1974 (Amended as the *Robert T. Stafford Disaster Relief and Emergency Assistance Act* in 1988), and the *2000 Disaster Mitigation Act*, West Virginia has not experienced a Presidential Disaster Declaration resulting from a dam failure. There are several notable dam failures though. Several occurred in 1914 and 1916 due to inflow flooding. There were approximately 60-75 deaths, but it is not known if they were related to the failure, or flash flooding.

February 26, 1972. Buffalo Creek flooding disaster was due to a catastrophic dam break. This coal slurry dam consisted of three embankments. One embankment failed as a result of heavy rain soaking the earthen dam, causing the subsequent failure of the other two. The result was a flood wave barreling through Logan County that killed 139 people and destroyed millions of



dollars-worth of property²⁰. Since the Buffalo Creek dam failure and resulting flood, West Virginia has not experienced deaths due to a dam failure.

October 2000. A dam in Inez, Kentucky affected WV streams, and caused \$56 Million in clean-up costs across both states.

July 2002. A coal waste valley fill slid into a pond, causing it to discharge through the emergency spillway and overtop, destroying three houses.

April 2007. A privately-owned pond, Lee's Fishing Lake, rose 22" after 2.5" of rainfall in 24 hours. Nearly 1000 evacuated, but no damage²¹.

²⁰ Steinberg, Ted. Acts of God: the Unnatural History of Natural Disaster in America. Oxford University Press 2000. Page 74.

²¹ Association of State Dam Safety Officials. Historic Dam Failures in the U.S. www.damsafety.org, 4/22/2013



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Date	Dam	Location	Deaths	Damages	Cause	Description
Pre-1914		Lincoln County			Catastrophic failure of a coal mine tailings dam.	
January 15, 1914	Old Stony River Dam	Grant County			Reinforced concrete dam failed during winter storm.	
August 9, 1916	Unnamed	Between Acme & Kayford, WV (Kanawha County)	60-75 from flood (unknown if related to failure)		Inflow flood	
August 9, 1916	Unnamed	Jarrolds Valley, Boone County	60-75 from flood (unknown if related to failure)		Inflow flood	
August 9, 1916	Unnamed	Cabin Creek Valley (Kanawha County)	60-75 from flood (unknown if related to failure)	>\$600,000	Inflow flood	Extensive damage; especially to rail, telephone, and coal company
February 26, 1972	Buffalo Creek	Logan County	125	\$400 Million	Coal slurry dam consisted of three embankments, one embankment failed causing the subsequent failure of the other two.	546 house destroyed and 538 houses damaged, 4,000 left homeless
October 11, 2000		Inez, KY affecting WV streams including the Big Sandy River watershed's Tug Fork		\$56 Million in clean up costs		
July 19, 2002		Logan County			During heavy rains, an upstream coal waste valley fill slid into the pond, causing it to discharge through the emergency spillway and overtop.	Dam overtopped and destroyed three houses. The dam (surface mine sediment pond) did not fail or malfunction.



Date	Dam	Location	Deaths	Damages	Cause	Description
April 15, 2007	Lee's Fishing Lake Dam	Hamlin, Lincoln Co., WV			2.5" of rainfall in 24 hours	Pond had been drained, and then refilled by new owner 22' high HH dam. Nearly 1,000 evacuated.

Table 65 – Association of State Dam Safety Official Dam Failures and Incidents

4.I.3. Risk Assessment

4.I.3.a Introduction

The shows locations of the dams and levees in West Virginia is shown in Figure 76. Dam owners in West Virginia include the National Resources Conservation Service (NRCS), other Federal Government bodies, the State, local government, private individuals or corporations, and unknown owners.

4.I.3.b Probability

The National Inventory of Dams (NID) categorization for 614 dams in West Virginia. Of these, 384 have a rating of High Hazard and 62 rate a Significant Hazard designation. The US Army Corps of Engineers (USACE) operates 30 Federal structures. Flood control accounts for the highest number of dams.

There are approximately 18 levees in West Virginia's USACE National Levee Database (NLD), accounting for over 36.9 miles of protected levee area. USACE constructed most of the levees and turned them over to public sponsors for operations and maintenance. Failure of any one of the dams or levees in West Virginia has the potential to inundate the surrounding areas, particularly those that are low-lying. Dam and levee failure can occur with little or no advance warning. There is likely to be some warning for larger dams and levees that are being loaded by water and not performing adequately, but smaller dams in flash flood areas (or coal impoundments) would have little to no warning.

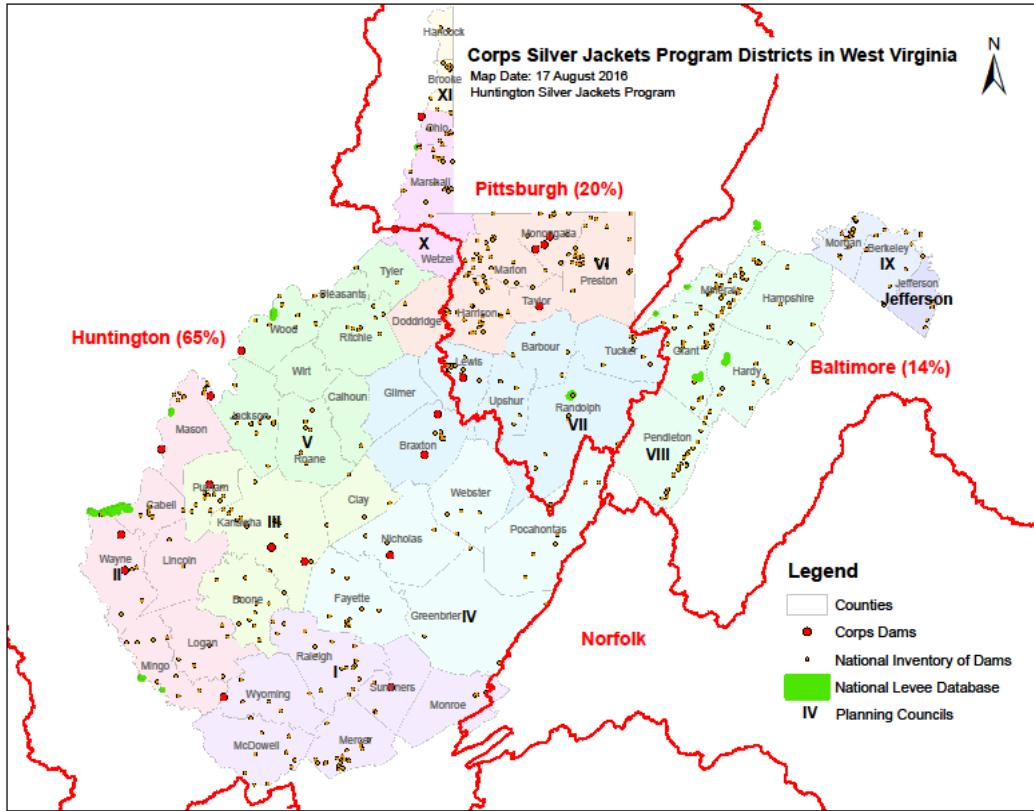


Figure 76 – Dams and Levees in WV

	Definition	Number of Dams
Class 1	Loss of one human life is likely if the dam fails	436
Class 2	Possible loss of human life and likely significant property or environmental destruction,	93
Class 3 & 4	Low or no potential for downstream damage	85

Table 66 – National Dam Inventory Lists for WV



One of the greatest challenges facing dam safety is the aging infrastructure in WV. Approximately 65% of the dams were built before 1969.

Year Built	Number of Dams
Before 1990	3
1900-1909	5
1910-1919	6
1920-1929	12
1930-1939	16
1940-1949	14
1950-1959	72
1960-1969	145
1970-1979	78
1980-1989	22
1990-1999	23
Since 2000	27

Table 67 – Year Dams were Built

Another area of concern relates to the material used for the construction of the dam. The majority of the dams are constructed using earthen material.

Material	Number of Dams
Buttress	2
Concrete	29
Earth	354
Gravity	12
Masonry	2
Other	51
Rockfill	55
Unknown	109

Table 68 – Dam Construction Material



4.I.3.c **Impact and Vulnerability**

Failure of dams and levees may result in catastrophic localized damages. Vulnerability to dam failure is dependent on dam operation planning and the nature of downstream development. Depending on the elevation and storage volume of the impoundment, the impact of dam failure may include loss of human life, economic losses such as property damage and infrastructure disruption, and environmental impacts such as destruction of habitat. Evaluation of vulnerability and impact is highly dependent on site-specific conditions.

One element of reducing the impacts of a dam failure is the presence of an Emergency Action Plan (EAP). Residents of areas that could be affected by a dam failure or operational incident have a risk of loss of life, injuries, and damage to property from a failure or operational incident. The purpose of this document is to provide guidelines for the preparation of an Emergency Action Plan (EAP) to facilitate the development of plans that are comprehensive and consistent. The purpose of an EAP is to protect lives and reduce property damage.

An EAP is a formal document that identifies potential emergency conditions at a dam and specifies actions to be followed to minimize loss of life and property damage. The EAP includes:

- Actions the dam owner will take to moderate or alleviate a problem at the dam
- Actions the dam owner will take, and in coordination with emergency management authorities, to respond to incidents or emergencies related to the dam
- Procedures dam owners will follow to issue early warning and notification messages to responsible downstream emergency management authorities
- Inundation maps to help dam owners and emergency management authorities identify critical infrastructure and population-at-risk sites that may require protective measures, warning, and evacuation planning
- Delineation of the responsibilities of all those involved in managing an incident or emergency and how the responsibilities should be coordinated²²

²² https://www.fema.gov/media-library-data/5b20db599c212f77fd5e85d256f471a3/EAP_Federal_Guidelines_FEMA_P-64.pdf



Overall Dams in WV		Number of Plans	Percentage
High Risk Dams (Class 1)			
	EAP Developed	326	74%
	No EAPs	110	26%
Significant Risk Dams (Class 2)			
	EAP Developed	57	61%
	No EAPs	36	39%

Table 69 – Status of EAPs

The potential failure of the Bluestone Dam represents the great threat associated with the failure of a single dam or levee. However, over the last several years the U.S. Army Corps of Engineers has spent millions of dollars to enhance the safety of the Bluestone Dam. Since the early 2000s, a total of \$200 million has been spent to prevent a catastrophic failure of the dam and in July 2018 allocated an additional \$574 for critical repairs of the Bluestone Dam.

Based upon the most recent risk assessment of Bluestone Dam in 2016, USACE considers this dam to be a high-risk dam because of instability in the spillway monoliths (a monolith is a large block of concrete that stands on its own and serves as a section of the dam). USACE has implemented interim risk reduction measures and/or long-term risk reduction measures to reduce this risk. Since, 2000 USACE has worked to increase the stability of Bluestone Dam with significant investments. This work is projected to continue into the 2040s. Until such time as this work is completed, USACE alters how the dam stores and discharges water to reduce the probability of a structural failure (breach).

The primary areas impacted should the Bluestone Dam breach with a full reservoir during a flood event or experience major spillway/outlet works flows are shown in the following map. The potential for loss of life is *highest within a couple of miles of the dam with the loss of life concerns decreasing substantially beyond 60 miles downstream of the dam*. Advanced warning of problems and events plays a major role in protecting life and property. See the map for a general indication of flooding with a full reservoir during a rare flood event.

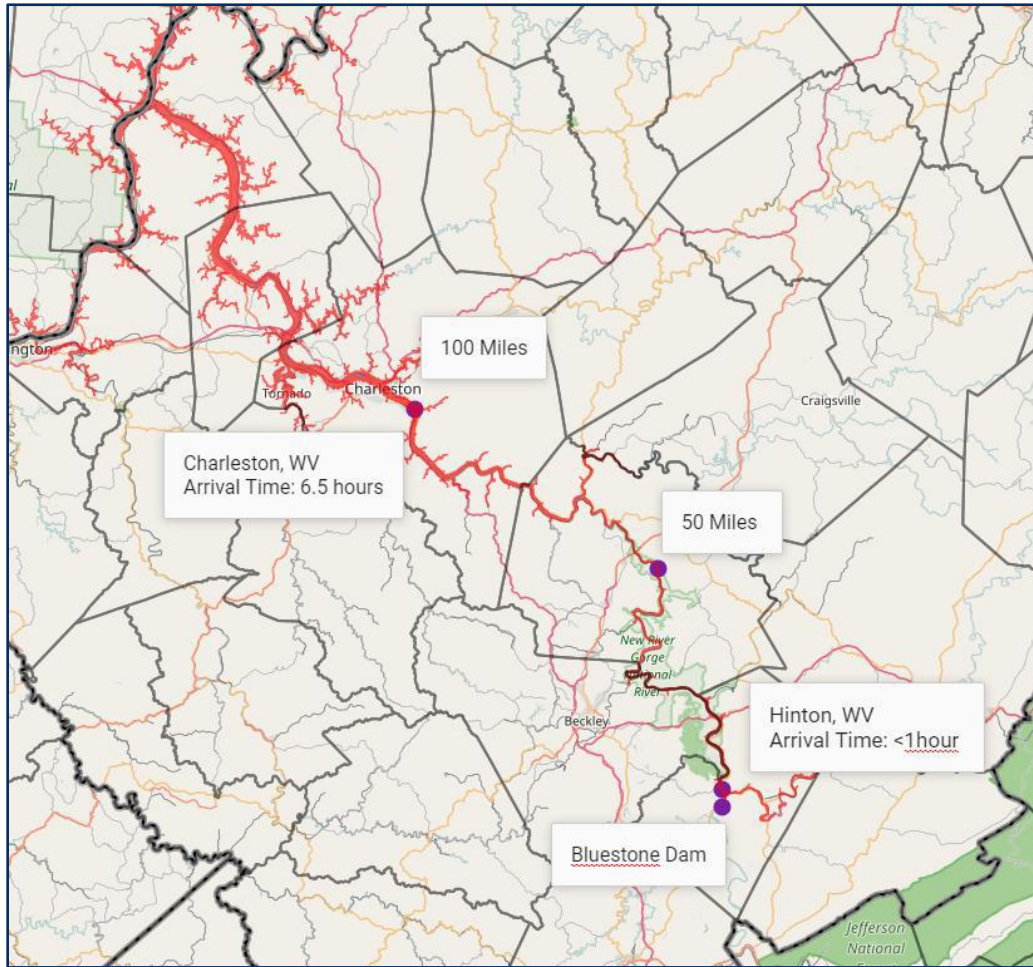


Figure 77 – Potential Inundation with Failure of Bluestone Dam

PDC Region	County Name	Number of Facilities
Region 1	Raleigh	11
Region 1	Summers	4
Region 2	Mason	2
Region 3	Kanawha	71
Region 3	Putnam	10
Region 4	Fayette	12

Table 70 – Critical Facilities in Bluestone Inundation by Counties

Table 71 provides a listing by counties of the facilities that would be directly affected by the inundation. There are many others that would be indirectly affected by loss of utilities, damage to roads, and other issues related to support infrastructure.



County	Number of Structures	Building Value	Content Value	Total Value
Fayette	8	\$0	\$155,000	\$155,000
Kanawha	553	\$404,507,262	\$113,510,256	\$518,017,518
Mason	15	\$225,000	\$20,000	\$245,000
Putnam	103	\$137,939	\$2,870,525	\$3,008,464
Raleigh	14	\$0	\$35,000	\$35,000
Summers	6	No Values Reported	No Values Reported	No Values Reported

Table 71 – BRIM-covered Structures in Bluestone Inundation by Counties

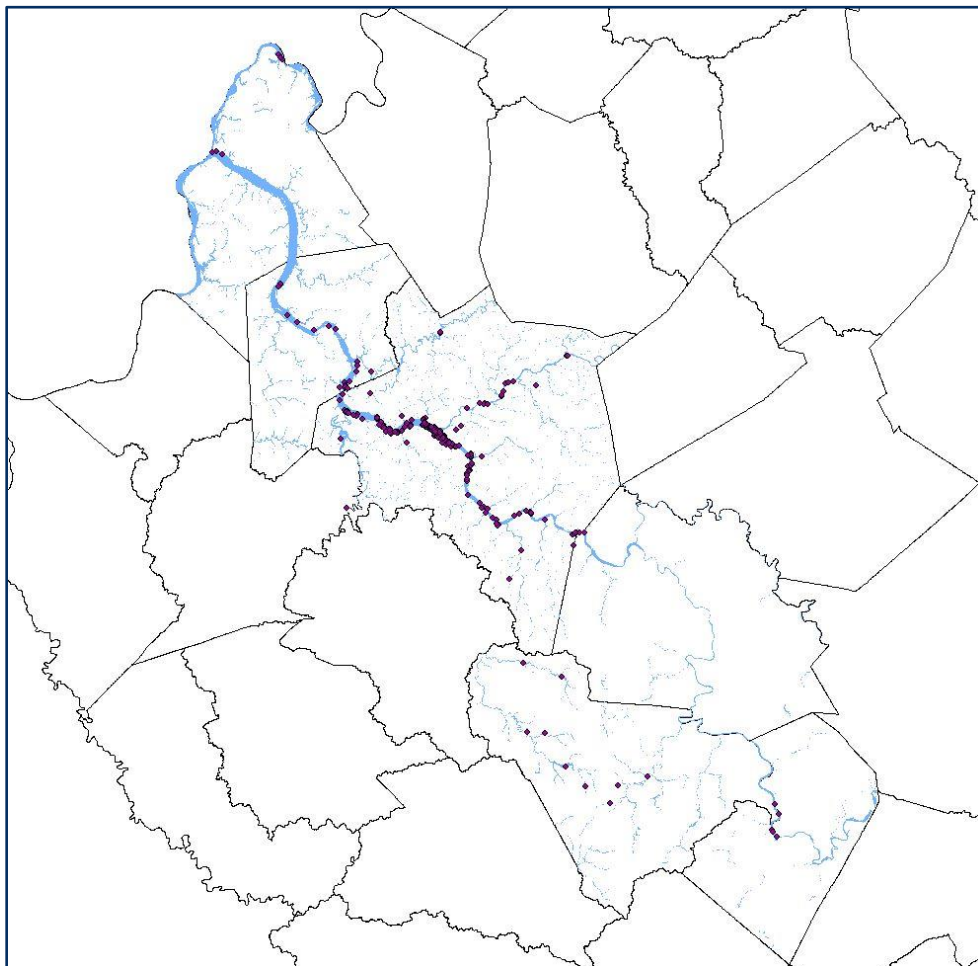


Figure 78 – BRIM Facilities in Bluestone Inundation Area



4.I.3.d **Annualized Events and Loss**

Predicting the probability of a dam or levee failure requires a detailed, site-specific engineering analysis for each location in question. Failure may result from hydrologic and hydraulic design limitations, or from geotechnical or operational factors. The data and time necessary to perform a probabilistic failure analysis for each dam and levee in West Virginia is beyond the scope of this plan.

Failure of any one of dams or levees in West Virginia has the potential to inundate the surrounding areas, particularly those that are low-lying. Dam and levee failure can occur with little or no advance warning. There is likely to be some warning for larger dams and levees that it is being loaded by water and not performing adequately, but smaller dams in flash flood areas (or coal impoundments) would have little to no warning.

4.I.3.e **Hazard Ranking**

Local Hazard Mitigation Plan Ranking

While each PDC developed its own methodology to rank the hazards, a county-level ranking provides useful information to gain an understanding the hazard at a local level.

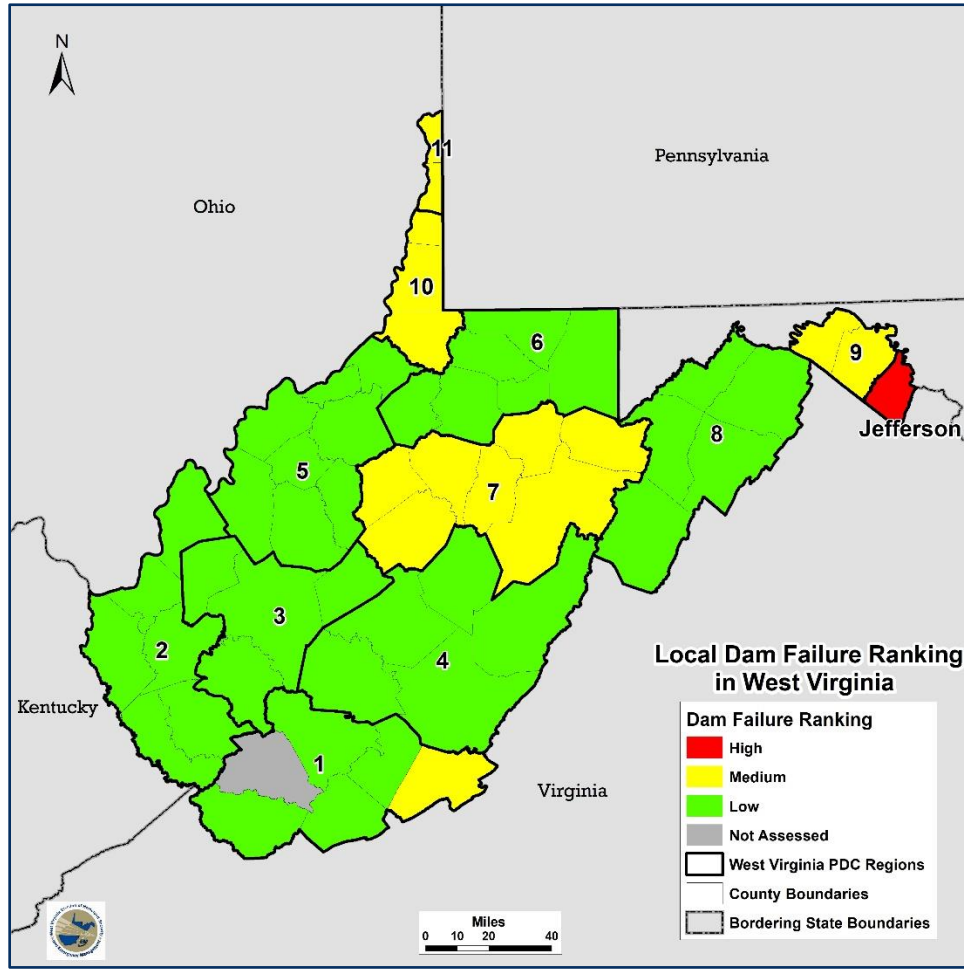


Figure 79 – Local Dam Failure Ranking Map

State Hazard Ranking

The Hazard Ranking Methodology uses a structured assessment to identify a Risk Rating based upon seven areas:

- Geographic Area Impacted
- Property Damage
- Population Vulnerability
- State Infrastructure Damages
- Deaths or Injuries
- History of Occurrence
- Regional HMP Ranking



Utilizing the methodology established for the 2018 WV Statewide Standard Hazard Mitigation Plan Update, the vulnerability for Dam and Levee was calculated. Only Jefferson was ranked as having a high risk for Dam and Levee Failure.

4.I.3.f Critical Facilities

The inability to calculate probabilities for dam and levee failure limit the degree to which potential losses can be calculated. A dam or levee failure would be costly and traumatic to downstream communities, but the probability is of failure based on historical events, is Low. Increased awareness and significant infrastructure investments have reduced probability as well. Jefferson County based their LHMP ranking on worst-case scenario using out-of-state dams.

County	OES	Police Departments	Fire Departments	Hospitals	Public Schools (K-12)
Jefferson	1	7	8	1	17

Table 72 – Critical Facilities in Jefferson County

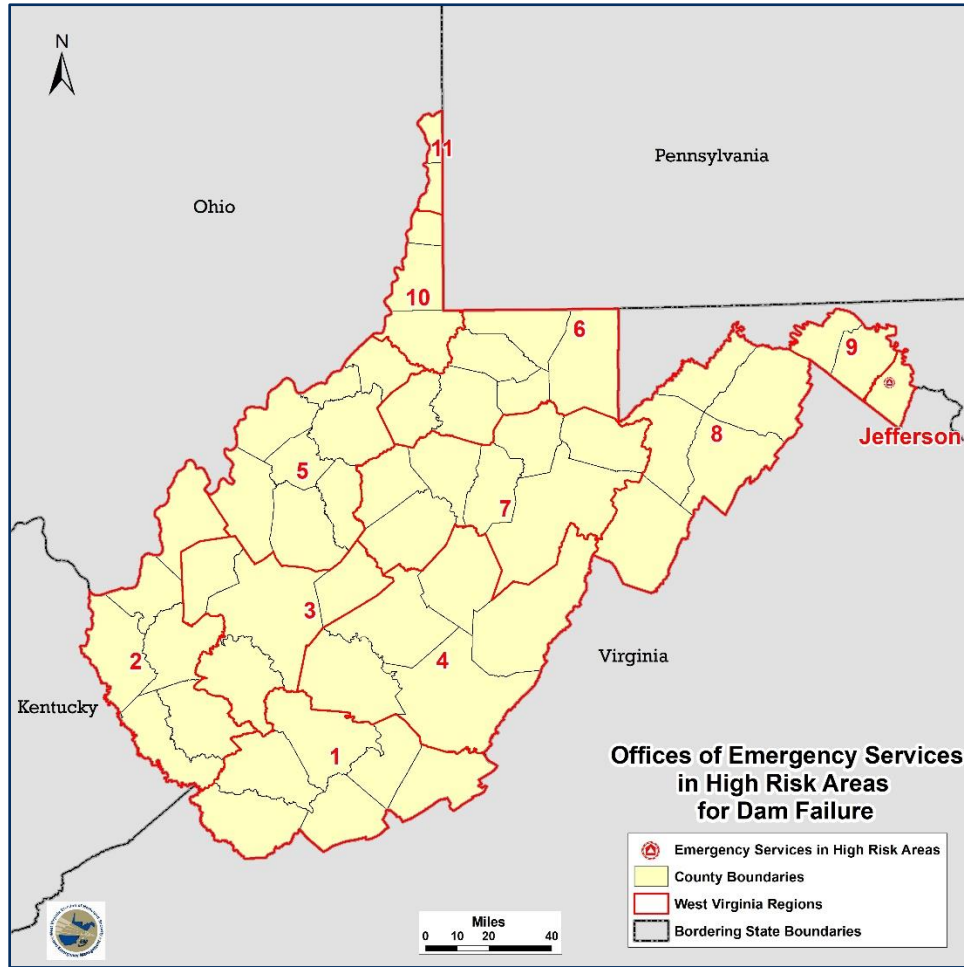


Figure 80 – OES in Counties with High Vulnerability for Dam Failure

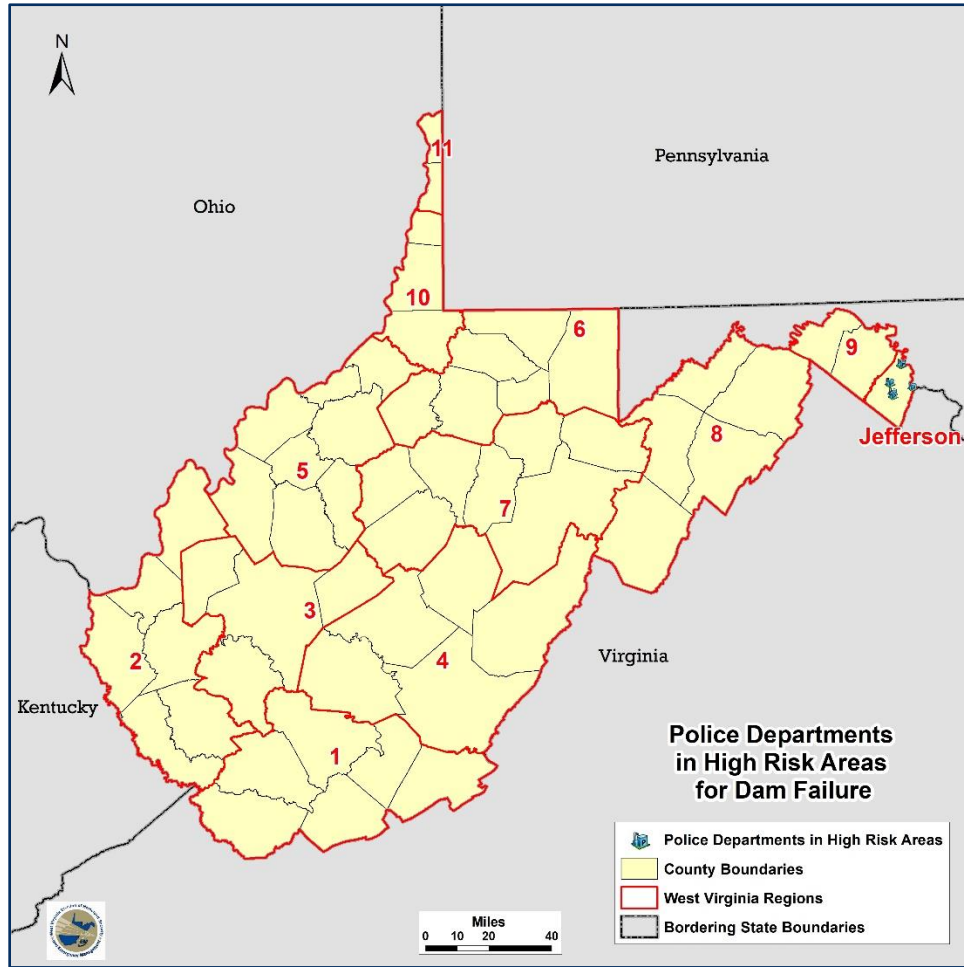


Figure 81 – Police Departments in Counties with High Vulnerability for Dam Failure



Figure 82 – Fire Departments in Counties with High Vulnerability for Dam Failure

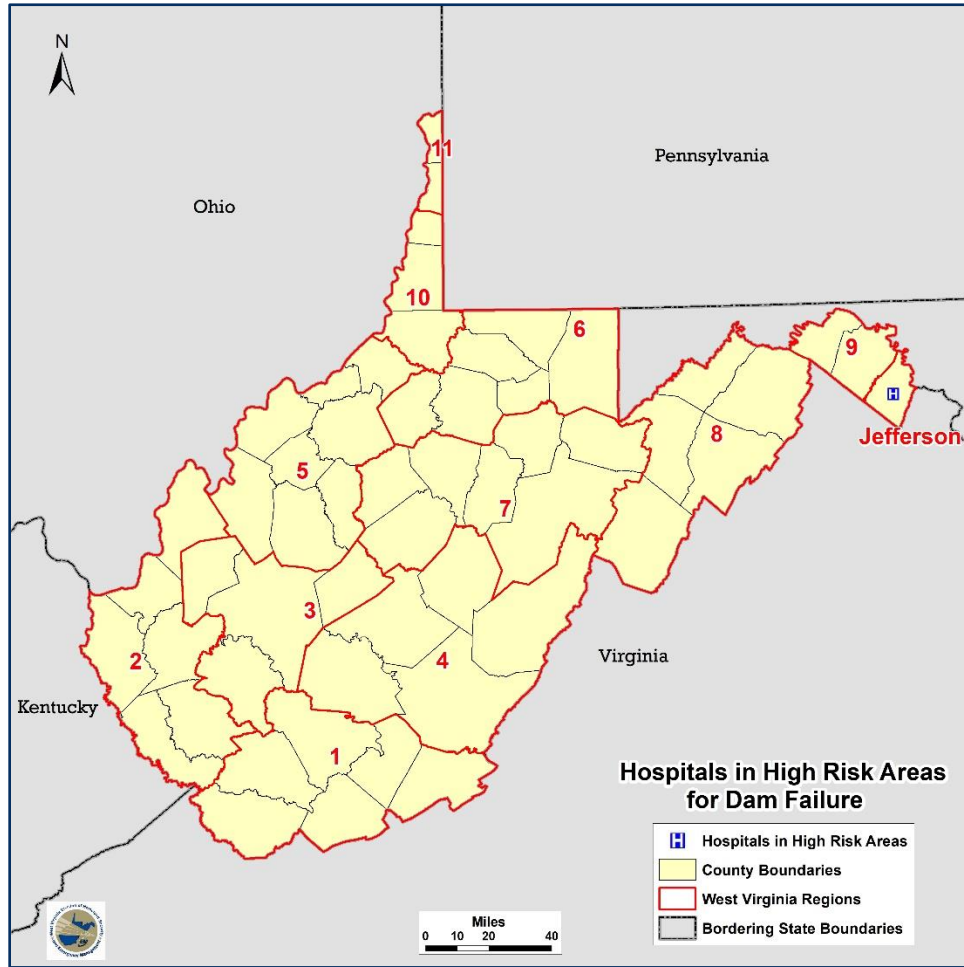


Figure 83 – Hospitals in Counties with High Vulnerability for Dam Failure

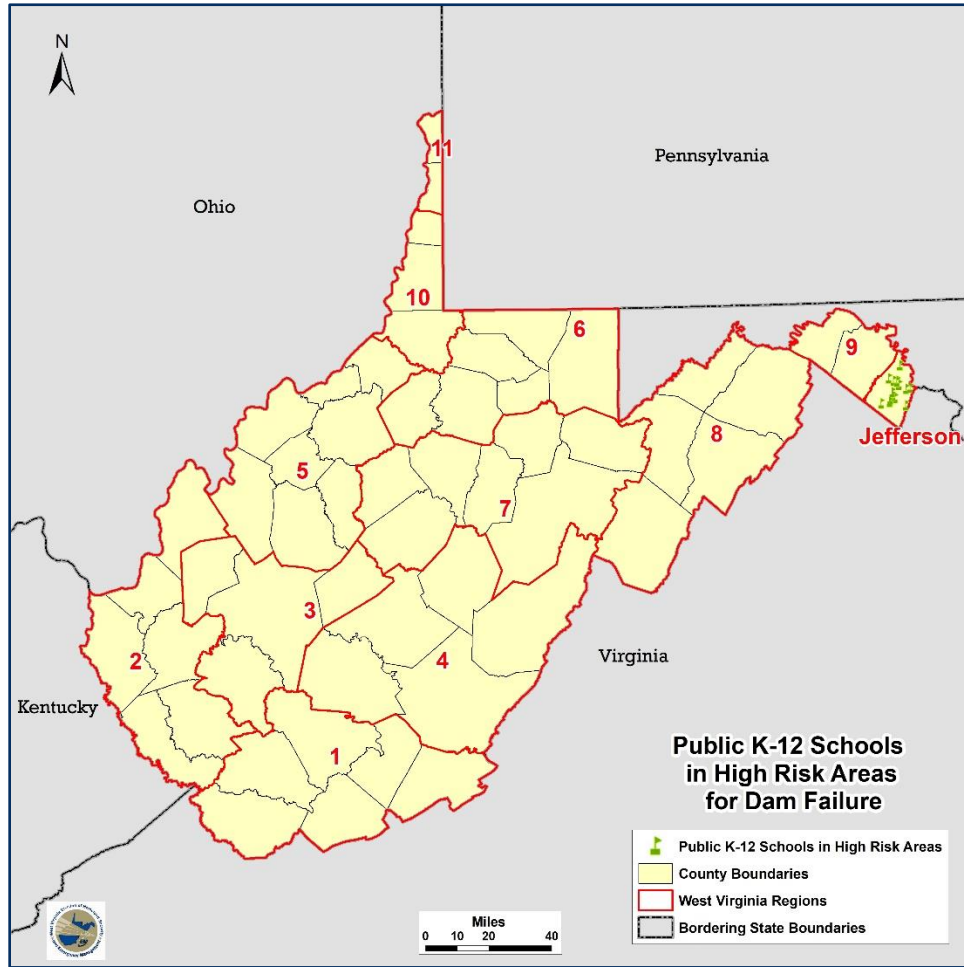


Figure 84 – Public Schools (K-12) in Counties with High Vulnerability for Dam Failure



4.I.3.g **BRIM-covered Facilities**

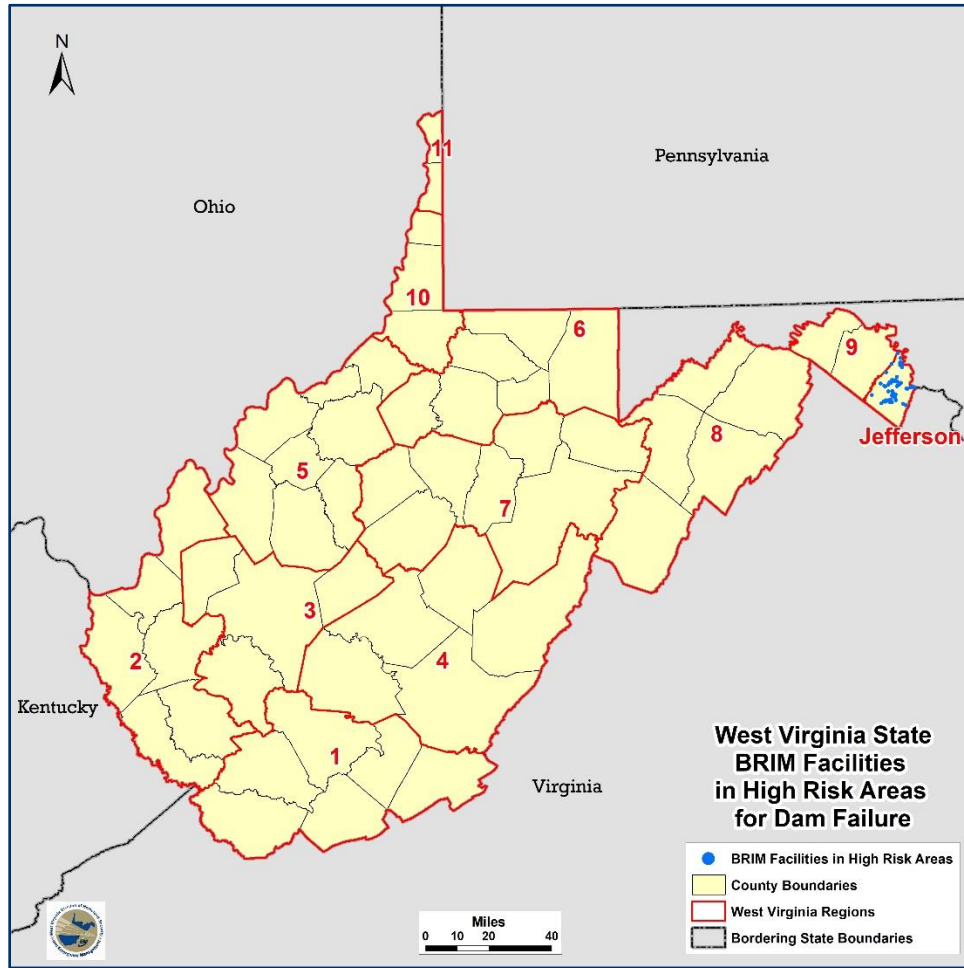


Figure 85 – BRIM-covered Facilities in Counties with High Vulnerability for Dam Failure

County	Number of Structures	Building Value	Content Value	Total Value
Jefferson	357	\$852,898,365	\$89,343,623	\$942,241,988

Table 73 – BRIM-covered Facilities in Jefferson County



4.I.4. Future Conditions

As predictions indicate increased precipitation and more extreme weather events, the flood control and impoundment infrastructure in West Virginia becomes more of a concern. Like most of the country, the infrastructure in West Virginia is overwhelmingly privately owned and maintained, and it is aging – in many cases, to the end of its design life. The occurrence of more frequent high intensity rainfall events may create conditions that exceed the original design criteria of these aging facilities.

4.J. Drought and Extreme Heat

4.J.1. Background Information

Drought is a normal, recurrent feature of climate that can be defined by several operational terms. Droughts are classified by their meteorological, agricultural, hydrological, or socioeconomic impact.

- Meteorological drought refers to a reduction in the normal rainfall for a given geographic area.
- Hydrological drought is from a precipitation deficit that affects the surface and subsurface water supply.
- Agricultural drought deals with the amount of moisture in soils available for plants.
- Socioeconomic drought, measures the impact that any or all of the first three have on people and businesses.

4.J.2. Historical and Notable Events

West Virginia has received two Federal Emergency declarations due to drought. Both droughts were declared in 1977 and primarily affected the southeast border of the state. Additionally, the USDA declared a disaster (Secretarial Declaration) in 1999, after the culmination of a few years of drought resulted in lost crops and subsequent fires caused by the dry conditions. The National Center for Environmental Information (NCEI) database includes over 500 records of drought events and over \$12 million in crop damages. Several significant events include:



1930s. Dust Bowl. Drought was greater in length and intensity than any events previously recorded, or recorded since. Public water supplies suffered, resulting in public health concerns for water and lack of flow for sewage²³.

July 1997. A very dry month, containing one 7-day heat wave, exacerbated drought-like conditions across much of the fertile farmland of eastern West Virginia. The weather in July proved to be the death knell for much of the crop yields, including corn, hay, and pasture. The West Virginia Farm Service Agency reported the following damage statistics: Corn, hay, and pasture yields were 40 to 50 percent of normal. Estimated damage to the corn crop included 2500 to 3000 acres per county in the Potomac Highlands (WVZ048>051, 055) but as much as 10,000 acres in the eastern panhandle (WVZ052>053). Hay damage was estimated to be 40,000 acres per county; pasture land an additional 80,000 acres per county. No significant damage to alfalfa was noted.

August 2000. The West Virginia Department of Agriculture reported the “agricultural economy of West Virginia suffered a loss of more than \$200 million, the long-term effects of the 1999 drought are still being witnessed”²⁴.

October 2014. A Secretarial disaster designation was declared for Greenbrier, Pocahontas and Pendleton counties in Region 4 and 8.

March 2015. An unusually dry Spring resulted in a drought designation for much of Region 10 and counties bordering Ohio in Region 5.

While West Virginia generally has a temperate climate, periods of extreme heat have occurred and are probable in the future.

There have not been any Presidential Disaster or Federal Emergency declarations, nor is there a history of any State Disasters or other major incidents, for extreme heat in West Virginia. While West Virginia generally has a temperate climate, periods of extreme heat have occurred and are probable in the future.

²³ The Drought of 1930 in West Virginia. L. Kermit Herndon and James R. Withrow. Journal of American Waterworks Association. Vol 23, No 5, May 1931. Pp 698-707

²⁴ West Virginia Department of Agriculture, 2000.



4.J.3. Risk Assessment

4.J.3.a Introduction

According to the US Department of Agriculture (USDA), West Virginia had approximately 3.6 million acres of farmland in 2016. West Virginia has extensive agricultural operations throughout the State, many of which are vulnerable to shortages in rainfall. USDA National Agriculture Statistics Service cropland data was used as the geographic extent factor in the statewide ranking for drought.

4.J.3.b Probability

Extended periods of dry weather with significant negative impacts on crops, livestock, and people have occurred in the past and will likely be decreasing in the future as rainfalls are projected to increase. Since drought is highly unpredictable and may vary locally, assessing probability of its occurrence is difficult. Quantifying drought in terms of historical frequency also proves to be a difficult task because of the variations in drought definition and the very limited and somewhat spotty nature of past drought reporting.

Perhaps the simplest and most consistent measure is meteorological drought. Characteristics and impacts of drought differ in many ways, so it is difficult to quantify drought. An existing index called the Palmer Drought Severity Index (PDSI)²⁵ (Table 74) uses temperature and precipitation levels to determine dryness, measuring a departure from the normal rainfall in a given area.

PDSI is standardized to local climate, so it can be applied to any part of the country to demonstrate relative drought or rainfall conditions. A monthly PDSI value below -2.0 indicates moderate drought, and a value below -3.0 indicates severe drought.

Severity	Index Value
Extreme Drought	-4 or less
Severe Drought	-4 to -3
Moderate Drought	-3 to -2
Mild Drought	-2 to -1
Incipient Dry Spell	-1 to -0.5

Table 74 – Palmer Drought Severity Index

²⁵ NOAA Drought Information Center, <http://www.drought.noaa.gov/palmer.html> (February 2012)

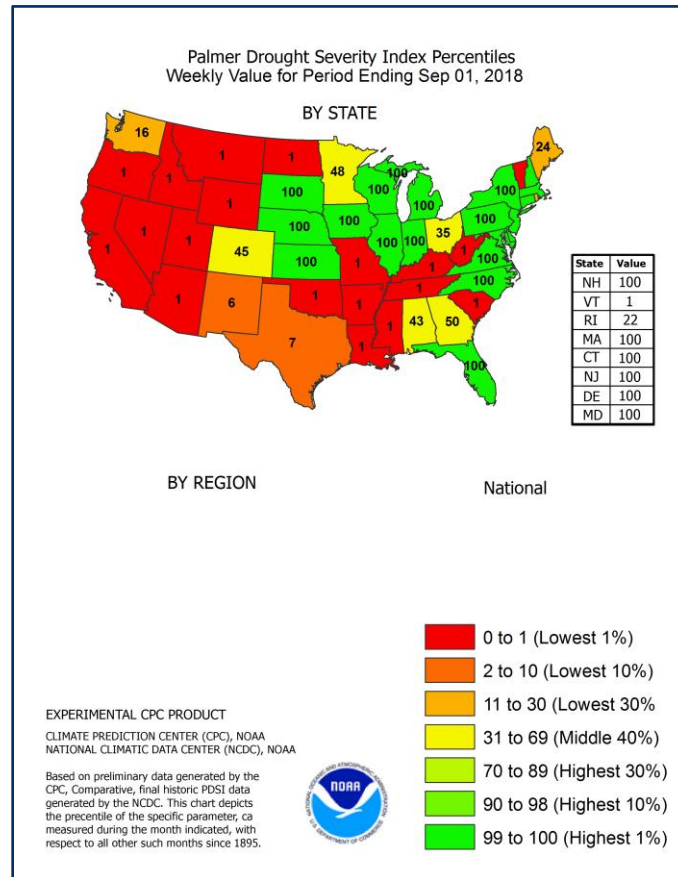


Figure 86 – Palmer Drought Severity Index Percentiles

4.J.3.c Impact and Vulnerability

According to the USDA, West Virginia had approximately 3.7 million acres of farmland in 2009. West Virginia has extensive agricultural operations throughout the State, many of which are vulnerable to shortages in rainfall. Jefferson County has the highest amount of agricultural land per square mile (0.44) followed by Berkeley County (0.27). McDowell County has the smallest percentage of agricultural land per square mile (0.012).

The top five farm counties are Preston, Mason, Greenbrier, Wood and Hampshire, but Greenbrier, in Region 4, has the largest number of acres in farmland, primarily for cattle and chickens.



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Farm Component	Amount
# of Farms	21,489
Ave Size	168 acres
Total Cropland	804,006 acres
Cropland Insured	51,582 acres
Market Value Crops	\$139,092,000
Market Value Livestock, Poultry	\$667,683,000
Total Land in Farms	3,606,674 acres
Total Livestock land	2,802,668 acres
Total Forested land	12 million acres
Total Land in WV	15,508,200 acres

Table 75 – WV Farm Lands

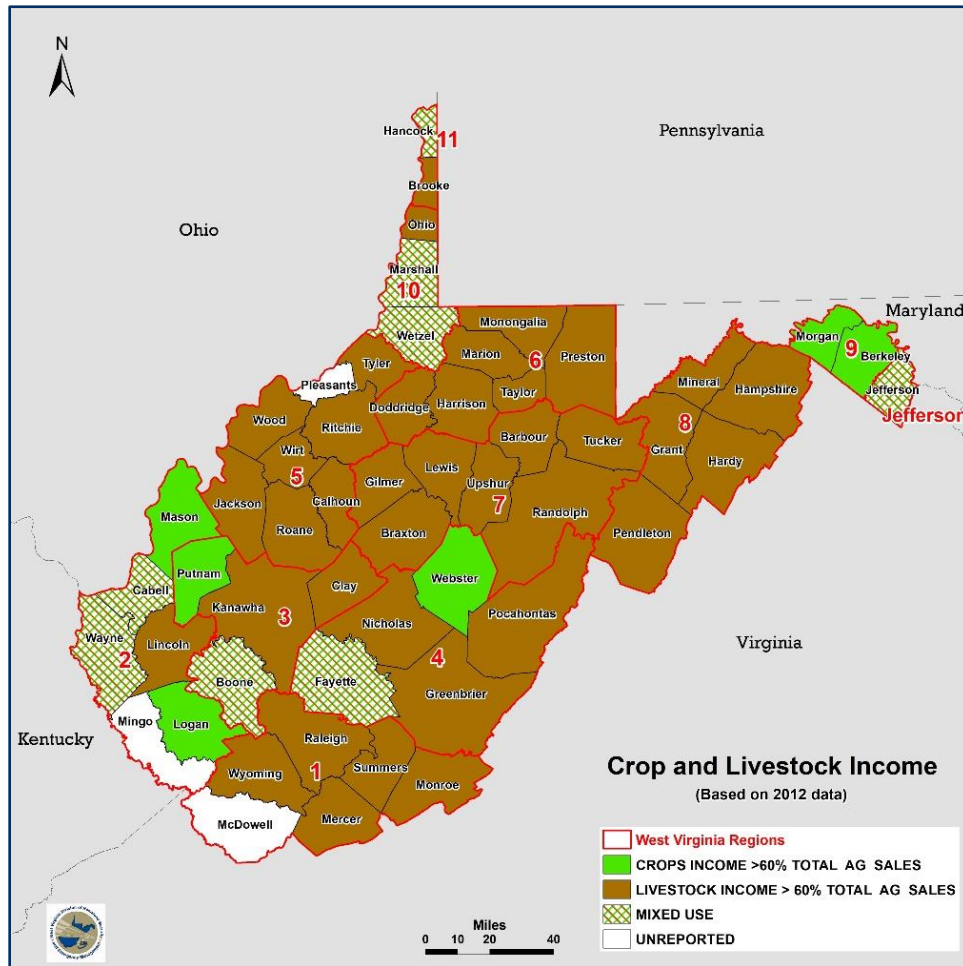


Figure 87 – Crop and Livestock Income

Short-term droughts can impact agricultural productivity, while longer term droughts are more likely to impact agriculture and water supply. Jurisdictions that have invested in water supply and distribution infrastructure are generally less vulnerable to drought. Short- and long-term drought may lead to an increase in the incidence of wildfires, which might in turn lead to increased potential for landslides or mudflows once rain occurs.

As reported by the National Drought Mitigation Center (NDMC) at the University of Nebraska at Lincoln, “drought is rarely a direct cause of death in the United States, although associated heat waves, dust and stress all contribute to mortality”. Drought impacts are inherently hard to quantify. They are mostly in the form of crop damage reports, though losses from subsequent fires and suppression costs can also be a large contributor to impacts.

From the limited data regarding previous drought events available through NCEI Storm Events, it is apparent that drought has taken a considerable toll on the State’s crops in the past. Between



1995 and 2012, crop damage in West Virginia was reported to be over \$27.8 million (in 2012 dollars), which can be expressed annually as approximately \$1.9 million. No deaths, injuries or property damage appear in the NCEI dataset for drought. Extreme heat has led to three injuries and one death since 1995.

The NWS can issue heat-related information products to inform citizens of forecasted extreme heat conditions. These products are based on projected or observed heat index values and include:

1. Excessive Heat Outlook: When there is a potential for an excessive heat event within 3 to 7 days;
2. Excessive Heat Watch: When conditions are favorable for an excessive heat event within 12 to 48 hours but some uncertainty exists in regards to occurrence and timing;
3. Excessive Heat Warning / Advisory: When an excessive heat event is expected within 36 hours. These products are usually issued when confidence is high that the event will occur. A warning implies that conditions could pose a threat to life or property, while an advisory is issued for less serious conditions that may cause discomfort or inconvenience, but could still lead to threat to life and property if caution is not taken.

In West Virginia, extreme heat constitutes a low risk to the general populace. The elderly, small children, the chronically ill, and pets are considered to be more vulnerable to excessive heat than the general population.

4.J.3.d **Annualized Events and Costs**

Using the National Centers for Environmental Information (NCEI) it is possible to determine the projected annual number of events and the annualized cost associated with the hazard. See Appendix B for a completing listing of annualized events and associated costs. One of the unique factors related to Drought and Extreme Heat Hazard is that it solely has costs associated with crop damage.



County	Events	Property	Crop	Annualized Events	Total Cost	Annual Cost
Berkeley	13	\$0	\$2,150,000	0.62	\$2,150,000	\$102,381
Jefferson	13	\$0	\$2,150,000	0.62	\$2,150,000	\$102,381
Hampshire	11	\$0	\$1,620,000	0.52	\$1,620,000	\$77,143
Hardy	11	\$0	\$1,620,000	0.52	\$1,620,000	\$77,143
Morgan	11	\$0	\$1,620,000	0.52	\$1,620,000	\$77,143
Monroe	7	\$0	\$98,000	0.33	\$98,000	\$4,667
Mercer	12	\$0	\$78,000	0.57	\$78,000	\$3,714
Summers	7	\$0	\$55,000	0.33	\$55,000	\$2,619

Table 76 – Annualized Events and Costs for Drought

4.J.3.e **Hazard Rankings**

Local Hazard Mitigation Plan Ranking

While each PDC developed its own methodology to rank the hazards, a county-level ranking provides useful information to gain an understanding the hazard at a local level.

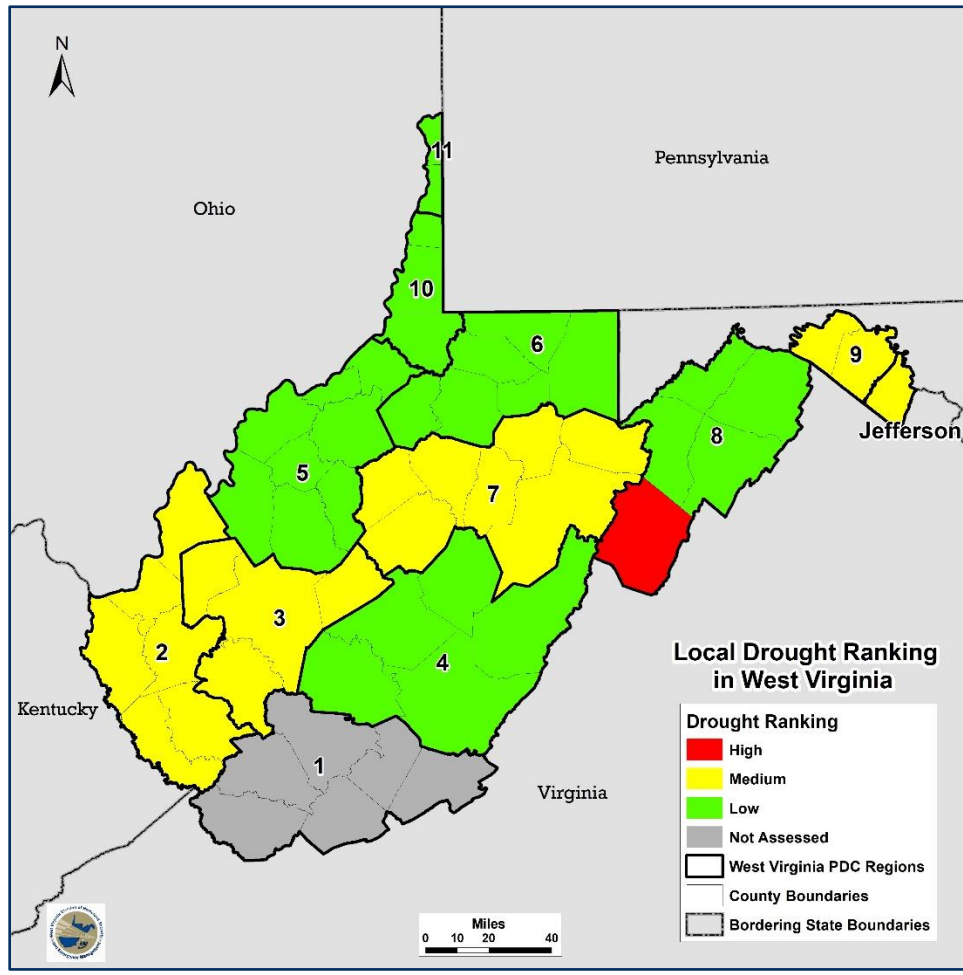


Figure 88 – Local Drought Hazard Ranking

State Hazard Ranking

The Hazard Ranking Methodology uses a structured assessment to identify a Risk Rating based upon seven areas:

- Geographic Area Impacted
- Property Damage
- Population Vulnerability
- State Infrastructure Damages
- Deaths or Injuries
- History of Occurrence
- Regional HMP Ranking

All counties in West Virginia were ranked as having a high level of risk for flooding.



Utilizing the methodology established for the *2018 WV Statewide Standard Hazard Mitigation Plan Update*, the vulnerability for drought was calculated. Only Pendleton was rated as having a High risk associated with drought.

4.J.3.f Critical Facilities

Since only 1 county is rated having a high vulnerability to droughts, the affected on critical facilities is limited. In most cases, the threats associated with drought would be related to the reallocation of existing funds to address drought issues than a direct impact on the facilities. In addition, there might be some additional impacts related to providing certain aspects of programs associated with these critical facilities. For instance, prolonged droughts would likely lower critical water tables necessary to feed fire hydrants or other filling stations which could prevent fire departments from obtaining needed water for fire suppression.

PDC Region	County	OES	Police Departments	Fire Departments	Hospitals	Public Schools (K-12)
Region 8	Pendleton	1	2	6	0	4

Table 77 – Critical Facilities in High Risk Drought Area

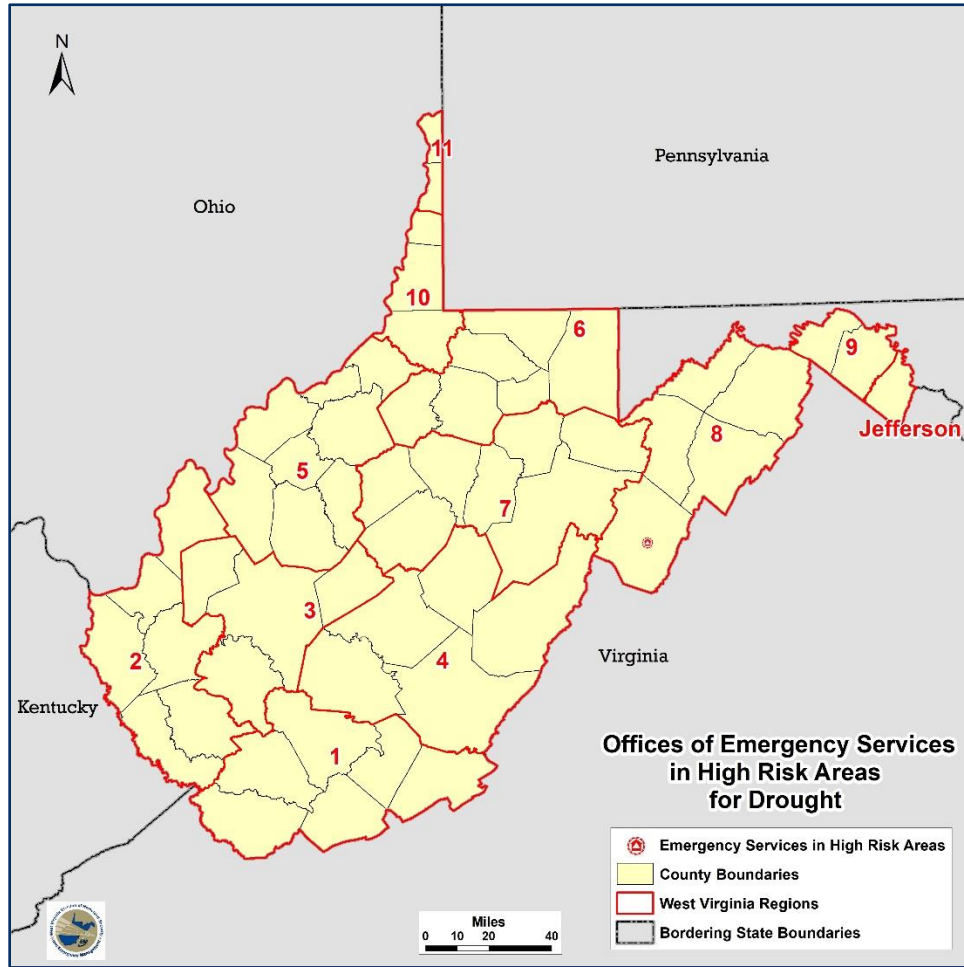


Figure 89 – OES in High Risk Drought Area

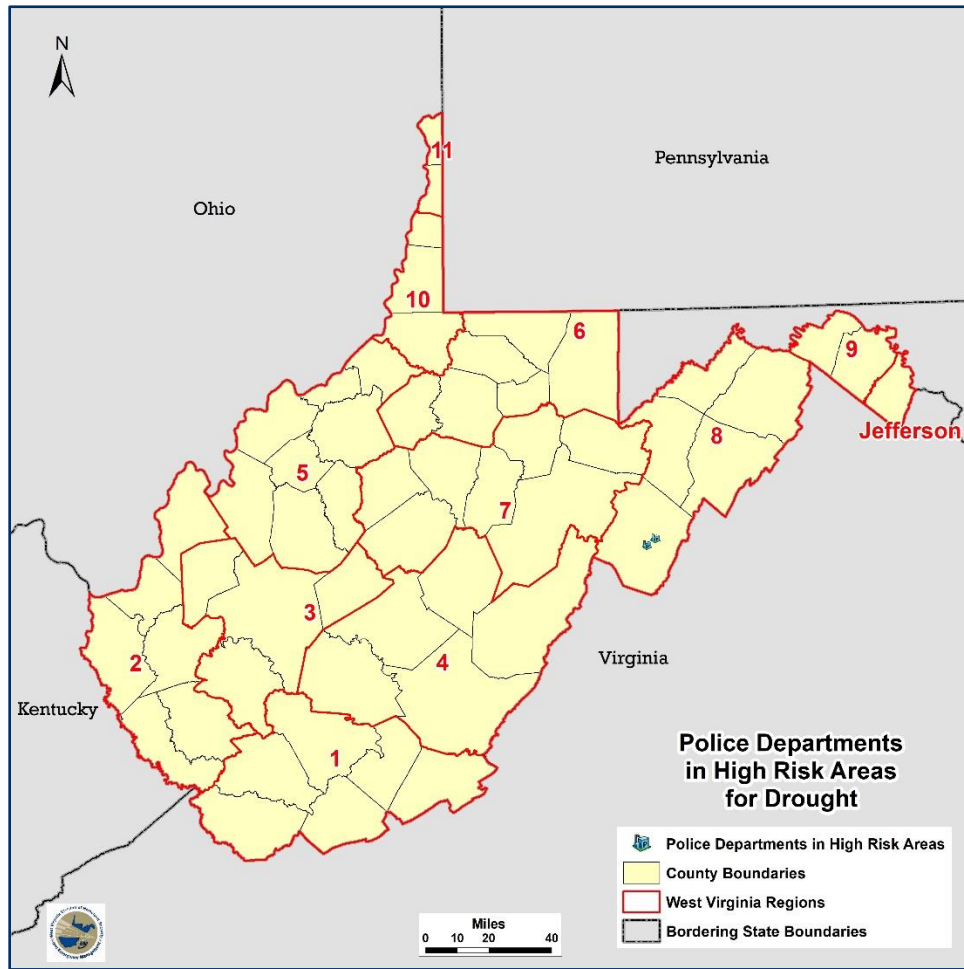


Figure 90 – Police Departments in High Risk Drought Area

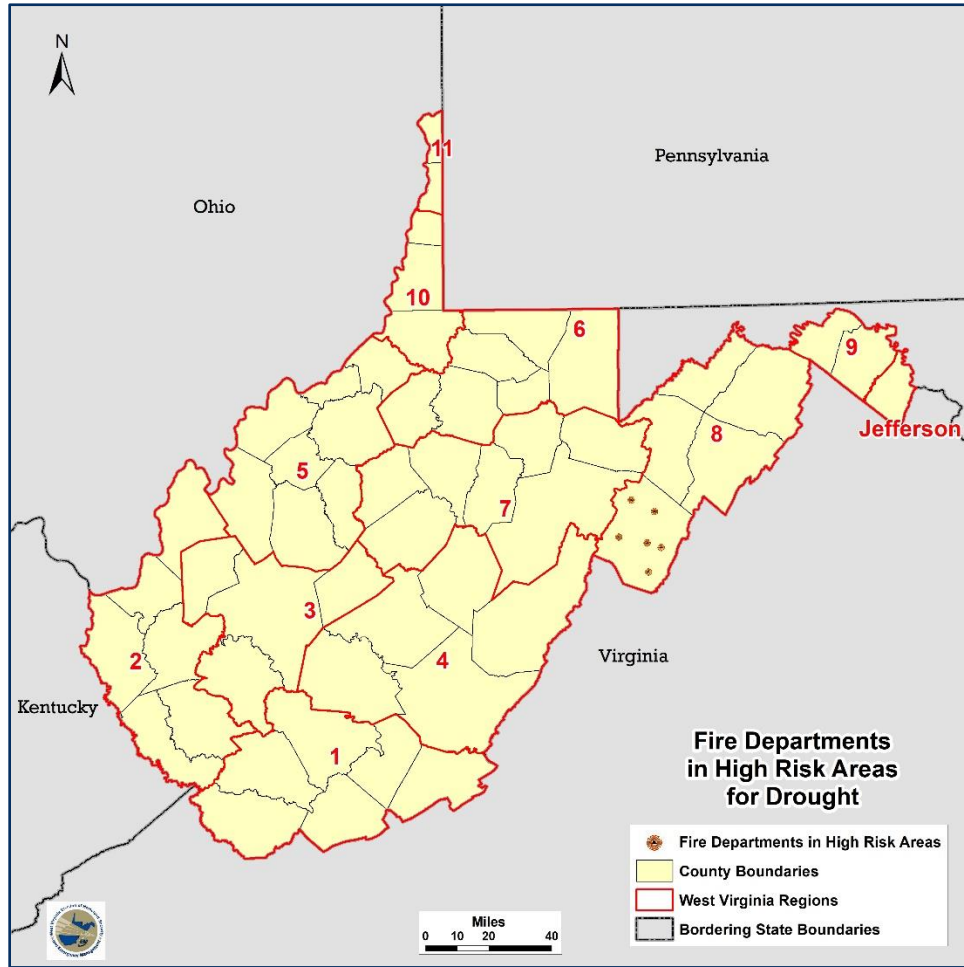


Figure 91 – Fire Departments in High Risk Drought Area

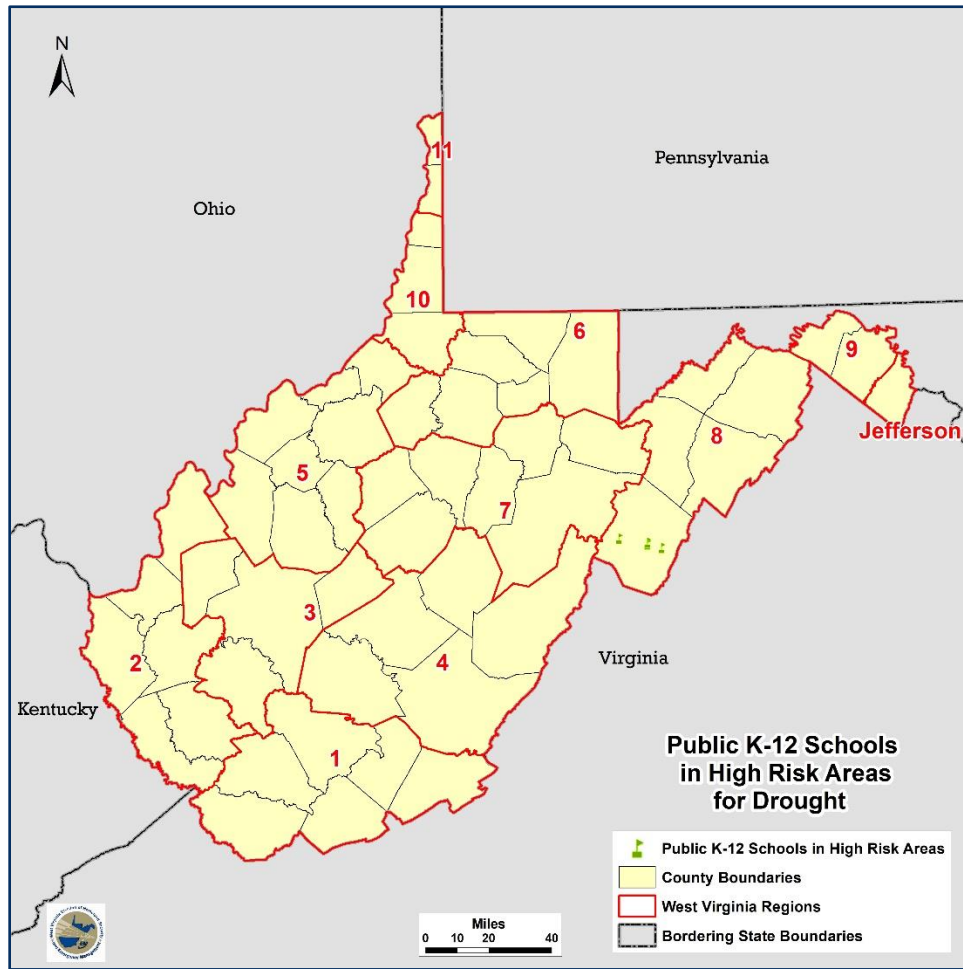


Figure 92 – Public Schools (K-12) in High Risk Drought Area

4.J.3.g **BRIM-covered Facilities**

There would be little direct impact on BRIM-covered facilities during prolonged droughts. There could, however, be secondary affects associated to increased landscaping expenses, lack of water, and other issues.

PDC Region	County	Number of Structures	Building Value	Content Value	Total Value
Region 8	Pendleton	110	\$59,148,606	\$9,853,900	\$69,002,506

Table 78 – BRIM-covered Facilities in High Risk Drought Area

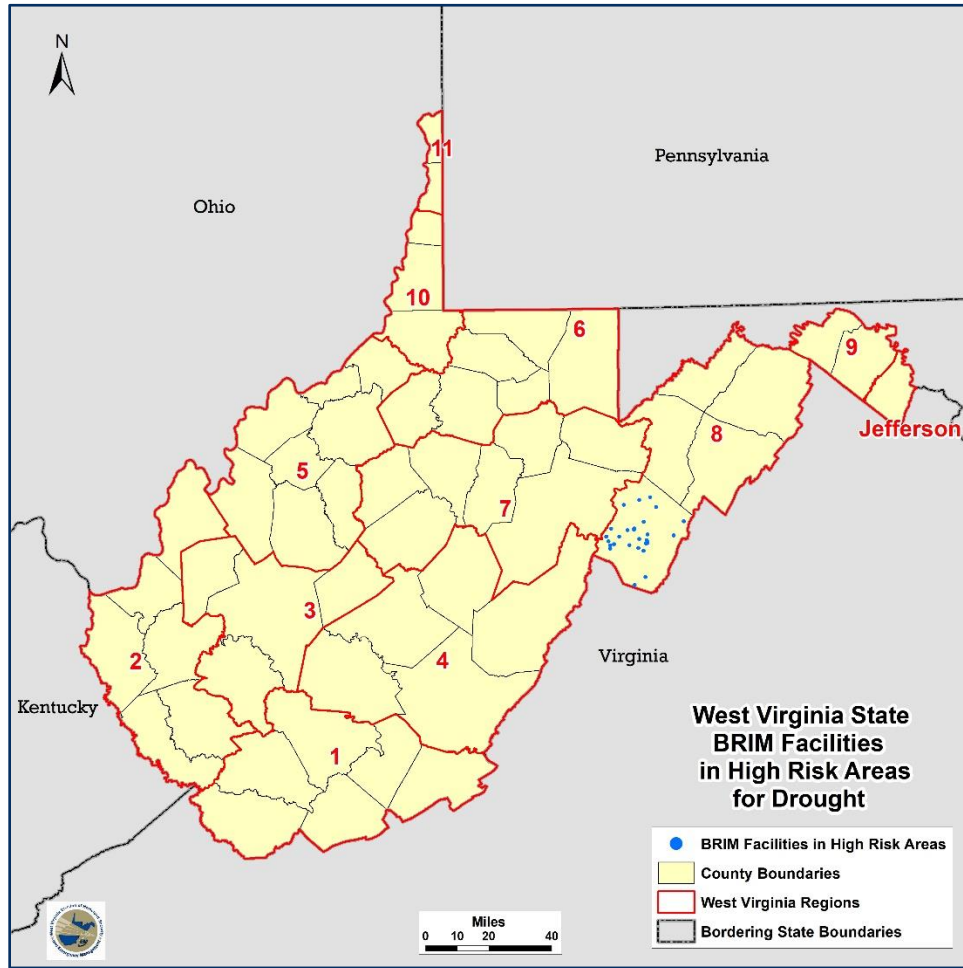


Figure 93 – BRIM-covered Facilities in High Risk Drought Area

4.J.4. Future Conditions

As predictions indicate increased precipitation and more extreme weather events, the possibility of drought becomes less of a concern. The occurrence of more frequent high intensity rainfall events may create less opportunity for drought conditions to manifest. While predicted increase rainfall diminishes droughts, it is unclear the effects on extreme heat conditions.

However, based upon information obtained to produce this report the drought hazard may be considered for removal from future updates.



4.K. Earthquake

4.K.1. Background Information

Earthquakes are the sudden, rapid shaking of the ground. Caused by the shifting and breaking of rock beneath the earth’s surface, earthquakes result in three basic phenomena: ground motion, surface faulting, and related ground failures. While most earthquakes tend to occur at the boundaries where tectonic plates meet, some earthquakes do occur in the middle of the plates.

Earthquakes are measured using two methods. The Seismic Magnitude scientifically measures the severity of ground motion, while the Modified Mercalli Intensity (MMI) Scale measures the “felt-intensity” of the earthquake. In terms of measuring community impact and potential damage, the MMI provides the best measurement, as it takes into account the stricter construction requirements in regions more prone to earthquakes than those that experience relatively few earthquakes.

Richter Magnitude Scale	Modified Mercalli Intensity Scale
1.0 to 3.0	I
3.1 to 3.9	II to III
4.1 to 4.9	IV to V
5.1 to 5.9	VI to VII
6.1 to 6.9	VI to IX
7.0 and Higher	X

Table 79 – Comparison of Earthquake Scales



Scale	Definition
I	Not felt except by a very few under especially favorable conditions
II	Felt only by a few persons at rest, especially on upper floors of buildings
III	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck.
IV	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors, disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken
VIII	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
XI	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
XII	Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Table 80 – Earthquake Scales Description



4.K.2. Historical and Notable Events

To date, there have been no Federal Declared Disasters or National Center for Environmental Information (NCEI) recorded events for earthquakes in West Virginia. West Virginia has a moderate risk of seismic activity; however, any potential damage from this seismic activity is relatively low, when compared to States with more dense populations and tall buildings.

Effects from intraplate earthquakes in other States are often felt in West Virginia. The New Madrid fault is considered a major seismic zone for the southern and Midwestern United States. The New Madrid fault caused a series of devastating earthquakes from 1811 through 1812 that could be felt throughout West Virginia. In September of 1886 a magnitude 7.3 earthquake occurred in Charleston, SC that produced noticeable movement and minor damage in West Virginia.

1897. Earthquake located in Giles County, Virginia was reported in Bluefield, West Virginia.

1909. Earthquake centered near Charles Town, WV caused pictures to be thrown from walls and residents were awakened by the 2:25am tremor.

1935. Earthquake located in Timiskaming, Quebec, Canada felt in West Virginia.

1937. Earthquake in Anna, Ohio felt in Region 2 along the Ohio River.

1944. Strong earthquake tremors in Canada reached Parkersburg.

1959. Earthquake located along the WV-VA border caused some minor damage.

1969. Earthquake with a 4.3 magnitude was the most widely felt earthquake in West Virginia's history. Epicenter location is not known.

1972. Morgantown, WV experienced a minor tremor.

1974. Giles County, Virginia was the center of a moderate disturbance, and a small earthquake in Ohio was felt in Parkersburg and other areas of Region 2.

2010. The USGS documented 15 felt reports near the epicenter in Braxton County, West Virginia, in Region 7.

August 2011. West Virginians felt a 5.8 Md earthquake that had its epicenter in Virginia. That quake caused buildings in Charleston to sway, and was felt as far away as Charlotte, NC.

July and August 2013. Three low magnitude earthquakes occurred. They ranged from 2.6 to 2.8 Md and were not reported, but rather showed up on sensing equipment.



October 2013. A similar, small-scale earthquake picked up by instrumentation.

June 2014. A small, 2.6Md earthquake picked up by instruments, but not reported.

January 2016. A 3.0 Md earthquake reported by one person in Bolivar, WV.

August 2016. A 2.31 Md earthquake picked up in Shamrock, WV.

May 2017. A 2.1 Md earthquake deep in the ground was picked up by instrumentation in West Liberty, WV. One month later, a similar 2.7 Md was recorded in Montgomery, WV.

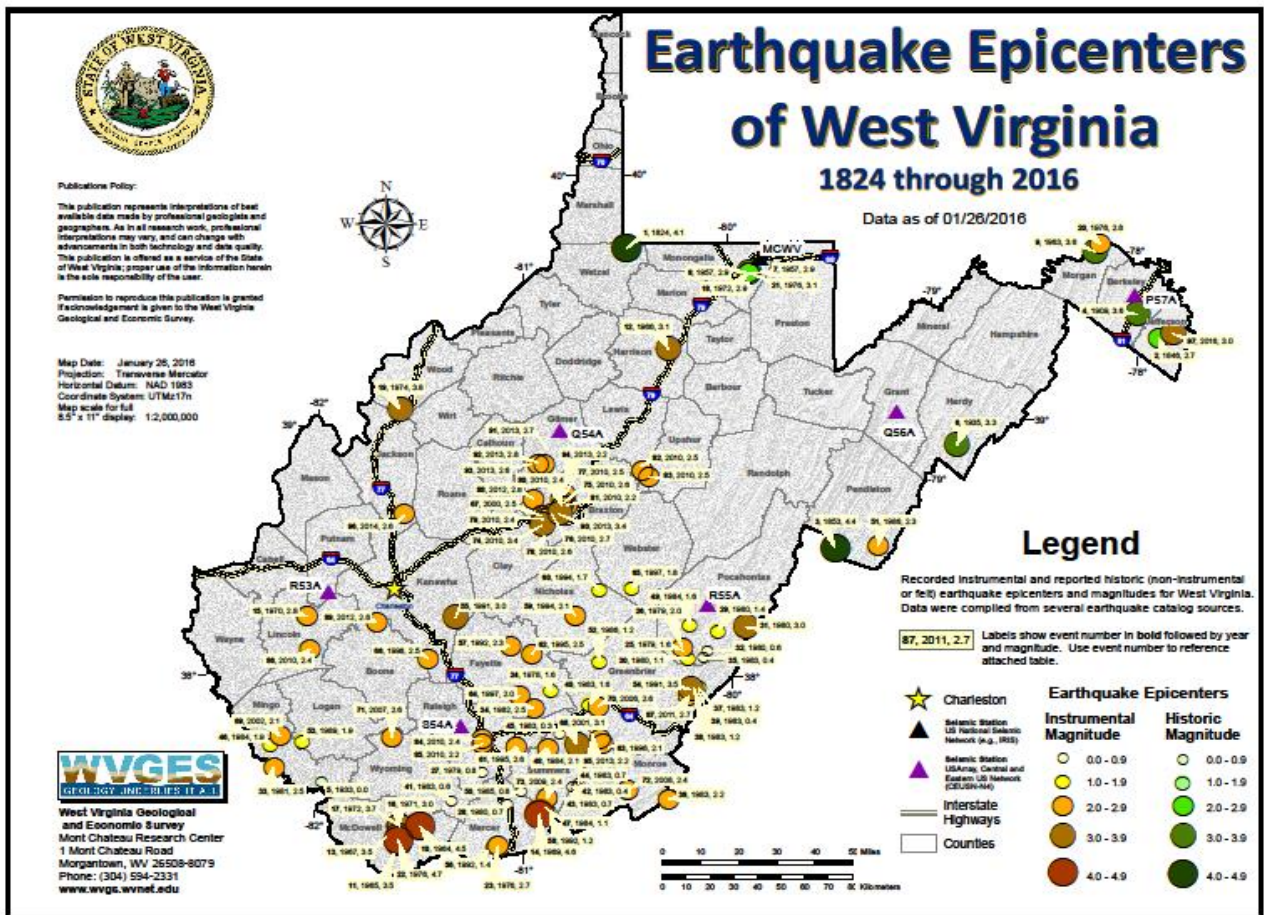


Figure 94 – Earthquake Epicenters (1824-2016)



4.K.3. Risk Assessment

4.K.3.a Introduction

In spite of extensive research and sophisticated equipment, it is difficult to predict an earthquake, although experts can estimate the likelihood of an earthquake occurring in a particular region. FEMA has developed a software suite, named HAZUS, for estimating potential losses from disasters. The HAZUS-MH earthquake model estimates damages and loss to buildings, lifelines, and essential facilities from scenario and probabilistic earthquakes.

Earthquake risk is related to the following factors²⁶:

- Ground motion
- Fault rupture under or near a building; often occurring in buildings located close to faults
- Reduction of the soil bearing capacity under or near a building
- Earthquake-induced landslide near a building
- Earthquake-induced waves in bodies of water near a building

4.K.3.b Probability

Earthquakes are low probability, high-consequence events. In states like West Virginia, with low seismic activity, buildings are not designed to deal with earthquake threat. Earthquakes occur along several fault lines crossing into the state, but larger earthquakes develop in surrounding states and are felt in West Virginia.

No single map is able to characterize seismic hazards because so many variables influence the magnitude and extent of areas affected. The map shown in Figure 95 was developed by the USGS and shows the relative hazard ranging from highest to lowest, and allows comparisons of the relative risk among different areas of the country. As can be seen on this map, West Virginia has a relatively low hazard level, with only a slight increase in the southern part of the State.

²⁶ HAZUS-MH Risk Assessment and User Group Series How-to-Guide: Using HAZUS-MH for Risk Assessment (FEMA 433/August 2004)

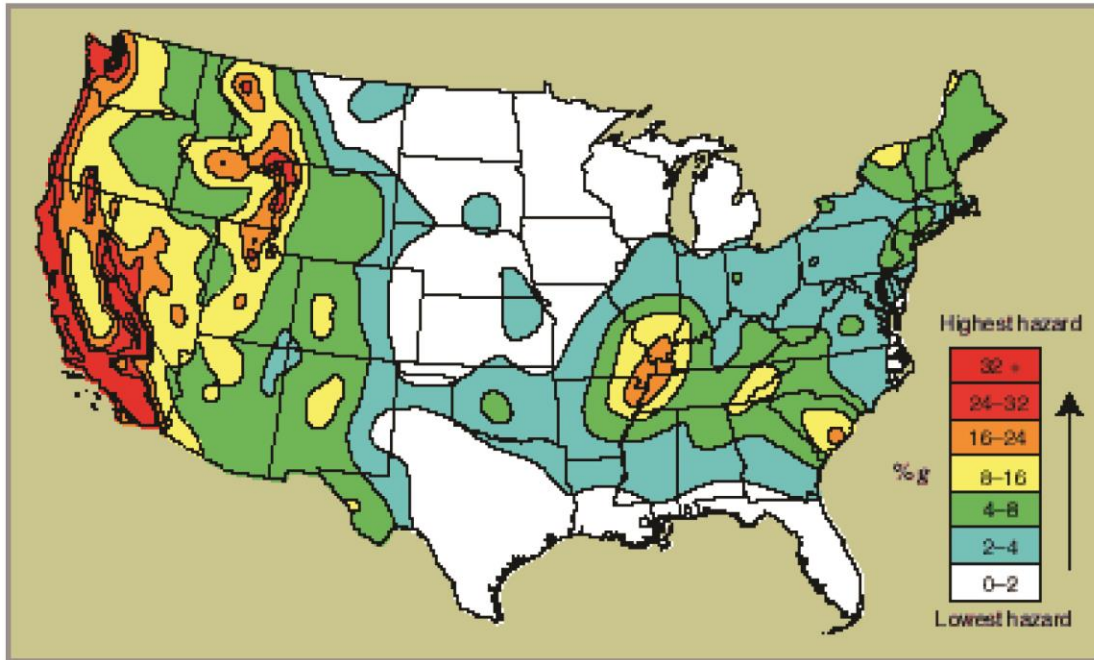


Figure 95 – Relative Seismic Hazard Map

Source: USGS, 2002

Probabilistic ground motion maps are typically used to assess the magnitude and frequency of seismic events. These maps measure the probability of exceeding a certain ground motion, expressed as percent Peak Ground Acceleration (PGA), over a specified period of years. The severity of earthquakes is site specific, and is influenced by proximity to the earthquake epicenter and soil type, among other factors. Figure 96 shows the 10% 50-year peak ground acceleration of West Virginia and surrounding States. The counties in the southwest portion of the State have a slightly elevated PGA as compared to the rest of West Virginia.

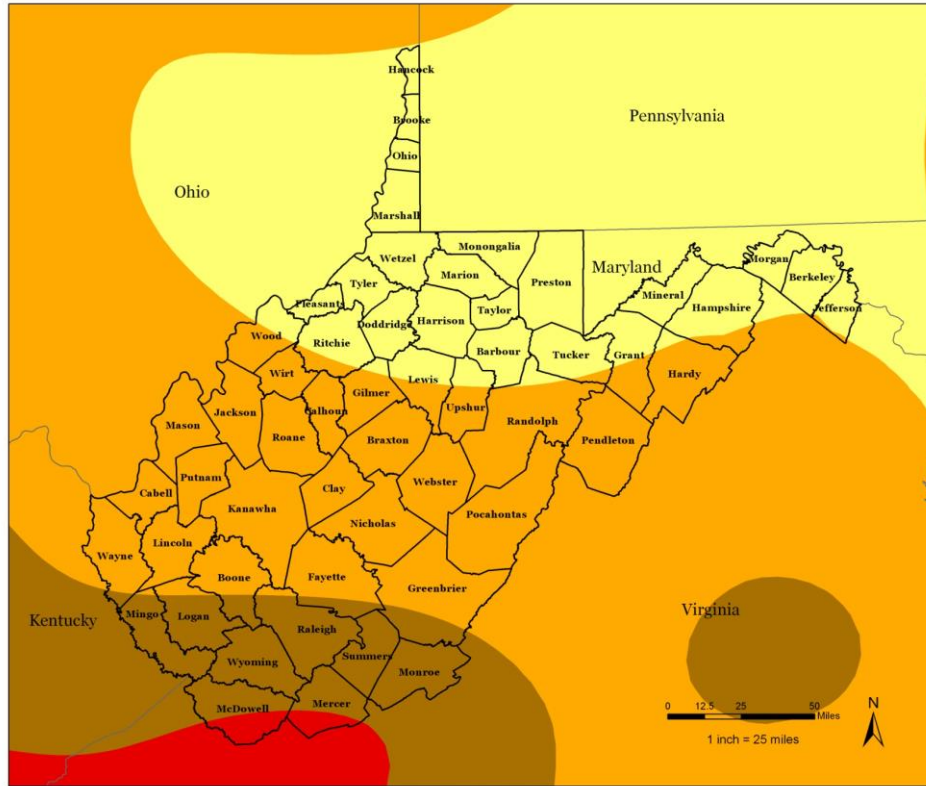


Figure 96 – Seismic Hazard, Peak Ground Acceleration

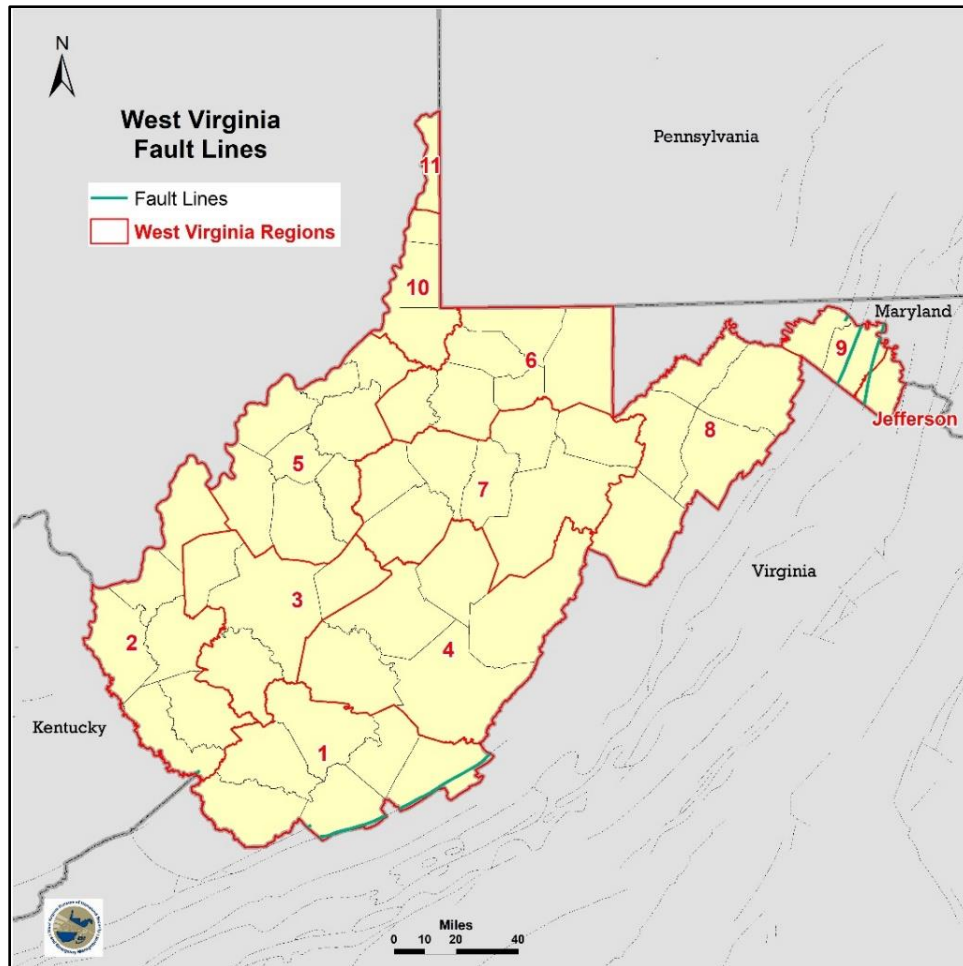


Figure 97 – Fault Lines in WV



4.K.3.c **Impact and Vulnerability**

Impacts from earthquakes can be severe and cause significant damage. Ground shaking can lead to the collapse of buildings and bridges and disruption of gas and electric lines, phone service, and other critical utilities. Death, injuries, and extensive property damage are possible vulnerabilities from earthquakes. Some secondary hazards caused by earthquakes may include fire, hazardous material release, landslides, flash flooding, avalanches, tsunamis, and dam failure.

4.K.3.d **Annualized Events and Cost**

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 States²⁷. 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).

The AEL and AELR utilized the 2010 U.S. Census for residential buildings, the 2006 Dun & Bradstreet report for nonresidential buildings and the 2014 R.S. Means report for all building replacement costs. Estimated statewide damage losses decreased by 65% during the update. Earthquake related losses to specific State and critical facilities were not calculated.

As seen in Figure 98, the majority of counties in WV have minimal damages associated with Earthquakes. Only a narrow band of counties had annualized damages between \$500,000 and \$1 million. This area corresponds with dense population corridor from Beckley to Charleston to Huntington.

²⁷ https://www.fema.gov/media-library-data/1497362829336-7831a863fd9c5490379b28409d541efe/FEMAP-366_2017.pdf

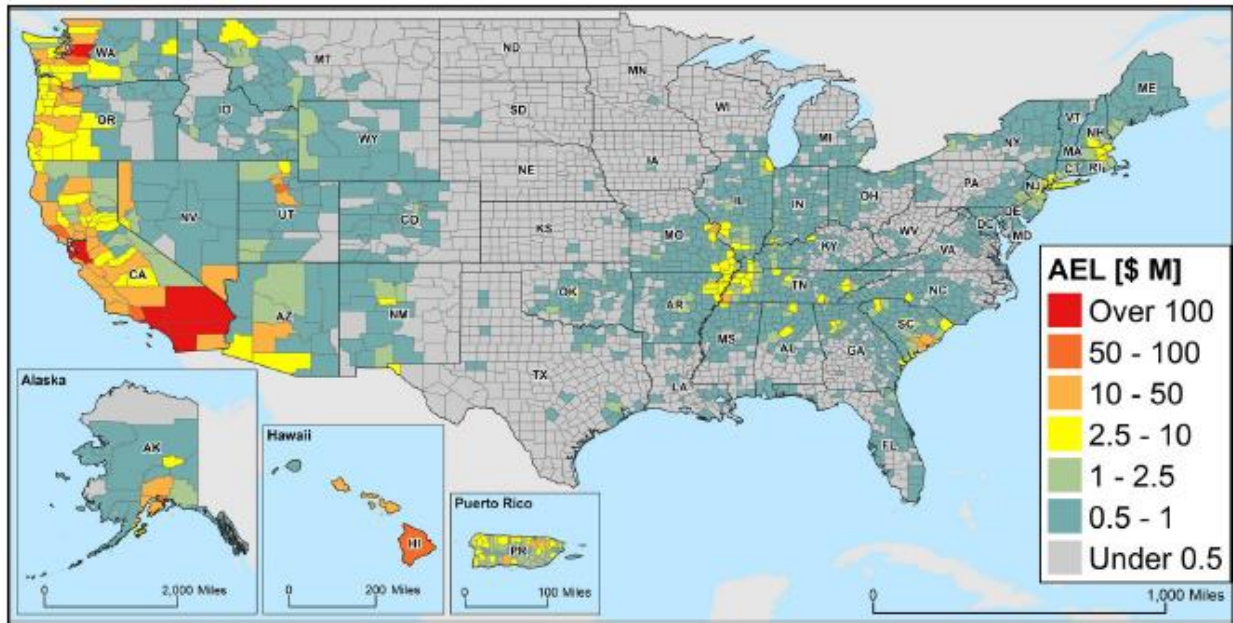


Figure 98 – Annualized Earthquake Loss Map by County

	Rank	\$
Annualized Earthquake Loss (AEL) (\$ x 1,000)	44	1,456
Annualized Earthquake Loss Ratio (\$/million \$)	41	7.4

Table 81 – Annualized Earthquake Loss

	Rank	250-Year Event	1,000-Year Event
Estimates of Debris (x 1,000 tons)	40	30	200
Estimates of Displaced Households	42	20	182
Estimates of Short-Term Shelter Requirements (# of People)	42	13	115

Table 82 – HAZUS Annualized Losses



With future growth, various non-structural methods, such as zoning and grading ordinances, as well as structural methods, would have to be analyzed in terms of being cost-effective alternatives. Zoning and grading ordinances to avoid building in areas of potential hazard or to regulate construction to minimize potential for landslide is one non-structural method to reduce the likely consequences of debris flows.

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. Table 83 shows the HAZUS results for the probabilistic annualized loss run by county. Kanawha County has the highest annualized loss due to earthquake; West Virginia can expect \$7,159,176 in annualized losses due to earthquake.



Earthquake Annualized Loss Brackets			
> \$500,000			
Kanawha County	\$722,629		
\$250,000 - \$499,999			
Mercer County	\$446,362	Fayette County	\$289,284
Raleigh County	\$444,673	Putnam County	\$254,898
Cabell County	\$431,987		
\$150,000 - \$249,999			
Wyoming County	\$249,094	Summers County	\$175,517
Logan County	\$235,516	Lincoln County	\$166,138
Greenbrier County	\$224,473	Wood County	\$160,327
McDowell County	\$201,161	Wayne County	\$157,889
Mingo County	\$185,500	Boone County	\$153,024
\$100,000 - \$149,999			
Monongalia County	\$135,271	Mason County	\$117,508
Berkeley County	\$130,436	Jackson County	\$107,283
Nicholas County	\$123,458	Randolph County	\$103,604
Harrison County	\$121,371		
\$50,000 - \$99,999			
Marion County	\$96,570	Pocahontas County	\$62,390
Monroe County	\$94,281	Ritchie County	\$62,384
Webster County	\$83,590	Lewis County	\$59,266
Jefferson County	\$83,424	Hardy County	\$58,073
Ohio County	\$83,400	Upshur County	\$55,140
Roane County	\$79,612	Barbour County	\$53,590
Grant County	\$77,620	Preston County	\$52,819
Clay County	\$75,806	Gilmer County	\$52,612
Taylor County	\$64,658		
< \$49,999			
Wetzel County	\$49,895	Tyler County	\$40,339
Braxton County	\$48,454	Hampshire County	\$39,834
Pendleton County	\$48,272	Pleasants County	\$39,019
Brooke County	\$46,969	Doddridge County	\$37,896
Wirt County	\$44,134	Mineral County	\$37,449
Morgan County	\$43,973	Hancock County	\$37,129
Marshall County	\$40,870	Tucker County	\$31,550
Calhoun County	\$40,759		

Table 83 – HAZUS Total Annualized Loss by County

4.K.3.e **Hazard Ranking**

Local Hazard Mitigation Plan Ranking

While each PDC developed its own methodology to rank the hazards, a county-level ranking provides useful information to gain an understanding the hazard at a local level.

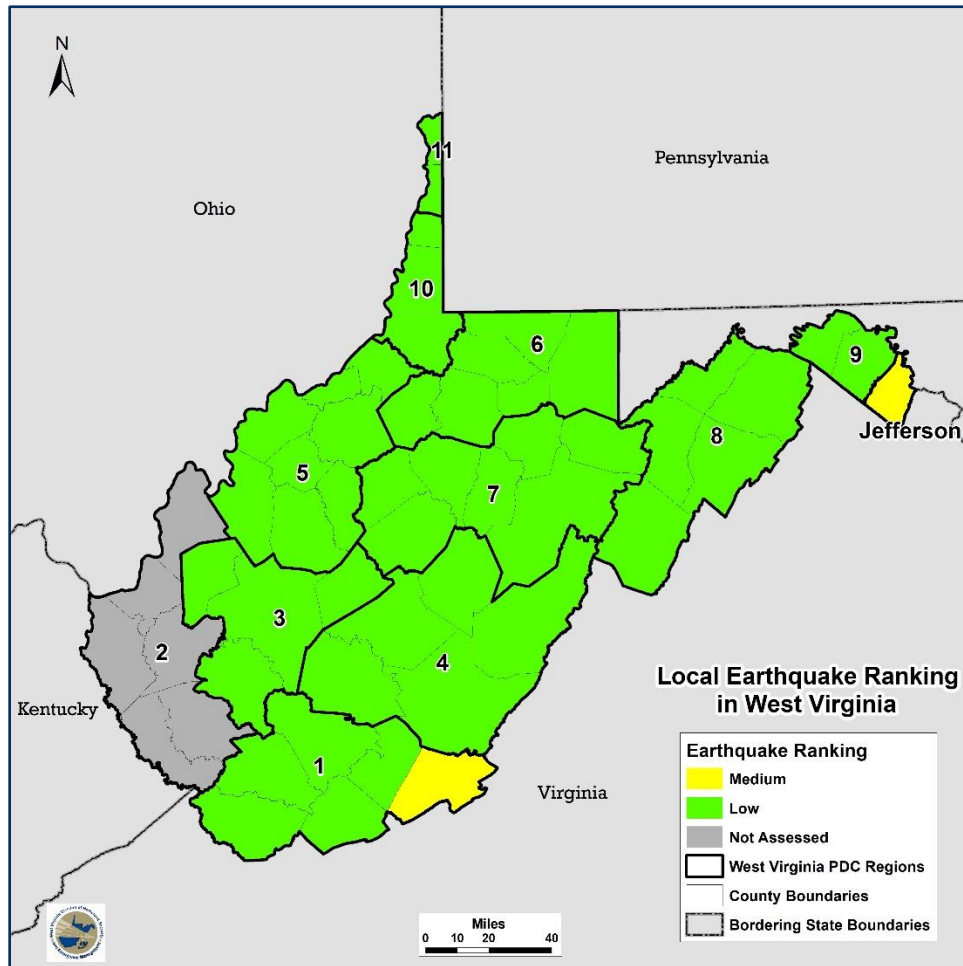


Figure 99 – Local Earthquake Hazard Ranking Map

State Hazard Ranking

The Hazard Ranking Methodology uses a structured assessment to identify a Risk Rating based upon seven areas:

- Geographic Area Impacted
- Property Damage
- Population Vulnerability
- State Infrastructure Damages
- Deaths or Injuries
- History of Occurrence
- Regional HMP Ranking

All counties in West Virginia were ranked as having a high level of risk for flooding.



Utilizing the methodology established for the 2018 WV Statewide Standard Hazard Mitigation Plan Update, the vulnerability for Earthquakes was calculated. Only two counties, Jefferson and Monroe, were rated as having a High risk associated with earthquakes.

4.K.3.f **Critical Facilities**

The majority of the critical facilities are located in Jefferson County with 34 of the total critical facilities. The majority of the critical facilities are schools (22), followed by fire departments (14).

PDC Region	County	OES	Police Departments	Fire Departments	Hospitals	Public Schools (K-12)
Jefferson	Jefferson	1	7	8	1	17
Region 1	Monroe	1	4	6	0	5

Table 84 – Critical Facilities in High Risk Earthquake Areas

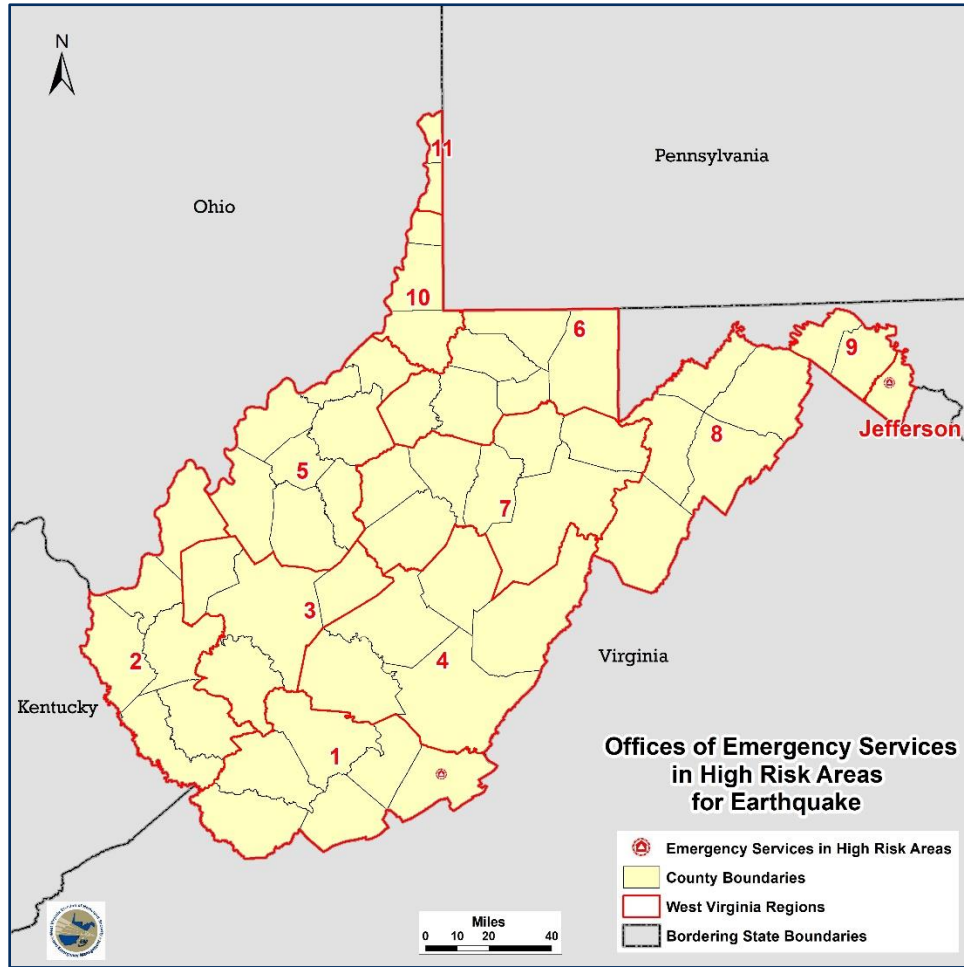


Figure 100 – OES in High Risk Earthquake Areas

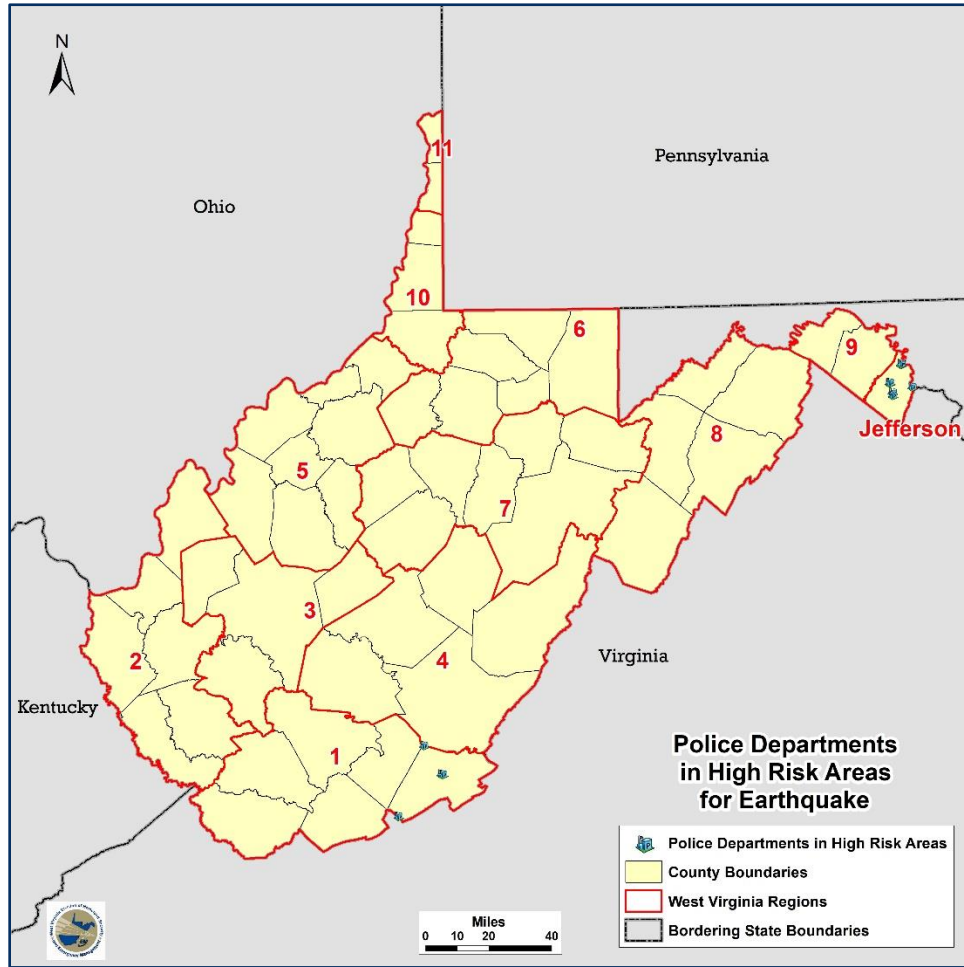


Figure 101 – Police Departments in High Risk Earthquake Areas

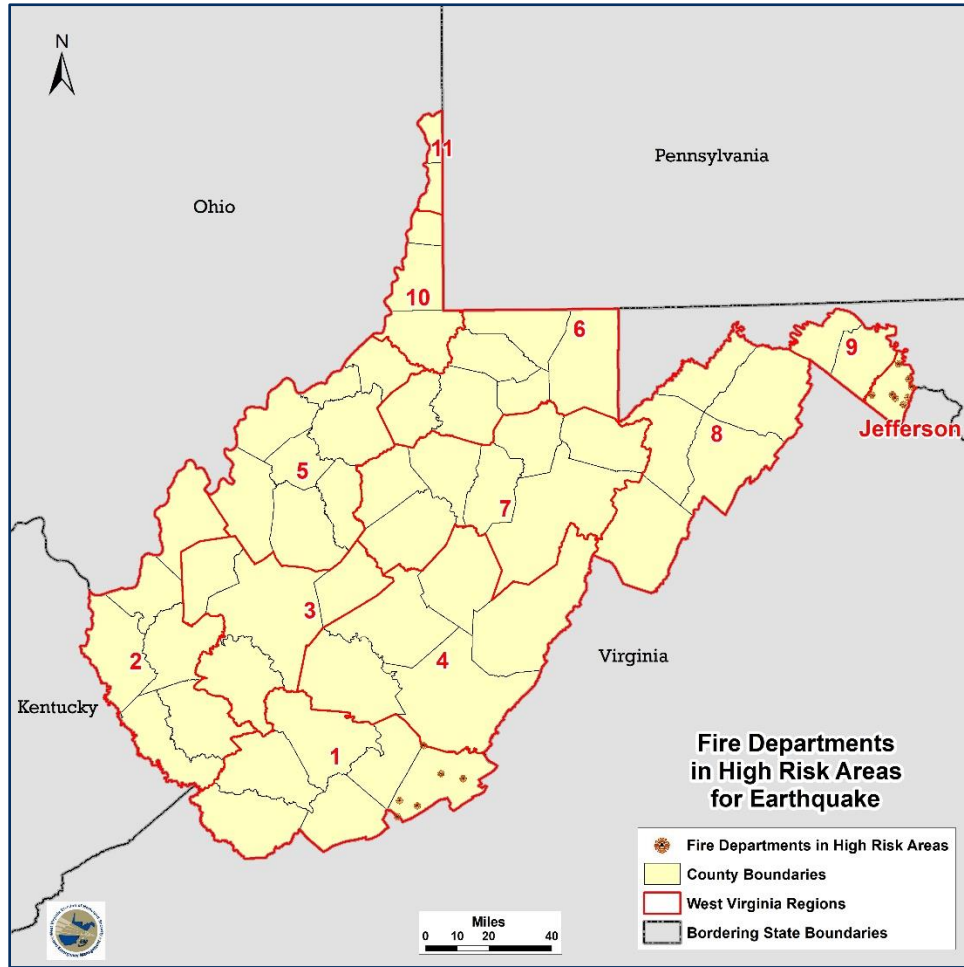


Figure 102 – Fire Departments in High Risk Earthquake Areas



Figure 103 – Hospitals in High Risk Earthquake Areas

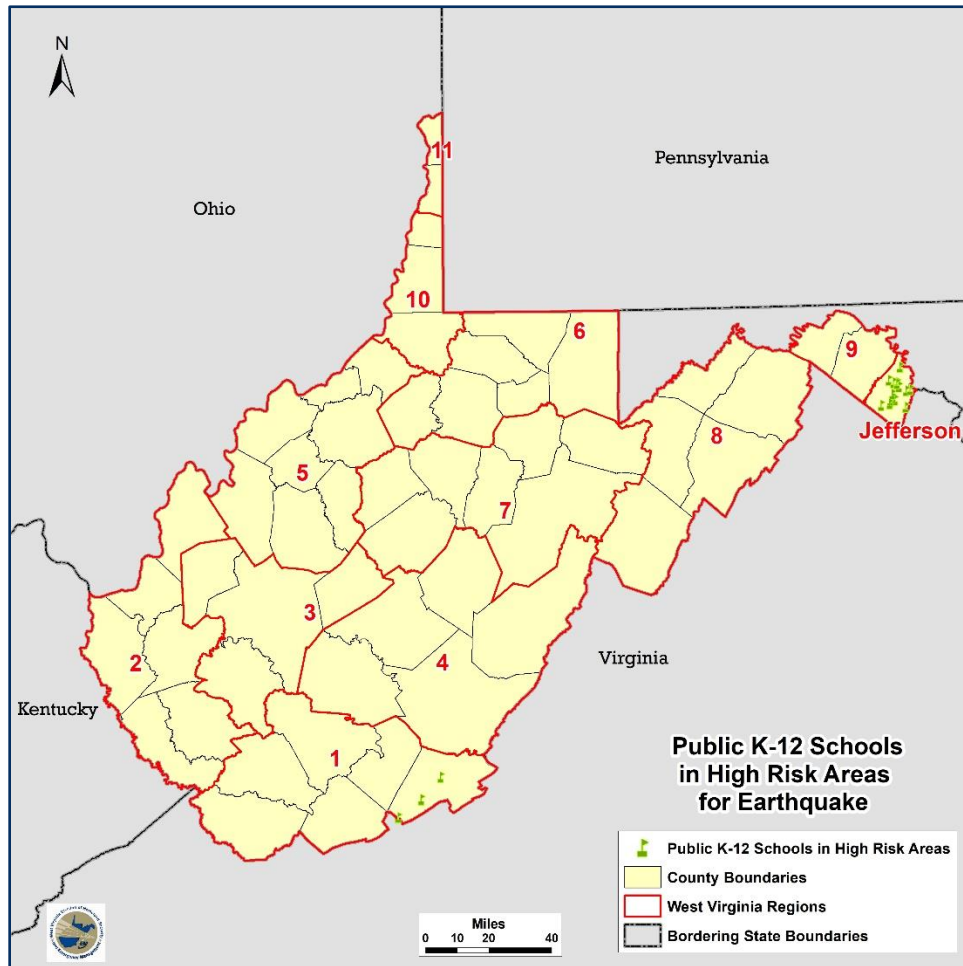


Figure 104 – Public Schools (K-12) in High Risk Earthquake Areas

4.K.3.g **BRIM-covered Facilities**

There is a total of 473 BRIM-covered structures in the two counties with the highest vulnerability to Earthquakes. Jefferson County accounts for 357 of the facilities, or 75% of the total number of critical facilities, and nearly 90% of the total value of the critical facilities.



2018 WV Statewide
Standard Hazard
Mitigation Plan Update

PDC Region	County	Number of Structures	Building Value	Content Value	Total Value
Jefferson	Jefferson	357	\$852,898,365	\$89,343,623	\$942,241,988
Region 1	Monroe	116	\$97,596,858	\$11,540,427	\$109,137,285

Table 85 – BRIM-covered Facilities in High Risk Earthquake Area



Figure 105 – BRIM-covered Facilities in High Risk Drought Area



4.K.4. Future Conditions

While there is no clear evidence as to any direct link between earthquakes (occurrence, frequency, intensity) and changing climate, it is likely that changing environmental conditions could lead to an increase in secondary hazard impacts. Increased rainfall amounts could result in significant flooding in the event of a dam or levee breach because of an earthquake; this is a concern if the dam or levee is routinely functioning at capacity.

With future growth, various non-structural methods, such as zoning and grading ordinances, as well as structural methods, would have to be analyzed in terms of being cost-effective alternatives. Zoning and grading ordinances to avoid building in areas of potential hazard or to regulate construction to minimize potential for landslide is one non-structural method to reduce the likely consequences of debris flows.

Impacts from earthquakes can be severe and cause significant damage. Ground shaking can lead to the collapse of buildings and bridges and disruption of gas and electric lines, phone service, and other critical utilities. Death, injuries, and extensive property damage are possible vulnerabilities from earthquakes. Some secondary hazards caused by earthquakes may include fire, hazardous material release, landslides, flash flooding, avalanches, tsunamis, and dam failure.

4.L. Composite Hazard Results

The previous sections of the 2018 WV Statewide Standard Hazard Mitigation Plan Update examined the threats which have the highest vulnerability in West Virginia. While the methodology used in this update is not ideal, it does provide a consistent approach for evaluating risk. Future updates will involve a more robust, data-driven approach.

4.L.1. Summary of Hazards

Table 86 describes the critical facility types and BRIM-covered structures which are vulnerable for each specific hazard. One of the challenges of methodology used in this analysis is that most of the threats were analyzed at the county level, meaning that all structures in a given county were deemed vulnerable. Flooding, however, used a more focused geographically analysis process by limiting identified structures to those in the 100-year floodplain.



2018 WV Statewide
Standard Hazard
Mitigation Plan Update

Hazard	Number of Counties	Critical Facilities	BRIM-covered Facilities	BRIM-covered Facilities Values
Flooding	55	224	106	\$180,659,602
Landslide/Subsidence	12	404	3,883	\$4,757,177,226
Severe Storms	9	306	2,849	\$2,802,237,506
Winter Weather	35	1,032	10,436	\$15,634,295,251
Wildfire	16	436	3,994	\$4,403,146,027
Dam Failure	1	34	357	\$942,241,988
Drought	1	12	110	\$69,002,506
Earthquake	2	50	473	\$1,051,379,746

Table 86 – Summary of Facilities Affect by Hazards



5. SUPPORTING LOCAL PLANS

This chapter provides details on funding for hazard mitigation plans, original plan development, plan updates, as well as technical assistance provided by WVDHSEM. To support the development of local hazard mitigation plans, WVDHSEM provides assistance to local and regional jurisdictions through several mediums, including interim guidance, training materials, and Pre-Disaster Mitigation (PDM) funding for plan development.

5.A. Status of Local Hazard Mitigation Plans

The 1971 *West Virginia Regional Planning & Development Act* mandated that West Virginia be divided into 11 regions to serve as "development districts" to more effectively use the State's resources and maximize attracting Federal dollars to small communities. Jefferson County opted to remain as a separate Region. Each Region submits a Local Hazard Mitigation Plan (LHMP) to West Virginia Division of Homeland Security and Emergency Management and to the Federal Emergency Management Agency for review and approval.

The LHMPs must be updated every five years from date of plan approval to maintain program funding eligibility. The update status for each the Local Hazard Mitigation Plan is located in Table 87.

PDC Region	Plan Status	Funding Source
1	1/31/2022	FEMA-4071-DR-0003 (\$50,900)
2	APA	FEMA-4220-DR-0003 (\$60,000)
3	5/22/2022	FEMA-4210-DR-0017 (\$51,000)
4	2/21/2022	FEMA-4071-DR-0003 (\$50,900)
5	12/4/2021	FEMA-4071-DR-0003 (\$50,900)
6	APA	FEMA-4221-DR-0004 (\$71,110)
7	APA	FEMA-4210-DR-0017 (\$61,800)
8	Expired	FEMA-4219-DR-0006 (\$60,536)
9	2/28/2022	FEMA-4210-DR-0013 (\$50,900)
10	9/28/2022	FEMA-4093-DR-0006 (\$50,900)
11	APA	FEMA-4219-DR-0005 (\$17,207)
Jefferson	Expired	FEMA-4273-DR-0005 (\$60,000)
WV HMP		PDM 2016 (\$250,000)

Table 87 – PDC Plan Status and Funding

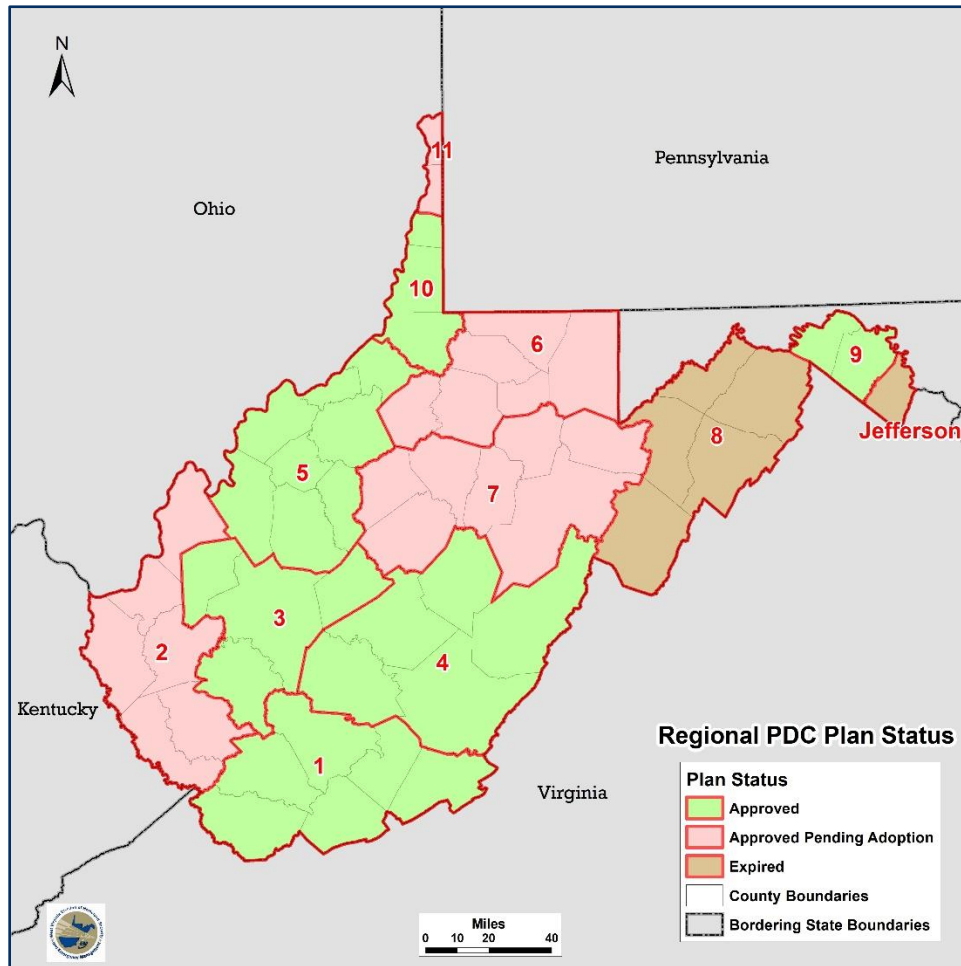


Figure 106 – Regional PDC Plan Status Map

Following the submission, the local plans are reviewed by WVDHSEM personnel to identify any deficiencies are identified, the plan is sent back to the PDCs for correction. After WVDHSEM approval, the LHMP is submitted to FEMA for official review and approval. Upon approval from FEMA, LHMPs are integrated into the WVSHMP.

5.B. Defining “Local Planning Jurisdictions”

One of the key issues facing any State as it starts the mitigation planning process is to define “locality” sufficiently to meet current FEMA standards. The definition of a “locality” provided in the Disaster Mitigation Act of 2000 (DMA2000) regulations was written to encompass the broad variety of community types across the United States. As such, it was much broader than most States’ political organization. The basis of the DMA2000 local government definition is the NFIP definition of a “locality”. It was FEMA Region III’s position that the definition of a locality responsible for development of an HMP is:



Any area or political subdivision within the State as defined by the Code of the State that has authority to create, adopt and/or enforce land use, zoning, or subdivision ordinances and regulations for the areas within its boundaries.

While the NFIP definition includes Native American tribes and organizations in its description, West Virginia does not currently have any federally recognized native organizations or authorized tribal organizations. As a result, those categories were excluded from the definition above. Within West Virginia, this definition encompasses the counties, cities, and incorporated recognized by the Code of West Virginia. West Virginia counties, cities, and incorporated towns have independent land use management authority within their respective boundaries. The PDCs are regional planning organizations that provide technical and planning support to the localities within their respective regions. However, while the PDCs do perform land use planning at the request of their localities, they cannot implement or enforce the plans they create for those localities. Implementation and enforcement remain the responsibility of the cities, counties, and towns for which plans were developed.

The term "locality" means the county where the construction is to be performed, except that if there is not available in the county a sufficient number of competent skilled laborers, workmen and mechanics to perform such construction efficiently and properly, and may include one or more counties in this state adjacent to the one in which the construction is to be performed and from which such skilled laborers, workmen and mechanics may be obtained in sufficient numbers to perform the construction. With respect to construction of public improvements with the state road commission, "locality" may be construed to include one or more counties in this state adjacent to the one in which the construction or public improvement is to be performed and from which skilled laborers, workmen and mechanics may be accessible for work on such construction on public improvements. (West Virginia Code §21-5A-1.)

West Virginia recognizes 55 counties. Incorporated cities and incorporated towns are included in county plans and are currently being uploaded into regional plans through the 11 West Virginia PDCs. Based on the DMA2000 regulations and the "locality" definition provided above, each of West Virginia's cities, counties, and towns is required to develop or take an active role in the development of an HMP for their respective areas. The PDCs are not required to develop a separate HMP for their regions, as they do not have the enforcement authority of the cities, counties, and incorporated towns. However, it is the intent of West Virginia to combine as many of the mitigation plans as possible into regional, multi-jurisdictional plans using the PDCs as the planning agency for these efforts.



5.C. Providing Planning Technical Assistance

The development of plans as prescribed by the Stafford Act Section §322 (42 U.S.C. 5165) is supported by a State Hazard Mitigation Planner (SHMP) within the Mitigation Program of the WVDHSEM. The §322 planning support includes:

- Participate in local meetings;
- Provide support for consultation, trouble-shooting, and technical assistance;
- Develop draft plan outlines for use at the local and regional levels;
- Compile hazard data at the State level (SRO) where possible for distribution to and use by PDC staff and local plan contacts (for consistency and to kick-start the hazard assessment process where possible);
- Conduct local training workshops;
- Develop crosswalk review of draft plan sections and final plan prior to submission to FEMA Region III for final approval;
- Provide support to local jurisdictions and regional PDCs during plan implementation, monitoring, evaluation and update processes;
- Provide on-site technical assistance for post-disaster planning immediately following disasters; and
- Provide technical support for planning project grant applications specifically related to PDM, HMGP, and FMA.

To ensure compliance, FEMA Region III staff provides training on mitigation plan review techniques to WVDHSEM staff. This ensures that local §322 plan drafts meet all required elements of the DMA2000 legislation. WVDHSEM staff provides crosswalk reviews of the local plans prior to submitting them to FEMA Region III staff for review. This review is conducted in accordance with the crosswalk procedures outlined in the appropriate guidance. The requirements for local §322 plans are outlined in FEMA *Multi-hazard Mitigation Planning Guidance under the Disaster Mitigation Act of 2000, March 2004*. Every effort has been employed to provide consistency of review between State and FEMA to provide this review to local plan developers as quickly as possible. It remains the goal of the State to complete each plan review within 30 days. After submission and review of plan to FEMA from the state, a corresponding call is conducted to ensure that required elements are met in the next submission.

During the 2010 Plan Update, it was decided that a regional approach to local mitigation planning would better ensure regularity in the local plan update process, as well as facilitate vertical integration of local plans into the State plan. This process was started during the 2010 State Plan Update process, and by the time of the 2013 Update all 11 PDCs had developed,



approved, and adopted regional plans. Jefferson County currently maintains its own local mitigation plan. Data from these plans was incorporated into the 2013 State Plan Update Hazard Identification and Risk Assessment (HIRA) and priority mitigation actions were consolidated. A similar process was in the 2018 update.

5.D. State Support of Local Mitigation Projects

Most local hazard mitigation projects are funded through the disaster-related HMGP. The Hazard Mitigation Administrative Plan outlines the process used to solicit and select HMGP-funded projects; it is updated annually. A copy of the current plan is provided in Appendix G - *West Virginia Hazard Mitigation Administrative Plan*. Similar procedures are used for the remaining suite of four Unified Hazard Mitigation Grant Assistance programs. To provide clarification and consistency across programs, an Administrative Plan has been developed that combines administrative management policies and procedures into a single Administrative Plan.

Special emphasis will be placed on communities with RL and SRL structures as priority in plan.

With final adoption and approval of the PDC-based mitigation plans, as well as Jefferson County's plan, the WVDHSEM Hazard Mitigation staff is shifting roles to provide plan implementation and grant management support. It has been acknowledged that annual steering committee meetings will occur, during which the local planning Steering Committee meetings for each local mitigation plan update where plan implementation, funding, maintenance, and revision can be discussed. Some of these meetings may occur through multiple teleconferencing or a web-based format. The WVDHSEM planners will attend as many meetings as is practicable to provide a stable technical resource. In addition, WVDHSEM will institute an occasional call-down system to call each local plan sponsor to monitor status. Special emphasis will be placed on incorporation of hazard mitigation goals and objectives, particularly those related to land use and zoning, into city, county, and town comprehensive plans as these are renewed. Finally, an annual report template is under development that will be distributed to each plan sponsor to ensure that annual progress is measured and celebrated. The annual reporting system will facilitate the initial steps of plan review and revision.

The desire for WVDHSEM to proactively have local HMP updated, to assist in overall administration mitigation efforts. During this effort scopes of work will be reviewed and refined to provide a more efficient planning process and product.

West Virginia has been proactive in supporting development of Flood Mitigation Plans to support eligibility of FMA grant projects for more than 10 years. With the inception of all-hazard mitigation planning, many local and regional §322 plans were crosswalked and approved to meet FMA plan standards per §78.5 of 44 Code of Federal Regulations- Flood Mitigation Plan Development. Since release of the new local mitigation plan guidance and crosswalk in July



2008, FMA planning requirements have been integrated into the State, local, and multi-jurisdictional plan crosswalks.

As a result of FEMA Memorandum “Cost Effectiveness Determinations for Acquisitions and Elevations in SFHA” (see Appendix H), WVDHSEM has had to reconsider how it will prioritize Federal mitigation grant funds for acquisition and elevation projects. While WVDHSEM has not finalized any particular strategy, it is considering awarding funding on a first come first serve basis, assuming all other eligibility requirements are met, or potentially still running a Benefit-Cost Analysis on the project and awarding funding based on those that are considered most cost-effective. More information will become available as WVDHSEM finalizes its prioritization strategy. Contact the State Hazard Mitigation Officer for complete information.

5.E. Repetitive Flood Loss Mitigation Strategies

It is important to note while this section addresses RL/SRL properties, specific funding mechanisms for mitigation have been changed significantly by the *Biggert-Waters Flood Insurance Reform Act of 2012*. As has been noted in other sections of this document, RL and SRL mitigation grant programs, within the overarching HMA program, have been consolidated into the FMA program. For more information please refer to the previously mentioned sections.

To prepare the 2018 mitigation plan update, an extensive analysis of RL and SRL data was performed. Four data sets were provided for the data analysis:

- RL properties in West Virginia, taken from BureauNet (Rep Loss List.xls)
- SRL properties in West Virginia, taken from BureauNet (SRL List.xls)
- 1,056 Mitigated properties in West Virginia, provided by the State
- Properties that received Increased Cost of Compliance (ICC) funding, taken from BureauNet (ICC report.xls)

The goal of the data amelioration was to combine all four datasets to determine which RL properties were SRL properties, which have been mitigated, and which received ICC funding. The SRL data set was added into the RL data set using the VLOOKUP function in Excel, based on the unique Property Locator number assigned in BureauNet. All 51 SRL properties in West Virginia were on the RL list.

The mitigated properties were located in the RL list manually; individual properties were searched for based on municipality, address (if available), and policy holder name. It was not possible to determine whether many of the mitigated properties were RL structures because, in many cases, street addresses were not available.



The ICC properties were located in the RL list manually; individual properties were searched for based on municipality and street address. Policy holder names were not available for the ICC data. A total of 28 ICC properties were found on the RL List.

5.F. Assessment of Vulnerability & Potential Losses

Local hazard rankings are highly variable. This variability does not lend itself to comparison of relative loss values for each hazard in the overall WVSHMP. To fully utilize the local plan efforts, West Virginia will need to develop standardized procedures for estimating losses, as well as a standard set of hazards to be evaluated. One continued goal of the WVSHMP update is to standardize the data analysis process so that future state and local plan updates are consistent and utilize comparable methodologies. As the scope of work effort to update plans proactively can assist with this effort for modification. HAZUS has supplied building data and damage costs that each Region can use to assess their own risks. Over the next few years, Total Exposure in a Flood (TEIF) and Total Exposure Area Landslide (TEAL) will make available very specific calculations for flood and landslide damages down to the municipality level. This will greatly enhance the reliability of damage estimates.



6. MITIGATION STRATEGIES

4.2.1: The Emergency Management Program has a plan to implement mitigation projects and sets priorities based upon loss reduction. The plan:

- (1) is based on the natural and human-caused hazards identified in Standard 4.1.1 and the risk and consequences of those hazards;
- (2) is developed through formal planning processes involving Emergency Management Program stakeholders; and
- (3) establishes interim and long-term strategies, actions, goals and objectives

6.A. Introduction

The WVSHMP is designed to be both comprehensive and strategic in nature. That is, the WVSHMP provides a comprehensive review of hazards and identifies far-reaching policies and projects intended to not only reduce the future impacts of hazards, but also assist the State, counties and municipalities to achieve compatible economic, environmental and social goals. In addition, the WVSHMP is strategic, in that all policies and projects are linked to departments or individuals responsible for their implementation. Funding sources are identified that can be used to implement identified actions.

VISION: It is the vision of the State of West Virginia to promote resiliency and reduce the long-term effects of on the population, infrastructure, economy, and natural resources of the state.

The crucial basis for action in this plan can be found in the Mitigation Goals. The major goals are supported by objectives, and the objectives are supported by mitigation actions, each of which contribute to reducing risk.



6.B. Transition from Previous Plans

The 2010 and the 2013 listed approximately 80 specific hazard mitigation strategies. These strategies were targeted to support a variety of goals. The *2018 WV Statewide Standard Hazard Mitigation Plan Update* adopted a revised approach which combined similar activities into new goals. A total of 21 hazard mitigation strategies were listed in the 2018 update.

Each of the hazard mitigation strategies are then grouped into a common goal. In 2007 the WV plan had a total of 5 goals. The 2010 version included 4 goals. The 2013 strategy included a total of 5 elements. The *2018 Statewide Standard Hazard Mitigation Plan Update* has developed a total of 4 goals to support the various strategies.



2018 WV Statewide
Standard Hazard
Mitigation Plan Update

	2007 Goals	2010 Goals	2013 Goals	2018 Goals
1	Promote projects, programs, and legislative action to minimize losses due to hazards.	Protect life and property	Improve Statewide Resilience	Identify and implement projects that will reduce or eliminate long-term risk, directly reduce impacts from hazards, and maintain critical societal functions. This includes reducing flood risk to repetitive loss and severe repetitive loss properties.
2	Enhance state’s ability to respond to disasters.	Improve understanding of risk and vulnerability	Protect life and property	Incorporate mitigation concepts and objectives into existing and future policies, plans, regulations, and laws in the State.
3	Improve state’s ability to identify and evaluate risk from hazards.	Bolster public understanding and preparedness	Improve understanding of risk and vulnerability for planning purposes	Improve the quality and accessibility of data used in the hazard identification and risk assessment and analysis process in state and regional hazard mitigation plans.
4	Increase public understanding, support, and demand for hazard mitigation.	Maximize State mitigation program resources to prioritize and implement mitigation projects to reduce flooding impacts on Severe Repetitive and Repetitive Loss properties	Bolster public understanding and preparedness	Promote and support a whole community approach to awareness of hazards, their risk, and potential mitigation actions in order to increase resiliency.
5	Improve coordination and communication with other relevant organizations and agencies	N/A	Maximize State mitigation program resources to prioritize and implement mitigation projects to reduce flooding impacts while considering local priorities	

Table 88 – State Hazard Mitigation Plan Goals



6.C. Mitigation Goals

The West Virginia mitigation strategy are structured with a traditional hierarchy of goals and supporting actions. The mitigation goals represent broad statements that are achieved through the implementation of more specific, action-oriented policies or projects. Goals provide the framework for achieving the intent of the Plan. The goals for the 2018 are as follows:

Goal 1: Identify and implement projects that will reduce or eliminate long-term risk, directly reduce impacts from hazards, and maintain critical societal functions. This includes reducing flood risk to repetitive loss and severe repetitive loss properties.

Goal 2: Incorporate mitigation concepts and objectives into existing and future policies, plans, regulations, and laws in the State.

Goal 3: Improve the quality and accessibility of data used in the hazard identification and risk assessment and analysis process in state and regional hazard mitigation plans.

Goal 4: Promote and support a whole community approach to awareness of hazards, their risk, and potential mitigation actions in order to increase resiliency.

During the 2018 Update, the overall goals were reviewed and revised slightly to improve clarity and reduce potential confusion. The first 2018 goal is built on previous goals related to protecting *life and property*. This goal specifically addressed repetitive and severe repetitive loss properties.

The second goal combines elements from previous goals into a concentrated effort to build mitigation program elements into agency policies, plans, and procedures. Specifically, this will include efforts to build the capabilities of the State Resiliency Office.

The third goal builds on the second 2013 (“improve understanding of risk and vulnerability for planning purposes) by building the quality of hazard information, critical infrastructure data and spatial analysis tools. Specifically, this would include efforts such as TIEF and TEAL.

The fourth 2018 goal is similar to the third 2013 goal and includes training and educational activities.



6.D. Mitigation Actions

This section identifies the status of mitigation actions identified in previous versions of this plan, as well as new strategies that were submitted under this revision. The action description includes the mitigation action, or hazardous mitigation strategies. These are the specific tasks which can be completed to support the overall hazard mitigation activities.

Mitigation Actions	Mitigation Strategy
FL-01	Promote/Enhance RL/SRL Program
FL-02	Promote/Enhance CRS Program
FL-03	Promote/Enhance NFIP
FL-04	Conduct Flood Mitigation Planning
LS-01	Soil Erosion Reduction Measures
LS-02	Understanding Landslide Risks
WF-01	Develop Wildfire Prevention Measures
WV-02	Fund Community Wildfire Protection Plan Program
DL-01	Coordinate Dam and Levee Safety Issues
CF-01	Complete Threat Assessments
CF-02	Utilize Risk Information in Planning
CF-03	Build Relationships with Critical Facilities
CF-04	Promote Building Codes
PL-01	Enhance Planning Process
PL-02	Utilization of Benefit-Cost Analysis
PL-03	Integration of Climate/Land Use Change into Planning
TE-01	Conduct Public Outreach
TE-02	Improve Use of Media
TE-03	Conduct Wildfire Suppression Training
GL-01	Obtain Executive/Legislative Support
GL-03	Explore Enhanced Funding Methods

Table 89 – 2018 Hazard Mitigation Strategies



6.E. Hazard Mitigation Action Sheets

The previous strategy number is referenced on the one-page summary for each of the new mitigation action items.

6.E.1. Mitigation Strategy Number

The first two letters of the new strategy number refer to the program area. The numbers provide a sequential number associated with each program area. The following program areas are used in 2018 update:

FL: Flood

LS: Landslides and Subsidence

WF: Wildfires

DL: Dam and Levee Failure

CF: Critical Facilities

PL: Planning/Assessment

TE: Training and Education

GL: Governance and Legislation

6.E.2. Previous Mitigation Strategy Elements

This section identifies the elements of previous plans which have been rolled into the new mitigation strategy. Previous strategies were listed under multiple new strategies. The WV Hazard Mitigation Planning Team formed a workgroup to review and consolidated previous mitigation goals going back to 2010. The work group identified numerous goals which were either out-of-date or could be grouped with other goals. This reduced the number of goals from over 80 down to 21 while maintaining all viable mitigation options. This process not only allowed reduction of the number of strategies but created focused areas to support the state's overall mitigation goals (See 5.D above).



6.E.3. Mitigation Action Narrative

The narrative provides examples of the types of specific activities which can be completed for each of the Hazard Mitigation Action sheets. The Hazard Mitigation Planning Team developed the list of allowable activities by reviewing previous strategies, incorporating best practices from other states, and by considering items requested as part of grant requests. The items listed are intentionally vague, meaning broad enough to allow a variety of activities, but at the same time focused enough to determine permissible activities.

6.E.4. Development of Mitigation Action Details

6.E.4.a Hazard(s) Addressed

For each of the Mitigation Action Sheets the related hazards were noted. Some of the Action Sheets are specific to a hazard while others can be used to mitigate a variety of hazards. In some cases, the Mitigation Action Sheets were linked to all hazards.

6.E.4.b Goal Addressed

For each of the Mitigation Action Sheets the related state hazard mitigation goals was noted. Some of the Action Sheets are specific to a goal while others can be used to mitigate a variety of goals. In some cases, the Mitigation Action Sheets were linked to all goals. In fact, a good mitigation strategy should be linked to achieving multiple goals.

6.E.4.c Priority

For each of the Mitigation Action Sheets the related prioritization of each available activity was developed. Based on historical occurrence, probability, and potential impacts, activities to address flooding and landslides were given a high priority. Specifically, actions to address RL and SRL properties were seen as having a high priority. Other activities that address multiple hazards and goals were also given a high priority. The Hazard Mitigation Planning Team evaluated numerous data elements in determining this priority levels and validated available information with relevant stakeholders. This process used the STAPLEE approach (see Section 5F).

6.E.4.d Potential Funding

For each of the Mitigation Action Sheets a list of potential funding sources to implement the Mitigation Actions were listed. It is important to note that this is not necessarily an all-inclusive list and that proposed activities will still need to be compared with grant guidance to determine allowability of projects.



6.E.4.e **Lead Agency**

For each of the Mitigation Action Sheets a primary agency for coordinating the implementation of the activities was noted. However, one of the first tasks which needs to be completed is a reassessment of activities and stakeholder agencies. Specifically, the SRO needs to meet with representatives of each of the lead agencies to validate information list and confirm their status as lead agency.

6.E.4.f **Implementation Schedule and Status**

For each of the Mitigation Action Sheets a list of potential implementation schedule and current status was developed. The SRO should work responsible agencies to update implementation schedule and status bi-annually.

6.E.4.g **Comments**

The comment field provides a narrative update for the status of the actions. This information should be verified at least bi-annual by the SRO.

6.F. **Action Prioritization**

The Mitigation Action Strategies were developed within the context of the statewide vulnerability assessment and reviewed by the Hazard Mitigation Planning Team. This discussion followed a review of the draft HIRA and vulnerability analysis and was used to evaluate the prioritization of the available mitigation strategies.

Mitigation actions were evaluated using the STAPLEE criterion suggested in FEMA's Hazard Mitigation Planning How-to-Guide Series. The STAPLEE criterion addresses feasibility, cost-effectiveness, and environmental considerations, among other factors. This process varied somewhat from the 2010 and 2013 Plan Update, where each action was scored based on each criterion. For the 2018 Plan Update, the Hazard Mitigation Planning Team reviewed the STAPLEE criterion during the strategies development meeting and considered the potential impacts of the proposed action on the identified criteria. Each project, strategy, or action was then ranked as critical, high, medium, or low, based on this qualitative assessment. This information is then recorded on the prioritization field on the Mitigation Action Sheets.



Actions	Selection Criteria
<i>Social</i>	<ul style="list-style-type: none"> • Is the proposed action socially acceptable to residents of the State and surrounding community? • Are there equity issues involved that would mean that one segment of the community is more socially vulnerable?
<i>Technical</i>	<ul style="list-style-type: none"> • Will the proposed action work? Is it technically feasible • Does it provide a long-term solution to the identified issue? • Does the proposed action create secondary impacts or residual risk that is unacceptable?
<i>Administrative</i>	<ul style="list-style-type: none"> • Is there someone to coordinate and lead the effort? • Is there sufficient funding available? • Can the project be sustained? Are there ongoing administrative requirements that need to be met?
<i>Political</i>	<ul style="list-style-type: none"> • Is the action politically acceptable? • Is there public support both to implement and to maintain the project?
<i>Legal</i>	<ul style="list-style-type: none"> • Is the State authorized to implement the proposed action? • Are there legal side effects? Could the activity be construed as a taking? • Will the State be liable for action or lack of action? • Will the activity be challenged?
<i>Economic</i>	<ul style="list-style-type: none"> • What are the costs and benefits of this action? Do the benefits exceed the costs? • Has funding been secured for the proposed action? If not, what are the potential funding sources (public, nonprofit, and private)? • Does it support mitigation of RL/SRL properties?
<i>Environmental</i>	<ul style="list-style-type: none"> • Will the action need environmental regulatory approvals? • Is the action consistent with Federal laws? • Is it consistent with state environmental goals? • How does this related to predict land use change?

Table 90 – STAPLEE Review and Selection Criteria from FEMA



Actions	Analysis Elements (Information Sources)
<i>Social</i>	<ul style="list-style-type: none"> Demographic information (US Census) Human impacts (age, income, poverty level)
<i>Technical</i>	<ul style="list-style-type: none"> GIS, maps Federal websites (USACE, National Dam Inventory, NCEI)
<i>Administrative</i>	<ul style="list-style-type: none"> Cost (Benefit-Cost Assessment) Regional Planning and Develop Councils State Resiliency Office (SRO) WV Division of Homeland Security and Emergency Management
<i>Political</i>	<ul style="list-style-type: none"> Continuity of Government, Continuity of Operations issues Jurisdiction capabilities/support Local letters of support for PDCs
<i>Legal</i>	<ul style="list-style-type: none"> Legal review Assurances Program allowances Grant close outs
<i>Economic</i>	<ul style="list-style-type: none"> Monetary loss (BRIM) BCA analysis Prioritization Previous cost for disasters
<i>Environmental</i>	<ul style="list-style-type: none"> Studies Maps Charts Historic event data (NCEI)

Table 91 – STAPLEE Data Sources

6.G. Repetitive Loss & Severe Repetitive Loss Mitigation Strategies

Addressing the State’s more than 51 Severe Repetitive Loss (SRL) properties compounded with the FEMA-reported 3,120 Repetitive Loss (RL) structures will require the combined efforts of agencies and organizations beyond the hazard mitigation program staff housed at WVDHSEM.

West Virginia’s approach to targeting mitigation of SRL and RL is multi-tiered. Some activities must be coordinated and directed at the State level while others require the support of the local governments that serve as HMA project sponsors, since most mitigation of high-hazard structures in the State occurs through HMA grants.

West Virginia will move forward in partnership with FEMA and local governments to use southern West Virginia project marketing methods to target the next tier of priority SRL and RL property owners. WVHSEM will continue its diligence to fully use all HMA and other resources to leverage mitigation of these high-hazard properties.



7. Plan Monitoring, Maintenance & Revision

DISASTER MITIGATION ACT OF 2000

44 Code of Federal Regulations

§201.4(c)(5)(i): [The Standard State Plan Maintenance Process must include an] established method and schedule for monitoring, evaluating, and updating the plan.

Does the new or updated plan describe the method and schedule for monitoring the plan? (e.g., identifies the party responsible for monitoring, includes schedule for reports, site visits, phone calls, and/or meetings)

Does the new or updated plan describe the method and schedule for evaluating the plan? (e.g., identifies the party responsible for evaluating the plan, includes the criteria used to evaluate the plan)

Does the new or updated plan describe the method and schedule for updating the plan?

Does the updated plan include an analysis of whether the previously approved plan's method and schedule worked, and what elements or processes, if any, were changed?

§201.4(c)(5)(ii): [The Standard State Plan Maintenance Process must include a] system for monitoring implementation of mitigation measures and project closeouts.

Requirement §201.4(c)(5)(iii): [The Standard State Plan Maintenance Process must include a] system for reviewing progress on achieving goals as well as activities and projects in the Mitigation Strategy.

Does the new or updated plan describe how mitigation measures and project closeouts will be monitored?

Does the new or updated plan identify a system for reviewing progress on achieving goals in the Mitigation Strategy?

EMAP Standard

4.2.5: The Emergency Management Program has a method and schedule for evaluation, maintenance, and revision of the plan identified in Standard 4.2.1.

7.A. Plan Monitoring Procedures

The 2018 West Virginia Statewide Standard Hazard Mitigation Plan was initially approved during the summer of 2004. The first plan update was approved on October 18, 2007, and the second plan update was approved on October 18, 2010. Approval of the plan at three-year intervals is required by 44 Code of Federal Regulations so that West Virginia will continue to be eligible for the Federal Emergency Management Agency (FEMA) post-disaster Public Assistance (PA) Program and Hazard Mitigation Assistance (HMA) Programs. Based on this three-year update cycle, an updated, approved, and adopted plan would be required in 2016. However, there has been significant discussion of changing this requirement to a five-year update cycle. Were this change to occur, the next update would be projected for 2018.



Each of these plans was prepared in partnership with the State’s Hazard Mitigation Council (HMC). The 2013 plan is consistent with FEMA’s HMP guidance and crosswalk. As discussed in Chapter 1 (Introduction) and Chapter 2 (Planning Process), it was determined early in the plan update process that the plan would address natural hazards along with selected human-caused hazards with natural hazard implications such as levees. Further, the plan vulnerability analysis emphasizes critical facilities mitigation. Supplementing the plan was a Threats and Hazard Identification and Risk Assessment performed in accordance with CPG-201 requirements. That analysis will be reviewed and updated annually as FEMA prescribes.

When considering continuity of critical operations in the context of State services and facilities, the impacts of natural hazards can be similar or identical to the potential impact of a human-caused event. For example, in the aftermath of severe floods or winter storms, tens of thousands of West Virginians can be without power, some for as long as two weeks. A human-caused event that causes failure of a power plant due to operation error or terrorism would have similar impacts on West Virginia’s critical facilities. In other words, a power outage is a power outage whether caused by downed lines and transformers from debris, snow, ice or mechanical failure. While the plan does not specifically consider human-caused hazards, the “crosswalk” to continuity of critical operations demonstrates that many of the strategies and projects included in the plan also strongly support reduction of exposure to human-caused hazards.

As part of the 2018 plan update process, the progress of ongoing programs or projects was evaluated by agency personnel. In addition, the 2018 planning process developed mitigation actions along four subject areas. These were then re-categorized according to specific goals. The development process and the final mitigation actions are documented in Chapter 4, as well as in Appendix H, along with a tracking and updating tool. New actions, strategies and projects were developed by the Department of Homeland Security and Emergency Management and the West Virginia HMC during March and April 2013.

These actions include specific strategies to target RL and SRL properties for mitigation through the five Unified HMA grant programs as well as other appropriate funding sources. This plan enables West Virginia to qualify for up to 100% and 90% of Federal cost-share funding for SRL and RL properties respectively under the FMA Program. Guidance released by FEMA in 2013 clarifies these changes. Gaps and resolution of identified problems through data are included in the objectives, strategies, and projects listed in the Mitigation Strategies.

7.B. Tracking Strategies and Projects

The 2018 update provides guidance for hazard mitigation within West Virginia. Its vision is supported by four goals, numerous supporting objectives, and targeted mitigation strategies for the West Virginia State government that will reduce or prevent injury to citizens from natural hazards, reduce damage to property, and maintain operation of critical State and local facilities.



The strategies and projects that support the objectives organized within the four goal were submitted by West Virginia State agencies, colleges, and universities along with Federal agency cooperators and related non-governmental organizations.

Many of the projects identified in previous versions of the West Virginia Hazard Mitigation Plan were completed. However, due to funding constraints, some additional strategies have not yet been initiated or completed. Moving forward the Hazard Mitigation Planning Team will coordinate with stakeholder to ensure that established milestones are met, recorded, and tracked to completion. Additionally, the SRO with the assistance the WVDHESM Hazard Mitigation Planner will conduct outreach bi-annually in conjunction with established SRO meetings.

One effort to enhance the tracking of both the strategies and projects is the development of the Mitigation Strategy Action Sheets. In previous versions of the WV Hazard Mitigation Plan, the strategies were simply tracked on a spreadsheet. The intent of the Mitigation Strategy Action Sheets to provide agencies assigned to each strategy with more focused method to review available strategies and related funding options.

The SRO will be the moderator and will invite key stakeholders to these bi-annual meetings in coordination with WVDHSEM Hazard Mitigation Planner. To support this coordination, WVDHSEM will do the following at a minimum:

- Provide a current overview of open disasters and close-outs;
- Provide a current summary of mitigation projects;
- Provide a current summary of completed mitigation projects;
- Discusses changes in priority;
- Provide a review of approved mitigation strategies (Mitigation Strategy Action Sheets); and
- Solicit update information related to status of approved strategies.

The PDCs will provide any new information concerning plans from the current approved plan and discuss any known or potential issues within their jurisdictions.

7.B.1. Mitigation Database Maintenance

The WVDHSEM mitigation staff will maintain a Mitigation Strategy spreadsheet that has been developed in accordance with this plan. The West Virginia hazard mitigation program planner will be primarily responsible for this task, with redundancy provided by the State Hazard Mitigation Officer (SHMO), State Mitigation Project Officers, and contractual assistance. It is anticipated that major aspects of this task during the three- year cycle following plan approval will include:

- Continued development of protocol for local data input



- Inclusion of local §322 plan databases from local Hazard Identification and Risk Assessments (HIRAs), Capability Assessments, and local priority mitigation strategies
- Expansion of State hazard historical data
- Refinement of State agency facility inventories
- Continued expansion of databases to target critical facilities to enhance Continuity of Operations Plans (COOPs) and human-caused vulnerability assessment

An additional need is to disperse the new HIRA and Vulnerability Analysis to regional planners and local emergency managers for use in local plan updates. It is anticipated that regional planners can use new state HIRA data in their next cycle of plan updates. As local plans are updated, their HIRA information will be uploaded into the local plan tracker tool at the time the local plan is crosswalked so that local vulnerability as characterized in local plans is continually updated. This iterative process of updating the local plan data base to reflect annual accomplishment of mitigation actions and plan update HIRA data will facilitate a much easier local plan upload process for the next update of the State HMP.

7.B.2. Plan Maintenance

The WVDHSEM mitigation program staff, in consultation with key State agencies, Federal partners, and other organizations will continue to direct implementation of the plan. WVDHSEM serves as the lead coordinating agency for emergency management in West Virginia, and thus will continue to lead the mitigation planning effort, including plan maintenance.

The WVDHSEM will track projects identified in both the State HMP and in local plans using the tracking spreadsheets developed for the 2013 Plan Update. The State HMP spreadsheets (in Excel) list jurisdiction-specific mitigation strategies, record the type of project (i.e., elevation, zoning and land use, or education), estimated cost, potential funding sources, timeframe, and §322 and FMA plan approval dates. The projects are also identified as being in one of the four main mitigation categories of the State HMP: Policy, Planning and Funding, Mitigation of High-Hazard Structures, Risk Assessment, or Education and Outreach. Policies may need revision and legislation may be necessary to facilitate accomplishment of key mitigation strategies. Subcommittee functions will continue as necessary to support implementation efforts.

The planning process timeline will be revised continually during the next three years to ensure that the plan revision can be prepared and submitted to FEMA within the required time period. Special attention will continue to be focused on ensuring that businesses and special interest groups are included and have an input into the plan revision. The planning process will emphasize the expanded vulnerability assessment of the database of local and State critical facilities and the redevelopment of strategies for the intended purpose of continued proactive



assistance to the most vulnerable citizens and assets of West Virginia. State or Federal legislative, regulatory or rule changes or additions that have occurred during the period following approval of the 2013 Plan have been integrated into the 2018 Update.

Should a specific plan element or section require revision or amendment prior to the subsequent plan revision due to State or Federal legislation or policy change, WVDHSEM staff will meet with all appropriate stakeholders and propose the change or addendum to FEMA as quickly as is practicable.

7.B.3. Reporting

The sponsors of projects and strategies funded through the FEMA Unified HMA Program provide quarterly progress reporting to WVDHSEM throughout the duration of the project. WVDHSEM consolidates these reports into a quarterly summary that is provided to FEMA. Projects that support specific aspects of the HMP will be tracked on the Mitigation Strategies Spreadsheet so that specific FEMA-funded initiatives are tracked to achievement of HMP strategies.

7.B.4. Project Closeout

Project Closeout is the process that finalizes a completed mitigation project that FEMA has funded. Project closeouts will continue to be conducted based on FEMA Region III closeout procedures in accordance with national and regional FEMA guidance along with WVDHSEM financial management procedures. Projects and activities funded through other Federal or State grant programs, State general funds, or that can be achieved without targeted funding will be completed as dictated by the funding source or State program with administrative oversight for the activity of the project.



Task	Responsibility	Time Frame
1. Refine Planning Process and timeline for new plan development	SRO, WVDHSEM Mitigation Staff Planning and Public Policy Sub-committee	Ongoing
2. Expand data base	Risk Assessment Sub-Committee WVU	Ongoing
3. Continue to match available HMGP funds to priority projects, especially to mitigate severe repetitive and repetitive loss structures	SRO, WVDHSEM Mitigation Staff Project sponsors	Ongoing
4. Continue working with local plan and state contacts on plan implementation – use the WVDHSEM Mitigation Project Spreadsheet to track projects	SRO, WVDHSEM Mitigation Staff Project sponsors	Ongoing
5. Use available tools and resources to apply vulnerability analysis to manmade hazard mitigation where cross-program relationships exist	SRO, WVDHSEM Staff Geospatial Information System (GIS) database Commodity flow studies Local sample Hazmat Terrorism Consequence Management Plans State Agency COOP Plans	Ongoing
6. Convene the State Steering Committee Members to discuss plan implementation, the submittal of additional mitigation activities, and to lay the groundwork for future HIRA, Vulnerability Assessment and strategy changes to the State Plan	SRO, WVDHSEM Mitigation Staff, Risk Assessment Sub-Committee Members	January of each year
7. Evaluate progress on strategies and projects	SRO, WVDHSEM Mitigation Staff Strategy & Project Sponsors	January of each year
8. Upload Local Plan Updates	SRO, WVDHSEM Mitigation Staff	Bi-annually



2018 WV Statewide
Standard Hazard
Mitigation Plan Update

Task	Responsibility	Time Frame
9. Initiate review and revision of HIRA and Vulnerability Analysis	SRO, WVDHSEM Mitigation Staff	Annually
10. Review current regulatory requirements for plan revision	SRO, WVDHSEM Mitigation Staff	Annually
11. Review and Update of Mitigation Goals and Strategies	SRO, WVDHSEM Mitigation Staff Mitigation Council Committee Members Strategy and Project Sponsors	Annually
12. Draft Review	SRO, WVDHSEM Mitigation Staff Steering Committee Members	Annually
13. Submit Revised All-Hazard Mitigation Plan to FEMA	SRO, State Emergency Coordinator	Annually

Table 92 – State Plan Maintenance Schedule



8. Appendix A – Capability Assessment

§201.4(c)(3) (ii): The State mitigation strategy shall include a discussion of the State’s pre-and post-disaster hazard management policies, programs, and capabilities to mitigate the hazards in the area, including:
An evaluation of State laws, regulations, policies, and programs related to hazard mitigation as well as to development in hazard-prone areas;
A discussion of State funding capabilities for hazard mitigation projects.

EMAP STANDARD

4.2.4: The Emergency Management Program, consistent with the scope of the mitigation program, does the following:

- (1) provides technical assistance in implementing applicable mitigation codes and ordinances;
- (2) identifies ongoing opportunities and tracks repetitive loss; and
- (3) participates in applicable jurisdictional, inter-jurisdictional and multi-jurisdictional mitigation efforts.

4.2.5: The Emergency Management Program has a method and schedule for evaluation, maintenance, and revision of the plan identified in Standard 4.2.1.

A comprehensive state capability assessment includes an examination of the administrative, political, and financial support. Through a series of stakeholder meetings, agency interviews, and a review of both local mitigation plans and other state and local plans, a number of projects, programs, and policies were documented.

This section provides considerable information regarding West Virginia’s ongoing programs. A robust capability assessment provides planners with pertinent information that will shape how they structure and design mitigation strategies.

8.A. Introduction

A comprehensive state capability assessment includes an examination of the administrative, political, and financial support. Through a series of stakeholder meetings, agency interviews, and a review of both local mitigation plans and other state and local plans, a number of projects, programs, and policies were documented.

This appendix provides considerable information regarding the West Virginia’s ongoing programs. A robust capability assessment provides planners with pertinent information that will shape how they structure and design mitigation strategies. The development of this capability assessment has been developed with the following goals in mind:

- Prevent duplication of programs that may already address specific hazards.
- Identify potential gaps in capabilities.



- Identify potential resources for implementing additional mitigation strategies.
- Provide an understanding of how the State can better support local mitigation activities.

This appendix is laid out in a manner that intends to provide the most meaningful information regarding mitigation related programs first. First, WVDHSEM's organizational structure is described, as WVDHSEM serves as the primary agency responsible for implementation of mitigation related activities. Then, narrative descriptions of various State and local mitigation related programs provides details on the activities of each program. This includes accomplishment, changes, and challenges since the 2010 Plan was adopted. These descriptions are not comprehensive, but provide the most detail on WV's mitigation related activities. Finally, a detailed description of the Federal programs and potential funding sources available to WV as resources for implementation of new programs and strategies is provided.

Traditionally, mitigation planning has been directed by requirements of the Stafford Act for inclusion in State emergency management plans. The Disaster Mitigation Act of 2000 (DMA 2000) revised the Stafford Act and created a requirement for "all-hazard" planning. Final guidance on actual implementation of this requirement was delayed following the September 11, 2001, tragedy and the creation of the U.S. Department of Homeland Security. An approval deadline for Standard State All-hazard Mitigation Plans was eventually set for November 1, 2004.

Between 2004 and 2007, only flooding disasters were declared, so the same hazard ranking method that was used for the 2004 update was used for the 2007 plan update. As a result, the HIRA was not updated or expanded. The 2004 mitigation strategies were reviewed and updated to include supportive tasks and actions, but the 2004 mitigation strategies remained within the structure of the 2007 mitigation strategies section.

Since many of West Virginia's Federal, State and local programs, policies, and statutes address natural hazards, they are listed in this plan in the 2018 WV Statewide Standard Hazard Mitigation Plan. A thorough review of these programs provides important background on the State's existing approaches to natural hazard mitigation. Most of these programs have been in effect prior to the 2000 Stafford Act revision. They are relevant and contribute significantly to reduced impacts from natural hazards. Perhaps most importantly, these are the programs that will provide the West Virginia hazard mitigation community with the capability and capacity to implement the priority mitigation actions developed collaboratively during the 2013 update process. Significantly more detail on Federal, State, local, and Non-Government Organization (NGO) programs was provided in the 2010 and 2013 plan Update.

The 2010 and 2013 Updates include a HIRA that better reflects local and regional HIRAs. Local and regional plans were reviewed during the 2010 plan update process, but most local plans from



the 2004-05 era used either the original State HIRA or a qualitative ranking by the local mitigation community that ranked hazards High, Medium, or Low based on anecdotal information. Recently revised local plans were significantly underfunded, so HIRA information was not substantially improved.

During the 2010 State Plan Update it was decided to regionalize local mitigation planning around the State's Planning and Development Councils (PDCs). It was envisioned that if the plans were developed on a regional basis, stronger HIRAs that used the revised 2010 State HIRA as a basis would be incorporated into regional plans. That concept has been realized. There are now 11 federally approved and locally adopted regional plans throughout the State. Jefferson County retains responsibility for maintenance of its own plan.

8.B. Administrative Capability

Funding and direction for mitigation programs is funneled through state agencies with the organization and ability to provide meaningful mitigation related programs. First, WVDHSEM's organizational structure is described, as WVDHSEM serves as the primary agency responsible for implementation of mitigation related activities. Then, narrative descriptions of various State and local mitigation related programs provides details on the activities of each program.

8.B.1. WV Division of Homeland Security and Emergency Management

The mission of the West Virginia Division of Homeland Security and Emergency Management (WVDHSEM) is to ensure the protection of life and property by providing coordination, guidance, support and assistance to local emergency managers and first responders.

The initiatives recommended in this plan are supported by the WV State Code § 15-5-1, et. seq. and Executive Order No. 18-03. Section §15-5-20 directs the governor to take "steps that could be taken to prevent or reduce the harmful consequences of disasters." Under this proclamation, the Governor is required to consider actions that mitigate or eliminate the loss of life and property throughout the State of West Virginia. While ultimate direction and control of these actions rest with the Governor, Section § 15-5-1 establishes the WVDHSEM as the agency responsible for ensuring the enactment of these provisions.

Pursuant to West Virginia State Code and the West Virginia Emergency Operations Plan, the agency manages disaster preparedness, mitigation, and response and recovery efforts throughout the state by coordinating with all responsible government agencies. In the event of a federally declared disaster, the Federal Emergency Management Agency (FEMA) works closely with the division to administer assistance programs.



The division contains multiple branches that work seamlessly together to achieve WVDHSEM’s overall mission. In addition to these branches and the emergency call center, which is staffed 24/7, the division activates and operates the state’s Emergency Operations Center when local governments request state emergency assistance. During activation, WVDHSEM coordinates materials and support requested by local emergency service providers, who then administer direct assistance to citizens. When necessary, the Mobile Operations Center is activated so that WVDHSEM personnel can support local responders.

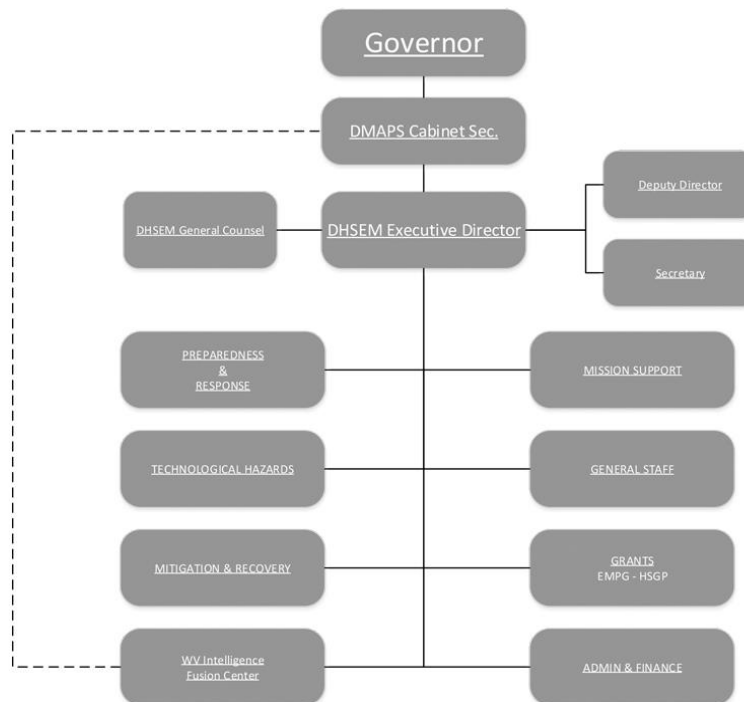


Figure 107 – WVDHSEM Organizational Chart

The West Virginia Division of Homeland Security and Emergency Management is made up of approximately 90 full-time employees, all of whom work within one of the division’s key branches.

- **Preparedness and Response:** Responsible for the coordination and operation of the State Emergency Operations Center. Includes the Homeland Security Area Liaisons, the Watch Center, Planning, Training, and Exercises.
- **Technological Hazards:** Responsible for the coordination of activities related to radiological and hazardous materials planning and response. This includes the Radiological Emergency Preparedness (REP) program, Tier II reporting, the Toxic



Report Inventory Program, and the administration of the State Emergency Response Commission (SERC).

- **Mitigation and Recovery:** Responsible for the implementation of program to prevent or recovery from disasters. Program areas include floodplain management, hazard mitigation and individual assistance.
- **WV Intelligence Fusion Center:** Responsible of the collection, analysis, and distribution of threat information.
- **Mission Support:** Responsible for the coordination of activities to support overall agency operations. This includes the State Interoperable Radio Network, the Integrated Flood Warning System (IFLOWS), Information Technology, and Geographic Information Systems programs.
- **General Staff:** Responsible for the coordination of specialized program to support preparedness and response. This includes the WV Safe Schools Program, Credentialing, Critical Infrastructure Project, and related activities.
- **Grants:** Responsible for managing the Homeland Security Grant Program and the Emergency Management Performance Grant. This includes completion of the Threat and Hazard Identification and Risk Assessment, the State Preparedness Report, and other related grant eligibility requirements.
- **Administration and Finance:** Responsible for accounts payable, accounts receivable, human resources, budgeting, asset management, and financial auditing.

8.B.2. West Virginia State Resiliency Office

The WV State Resiliency Office (SRO) was established in April 2017 to serve as a central office for the State's current and future recovery and resiliency efforts. A key purpose of the SRO will be to coordinate the development of community and economic resiliency plans (mitigation, environmental protection, efforts to support State's economy, etc.) SRO will also proactively develop resiliency strategies and seek funding for the implementation of the approved strategies. The SRO will work to improve the capacity of communities and regions to absorb and recover from external events, such as natural disasters and economic trends. The SRO will serve as a state coordinated 'Resource Hub' to engage the federal, state, and local partners (through technical assistance and funding) needed to develop and implement economic resiliency plans, initiatives, and specific projects needed for long-term sustainable community and economic diversification in the entire state.



The SRO is housed within WV Department of Commerce and governed by an eight-member board including:

- The Secretary of the Department of Commerce, Chair of the Board
- The Director of the Division of Homeland Security and Emergency Management
- The Director of the Division of Natural Resources
- The Secretary of the Department of Environmental Protection
- The Executive Director of the State Conservation Agency
- The Secretary of the Department of Military Affairs and Public Safety
- The Secretary of Transportation
- The Adjutant General of the West Virginia National Guard

Currently, the State's Community Development Block Grant Disaster Recovery planning and administration budget will be used as initial funding for the SRO. However, the SRO will seek additional federal funding for the sustainability of the office in the long term.

8.C. Implementation of Mitigation Strategies

Since the last plan update, the state has had successes in implementation, an aspect of the ability of a state to accomplish goals. This section represents the capability of the State to implement those significant accomplishments as they have occurred.

West Virginia continuously implements policies, programs and actions aimed at mitigating losses from future disasters. Mitigation strategies developed for this mitigation plan are built upon these other programs and activities.

It is with great pride, however, that WV continues to implement meaningful mitigation strategies as detailed in this plan. This section aims at addressing, in a general sense, the approach WV takes toward implementation of this plan. For further details regarding the specific programs that these strategies are built upon, please refer to the later sections of this appendix. They are documented in a narrative form first, then in comprehensive tables below.

West Virginia has traditionally funded the entire 25 percent match required for pre- and post-disaster FEMA mitigation grant projects. Typically, in other states, the local community is required to contribute between five and ten percent of the state's share. However, this is difficult



if not impossible for most of West Virginia's impoverished communities. By picking up the local share of the match, the state has demonstrated the state's commitment to its citizens.

To date, 269 mitigation projects totaling \$97.3 million dollars in federal and state monies have been implemented in West Virginia. Most of these projects have been implemented with FEMA-HMGP (Hazard Mitigation Grant Program) funding that became available after the floods that occurred between 2013 and 2018. A brief summary of accomplishments can be found in this Appendix on the pages that immediately follow.

8.C.1. Program Assessment

The number of projects that communities submitted has dropped from 2001 to present with the only anomaly being the 2016 flood or record. In 2015 money was returned because communities didn't apply or show true need. The current trend is for less individual assistance (IA) and for more public assistance (PA) due to the states concentration on housing mitigation. The trend toward more PA clearly demonstrates that our mitigation goals are being successful. As a matter of fact, the total number of permanently deed restricted properties in the flood plain has risen to 1056 since 1995.

The acquisition demolition program has been so successful that communities now equate mitigation to "buy out" and that has become the new normal. This may have led to the overall decline in new project submissions from communities for PA to due to a perceived loss of tax base. However, due to the capricious nature of both natural and human-caused disasters it will remain difficult to assess true success. Addressing both RL and SRL will remain priority for mitigation activities in WV despite the many challenges the program faces.

8.C.2. Program Effectiveness

In determine program effectiveness since the 2013 plan, key stakeholders within WVDHSEM were brought together for a work group to address:

1. Challenges and obstacles that have arisen;
2. Successes since the last plan;
3. Training conducted to support programs;
4. What products that we have to track projects; and
5. What opportunities we have to improve. The results of that meeting are listed below by program.



The information from this meeting was consolidated into the following table:

1. Challenges/Obstacles faced since the last plan for all HMA projects.
 - a. Internal grants management/closeouts support needed (FEMA specific NFIP guidance)
 - b. Additional state funding for CPA-SSSE grant to support programming (NFIP)
 - c. Lack of public willing to look alternatives to acquisition/demolition (HMA)
 - d. Getting adequate community participation planning/implantation (HMA)
2. Success stories since last plan for all HMA projects.
 - a. 75% of projects in WV successfully using 406 funds (PA)
 - b. Reduction in at risk structures (acquisition/demolitions) (HMA)
 - c. Disaster history map shows decline in Southern WV due to projects (HMA)
 - d. New GIS project tools being developed to support information sharing (PA)
 - e. Ongoing support to hiring addition personnel using Cat Z funds (PA/HMA)
3. Training to support certain programs
 - a. State code requires mandatory training yearly for flood plain managers (NFIP)
 - b. Able to provide at least 5 – 1-day training events to local officials per year (NFIP)
 - c. Able to provide at least 1 – week long L273 flood plaining training per year (NFIP)
 - d. Incorporated CRS training (not previously done) (NFIP)
 - e. Hiring a temporary employee to train flood tool to promote CRS (NFIP)
 - f. Conducting substantial damage estimator training (NFIP)
 - g. Providing internal training on PA tool to potential applicants (PA)
 - h. Conducted 101 classes for new employees and potential applicants (PA)
4. What types of tools and data sources are utilized to track project completion/status:
 - a. Total funding tracker (HMA)
 - b. Disaster history map (HMA)
 - c. GIS mapping (PA)
 - d. List of project closeouts (HMA)
5. Opportunities to approve programs:
 - a. Potentially develop a computer program to assist communities in adopting ordinances, using 5% initiative funds (NFIP)
 - b. Revise state code to require state agencies to go through the permit process and change language to allow “meet or exceed” standards (NFIP)
 - c. Continue to support development of TEIF/TEAL process to acquire better data (PA)
 - d. Clarification of FMA grant use and develop related training/education programs (NFIP/HMA)
 - e. Developing new product for project closeout to track project workflow to competition (PA)



Following the WVDHSEM program lead meeting, it was determined that both RL and SRL will remain priority across the board for all mitigation activities in WV.

8.C.3. Implementation & Evaluation of the 2018 Hazard Mitigation Plan

The success of the State Plan and the strategies presented rely on the continued support and effort of a wide range of stakeholders. Stakeholders were directed to participate in the mitigation planning process through the State Resiliency Office (SRO) and the Legislative Resiliency Committee meetings once a quarter. The majority of the 2013 mitigation strategies were successfully implemented or are currently being implemented.

Similar to the 2013 mitigation planning process, the 2018 mitigation strategies were developed at a meeting of the key stakeholders. Members of that committee were invited due to special expertise within each topic area contributed to the development of each strategy.

The SRO will manage these topic areas:

- Oversee all Statewide Planning, Policy and Programs;
- Provide Education and Outreach promoting overall resiliency;
- Re-evaluate Risk Assessments and possible mitigation actions to increase the overall resiliency of the State;
- Provide Training and Education on the availability of all available grant programs related to resiliency; and
- Formulate Mitigation strategies of High Hazard Facilities.

The Planning, Policy and Programs group developed strategies focused on advocacy of legislative policies, new programs, and plans that would further mitigate hazards in WV. For example, this group developed strategies aimed at development of a levee maintenance and certification program, development of a dam safety revolving loan fund, advocated for changes in the local mitigation planning process, conducting outreach to encourage local communities to join the FIREWISE program, and developing legislation or an Executive Order which directs State agencies to avoid building in the floodplain. As mentioned above, the majority of these were successfully implemented, others are in progress, some were canceled due to political or financial challenges, and others are currently underway. For example, WVDHSEM has restructured much of the local mitigation planning process and has greatly improved the local mitigation plan roll up process; WV Division of Forestry (WVDOP) has worked with many local communities to become better prepared for wildfires, however has found many challenges in assisting communities become recognized FIREWISE communities; WVDHSEM has worked with the legislature and the governor to pass the aforementioned legislation, but has been thus far



unsuccessful; and the WV Department of Environmental Protection has established the aforementioned revolving fund and is currently collecting money to fund projects.

The Education and Outreach program worked to reach out to members of the local WV community to educate homeowners and public officials about hazards they may face. These activities ranged from advocating that communities join either the NFIP or the CRS programs, to running stories about personal preparedness on the Public Broadcasting Station.

The Risk Assessment group focused on data deficiencies, scientific studies, and information that would provide decision makers with a sound basis on which to invest funding and resources. This group consisted of representatives from WVU GIS Technical Center, WV University, WVDEP, USACE, WVGES, etc. Strategies included examining state and critical facility data for identification of vulnerabilities, digitizing WV landslide quadrangles, geo-coding critical facilities datasets, and identification of additional abandoned mines, and identifying downstream dam inundation zones. The SRO needs to review statewide Plans, Policies, and Programs as they relate to established and emerging overall hazard risk in the state.

Mitigation of High Hazard Structures focused on brick and mortar type projects that would involve structural mitigation measures. Such strategies included acquisition and demolition of RL and SRL properties, as identified by the NFIP, exploring remediation designs for coal dam impoundment structures, and promoting the Statewide building code to local communities.

Implementation of the 2018 mitigation strategies may be hampered for any number of reasons. Lead agencies could experience a shift in priorities, fiscal constraints, or changes in personnel due to unforeseen circumstance or change in leadership. Labor resources and funds are always in short supply and create temporary barriers to success. In order to mitigate the problems related to resource availability, the Governor's Executive Order 18-03 conferred upon state agencies the authority and responsibility to participate in hazard mitigation activities. Stakeholders were directed to participate through the Hazard Mitigation Council and Executive Committee meetings. During the planning meetings, the Council recognized that state agency representatives must be allowed time away from other duties in order to be available to serve on the Hazard Mitigation Council, to be able to share information, to monitor progress with the strategies and to report on their progress for annual reports and State Plan revisions.

However, a lack of funding support hinders the implementation of any plan. Therefore, the Council understands and supports the idea that it is collectively responsible for promoting hazard mitigation activities and will continually seek funding for short-listed mitigation projects. The Council will also actively seek to implement mitigation projects with non-FEMA funds in order to optimize the hazard mitigation capabilities of the state.



Several challenges to the state's capability arose during the implementation of the 2013 Mitigation Plan. These challenges were related to the agencies involved, the projects proposed, and scarcity of resources. Mitigation projects cannot be implemented without sufficient human and financial resources. Throughout the planning process, emphasis was placed on stakeholder involvement and ownership of the plan. As such, several stakeholders have expressed a strong commitment to implementing the mitigation strategies. Through its advisory committees, the Hazard Mitigation Council and WVDHSEM involved stakeholders and attempted to ensure sufficient resources to support the state's mitigation initiatives. However, during an economic downturn when state and local financial resources are tight, many activities were put on hold or delayed. Financial resources can come from federal, state, or private entities. A number of potential federal and state funding sources and supportive programs are documented in the tables that follow.

Other potential challenges relate to the seven criteria used to evaluate the mitigation strategies namely, Social, Technical, Administrative, Political, Legal, Economic and Environmental. Each project will likely be implemented under one or more of these constraints. WVDHSEM will evaluate proposed projects based upon a consideration of several of these factors including a benefit-cost analysis. Overcoming some or all of these constraints using a strategic approach is the intended target of the mitigation strategies. For example, the residents of a community may be psychologically predisposed against stricter building code legislation. Implementation of this strategy will then require targeted education initiatives aimed at changing psychological attitudes and improving social support and gaining public opinion.

The state's capability to manage and implement mitigation actions is being enhanced through the addition of new mechanisms to improve areas of project planning, project selection, project implementation and program management.

A significant planning challenge since the 2013 Plan has continue to be the different formats of the local multi-jurisdictional plans submitted to the state for review. This has made the local plan reviewing process very difficult. To remedy this situation, the State Planner has begun standardized the format of the local plans and adopted a regional approach to local mitigation planning, thereby increasing their clarity and streamlining the process of their review and approval. As of the 2018 plan update, all local jurisdictions, with the exception of Jefferson County, participated in a regional mitigation plan, led by the State PDCs. Despite these changes, however, the 2018 State plan update still encountered issues with local plan integration. Each of the PDCs utilized different approaches to defining, categorizing, grouping, assessing, and ranking hazards. These inconsistencies impeded the reliability and accuracy of the data and made uniform statewide assessments challenging and cumbersome. Mitigation strategies were developed to attempt to address these challenges for the next State plan update.



Yet another challenge discovered during the planning process was the recognition that potential property acquisitions located adjacent to existing highways could hinder future highway improvements because of the requirement to maintain the land as perpetual open space. Therefore, a better method to coordinate with other agencies is being developed to prevent duplication of efforts or negative impacts to projects planned by other agencies, particularly WVDOH and USACE. The state is currently considering a “zoning” mechanism that would identify areas where other mitigation activities would be preferable to acquisition, as of the 2018 plan this continues to be an area of emphasis. This is particularly important to WVDOH as properties mitigated via acquisition/ demolition can prevent road construction and maintenance activities due to use restrictions enacted by FEMA.

8.C.4. Mitigated Structures

West Virginia has worked to provide mitigation of RL properties since the inception of FEMA HMA grant programs during the past two decades. Since 2008, emphasis has been placed on delivering mitigation to the RL properties. The 192 mitigated RL properties experienced a total of 509 flood related events resulting in \$7,983,156 claims paid.

The WVDHSEM administers DHS/FEMA flood mitigation grants. Funding has been used to mitigate flooding through acquiring and converting the properties into open space; elevating structures above the base flood elevation level; or building infrastructure that improved local drainage problems. Theoretically, these structures will no longer require payments for flood loss claims from the NFIP. WVDHSEM has completed mitigation of more than 938 structures²⁸. Most of these projects have been funded through post-disaster Hazard Mitigation Grant Program (HMGP) funds available from 2001 to the present. Most projects involved acquiring and demolishing floodprone residences.

Information on past use of mitigation funds can be used to assess loss avoidance as a result of implementing mitigation projects. To help with this assessment, WVDHSEM has developed a *Mitigation Action Assessment Form*. After a mitigation project is completed, the community that performed the mitigation action will complete and submit this form after a subsequent event occurs that impacted that site. For instance, water depths on each property, provided by the community, will be combined with the appraised value of the property that existed prior to mitigation, to estimate the losses avoided.

In addition to Executive Order 18-03 and WV Code § 15-5-4, other legislative initiatives have been promulgated to fulfill the goals and strategies of the State Mitigation Plan, including flood

²⁸ WVDHSEM



loss prevention. An example of flood-related legislation that has passed includes Senate Bill 635 (2006), which requires county BOEs to carry flood insurance on certain buildings and their contents.

This information can also be found in Section 3.7.5 of the base plan.

AN ACT to amend the Code of West Virginia, 1931, as amended, by adding thereto a new article, designated §4-15-1 (HB 2935 2017); and to amend said code by adding thereto a new article, designated §29-30-1, §29-30-2, §29-30-3 and §29-30-4, all relating to state flood protection generally; establishing a Joint Legislative Committee on Flooding and providing for duties; establishing the Resiliency and Flood Protection Planning Act; providing legislative findings and purpose; creating the State Resiliency Office within the Development Office in the Department of Commerce; establishing a State Resiliency Office Board; providing certain duties and authorities of the State Resiliency Office; and requiring reporting to the Legislature.

8.D. Fiscal Capability

The ability to take action in a state is closely associated with the amount of money available to implement policies and projects. Funding may be obtained from grants or state and locally based revenue. The costs associated with policy and project implementation vary widely. In some cases, policies are tied to staff costs associated with the creation and monitoring of a given program. In other cases, funding is linked to a project, like the acquisition of flood-prone homes that can require a substantial commitment from local, state and federal funding sources. In either case, decisions must be made concerning how the state can reduce vulnerability to an acceptable level considering the availability of existing and future finances.

West Virginia has traditionally funded the entire 25 percent match required for pre and post-disaster FEMA mitigation grant projects. Typically, in other states, the local community is required to contribute between five and ten percent of the state's share. However, this is difficult if not impossible for most of West Virginia's impoverished communities. By picking up the local share of the match, the state has demonstrated the state's commitment to its citizens. To date, 875 Repeated Loss mitigation projects totaling \$145 million dollars in federal and state monies have been implemented in West Virginia. Most of these projects have been implemented with FEMA Hazard Mitigation Grant Program. HMGP

8.D.1. Traditional Funding Programs

Taking into account both state agency operating budgets tied to mitigation-related activities and external funding sources obtained in recent years, the state has a limited fiscal capability for West Virginia's size and hazard vulnerability. Fiscal capability can be increased over time as a



more direct link is made between existing state-level environmental and economic development programs and hazard mitigation objectives identified in this plan.

US Department of Housing & Urban Development (HUD) Administers the Community Development Block Grant (CDBG) program to address mitigation-related projects.

US Department of Agriculture (USDA) offers a variety of programs and services to help communities, farmers, ranchers, and businesses that have been hard hit by natural disaster events. To find out how USDA can further assist you, visit [USDA's Storm Disaster Page](#).

The identification of eligible Pre-Disaster Mitigation projects, as well as other federal funding sources identified in this plan, should allow communities in the state to compete nationally for available funding and serve to highlight opportunities for state agencies to coordinate funding resources.

The HMA programs are composed of three separate funding streams. Each program aims at addressing its own set of priorities, encompasses its own set of eligibility requirements, and revenue sources. These programs include:

- Flood Mitigation Assistance (FMA)
- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation (PDM)

These programs provide significant opportunities to reduce or eliminate potential losses to State, Indian Tribal government, and local assets through hazard mitigation planning and project grant funding. Each HMA program was authorized by separate legislative action, and as such, each program differs slightly in scope and intent.



Eligible Activities	HMGP	PDM	FMA
<u>Mitigation Projects</u>	√	√	√
Property Acquisition and Structure Demolition	√	√	√
Property Acquisition and Structure Relocation	√	√	√
Structure Elevation	√	√	√
Mitigation Reconstruction	√	√	√
Dry Flood proofing of Historic Residential Structures	√	√	√
Dry Flood proofing of Non-residential Structures	√	√	√
Minor Localized Flood Reduction Projects	√	√	√
Structural Retrofitting of Existing Buildings	√	√	
Non-structural Retrofitting of Existing Buildings and Facilities	√	√	√
Safe Room Construction	√	√	
Wind Retrofit for One- and Two-Family Residences	√	√	
Infrastructure Retrofit	√	√	√
Soil Stabilization	√	√	√
Wildfire Mitigation	√	√	
Post-Disaster Code Enforcement	√		
Generators	√	√	
5% Initiative Projects	√		
Advance Assistance	√		
Hazard Mitigation Planning	√	√	√
Management Costs	√	√	√

Table 93 – Activities Allowable Under Grants

8.D.2. Flood Mitigation Assistance (FMA)

The FMA program is authorized by Section 1366 of the National Flood Insurance Act of 1968, as amended (NFIA), 42 U.S.C. 4104c, with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). The *Biggert-Waters Flood Insurance Reform Act of 2012* restructured this program through the consolidation of SRL and RFC Programs into the FMA program. In so doing, the FMA program acquired several of the SRL and RFC programmatic elements. A major component of these changes is to the flexibility of Federal cost



shares. Per this new guidance, Repetitive Loss and Severe Repetitive Loss properties, as defined by the NFIP, are eligible for funding under the FMA program with increased Federal cost shares. The cost shares for these activities are broken out as follows:

- Up to 100% Federal cost share for SRL properties
- Up to 90% Federal cost share for RL properties
- Up to 75% Federal cost share for NFIP insured properties

Funds under this program are allocated to each state based on the total number of NFIP insurance policies and the total number of repetitive loss properties within the state. States may apply for funding in excess of their allocations; additional funds are awarded on a competitive basis pending availability of funds. The National Flood Insurance Fund (NFIF) provides the funding for the FMA program. The FMA programs are subject to the availability of appropriation funding, as well as any program-specific directive or restriction made with respect to such funds.

Projects have been funded in West Virginia through the FMA program since 2007. Historically, grant funds have been used for planning and technical assistance. Given the recent changes to the HMA programs, funds under this program are likely to be used in new ways by the State.

8.E. Hazard Mitigation Grant Program

HMGP is authorized by Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended (the Stafford Act), Title 42, U.S. Code (U.S.C.) 5170c. The key purpose of HMGP is to ensure that the opportunity to take critical mitigation measures to reduce the risk of loss of life and property from future disasters is not lost during the reconstruction process following a disaster. HMGP is available, when authorized under a Presidential major disaster declaration, in the areas of the State requested by the Governor.

The HMGP has become the most widely known grant program that provides grant funding to address at-risk development. While the program's primary emphasis has been to remove homes through acquisition or to elevate them above predicted flood levels, HMGP funds have also been used on a wide variety of projects to increase resistance to nearly all-natural hazards. Funds for this program become available only after a disaster declaration; recipients must meet certain eligibility criteria; projects must also be feasible and cost effective. Many of the projects identified within the Structural Mitigation goal element of the plan could be funded through HMGP.



8.E.1. Response & Recovery – Public Assistance (PA)

Immediately following the declaration of a major disaster, FEMA and state implement procedures to assess damage, estimate the cost of restoration, and allocate funds for recovery. Public Assistance program focuses on restoration of certain non-profit and public buildings, public utility and transportation infrastructure that covers a portion of the costs to respond and recover from the event. Under certain circumstances, mitigation measures can be factored into recovery of public buildings and facilities in order to minimize the potential for future losses from comparable events through use of the 406 program. Use of this program to strengthen structures impacted by disasters as part of the repair and recovery process will be pursued as disasters occur that provide federal Public Assistance funding for eligible structures. WVDHSEM is responsible for coordinating response and recovery efforts with FEMA and local jurisdictions.

According to the FEMA website, through the PA Program, FEMA provides assistance for the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain Private Non-Profit (PNP) organizations. Section 406 of the Stafford Act provides a funding source for cost-effective hazard mitigation measures that would reduce or eliminate the threat of future damage to a facility damaged during the disaster. The measures must apply only to the damaged elements of a facility rather than to other, undamaged parts of the facility or to the entire system. Section 406 mitigation measures are considered part of the total eligible cost of repair, restoration, reconstruction, or replacement of a facility. They are limited to measures of permanent work, and the Applicant may not apply mitigation funding to alternate projects or improved projects if a new replacement facility is involved. Upgrades required to meet applicable codes and standards are not “mitigation measures” because these measures are part of eligible restoration work.

8.E.2. Response & Recovery – Individual Assistance (IA)

Also implemented jointly immediately following a major disaster declaration for events which impacts citizens, the IA program provides funds for temporary housing, basic housing repairs, and replacement of essential household items. The terrain of West Virginia often leads to serial damage and limits many of the options available following disasters. For instance, the difference between 100-year flood zone and the 500-year flood zone is very small.

The current use of IA funding is based on the impact of a disaster rather than the cumulative effect of several disasters over a short period of time. There can be several disasters that are still being addressed by the state when new disasters happen compounding existing issues. Since the IA criteria changes based each event there can be a disparity in applications for funding. The geography of West Virginia places a good deal of infrastructure in flood prone areas, that coupled with the lack of standard building code creates an environment where change is difficult.



8.E.3. Pre-Disaster Mitigation (PDM) Program

The PDM Program is authorized by Section 203 of the Stafford Act, 42 U.S.C. 5133. The Program is designed to assist States, Territories, Indian Tribal governments, and local communities to implement a sustained pre-disaster natural hazard mitigation program to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on Federal funding in future disasters. In the late 1990s, FEMA's *Project Impact* initiative was created to promote the concept of disaster resistant communities through public-private partnerships. The program was eliminated following the Stafford Act revision in 2000. This law created the requirement to develop all-hazard mitigation plans. The Pre-disaster Mitigation Program was created to fund common-sense, damage-reduction approaches, based on planning developed with three principles:

1. Preventive actions must be decided at the local level;
2. Private sector participation is vital; and
3. Long-term efforts and investments in prevention measures are essential.

It is important to note that funding under this program is competitive. This is unique from the other programs under HMA, which are eligibility based. As part of the annual Congressional appropriations process, state allocations and Congressionally-directed funds (also known as earmarks) have occurred at varying levels. Congressionally-directed funds for this program have been scarce over the past few funding cycles.

8.F. State Mitigation Related Programs

The programs described in this section represent some of the notable successes and challenges encountered in the effort to reduce loss of life and property throughout the state of West Virginia. These are ongoing programs that have significantly reduced the state's exposure to risk. Of the programs described, they range from Federal, private, not-for-profit, and voluntary agencies. Not all of programs are unique to West Virginia, and their full potential may yet have to be realized. They have been listed in the hopes that resources and assets that they offer may be incorporated into West Virginia's already significant portfolio.

The following tables describe programs, plans, policies, regulations, funding sources, and practices that support three phases of the mitigation process: 1) pre-disaster; 2) response, recovery, preparedness; and 3) during/post- disaster declaration. Each capability is marked based on its ability to support or facilitate loss reduction from a natural disaster and/or if it has the possibility to be a source of funding for mitigation.



For the 2013 Plan, the tables were divided by federal programs, State programs, and private/non-profit programs, and include a column indicating what phase of the disaster would be addressed.

8.F.1. Floodplain Management in West Virginia

Provisions for development within the regulated floodplain have typically been addressed by stand-alone ordinances adopted for voluntary participation in the NFIP, established in 1968. Revised floodplain ordinance provisions were recently incorporated into comprehensive zoning ordinances when localities adopt, revise, or re-codify zoning ordinances.

West Virginia enacted the West Virginia Flood Damage Reduction Act of 1989 to comply with the NFIP. This legislation was motivated by the damages incurred by several floods and storm events between 1969 and 1985. In 1987, to improve West Virginia's flood protection programs and consolidate similar programs in one agency, coordination of all State floodplain programs was transferred from the Water Control Board to the WVDHSEM.

According to FEMA's NFIP Community Status Book, as of September, 2018, 278 of WV's 282 communities participate in the NFIP. This means that they have voluntarily adopted and are enforcing local floodplain management ordinances. There are only 5 communities that do not participate.

The WVDHSEM Floodplain Management Section has made significant strides in assisting communities' adoption of floodplain management ordinances and encouraging them to adopt more stringent ordinances. WVDHSEM supports communities in floodplain management through the provision of model floodplain management regulations. Of the 278 communities that participate in the NFIP, the majority of these adopted the State model floodplain ordinance. This ordinance has been available to communities since February 14, 2011 and exceeds the minimum requirements laid out by the NFIP. For example, the WV model floodplain ordinance includes 2' of freeboard as an additional measure of flood protection highlights those standards prescribed in WV's model floodplain ordinance that exceed NFIP minimums. The majority of communities who have adopted this model ordinance have done so without modification.



Topic Area	NFIP Minimum	WV Model
Elevation	44 CFR 60.3(c): At or above BFE	Section 5.6: BFE + 2ft
Setbacks	None	Section 5.6: All new development must be sited 25' from SFHA boundary
Subdivisions	44 CFR 60.3(a)(4): Must minimize flood damage through clustering and adequate drainage	Appendix 5.5: All lots shall have 3,000 square feet of buildable area outside the SFHA
Manufactured Homes	44 CFR 60.3(c)(6): Manufactured homes built in the floodplain must be anchored and built to BFE	Appendix 6.1(B): Manufactured homes shall not be sited within the SFHA
Manufactured Homes	44 CFR 60.3(c)(12): Excludes existing manufactured home parks from requiring new manufactured homes from elevating to BFE	Appendix 6.1(B): Removes 44 CFR 60.3(c)(12) exclusion of existing manufactured home parks from meeting minimum BFE

Table 94 – WV Floodplain Ordinance Standards that Exceed NFIP Minimums

It is important to note that FEMA’s Map Modernization progress was completed in WV. These new maps aim to serve several purposes, which includes reducing reliance on paper map products and updating maps with revised mapping data and development trends. The new maps should help WV communities more accurately identify at-risk communities. Additional, mapping is an ongoing process under numerous funding sources for example HMGP 5% initiatives, Advisory flood heights through CAP, independent sources such as counties, TEIF/TEAL, etc..

West Virginia supports local floodplain management activities in many other ways as well. Through the 2012 1st Special Session, §15-5-20a of the WV Code was updated by the WV Congress. §15-5-20a: Floodplain Manager Training requires all local floodplain managers within the state to annually complete six hours of training in floodplain management and to maintain good standing with WVDHSEM. Failure to meet this requirement results in suspension of the floodplain manager from their responsibilities until the training requirement is met. Communities with floodplain managers who are suspended of their duties are then required to transfer floodplain management responsibilities and fees to another jurisdiction with floodplain managers in good standing. WVDHSEM has been working with communities to develop cooperative agreements that would help facilitate transfer of responsibilities should such an event occur. This requirement became effective July 1, 2012.

In order to assist communities meet this training requirement and to help local floodplain managers further augment their skill sets, WVDHSEM’s Floodplain Management Section annually offers a multitude of training opportunities. These are offered throughout the year and throughout the State.



In order to encourage higher levels of flood protection, the NFIP instituted the Community Rating System (CRS). CRS is a voluntary incentive programs that encourages community floodplain activities that exceed the minimum NFIP floodplain management regulations. The State NFIP Coordinators also regularly encourage communities to join the CRS Program. West Virginia has five communities (Berkeley County, City of Buckhannon, City of Charleston, Jefferson County, and City of Philippi) that have qualified for CRS benefits, which includes lower flood insurance premium rates. The City of Buckhannon, Jefferson County, and the City of Philippi remain members of the CRS program and are all in Class 8. Berkeley County has received a Class 7 rating and the City of Charleston Class 9.

While no new communities joined the CRS program between 2010 and 2013, the passing of the Biggert-Waters Act, described in Chapter 1, has dramatically increased interest in the program as a means of lowering communities' flood insurance premiums. The Flood Insurance Affordability and Sustainability Act of 2017 modified insurance program rates and program deliverables in order to less the impact of the Biggert-Waters Act to pre-FIRM structures.

The success of the Certified Floodplain Manager (CFM) program in West Virginia since the 2004 Plan deserves special mention. Due to the efforts of the State NFIP Coordinator and his team that comprise WVDHSEM's Floodplain Management Section, the number of CFMs increased from approximately 5 in 2004, to 36 in 2007, to 45 in 2010, to 72 in 2013.²⁹ As of September 2018 the total number of CFMs in West Virginia is 70. Several new CFMs are local community floodplain managers. This demonstrates that flood hazard awareness among community officials is growing which in turn will influence decision making at the local level and translate to better floodplain management choices for those communities. The increase in the number of CFMs is a notable success in terms of pre-disaster mitigation. Additionally, the West Virginia Floodplain Management Association (WVFMA) offers free membership.³⁰

The West Virginia Floodplain Management Association is an organization dedicated to mitigating the losses, costs and human suffering caused by flooding, and promoting the protection and natural beneficial functions of floodplains.

West Virginia supports local floodplain management activities. Floodplain manager training became mandatory. Through the 2012 1st Special Session, §15-5-20a of the WV Code was updated by the WV Congress. §15-5-20a: Floodplain Manager Training requires all local

²⁹ Association of State Floodplain Managers. Madison, WI. Retrieved June 2013 from:
<http://www.floods.org/Certification/certlist.asp#WV>

³⁰ West Virginia Floodplain Managers Association (WVFMA). Retrieved January 2013 from:
<http://wvfma.org/Membership.php>



floodplain managers within the state to annually complete six hours of training in floodplain management and to maintain good standing with WVDHSEM. Failure to meet this requirement results in suspension of the floodplain manager from their responsibilities until the training requirement is met. Communities with floodplain managers who are suspended of their duties are then required to transfer floodplain management responsibilities and fees to another jurisdiction with floodplain managers in good standing. WVDHSEM has been working with communities to develop cooperative agreements that would help facilitate transfer of responsibilities should such an event occur. This requirement became effective July 1, 2012.

In order to provide assistance for communities to meet this training requirement and to help local floodplain managers further augment their skill sets, WVDHSEM's Floodplain Management Section annually offers a multitude of training opportunities.

As part of WVDHSEM's responsibilities under the NFIP, regular visits and presentations to local community offices are helping them become better informed and better prepared.

8.F.2. Geographic Information System

Geographic Information System (GIS) funding from FEMA led to a comprehensive map modernization program that continued through 2018. The program then transitioned into the Risk Mapping Assessment and Planning program (Risk MAP). The WV Floodplain Management Program (FMP) partnered with WVU to develop a system to enable easier access to current flood maps online. The project worked to overcome the limited number of flood studies in West Virginia through implementation of the State's Map Modernization Business Plan. This tool incorporates data such as: HAZUS risk assessment outputs, NFIP flood maps, locations of mitigated structures, etc., which required digitization of revised FIRMs. In July 2011, this online tool launched. It is currently maintained by the West Virginia University GIS Technical Center (WVGISTC), housed in the Department of Geology and Geography at WVU.

The WVGISTC supports digital data conversion, data development, and coordination with Federal geospatial data initiatives, statewide mapping programs, and local (county, municipal) data producers. The center collaborates with the Statewide Addressing and Mapping Board, U.S. Geological Survey, and other partners to create high-resolution digital maps for West Virginia.

The West Virginia FMP continues to work with partners to improve the map tool, including the development of LiDAR data, bridge and culvert data, and information that will enhance the analysis of approximate Zone A flood elevations. As noted in the section above on floodplain management, in the Map Modernization program has nearly completed its updating of the WV flood maps. As each new map is completed and adopted, the Flood Tool incorporates the new data. The HAZUS layer will be replaced by TEIF/TEAL once that project is completed.



8.G. Planning Efforts by State and Local Agencies

Essential to mitigation is its integration with other planning and development efforts throughout the State. Established planning and development efforts often wield significant resources and hold the potential for implementation of strong mitigation-related activities. These plans provide opportunities for integration of mitigation-related principles in current work and future projects, so acknowledgement and consideration is important for the development of the State plan Update.

Local jurisdictions control land use through plans, ordinances, and codes in ways that can reduce natural hazard impacts. Programs are enabled through State law and regulation and like the many State programs described in this chapter, contribute significantly to mitigation of natural hazards. These programs were not directly considered during development of the 2018 Update because the plan targets critical State facilities determined to be at risk following analysis of the vulnerability of State facilities to natural hazards. In addition, hazards were considered broadly in terms of State impact. However, these efforts are extremely relevant as State agencies generally manage State facilities in a manner that is consistent with and complementary of local comprehensive planning and zoning.

8.H. Comprehensive Plans

Comprehensive Plans are prepared by planning commissions to address the physical development of land within a jurisdiction's boundaries to achieve a goal or series of goals. The *2018 West Virginia Statewide Standard Hazard Mitigation Plan Update* is a comprehensive plan with the intended purpose of reducing loss during natural hazards. The Code of West Virginia defines a comprehensive plan:

A comprehensive plan is a process through which citizen participation and thorough analysis are used to develop a set of strategies that establish as clearly and practically as possible the best and most appropriate future development of the area under the jurisdiction of the planning commission. A comprehensive plan aids the planning commission in designing and recommending to the governing body ordinances that result in preserving and enhancing the unique quality of life and culture in that community and in adapting to future changes of use of an economic, physical or social nature. A comprehensive plan guides the planning commission in the performance of its duties to help achieve sound planning (§ 8A-3-1(b), Code of West Virginia).

Most plans evaluate and provide guidance for both land use and the environment. Planning depends on informed decision making. In preparation of a comprehensive plan, a planning commission, both at the state and local level, must consider land use, characteristics and



conditions of existing development, natural resources, local and regional geography, environmental and economic factors, infrastructure, and other demographic information. Much of the background information includes Federal, State, and local programs, policies, and statutes. Those that pertain to natural hazards are listed in detail in the Capability section of this plan, located in the appendixes.

Most State planning and development is regulated under Chapter 8A: Land Use Planning under the West Virginia Code. This section provides general provisions, planning commissions, comprehensive plan, subdivisions and land development, methods of security, zoning ordinances, appeals, and enforcement of provisions.

These all serve as resources and guides to development of local comprehensive plans. Local municipalities are not required but are encouraged by the State to develop these plans. While these State resources do guide local plans, localities having jurisdiction can develop and organize the plans however they believe would provide them with the greatest level of utility. Thus those comprehensive plans vary greatly in scope and detail from jurisdiction to jurisdiction.

Since comprehensive plans are not regulated or approved by the State, there is no comprehensive list of jurisdictions that have developed and adopted these. As a result, each jurisdiction would have to be contacted individually to obtain this information. Further, there are 282 individual communities in WV, which makes it impossible to obtain this information. WVDHSEM Region III, however, can be considered representative of the State, as the jurisdictions in that region range from rural to Urban. Thus, Region III was used to obtain a sample of the jurisdictions that maintain comprehensive plans:

Within these jurisdictions are incorporated towns and villages, which may or may not maintain codes and ordinances. For example, the City of Petersburg is within Grant County. While the County does not have a zoning Ordinance, the City of Petersburg does. With over 280 individual communities in WV, there can be wide variations in adoption of zoning and land use ordinances but based on the small sample of counties within the State, most, if not all, of the counties should have Comprehensive Plans, and about half should have Zoning Ordinances. See the Local Planning and Development Summary section below for this table.

8.H.1. Zoning Ordinances

Zoning ordinances serve the general purpose of promoting health, safety, and general public welfare. Zoning districts may consider: Adequate light, air, convenience of access, and safety from fire, flood, crime, and other dangers. They provide adequate police and fire protection, disaster evacuation, water, sewerage, flood protection, and other public requirements. They also protect against loss of life, health, or property from fire, flood, panic, or other dangers.



More information on the State zoning ordinance can be located in the Code of West Virginia in Chapter 8A, Article 7 (CWV § 8A-7).

8.H.2. Land Subdivision and Development Ordinances

Land subdivision and development ordinances are prescribed statutes and restrictions for plats, utilities, streets and other related building activities. They address issues such as flood control or population density to allow for safer communities. Chapter 8A, Article four of the Code of West Virginia elaborates on the State laws governing these actions (CWV § 8A-4).

8.H.3. State Building Code

The West Virginia State Building Code (SBC) is a set of model codes managed under the authority of the State Fire Commission under West Virginia Code §29-3-5b. The SBC incorporates the International Building Codes (IBC) and supports mitigation of damages due to hazards, including, but not limited to wind, snow, seismic, and fire. The SBC provides WV communities with a set of life safety building standards that they can voluntarily adopt.

The SBC incorporates many aspects of the National Flood Insurance Program (NFIP) regulations. While these regulations do not meet all the requirements of the NFIP or qualify the jurisdiction for participation, these regulations serve communities that have adopted the WV statewide building code with some level of flood protection.

Currently, only 8 counties had adopted the State Building Code and 83 communities have adopted the code³¹, which is an additional 28 communities since the 2013 plan. Those communities are:

Counties

- Berkeley
- McDowell

County Commissions:

- Fayette
- Greenbrier
- Hampshire

- Harrison
- Jefferson
- Raleigh

Cities:

- Charles Town
- Beckley
- Benwood

- Bluefield
- Bridgeport
- Buchannon
- Charleston
- Cheseapeake
- Clarksburg
- Dunbar

³¹ International Code Council: West Virginia State Adoptions. <https://wvleap.wvu.edu/d/bc75e8d9-02bc-476b-bd0d-65da514f5870/2017-02-15-appendix-c-communities-who-have-adopted-the-building-code.pdf> (February 2017)



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- Elkins
 - Fairmont
 - Glen Dale
 - Glenville
 - Grafton
 - Hinton
 - Huntington
 - Hurricane
 - Kenova
 - Kingwood
 - Lewisburg
 - Logan
 - Mannington
 - Martinsburg
 - Martinsville
 - Milton
 - Morgantown
 - Moundsville
 - New Martinsville
 - Nitro
 - Parkersburg
 - Philippi
 - Pleasant Valley
 - Pleasantville
 - Princeton
 - Ranson
 - Ravenswood
 - Richwood
 - Ripley
 - Ronceverte
 - Salem
 - Shinnston
 - South Charleston
 - St. Albans
 - St. Marys
 - Stonewood
 - Summersville
 - Vienna
 - Weirton
 - Weston
 - Westover
 - Wheeling
 - Williamson
 - Williamstown
 - Westover
 - Durbin
 - Farmington
 - Fayetteville
 - Granville
 - Grant Town
 - Hedgesville
 - Hundred
 - Lumberport
 - Marlinton
 - Northfork
 - Nutter Fort
 - Ridgeley
 - Rivesville
 - Rupert
 - Shepardstown
 - Sophia
 - Spencer
 - Star City
 - Tunnelton
 - Winfield
 - Womesldorf
 - Worthington
- Towns:**
- Alderson
 - Anmoore
 - Bolivar
 - Delbarton
- Villages:**
- Barboursville
 - Bethlehem

8.I. Legal Capability

Comprehensive Plans are prepared by planning commissions to address the physical development of land within a jurisdiction's boundaries to achieve a goal or series of goals. The 2018 West Virginia Statewide Standard Hazard Mitigation Plan Update is a comprehensive plan with the intended purpose of reducing loss during natural hazards. The Code of West Virginia defines a comprehensive plan:



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9. Appendix B – Annualized Events and Losses

9.A. Flooding

County	Events	Property	Crop	Annualized Events	Total Cost	Annualized Cost
Barbour	31	\$2,499,000	\$0	1.48	\$2,499,000	\$119,000
Berkeley	54	\$264,500	\$50,000	2.57	\$314,500	\$14,976
Boone	37	\$9,672,000	\$0	1.76	\$9,672,000	\$460,571
Braxton	34	\$4,262,000	\$0	1.62	\$4,262,000	\$202,952
Brooke	33	\$23,435,000	\$0	1.57	\$23,435,000	\$1,115,952
Cabell	54	\$9,920,000	\$0	2.57	\$9,920,000	\$472,381
Calhoun	32	\$3,274,000	\$0	1.52	\$3,274,000	\$155,905
Clay	28	\$19,505,000	\$0	1.33	\$19,505,000	\$928,810
Doddridge	29	\$2,369,000	\$0	1.38	\$2,369,000	\$112,810
Fayette	27	\$54,453,000	\$0	1.29	\$54,453,000	\$2,593,000
Gilmer	36	\$4,059,000	\$0	1.71	\$4,059,000	\$193,286
Grant	37	\$325,000	\$25,000	1.76	\$350,000	\$16,667
Greenbrier	53	\$42,990,000	\$50,000	2.52	\$43,040,000	\$2,049,524
Hampshire	46	\$2,339,000	\$400,000	2.19	\$2,739,000	\$130,429
Hancock	26	\$38,325,000	\$0	1.24	\$38,325,000	\$1,825,000
Hardy	38	\$15,607,000	\$620,000	1.81	\$16,227,000	\$772,714
Harrison	60	\$6,460,000	\$0	2.86	\$6,460,000	\$307,619
Jackson	47	\$7,482,000	\$25,000	2.24	\$7,507,000	\$357,476
Jefferson	35	\$20,401,000	\$200,000	1.67	\$20,601,000	\$981,000
Kanawha	71	\$100,263,000	\$0	3.38	\$100,263,000	\$4,774,429
Lewis	33	\$2,894,000	\$0	1.57	\$2,894,000	\$137,810
Lincoln	47	\$13,826,000	\$0	2.24	\$13,826,000	\$658,381
Logan	44	\$28,942,000	\$0	2.10	\$28,942,000	\$1,378,190
Marion	68	\$7,108,000	\$0	3.24	\$7,108,000	\$338,476
Marshall	69	\$11,447,000	\$0	3.29	\$11,447,000	\$545,095
Mason	36	\$2,996,000	\$0	1.71	\$2,996,000	\$142,667
McDowell	32	\$143,015,000	\$0	1.52	\$143,015,000	\$6,810,238
Mercer	54	\$11,849,000	\$0	2.57	\$11,849,000	\$564,238



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County	Events	Property	Crop	Annualized Events	Total Cost	Annual Cost
Mineral	32	\$522,000	\$50,000	1.52	\$572,000	\$27,238
Mingo	36	\$43,729,000	\$0	1.71	\$43,729,000	\$2,082,333
Monongalia	64	\$2,465,000	\$0	3.05	\$2,465,000	\$117,381
Monroe	29	\$1,015,000	\$0	1.38	\$1,015,000	\$48,333
Morgan	32	\$1,044,000	\$25,000	1.52	\$1,069,000	\$50,905
Nicholas	29	\$27,885,000	\$0	1.38	\$27,885,000	\$1,327,857
Ohio	39	\$48,258,000	\$0	1.86	\$48,258,000	\$2,298,000
Pendleton	29	\$11,357,000	\$75,000	1.38	\$11,432,000	\$544,381
Pleasants	19	\$2,265,000	\$0	0.90	\$2,265,000	\$107,857
Pocahontas	29	\$2,269,000	\$0	1.38	\$2,269,000	\$108,048
Preston	64	\$573,000	\$0	3.05	\$573,000	\$27,286
Putnam	46	\$4,874,000	\$0	2.19	\$4,874,000	\$232,095
Raleigh	31	\$47,885,000	\$0	1.48	\$47,885,000	\$2,280,238
Randolph	37	\$2,820,000	\$0	1.76	\$2,820,000	\$134,286
Ritchie	31	\$3,498,000	\$0	1.48	\$3,498,000	\$166,571
Roane	42	\$10,747,000	\$0	2.00	\$10,747,000	\$511,762
Summers	21	\$2,502,000	\$0	1.00	\$2,502,000	\$119,143
Taylor	29	\$2,409,000	\$0	1.38	\$2,409,000	\$114,714
Tucker	29	\$200,000	\$0	1.38	\$200,000	\$9,524
Tyler	42	\$3,268,000	\$0	2.00	\$3,268,000	\$155,619
Upshur	39	\$1,965,000	\$0	1.86	\$1,965,000	\$93,571
Wayne	43	\$10,208,000	\$0	2.05	\$10,208,000	\$486,095
Webster	33	\$11,154,000	\$0	1.57	\$11,154,000	\$531,143
Wetzel	39	\$22,027,000	\$0	1.86	\$22,027,000	\$1,048,905
Wirt	16	\$2,502,000	\$5,000	0.76	\$2,507,000	\$119,381
Wood	39	\$8,926,000	\$0	1.86	\$8,926,000	\$425,048
Wyoming	25	\$75,671,000	\$0	1.19	\$75,671,000	\$3,603,381



9.B. Severe Storms

County	Events	Property	Crop	Annualized Events	Total Cost	Annualized Cost
Barbour	31	\$2,499,000	\$0	1.48	\$2,499,000	\$119,000
Berkeley	54	\$264,500	\$50,000	2.57	\$314,500	\$14,976
Boone	37	\$9,672,000	\$0	1.76	\$9,672,000	\$460,571
Braxton	34	\$4,262,000	\$0	1.62	\$4,262,000	\$202,952
Brooke	33	\$23,435,000	\$0	1.57	\$23,435,000	\$1,115,952
Cabell	54	\$9,920,000	\$0	2.57	\$9,920,000	\$472,381
Calhoun	32	\$3,274,000	\$0	1.52	\$3,274,000	\$155,905
Clay	28	\$19,505,000	\$0	1.33	\$19,505,000	\$928,810
Doddridge	29	\$2,369,000	\$0	1.38	\$2,369,000	\$112,810
Fayette	27	\$54,453,000	\$0	1.29	\$54,453,000	\$2,593,000
Gilmer	36	\$4,059,000	\$0	1.71	\$4,059,000	\$193,286
Grant	37	\$325,000	\$25,000	1.76	\$350,000	\$16,667
Greenbrier	53	\$42,990,000	\$50,000	2.52	\$43,040,000	\$2,049,524
Hampshire	46	\$2,339,000	\$400,000	2.19	\$2,739,000	\$130,429
Hancock	26	\$38,325,000	\$0	1.24	\$38,325,000	\$1,825,000
Hardy	38	\$15,607,000	\$620,000	1.81	\$16,227,000	\$772,714
Harrison	60	\$6,460,000	\$0	2.86	\$6,460,000	\$307,619
Jackson	47	\$7,482,000	\$25,000	2.24	\$7,507,000	\$357,476
Jefferson	35	\$20,401,000	\$200,000	1.67	\$20,601,000	\$981,000
Kanawha	71	\$100,263,000	\$0	3.38	\$100,263,000	\$4,774,429
Lewis	33	\$2,894,000	\$0	1.57	\$2,894,000	\$137,810
Lincoln	47	\$13,826,000	\$0	2.24	\$13,826,000	\$658,381
Logan	44	\$28,942,000	\$0	2.10	\$28,942,000	\$1,378,190
Marion	68	\$7,108,000	\$0	3.24	\$7,108,000	\$338,476
Marshall	69	\$11,447,000	\$0	3.29	\$11,447,000	\$545,095
Mason	36	\$2,996,000	\$0	1.71	\$2,996,000	\$142,667
McDowell	32	\$143,015,000	\$0	1.52	\$143,015,000	\$6,810,238
Mercer	54	\$11,849,000	\$0	2.57	\$11,849,000	\$564,238



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County	Events	Property	Crop	Annualized Events	Total Cost	Annual Cost
Mineral	32	\$522,000	\$50,000	1.52	\$572,000	\$27,238
Mingo	36	\$43,729,000	\$0	1.71	\$43,729,000	\$2,082,333
Monongalia	64	\$2,465,000	\$0	3.05	\$2,465,000	\$117,381
Monroe	29	\$1,015,000	\$0	1.38	\$1,015,000	\$48,333
Morgan	32	\$1,044,000	\$25,000	1.52	\$1,069,000	\$50,905
Nicholas	29	\$27,885,000	\$0	1.38	\$27,885,000	\$1,327,857
Ohio	39	\$48,258,000	\$0	1.86	\$48,258,000	\$2,298,000
Pendleton	29	\$11,357,000	\$75,000	1.38	\$11,432,000	\$544,381
Pleasants	19	\$2,265,000	\$0	0.90	\$2,265,000	\$107,857
Pocahontas	29	\$2,269,000	\$0	1.38	\$2,269,000	\$108,048
Preston	64	\$573,000	\$0	3.05	\$573,000	\$27,286
Putnam	46	\$4,874,000	\$0	2.19	\$4,874,000	\$232,095
Raleigh	31	\$47,885,000	\$0	1.48	\$47,885,000	\$2,280,238
Randolph	37	\$2,820,000	\$0	1.76	\$2,820,000	\$134,286
Ritchie	31	\$3,498,000	\$0	1.48	\$3,498,000	\$166,571
Roane	42	\$10,747,000	\$0	2.00	\$10,747,000	\$511,762
Summers	21	\$2,502,000	\$0	1.00	\$2,502,000	\$119,143
Taylor	29	\$2,409,000	\$0	1.38	\$2,409,000	\$114,714
Tucker	29	\$200,000	\$0	1.38	\$200,000	\$9,524
Tyler	42	\$3,268,000	\$0	2.00	\$3,268,000	\$155,619
Upshur	39	\$1,965,000	\$0	1.86	\$1,965,000	\$93,571
Wayne	43	\$10,208,000	\$0	2.05	\$10,208,000	\$486,095
Webster	33	\$11,154,000	\$0	1.57	\$11,154,000	\$531,143
Wetzel	39	\$22,027,000	\$0	1.86	\$22,027,000	\$1,048,905
Wirt	16	\$2,502,000	\$5,000	0.76	\$2,507,000	\$119,381
Wood	39	\$8,926,000	\$0	1.86	\$8,926,000	\$425,048
Wyoming	25	\$75,671,000	\$0	1.19	\$75,671,000	\$3,603,381



9.C. Winter Weather

County	Events	Property	Crop	Annualized Events	Total Cost	Annualized Cost
Barbour	101	\$3,619,000	\$0	4.81	\$3,619,000	\$172,333
Berkeley	252	\$1,319,000	\$195,000	12.00	\$1,514,000	\$72,095
Boone	149	\$1,240,000	\$0	7.10	\$1,240,000	\$59,048
Braxton	112	\$2,563,000	\$0	5.33	\$2,563,000	\$122,048
Brooke	110	\$1,677,000	\$0	5.24	\$1,677,000	\$79,857
Cabell	196	\$5,906,000	\$0	9.33	\$5,906,000	\$281,238
Calhoun	83	\$1,232,000	\$0	3.95	\$1,232,000	\$58,667
Clay	86	\$1,151,000	\$0	4.10	\$1,151,000	\$54,810
Doddridge	86	\$1,106,000	\$0	4.10	\$1,106,000	\$52,667
Fayette	130	\$3,410,000	\$0	6.19	\$3,410,000	\$162,381
Gilmer	85	\$1,214,000	\$0	4.05	\$1,214,000	\$57,810
Grant	114	\$148,000	\$42,500	5.43	\$190,500	\$9,071
Greenbrier	210	\$2,207,000	\$100	10.00	\$2,207,100	\$105,100
Hampshire	180	\$881,100	\$354,750	8.57	\$1,235,850	\$58,850
Hancock	136	\$1,312,000	\$0	6.48	\$1,312,000	\$62,476
Hardy	132	\$323,100	\$123,500	6.29	\$446,600	\$21,267
Harrison	206	\$6,324,000	\$0	9.81	\$6,324,000	\$301,143
Jackson	163	\$4,299,000	\$0	7.76	\$4,299,000	\$204,714
Jefferson	217	\$2,585,000	\$112,500	10.33	\$2,697,500	\$128,452
Kanawha	445	\$28,693,000	\$0	21.19	\$28,693,000	\$1,366,333
Lewis	114	\$1,420,000	\$0	5.43	\$1,420,000	\$67,619
Lincoln	152	\$2,043,000	\$0	7.24	\$2,043,000	\$97,286
Logan	135	\$2,100,000	\$0	6.43	\$2,100,000	\$100,000
Marion	132	\$1,542,000	\$3,000	6.29	\$1,545,000	\$73,571
Marshall	159	\$1,996,000	\$0	7.57	\$1,996,000	\$95,048
Mason	151	\$2,680,000	\$5,000	7.19	\$2,685,000	\$127,857
McDowell	141	\$1,989,000	\$0	6.71	\$1,989,000	\$94,714
Mercer	173	\$1,444,000	\$200	8.24	\$1,444,200	\$68,771
Mineral	114	\$341,500	\$117,250	5.43	\$458,750	\$21,845



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Mingo	149	\$2,172,000	\$0	7.10	\$2,172,000	\$103,429
Monongalia	147	\$2,164,000	\$0	7.00	\$2,164,000	\$103,048
Monroe	100	\$1,049,000	\$5,300	4.76	\$1,054,300	\$50,205
Morgan	147	\$1,381,000	\$41,000	7.00	\$1,422,000	\$67,714
Nicholas	89	\$2,418,000	\$15,000	4.24	\$2,433,000	\$115,857
Ohio	142	\$1,553,000	\$0	6.76	\$1,553,000	\$73,952
Pendleton	77	\$80,500	\$2,100	3.67	\$82,600	\$3,933
Pleasants	67	\$810,000	\$0	3.19	\$810,000	\$38,571
Pocahontas	46	\$933,000	\$0	2.19	\$933,000	\$44,429
Preston	175	\$6,904,000	\$2,000,000	8.33	\$8,904,000	\$424,000
Putnam	187	\$4,481,000	\$0	8.90	\$4,481,000	\$213,381
Raleigh	179	\$6,051,000	\$0	8.52	\$6,051,000	\$288,143
Randolph	94	\$2,180,000	\$0	4.48	\$2,180,000	\$103,810
Ritchie	103	\$2,282,000	\$0	4.90	\$2,282,000	\$108,667
Roane	110	\$2,424,000	\$0	5.24	\$2,424,000	\$115,429
Summers	98	\$554,000	\$0	4.67	\$554,000	\$26,381
Taylor	103	\$5,296,000	\$0	4.90	\$5,296,000	\$252,190
Tucker	63	\$612,000	\$0	3.00	\$612,000	\$29,143
Tyler	76	\$1,062,000	\$0	3.62	\$1,062,000	\$50,571
Upshur	105	\$1,996,000	\$0	5.00	\$1,996,000	\$95,048
Wayne	182	\$3,755,000	\$0	8.67	\$3,755,000	\$178,810
Webster	80	\$1,356,000	\$0	3.81	\$1,356,000	\$64,571
Wetzel	94	\$972,000	\$3,000	4.48	\$975,000	\$46,429
Wirt	64	\$1,613,000	\$25,000	3.05	\$1,638,000	\$78,000
Wood	183	\$9,569,000	\$0	8.71	\$9,569,000	\$455,667
Wyoming	154	\$655,500	\$0	7.33	\$655,500	\$31,214



9.D. Wildfire

County	Events	Property	Crop	Annualized Events	Total Cost	Annualized Cost
Barbour	0	\$0	\$0	0.00	\$0	0
Berkeley	0	\$0	\$0	0.00	\$0	0
Boone	4	\$25,000	\$0	0.19	\$25,000	\$
Braxton	0	\$0	\$0	0.00	\$0	0
Brooke	0	\$0	\$0	0.00	\$0	0
Cabell	0	\$0	\$0	0.00	\$0	0
Calhoun	0	\$0	\$0	0.00	\$0	0
Clay	1	\$0	\$0	0.05	\$0	0
Doddridge	0	\$0	\$0	0.00	\$0	0
Fayette	2	\$0	\$0	0.10	\$0	0
Gilmer	0	\$0	\$0	0.00	\$0	0
Grant	0	\$0	\$0	0.00	\$0	0
Greenbrier	0	\$0	\$0	0.00	\$0	0
Hampshire	0	\$0	\$0	0.00	\$0	0
Hancock	0	\$0	\$0	0.00	\$0	0
Hardy	0	\$0	\$0	0.00	\$0	0
Harrison	0	\$0	\$0	0.00	\$0	0
Jackson	0	\$0	\$0	0.00	\$0	0
Jefferson	0	\$0	\$0	0.00	\$0	0
Kanawha	3	\$25,000	\$0	0.14	\$25,000	\$1,190
Lewis	0	\$0	\$0	0.00	\$0	0
Lincoln	1	\$0	\$0	0.05	\$0	0
Logan	3	\$10,000	\$0	0.14	\$10,000	\$476
Marion	0	\$0	\$0	0.00	\$0	0
Marshall	0	\$0	\$0	0.00	\$0	0
Mason	0	\$0	\$0	0.00	\$0	0
McDowell	3	\$0	\$0	0.14	\$0	0
Mercer	0	\$0	\$0	0.00	\$0	0
Mineral	0	\$0	\$0	0.00	\$0	0



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Mingo	3	\$3,000	\$0	0.14	\$3,000	\$143
Monongalia	0	\$0	\$0	0.00	\$0	0
Monroe	0	\$0	\$0	0.00	\$0	0
Morgan	0	\$0	\$0	0.00	\$0	0
Nicholas	1	\$0	\$0	0.05	\$0	0
Ohio	0	\$0	\$0	0.00	\$0	0
Pendleton	1	\$10,000	\$0	0.05	\$10,000	\$476
Pleasants	0	\$0	\$0	0.00	\$0	0
Pocahontas	0	\$0	\$0	0.00	\$0	0
Preston	0	\$0	\$0	0.00	\$0	0
Putnam	0	\$0	\$0	0.00	\$0	0
Raleigh	3	\$0	\$0	0.14	\$0	0
Randolph	0	\$0	\$0	0.00	\$0	0
Ritchie	0	\$0	\$0	0.00	\$0	0
Roane	1	\$0	\$0	0.05	\$0	0
Summers	0	\$0	\$0	0.00	\$0	0
Taylor	0	\$0	\$0	0.00	\$0	0
Tucker	0	\$0	\$0	0.00	\$0	0
Tyler	0	\$0	\$0	0.00	\$0	0
Upshur	0	\$0	\$0	0.00	\$0	0
Wayne	1	\$0	\$0	0.05	\$0	0
Webster	0	\$0	\$0	0.00	\$0	0
Wetzel	0	\$0	\$0	0.00	\$0	0
Wirt	0	\$0	\$0	0.00	\$0	0
Wood	0	\$0	\$0	0.00	\$0	0
Wyoming	3	\$0	\$0	0.14	\$0	0



9.E. Drought

County	Events	Property	Crop	Annualized Events	Total Cost	Annualized Cost
Barbour	9	\$0	\$0	0.43	\$0	\$0
Berkeley	13	\$0	\$2,150,000	0.62	\$2,150,000	\$102,381
Boone	12	\$0	\$0	0.57	\$0	\$0
Braxton	9	\$0	\$0	0.43	\$0	\$0
Brooke	2	\$0	\$0	0.10	\$0	\$0
Cabell	14	\$0	\$0	0.67	\$0	\$0
Calhoun	9	\$0	\$0	0.43	\$0	\$0
Clay	10	\$0	\$0	0.48	\$0	\$0
Doddridge	9	\$0	\$0	0.43	\$0	\$0
Fayette	0	\$0	\$0	0.00	\$0	\$0
Gilmer	9	\$0	\$0	0.43	\$0	\$0
Grant	0	\$0	\$0	0.00	\$0	\$0
Greenbrier	0	\$0	\$0	0.00	\$0	\$0
Hampshire	11	\$0	\$1,620,000	0.52	\$1,620,000	\$77,143
Hancock	2	\$0	\$0	0.10	\$0	\$0
Hardy	11	\$0	\$1,620,000	0.52	\$1,620,000	\$77,143
Harrison	8	\$0	\$0	0.38	\$0	\$0
Jackson	15	\$0	\$0	0.71	\$0	\$0
Jefferson	13	\$0	\$2,150,000	0.62	\$2,150,000	\$102,381
Kanawha	14	\$0	\$0	0.67	\$0	\$0
Lewis	8	\$0	\$0	0.38	\$0	\$0
Lincoln	14	\$0	\$0	0.67	\$0	\$0
Logan	12	\$0	\$0	0.57	\$0	\$0
Marion	2	\$0	\$0	0.10	\$0	\$0
Marshall	2	\$0	\$0	0.10	\$0	\$0
Mason	14	\$0	\$0	0.67	\$0	\$0
McDowell	10	\$0	\$0	0.48	\$0	\$0
Mercer	12	\$0	\$78,000	0.57	\$78,000	\$3,714
Mineral	0	\$0	\$0	0.00	\$0	\$0



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Mingo	12	\$0	\$0	0.57	\$0	\$0
Monongalia	0	\$0	\$0	0.00	\$0	\$0
Monroe	7	\$0	\$98,000	0.33	\$98,000	\$4,667
Morgan	11	\$0	\$1,620,000	0.52	\$1,620,000	\$77,143
Nicholas	0	\$0	\$0	0.00	\$0	\$0
Ohio	2	\$0	\$0	0.10	\$0	\$0
Pendleton	0	\$0	\$0	0.00	\$0	\$0
Pleasants	9	\$0	\$0	0.43	\$0	\$0
Pocahontas	0	\$0	\$0	0.00	\$0	\$0
Preston	0	\$0	\$0	0.00	\$0	\$0
Putnam	14	\$0	\$0	0.67	\$0	\$0
Raleigh	0	\$0	\$0	0.00	\$0	\$0
Randolph	0	\$0	\$0	0.00	\$0	\$0
Ritchie	9	\$0	\$0	0.43	\$0	\$0
Roane	12	\$0	\$0	0.57	\$0	\$0
Summers	7	\$0	\$55,000	0.33	\$55,000	\$2,619
Taylor	9	\$0	\$0	0.43	\$0	\$0
Tucker	0	\$0	\$0	0.00	\$0	\$0
Tyler	9	\$0	\$0	0.43	\$0	\$0
Upshur	9	\$0	\$0	0.43	\$0	\$0
Wayne	14	\$0	\$0	0.67	\$0	\$0
Webster	0	\$0	\$0	0.00	\$0	\$0
Wetzel	2	\$0	\$0	0.10	\$0	\$0
Wirt	9	\$0	\$0	0.43	\$0	\$0
Wood	9	\$0	\$0	0.43	\$0	\$0
Wyoming	10	\$0	\$0	0.48	\$0	\$0



10. Appendix C – BRIM Customer Name in Hazard Areas

10.A.Flooding

Customer Name	Number of Facilities
PARKS, WEST VIRGINIA STATE C\O DEPARTMENT OF NATURAL RESOURCES	21
MERCER COUNTY BOARD OF EDUCATION	15
NATURAL RESOURCES, DEPARTMENT OF STATE OF WEST VIRGINIA	10
ARMORY BOARD STATE OF WEST VIRGINIA	9
HIGHWAYS, DIVISION OF STATE OF WEST VIRGINIA	9
SUPREME COURT OF APPEALS STATE OF WEST VIRGINIA	4
RAIL AUTHORITY STATE OF WEST VIRGINIA	4
WEST VIRGINIA UNIVERSITY	3
HEALTH & HUMAN RESOURCES, DEPARTMENT OF STATE OF WEST VIRGINIA	3
SHEPHERD UNIVERSITY	3
GENERAL SERVICES DIVISION DEPARTMENT OF ADMINISTRATION	2
MINERAL COUNTY BOARD OF EDUCATION	2
MINGO COUNTY COMMISSION	2
SOUTHERN WV COMMUNITY COLLEGE	2
NORTHERN COMMUNITY COLLEGE, WV COLLEGE SQUARE	2
VETERANS ASSISTANCE, DEPARTMENT OF STATE OF WEST VIRGINIA	1
BARBOUR COUNTY SENIOR CENTER INC	1
CLAYMONT SOCIETY FOR CONTINUOUS EDUCATION INC	1
SUMMERS COUNTY BOARD OF EDUCATION	1
GOODWILL INDUSTRIES OF KANAWHA VALLEY INC	1
HARDY COUNTY BOARD OF EDUCATION	1
NICHOLAS COUNTY BOARD OF EDUCATION	1
KANAWHA COUNTY BOARD OF EDUCATION	1
MEDICINE, BOARD OF STATE OF WEST VIRGINIA	1
RANDOLPH/ELKINS HEALTH DEPARTMENT	1
RACING COMMISSION STATE OF WEST VIRGINIA	1
AGRICULTURE, DEPARTMENT OF STATE OF WEST VIRGINIA	1
POCAHONTAS COUNTY BOARD OF EDUCATION	1
WORKFORCE WEST VIRGINIA	1
REHABILITATION SERVICES, DIVISION OF WV DEPT OF EDUCATION & THE ARTS	1



10.B.Landslides and Subsidence

Customer Name	Number of Facilities
25045 A NEW CLENDENIN INC	3
ACCOUNTANCY, BOARD OF STATE OF WEST VIRGINIA	1
ACUPUNCTURE, WEST VIRGINIA BOARD OF	1
ADALAND MANSION DEVELOPMENT INC	4
ADJUTANT GENERAL'S OFFICE STATE OF WEST VIRGINIA	3
ADMINISTRATION, SECRETARY OF DEPARTMENT OF ADMINISTRATION	1
ADMINISTRATIVE HEARINGS, OFFICE OF	1
AERONAUTICS COMMISSION - DOT STATE OF WEST VIRGINIA	1
AFL-CIO APPALACHIAN COUNCIL INC	3
AGRICULTURE, DEPARTMENT OF STATE OF WEST VIRGINIA	38
AIR AND ENVIRONMENTAL QUALITY BOARDS STATE OF WEST VIRGINIA	1
ALCOHOL BEVERAGE CONTROL ADMINISTRATION STATE OF WEST VIRGINIA	3
ARCHITECTS, BOARD OF STATE OF WEST VIRGINIA	1
ARMORY BOARD STATE OF WEST VIRGINIA	50
ARTS AND EDUCATION, OFFICE OF THE SECRETARY OF	1
ARTS IN ACTION INC	1
ATTORNEY GENERAL, OFFICE OF THE STATE OF WEST VIRGINIA	3
AUDITOR'S OFFICE STATE OF WEST VIRGINIA	1
AVIATION, DIVISION OF	2
BANCROFT, TOWN OF	4
BAR, STATE STATE OF WEST VIRGINIA	1
BARBERS & COSMETOLOGISTS, BOARD OF STATE OF WEST VIRGINIA	1
BARBOUR COUNTY BOARD OF EDUCATION	27
BARBOUR COUNTY BOARD OF HEALTH	1
BARBOUR COUNTY FAIR ASSOCIATION	1
BARBOUR COUNTY SENIOR CENTER INC	11
BARN COMMUNITY GROUP	1
BELINGTON COMMUNITY MEDICAL SERVICES	5
BIG BROTHERS BIG SISTERS OF SOUTH CENTRAL WEST VIRGINIA INC	1
BITUMINOUS COAL HERITAGE FOUNDATION	2



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Customer Name	Number of Facilities
BOARD OF TREASURY INVESTMENTS	1
BOB BURDETTE CENTER INC	3
BOONE RALEIGH PUBLIC SERVICE DISTRICT	33
BRANCHES DOMESTIC VIOLENCE SHELTER OF HUNTINGTON WEST VIRGINIA INC	1
BRAXTON COUNTY BOARD OF EDUCATION	39
BRAXTON COUNTY CONVENTION & VISITORS BUREAU	1
BRAXTON COUNTY SENIOR CITIZENS CENTER INC	2
BRIDGEVALLEY COMMUNITY & TECH COLLEGE	6
BUCKHANNON HOUSING AUTHORITY	50
BUCKHANNON-UPSHUR WORK ADJUSTMENT CENTER	1
BUDGET OFFICE DEPARTMENT OF REVENUE	1
BURNSVILLE PUBLIC UTILITY BOARD	16
BURNSVILLE, TOWN OF	7
CABIN CREEK HEALTH CENTER INC	8
CAMP BARBOUR INC	4
CANAAN VALLEY INSTITUTE	1
CAPITOL MARKET	4
CARELEARNING	1
CENTER PUBLIC SERVICE DISTRICT	8
CENTRAL APPALACHIA EMPOWERMENT ZONE OF WEST VIRGINIA (CAEZWV)	3
CENTRAL CHILD CARE OF WEST VIRGINIA INC	1
CENTRAL WEST VIRGINIA AGING SERVICES INC	3
CHARLESTON KANAWHA CONVENTION AND VISITORS BUREAU INC	1
CHARLESTON MONTESSORI INC	1
CHARLESTON-KANAWHA HOUSING AUTHORITY	159
CHILDREN'S THERAPY CLINIC INC	1
CHIROPRACTIC EXAMINERS BOARD STATE OF WEST VIRGINIA	1
CHRIST'S KITCHEN & FOOD PANTRY	1
CLAY COUNTY BOARD OF EDUCATION	17
CLAY COUNTY SERVICES UNLIMITED INC	1
CLAY SENIOR AND COMMUNITY SERVICES INC	4
CLAY, TOWN OF	17
COALFIELD COMMUNITY ACTION PARTNERSHIP INC	1



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Customer Name	Number of Facilities
COALFIELD DEVELOPMENT CORP	1
COALFIELDS EXPRESSWAY AUTHORITY	1
COALTON, TOWN OF	4
COMMERCE, WV DEPT. OF STATE CAPITOL COMPLEX	1
COMMISSION FOR NATIONAL AND COMMUNITY SERVICE, WV	1
COMMITTEE ON AGING FOR RANDOLPH COUNTY	5
COMMUNITY ASSOCIATION REINFORCING EDUC C\O APPALACHIAN COMMUNITY CARE	5
COMMUNITY HOUSING INC	3
COMMUNITY RESOURCES INC	1
COMMUNITY WORKS OF WEST VIRGINIA INC	2
CONSERVATION AGENCY, WEST VIRGINIA STATE OF WEST VIRGINIA	4
CONSOLIDATED PUBLIC RETIREMENT BOARD DEPARTMENT OF ADMINISTRATION	1
CONSTRUCTORS' LABOR COUNCIL OF WEST VIRGINIA INC	1
CONSUMER ADVOCATE, DIVISION OF WV PUBLIC SERVICE COMMISSION	1
CORRECTIONS, DIVISION OF STATE OF WEST VIRGINIA	33
COUNCIL ON AGING INC	2
COURTHOUSE FACILITIES IMPROVEMENT AUTHORITY	1
COVENANT HOUSE INC	2
CRAIK - PATTON INC	4
CROSS LANES UNITY APARTMENTS INC	1
CULTURE & HISTORY, DEPARTMENT OF STATE OF WEST VIRGINIA	2
DELEGATES, HOUSE OF STATE OF WEST VIRGINIA	1
DEVELOPMENT OFFICE, WV 1900 KANAWHA BLVD E	1
DIETITIANS, BOARD OF LICENSED	1
DRIVEN KNIGHTS INC	1
DUNBAR HOUSING AUTHORITY, CITY OF	20
EAST BANK, TOWN OF	5
EAST END FAMILY RESOURCE CENTER	2
EASTERN WV COMMUNITY & TECH. COLLEGE	1
EASTERN WYOMING PSD	31
ECONOMIC DEVELOPMENT AUTHORITY STATE OF WEST VIRGINIA	2
EDUCATION ALLIANCE-BUSINESS & THE COMMUNITY FOR PUBLIC SCHOOLS INC	1



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Customer Name	Number of Facilities
EDUCATION, DEPARTMENT OF STATE OF WEST VIRGINIA	18
EDUCATIONAL BROADCASTING AUTHORITY STATE OF WEST VIRGINIA	7
ELK RIVER COMMUNITY COUNCIL	1
ELK SOIL CONSERVATION DISTRICT	2
ELK VALLEY PUBLIC SERVICE DISTRICT	31
ELKINS DEPOT WELCOME CENTER INC	1
EMS INC DBA ELKINS MOUNTAIN SCHOOL	10
ENERGY, DIVISION OF	1
ENVIRONMENTAL PROTECTION, DIVISION OF STATE OF WEST VIRGINIA	19
ETHICS COMMISSION, WEST VIRGINIA DEPARTMENT OF ADMINISTRATION	1
EXAMINERS IN COUNSELING, BOARD OF STATE OF WEST VIRGINIA	1
FAIRMONT STATE UNIVERSITY	1
FINANCE, DIVISION OF DEPARTMENT OF ADMINISTRATION	2
FINANCIAL INSTITUTIONS, DIVISION OF STATE OF WEST VIRGINIA	1
FIRE COMMISSION STATE OF WEST VIRGINIA	2
FLATWOODS, TOWN OF	2
FLEET MANAGEMENT OFFICE, DEPT OF ADMIN STATE OF WEST VIRGINIA	1
FORESTRY, DIVISION OF STATE OF WEST VIRGINIA	12
FUNERAL SERVICE EXAMINERS, BOARD OF STATE OF WEST VIRGINIA	1
GENERAL SERVICES DIVISION DEPARTMENT OF ADMINISTRATION	30
GENESIS YOUTH CENTER INC	2
GILMER COUNTY BOARD OF EDUCATION	23
GILMER COUNTY HEALTH DEPARTMENT	1
GILMER COUNTY PUBLIC SERVICE DISTRICT	16
GLASGOW, TOWN OF	8
GLENVILLE STATE COLLEGE	44
GLENVILLE STATE COLLEGE FOUNDATION	1
GLENVILLE STATE COLLEGE HOUSING CORP	32
GLENVILLE STATE COLLEGE RESEARCH CORP	3
GLENVILLE, CITY OF	31
GOOD NEWS MOUNTAINEER GARAGE DBA\GOOD NEWS USED CARS	1
GOODWILL INDUSTRIES OF KANAWHA VALLEY INC	8
GOVERNOR, OFFICE OF THE STATE OF WEST VIRGINIA	3



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Customer Name	Number of Facilities
GREATER CLAY LONG TERM RECOVERY COMMITTEE	2
GREATER ST ALBANS PSD	32
HATFIELD-MCCOY REGIONAL RECREATION AUTHORITY A PUBLIC CORPORATION	3
HEALTH & HUMAN RESOURCES, DEPARTMENT OF STATE OF WEST VIRGINIA	46
HEDGESVILLE, TOWN OF	1
HENDRICKS, TOWN OF	4
HERO HOUSE	1
HIGHER EDUCATION POLICY COMMISSION, WV	25
HIGHVIEW UNITY APARTMENTS	1
HIGHWAYS, DIVISION OF STATE OF WEST VIRGINIA	330
HISTORIC BEVERLY PRESERVATION INC	8
HISTORIC GLENWOOD FOUNDATION INC	3
HOMELAND SECURITY & EMERGENCY MANAGEMENT DIVISION OF	29
HOMEOWNERSHIP CENTER INC	1
HOPE FOR APPALACHIA INC	3
HOSPITAL FINANCE AUTHORITY	1
HOUSING DEVELOPMENT CORPORATION	8
HUMAN RESOURCE DEVELOPMENT & EMPLOYMENT INC	1
HUMAN RESOURCE DEVELOPMENT FOUNDATION	4
HUMAN RIGHTS COMMISSION STATE OF WEST VIRGINIA	1
INSTITUTE OF SPIRITUALITY INC, WV	4
INSURANCE COMMISSIONER, OFFICE OF THE STATE OF WEST VIRGINIA	4
INTEGRATED RESOURCES INC	8
INVESTMENT MANAGEMENT BOARD, WV STATE OF WEST VIRGINIA	1
ITMANN FOOD BANK	1
JERICHO HOUSE INC	1
JOINT COMMITTEE ON GOVERNMENT & FINANCE STATE OF WEST VIRGINIA	9
JUNIOR, TOWN OF	10
JUSTICE & COMMUNITY SERVICES, DIV. OF	1
JUVENILE SERVICES, DIVISION OF	21
KANAWHA CHARLESTON HEALTH DEPARTMENT	5
KANAWHA COUNTY BOARD OF EDUCATION	359
KANAWHA COUNTY MEDICAL SOCIETY	1



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Customer Name	Number of Facilities
KANAWHA COUNTY SOLID WASTE AUTHORITY	3
KANAWHA PUBLIC SERVICE DISTRICT	72
KANAWHA VALLEY FELLOWSHIP HOME	4
KANAWHA VALLEY REGIONAL TRANSPORTATION AUTHORITY	11
KANAWHA VALLEY SENIOR SERVICES INC	11
LABOR EDUCATION AND DEVELOPMENT FUND	1
LABOR, DEPARTMENT OF STATE OF WEST VIRGINIA	2
LAND DIVISION/DEPT OF AGRICULTURE STATE OF WEST VIRGINIA	20
LEMMA VILLAGE INC DBA VILLAGE ON THE PARK	1
LEWIS COUNTY SENIOR CITIZENS CENTER INC	1
LIBRARY COMMISSION STATE OF WEST VIRGINIA	1
LOTTERY COMMISSION STATE OF WEST VIRGINIA	1
MARSHALL UNIVERSITY	5
MASSAGE THERAPY LICENSURE, WV BOARD OF	1
MEDICAL EYE BANK OF WEST VIRGINIA, THE INC	1
MEDICINE, BOARD OF STATE OF WEST VIRGINIA	1
MID-OHIO VALLEY BOARD OF HEALTH	1
MILITARY AFFAIRS, SECRETARY OF AND PUBLIC SAFETY	2
MINER'S HEALTH SAFETY, DIVISION OF AND TRAINING, STATE OF WEST VIRGINIA	5
MISSION WEST VIRGINIA INC	1
MORRIS FOUNDATION	14
MOTOR VEHICLES, DEPARTMENT OF STATE OF WEST VIRGINIA	6
MOUNTAIN CAP OF WEST VIRGINIA INC	14
MOUNTAIN MISSION INC	6
MOUNTAIN STATE ESC	1
MOUNTAINHEART COMMUNITY SERVICES INC	22
MUNICIPAL BOND COMMISSION STATE OF WEST VIRGINIA	1
NATIONAL YOUTH SCIENCE FOUNDATION	3
NATURAL RESOURCES, DEPARTMENT OF STATE OF WEST VIRGINIA	108
NITRO DEVELOPMENT AUTHORITY INC	3
NORTHERN WEST VIRGINIA RURAL HEALTH EDUCATION CENTER INC	1
OFFICE OF TECHNOLOGY/IS&C DEPARTMENT OF ADMINISTRATION	9
OIL AND GAS CONSERVATION COMMISSION STATE OF WEST VIRGINIA	1



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Customer Name	Number of Facilities
OPTOMETRY, BOARD OF STATE OF WEST VIRGINIA	1
OSTEOPATHIC MEDICINE, WV BOARD OF STATE OF WEST VIRGINIA	1
PACE ENTERPRISES OF WEST VIRGINIA INC	2
PARKS, WEST VIRGINIA STATE C\O DEPARTMENT OF NATURAL RESOURCES	366
PAROLE BOARD, WEST VIRGINIA	1
PARSONS REVITALIZATION ORGANIZATION	3
PARTNERSHIP OF AFRICAN AMERICAN CHURCHES	2
PENTECOSTAL HOLINESS CHURCH HOUSING CORP MIRACLE ACRES APARTMENTS	22
PERSONNEL, DIVISION OF DEPARTMENT OF ADMINISTRATION	1
PHARMACY, BOARD OF STATE OF WEST VIRGINIA	1
PHYSICAL THERAPY, BOARD OF STATE OF WEST VIRGINIA	1
POCA RIVER HUNTING FISHING & REC CLUB	7
POCA, TOWN OF	4
PORT AUTHORITY, WV PUBLIC	1
POTOMAC COMPREHENSIVE DIAGNOSTIC AND GUIDANCE CENTER INC	1
PRACTICAL NURSES, BOARD OF STATE OF WEST VIRGINIA	1
PROFESSIONAL DEVELOPMENT, CENTER FOR	1
PROFESSIONAL ENGINEERS, BOARD OF STATE OF WEST VIRGINIA	1
PROFESSIONAL SURVEYORS WEST VIRGINIA BOARD OF	1
PROMISE FOUNDATION OF BARBOUR CO INC	12
PROSECUTING ATTORNEYS INSTITUTE, WV	1
PROTECTIVE SERVICES, DIVISION OF	4
PSYCHOLOGISTS EXAMINERS, BOARD OF STATE OF WEST VIRGINIA	1
PUBLIC DEFENDER CORPORATION 25TH JUDICIAL CIRCUIT	1
PUBLIC DEFENDER SERVICES DEPARTMENT OF ADMINISTRATION	1
PUBLIC EMPLOYEES INSURANCE AGENCY DEPARTMENT OF ADMINISTRATION	1
PUBLIC SERVICE COMMISSION STATE OF WEST VIRGINIA	3
PUBLIC TRANSIT, DIVISION OF 1900 KANAWHA BOULEVARD EAST	1
PURCHASING, DIVISION OF DEPARTMENT OF ADMINISTRATION 2ND FL	4
PUTNAM COUNTY AGING PROGRAM INC	4
PUTNAM COUNTY BOARD OF EDUCATION	248
PUTNAM COUNTY CONVENTION & VISITORS BUREAU	1
PUTNAM COUNTY DEVELOPMENT AUTHORITY	1



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Customer Name	Number of Facilities
PUTNAM COUNTY PARKS AND RECREATION	33
PUTNAM COUNTY SOLID WASTE AUTHORITY	1
PUTNAM DAY REPORT CENTER	2
RACING COMMISSION STATE OF WEST VIRGINIA	2
RAIL AUTHORITY STATE OF WEST VIRGINIA	34
RALEIGH COUNTY SOLID WASTE AUTHORITY	1
RANDOLPH COUNTY BOARD OF EDUCATION	28
RANDOLPH COUNTY HOUSING AUTHORITY	16
RANDOLPH/ELKINS HEALTH DEPARTMENT	3
REA OF HOPE FELLOWSHIP HOME	4
REAL ESTATE APPRAISER LICENSING AND CERTIFICATION BOARD, WV	1
REAL ESTATE COMMISSION STATE OF WEST VIRGINIA	1
REAL ESTATE DIVISION	4
REGIONAL JAIL & CORR. FAC. AUTHORITY STATE OF WEST VIRGINIA	4
REGISTERED NURSES, BOARD OF STATE OF WEST VIRGINIA	1
REHABILITATION SERVICES, DIVISION OF WV DEPT OF EDUCATION & THE ARTS	14
RELIGIOUS COALITION FOR COMMUNITY RENEWAL INC	2
RESA III	5
RESA VII	4
RESPIRATORY CARE, WV BOARD OF	1
RICH MOUNTAIN BATTLEFIELD FOUNDATION INC	2
RISK & INSURANCE MANAGEMENT, BOARD OF DEPARTMENT OF ADMINISTRATION	1
ROARK-SULLIVAN LIFEWAY CENTER	7
ROBERTSON ASSOCIATION INC, THE	8
RURAL APPALACHIAN IMPROVEMENT LEAGUE	1
RURAL EMERGENCY TRAUMA INSTITUTE INC	1
SAND FORK, TOWN OF	5
SCHOOL BUILDING AUTHORITY, WEST VIRGINIA	1
SECRETARY OF STATE, OFFICE OF THE STATE OF WEST VIRGINIA	1
SENIOR SERVICES, BUREAU OF STATE OF WEST VIRGINIA	1
SOCIAL WORK, BOARD OF STATE OF WEST VIRGINIA	1
SOCIETY OF ST VINCENT DEPAUL INC ST VINCENT DEPAUL STORE	1
SOUTH CHARLESTON HOUSING AUTHORITY CITY OF	40



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Customer Name	Number of Facilities
SOUTH CHARLESTON UNITY APARTMENTS	1
SOUTH CHARLESTON VISITORS & CONVENTION BUREAU	1
SOUTH WESTERN WV REGIONAL 2 WORKFORCE INVESTMENT BOARD	2
SOUTHERN WV COMMUNITY COLLEGE	2
SOUTHWESTERN COMMUNITY ACTION COUNCIL INC	1
SPEECH PATHOLOGY & AUDIOLOGY EXAMINERS WEST VIRGINIA BOARD OF	1
STAT EMS LLC	1
STATE POLICE, WEST VIRGINIA DEPT OF MILITARY AFFAIRS & PUBLIC SAFETY	52
STEP BY STEP INC	1
STOP ABUSIVE FAMILY ENVIRONMENTS INC	1
SUPREME COURT OF APPEALS STATE OF WEST VIRGINIA	31
SUTTON, TOWN OF	1
TAMARACK FOUNDATION INC	1
TAX APPEALS, WV OFFICE OF	1
TAX DEPARTMENT STATE OF WEST VIRGINIA	6
THOMAS PATRICK MARONEY UNITY APARTMENTS INC.	1
TOURISM, DIVISION OF	1
TREASURER OF STATE STATE OF WEST VIRGINIA	5
TRI-COUNTY YMCA 6989 200 CARL'S LANE	19
TUCKER COMMUNITY FOUNDATION	2
TUCKER COUNTY BOARD OF EDUCATION	30
TUCKER COUNTY SENIOR CITIZENS INC	5
UNION PUBLIC SERVICE DISTRICT	40
UNITED WAY OF CENTRAL WV	1
UNIVERSITY PHYSICIANS AND SURGEONS	3
UPSHUR COUNTY SOCIETY FOR CRIPPLED CHILDREN & ADULTS	1
UPSHUR HUMAN RESOURCES INC	7
VETERANS ASSISTANCE, DEPARTMENT OF STATE OF WEST VIRGINIA	3
VETERINARY MEDICINE, BOARD OF STATE OF WEST VIRGINIA	1
WATER DEVELOPMENT AUTHORITY STATE OF WEST VIRGINIA	1
WEST DUNBAR PSD	10
WEST VIRGINIA ADVOCATES INC DISABILITY RIGHTS OF WEST VIRGINIA	1
WEST VIRGINIA CHILD CARE ASSOCIATION INC	1



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Customer Name	Number of Facilities
WEST VIRGINIA COMMUNITY ACTION PARTNERSHIPS INC	1
WEST VIRGINIA FORESTRY ASSOCIATION	1
WEST VIRGINIA JOBS INVESTMENT TRUST	1
WEST VIRGINIA MOUNTAIN AIRS INC	1
WEST VIRGINIA PARKWAYS AUTHORITY	109
WEST VIRGINIA PUBLIC EMPLOYEES GRIEVANCE BOARD	1
WEST VIRGINIA SCHOOL BOARD ASSOCIATION	1
WEST VIRGINIA STATE UNIVERSITY (STATE) 105 COLE COMPLEX	91
WEST VIRGINIA UNIVERSITY	75
WESTON HOUSING AUTHORITY	1
WHITESVILLE, TOWN OF	8
WOMEN'S HEALTH CENTER OF WEST VIRGINIA INC	1
WOODLANDS COMMUNITY LENDERS	1
WOODLANDS DEVELOPMENT GROUP INC	31
WORK FORCE INVESTMENT BOARD OF KANAWHA COUNTY	1
WORKFORCE WEST VIRGINIA	4
WV AFFORDABLE HOUSING TRUST FUND	1
WV CITIZEN ACTION GROUP	1
WV COUNCIL FOR COMMUNITY & TECH. COLLEGE	1
WV FOUNDATION FOR RAPE INFORMATION	1
WV FREE	1
WV HEALTH RIGHT INC	1
WV MEDICAL PROFESSIONAL HEALTH PROGRAM INC	1
WV MUNICIPAL PENSIONS OVERSIGHT BOARD	1
WV MUSIC HALL OF FAME	1
WV OHIO VALLEY CHAPTER OF NECA	1
WV PARALYZED VETERANS OF AMERICA INC WEST VIRGINIA CHAPTER	1
WV REGIONAL TECHNOLOGY PARK	1
WYOMING COUNTY BOARD OF EDUCATION	77
WYOMING COUNTY ECONOMIC DEVELOPMENT AUTHORITY	5



10.C. Severe Storms

Customer Name	Number of Facilities
ACTORS GUILD OF PARKERSBURG INC	4
ADJUTANT GENERAL'S OFFICE STATE OF WEST VIRGINIA	3
AFL-CIO APPALACHIAN COUNCIL INC	3
AGRICULTURE, DEPARTMENT OF STATE OF WEST VIRGINIA	10
ALDERSON HOSPITALITY HOUSE	2
ALDERSON RENAISSANCE CORP C/O WV HOUSING DEVELOPMENT	1
APOLLO CIVIC THEATRE	1
APPALACHIAN AREA AGENCY ON AGING	1
ARMORY BOARD STATE OF WEST VIRGINIA	99
ATTORNEY GENERAL, OFFICE OF THE STATE OF WEST VIRGINIA	1
BATH, TOWN OF	3
BERKELEY COUNTY BOARD OF EDUCATION ATTENTION: FINANCE OFFICE	199
BERKELEY COUNTY COMMITTEE ON AGING INC DBA BERKELEY SENIOR SERVICES	2
BERKELEY COUNTY DEVELOPMENT AUTHORITY	2
BERKELEY COUNTY ROUNDHOUSE AUTHORITY	5
BERKELEY COUNTY YOUTH FAIR ASSOCIATION	19
BERKELEY-MORGAN COUNTY BOARD OF HEALTH	3
BLENNERHASSET HISTORICAL FOUNDATION INC	4
BLUE RIDGE COMMUNITY & TECHNICAL COLLEGE	5
BOYS AND GIRLS CLUB OF THE EASTERN PANHANDLE	2
BRIDGEVALLEY COMMUNITY & TECH COLLEGE	4
CAMDEN-ON-GAULEY, TOWN OF	2
CAMP CAESAR - WEBSTER CO 4-H INC	24
CAMP FRAME 4-H ASSOCIATION INC	7
CENTRAL APPALACHIA EMPOWERMENT ZONE OF WEST VIRGINIA (CAEZWV)	5
CENTRAL WEST VIRGINIA AGING SERVICES INC	3
COMMUNITY ACTION OF SOUTHEASTERN WV	1
COMMUNITY NETWORKS INC	4
COMMUNITY RESOURCES INC	3
CONSERVATION AGENCY, WEST VIRGINIA STATE OF WEST VIRGINIA	3
CORRECTIONS, DIVISION OF STATE OF WEST VIRGINIA	75



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Customer Name	Number of Facilities
COWEN, TOWN OF CITY HALL	3
CULTURE & HISTORY, DEPARTMENT OF STATE OF WEST VIRGINIA	12
DAVIS-STUART INC	23
DENVER WATER ASSOCIATION	3
DIANA EAGLES COMMUNITY CENTER	1
EASTERN AREA HEALTH EDUCATION CENTER	1
EASTERN PANHANDLE CONSERVATION DISTRICT	1
EASTERN PANHANDLE INSTRUCTIONAL COOP	21
EASTERN PANHANDLE TRANSIT AUTHORITY DBA EPTA	2
EASTERN WEST VIRGINIA COMMUNITY ACTION AGENCY INC	1
EDUCATION, DEPARTMENT OF STATE OF WEST VIRGINIA	17
EDUCATIONAL BROADCASTING AUTHORITY STATE OF WEST VIRGINIA	4
ENVIRONMENTAL PROTECTION, DIVISION OF STATE OF WEST VIRGINIA	51
FAMILY REFUGE CENTER	4
FAMILY RESOURCE NETWORK OF THE PANHANDLE	1
FAYETTE COUNTY BOARD OF EDUCATION	71
FAYETTE COUNTY HEALTH DEPARTMENT	2
FAYETTE COUNTY SOLID WASTE AUTHORITY	1
FAYETTE HILLS UNITY APARTMENTS INC	1
FORESTRY, DIVISION OF STATE OF WEST VIRGINIA	18
GAULEY BRIDGE, TOWN OF	10
GENERAL SERVICES DIVISION DEPARTMENT OF ADMINISTRATION	1
GENESIS YOUTH CENTER INC	1
GOODWILL INDUSTRIES OF KANAWHA VALLEY INC	4
GREENBRIER COUNTY BOARD OF EDUCATION	70
GREENBRIER COUNTY CHILD AND YOUTH ADVOCACY CENTER INC	2
GREENBRIER COUNTY COMMITTEE ON AGING	4
GREENBRIER COUNTY SOLID WASTE AUTHORITY	9
GREENBRIER EPISCOPAL SCHOOL	1
GREENBRIER SENIOR HOUSING	1
GREENBRIER VALLEY THEATRE INC	3
GREENBRIER-MONROE YOUTH LIVESTOCK ASSOC	1
HEALTH & HUMAN RESOURCES, DEPARTMENT OF STATE OF WEST VIRGINIA	26



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Customer Name	Number of Facilities
HEDGESVILLE, TOWN OF	2
HIGH ROCKS EDUCATIONAL CORPORATION	13
HIGHER EDUCATION POLICY COMMISSION, WV	1
HIGHWAYS, DIVISION OF STATE OF WEST VIRGINIA	261
HILLSBORO, TOWN OF	1
HISTORIC FAYETTEVILLE CVB	1
HOMELAND SECURITY & EMERGENCY MANAGEMENT DIVISION OF	18
HORIZONS CENTER FOR INDEPENDENT LIVING INC	1
HUMAN RESOURCE DEVELOPMENT & EMPLOYMENT INC	3
HUMAN RESOURCE DEVELOPMENT FOUNDATION	1
HUMANE SOCIETY OF PARKERSBURG INC	4
INSURANCE COMMISSIONER, OFFICE OF THE STATE OF WEST VIRGINIA	2
IZAACK WALTON LEAGUE OF AMERICA INC BERKELEY COUNTY CHAPTER	2
JACKSON COUNTY DEVELOPMENTAL CENTER INC	1
JAMES RUMSEY TECHNICAL INSTITUTE	7
JUVENILE SERVICES, DIVISION OF	13
LAND DIVISION/DEPT OF AGRICULTURE STATE OF WEST VIRGINIA	6
LIONS CLUB OF MOUNT HOPE	1
LITTLE EAGLE CHILD CARE CENTER INC	2
LITTLE KANAWHA CONSERVATION DISTRICT	1
MAIN ST MARTINSBURG INC	2
MARLINTON, TOWN OF	11
MARTINSBURG HOUSING AUTHORITY	26
MARTINSBURG PUBLIC LIBRARY COMMISSION	4
MEADOW BRIDGE, TOWN OF	10
MID OHIO VALLEY FELLOWSHIP HOME INC	5
MID OHIO VALLEY TRANSIT AUTHORITY	12
MID OHIO VALLEY WORK FORCE INVESTMENT CORPORATION	1
MID-OHIO VALLEY BOARD OF HEALTH	2
MINERAL WELLS PSD	31
MINER'S HEALTH SAFETY, DIVISION OF AND TRAINING, STATE OF WEST VIRGINIA	1
MONTGOMERY, CITY OF	6
MORGAN ARTS COUNCIL INC	1



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Customer Name	Number of Facilities
MORGAN COUNTY BOARD OF EDUCATION	65
MORGAN COUNTY HEALTH DEPARTMENT	1
MORGAN COUNTY PARKS AND RECREATION COMMISSION	4
MORGAN COUNTY PARTNERSHIP INC	1
MORGAN COUNTY SOLID WASTE AUTHORITY	2
MOTOR VEHICLES, DEPARTMENT OF STATE OF WEST VIRGINIA	4
MOUNT HOPE HERITAGE & HOPE INC	2
MOUNT HOPE HOUSING AUTHORITY, CITY OF	3
MOUNTAIN CAP OF WEST VIRGINIA INC	15
MOUNTAIN STATE RAILROAD AND LOGGING HISTORICAL ASSOCIATION	1
MOUNTAIN TRANSIT AUTHORITY	2
MOUNTAINEER COMMUNITY HEALTH CENTER INC	1
MOUNTAINHEART COMMUNITY SERVICES INC	4
NATIONAL COAL HERITAGE AREA AUTHORITY	2
NATIONAL YOUTH SCIENCE FOUNDATION	1
NATURAL RESOURCES, DEPARTMENT OF STATE OF WEST VIRGINIA	67
NEW RIVER COMMUNITY & TECHNICAL COLLEGE	9
NEW RIVER GORGE TRAIL ALLIANCE INC	1
NEW RIVER RANCH INC	11
NICHOLAS COUNTY BOARD OF EDUCATION	58
NICHOLAS COUNTY HEALTH DEPARTMENT	3
NICHOLAS COUNTY SOLID WASTE AUTHORITY	3
NORBORNE PRE-SCHOOL & DAY CARE CTR INC	2
NORTH HILLS, TOWN OF	3
NORTH PRESTON FARMERS CLUB INC	3
OIL GAS & INDUSTRIAL HISTORICAL ASSOCIATION INC	8
OSTEOPATHIC MEDICINE, WV SCHOOL OF	29
PARKERSBURG ART CENTER INC	5
PARKERSBURG HOUSING AUTHORITY	51
PARKS, WEST VIRGINIA STATE C\O DEPARTMENT OF NATURAL RESOURCES	510
PAX, TOWN OF	16
POCAHONTAS COUNTY 4-H FOUNDATION INC C/O SHIRLEY WILKINS	13
POCAHONTAS COUNTY BOARD OF EDUCATION	68



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Customer Name	Number of Facilities
POCAHONTAS COUNTY SENIOR CITIZENS INC	3
POCAHONTAS SOLID WASTE AUTHORITY	3
POLYMER ALLIANCE ZONE INC OF WV	3
POOR HOUSE FARM ARENA COMMITTEE INC	1
PRESTON COUNTY BOARD OF EDUCATION	57
PRESTON COUNTY CARING COUNCIL INC	4
PRESTON COUNTY HEALTH DEPARTMENT	1
PRESTON COUNTY LITERACY VOLUNTEERS INC	1
PRESTON COUNTY SENIOR CITIZENS INC	12
PRESTON COUNTY WORKSHOP INC	12
PUBLIC DEFENDER CORP 11TH JUC CIRCUIT	2
PUBLIC DEFENDER CORP FOR THE 18TH JUDICIAL CIRCUIT	1
PUBLIC DEFENDER CORPORATION FOR THE 12TH JUDICIAL CIRCUIT	1
PUTNAM COUNTY AGING PROGRAM INC	3
QUINWOOD EMERGENCY AMBULANCE INC	3
QUINWOOD, TOWN OF	7
RAIL AUTHORITY STATE OF WEST VIRGINIA	15
RAPE AND DOMESTIC VIOLENCE INFORMATION CENTER INC	1
REEDSVILLE, TOWN OF	9
REGION 4 PLANNING AND DEVELOPMENT COUNCIL	1
REGION 8 PLANNING & DEVELOPMENT COUNCIL	2
REGIONAL JAIL & CORR. FAC. AUTHORITY STATE OF WEST VIRGINIA	1
REHABILITATION SERVICES, DIVISION OF WV DEPT OF EDUCATION & THE ARTS	7
RENICK, TOWN OF CORPORATION OF FALLING SPRINGS	4
RESA IV	1
RESA V	1
RESA VII	1
RESA VIII	21
RICHWOOD, CITY OF	24
ROWLESBURG, TOWN OF	10
RUPERT, TOWN OF	6
SENIOR LIFE SERVICE OF MORGAN COUNTY INC	2
SOUTHEASTERN APPALACHIAN RURAL ALLIANCE	7



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Customer Name	Number of Facilities
SOUTHERN APPALACHIAN LABOR SCHOOL	29
STATE POLICE, WEST VIRGINIA DEPT OF MILITARY AFFAIRS & PUBLIC SAFETY	22
SUMMERSVILLE AREA CHAMBER OF COMMERCE	1
SUMMERSVILLE CONVENTION AND VISITORS BUREAU	1
SUPREME COURT OF APPEALS STATE OF WEST VIRGINIA	18
TAX DEPARTMENT STATE OF WEST VIRGINIA	2
THE ARC OF THE MID OHIO VALLEY INC	3
THE ARTS CENTRE	1
TUNNELTON MUNICIPAL SEWER SYSTEM	6
TUNNELTON, TOWN OF	1
UNION WILLIAMS PSD	40
UNITED WAY OF THE EASTERN PANHANDLE INC	3
UNITY COURT APARTMENTS	1
UNITY HOUSING	1
VETERANS ASSISTANCE, DEPARTMENT OF STATE OF WEST VIRGINIA	4
WEBSTER COUNTY BOARD OF EDUCATION	31
WEBSTER COUNTY HOUSING AUTHORITY	1
WEBSTER COUNTY SENIOR CITIZENS INC	3
WEBSTER COUNTY SOLID WASTE AUTHORITY	2
WEBSTER SPRINGS PUBLIC SERVICE DISTRICT	15
WEST VIRGINIA COMMUNITY ACTION PARTNERSHIPS INC	1
WEST VIRGINIA PARKWAYS AUTHORITY	32
WEST VIRGINIA SCHOOL OF OSTEOPATHIC MEDICINE FOUNDATION INCORPORATED	1
WEST VIRGINIA UNIVERSITY	56
WEST VIRGINIA UNIVERSITY AT PARKERSBURG	12
WESTLAND ADAMS MANAGEMENT	1
WHITE OAK PUBLIC SERVICE DISTRICT	5
WILLIAMSBURG COMMUNITY ACTION GROUP INC	2
WOOD COUNTY PERMANENT 4-H CAMP ASSOCIATION INC	14
WOOD COUNTY RECREATION COMMISSION	1
WORKFORCE WEST VIRGINIA	4
WV INTERSTATE FAIR & EXPOSITION	13
WVSOM CLINIC INC DBA ROBERT C BYRD CLINIC	2



10.D.Winter Weather

Customer Name	Number of Facilities
PARKS, WEST VIRGINIA STATE C\O DEPARTMENT OF NATURAL RESOURCES	1196
HIGHWAYS, DIVISION OF STATE OF WEST VIRGINIA	830
WEST VIRGINIA UNIVERSITY	559
KANAWHA COUNTY BOARD OF EDUCATION	359
PUTNAM COUNTY BOARD OF EDUCATION	248
NATURAL RESOURCES, DEPARTMENT OF STATE OF WEST VIRGINIA	209
BERKELEY COUNTY BOARD OF EDUCATION ATTENTION: FINANCE OFFICE	199
HARRISON COUNTY BOARD OF EDUCATION	191
ARMORY BOARD STATE OF WEST VIRGINIA	179
WEST VIRGINIA PARKWAYS AUTHORITY	176
JEFFERSON COUNTY BOARD OF EDUCATION	166
CHARLESTON-KANAWHA HOUSING AUTHORITY	159
CORRECTIONS, DIVISION OF STATE OF WEST VIRGINIA	158
STATE POLICE, WEST VIRGINIA DEPT OF MILITARY AFFAIRS & PUBLIC SAFETY	110
HEALTH & HUMAN RESOURCES, DEPARTMENT OF STATE OF WEST VIRGINIA	105
MERCER COUNTY BOARD OF EDUCATION	93
ENVIRONMENTAL PROTECTION, DIVISION OF STATE OF WEST VIRGINIA	91
WEST VIRGINIA STATE UNIVERSITY (STATE) 105 COLE COMPLEX	91
MARSHALL COUNTY BOARD OF EDUCATION	86
TAYLOR COUNTY BOARD OF EDUCATION	77
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SUPREME COURT OF APPEALS STATE OF WEST VIRGINIA	73
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FAYETTE COUNTY BOARD OF EDUCATION	71
GREENBRIER COUNTY BOARD OF EDUCATION	70
POCAHONTAS COUNTY BOARD OF EDUCATION	68
MARION COUNTY BOARD OF EDUCATION	67
MORGAN COUNTY BOARD OF EDUCATION	65
MOUNDSVILLE HOUSING AUTHORITY, CITY OF	58
NICHOLAS COUNTY BOARD OF EDUCATION	58
PRESTON COUNTY BOARD OF EDUCATION	57
SHEPHERD UNIVERSITY	55
AGRICULTURE, DEPARTMENT OF STATE OF WEST VIRGINIA	54
JACKSON COUNTY BOARD OF EDUCATION	53
CONCORD UNIVERSITY	52
PARKERSBURG HOUSING AUTHORITY	52
EDUCATION, DEPARTMENT OF STATE OF WEST VIRGINIA	51
WEST LIBERTY UNIVERSITY	51
CEDAR LAKES CONFERENCE CENTER STATE OF WEST VIRGINIA	50
BUCKHANNON HOUSING AUTHORITY	50
MONROE COUNTY BOARD OF EDUCATION	50
RAIL AUTHORITY STATE OF WEST VIRGINIA	49
JUVENILE SERVICES, DIVISION OF	46
GLENVILLE STATE COLLEGE	44
FORESTRY, DIVISION OF STATE OF WEST VIRGINIA	42
SOUTH CHARLESTON HOUSING AUTHORITY CITY OF	41
ROANE COUNTY BOARD OF EDUCATION	41
UNION WILLIAMS PSD	40
UNION PUBLIC SERVICE DISTRICT	40
BRAXTON COUNTY BOARD OF EDUCATION	39
MARSHALL COUNTY PARKS & RECREATION	38
GENERAL SERVICES DIVISION DEPARTMENT OF ADMINISTRATION	34
BOONE RALEIGH PUBLIC SERVICE DISTRICT	33



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Customer Name	Number of Facilities
PUTNAM COUNTY PARKS AND RECREATION	33
LAND DIVISION/DEPT OF AGRICULTURE STATE OF WEST VIRGINIA	33
FAIRMONT STATE UNIVERSITY	33
GREATER ST ALBANS PSD	32
GLENVILLE STATE COLLEGE HOUSING CORP	32
PADEN CITY, CITY OF	32
EASTERN WYOMING PSD	31
WOODLANDS DEVELOPMENT GROUP INC	31
JEFFERSON COUNTY PUBLIC SERVICE DISTRICT	31
MINERAL WELLS PSD	31
ELK VALLEY PUBLIC SERVICE DISTRICT	31
WEBSTER COUNTY BOARD OF EDUCATION	31
GLENVILLE, CITY OF	31
OSTEOPATHIC MEDICINE, WV SCHOOL OF	30
REHABILITATION SERVICES, DIVISION OF WV DEPT OF EDUCATION & THE ARTS	30
TUCKER COUNTY BOARD OF EDUCATION	30
MOUNTAIN CAP OF WEST VIRGINIA INC	30
SOUTHERN APPALACHIAN LABOR SCHOOL	29
CENTRAL WEST VIRGINIA TRANSIT AUTHORITY	29
MOUNTAINHEART COMMUNITY SERVICES INC	28
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BARBOUR COUNTY BOARD OF EDUCATION	27
EASTERN PANHANDLE INSTRUCTIONAL COOP	27
RESA VIII	27
FAIRMONT COMMUNITY DEVELOPMENT PARTNERSHIP	26
HIGHER EDUCATION POLICY COMMISSION, WV	26
MARTINSBURG HOUSING AUTHORITY	26
DAVIS-STUART INC	25
CAMP CAESAR - WEBSTER CO 4-H INC	24
RICHWOOD, CITY OF	24
GILMER COUNTY BOARD OF EDUCATION	23



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MYLAN PARK FOUNDATION INC	22
SOUTHERN JACKSON CO PSD	21
SUMMERS COUNTY BOARD OF EDUCATION	21
DODDRIDGE COUNTY BOARD OF EDUCATION	20
TAYLOR COUNTY PUBLIC SERVICE DISTRICT	20
DUNBAR HOUSING AUTHORITY, CITY OF	20
BLUEFIELD STATE COLLEGE	20
JEFFERSON COUNTY FAIR ASSOCIATION INC C\O CHARLOTTE VICKERS	20
MARION COUNTY 4-H CAMP BOARD ASSOC	20
TRI-COUNTY YMCA 6989 200 CARL'S LANE	19
BERKELEY COUNTY YOUTH FAIR ASSOCIATION	19
STAR CITY, TOWN OF	18
OHIO COUNTY COMMISSION	18
CLINTON WATER ASSOCIATION	18
CLAY, TOWN OF	17
CLAY COUNTY BOARD OF EDUCATION	17
MOTOR VEHICLES, DEPARTMENT OF STATE OF WEST VIRGINIA	17
PAX, TOWN OF	16
RANDOLPH COUNTY HOUSING AUTHORITY	16
CULTURE & HISTORY, DEPARTMENT OF STATE OF WEST VIRGINIA	16
GILMER COUNTY PUBLIC SERVICE DISTRICT	16
CLAYMONT SOCIETY FOR CONTINUOUS EDUCATION INC	16
BURNSVILLE PUBLIC UTILITY BOARD	16
WEBSTER SPRINGS PUBLIC SERVICE DISTRICT	15
NORTHERN PANHANDLE HEAD START INC	15
EDUCATIONAL BROADCASTING AUTHORITY STATE OF WEST VIRGINIA	15
MORRIS FOUNDATION	14
RIVESVILLE, TOWN OF	14



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WOOD COUNTY PERMANENT 4-H CAMP ASSOCIATION INC	14
WEST VIRGINIA UNIVERSITY AT PARKERSBURG	14
WORKFORCE WEST VIRGINIA	14
VETERANS ASSISTANCE, DEPARTMENT OF STATE OF WEST VIRGINIA	13
WESTOVER, CITY OF	13
GOODWILL INDUSTRIES OF KANAWHA VALLEY INC	13
POCAHONTAS COUNTY 4-H FOUNDATION INC C/O SHIRLEY WILKINS	13
HIGH ROCKS EDUCATIONAL CORPORATION	13
NAZARETH FARM INC	13
WV INTERSTATE FAIR & EXPOSITION	13
PRESTON COUNTY SENIOR CITIZENS INC	12
FAIRMONT-MARION COUNTY TRANSIT AUTHORITY	12
MONONGAH, TOWN OF	12
PRESTON COUNTY WORKSHOP INC	12
SPENCER HOUSING AUTHORITY, CITY OF	12
MID OHIO VALLEY TRANSIT AUTHORITY	12
HUMAN RESOURCE DEVELOPMENT & EMPLOYMENT INC	12
ADJUTANT GENERAL'S OFFICE STATE OF WEST VIRGINIA	12
PROMISE FOUNDATION OF BARBOUR CO INC	12
MARLINTON, TOWN OF	11
NEW RIVER RANCH INC	11
MOUNDSVILLE SANITARY BOARD, CITY OF	11
KANAWHA VALLEY REGIONAL TRANSPORTATION AUTHORITY	11
BARBOUR COUNTY SENIOR CENTER INC	11
KANAWHA VALLEY SENIOR SERVICES INC	11
PLEASANT VALLEY PUBLIC SERVICE DISTRICT	10
NEW RIVER COMMUNITY & TECHNICAL COLLEGE	10
SPROUTING FARMS CORP	10
AFL-CIO APPALACHIAN COUNCIL INC	10
TAX DEPARTMENT STATE OF WEST VIRGINIA	10



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Customer Name	Number of Facilities
CONSERVATION AGENCY, WEST VIRGINIA STATE OF WEST VIRGINIA	10
GAULEY BRIDGE, TOWN OF	10
ROWLESBURG, TOWN OF	10
EMS INC DBA ELKINS MOUNTAIN SCHOOL	10
OFFICE OF TECHNOLOGY/IS&C DEPARTMENT OF ADMINISTRATION	10
BRIDGEVALLEY COMMUNITY & TECH COLLEGE	10
WEST DUNBAR PSD	10
JUNIOR, TOWN OF	10
YOUTH SERVICES SYSTEM INC	10
MEADOW BRIDGE, TOWN OF	10
GRANT TOWN, TOWN OF	9
MERCER COUNTY SOLID WASTE AUTHORITY	9
JOINT COMMITTEE ON GOVERNMENT & FINANCE STATE OF WEST VIRGINIA	9
CENTRAL APPALACHIA EMPOWERMENT ZONE OF WEST VIRGINIA (CAEZWV)	9
HINTON SANITARY BOARD, CITY OF PO BOX 866	9
REEDSVILLE, TOWN OF	9
TRI COUNTY WATER ASSOCIATION	9
COMMUNITY RESOURCES INC	9
STONEWOOD, CITY OF	9
GREENBRIER COUNTY SOLID WASTE AUTHORITY	9
CENTER PUBLIC SERVICE DISTRICT	8
NORTHERN COMMUNITY COLLEGE, WV COLLEGE SQUARE	8
OIL GAS & INDUSTRIAL HISTORICAL ASSOCIATION INC	8
WHITESVILLE, TOWN OF	8
HOUSING DEVELOPMENT CORPORATION	8
BINGAMON PUBLIC SERVICE DISTRICT	8
GLASGOW, TOWN OF	8
INTEGRATED RESOURCES INC	8
GENESIS YOUTH CENTER INC	8
SOUTHEASTERN APPALACHIAN RURAL ALLIANCE	8



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Customer Name	Number of Facilities
INSURANCE COMMISSIONER, OFFICE OF THE STATE OF WEST VIRGINIA	8
LAKE FLOYD PUBLIC SERVICE DISTRICT	8
FLORENCE CRITTENTON PROGRAMS INC	8
ROBERTSON ASSOCIATION INC, THE	8
HISTORIC BEVERLY PRESERVATION INC	8
RESA VII	8
ROANE COUNTY ECONOMIC DEVELOPMENT AUTHORITY	8
CABIN CREEK HEALTH CENTER INC	8
ROANE-JACKSON TECHNICAL CENTER	8
JACKSON COUNTY COMMISSION ON AGING	7
JAMES RUMSEY TECHNICAL INSTITUTE	7
QUINWOOD, TOWN OF	7
BURNSVILLE, TOWN OF	7
CENTRAL WEST VIRGINIA AGING SERVICES INC	7
MANNINGTON SANITARY BOARD	7
MINER'S HEALTH SAFETY, DIVISION OF AND TRAINING, STATE OF WEST VIRGINIA	7
PUTNAM COUNTY AGING PROGRAM INC	7
UPSHUR HUMAN RESOURCES INC	7
POCA RIVER HUNTING FISHING & REC CLUB	7
CRITTENTON PROPERTIES INC	7
MONROE COUNTY COUNCIL ON AGING INC	7
CAMP FRAME 4-H ASSOCIATION INC	7
APPALACHIAN SOUTH FOLK LIFE CENTER INC	7
ROARK-SULLIVAN LIFEWAY CENTER	7
PRINCETON MEMORIAL COMPANY	6
BLUEFIELD STATE COLLEGE RESEARCH & DEVELOPMENT	6
GEOLOGICAL AND ECONOMIC SURVEY STATE OF WEST VIRGINIA	6
FARMINGTON, TOWN OF	6
COONS RUN PSD	6
FAMILY REFUGE CENTER	6
MARSHALL UNIVERSITY	6



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Customer Name	Number of Facilities
MONTGOMERY, CITY OF	6
COMMUNITY WORKS OF WEST VIRGINIA INC	6
MOUNTAIN MISSION INC	6
CLARKSBURG MISSION INC	6
REGIONAL JAIL & CORR. FAC. AUTHORITY STATE OF WEST VIRGINIA	6
TREASURER OF STATE STATE OF WEST VIRGINIA	6
RUPERT, TOWN OF	6
TUNNELTON MUNICIPAL SEWER SYSTEM	6
REEDY, TOWN OF	5
MARSHALL COUNTY SENIOR CITIZENS CENTER	5
SCOTTIE'S PLACE	5
HUMAN RESOURCE DEVELOPMENT FOUNDATION	5
SAND FORK, TOWN OF	5
PARKERSBURG ART CENTER INC	5
MID OHIO VALLEY FELLOWSHIP HOME INC	5
MID-OHIO VALLEY BOARD OF HEALTH	5
MIRACLE MEADOWS SCHOOL INC	5
COMMITTEE ON AGING FOR RANDOLPH COUNTY	5
JACKSON COUNTY DEVELOPMENT AUTHORITY	5
NORTHERN PANHANDLE COMMUNITY CRIMINAL JUSTICE BOARD	5
PACE ENTERPRISES OF WEST VIRGINIA INC	5
BLUE RIDGE COMMUNITY & TECHNICAL COLLEGE	5
TUCKER COUNTY SENIOR CITIZENS INC	5
MONTANA WATER ASSOCIATION	5
BARRACKVILLE, TOWN OF	5
BETHLEHEM FARM INC	5
GREATER WHEELING COALITION, THE FOR THE HOMELESS INC	5
BELINGTON COMMUNITY MEDICAL SERVICES	5
BERKELEY COUNTY ROUNDHOUSE AUTHORITY	5
RESA III	5



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Customer Name	Number of Facilities
COMMUNITY ASSOCIATION REINFORCING EDUC C\O APPALACHIAN COMMUNITY CARE	5
PRICKETTS FORT MEMORIAL FOUNDATION	5
PRESTON COUNTY CARING COUNCIL INC	5
ALDERSON HOSPITALITY HOUSE	5
EAST BANK, TOWN OF	5
WHITE OAK PUBLIC SERVICE DISTRICT	5
KANAWHA CHARLESTON HEALTH DEPARTMENT	5
WYOMING COUNTY ECONOMIC DEVELOPMENT AUTHORITY	5
REAL ESTATE DIVISION	4
CRAIK - PATTON INC	4
MILAN PUSKAR HEALTH RIGHT INC	4
HEART 2 HEART VOLUNTEERS INC	4
GRAFTON HOUSING AUTHORITY, CITY OF	4
COALTON, TOWN OF	4
PROPERTY MANAGEMENT SERVICES INC	4
PURCHASING, DIVISION OF DEPARTMENT OF ADMINISTRATION 2ND FL	4
CAMP BARBOUR INC	4
ACTORS GUILD OF PARKERSBURG INC	4
HATFIELD-MCCOY REGIONAL RECREATION AUTHORITY A PUBLIC CORPORATION	4
ADALAND MANSION DEVELOPMENT INC	4
REA OF HOPE FELLOWSHIP HOME	4
HENDRICKS, TOWN OF	4
MORGAN COUNTY PARKS AND RECREATION COMMISSION C/O MIKE BURKS	4
NATIONAL YOUTH SCIENCE FOUNDATION	4
BLENNERHASSET HISTORICAL FOUNDATION INC	4
COMMUNITY NETWORKS INC	4
KANAWHA VALLEY FELLOWSHIP HOME	4
MARSHALL CO ACTIVITIES DEV AUTHORITY INC	4
POCA, TOWN OF	4



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Customer Name	Number of Facilities
INSTITUTE OF SPIRITUALITY INC, WV	4
WV FOUNDATION FOR RAPE INFORMATION	4
HUNTINGTON WEST VIRGINIA HOUSING AUTHORITY	4
HUMANE SOCIETY OF PARKERSBURG INC	4
CLAY SENIOR AND COMMUNITY SERVICES INC	4
CAPITOL MARKET	4
MARION COUNTY PUBLIC LIBRARY	4
ATTORNEY GENERAL, OFFICE OF THE STATE OF WEST VIRGINIA	4
RACING COMMISSION STATE OF WEST VIRGINIA	4
PROTECTIVE SERVICES, DIVISION OF	4
MARTINSBURG PUBLIC LIBRARY COMMISSION	4
CLEARVIEW, VILLAGE OF	4
WETZEL COUNTY COMMITTEE ON AGING INC	4
RENICK, TOWN OF CORPORATION OF FALLING SPRINGS	4
GREENBRIER COUNTY COMMITTEE ON AGING	4
ORAL FISHING CLUB	4
CRYSTAL LAKE CLUB INC	4
BANCROFT, TOWN OF	4
BOYS AND GIRLS CLUB OF THE EASTERN PANHANDLE	4
BERKELEY-MORGAN COUNTY BOARD OF HEALTH	3
THE ARC OF THE MID OHIO VALLEY INC	3
GREENBRIER VALLEY THEATRE INC	3
CARITAS HOUSE INC	3
SHACK NEIGHBORHOOD HOUSE INC, THE	3
JACKSON COUNTY HEALTH DEPARTMENT	3
MARION REGIONAL DEVELOPMENT CORPORATION	3
MARION COUNTY SENIOR CITIZENS INC	3
BOB BURDETTE CENTER INC	3
HOPE FOR APPALACHIA INC	3
WHITE HALL, TOWN OF	3
JEFFERSON COUNTY COUNCIL ON AGING INC	3
CAMPUS NEIGHBORHOOD REVITALIZATION CORPORATION	3



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HISTORIC GLENWOOD FOUNDATION INC	3
ROANE COUNTY PATCH	3
COMMUNITY HOUSING INC	3
KANAWHA COUNTY SOLID WASTE AUTHORITY	3
ROANE COUNTY COMMITTEE ON AGING	3
HEDGESVILLE, TOWN OF	3
CHILDREN'S HOME OF WHEELING INC	3
POCAHONTAS COUNTY SENIOR CITIZENS INC	3
COWEN, TOWN OF CITY HALL	3
OHIO COUNTY SOLID WASTE AUTHORITY CITY COUNTY BUILDING	3
UNITED WAY OF THE EASTERN PANHANDLE INC	3
RAPE AND DOMESTIC VIOLENCE INFORMATION CENTER INC	3
RANDOLPH/ELKINS HEALTH DEPARTMENT	3
DENVER WATER ASSOCIATION	3
MOUNT HOPE HOUSING AUTHORITY, CITY OF	3
UNIVERSITY PHYSICIANS AND SURGEONS	3
QUINWOOD EMERGENCY AMBULANCE INC	3
COUNCIL ON AGING INC	3
PIERPONT COMMUNITY AND TECHNICAL COLLEGE	3
PARSONS REVITALIZATION ORGANIZATION	3
POCAHONTAS SOLID WASTE AUTHORITY	3
POLYMER ALLIANCE ZONE INC OF WV	3
ANIMAL FRIENDS OF NORTH CENTRAL WV	3
FAIRVIEW, TOWN OF	3
ALCOHOL BEVERAGE CONTROL ADMINISTRATION STATE OF WEST VIRGINIA	3
WEBSTER COUNTY SENIOR CITIZENS INC	3
PUBLIC SERVICE COMMISSION STATE OF WEST VIRGINIA	3
WEST VIRGINIA COMMUNITY ACTION PARTNERSHIPS INC	3
25045 A NEW CLENDENIN INC	3
APPALACHIAN AREA AGENCY ON AGING	3
NICHOLAS COUNTY HEALTH DEPARTMENT	3



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Customer Name	Number of Facilities
BATH, TOWN OF	3
NATIONAL COAL HERITAGE AREA AUTHORITY	3
BARTLETT HOUSE INC	3
GLENVILLE STATE COLLEGE RESEARCH CORP	3
GRAHAM HOUSE OF PRESERVATION SOCIETY INC	3
MAIN STREET FAIRMONT INC	3
GOVERNOR, OFFICE OF THE STATE OF WEST VIRGINIA	3
NICHOLAS COUNTY SOLID WASTE AUTHORITY	3
NITRO DEVELOPMENT AUTHORITY INC	3
NORTH PRESTON FARMERS CLUB INC	3
NORTHERN PANHANDLE WORKFORCE DEVELOPMENT BOARD INC	3
NORTH HILLS, TOWN OF	3
WV RESCUE MINISTRIES INC	3
GREENBRIER COUNTY CHILD AND YOUTH ADVOCACY CENTER INC	2
WEST VIRGINIA JOBS INVESTMENT TRUST	2
GREATER WHEELING SPORTS & ENTERTAINMENT AUTHORITY BOARD DBA WESBANCO ARENA	2
SOUTHERN WV COMMUNITY COLLEGE	2
SOBRANIA INC	2
WHEELING SYMPHONY SOCIETY INC	2
HARRISON CO SENIOR CITIZENS CENTER INC	2
WEBSTER COUNTY SOLID WASTE AUTHORITY	2
GREATER PAW PAW SANITARY DISTRICT	2
WEST VIRGINIA ADVOCATES INC DISABILITY RIGHTS OF WEST VIRGINIA	2
EAST END FAMILY RESOURCE CENTER	2
CENTRAL COMMUNICATIONS INCORPORATED	2
EASTERN PANHANDLE TRANSIT AUTHORITY DBA EPTA	2
ELK SOIL CONSERVATION DISTRICT	2
DODDRIDGE CO EMERGENCY SQUAD INC	2
WILLIAMSBURG COMMUNITY ACTION GROUP INC	2



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Customer Name	Number of Facilities
SOCIETY OF ST VINCENT DEPAUL INC ST VINCENT DEPAUL STORE	2
WEST AUGUSTA HISTORICAL SOCIETY OF MANNINGTON DISTRICT INC	2
SOUTH WESTERN WV REGIONAL 2 WORKFORCE INVESTMENT BOARD	2
FLATWOODS, TOWN OF	2
COVENANT HOUSE INC	2
COALFIELD DEVELOPMENT CORP	2
WEST VIRGINIA PUBLIC THEATRE INC	2
SUMMERS COUNTY COUNCIL ON AGING INC	2
GAP MILLS PUBLIC SERVICE DISTRICT INC	2
TUCKER COMMUNITY FOUNDATION	2
WEST VIRGINIA PUBLIC EMPLOYEES GRIEVANCE BOARD	2
FAMILY SERVICE UPPER OHIO VALLEY INC	2
GREATER NEW MARTINSVILLE DEVELOPMENT CORPORATION	2
GREATER CLAY LONG TERM RECOVERY COMMITTEE	2
HUMAN-ANIMAL BOND INC, THE	2
FIRE COMMISSION STATE OF WEST VIRGINIA	2
FINANCE, DIVISION OF DEPARTMENT OF ADMINISTRATION	2
TAYLOR COUNTY SENIOR CITIZENS INC	2
FAYETTE COUNTY HEALTH DEPARTMENT	2
IZAAK WALTON LEAGUE OF AMERICA INC BERKELEY COUNTY CHAPTER	2
STOP ABUSIVE FAMILY ENVIRONMENTS INC	2
JACKSON COUNTY DEVELOPMENTAL CENTER INC	2
STRAND THEATRE PRESERVATION SOCIETY	2
MID OHIO VALLEY WORK FORCE INVESTMENT CORPORATION	2
BLACKSVILLE, TOWN OF	2
ROANE COUNTY CHAMBER OF COMMERCE	2



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Customer Name	Number of Facilities
MONONGALIA COUNTY URBAN MASS TRANSIT AUTHORITY	2
MONONGAHELA SOIL CONSERVATION DISTRICT	2
BLUEFIELD CHAMBER OF COMMERCE	2
BRAXTON COUNTY SENIOR CITIZENS CENTER INC	2
MILITARY AFFAIRS, SECRETARY OF AND PUBLIC SAFETY	2
MORGAN COUNTY SOLID WASTE AUTHORITY	2
WV MEDICAL PROFESSIONAL HEALTH PROGRAM INC	2
RURAL EMERGENCY TRAUMA INSTITUTE INC	2
MERCER COUNTY FELLOWSHIP HOME INC	2
MOUNT HOPE HERITAGE & HOPE INC	2
PUTNAM DAY REPORT CENTER	2
BRAMWELL, TOWN OF	2
OP SHOP INC, THE	2
LOTTERY COMMISSION STATE OF WEST VIRGINIA	2
REGION 8 PLANNING & DEVELOPMENT COUNCIL	2
NAMI OF GREATER WHEELING INC	2
RELIGIOUS COALITION FOR COMMUNITY RENEWAL INC	2
BECKLEY HEALTH RIGHT INC	2
MOUNTAIN TRANSIT AUTHORITY	2
NORBORNE PRE-SCHOOL & DAY CARE CTR INC	2
BITUMINOUS COAL HERITAGE FOUNDATION	2
BERKELEY COUNTY DEVELOPMENT AUTHORITY	2
OHIO VALLEY CONSTRUCTION EMPLOYERS COUNCIL INC	2
LABOR, DEPARTMENT OF STATE OF WEST VIRGINIA	2
AVIATION, DIVISION OF	2
MOUNDSVILLE ECONOMIC DEVELOPMENT COUNCIL	2
RICH MOUNTAIN BATTLEFIELD FOUNDATION INC	2
REACHH-FAMILY RESOURCE CENTER INC	2
PARTNERSHIP OF AFRICAN AMERICAN CHURCHES	2
BERKELEY COUNTY COMMITTEE ON AGING INC DBA BERKELEY SENIOR SERVICES	2
WVSOM CLINIC INC DBA ROBERT C BYRD CLINIC	2
LITTLE EAGLE CHILD CARE CENTER INC	2



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Customer Name	Number of Facilities
SHEPHERD UNIVERSITY FOUNDATION SUPPORTING ORGANIZATION	2
ANMOORE, TOWN OF	2
SHEPHERD UNIVERSITY FOUNDATION INC	2
PUBLIC DEFENDER CORP 11TH JUC CIRCUIT	2
LIBRARY COMMISSION STATE OF WEST VIRGINIA	2
CAMDEN-ON-GAULEY, TOWN OF	2
SENIOR LIFE SERVICE OF MORGAN COUNTY INC	2
MARION COUNTY HUMANE SOCIETY	2
MAIN ST MARTINSBURG INC	2
ECONOMIC DEVELOPMENT AUTHORITY STATE OF WEST VIRGINIA	2
Number of Single Entry Records	269



10.E. Wildfire

Customer Name	Number of Facilities
PARKS, WEST VIRGINIA STATE C/O DEPARTMENT OF NATURAL RESOURCES	482
HIGHWAYS, DIVISION OF STATE OF WEST VIRGINIA	333
JEFFERSON COUNTY BOARD OF EDUCATION	166
MASON COUNTY BOARD OF EDUCATION	147
WAYNE COUNTY BOARD OF EDUCATION	134
NATURAL RESOURCES, DEPARTMENT OF STATE OF WEST VIRGINIA	133
MERCER COUNTY BOARD OF EDUCATION	93
WEST VIRGINIA UNIVERSITY	82
LOGAN COUNTY BOARD OF EDUCATION	82
WYOMING COUNTY BOARD OF EDUCATION	77
MINGO COUNTY PUBLIC SERVICE DISTRICT	68
KENOVA, CITY OF	59
SHEPHERD UNIVERSITY	55
CONCORD UNIVERSITY	52
MONROE COUNTY BOARD OF EDUCATION	50
BUCKHANNON HOUSING AUTHORITY	50
LINCOLN COUNTY BOARD OF EDUCATION	49
MATEWAN, TOWN OF	47
MINGO COUNTY BOARD OF EDUCATION	45
WILLIAMSON, CITY OF	45
GLENVILLE STATE COLLEGE	44
HEALTH & HUMAN RESOURCES, DEPARTMENT OF STATE OF WEST VIRGINIA	42
CORRECTIONS, DIVISION OF STATE OF WEST VIRGINIA	41
BRAXTON COUNTY BOARD OF EDUCATION	39
ARMORY BOARD STATE OF WEST VIRGINIA	36



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Customer Name	Number of Facilities
WEST VIRGINIA PARKWAYS AUTHORITY	35
STATE POLICE, WEST VIRGINIA DEPT OF MILITARY AFFAIRS & PUBLIC SAFETY	35
RAIL AUTHORITY STATE OF WEST VIRGINIA	34
GLENVILLE STATE COLLEGE HOUSING CORP	32
GLENVILLE, CITY OF	31
WOODLANDS DEVELOPMENT GROUP INC	31
HOMELAND SECURITY & EMERGENCY MANAGEMENT DIVISION OF	31
JEFFERSON COUNTY PUBLIC SERVICE DISTRICT	31
EASTERN WYOMING PSD	31
TUCKER COUNTY BOARD OF EDUCATION	30
LAND DIVISION/DEPT OF AGRICULTURE STATE OF WEST VIRGINIA	30
FORESTRY, DIVISION OF STATE OF WEST VIRGINIA	29
RANDOLPH COUNTY BOARD OF EDUCATION	28
SUPREME COURT OF APPEALS STATE OF WEST VIRGINIA	28
BARBOUR COUNTY BOARD OF EDUCATION	27
MINGO COUNTY COMMISSION	27
LOGAN COUNTY COMMISSION COUNTY COURTHOUSE ROOM 103	26
COMMUNITY ACTION OF SOUTHEASTERN WV	25
SOUTHWESTERN COMMUNITY ACTION COUNCIL INC	25
MOUNTAINHEART COMMUNITY SERVICES INC	23
CHAPMANVILLE, TOWN OF	23
GILMER COUNTY BOARD OF EDUCATION	23
FORT GAY, TOWN OF	22



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Customer Name	Number of Facilities
HOUSING AUTHORITY, CITY OF WILLIAMSON	22
JUVENILE SERVICES, DIVISION OF	21
JEFFERSON COUNTY FAIR ASSOCIATION INC C\O CHARLOTTE VICKERS	20
BLUEFIELD STATE COLLEGE	20
NORTHERN WAYNE COUNTY PUBLIC SERVICE DISTRICT	19
MINGO COUNTY, HOUSING AUTHORITY OF	19
EDUCATION, DEPARTMENT OF STATE OF WEST VIRGINIA	17
COALFIELD COMMUNITY ACTION PARTNERSHIP INC	17
AGRICULTURE, DEPARTMENT OF STATE OF WEST VIRGINIA	17
RANDOLPH COUNTY HOUSING AUTHORITY	16
WEST HAMLIN, TOWN OF	16
GILMER COUNTY PUBLIC SERVICE DISTRICT	16
CLAYMONT SOCIETY FOR CONTINUOUS EDUCATION INC	16
BURNSVILLE PUBLIC UTILITY BOARD	16
HARTFORD, CITY OF	15
LOGAN WATER DEPARTMENT, CITY OF	15
DELBARTON, TOWN OF	14
MOUNTAIN CAP OF WEST VIRGINIA INC	14
MORRIS FOUNDATION	14
MINGO COUNTY REDEVELOPMENT AUTHORITY	14
GILBERT, TOWN OF	14
COALFIELD DEVELOPMENT CORP	14
HATFIELD-MCCOY REGIONAL RECREATION AUTHORITY A PUBLIC CORPORATION	13
PROMISE FOUNDATION OF BARBOUR CO INC	12
LOGAN, CITY OF	12



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Customer Name	Number of Facilities
GREATER HUNTINGTON PARK & RECREATION DISTRICT	11
ENVIRONMENTAL PROTECTION, DIVISION OF STATE OF WEST VIRGINIA	11
BARBOUR COUNTY SENIOR CENTER INC	11
JUNIOR, TOWN OF	10
EMS INC DBA ELKINS MOUNTAIN SCHOOL	10
SOUTHERN WV COMMUNITY COLLEGE	10
MERCER COUNTY SOLID WASTE AUTHORITY	9
EDUCATIONAL BROADCASTING AUTHORITY STATE OF WEST VIRGINIA	9
LOGAN-MINGO AREA MENTAL HEALTH INC	8
LINCOLN EMERGENCY MEDICAL SERVICES INC	8
INTEGRATED RESOURCES INC	8
HISTORIC BEVERLY PRESERVATION INC	8
CENTER PUBLIC SERVICE DISTRICT	8
ROBERTSON ASSOCIATION INC, THE	8
REHABILITATION SERVICES, DIVISION OF WV DEPT OF EDUCATION & THE ARTS	8
BURNSVILLE, TOWN OF	7
STEPPING STONES INC	7
MOTOR VEHICLES, DEPARTMENT OF STATE OF WEST VIRGINIA	7
MONROE COUNTY COUNCIL ON AGING INC	7
UPSHUR HUMAN RESOURCES INC	7
PRINCETON MEMORIAL COMPANY	6
BLUEFIELD STATE COLLEGE RESEARCH & DEVELOPMENT	6
RESA VIII	6
WILLIAMSON HEALTH & WELLNESS CENTER INC	6
EASTERN PANHANDLE INSTRUCTIONAL COOP	6



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Customer Name	Number of Facilities
WAYNE COUNTY COMMUNITY SERVICE ORGANIZATION INC	6
SOUTH WESTERN WV REGIONAL 2 WORKFORCE INVESTMENT BOARD	5
WYOMING COUNTY ECONOMIC DEVELOPMENT AUTHORITY	5
COMMUNITY ASSOCIATION REINFORCING EDUC C\O APPALACHIAN COMMUNITY CARE	5
BELINGTON COMMUNITY MEDICAL SERVICES	5
SAND FORK, TOWN OF	5
COMMITTEE ON AGING FOR RANDOLPH COUNTY	5
SCOTTIE'S PLACE	5
TUCKER COUNTY SENIOR CITIZENS INC	5
HENDRICKS, TOWN OF	4
RESA VII	4
CAMP BARBOUR INC	4
COALTON, TOWN OF	4
ADALAND MANSION DEVELOPMENT INC	4
PROPERTY MANAGEMENT SERVICES INC	4
LINCOLN ECONOMIC DEV AUTHORITY INC	4
JEFFERSON COUNTY COUNCIL ON AGING INC	3
HOUSING AUTHORITY OF WAYNE COUNTY	3
REGIONAL JAIL & CORR. FAC. AUTHORITY STATE OF WEST VIRGINIA	3
JUSTICE PUBLIC SERVICE DISTRICT	3
MARSHALL UNIVERSITY	3
HOUSING DEVELOPMENT CORPORATION	3
LOGAN COUNTY CHILD ADVOCACY CENTER INC	3
LINCOLN COUNTY FAIRS & FESTIVALS	3
ALDERSON HOSPITALITY HOUSE	3



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Customer Name	Number of Facilities
VETERANS ASSISTANCE, DEPARTMENT OF STATE OF WEST VIRGINIA	3
CONSERVATION AGENCY, WEST VIRGINIA STATE OF WEST VIRGINIA	3
MASON COUNTY ACTION GROUP INC	3
GLENVILLE STATE COLLEGE RESEARCH CORP	3
BRANCHES DOMESTIC VIOLENCE SHELTER OF HUNTINGTON WEST VIRGINIA INC	3
GENERAL SERVICES DIVISION DEPARTMENT OF ADMINISTRATION	3
PARSONS REVITALIZATION ORGANIZATION	3
TWISTED GUN GOLF COURSE LLC	3
RANDOLPH/ELKINS HEALTH DEPARTMENT	3
WORKFORCE WEST VIRGINIA	3
FAMILY REFUGE CENTER	2
SHEPHERD UNIVERSITY FOUNDATION INC	2
GAP MILLS PUBLIC SERVICE DISTRICT INC	2
FLATWOODS, TOWN OF	2
STOP ABUSIVE FAMILY ENVIRONMENTS INC	2
ELK SOIL CONSERVATION DISTRICT	2
DIGNITY HOSPICE OF SOUTHERN WV	2
SHEPHERD UNIVERSITY FOUNDATION SUPPORTING ORGANIZATION	2
UNIVERSITY PHYSICIANS AND SURGEONS	2
STRONG THROUGH OUR PLAN	2
STEP BY STEP INC	2
DAVIS-STUART INC	2
COUNCIL ON AGING INC	2
HAMLIN PUBLIC SERVICE DISTRICT	2
COMMUNITY EXCELLENCE CORPORATION	2
GENESIS YOUTH CENTER INC	2
BRAMWELL, TOWN OF	2



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Customer Name	Number of Facilities
BRAXTON COUNTY SENIOR CITIZENS CENTER INC	2
COALFIELD JAMBOREE AT THE LOGAN THEATRE	2
APPALACHIAN AREA AGENCY ON AGING	2
BLUEFIELD CHAMBER OF COMMERCE	2
PUBLIC DEFENDER CORPORATION 25TH JUDICIAL CIRCUIT	2
RECOVERY GROUP OF SOUTHERN WV	2
RICH MOUNTAIN BATTLEFIELD FOUNDATION INC	2
WEST LOGAN, TOWN OF	2
TUCKER COMMUNITY FOUNDATION	2
CENTRAL WEST VIRGINIA AGING SERVICES INC	2
BOYS AND GIRLS CLUB OF THE EASTERN PANHANDLE	2
MERCER COUNTY FELLOWSHIP HOME INC	2
NATIONAL YOUTH SCIENCE FOUNDATION	2
WAYNE COUNTY SOLID WASTE AUTHORITY	2
MID-OHIO VALLEY BOARD OF HEALTH	2
ALLIANCE FOR THE ARTS LTD	1
BARBOUR COUNTY FAIR ASSOCIATION	1
BECKLEY HEALTH RIGHT INC	1
BARBOUR COUNTY BOARD OF HEALTH	1
WOODLANDS COMMUNITY LENDERS	1
ANIMAL WELFARE SOCIETY OF JEFFERSON COUNTY	1
WV FOUNDATION FOR RAPE INFORMATION	1
EASTERN WV COMMUNITY & TECH. COLLEGE	1
TUG VALLEY RECOVERY SHELTER ASSOCIATION INC	1



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Customer Name	Number of Facilities
ADJUTANT GENERAL'S OFFICE STATE OF WEST VIRGINIA	1
DISCOVER DOWNTOWN CHARLES TOWN DBA CHARLES TOWN NOW	1
COMMUNITY RESOURCES INC	1
CHILD PROTECT OF MERCER COUNTY INC	1
WEST HAMLIN UNITY PLACE	1
COALFIELDS EXPRESSWAY AUTHORITY	1
SOUTHERN MOUNTAINS, THE COUNCIL OF THE WV BRANCH--MCDOWELL CO. CHAPTER INC	1
WEST VIRGINIA COMMUNITY ACTION PARTNERSHIPS INC	1
WESTMORELAND APARTMENTS INC	1
WESTMINSTER AT WADE INC DBA WADE CENTER	1
WESTON HOUSING AUTHORITY	1
UPSHUR COUNTY SOCIETY FOR CRIPPLED CHILDREN & ADULTS	1
CONCORD UNIVERSITY FOUNDATION INC	1
CONCORD UNIVERSITY RESEARCH & DEVELOPMENT	1
BRAXTON COUNTY CONVENTION & VISITORS BUREAU	1
CONTEMPORARY AMERICAN THEATER FESTIVAL	1
CANAAN VALLEY INSTITUTE	1
BUCKHANNON-UPSHUR WORK ADJUSTMENT CENTER	1
PRINCETON-MERCER COUNTY CHAMBER OF COMMERCE	1
JEFFERSON DAY REPORT CENTER INC	1
LEWIS COUNTY SENIOR CITIZENS CENTER INC	1
LINCOLN COUNTY PARKS AND RECREATION	1



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Customer Name	Number of Facilities
LOGAN COUNTY HEALTH DEPARTMENT	1
RALEIGH COUNTY SOLID WASTE AUTHORITY	1
RACING COMMISSION STATE OF WEST VIRGINIA	1
PUBLIC DEFENDER CORPORATION FOR THE 7TH JUDICIAL DISTRICT	1
MAGNOLIA FAIR	1
MASON COUNTY FAIR INC	1
PUBLIC DEFENDER CORP\6TH & 24TH CIRCUITS	1
MERCER COUNTY BOARD OF HEALTH	1
MERCER COUNTY CONVENTION AND VISITORS BUREAU INC	1
GOOD SHEPHERD INTERFAITH VOLUNTEER CARE GIVERS INC	1
PROFESSIONAL SURVEYORS WEST VIRGINIA BOARD OF	1
RURAL APPALACHIAN IMPROVEMENT LEAGUE	1
MINGO COUNTY HEALTH DEPARTMENT	1
POTOMAC COMPREHENSIVE DIAGNOSTIC AND GUIDANCE CENTER INC	1
PORT AUTHORITY, WV PUBLIC	1
MINGO COUNTY SOLID WASTE AUTHORITY	1
MITCHELL HEIGHTS, TOWN OF	1
OSTEOPATHIC MEDICINE, WV SCHOOL OF	1
OMAR AREA CRIME WATCH INC	1
OFFICE OF TECHNOLOGY/IS&C DEPARTMENT OF ADMINISTRATION	1
MOUNTAINEER DEVELOPMENT CORPORATION	1
NORTHERN WEST VIRGINIA RURAL HEALTH EDUCATION CENTER INC	1



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Customer Name	Number of Facilities
MOUNTWEST COMMUNITY & TECHNICAL COLLEGE	1
NATIONAL COAL HERITAGE AREA AUTHORITY	1
MERCER COUNTY OPPORTUNITY INDUSTRIES INC	1
SOUTHEASTERN APPALACHIAN RURAL ALLIANCE	1
TRI RIVER TRANSIT AUTHORITY	1
TREASURER OF STATE STATE OF WEST VIRGINIA	1
FAIRMONT STATE UNIVERSITY	1
TAX DEPARTMENT STATE OF WEST VIRGINIA	1
SUTTON, TOWN OF	1
GILMER COUNTY HEALTH DEPARTMENT	1
GLENVILLE STATE COLLEGE FOUNDATION	1
STAT EMS LLC	1
SPEECH PATHOLOGY & AUDIOLOGY EXAMINERS WEST VIRGINIA BOARD OF	1
LINCOLN UNITY APARTMENTS	1
GREATER APPALACHIAN OUTREACH INC	1
NEW RIVER COMMUNITY & TECHNICAL COLLEGE	1
JEFFERSON COUNTY SOLID WASTE AUTHORITY	1
HARPERS FERRY PARK ASSOCIATION INC	1
JEFFERSON COUNTY HEALTH DEPARTMENT	1
SOUTH CENTRAL EDUCATIONAL DEVELOPMENT	1
HENDERSON, TOWN OF	1
SOCIETY OF ST VINCENT DEPAUL INC ST VINCENT DEPAUL STORE	1
HISTORIC SHEPHERDSTOWN COMMISSION	1
HOMELESS INC	1



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Customer Name	Number of Facilities
HOMEOWNERSHIP CENTER INC	1
HUMAN RESOURCE DEVELOPMENT & EMPLOYMENT INC	1
HUMAN RESOURCE DEVELOPMENT FOUNDATION	1
INSURANCE COMMISSIONER, OFFICE OF THE STATE OF WEST VIRGINIA	1
ITMANN FOOD BANK	1
JACKSON COUNTY BOARD OF EDUCATION	1
RURAL EMERGENCY TRAUMA INSTITUTE INC	1
ELKINS DEPOT WELCOME CENTER INC	1
HARDY COUNTY BOARD OF EDUCATION	1



10.F. Dam Failure

Customer Name	Number of Facilities
JEFFERSON COUNTY BOARD OF EDUCATION	166
SHEPHERD UNIVERSITY	55
JEFFERSON COUNTY PUBLIC SERVICE DISTRICT	31
JEFFERSON COUNTY FAIR ASSOCIATION INC C\O CHARLOTTE VICKERS	20
CLAYMONT SOCIETY FOR CONTINUOUS EDUCATION INC	16
HIGHWAYS, DIVISION OF STATE OF WEST VIRGINIA	11
WEST VIRGINIA UNIVERSITY	11
EASTERN PANHANDLE INSTRUCTIONAL COOP	6
RESA VIII	6
JEFFERSON COUNTY COUNCIL ON AGING INC	3
STATE POLICE, WEST VIRGINIA DEPT OF MILITARY AFFAIRS & PUBLIC SAFETY	3
NATURAL RESOURCES, DEPARTMENT OF STATE OF WEST VIRGINIA	3
JUVENILE SERVICES, DIVISION OF	2
HEALTH & HUMAN RESOURCES, DEPARTMENT OF STATE OF WEST VIRGINIA	2
SUPREME COURT OF APPEALS STATE OF WEST VIRGINIA	2
SHEPHERD UNIVERSITY FOUNDATION INC	2
BOYS AND GIRLS CLUB OF THE EASTERN PANHANDLE	2
SHEPHERD UNIVERSITY FOUNDATION SUPPORTING ORGANIZATION	2
CONTEMPORARY AMERICAN THEATER FESTIVAL	1
ANIMAL WELFARE SOCIETY OF JEFFERSON COUNTY	1
GOOD SHEPHERD INTERFAITH VOLUNTEER CARE GIVERS INC	1
HARDY COUNTY BOARD OF EDUCATION	1
DISCOVER DOWNTOWN CHARLES TOWN DBA CHARLES TOWN NOW	1
HARPERS FERRY PARK ASSOCIATION INC	1
HISTORIC SHEPHERDSTOWN COMMISSION	1
JACKSON COUNTY BOARD OF EDUCATION	1
JEFFERSON COUNTY HEALTH DEPARTMENT	1
JEFFERSON COUNTY SOLID WASTE AUTHORITY	1
JEFFERSON DAY REPORT CENTER INC	1
MOTOR VEHICLES, DEPARTMENT OF STATE OF WEST VIRGINIA	1
RACING COMMISSION STATE OF WEST VIRGINIA	1
HOMELAND SECURITY & EMERGENCY MANAGEMENT DIVISION OF	1



10.G.Drought

Customer Name	Number of Facilities
CHS PRESERVATION INCORPORATED	1
EASTERN ALLEGHENY COUNCIL FOR HUMAN SERVICES INC	1
EASTERN PANHANDLE INSTRUCTIONAL COOP	1
EASTERN WEST VIRGINIA COMMUNITY ACTION AGENCY INC	1
EASTERN WV COMMUNITY & TECH. COLLEGE	1
EXPERIENCE LEARNING INC	10
FORESTRY, DIVISION OF STATE OF WEST VIRGINIA	3
FUTURE GENERATIONS UNIVERSITY CORP	6
HEALTH & HUMAN RESOURCES, DEPARTMENT OF STATE OF WEST VIRGINIA	1
HIGHWAYS, DIVISION OF STATE OF WEST VIRGINIA	21
HOMELAND SECURITY & EMERGENCY MANAGEMENT DIVISION OF	3
MOTOR VEHICLES, DEPARTMENT OF STATE OF WEST VIRGINIA	1
NATURAL RESOURCES, DEPARTMENT OF STATE OF WEST VIRGINIA	18
PENDLETON COUNTY BOARD OF EDUCATION	19
PENDLETON COUNTY COMMITTEE FOR THE ARTS	1
PENDLETON SENIOR AND FAMILY SERVICES INC	3
POTOMAC HIGHLANDS RECREATION CENTER INC	1
RESA VIII	1
STATE POLICE, WEST VIRGINIA DEPT OF MILITARY AFFAIRS & PUBLIC SAFETY	2
SUPREME COURT OF APPEALS STATE OF WEST VIRGINIA	1
THORN SPRING PARK ASSOCIATION	12
TREASURE MOUNTAIN FESTIVAL ASSOCIATION	1
WEST VIRGINIA UNIVERSITY	1



10.H.Earthquake

Customer Name	Number of Facilities
JEFFERSON COUNTY BOARD OF EDUCATION	166
SHEPHERD UNIVERSITY	55
MONROE COUNTY BOARD OF EDUCATION	50
JEFFERSON COUNTY PUBLIC SERVICE DISTRICT	31
HIGHWAYS, DIVISION OF STATE OF WEST VIRGINIA	24
JEFFERSON COUNTY FAIR ASSOCIATION INC C\O CHARLOTTE VICKERS	20
WEST VIRGINIA UNIVERSITY	19
PARKS, WEST VIRGINIA STATE C\O DEPARTMENT OF NATURAL RESOURCES	18
CLAYMONT SOCIETY FOR CONTINUOUS EDUCATION INC	16
MONROE COUNTY COUNCIL ON AGING INC	7
EASTERN PANHANDLE INSTRUCTIONAL COOP	6
RESA VIII	6
SCOTTIE'S PLACE	5
NATURAL RESOURCES, DEPARTMENT OF STATE OF WEST VIRGINIA	4
STATE POLICE, WEST VIRGINIA DEPT OF MILITARY AFFAIRS & PUBLIC SAFETY	4
HEALTH & HUMAN RESOURCES, DEPARTMENT OF STATE OF WEST VIRGINIA	3
JEFFERSON COUNTY COUNCIL ON AGING INC	3
ALDERSON HOSPITALITY HOUSE	3
SUPREME COURT OF APPEALS STATE OF WEST VIRGINIA	3
GAP MILLS PUBLIC SERVICE DISTRICT INC	2
JUVENILE SERVICES, DIVISION OF	2
BOYS AND GIRLS CLUB OF THE EASTERN PANHANDLE	2
SHEPHERD UNIVERSITY FOUNDATION SUPPORTING ORGANIZATION	2
SHEPHERD UNIVERSITY FOUNDATION INC	2
ANIMAL WELFARE SOCIETY OF JEFFERSON COUNTY	1
SOUTHEASTERN APPALACHIAN RURAL ALLIANCE	1
COMMUNITY ACTION OF SOUTHEASTERN WV	1
CONTEMPORARY AMERICAN THEATER FESTIVAL	1



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Customer Name	Number of Facilities
DISCOVER DOWNTOWN CHARLES TOWN DBA CHARLES TOWN NOW	1
EDUCATIONAL BROADCASTING AUTHORITY STATE OF WEST VIRGINIA	1
FAMILY REFUGE CENTER	1
JACKSON COUNTY BOARD OF EDUCATION	1
HARDY COUNTY BOARD OF EDUCATION	1
JEFFERSON COUNTY SOLID WASTE AUTHORITY	1
HARPERS FERRY PARK ASSOCIATION INC	1
RACING COMMISSION STATE OF WEST VIRGINIA	1
HISTORIC SHEPHERDSTOWN COMMISSION	1
HOMELAND SECURITY & EMERGENCY MANAGEMENT DIVISION OF	1
HOMELESS INC	1
AGRICULTURE, DEPARTMENT OF STATE OF WEST VIRGINIA	1
MOTOR VEHICLES, DEPARTMENT OF STATE OF WEST VIRGINIA	1
JEFFERSON DAY REPORT CENTER INC	1
JEFFERSON COUNTY HEALTH DEPARTMENT	1
GOOD SHEPHERD INTERFAITH VOLUNTEER CARE GIVERS INC	1



11. Appendix D – Mitigation Action Sheets

Promote/Enhance RL/SRL Program	
Mitigation Action FL-01	
Previous Mitigation Strategy Elements	
	2010-70
	2010-71
	2010-72
	2010-74
	2010-75
<p>This Mitigation Action will focus on promoting and enhancing the Repetitive Loss (RL) and the Severe Repetitive Loss (SRL) program. Specific activities to support this initiative include, but are not limited to:</p> <ol style="list-style-type: none"> 5.1. Promote HMA grant programs to mitigate listed SRL and RL properties. 5.2. Promote mitigation at no property owner cost through HMA grant programs. 5.3. Allocate designated SRL funds to at least three high risk SRL properties for acquisition and demolition projects in targeted communities. 5.4. Prioritize mitigation of SRL and Repetitive Loss properties through post-disaster mitigation strategy priorities and activities among with bonus grant application scoring points for all HMA funding. 5.5. Provide local project sponsors that target RL and SRL property mitigation priority HMA funding. 5.6. Annually perform data synthesis and update the Bureau Net Database in coordination with FEMA Region III - provide RL and SRL datasets to local governments for use in their RL and SRL targeting efforts. 	
Mitigation Action Details	
Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	1
Priority:	High
Costs Associated:	Minimal
Potential Funding:	Agency budgets, NFIP, HMPG, PDM, FMA, HUD
Lead Agency:	WVDHSEM
Implementation Schedule:	Planning and initiation
Status:	On-going
Additional Comments	
<p>WVDHSEM hired additional personnel in September 2018 to provide assistance in this programmatic area. It is anticipated that this program will be completely operational in the near future.</p>	



Promote/Enhance CRS Program

Mitigation Action FL-02

Previous Mitigation Strategy Elements 2010-11
2010-12
2013-03

This Mitigation Action will focus on promoting and enhancing the Community Rating System program. Specific activities to support this initiative include, but are not limited to:

1. Target and provide technical assistance to local communities.
2. Develop a CRS application to capture critical information.
3. Provide detailed directions to assist communities with the applicable process.
4. Identify communities which could benefit from CRS participation.

Mitigation Action Details

Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	4, 1
Priority:	High
Costs Associated:	Minimal
Potential Funding:	Agency budgets, NFIP, CAP-SSSE, CTP
Lead Agency:	WVDHSEM
Implementation Schedule:	On-going
Status:	On-going

Additional Comments



Promote/Enhance NFIP

Mitigation Action FL-03

Previous Mitigation Strategy Elements 2010-14
2010-15

This Mitigation Action will focus on promoting and enhancing the National Flood Insurance Program. Specific activities to support this initiative include, but are not limited to:

1. Conduct an outreach campaign to property owners located in Special Flood Hazard Areas regarding flood insurance and mitigation.
2. Coordinate efforts to reduce Flood Insurance Premiums by focusing on Pre-FIRM and approximate A zone.

Mitigation Action Details

Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	1, 2, 4
Priority:	High
Costs Associated:	
Potential Funding:	Agency budgets, NFIP, CAP-SSSE
Lead Agency:	WVDHSEM
Implementation Schedule:	On-going
Status:	On-going

Additional Comments

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Conduct Flood Mitigation Planning

Mitigation Action FL-04

Previous Mitigation Strategy Elements 2010-16
2010-19

This Mitigation Action will focus on promoting and enhancing a variety of specific mitigation activities. Specific activities to support this initiative include, but are not limited to:

1. Create advisory flood heights for all Zone A (100-year floodplain) in state;
2. Develop prioritized list of state-owned or leased facilities at risk to flood and conduct detailed site assessment to develop site-specific mitigation action plans.

Mitigation Action Details

Hazard(s) Addressed:	Flooding
Goal(s) Addressed:	1, 2, 3
Priority:	High
Estimated Cost	
Potential Funding:	HMA, CTP
Lead Agency:	WVU GIS Technical Center, WVDHSEM
Implementation Schedule:	On-going
Status:	On-going

Additional Comments



Soil Erosion Reduction Measures

Mitigation Action LS-01

Previous Mitigation Strategy Element 2013-24

This Mitigation Action will focus on promoting and enhancing a variety of specific mitigation activities. Specific activities to support this initiative include, but are not limited to:

1. Work with logging operations to reduce soil erosion.
2. Develop and implementing programs to reduce erosion and run-off following logging.
3. Identify best practices and education programs for logging operations.

Mitigation Action Details

Hazard(s) Addressed:	Landslide and Subsidence
Goal(s) Addressed:	1, 2, 4
Priority:	Medium
Estimated Cost	
Potential Funding:	Agency budgets
Lead Agency:	WV Conservation Agency, WV Division of Forestry
Implementation Schedule:	On-going
Status:	On-going

Additional Comments

Forestry reviewed in April 2018.



Understanding Landslide Risks

Mitigation Action LS-02

Previous Mitigation Strategy Elements 2013-13
2010-33
2010-51

This Mitigation Action will focus on promoting and enhancing a variety of specific mitigation activities. Specific activities to support this initiative include, but are not limited to:

1. Spatially track landslide occurrence along roadways.
2. Digitize WV landslide quadrangle maps to support.
3. Digitize information related to landslide prone areas.
4. Provide landslide information to support landslide risk analysis.

Mitigation Action Details

Hazard(s) Addressed:	Landslide and Subsidence
Goal(s) Addressed:	3, 1, 2
Priority:	Medium
Estimated Cost	
Potential Funding:	Agency budgets, 5% Initiative Funds (HMGP)
Lead Agency:	WV Division of Forestry
Implementation Schedule:	On-going
Status:	On-going

Additional Comments

Forestry reviewed in April 2018.



Develop Wildfire Prevention Measures	
Mitigation Action WF-01	
Previous Mitigation Strategy Element 2013-06	
<p>This Mitigation Action will focus on promoting and enhancing a variety of specific mitigation activities to take steps to reduce the risk that wildfires pose to state-owned and operated facilities, critical facilities, and private residences. Specific activities to support this initiative include, but are not limited to:</p> <ol style="list-style-type: none"> 1. Promote creation of defensible spaces between structures and potential wildfire fuel sources; 2. Assist communities with reduction of hazardous wildland fuels; 3. Identify potential wildfire hazards (i.e. burning coal seams) and take measures to mitigate that hazard fuel sources. 	
Mitigation Action Details	
Hazard(s) Addressed:	Wildfire
Goal(s) Addressed:	1, 2, 3, 4
Priority:	High
Estimated Cost	
Potential Funding:	Agency budgets
Lead Agency:	WV Division of Forestry
Implementation Schedule:	On-going
Status:	On-going
Additional Comments	
Forestry reviewed in April 2018.	



Fund Community Wildfire Protection Plan Program

Mitigation Action WF-02

Previous Mitigation Strategy Element 2010-07

This Mitigation Action will focus on promoting and enhancing a variety of specific mitigation activities. Specific activities to support this initiative include, but are not limited to:

1. Provide potential financial and technical assistance for development of Community Wildfire Protection Plans.

Mitigation Action Details

Hazard(s) Addressed:	Wildfire
Goal(s) Addressed:	2, 4
Priority:	Medium
Estimated Cost	
Potential Funding:	Agency budgets, FIREWISE
Lead Agency:	WV Division of Forestry
Implementation Schedule:	Continuous
Status:	On-Going

Additional Comments



Coordinate Dam & Levee Safety Issues	
Mitigation Action DL-01	
Previous Mitigation Strategy Elements 2010-02 2010-65 2013-05 2013-21	
<p>This Mitigation Action will focus on promoting and enhancing a variety of specific mitigation activities align programs and initiatives related to dam and levee safety. Specific activities to support this initiative include, but are not limited to:</p> <ol style="list-style-type: none"> 1. Coordinate activities among all stakeholders; 2. Explore remediation designs for coal dam impoundment structures to minimize inundation zone risks. 3. Develop methods to prioritize funding to mitigate risks associated with dams and levees. 4. Obtain funding for a dam safety revolving fund. 5. Explore other financial methods to fund safety programs. 	
Mitigation Action Details	
Hazard(s) Addressed:	Dam and Levee Failure, Flooding (secondary)
Goal(s) Addressed:	1
Priority:	High
Estimated Cost	
Potential Funding:	Agency budgets
Lead Agency:	SRO, WV DEP, USACE
Implementation Schedule:	Have operational by 2020
Status:	On-going
Additional Comments	
The focus would be on addressing the needs related to at risk dam/levee structures.	



Complete Threat Assessments

Mitigation Action CF-01

Previous Mitigation Strategy Elements 2010-76
2010-77
2013-09

This Mitigation Action will focus on promoting and enhancing a variety of specific mitigation activities. Specific activities to support this initiative include, but are not limited to:

1. Build on current and existing assessment programs to conduct vulnerability assessments of critical facilities and evaluate for potential new mitigation strategies.
2. Support integration of state vulnerability analysis local data into local plan updates for use in prioritizing mitigation projects to include acquisition and demolition projects.

Mitigation Action Details

Hazard(s) Addressed:	All
Goal(s) Addressed:	1
Priority:	High
Estimated Cost	Normal Operations
Potential Funding:	State Appropriations, Agency budgets, HSGP
Lead Agency:	SRO, WV Intelligence Fusion Center, DHSEM
Implementation Schedule:	Continuous
Status:	On-Going

Additional Comments

The RRAP was completed several years ago. Other activities of the WV Intelligence Fusion Center support this activity.



Utilize Risk Information in Planning

Mitigation Action CF-02

Previous Mitigation Strategy Elements

2010-44	2010-55	2013-02
2010-45	2010-58	2013-10
2010-49	2010-66	2013-16
2010-50	2010-67	2013-17
2010-54	2010-68	2013-23

This Mitigation Action will focus on promoting and enhancing a variety of specific mitigation activities. Specific activities to support this initiative include, but are not limited to:

1. Integrate information from a variety of sources to develop a more detail vulnerability assessment to all types of natural hazards;
2. Utilize risk assessments to identify critical facilities which need redundant power;
3. Provide support to critical facilities to obtain redundant power/utilities;
4. Integrate risk information from hazards to identify communities at risk;
5. Evaluate state-owned/-operate facilities for specific vulnerability and develop methods to mitigate highest risks;
6. Incorporate Dam and Levee Safety Action Classes into risk assessment programs;
7. Collect necessary information to generate require threat/hazard assessments; and
8. Utilize existing data from WVIFC and THIRA to help sustain life and property.
9. Support development of TIEF/TIEL to enhance mapping.

Mitigation Action Details

Hazard(s) Addressed:	All
Goal(s) Addressed:	1, 2, 3
Priority:	High
Estimated Cost	Normal Operations
Potential Funding:	State Appropriations, Agency budgets, Homeland Security Grant, 5% Initiative (HMGP)
Lead Agency:	SRO, WVDHSEM, BRIM
Implementation Schedule:	Continuous
Status:	On-Going

Additional Comments

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Build Relationships with Critical Facilities

Mitigation Action CF-03

Previous Mitigation Strategy Elements 2013-01
2010-20

This Mitigation Action will focus on promoting and enhancing a variety of specific mitigation activities. Specific activities to support this initiative include, but are not limited to:

1. Continue to build relations with private utilities and owners of critical facilities;
2. Provide information related to best practices, lessons-learned, and local hazard knowledge;
3. Provide information related to threats and hazards in local communities;
4. Develop facility assessment checklist to be used as part of a Continuity of Operations/Hazard Vulnerability Assessment.
5. Encourage facility involvement in local planning efforts.

Mitigation Action Details

Hazard(s) Addressed:	All
Goal(s) Addressed:	2
Priority:	High
Estimated Cost	
Potential Funding:	Agency budgets
Lead Agency:	SRO, WVDHSEM/ WV Intelligence Fusion Center
Implementation Schedule:	Continuous
Status:	On-Going

Additional Comments

This is an ongoing program activity. This is supported through the collaboration of WVDHSEM and the WVIFC. Focus is on all critical infrastructure areas.



Promote Building Codes	
Mitigation Action CF-04	
Previous Mitigation Strategy Elements 2010-17 2010-18 2010-62 2010-69	
<p>This Mitigation Action will focus on promoting and enhancing a variety of specific mitigation activities. Specific activities to support this initiative include, but are not limited to:</p> <ol style="list-style-type: none"> 1. Promote adoption and enforcement of State Building Codes; 2. Provide technical assistance to communities related to enforcing building codes; 3. Promote building code standards for all critical facilities; and 4. Promote importance of redundant systems and protection measures in building codes. 	
Mitigation Action Details	
Hazard(s) Addressed:	All
Goal(s) Addressed:	1, 2, 4
Priority:	High
Estimated Cost	
Potential Funding:	Agency budgets
Lead Agency:	SRO, WV State Fire Marshal
Implementation Schedule:	Continuous
Status:	On-Going
Additional Comments	
SFM will continue to promote building codes and fire safety recommendations.	



Enhance Planning Process

Mitigation Action PL-01

Previous Mitigation Strategy Elements 2013-11
2013-12
2013-30

This Mitigation Action will focus on promoting and enhancing a variety of specific mitigation activities. Specific activities to support this initiative include, but are not limited to:

1. Interface with Regional Planning and Development Council's to make recommendations to improve process for next planning cycle.
2. Collaborate with Regional Planning Development Council's and local jurisdictions for standardizations of hazard data and classification for assessment of hazards in local mitigation plans in order to aid in future roll-up in the state hazard mitigation plan (i.e. standard GIS layers).
3. Identify opportunities to coordinate mitigation and CRS planning efforts.
4. Develop better methods and tools to determine effectiveness of strategies.

Mitigation Action Details

Hazard(s) Addressed:	All
Goal(s) Addressed:	1, 2, 3
Priority:	High
Estimated Cost	
Potential Funding:	HMGP, FMA, PDM
Lead Agency:	FEMA, WVDHSEM, SRO
Implementation Schedule:	2019
Status:	Ongoing

Additional Comments



Utilization of Benefit-Cost Analysis

Mitigation Action: PL-02

Previous Mitigation Strategy Elements 2010-06
2010-79
2013-22

This Mitigation Action will focus on promoting and enhancing a variety of specific mitigation activities. Specific activities to support this initiative include, but are not limited to:

1. Create guidance on how to document losses due to high frequency, low impact events for use in developing Benefit-Cost Analyses.
2. Geospatially map current Benefit Cost Analysis data sets in order to facilitate geographic assessment of grant applications.
3. Provide BCA information (to policy maker, property owners, etc) to promote use of mitigation measures.

Mitigation Action Details

Hazard(s) Addressed:	All
Goal(s) Addressed:	1, 2, 3, 4
Priority:	High
Estimated Cost	
Potential Funding:	5% Initiative funds (HMGP), Agency budgets
Lead Agency:	FEMA, WVDHSEM, SRO
Implementation Schedule:	On-Going
Status:	On-Going

Additional Comments

FEMA training
FEMA Benefit Cost Analysis tool



Integration of Climate/Land Use Change into Planning

Mitigation Action: PL-03

Previous Mitigation Strategy Elements 2010-43
2010-48
2013-14

This Mitigation Action will focus on promoting and enhancing a variety of specific mitigation activities. Specific activities to support this initiative include, but are not limited to:

1. Develop statewide databases for geological hazards including earthquake, karst, topography and landslide to determine land use changes;
2. Examine how land use change relates to all hazards;
3. Examine how predicted weather patterns (short-term and long-term) will affect likelihood of hazards and severity of the hazards;
4. Develop protective action recommendations related to land use changes and climate change.

Mitigation Action Details

Hazard(s) Addressed:	All
Goal(s) Addressed:	1, 3
Priority:	Medium
Estimated Cost	
Potential Funding:	5% Initiative funds (HMGP), Agency budgets
Lead Agency:	WVU-GIS Tech, National Weather Service, SRO
Implementation Schedule:	On-Going
Status:	On-Going

Additional Comments

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Conduct Public Outreach

Mitigation Action: TE-01

Previous Mitigation Strategy Elements 2010-08
2010-41
2013-18
2013-25
2013-28

This Mitigation Action will focus on promoting and enhancing a variety of specific mitigation activities. Specific activities to support this initiative include, but are not limited to:

1. Conduct presentations and outreach programs to homeowner associations, civic organizations, and other groups to recommend mitigations measures;
2. Disseminate information for communities at risk for specific hazards (i.e. communities near coal impoundments);
3. Produce multi-media information related to hazards to increase awareness;
4. Conduct an outreach campaign to engaging in hazard reduction programs (i.e. use of the FIREWISE program to promote measures to reduce wildfire threats);
5. Display information related to historical hazard occurrence to promote awareness (i.e. flood high water marks to increase flood awareness).

Mitigation Action Details

Hazard(s) Addressed:	All
Goal(s) Addressed:	3, 4
Priority:	High
Estimated Cost	
Potential Funding:	FIREWISE, 5% Initiative funds (HMGP)
Lead Agency:	WVDHSEM, SRO, Department of Forestry
Implementation Schedule:	On-Going
Status:	On-Going

Additional Comments



Improve Use of Media

Mitigation Action: TE-02

Previous Mitigation Strategy Elements

2010-30	2010-41	2013-27
2010-39	2013-19	2013-29
2010-40	2013-26	

This Mitigation Action will focus on promoting and enhancing a variety of specific mitigation activities. Specific activities to support this initiative include, but are not limited to:

1. Develop preparedness presentations, videos, fliers, information packets, etc;
2. Develop education programs related to hazards, mitigation, and preparedness for schools;
3. Encourage all media to run stories about preparedness and mitigation activities;
4. Ensure that preparedness information is available for all media formats;
5. Promote the whole community approach for all-hazards.
6. Develop an interagency flood risk management team (i.e. Silver Jackets Program).

Mitigation Action Details

Hazard(s) Addressed:	All
Goal(s) Addressed:	4
Priority:	High
Estimated Cost	
Potential Funding:	Agency budgets
Lead Agency:	Silver Jackets, WVDHSEM, SRO
Implementation Schedule:	On-Going
Status:	On-Going

Additional Comments



Conduct Wildfire Suppression Training

Mitigation Action TE-03

Previous Mitigation Strategy Element 2013-07

This Mitigation Action will focus on promoting and enhancing a variety of specific mitigation activities. Specific activities to support this initiative include, but are not limited to:

1. Provide training on wildfire suppression techniques to volunteer structure fire departments and wildland firefighters.

Mitigation Action Details

Hazard(s) Addressed:	Wildfire
Goal(s) Addressed:	4
Priority:	High
Estimated Cost	
Potential Funding:	Agency budgets
Lead Agency:	WV Division of Forestry
Implementation Schedule:	On-going
Status:	On-going

Additional Comments

Completed on an annual basis. Conducted as part of normal operations. Email guidance of no change from Walter Jackson 4-5-2018.



Obtain Executive/Legislative Support

Mitigation Action: GL-01

Previous Mitigation Strategy Elements 2010-09
2010-21
2010-23
2010-32

This Mitigation Action will focus on promoting and enhancing a variety of specific mitigation activities. Specific activities to support this initiative include, but are not limited to:

1. Develop directives forcing state agencies to address mitigation;
2. Develop tax incentive structure that would encourage private sector investment in mitigation;
3. Develop a review process for proposed tax-funded capital improvement projects to ensure that proper mitigation measures are being utilized;
4. Develop legislation requiring threat/hazard information is available prior to property sales/purchases.

Mitigation Action Details

Hazard(s) Addressed:	All
Goal(s) Addressed:	1, 2
Priority:	High
Estimated Cost	
Potential Funding:	Agency budgets
Lead Agency:	WVDHSEM, SRO
Implementation Schedule:	On-Going
Status:	On-Going

Additional Comments



Explore Enhanced Funding Methods	
Mitigation Action: GL-02	
Previous Mitigation Strategy Elements 2010-22 2010-57 2013-04 2013-30	
<p>This Mitigation Action will focus on promoting and enhancing a variety of specific mitigation activities. Specific activities to support this initiative include, but are not limited to:</p> <ol style="list-style-type: none"> 1. Identify stable and annual funding source for future regional hazard mitigation plans; 2. Evaluate funding levels available through various grants; 3. Explore alternative sources of funding to address mitigation efforts; 4. Allocate portion of available state funds to address projects that do not meet FEMA eligibility requirements. 	
Mitigation Action Details	
Hazard(s) Addressed:	All
Goal(s) Addressed:	1, 2
Priority:	High
Estimated Cost	
Potential Funding:	Agency budgets
Lead Agency:	Silver Jackets, WVDHSEM, SRO
Implementation Schedule:	On-Going
Status:	On-Going
Additional Comments	



12. Appendix E – Federal Mitigation Programs and Capabilities

Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
US Army Corps of Engineers	Flood Control Projects	√			√		√	Design and construction of local flood control projects not specifically authorized by Congress. State, political subdivisions and other local agencies established within state law with full authority and ability to undertake required legal and financial responsibilities.
	Riverbank Protection	√			√	√	√	Design & construction of stream and river bank protection projects to safeguard highways, highway bridges, essential public works, churches, hospitals, schools and other non-profit public critical facilities endangered by flood-caused erosion. State, political subdivisions and other local agencies established within state law with full authority and ability to undertake required legal and financial responsibilities.
	Flood Control Clearing	√			√	√	√	Design and construction of snagging and clearing projects for navigable waters and their tributaries to reduce potential flood damage. State, political subdivisions and other local agencies established within state law with full authority and ability to undertake required legal and financial responsibilities.
	Floodplain Management	√			√	√		Technical assistance in identification of flood-prone areas, potential losses and the flood hazard of proposed building sites; guidance in land use management to prevent flood damage. Funding limitations set by District Office. State, political subdivisions and other public organizations.



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Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
	Drought Assistance	√		√			√	<p>Coordinate the development of drought plans and procedures for lakes and dams within the State under the jurisdiction of the Corps of Engineers.</p> <p>Provide information and reports as needed.</p> <p>Coordinate USACOE drought related activities.</p> <p>Provide water from USACOE reservoirs and dams, as available during emergencies.</p>
U.S. Department of Agriculture	Watershed Protection Loans	√			√	√	√	<p>Loans to assist local sponsors provide the local share of the cost of watershed improvements for flood prevention, irrigation, drainage, water quality management, sediment control, fish and wildlife management, public water supplies and water storage.</p> <p>Sponsoring local organizations such as soil and water conservation districts with authority under state law to obtain give security for and raise revenues to repay loans.</p>
	Emergency Watershed Protection	√			√	√		<p>Technical services to determine eligibility and to plan needed measures. Financial assistance to construct approved measures.</p> <p>Any state agency, county (or group of counties), municipality, town, soil and water conservation district, flood prevention or control district or any other non-profit agency with authority under state law to carry out, maintain and operate watershed improvement works.</p>
	Resource Conservation & Development	√			√	√	√	<p>Grants and technical assistance to aid public agencies in implementing long-range resource conservation and development programs, including flood control projects.</p> <p>Public agencies and non-profit organizations having legal authority to plan, install, operate and maintain community projects benefiting the public.</p>



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Agency	Programs, Plans, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
	Forest Land Flood Prevention	√			√	√		<p>Technical assistance in planning and application of measures to protect public health and safety, reduce flood hazards and control sedimentation from forest and related lands when existing local, state and federal programs do not provide adequate facilities and funds for immediate protective action.</p> <p>Provides assistance in preparing requests for Section 216 funds for emergency treatment of watersheds impaired by fire, flood, earthquake or other natural disasters.</p> <p>State and local governments</p>
	Rural Housing Service (RHS) Homeownership Loans			√	√	√	√	Loans for the purchase, construction, rehabilitation or relocation of a dwelling and related facilities for low or moderate-income persons in rural areas. RHS can help subsidize monthly mortgage payments, limiting these costs to no more than 30 percent of the adjusted monthly income of the applicant.
	Very Low Income Housing Repair Loans and Grants: USDA Rural Development			√	√	√	√	<p>Home improvement and repair loans and grants enable very-low and low-income rural homeowners to remove health and safety hazards from their homes and to make homes accessible for people with disabilities. Grants are available for people 62 years old and older who cannot afford to repay the part of the assistance received as a loan.</p> <p>An applicant must own and occupy a home in a rural area, be without sufficient income to qualify for a Section 502 loan, have sufficient income to repay the loan, and be a citizen of the U.S. or reside in the U.S. after having been legally admitted for permanent residence.</p>



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Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
	Farm Service Agency Drought Assistance			√	√	√	√	<p>Provide assessments of drought damages.</p> <p>Coordinate requests for drought related Presidential Declaration of Drought Emergency.</p> <p>Recommend federal drought assistance declaration to the Governor through Department of Emergency Management.</p> <p>Implement federal drought assistance programs.</p> <p>Administer drought-related relief in coordination with the West Virginia Department of Agriculture</p>
	Emergency Food Stamp Program			√	√	√	√	<p>Provides emergency food stamps to disaster victims</p> <p>Coordinated with West Virginia Department of Health and Human Resources and the West Virginia Department of Agriculture</p>
	Disaster Assistance			√	√	√	√	<p>Emergency Conservation program shares with agricultural producers the cost of rehabilitating eligible farmlands damaged by natural disaster. .</p> <p>Farm Service Agency provides emergency loans to assist producers recover from production and physical losses due to drought, flooding, other natural disasters or quarantine.</p> <p>Natural Resources Conservation Service’s Emergency Watershed Protection Program (EWP) provides emergency measures, including purchase of floodplain easements for runoff retardation and soil erosion prevention to safeguard lives and property from floods, drought, and the products of erosion on the watershed.</p> <p>Food and Nutrition Service’s Food Distribution division has the primary responsibility of supplying food to disaster relief organizations.</p>



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Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
FEMA	National Flood Insurance Program (NFIP)	√			√	√	√	Insurance at a reasonable rate is provided to properties within communities participating in the National Flood Insurance Program. In West Virginia, 270 cities, counties and towns participated in the NFIP as of July 1, 2004. Property owners in communities participating in the National Flood Insurance Program.
	Hazard Mitigation Assistance (HMA)	√		√	√	√	√	The HMA program consists of three separate grant programs: Hazard Mitigation Grant Program (HMGP); Flood Mitigation Assistance (FMA) and Pre-Disaster Mitigation (PDM). FMA and PDM may be used to enhance State mitigation planning. HMGP, FMA and PDM may be used to implement structural flood mitigation programs to directly assist communities to reduce flood losses. Three NFIP-funded flood mitigation programs, SRL, and FMA were combined through the Biggert-Waters National Flood Insurance Reform Act of 2012, signed into law by President Barack Obama on July 6, 2012. Specific program guidance on the newly combined mitigation programs was released by FEMA during mid-July, 2013. It combines the former Flood Mitigation Assistance (FMA), Repetitive Flood Claims (RFC), and Severe Repetitive Loss (SRL) programs into one newly merged Flood Mitigation Assistance program. State or communities can receive financial and technical support for flood mitigation planning and implementation of flood mitigation projects. FMA, RFC and SRL must be used for repetitive loss properties that are covered through the NFIP. HMGP funding levels are dependent upon a Presidential Disaster Declaration and the amount of funding provided through Public Assistance. Grants are provided to state and local governments to support hazard mitigation projects per the disaster-specific Mitigation Strategy sate priorities. Projects included incentive projects at up to 5% of the total HMGP allocation, planning projects at up to 7% of the allocation and structural projects that are cost-beneficial at >88% of the allocation.



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Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
	Community Assistance Program – State Support Services Element (CAP-SSSE)	√			√	√	√	Identify, prevent, resolve floodplain management issues and reduce flood hazards Communities participating in the National Flood Insurance Program are supported by the state NFIP coordinator's office.
	National Dam Safety Program (NDSP)		√		√	√	√	Grants to reduce the risks to life and property from dam failure, through the establishment and maintenance of an effective dam safety program. States with new and existing impoundment structures
	Homeland Security Grant Program		√		√	√	√	The State Homeland Security Program (SHSP) enhances capabilities through planning, equipment, and training and exercise activities. The Citizen Corps Program engages citizens in personal preparedness, exercises, ongoing volunteer programs, and surge capacity response. Part of the Citizen Corps Program is the Community Emergency Response Team (CERT) program. Provides grant funding to volunteer organizations that make local communities safe and prepare to respond to any emergency situation. CERT trains people to respond to communities in their own local communities
	Regional Catastrophic Preparedness Grant Program (RCPGP)		√				√	Provides funding to support coordination of regional all-hazard planning for catastrophic events, including the development of integrated planning communities, plans, protocols, and procedures
	Preparedness Grants (formerly known as the Infrastructure Protection Program)		√				√	Supports specific activities to strengthen security at ports and enhance transit, trucking and intercity bus systems



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Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
	Emergency Management Performance Grants (EMPG)		√		√	√	√	Helps state and local governments to sustain and enhance their emergency management programs' effectiveness
	Disaster Preparedness Improvement Grant (DPIG)		√		√	√	√	Grants to encourage the maintenance and improvement of disaster preparedness plans and activities. For State and local governments
	Educational outreach programs		√		√			Educational materials for preventing injury are readily available at the FEMA website. (FEMA, 2003c)
	Disaster Housing			√	√	√	√	Residents within Presidentially declared areas are eligible for temporary housing assistance. The FEMA Administrator or their designee determines that other circumstances necessitate temporary housing assistance. Home Repair Program: Home repairs may be provided to those eligible applicants who are owner-occupants of the primary residence to be made habitable and whose property can be made habitable by repairs to the essential living area within 30 days following feasibility determination. The FEMA Region III Director may extend this period.
	Forest Fire Suppression			√			√	Federal assistance under Section 420 of the Act is provided in accordance with continuing Federal-State agreement for Fire Suppression (the Agreement) signed by the Governor and Regional Director. The Agreement contains the necessary terms and conditions consistent with the provisions of applicable laws, Executive orders, and regulations, as the Associate Director may require and specifies the type and extent of Federal Assistance



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Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
	Individual and Households Assistance Program (IFGP)			√	√	√	√	<p>Federal law authorizes grants to disaster victims with disaster related expenses and needs that cannot be met through other available governmental disaster assistance programs.</p> <p>The Federal share of a grant to an individual family under this program shall be equal to 75% of the actual cost of meeting such an expense or need and shall be made only on condition that the remaining 25% of such costs is paid to the individual or family from funds made available by the State. No individual or family shall receive any grant or grants under this program aggregating more than a maximum amount established by Federal regulation with respect to any one major disaster.</p> <p>The State:</p> <p>Maintains an Individual and Family Grant Program Administrative Plan</p> <p>Coordinates administration of the Individual and Family Grant Program through DHSEM supervised by the State Coordinating Officer.</p>



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Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
	Public Assistance			√	√	√	√	<p>If damage sites have been surveyed during the Pre-disaster Damage Assessment, eligible applicants may apply for Immediate Needs Funding (INF) within days of the disaster to support repair of replacement of qualifying public infrastructure. INF may be up to 50% of the Federal share of the PDA estimate for emergency work (Categories A and B). Any up-front funds received by an applicant will be offset later against actual emergency work projects as they are received. The State provides a 25% match to federal fund.</p> <p>Subsequent to a disaster declaration by the President, FEMA provides assistance to state agencies, local governments and some private non-profit organizations for the repair and restoration of damaged public facilities. A grant is made to the state, which then authorizes sub-grants to eligible applicants. Funding is then provided on a cost share basis with percentages established in the FEMA-State Agreement, but requiring a federal share of no less than 75%. The purpose of this Public Assistance Administrative Plan Annex is to identify the roles and responsibilities of the State in administering the Public Assistance program and to outline staffing requirements and the policies and procedures to be used.</p> <p>Though section 406, mitigation is available to damaged elements of certain structures and can be mitigated if the project is eligible and proven cost-beneficial.</p>
	Community Disaster Loans			√	√	√	√	Disaster-related expenses during the year of occurrence and the three succeeding fiscal years.
U.S. Department of Commerce	Fire Accident Analysis				√	√		<p>Detailed on-site studies of uncontrolled fires or the remains of fires by teams of experienced fire investigators, scientists and engineers to determine the causes, character of and ways of avoiding serious fire accidents.</p> <p>Elected or appointed state and local officials concerned with fire disasters and authorized to request such assistance.</p>
U.S. Department of Energy	Disaster-related Power Outage			√			√	Implements emergency related functions under the Federal Response Plan.



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Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
	Radiological Emergency Assistance			√		√	√	Provision of specialized services, advisory services, counseling and dissemination of technical information to assist in responding to incidents involving loss of control of radioactive materials and supporting efforts to protect public health and safety. For any person or organization with knowledge of an incident believed to involve ionizing radiation or radioactive material hazardous to health and safety.
US Department of Transportation	Hazardous Materials Emergency Preparedness (HMEP) Grant Program			√		√	√	Used by DHSEM/State Emergency Response Commission to grants to active Local Emergency Planning Committees for education and training to public sector employees for the purpose of responding to chemical accidents/incidents.
Environmental Protection Agency	Superfund Amendment and Reauthorization Act (SARA), Title III			√	√	√		Support programs that are designed to improve emergency planning, preparedness, mitigation, response and recovery capabilities with special emphasis on emergencies associated with hazardous materials. For state and local governments and university-sponsored programs.
Federal Bureau of Investigation	Victim Identification			√	√	√	√	Fingerprint identification of disaster victims For any authorized state or local law enforcement agency
U.S. Department of Health and Human Services, Public	Contaminated Food and Drugs			√	√	√	√	Through coordinated planning, advice, technical information, assistance and expertise can be provided to establish public health controls and to protect citizens from contaminated and unsafe food and drugs. Assists state and local agencies through the Department of Agriculture and Consumer Services and the Department of Health.
	Emergency Health Assistance			√			√	Provide emergency health care assistance as required and requested by the West Virginia Bureau for Public Health



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Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
	Vector Control			√			√	<p>Advice and technical assistance to prevent the spread of communicable diseases by disease-carrying animals or insects in the aftermath of a disaster.</p> <p>State and local public health authorities coordinated by the West Virginia Department of Health</p>
U.S. Department of Housing and Urban Development	Comprehensive Planning Assistance		√		√	√		<p>Grants to strengthen planning and decision-making capabilities of chief executives of state, regional and local agencies to promote more effective use of natural, economic and physical resources. Disaster mitigation and recovery planning are eligible activities.</p> <p>For state agencies designated by the Governor; counties, cities, regional and local planning agencies, local development districts, economic development districts and localities that suffered a major disaster</p>
	Community Block Development Grants		√		√	√	√	Grants to entitlement communities. Preferred use of funding is for long-term needs but may be used for emergency response activities.
	CDBG Disaster Recovery Assistance			√	√	√	√	<p>In response to disasters, Congress may appropriate additional funding for the CDBG program as Disaster Recovery grants to rebuild the affected areas and provide seed money to start the recovery process.</p> <p>Grantees may use DCBG Disaster Recovery funds for recovery efforts involving housing, economic development, infrastructure and prevention of further damage to affected areas. Funds may not duplicate funding available from FEMA, SBA, or USACE.</p>
	Mortgage Insurance for Disaster Victims							The program provides mortgage insurance to qualified disaster victims if their homes are located in an area that was designated by the President as a disaster area and if their homes were destroyed or damaged to such an extent that reconstruction or replacement is necessary.



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Agency	Programs, Plans, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
National Oceanic and Atmospheric Administration (NOAA)	NOAA National Weather Service Forecasts and Warnings		√		√	√	√	<p>Public forecasts and warnings of hazardous weather phenomena and floods, and training programs on disaster safety rules. These are available to agencies and the public.</p> <p>Educational materials for preventing injury are readily available at the NOAA website and news of impending heat conditions, including expected intensity are broadcast on local radio, NOAA Weather Radio, and television stations.</p>
Small Business Administration	Emergency Loans			√	√	√	√	<p>The SBA offers three types of loans:</p> <p>Home Disaster Loans for homeowners and tenants to repair or replace disaster damages to real estate and/or personal property. Tenants are eligible for personal property losses only.</p> <p>Business Physical Disaster Loans are for businesses to repair or replace disaster damages to property owned by the business. These losses could be to real estate, machinery and equipment, leasehold improvements, inventory and supplies. Businesses of any size are eligible to apply.</p> <p>Economic Injury Disaster Loans are working capital loans for small businesses and small agricultural cooperatives to assist them through the disaster recovery period. These loans are available to applicants without credit available elsewhere.</p>



13. Appendix F – Training Offerings in WV

Course Name	Dates	Location
Emergency Operations Plans for Rural Jurisdictions	January 30, 2013	Judge Black Annex - Parkersburg, WV
Resource Inventory Management for Rural Communities	February 21, 2013	Judge Black Annex - Parkersburg, WV
EOC Operations and Planning for All-Hazards	February 5-7, 2013	Tri-State Fire Academy - Huntington, WV
Social Media for Natural Disaster Response and Recovery	March 12, 2013	West Virginia State Police Academy (PDC)
Social Media for Natural Disaster Response and Recovery	March 13, 2013	Erma Byrd Higher Education Center - Beaver, WV
Bluestone Dam Full Scale Exercise Regional Seminar - Regions 2 & 4	January 23, 2013	State Fire Academy - Jackson's Mill
Bluestone Dam Full Scale Exercise Regional Seminar - Regions 1 & 6	January 29, 2013	WV State Police Academy (PDC) - Dunbar, WV
Bluestone Dam Full Scale Exercise Regional Seminar - Region 5	February 1, 2013	Erma Byrd Higher Education Center - Beaver, WV
ETeam Training Following BSD FSE Regional Seminar - Regions 2 & 4	January 23, 2013	State Fire Academy - Jackson's Mill
ETeam Training Following BSD FSE Regional Seminar - Regions 1 & 6	January 29, 2013	WV State Police Academy (PDC)
ETeam Training Following BSD FSE Regional Seminar - Region 5	March 14, 2013	Erma Byrd Higher Education Center - Beaver, WV
A Coordinated Response to Food Emergencies: Practice and Execution	February 26-27, 2013	One Davis Square - Training Room, Charleston, WV 25301



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Course Name	Dates	Location
Dealing With The Media: A Short Course for Rural First Responders	April 11, 2013	Judge Black Annex - Fort Boreman Room - Parkersburg, WV
Open Source Intelligence (OSINT) Practitioners's Training Course	May 1-2, 2013	Nisource/Columbia Gas Building, 1700 MacCorckle Ave. S.E., Charleston, WV 25305
Mobilizing Faith-Based Community Organizations in Preparing for Disaster	April 25, 2013	Clarion Hotel - Shepherdstown, WV
Public Information in a WMD/Terrorism Incident	August 28-29, 2013	Cabela's - Wheeling, WV
Testing an Emergency Operations Plan in a Rural EOC	June 7, 2013	American Red Cross (River Valley Chapter), Morgantown, WV - 3rd Floor Training Room
Real Time Evacuation Planning Model (RtePM)	May 14, 2013	NASA IV&V Facility, 100 University Dr., Fairmont, WV
Real Time Evacuation Planning Model (RtePM)	May 13, 2013	State Capitol Complex Bldg. 7 (computer lab), Charleston, WV
Disaster Management for Water and Wastewater Utilities	July 9-10, 2013	Bank of Romney - 95 E. Main Street, Romney, WV
EOC Operations and Planning for All-Hazards	October 15-17, 2013	128 Industrial Blvd., Kearneysville, WV 25430
WMD Radiological/Nuclear Awareness	September 17, 2013	Monongalia County Health Department - 453 Van Voorhis Road, Morgantown, WV
Law Enforcement Active Shooter Emergency Response (Law Enforcement Only)	September 17-19, 2013	Dunn Bldg. Berkeley County Council, 400 West Stephen St., Martinsburg, WV
Social Media for Natural Disaster Response and Recovery	October 22, 2013	128 Industrial Blvd., Kearneysville, WV



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Course Name	Dates	Location
Social Media for Natural Disaster Response and Recovery	October 24, 2013	Robert H. Mollohan Research Center- 1000 Galliher Dr., Fairmont, WV
Improvement Planning Workshop Region 1	October 23, 2013	WV State Police Academy (PDC) - Dunbar, WV Lunch will be provided
Improvement Planning Workshop Region 2	November 15, 2013	American Red Cross Office - Morgantown, WV Lunch will be provided
Improvement Planning Workshop Region 3	November 19, 2013	Augusta Church of Christ - 15338 Northwestern Pike (Rt. 50), Augusta, WV Lunch will be provided
Improvement Planning Workshop Region 4	October 25, 2013	WV DOT Equipment Division Conference Room - Buckhannon, WV Lunch will be provided
Improvement Planning Workshop Region 5	November 8, 2013	Erma Byrd Higher Education Center - Beaver, WV Lunch will be provided
Improvement Planning Workshop Region 6	November 7, 2013	Logan County EOC - Logan, WV Lunch will be provided
G290 Basic PIO	January 14th-15th,2014	Chief Logan State Park
G291 Joint Information System/Center Planning for PIO's	Feb. 11th,2014	North Bend State Park
G270.4 Recovery from Diaster the Local Government Role	March 18th - 19th, 2014	Pipestem State Park
G557 Rapid Needs Assessment	April 15th - 16th,2014	Cacapon State Park
G386 Mass Fatalities Incident Response	May 13th-14th, 2014	Twin Falls State Park



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Course Name	Dates	Location
G364 Multi Hazard Planning for Schools	June 17th - 18th	Hawks Nest State Park
G272 Warning Coordination	July 15th - 16th	Blackwater Falls State Park
G358 Evacuation and Re-Entry Planning	August 19th - 20th, 2014	Tygart Lake State Park
G775 EOC Management and Operations	Sept. 16th - 17th	Chief Logan State Park
Bioterrorism: Mass Prophylaxis Preparedness and Planning	February 25-26, 2014	Monongalia County Health Dept. - Morgantown, WV
Emergency Operations Plans for Rural Jurisdictions	March 14, 2013	Judge Black Annex - Parkersburg, WV
Community Healthcare Planning and Response to Disasters	March 25-26, 2014	WV State Police Academy (Professional Development Center) - Dunbar, WV
Threat and Hazard Identification and Risk Assessment (THIRA) Workshop	March 20, 2014	National Guard Armory Readiness Center - Parkersburg, WV
Threat and Hazard Identification and Risk Assessment (THIRA) Workshop	March 27, 2104	Tri-State Fire Academy - Huntington, WV
Threat and Hazard Identification and Risk Assessment (THIRA) Workshop	April 8, 2014	DOH Conference Room - Buckhannon, WV
Threat and Hazard Identification and Risk Assessment (THIRA) Workshop	April 17, 2014	Cacapon State Park - Berkeley Springs, WV
Threat and Hazard Identification and Risk Assessment (THIRA) Workshop	April 3, 2014	Robert H. Mollohan Center - I-79 Technology Park, 1000 Galliher Drive, Fairmont, WV



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Course Name	Dates	Location
Threat and Hazard Identification and Risk Assessment (THIRA) Workshop	May 1, 2014	National Mine Health and Safety Academy - Beaver, WV
Homemade Explosives: Awareness, Recognition, and Response	July 18, 2014	Williamstown Readiness Center - 285 Aviation Dr., Williamstown, WV
WMD Rad/Nuc Responder Operations Course	July 15-17, 2014	Joint Interagency Training & Education Center - 5 Armory Rd, St. Albans, WV
Homeland Security Exercise and Evaluation Program (HSEEP)	July 9-10, 2014	Tri-State Fire Academy - Huntington, WV
Homeland Security Exercise and Evaluation Program (HSEEP)	July 16-17, 2014	West Virginia State Police Academy (PDC), Dunbar, WV
Introduction to the CAMEO Suite	October 14-17, 2014	West Virginia State Police Academy (PDC)
Introduction to the CAMEO Suite	October 28-31, 2014	Robert H. Mollohan Research Center - 1000 Technology Dr., Fairmont, WV
Local Mitigation Planning Workshop	September 22-23, 2014	Days Hotel - Flatwoods, WV
Improvement Planning Workshop	September 25, 2014	Canaan State Park
Improvement Planning Workshop	September 10, 2014	Tygart Lake
Improvement Planning Workshop	September 30, 2014	WV State Police Academy (PDC), Dunbar, WV
Homeland Security Exercise and Evaluation Program	October 1-2, 2014	St. Albans Armory



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Course Name	Dates	Location
Homeland Security Exercise and Evaluation Program	October 15-16, 2014	St. Albans Armory
Improvement Planning Workshop	October 2, 2014	Twin Falls State Park
Personal Radiation Detector Course	December 16, 2014	Tri-State Fire Academy, Huntington, WV
Secondary Screener/Radiation Isotope Identifier Device Course	December 17-18, 2014	Tri-State Fire Academy, Huntington, WV
Local Volunteer and Donations Management	February 10-11, 2015	North Bend State Park
Continuity of Operations Managers Training Course	March 17-19, 2015	Cacapon State Park
Homeland Security Exercise and Evaluation Program	January 28-29, 2015	Hampton Inn - Buckhannon, WV
Managing Floodplain Development Through the NFIP	March 23-26, 2015	Quality Hotel Conference Center, Harpers Ferry, WV
EOC Operations and Planning for All-Hazards	March 31, 2015 to April 2, 2015	Pipestem Resort State Park
Disaster Management for Public Services	May 6-7, 2015	Charleston Civic Center (Public Safety Expo) - Charleston, WV
Mass Fatalities Incident Response	April 14-15, 2015	Chief Logan State Park
Team Approach to Foodborne Outbreak Response	June 8-9, 2015	Tamarack - Beckley, WV



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Course Name	Dates	Location
Team Approach to Foodborne Outbreak Response	June 11-12, 2015	Lakeview Golf Resort and Spa - Morgantown, WV
Basics of Floodplain Management	April 22, 2015	Sleep Inn - 1015 Oakvale Rd. Princeton, WV
Basics of Floodplain Management	June 30, 2015	Elkins Fire Dept. 226 4th Street, Elkins, WV
Emergency Operations Center/Incident Command System Interface	May 20-21, 2015	Canaan Valley Resort State Park
Basic Public Information Officers Course	May 2-3, 2015	Canaan Valley Resort State Park
Regional THIRA Workshop	April 7, 2015	DOH Equipment Division - Buckhannon, WV
Regional THIRA Workshop	April 9, 2015	Grand Vue Park - Moundsville, WV
Regional THIRA Workshop	April 13, 2015	Berkeley County Sheriff Dept. - Martinsburg, WV
Regional THIRA Workshop	April 22, 2015	Glen Jean Armory - Glen Jean, WV
Regional THIRA Workshop	April 24, 2015	Hamlin Community Center - Hamlin, WV
Regional THIRA Workshop	April 28, 2015	Wood County Readiness Center - Williamstown, WV
WMD Radiological/Nuclear Awareness	April 27, 2015	Cabell-Huntington Health Dept. 703 7th Ave. Huntington, WV



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Course Name	Dates	Location
WMD Radiological/Nuclear Responder Operations	April 28-30, 2015	Cabell-Huntington Health Dept. 703 7th Ave. Huntington, WV
Basic Public Information Officers Course	May 1-2, 2015	Canaan Valley Resort State Park
Pediatric Disaster Response And Emergency Preparedness	June 22-23, 2015	Days Hotel - Flatwoods, WV
Hazardous Weather and Flooding Preparedness	July 28-29, 2015	Days Hotel - Flatwoods, WV
WMD Rad/Nuc Awareness	August 3, 2015	Monongalia Health Dept. - 453 Van Voorhis Rd., Morgantown, WV
WMD Rad/Nuc Responder Operations	August 4-6, 2015	Monongalia Health Dept. - 453 Van Voorhis Rd., Morgantown, WV
Population Monitoring - Community Reception Center	August 7, 2015	Monongalia Health Dept. 453 Van Voorhis Rd., Morgantown, WV
Homeland Security Exercise and Evaluation Program	June 24-25, 2015	Ripley High School Library, Ripley, WV
Basic Public Information Officer	September 22-23, 2015	WV State Police Academy (PDC) - Dunbar, WV
Basics of Floodplain Management	August 26, 2015	30 12th Street, Wellsburg, WV
Social Media for Natural Disaster Response and Recovery	August 25, 2015	West Virginia State Police Academy (PDC)
Social Media for Natural Disaster Response and Recovery	8am to 5pm	RESA 1 - 214 North Kanawha Street, Beckley, WV



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Course Name	Dates	Location
Basics of Floodplain Management	October 21, 2015	5 Highland Ave., Petersburg, WV
Basics of Floodplain Management	February 17, 2016	Chief Logan State Park, WV
Advance Floodplain Management Concepts II	August 17-20, 2015	202 North Bend State Park - Cairo, WV 26337
Basics of Floodplain Management	April 20, 2016	929 Brushy Fork Rd, Buckhannon, WV
Homeland Security Exercise and Evaluation Program	August 11-12, 2015	Camp Dawson
EOC Operations and Planning for All-Hazards	October 20-22, 2015	Blackwater Falls State Park
Improvement Planning Workshop	October 2, 2015	Canaan Valley Resort State Park
Improvement Planning Workshop	October 8, 2015	Glen Jean Armory
Advance Floodplain Management Concepts III	November 16-19, 2015	Hawks Nest State Park
Homeland Security Exercise and Evaluation Program	October 7-8, 2015	Jefferson County Maintenance Department - 128 Industrial Blvd., Kearneysville, WV
Improvement Planning Workshop	October 29, 2015	West Liberty University Highlands Campus - 355 Wharton Circle, Triadelphia, WV
Hazard Mitigation Grant Program Workshop	September 29, 2015	Days Inn - Flatwoods, WV



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Course Name	Dates	Location
Disaster Management for Water & Wastewater Utilities	December 15-16, 2015	Morgantown Utility Board - 278 Greenbag Rd., Morgantown, WV 26507
Disaster Management for Water & Wastewater Utilities	April 12-13, 2016	Triadelphia City Hall - 4453 National Rd - Triadelphia, WV
Improvement Planning Workshop	October 27, 2015	West Virginia State Police Academy (PDC)
Natural Disaster Awareness for Caregivers of Senior Citizens	December 8, 2015	157 Freedom Way, Moorefield, WV 26836
Natural Disaster Awareness for Community Leaders	December 8, 2015	157 Freedom Way, Moorefield, WV 26836
Floodplain Management - PERMITTING	December 3, 2015	WEBINAR HTTPS://SHARE.DHS.GOV/WVFPM
Floodplain Management - ORDINANCE REVIEW CHECK LIST	January 7, 2016	WEBINAR HTTPS://SHARE.DHS.GOV/WVFPM
Floodplain Management - OIL AND GAS PERMITTING	March 10, 2016	WEBINAR HTTPS://SHARE.DHS.GOV/WVFPM
Floodplain Management - ABCs of FPM	May 12, 2016	WEBINAR HTTPS://SHARE.DHS.GOV/WVFPM
Floodplain Management - COMMON MISTAKES ON THE EC	July 14, 2016	WEBINAR HTTPS://SHARE.DHS.GOV/WVFPM
Floodplain Management - WV FLOOD TOOL	September 8, 2016	WEBINAR HTTPS://SHARE.DHS.GOV/WVFPM
Basic Public Information Officer	March 22-23, 2016	Cacapon State Park



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Course Name	Dates	Location
Community Mass Care and Emergency Assistance	April 26-28, 2016	Days Hotel - Flatwoods, WV
Disaster Management for Water Wastewater Utilities	May 24-25, 2016	West Virginia Rural Water Association - 100 Young Street, Scott Depot, WV
Hazardous Materials Contingency Planning	May 25, 2016	WV State Police Academy (PDC)
Public Information in an All-Hazards Incident	April 20-21, 2016	Days Hotel - Flatwoods, WV
Homeland Security Exercise and Evaluation Program	March 22-23, 2016	Mountainside Conference - Bethany, WV
ICC Policies	November 17, 2016	HTTPS://SHARE.DHS.GOV/WVFPM
Post Duties of the FPM	December 15, 2016	HTTPS://SHARE.DHS.GOV/WVFPM
Managing Floodplain Development Through The NFIP	April 25-29, 2016	Court Yard by Marriott - 100 Kanawha Blvd., E. Charleston, WV
Incident Response to Terrorist Bombings	May 11, 2016	WV State Police Academy PDC Course
The Prevention of and Response to Suicide Bombing Incidents	May 11, 2016	WV State Police Academy PDC Course
Basic Public Information Officer	June 14-15, 2016	North Bend State Park (Travel Included)
Natural Disaster Awareness for Caregivers of Senior Citizens	July 12, 2016	WV State Police Academy (PDC)



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Course Name	Dates	Location
Natural Disaster Awareness for Community Leaders	July 12, 2016	WV State Police Academy (PDC)
Joint Information Center Planning for Public Information Officers	July 20, 2016	Days Hotel - Flatwoods, WV
Team Approach to Foodborne Outbreak Response	August 9-10, 2016	Judge Black Annex - 319 Market Street, Parkersburg, WV
Community Mass Care and Emergency Assistance	June 28-29, 2016	Chief Logan State Park
NIMS All-Hazards Incident Commander	October 24-28, 2016	Canaan Valley Resort State Park
Law Enforcement Active Shooter Emergency Response TtT	August 2-4, 2016	Berkeley County Sheriff's Department - 510 S. Raleigh Street, Martinsburg, WV
Basics of Floodplain Management	August 18, 2016	337 W Main Street, Ripley, WV 25271
Basics of Floodplain Management	March 1, 2017	1000 Galliher Dr., Fairmont, WV 26554
Basics of Floodplain Management	April 28, 2017	104 East 4th Ave., Williamson, WV 25661
Pipeline Security in Rural Communities	September 9, 2016	Sissonville Fire Dept., 383 Call Road, Sissonville, WV
HazMat Highway Containers in a Tunnel Specialist	February 21-23, 2017	The Center for National Response (CNR), Memorial Tunnel Complex, Gallagher, WV
Emergency Operations Center/Incident Command System Interface	August 23-24, 2016	Tygart Lake State Park



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Course Name	Dates	Location
Mobilizing Faith-Based Community Organizations in Preparedness of Disasters	November 3, 2016	Believer's Victory Center - 160 Victory Lane, Moorefield, WV
Homeland Security Exercise and Evaluation Program	August 23-24, 2016	Kingwood National Guard Armory
Guidance and Best Practices for Meeting Day to Day Challenges	October 18, 2016	Rhema Christian Center - 3584 Davis Stuart Rd., Lewisburg
Homeland Security Exercise and Evaluation Program	October 5-6, 2016	5 Armory Drive, Saint Albans, WV 25177
Guidance and Best Practices for Meeting Day to Day Challenges	October 20, 2016	687 Dayes Drive, Sutton, WV
Search and Rescue in Community Disasters	March 28-29, 2017	Monongalia County Health Dept. - 453 Van Voorhis Rd., Morgantown, WV
Disaster Preparedness for Hospitals and HealthCare Organizations Within the Community Infrastructure	April 21-22, 2017	Cabela's, Triadelphia, WV
National Emergency Management Basic Academy TtT	May 8-12, 2017	Days Hotel - Flatwoods, WV
Advanced Floodplain Management Concepts	January 30 - February 2, 2017	North Bend State Park - 202 N Bend Park Rd, Cairo, WV 26337
Rail Car Incident Response for Crude, Ethanol and Other Flammable Liquids	May 13, 2017	Charleston Civic Center - 200 Civic Center Way, Charleston, WV
HSEEP	January 19-20, 2017	Country Inn, 2120 Harper Road, Beckley, WV 25801
Incident Command System Overview for Executives and Senior Officials	April 5, 2017	Independent Fire Department Social Hall, Ranson, WV



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Course Name	Dates	Location
Unified Hazard Mitigation Assistance: Developing Quality Application Elements	March 13-15, 2017	Days Inn & Suites - Flatwoods, WV
Unified Hazard Mitigation Assistance: Application Review and Evaluation	March 16-17, 2017	Days Inn & Suites - Flatwoods, WV
Unified Hazard Mitigation Assistance: Project Implementation and Programmatic Closeout	March 27-28, 2017	Days Inn & Suites - Flatwoods, WV
Mitigation Planning for Local Governments	March 29-31, 2017	Days Inn & Suites - Flatwoods, WV
ICS 300	May 16-18, 2017	WV National Guard Armory - 157 Freedom Way, Moorefield, WV
Incident Command System Overview for Executives and Senior Officials	June 27, 2017	103 Academy Dr., Glenville, WV 26351
HSEEP	March 15-16, 2017	Armed Forces Reserve Center, 111 Army Navy Drive, Red House WV 25168
Basics of Floodplain Management	June 26-29, 2017	Pipestem State Park
HSEEP	May 25-26, 2017	Mineral County Health Department, 541 Harley O Staggers Dr. STE 1, Keyser, WV 26726
ICS 300	June 13-15, 2017	West Virginia State Police Academy (PDC)
Active Shooter Incident Management	July 11-13, 2017	Monongalia County Health Dept. Training Room
Basics of Floodplain Management	July 20, 2017	Keyser City Chambers, Keyser, WV



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Course Name	Dates	Location
Basics of Floodplain Management	August 10, 2017	436 Seng Camp Rd., Chief Logan State Park, WV
Basics of Floodplain Management	September 14, 2017	Marlington Municipal Building, 709 Second Ave., Marlington, WV
Winter Weather Hazards: Science and Preparedness	October 3, 2017	WV State Police Academy (PDC)
ICS 300	October 11-13, 2017	Cabell Huntington Health Department
Winter Weather Hazards: Science and Preparedness	October 17, 2017	Jefferson County Maintenance Department Meeting Room - 128 Industrial Rd., Kearneysville, WV 25430
Basics of Floodplain Management	October 13, 2017	Follansbee Library, 844 Main Street, Follansbee, WV
Basics of Floodplain Management	November 9, 2017	Amma Senior Community Center, Amma, WV
HSEEP	September 19-20, 2017	Cabell Huntington Health Department, Huntington, WV
Community Rating System	October 4-5, 2017	Fairfield Inn 273 Coleman Dr., Lewisburg, WV
Community Rating System	December 6-7, 2017	Tygart Lake State Park, WV
Incident Command System Overview for Executives and Senior Officials	November 9, 2017	Barbour County OEM/911 - Philippi, WV
Basics of Floodplain Management	October 27, 2017	RESA - 1201 North 15th Street, Clarksburg, WV 26301



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Course Name	Dates	Location
HSEEP	November 1-2, 2017	St. Albans Armory - 610 Dame Street, St. Albans
HSEEP	November 7-8, 2017	1001 Army Road - Kingwood, WV 26537
HSEEP	December 6-7, 2017	Buckhannon Fire Dept - 20 S. Florida St., Buckhannon, WV 26201
All Hazards Planning for Animal, Agricultural, and Food Related Disasters	April 17, 2018	Braxton County Technology Center - WVRETI Training Center - 89 Richard Minnich Dr., Sutton, WV 26601
Incident Command System Overview for Executives and Senior Officials	December 14, 2017	Putnam County OEM Bldg. 100 Emergency Lane - Winfield, WV
Essentials of Community Cybersecurity (Prerequisite)		Canaan Valley Resort
Community Preparedness for Cyber Incidents	March 28-29, 2018	Canaan Valley Resort
ICS Forms Review	May 1, 2018	Blackwater Falls State Park
ICS 300	May 1-3, 2018	Blackwater Falls State Park
L273 Basics of Floodplain Management	March 12-15, 2018	North Bend State Park
On-Scene Crisis Leadership and Decision Making	July 9, 2018	WV State Police Academy - PDC
Building Whole Community Engagement Through LEPC	July 10, 2018	WV State Police Academy - PDC



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Course Name	Dates	Location
HSEEP	February 21-22, 2018	167 Airlift Wing - 222 Sabre Jet Blvd., Martinsburg, WV
Benefit-Cost Analysis: Entry-Level Training	July 11-12, 2018	Days Inn - 350 Days Dr. Sutton, WV 25305
Basics of Floodplain Management	April 11, 2018	Putnam County Court House - 12093 Winfield Rd, Winfield, WV
Basics of Floodplain Management (Cancelled)	May 17, 2018	Hardy 911 Center - 157 Freedom Way, Moorefield, WV
Incident Command System Overview for Executive and Senior Officials	March 29, 2018	Glen Jean National Guard Armory - 409 Wood Mountain Rd., Glen Jean, WV 25846
Managing Food Emergencies: Strategies for a Community Response	May 10-11, 2018	Cedar Lakes Conference Center - 82 FFA Drive - Ripley, WV 25271
Law Enforcement Active Shooter Emergency Response TtT	September 18-21, 2018	Kanawha County Sheriff's Office - #5 Goshorn Street, Charleston, WV
Nonstructural Flood Risk Adaptive Measures for Flood Risk Management	March 20, 2018	WEBINAR
A Virtual Nonstructural Assessment and Mitigation of a Flood Prone Structure	March 27, 2018	WEBINAR
West Virginia Advisory Flood Height Data: Where does it come from and what's in store for the future?	March 29, 2018	WEBINAR
Floodplain Design, Construction, and Impacts on Flood Insurance (Cancelled)	March 30, 2018	WEBINAR
Basic Public Information Officer	April 25-26, 2018	Country Inn 110 S Washington St, Berkeley Springs, WV 25411



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Course Name	Dates	Location
Homeland Security Regional Workshop	April 11, 2018	Hardy County EMA - 157 Freedom Way, Moorefield, WV
Homeland Security Regional Workshop	April 12, 2018	Buckhannon Fire Dept. - 20 S. Florida Street, Buckhannon
Homeland Security Regional Workshop	April 18, 2018	West Liberty University Highlands Campus - 355 Wharton Circle, Triadelphia, WV
Homeland Security Regional Workshop	April 24, 2018	Tri State Fire Academy - 4200 Ohio River Rd., Huntington, WV
Homeland Security Regional Workshop	April 26, 2018	Raleigh County Emergency Services Authority - 162 Industrial Park Rd., Beaver, WV
Homeland Security Regional Workshop	April 19, 2018	Judge Black Annex
Substantial Damage Estimations	June 6, 2018	100 Emergency Lane, Winfield, WV
Substantial Damage Estimations		300 Rich Wolfe - Kingwood, WV
Substantial Damage Estimations	June 7, 2018	400 North Broad Street - Summersville, WV
Basics of Floodplain Management	August 20-24, 2018	Chief Logan State Park
Modular Emergency Response Radiological Transportation Training	August 22-23, 2018	Charleston Civic Center
Critical Decision Making for Complex Coordinated Attacks	December 4-5, 2018	The Highlands Conference Center - Triadelphia, WV



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Course Name	Dates	Location
All Hazards Preparedness for Animals in Disasters	October 10, 2018	WV National Guard Armory - 157 Freedom Way, Moorefield, WV
All Hazards Planning for Animal, Agricultural, and Food Related Disasters	October 11, 2018	WV National Guard Armory - 157 Freedom Way, Moorefield, WV
HSEEP	August 29-30, 2018	WV State Police Academy (PDC)
Basics of Floodplain Management	September 6, 2018	Hardy 911 Center, 157 Freedom Way, Moorefield
Basics of Floodplain Management	September 18, 2018	Bridgeport Conference Center



14. Appendix G – Hazard Mitigation Administrative Plan

STATE OF WEST VIRGINIA ADMINISTRATIVE PLAN FOR THE HAZARD MITIGATION GRANT PROGRAM FEMA-4331-DR-WV DECLARED ON August 18, 2017

I. INTRODUCTION

Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (P.L. 100-707) was enacted on November 23, 1988, thereby establishing the Hazard Mitigation Grant Program (HMGP). The HMGP program is used to fund State and local post-disaster mitigation measures, pre- and post-disaster planning, and initiative projects.

II. PURPOSE

On February 20, 2002, Section 404 of the Hazard Mitigation and Relocation Act was revised and amended by the President. Revisions included a decrease in the amount of HMGP funds available resulting from a Presidential Disaster Declaration to 7.5% of the eligible costs of the disaster. In September 2006, the available funding from a Presidential Disaster Declaration was returned to the previous 15%. HMGP project awards may be funded after removing any programmatic and administrative costs. This Administrative Plan has been revised to reflect, and expand upon these, and other, recent changes most notably to include Hazard Mitigation Grant Program Streamlining, eligibility for generator purchase and cost effectiveness determinations for mitigation reconstruction, acquisition, relocation and elevation projects and strategic funds management initiative.

This plan sets forth the organization, staffing and administrative procedures for implementing the Hazard Mitigation Grant Program to be followed by the State of West Virginia.

III. AUTHORITIES AND REFERENCE

A) Federal

1. Public Law 93-288, The Robert T. Stafford Disaster Relief and Emergency Assistance Act.
2. Title 44 of the Code of Federal Regulations (44 CFR) Section 206, Federal Assistance Act for Disasters Declared On or After November 23, 1988.
3. 44 CFR Section 201, Mitigation Planning.
4. Title 2 of the Code of Federal Regulations (2 CFR) Section 200, Office of



Management and Budget (OMB) Uniform Guidance: Administrative Cost Principals, and Audit Requirements for Federal Funding: formally known as 44 CFR Part 13, OMB Circulars A-21, A-87, A-110 and A-122.

5. 44 CFR Part 9, Executive Order 13690 of January 30, 2015 Establishing a Federal Flood Risk Management Standard and Process for Further Soliciting and Considering Stakeholder Input (formerly Executive Order 11988, Floodplain Management).
6. 44 CFR Part 9, Executive Order 11988, Floodplain Management and Executive Order 11990, Protection of Wetlands.
7. Department of Homeland Security (DHS) Directives System, Directive Number: 023-0144 CFR, Part 9, Protection of Wetlands.
8. Executive Order 12898, Environmental Justice.
9. FEMA Policy 203-074-1 Minimum Design Standards for Hazard Mitigation Assistance Project in Special Flood Hazard Areas.
10. FEMA Policy 203-07401 Minimum Design Standards for Hazard Mitigation Assistance Projects in Flood Hazard Areas: FEMA requirement for use of ASCE 24-05, a standard developed by the American Society of Civil Engineers for safer construction in the special flood hazard area.
11. Guidance for Applying ASCE 24 Engineering Standards to HMA Flood Retrofitting and Reconstruction Projects Cost Effectiveness Determinations for Acquisition, Elevation and Mitigation Reconstruction projects in special flood hazard areas (8/15/2013) Revised on 10/8/2013.
12. Hazard Mitigation Assistance Acquisition Projects: Hydraulic Fracturing and Horizontal Directional Drilling FEMA Policy #302-094-03
13. Department of Homeland Security Office of the Chief Financial Officer Division of Financial Assistance Policy and Oversight Grant Alert 16-08 Procurement
14. Disaster Risk Reduction Minimum Codes and Standards FEMA Policy 204-078-2
15. Eligibility of Generator Purchases under the HMGP (11/15/2012).
16. Strategic Funds Management Initiative (6/11/2012).
17. Hazard Mitigation Assistance (HMA) Guidance and HMA Guidance Addendum (2/27/2015).
18. HMA tool for identifying Duplication of Benefits (DOB) (10/20/2012).
19. Section 1104 of the Sandy Recovery Improvement Act (SRIA) authorizes the use of Advance Assistance

B) State

1. West Virginia Code, Chapter 12, Article 3A Pertaining to State Audit Requirements.
2. West Virginia Code, Chapter 15, Article 5 Pertaining to Disaster Relief in West Virginia.
3. West Virginia Code, Chapter 21, Article 5A Pertaining to Prevailing Wage in West Virginia.



4. The West Virginia Purchasing Guidelines (4/8/2015).
5. West Virginia Statewide All Hazards Mitigation Plan (also known as the Section 322 Plan).
6. The FEMA – State Agreement.
7. The Sub-Recipient Grant Agreement if acting as a Sub-Recipient (example: State Plan Update Grant).

IV. DEFINITIONS

- A) **Applicant:** A State agency, local government or eligible private nonprofit organization, as defined in 44 CFR 206, Sub-part H, submitting through a local government, submitting an application to the Mitigation and Recovery Section, West Virginia Division of Homeland Security and Emergency Management (WVDHSEM) for assistance under the Hazard Mitigation Grant Program. An applicant has not had an application evaluated or approved.
- B) **Intent to Apply:** The initial request for Section 404 funding, to be submitted to FEMA by the State, within 15 days of the declaration. Standard Form 424 (SF-424) and accompanying assurance documents are used for this purpose. If the Governor asks for HMGP in the declaration request, this requirement is satisfied. Typically the State of West Virginia requests HMGP in the declaration request.
- C) **Application:** A document submitted by the Sub-Recipient that describes in detail the scope of work, budget, time line and other pertinent information required for evaluation of a project by the State and FEMA.
- D) **Recipient:** The unit of government to which the grant is awarded and which is accountable for the use of funds provided. For the purposes of this program, the State is the Recipient.
- E) **Sub-Recipient:** The unit of government to which a sub-grant is awarded and which is accountable to the Recipient for the use of funds provided. Sub-Recipients can be a State Agency, local government, certain private nonprofit organization submitting through a local government or other entity outlined in 44 CFR 206.434.
- F) **Notice of Intent (NOI):** A document notifying the Recipient that a Sub-Recipient wishes to apply for Hazard Mitigation funding describing the type of project they wish to apply for and outlining estimates of cost. See Appendix A for the State of West Virginia NOI form.
- G) **Hazard Mitigation Data Collection Team:** Utilizing an enhanced data collection effort, facilities affected during a Presidential Disaster Declaration with mitigation potential, and in compliance with the Disaster Strategy, will be cataloged by FEMA. This data collection will be accomplished through a review of the preliminary damage assessment (PDA), coordination and survey of state and local officials, and site visits by FEMA staff. The resulting product will be compiled in a report including photographs, maps, and available details organized by county and sub-organized by community with the intent to combine Section 404 Mitigation with Section 406 Mitigation efforts to build a more resilient community.



- H) Measures: Any mitigation measure, project, or action proposed to reduce, or, where possible, eliminate, risk of future damage, hardship, loss or suffering from disasters.
- I) Project: Any proposal submitted for approval for funding and given a unique accounting number (example: FEMA-9999-DR-WV-0000).
- J) Flood Insurance Rate Map (FIRM): An official map of a community on which the Administrator has delineated both the special hazard areas and the risk premium zones applicable to the community. FIRM maps are a required component for flood projects.
- K) Post-FIRM: Construction or substantial improvement that started on or after the effective date of the initial Flood Insurance Rate Map of the community or after December 23, 1974, whichever is later see 44CFR Part 80.19.
- L) Pre-FIRM: Construction or substantial improvement that started before the effective date of the initial Flood Insurance Rate Map of the community or after December 23, 1974, whichever is later.
- M) Secondary Residence: A property that is not the primary residence of a participant (example: summer cabin or a residence where the property owner does not live more than 6 months of the year).
- N) Project Officer: An individual highly trained in mitigation that is the primary contact between the community's Project Manager and the State Hazard Mitigation Officer.
- O) Program Specialist: An individual familiar with the aspects of hazard mitigation and floodplain management, but does not serve in a coordination/collaboration role. May include support, technology, and supervised administrative staff.
- P) Lock-In: The amount of funds available to a Recipient for a particular major disaster declaration, as FEMA determines in estimate at 6 months and assures at 12 months.
- Q) Pass-Through Funding: The percentage or amount of management costs that the Recipient determines it will make available to Sub-Recipients. This funding is not the same as project management funding which is considered to be a line item in the project budget. Special consideration is given when evaluating pass-through funding eligibility. Typically West Virginia does not provide pass-through funding.
- R) Benefit Cost Analysis (BCA): Methodology used to determine the cost effectiveness of a given project as required by the Stafford Act and in compliance with the HMA Guidance.
- S) 7% Planning Project: Money set aside strictly for planning initiatives. Funding is limited to 7% of the total HMGP allocation and is deducted from the total allocation as if it were a standard project.
- T) 5% Initiative Project: Money set aside for projects that do not have a validated means of calculating a BCA but that still have a mitigating effect (Example: Flood Warning Systems). Funding is limited to 5% of the total HMGP allocation and is deducted from the total allocation as if it were a standard project. The additional 5 percent set-aside is available to address all hazards and to promote resilience through the use of disaster-resistant building codes and practices.
- U) Strategic Funds Management Initiative: An initiative started by FEMA to enable communities to develop applications. Communities wishing to apply for this funding



must request it of the Recipient at the same time as they submit their NOI.

V. DECLARATION PROCESS

Following a major disaster event, the Governor of the State may seek Federal Assistance by requesting a Presidential Declaration when the recovery process is beyond the capacity of the State and local capabilities and resources. The Presidential Declaration applies to specific counties and communities in the State; however, the opportunity to participate in an HMGP application is open statewide. The State must provide a Letter of Intent within 15 days after the disaster declaration that tells FEMA whether or not the State will participate in HMGP. If the Governor asks for HMGP in the declaration request, this requirement is satisfied. The 15-day Letter of Intent deadline may be extended should the Regional Administrator determine the extension, submitted in writing, is justified.

VI. RESPONSIBILITIES

A) FEMA Responsibilities

1. The FEMA Regional Administrator or their designee(s) is responsible for:
 - a) Overseeing all pre- and post-disaster hazard mitigation programs and activities.
 - b) Assisting the State in setting priorities for the use of HMGP funds in the aftermath of a disaster.
 - c) Approving or denying applications for funding submitted by the State.
 - d) Approving or denying changes in scope of submitted projects.
 - e) Approving or denying deadline extensions.
 - f) Assuring that the State is complying with all Federal laws, regulations and guidance.
 - g) Perform programmatic and financial audits as required by Federal Regulations.
2. The FEMA Regional Mitigation staff serves as the point of contact for the State Hazard Mitigation Officer. FEMA Regional Mitigation staff members are responsible for:
 - a) Keep the State apprised of the anticipated amount of available funding.
 - b) Assist the State Hazard Mitigation Planning staff to ensure plans are current and provide assistance with plans that are expired.
 - c) Reviewing and evaluating submitted applications or project summaries and the State's determination of eligibility.
 - d) Coordinating with the Regional Environmental Officers to prepare environmental decision documents based on information submitted by the Sub-Recipient and the State.
 - e) Obtaining clearances from the State Historic Preservation Office.
 - f) Notify the State in writing of application decisions.
 - g) Assisting the State with the identification of appropriate projects.
 - h) Assisting the State with project applications, specifically environmental,



planning and floodplain management considerations and project cost effectiveness.

- i) Provide technical information from appropriate experts as necessary.
- j) Appoints a Federal Hazard Mitigation Officer for each Presidential Disaster Declaration to manage and monitor hazard mitigation programs and activities.
- k) Conduct periodic review of the State Hazard Mitigation activities and programs to ensure that the State is adequately prepared to meet their responsibilities.
- l) Assist the State in the identification of appropriate mitigation actions.
- m) After a Presidential Declaration, follow up with the State government to ensure that mitigation commitments are fulfilled, and take action when necessary, including recovery of funds or denial of future funds, if mitigation commitments are not fulfilled.
- n) After a Presidential Declaration, FEMA will provide the State with a Hazard Mitigation Data Collection Team as defined in section IV-G above. This team will prepare and distribute to the State a report on opportunities related to the disaster with the intent of combining section 404 and section 406 mitigation activities. Further, this team may be used in determining other mitigation opportunities such as private bridge access mitigation.
- o) The opportunities report is due to be delivered to the State Hazard Mitigation Officer for action 180 days after the date of the disaster. The Regional Administrator or their designee has the authority to extend this due date only if previously identified in the mitigation strategy or previously agreed upon.
- p) Depending on availability, FEMA may provide technical assistance to the State. Period of time to be agreed upon by both FEMA and the State. The Director, West Virginia Division of Homeland Security and Emergency Management will make requests for supplemental FEMA mitigation personnel.

B) State Responsibilities

1. The West Virginia Division of Homeland Security and Emergency Management shall be the Recipient to which funds are awarded and will be accountable for those funds. The State, as the grantee, has primary responsibility for project management and accountability of funds as indicated in 2 CFR 200 and 206 and for ensuring that all program and administrative requirements are met as indicated in 2 CFR 200 and 206 and the HMA Unified Guidance as applicable to HMGP projects.
2. The State is responsible for ensuring that applicants and Sub-Recipients adhere to all program and administrative requirements including 2 CFR Part 200 and 44 CFR.
3. The State will have an Administrative Plan (404 Plan), and a State Standard All-Hazard Mitigation Plan (322 Plan) approved by the Regional Administrator.
 - a) Assist the local staff to ensure plans are current and provide assistance with plans that are expired.
 - b) Reviewing and evaluating submitted applications or project summaries and the State's determination of eligibility.
 - c) Notify the local in writing of application decisions.



- d) Assisting the local with the identification of appropriate projects.
 - e) Assisting the local with project applications, specifically environmental, planning and floodplain management considerations and project cost effectiveness.
 - f) Provide technical information from appropriate experts as necessary.
 - g) Assist the local in the identification of appropriate mitigation actions.
 4. The State will determine priorities for funding in compliance with 44 CFR 206.435.
 5. The State Hazard Mitigation Officer, Brian Penix, serves as the responsible individual for all matters related to the Hazard Mitigation Grant Program.
 6. The State will deliver to FEMA the State's 404 Administrative Plan within 180 days of the date of the disaster declaration.
 7. The State has the 322 Plan and 404 Plan referenced in the State Emergency Operations Plan (EOP) at Section 3.C.4 and 3.C.5 respectively.
 8. Conduct site visits and closeouts.
 9. The State will make every effort to have sufficient staff to:
 - a) Provide a post-disaster mitigation strategy.
 - b) Provide applicants with assistance in completing their HMGP application.
 - c) Understand the National Environmental Policy Act and related Federal environmental requirements.
 - d) Complete other major tasks and activities required under the Hazard Mitigation Grant Program.
 - e) Understand the FY 2015 Hazard Mitigation Assistance (HMA) Unified Guidance requirements.
- C) Local Responsibilities
- A local unit of government is generally the Sub-Recipient to which Hazard Mitigation Grant Program funds are awarded and shall be accountable for the use of these funds. The Sub-Recipient shall have primary responsibility for managing the implementation and administration of the Hazard Mitigation Grant Program project.
1. Complies with HMGP requirements, grants management procedures in 2 CFR Part 200 and 44 CFR, the Grant Agreement, FY 2015 Hazard Mitigation Assistance (HMA) Unified Guidance and applicable Federal, State and Local laws and standards.
 2. Accounts for the appropriate use of grant funds awarded.
 3. Prepares and distributes financial reports to all appropriate parties as required by the Single Audit Act.
 4. Procurement of contractors and other goods and services for the completion of approved projects will be in accordance with their own standard procurement procedures, provided they are in compliance with applicable federal law and the standards found in the 2 CFR 200.
 5. Should the Sub-Recipient lack the capacity to manage the day-to-day operation of the HMGP project, a qualified entity may be retained to manage the project with



any project management funds being accounted for as a line item in the project budget. In accordance with State ethics law, a community employee cannot be paid project management while also being paid by the community for their day-to-day work. This is considered as “double dipping”. In this case, the community can be reimbursed for the management of their project provided they keep adequate records of the costs associated with that management. All project management must be approved by the State Hazard Mitigation Officer (SHMO).

6. Will maintain all “Project” records and documents for a period of three years after the completion of the project as required by 2 CFR Part 200.
7. Conduct site visits and closeouts.

VII. FUNDING

- A) The amount of money available following a Presidential Disaster Declaration is 15% of the cost of the disaster. A standard Section 322 plan is required as of November 1, 2004.
- B) An Enhanced Section 322 State Plan provides an opportunity to increase the HMGP funding up to 20%.
- C) Up to 7% of the allotted HMGP may be set aside for mitigation planning purposes. Up to 5% of the total HMGP allotment may be set aside by the State to fund mitigation measures that are difficult to evaluate against traditional program cost effectiveness criteria.
- D) Costs for HMGP projects will be shared at 75% Federal Share and 25% Non-Federal Share unless otherwise determined by FEMA at a different level.
- E) Management costs outside of the scope of the project shall be kept at the State level with no pass-through unless legitimate funding requests are received from local units of government. Project management costs are a line item in the project budget and are subject to the cost effectiveness determination.
- F) Other funding sources include: Housing and Urban Development, United States Army Corp of Engineers, Natural Resources Conservation Services, Small Business Administration, Increased Cost of Compliance, Pre-Disaster Mitigation, Disaster Housing Program, Other Needs Assistance Grant Program, and Infrastructure Grant Program.

VIII. STAFFING

- A) State
 1. Governor
 2. Governor's Authorized Representative (GAR): Generally, the GAR is the Director, West Virginia Division of Homeland Security and Emergency Management.
 3. Deputy GAR: Generally, the Deputy GAR is the Director of Mitigation and Recovery.



4. The position of GAR is not static and, at the will and pleasure of the governor, may alternate from disaster to disaster.
 5. The number of those appointed to the positions of GAR and Deputy GAR is at the Governor's discretion.
- B) West Virginia Division of Homeland Security and Emergency Management. Refer to Appendix B for the WVDHSEM Mitigation, to include the National Flood Insurance Program (NFIP), staffing chart.
1. Director, Mitigation and Recovery: The Director, Mitigation and Recovery is responsible for all FEMA programmatic implementation of all forms of mitigation in the State of West Virginia and the day-to-day management of the SHMO and NFIP Coordinator. Typically, the Alternate Governor's Authorized Representative (GAR), they are also responsible for the required GAR documents to the Regional Administrator. They are also typically the one that prepares a declaration request and conducts Preliminary Damage Assessments in support of the declaration request.
 - a) State Hazard Mitigation Officer (SHMO): Responsible for the implementation of mitigation initiatives and financial management on the project level. The SHMO is also responsible for the day-to-day management of the Project Officers and Mitigation Planner. It is the responsibility of the SHMO to ensure all Federal, State and Local laws and procedures are followed and all required reporting to FEMA is done.
 - i. State Project Officer (PO): Responsible for providing technical assistance to communities and assistance as necessary to support the mission of the SHMO. The PO is also responsible for community correspondence required for successful project completion and documentation.
 - ii. State Mitigation Planner: Responsible for ensuring that all mitigation planning requirements are met to include the State Mitigation Plan (322 Plan) and the Local Mitigation Plans. The planner provides planning assistance to support the mission of the SHMO.
 - iii. Temporary contractors as necessary and approved from the Director WVDHSEM.
 - b) NFIP Coordinator: The NFIP Coordinator is responsible for ensuring that new construction or substantial improvements in the identified flood hazard areas are done in compliance with Federal, State and Local laws and FEMA policy. The NFIP Coordinator ensures that technical assistance and training is provided to communities participating in the NFIP. They are also responsible for the day-to-day management of the NFIP Specialists. The NFIP Coordinator is the interface to FEMA for floodplain management issues.
 - i. NFIP Specialist: The NFIP Specialists are responsible for program implementation on a regional basis and provide technical assistance to communities and individual property owners as necessary. They also work in conjunction with FEMA to conduct Community Assistance Visits (CAV) and Community Assistance Contacts (CAC) as required by the program.



- ii. Temporary contractors as necessary and approved from the Director WVDHSEM.

C) Local

1. Project Development Team: Individuals qualified to assess and select the most appropriate measures to include in the HMGP Application, using the areas of interest as defined in the local mitigation plan, requirements and priorities outlined in the Notice of Intent letter, distributed to local units of government, following a Presidential Disaster Declaration. The team should include an individual, or individuals, qualified to complete the Hazard Mitigation Grant Program Application.
2. Authorized Agent: The individual authorized to act on behalf of the community receiving an HMGP project. The Authorized Agent has the responsibility to ensure the successful completion of the project and make financial commitments on behalf of the community.
3. Project Manager: A qualified individual who will oversee the HMGP project, maintain necessary records and files, act as liaison with the local unit of government, the State Hazard Mitigation Office, project participants, contractors and professionals; (example: Attorneys)
4. Such clerical staff as is available to the project.

IX. IDENTIFICATION AND NOTIFICATION OF POTENTIAL APPLICANTS

A) Identification

1. Potential projects may be identified utilizing:
 - a) Areas identified in the local all-hazard mitigation plans.
 - b) Items identified in the State of West Virginia's All-hazard Mitigation Plan that supports the State's identified goals and / or are determined to provide the most benefit to an area increasing its resilience to hazards.
 - c) The Preliminary Damage Assessment.
 - d) The HMGP Data Collection Report as defined in Section IV Part G above.
 - e) Previously submitted unfunded HMGP applications.
 - f) State agency personnel and local governments involved in the development of the Section 322 Plan may provide further possibilities and applicants.
2. The State Hazard Mitigation Officer will prepare a strategy paper to summarize and prioritize data collection /public information efforts.

B) Notification

1. Public Notices such as newspaper ads, fliers, radio / television announcements.
2. Community briefings that will be attended by State Mitigation staff on the Section 404 Program.
3. Following a Presidential Disaster Declaration, the State will notify all local units of



government, including municipalities and counties, in all fifty-five counties of the State, within 90 days, of the availability of funds for HMGP projects. Note: The Regional Administrator may grant an extension, submitted in writing, should an extension be justified.

4. Such notification shall be by Letter of Intent with a *Notice of Intent* (Pre-Application for Hazard Mitigation Grant Program form) enclosed. Included in the Notice of Intent letter to communities are listed the State and FEMA areas of interest, the requirements for meeting these goals and the State's priorities for the selection of applications. The Letter of Intent with a *Notice of Intent* Application may be delivered electronically.
5. The deadline for submitting a community's Notice of Intent (NOI) is clearly stated in the letter. NOIs received after this deadline may be considered after all properly submitted NOIs have been processed and funds remain available.
6. After all the NOIs are received, the State will compile a list of communities submitting NOIs, along with the number of proposed mitigation options and the approximate amount of funding requested. This information will be forwarded to FEMA, Region III.
7. The State Hazard Mitigation Officer, during development of the application, will offer technical assistance, when available, to each community.
8. An HMGP Workshop may be offered to communities to enhance attendee's knowledge for completion of the HMGP Application. An interest form is included with the NOI letter to determine if there is sufficient interest.
9. If there is sufficient interest in the HMGP Application workshop, the one day workshop should be held in a location most central to the state. Traditionally, with the approval of the WVDHSEM Director, motel, meal and transportation costs have been paid by WVDHSEM to one community representative, preferably the individual who will be most involved in completing the application.

X. APPLICANT ELEGIBILITY REQUIREMENTS

A) Minimum requirements

1. Have an approved and adopted all-hazards mitigation plan (322 plan).
2. Be a State or Local Unit of Government, Native American Tribe or non-profit organizations or institutions that own or operate a private non-profit facility as defined in 44 CFR 206.221 (e).
3. Be in a community participating in, and in good standing with, the National Flood Insurance Program.
4. Possess the ability to develop the HMGP Application and, if funded, the ability to administer the project, possibly with assistance.

B) Additional Applicant Requirements

1. Have the support of the local unit of government and of the community.
2. Meet applicable Federal, State and local permit requirements.



3. Have, and enforce, an approved Floodplain Ordinance.
4. Discourage inappropriate development in the floodplain or other identified hazardous areas.

XI. CRITERIA FOR APPLICANT ELEGIBILITY

- A) Conforms to State and Local Hazard Mitigation Plan. (Section 322).
- B) Provides beneficial impact upon the at risk area.
- C) Considers long-term changes to the areas and entities it protects, and has manageable future maintenance and modification requirements.
- D) Conforms to environmental laws and regulations. Be in conformance with 44 CFR Part 9, Floodplain Management and Protection of Wetlands, and DHS Directive Number: 023-01.
- E) Solves a problem independently or constitutes a functionally independent portion of a solution.
- F) Is cost effective. Will not cost more than the anticipated value of the reduction in damages to the area if future disasters were to occur. (Meets benefit / cost). Every effort should be made to determine the cost effectiveness of projects but where that is difficult, the project must be clearly identified as a 5% initiative project. In both cases the project should be proven to make the community more disaster resilient rather than simply restoring a function.
- G) Meets all applicable Federal, State and Local permit requirements. (Example: Corps of Engineers permit for navigable waterways).
- H) Constitutes a practical, effective and environmentally sound proposal.
- I) Contributes, to the extent practicable, to a permanent or long term solution to the problem it is intended to address, rather than temporary or short term. In any case, the project should, at a minimum, be demonstrated to outlive the project useful life which was used to calculate the benefit / cost.
- J) Addresses the problems of floodway, repetitively and substantially damaged structures or facilities. Specifically, the State's areas of interest are:
 1. Reduction in damage to structures or facilities located in the floodway.
 2. Reduction in damage to repetitive loss structures or facilities.
 3. Reduction in damage to structures or facilities considered substantially damaged.
 4. Reduction in damages to structures and facilities considered severe repetitive loss.
 5. Other eligible projects as described in 44 CFR Section 206.434 (d)(2).
 - a) Stream Capacity Restoration Activities
 - b) Eligible Pilot Projects
 6. Adheres to the State's priorities of applications as outlines in the State Standard All-Hazard Mitigation Plan (322 Plan) and in line with priorities set by the Governor at the time of declaration.



7. Projects addressing FEMA identified Repetitive Loss Structures list and Severe Repetitive Loss list and pre-FIRM structures or facilities will be given priority.
8. Post-FIRM structures, when no evidence of proper permitting or an error on the FIRM can be shown, will only be considered for acquisition/demolition projects and the homeowner or local government will be required to provide the 25% non-federal share of the total cost of the project and all other costs associated with the application and acquisition. Such costs will be deducted from the total award.
9. The President's 2015 Opportunity, Growth, and Security Initiative; Executive Order 13653 Preparing the United States for the Impacts of Climate Change; the President's 2013 Climate Action Plan; FEMA's Climate Change Adaptation Policy; and the 2014-2018 FEMA Strategic Plan, all identify the risks and impacts associated with climate change on community resilience to natural hazards and direct Federal agencies to support climate resilient infrastructure.
10. Stream restoration / retention ponds / storm water management flood risk reduction measures will be on a case by case basis in accordance with Flood Risk Reduction Measures Policy FP 204-078-112-1.

XII. APPLICATION PROCEDURES

- A) Each community submitting a Notice of Intent by the established and published deadline will either be mailed, or provided at the HMGP Workshop, a copy of the FY 2015 Hazard Mitigation Assistance Guidance with Addendum. If available, each community will be offered technical assistance in completing their application by the State Hazard Mitigation Office. Every effort will be made to ensure that such technical assistance is given in a fair and equitable manner to each community requesting assistance.
- B) Applications for a Hazard Mitigation Grant Program project must be submitted by the Chief Executive Officer of the responsible government entity, in person or be postmarked, to the State Hazard Mitigation Office, on, or before, the designated deadline. **NO EXCEPTIONS.**
- C) The application must be fully completed with all supporting documents. The following documents **MUST** be included for private real property:
 1. A clear scope of work.
 2. A detail cost estimate.
 3. Property Inventory Form.
 4. Statement of Voluntary Participation.
 5. West Virginia Hazardous Material Property Survey.
 6. Substantial Damage Calculation forms if applicable.
 7. Tax Map with the property or facility located on the map.
 8. FIRM with the property or facility located on the map.
 9. Photographs of all 4 sides of the structure or facility as well as a street scape.



10. Latitude and longitude location listed in decimal degrees.
- D) Attachments and Enclosures to be included:
1. Local unit of government letter supporting the HMGP Application.
 2. Community letter regarding impact on low income / minority individuals.
 3. Community letter regarding contamination by hazardous materials.
 4. Community letter regarding compliance with Federal Fair Housing Regulations.
 5. Topographical maps.
 6. Street maps.
 7. Sign-in sheets from public meetings.
 8. Newspaper public meeting notices and / or other material advertising HMGP meetings.
 9. Photos of damaged areas in the community (if available) to support damage impact statements made in the application.
 10. List of potential property substitutions if an over subscription is sought.
 11. Benefit / Cost analysis if appropriate.
- E) When submitting an application to FEMA, the State Hazard Mitigation Officer will prepare a project merit package containing:
1. A narrative recommendation and rationale for project selection in the event of more submissions than funding allows to be funded.
 2. A certification that the projects meet all eligibility requirements as listed in Section XI.
 3. Any pertinent project management information not contained in the State Administrative Plan.
 4. GAR letter submitting recommended projects to FEMA.
- F) Environmental review data shall be included for each project enabling FEMA to conduct an environmental review in accordance with HMA Guidance 2015. The State will ensure the following:
1. Each property or facility has a fully completed West Virginia Hazardous Material Survey.
 2. Photographic imagery necessary to determine the historic preservation record eligibility.
 3. Provide FEMA all documentation necessary to comply with the National Environmental Policy Act (NEPA).
- G) Benefit / Cost analysis shall be performed in accordance with FEMA guidelines as outlined in HMA Guidance 2015 using the FEMA BCA toolkit 5.3 or best available data.
- H) Obtaining clearances from the State Historic Preservation Office shall be the responsibility of FEMA.
- I) A project should be of the nature that work can begin within ninety (90) days of receipt of notice of approval and be completed within one (1) to three (3) years, depending on the complexity of the project.



XIII. REVIEW, RANKING, SELECTION AND SUBMISSION OF PROJECTS

- A) After receipt of applications, HMGP staff will review each application for completeness. Should an application need additional information, HMGP staff will inform the applicant. Assistance in obtaining necessary information, forms, etc. will again be offered to the applicant. A deadline for submitting updated information will be set by the SHMO.
- B) All applications shall be reviewed by a committee consisting of the SHMO, the Director, Mitigation and Recovery and the Mitigation staff from the Mitigation Section of the West Virginia Division of Homeland Security and Emergency Management for ranking and selection.
- C) In the event of more applications than the available funding, the ranked projects will be forwarded to the Governor's Office for selection in compliance with West Virginia Code.
- D) Ranking shall be accomplished based on the following criteria:
 - 1. Benefit / Cost.
 - 2. Technical Feasibility.
 - 3. Local Planning Criteria.
 - 4. Compliance with priorities identified in the State Hazard Mitigation Plan.
 - 5. Reasonableness and sound evidence that the project will make the community more resilient.
- E) The SHMO will determine if the selected projects are eligible for the standard or 5% Initiative funding, and if so designate the application accordingly.
- F) Following the Governor's approval through the GAR, the applications will be submitted to FEMA, Region III, utilizing the National Emergency Management Information System (NEMIS). Paper copies of the applications, along with all supporting documents, will be submitted to FEMA by the Period of Availability (POA) deadline.
- G) Applications must be submitted to FEMA within 12 months following the date of declaration. Upon written request and justification from the Recipient, FEMA may extend the application submission timeline in 30-90 day increments not to exceed a total extension of 180 days, in the event of extraordinary conditions. For additional information see 44 CFR Section 206.436.
- H) Projects not submitted to FEMA will be returned to the community by the mitigation staff in the event additional funding becomes available along with written notification that the project was not selected for funding and providing the reason for the rejection so it can be corrected for the next submission.
- I) Final approval of the selected projects is the responsibility of FEMA.



XIV. NOTIFICATION OF PROJECT APPROVAL

A) Upon notification from FEMA of their decision on selected projects, the State Hazard Mitigation Officer (SHMO) will notify the applicant that their project was:

1. Approved:

- a) Upon approval of the application by FEMA, the Sub-Recipient will be provided with a copy of the FEMA Record of Environmental Consideration, a copy of the FEMA Financial Obligation Report and a letter from FEMA informing the applicant of the project approval and period of performance deadline.
- b) The Sub-Recipient is provided a prepared West Virginia Division of Homeland Security and Emergency Management Assurances and Certification Agreement. This document details the duties and responsibilities of the sub-grantee. Article 14 informs the Sub-Recipient of the Single Audit Act of 1984 requirements.
- c) No funds may be released to the Sub-Recipient until the document referred to above has been signed and received by the WVDHSEM.
- d) There will be a face-to-face meeting between the HMGP Project Officer assigned to the project and the Sub-Recipient project manager to inform the project manager of duties and responsibilities associated with the implementation and administration of the project.
- e) The necessary paperwork, technical assistance and guidance will be provided to the Sub-Recipient to ensure a successful and smooth completion of the project.
- f) The Mitigation Office and FEMA, Region III will offer technical assistance as needed.

2. Not Approved:

- a) The SHMO will inform applicants, in writing, those whose applications have not been approved along with the reason for the denial. The applicant will be advised of the appeal process.
- b) Upon the considerations of FEMA of the appeal, if the application is still deemed denied, then it will be sent back to the applicant for correction of any faults and may be considered in later funding.

XV. APPEALS

A) Applicants with projects not approved by FEMA will be notified by the State Hazard Mitigation Officer (SHMO) and advised of the following appeal process:

1. An eligible applicant, or the State, may appeal, in writing, any FEMA decision regarding an unapproved application.
2. The appeal should contain documentation that justifies the request for reconsideration.
3. The appeal will be submitted to the SHMO, in writing, within 60 days of the



- applicant's receipt of the FEMA denial decision.
- B) Two levels of appeal
 1. First appeal is to the Administrator, FEMA Region III. If the decision to deny the application stands, then the applicant can appeal again providing even more information required to justify reconsideration.
 2. Second appeal is to the Associate Director for Mitigation, FEMA Headquarters via Administrator, FEMA Region III. If the denial still stands, then the application is considered fully vetted and the denied application will be returned to the applicant following the procedure listed in Section XV part 2 sub-part b above.
 - C) The SHMO will forward any applicant's appeal, with the State's written recommendation, to the Regional Administrator within 60 days of receipt from the applicant.
 - D) The Regional Administrator will notify the State, in writing, within 90 days following FEMA receipt of an appeal, of their appeal decision.
 - E) If additional information, or technical evaluation, is needed in order to make a decision, the Regional Administrator, or Associate Director, will request the information through the SHMO.
 - F) FEMA will provide its decision on the appeal to the State in writing. If the decision is to grant the appeal, the Regional Administrator will advise the SHMO and take any appropriate action at the Regional level.
 - G) The State will notify the applicant making the appeal of the decision within 10 days of notification by FEMA.

XVI. PROJECT IMPLEMENTATION

- A) The SHMO will verify the status of local plans and oversee the implementation of HMGP projects. Projects will be monitored by site visits, updates via telephone, meetings and progress reports.
- B) The HMGP will be administered in an equitable and impartial manner in compliance with Section 308 of the Stafford Act and Title VI of the 1964 Civil Rights Act.
- C) The State and Sub-Recipients will avoid conflict of interest, or the appearance of conflict of interest, and will comply with procurement guidelines in 2 CFR 200.
- D) The Sub-Recipient is responsible for maintaining the project after initial implementation.
- E) The Sub-Recipient will implement any environmental or historical preservation mitigation actions required in relation to the project's approval.
- F) HMGP funds will not be used to purchase contaminated property. The owner, prior to purchase, must remove all hazardous materials and containers.
- G) When the project is implemented, Flood Insurance must cover any structures not being demolished or relocated outside of the Special Flood Hazard Area throughout the life of the property, regardless of ownership. The amount of insurance is to be equal to the cost of implementing the property mitigation measure, adjusted annually for inflation.



H) Alterations to existing structures will:

1. Comply with all applicable Federal, State and local codes and ordinances.
2. Comply with floodplain management standards outlined in 44 CFR Part 9 and Part 60.0.
3. The State of West Virginia requires that any work performed that is funded with public monies (federal, state, or local) must comply with West Virginia Code, Chapter 21, Article 5A Pertaining to Prevailing Wage. If a contract is less than \$500,000 then it does not have to pay prevailing wage. Any contract over that amount MUST pay prevailing wage as defined by Workforce West Virginia.
4. FEMA, the Recipient and Sub-Recipient will avoid Duplication of Benefits (DOB) between the HMGP and any other form of assistance. DOB are deducted from the Fair Market Value (FMV) purchase price on structures where the pre-event FMV purchase value is used. If, however, the owner has receipts proving that the grants were used for structural repairs, or cleanup, no deductions are required. For post event FMV, DOB are not calculated. Typically, West Virginia does post event appraisals thus avoiding potential DOB.
5. DOB that may be deducted from the FMV include:
 - a) U.S. Small Business Administration loans: such loans must be either repaid or rolled over to the new structure at closing.
 - b) Flood Insurance payments, minimal repair grants, other needs assistance Grants that were awarded for the purpose of making repairs to a structure after the Fair Market date when the pre-FMV is used.
 - c) If the owner used any grant for purposes other than stipulated, (example: made a mortgage payment), this is a potential DOB and the amount is deducted from the purchase offer.
 - d) An insurance payment that reimbursed the owner for their own labor to clean up after the event will not be deducted if such cleanup occurred: no receipt is required.
 - e) Purchased property, acquisition and relocation projects, will be used for open-space. Requirements for open space acquisition and relocation projects include:
 - i. Informing participants, in writing, that the project will not use its eminent domain authority to acquire their property.
 - ii. With stated exceptions, the property will be used in perpetuity for open space.
 - iii. FEMA Model Deed Restriction (Exhibit A) will be recorded with each property deed as a condition of receiving the grant. The State and Sub-Recipient agree to ensure that all items and conditions outlined in Exhibit A are met.
 - iv. Fair Market Value (FMV) will be established for each property to be acquired. The methodology will be used consistently throughout the project. Methods used are:
 - (a) Certified independent appraisals reflecting post event market values



- (preferred method, DOB does not apply).
- (b) Certified independent appraisals reflecting pre-event values (DOB will apply).
 - (c) A formula based on tax assessments (DOB will apply).
- i. The State will coordinate with the Sub-Recipient on whether the FMV will be based on pre- or post-event certified appraisals or on the tax assessment formula. All appraisals will be based on the same criteria based on bullet 4 below.
 - ii. All property owners will be treated fairly and offered an equitable package of benefits.
 - iii. The Sub-Recipient will inform each property owner, in writing, the amount it considers to be the FMV of the property.
 - iv. Pre-event value is only available to owners who owned the property during the event. Owners who purchased the property after the event cannot be offered more than the post-event market value.
 - v. If the purchase offer for a property is less than the amount the property owner must pay to purchase a comparable replacement dwelling in a non-hazard-prone site in the same community, the Recipient and Sub-Recipient may choose to make available to the property owner a supplemental payment of up to \$31,000 that would be applied to the difference. Sub-Recipients should consider the cost of relocating to a permanent residence that is of comparable value and that is functionally equivalent.
 - vi. The Recipient has the option of allowing Sub-Recipient to provide a credit to property owners who have flood insurance. The Sub-Recipient provides an incentive payment that is equal to up to 5 years of flood insurance premiums actually paid by the current property owner for an NFIP policy for structure coverage.
 - vii. In order for the property owner to receive a supplemental payment, the Recipient and Sub-Recipient must demonstrate that the following conditions must exist:
 - (a) Funds cannot be secured from other more appropriate sources, such as housing agencies or voluntary groups.
 - (b) Decent, safe, and sanitary housing of comparable size and capacity is not available in non-hazard-prone sites within the community at the anticipated acquisition price of the property being vacated.
 - (c) The project would otherwise have a disproportionately high adverse effect on low-income or minority populations because project participants in these populations would not be able to secure comparable decent, safe, and sanitary housing.
 - i. A title search will be conducted on each property to ensure that the owner possesses a marketable title. It is the responsibility of the property owner to furnish a clear title, free of defects.
 - ii. The Sub-Recipient will provide for the continued maintenance of the property. Regardless of new land use, no further Federal Assistance will



- be provided.
- iii. Before transferring ownership (ex. leasing, renting etc.) of the property, the Sub-Recipient will seek prior approval of the State and FEMA. In certain cases National Environmental Policy Act evaluation may be required. All activities on the acquired land must be consistent with authorized open space land use per 44 CFR Part 80.
 - iv. The State will monitor and inspect the purchased properties every three years and certify that the inspected parcels continue to be in compliance with the open space deed restriction and will take the necessary measures to bring a non-compliant property back into compliance within 60-days.
 - v. Every three years the Sub-Recipient, the Recipient and FEMA must coordinate to ensure that the Sub-Recipient submits documentation to the appropriate FEMA Regional Administrator certifying that the Sub-Recipient has inspected the subject property within the month preceding the report and that the property continues to be maintained consistent with the provisions of the award / sub-award.
 - vi. As the State does not generally consider the purchase of large tracts of land, requirements for crop storage facilities on open space, future disaster assistance, and uninsured and insured crop requirements, and, therefore, are not included in this plan. Should these requirements become an issue, the requirements outlined 44 CFR Part 80.19 will apply.
 - vii. Due to the voluntary nature of the HMGP property owners are not eligible for Uniform Relocation Assistance (URA). Property owners and the Sub-Recipient will sign a Voluntary Participation Agreement, informing the property owner of the voluntary nature of the project.
 - viii. An exception to the voluntary rule are tenants and mobile home owners who rent mobile home pads and are being involuntarily displaced due to the owner selling the property and are eligible for URA Assistance. The amount of assistance the community may pay to the tenant is derived from 49 CFR, Part 24, and Sub-part E. Conditions governing the amount of URA to which the tenant is entitled are outlined in the 2015 HMA Unified Guidance Addendum Part A.
 - ix. Except under certain conditions, the maximum allowable URA is \$7,200.
 - x. Owners of mobile homes who rent home pads being acquired by the project are being involuntarily displaced and are eligible for the following types of URA assistance:
 - a) Home pad Rental Assistance: Eligible for rental and utility increases to a maximum of \$7,200.
 - b) Replacement Housing Assistance: If the mobile home is purchased, the displaced mobile home owner is entitled to replacement housing assistance. For further clarification on replacement housing assistance, refer to 49 CFR, Part 24 and the 2015 HMA Unified Guidance Addendum, Part A.
 - c) Costs to Move Manufactured Home: Reasonable relocation/moving



costs are eligible. Eligible costs include disassembling, moving, and reassembling and attached appurtenances, such as porches, decks, skirting and awnings, anchoring the unit. Utility hookup charges are included.

- d) Purchasing a New Home or Home Pad: It is allowable should a tenant choose to use the rental assistance to purchase a new home or home pad.
- e) An alien who is not lawfully present in the United States is not eligible to receive URA relocation benefits or relocation advisory services.

II. ALLOWABLE PROJECT COSTS

- A) General policies for determining allowable costs as established in 2 CFR 200, will be followed:
 - 1. Grant funds may be used only for:
 - a) Allowable costs of Recipients, Sub-Recipients and contractors per 2CFR Part 200.
- B) The State or local unit of government will use the governing principles as stated in 2 CFR Part 200, Cost Principles for State, Local and Indian Tribal Governments.
- C) General criteria the State will use for allowable costs:
 - 1. Necessary and reasonable for proper and efficient performance and administration of Federal awards.
 - 2. Conforms to conditions set forth in 2 CFR Part 200, Federal Laws, terms and conditions of the Federal award.
 - 3. Applicable to Federal Awards under 2 CFR Part 200.
 - 4. Be authorized or not prohibited under State or local laws or regulations.
 - 5. Will not be included as a cost or used to meet cost sharing or matching requirements.
 - 6. Be consistent with policies, regulations, and procedures that apply uniformly to both Federal awards and other activities of the governmental unit.
 - 7. Except as otherwise provided in 2 CFR Part 200, to be determined in accordance with generally accepted accounting principles.
 - 8. Be adequately documented.
- D) In reviewing budgets, the State will consider whether the application, budget and change of scope requests are costs that are reasonable. Elements to consider when determining reasonableness of a given cost include:
 - 1. Federal, State and other laws and regulations.
 - 2. Terms and conditions of the grant.
 - 3. Market prices for comparable goods or services.
- E) Unallowable costs include:
 - 1. Costs incurred prior to the date of declaration.



2. Loss of tax revenue due to acquisition and relocation.
 3. Maintenance of the project after initial implementation.
- F) Project specific allowable costs include: (See the 2015 HMA Unified Guidance for a more complete explanation of the following):
1. Costs for post disaster code enforcement: Only extraordinary enforcement costs will be allowed.
 2. Environmental mitigation costs: The costs to implement any environmental or historic preservation mitigation actions required in relation to project approval. (Example: Phase 1 environmental survey)
 3. Acquisition / Relocation costs: Fair Market Value of acquired property, real estate legal fees, appraisal costs, moving the structure to the new location, necessary site preparations.
 4. Additional award to relocate: When there is a significant shortfall between the amount the community pays an owner for their property and the cost of comparable replacement housing, the State may, in exceptional circumstances, allow the community to provide additional funding.
- G) Examples of allowable costs under 2 CFR Part 200 are:
1. Advertising on radio, television and newspapers for recruitment of personnel, goods and services and public notices for bids on project work.
 2. Prior to including costs the applicant must verify if the cost is eligible under the program. Not all costs are eligible. The cost must benefit the objective or the intended purpose.
 3. Pre-Award costs must be identified before the time of application.
 4. Audit services for case or project reviews and project inspections.
 5. Bond costs when attaining surety bonds for employees and officials.
 6. Budget development, preparation, presentation and execution.
 7. Telephones, mail and messenger services.
 8. Wages, salaries, fringe benefits to compensate personnel.
 9. Costs associated with the accounts payable function.
 10. Equipment and other capital expenditures.
 11. Maintenance, operation, and repairs are allowable if they keep property in efficient operating condition, do not add to the permanent value of the property and are not included in rental charges for space.
 12. Expendable supplies and minor equipment with an individual cost / value exceeding \$250.00 must be pre-approved by the State Hazard Mitigation Officer (SHMO).
 13. Motor pools to include vehicle maintenance, inspection and repair services if charged to the program at a mileage or fixed rate. State travel is only allowed under Management costs.
1. Employee training is allowable to the extent that the training is required for program operation.



2. Travel to include transportation, lodging, subsistence provided that such travel is on official business, the costs do not exceed the amount normally allowed by the agency and the travel is reimbursed under Management Costs.

III. ADMINISTRATION OF APPROVED PROJECTS

A) Roles and Responsibilities:

1. State Hazard Mitigation Officer

- a) Interfaces with FEMA, Region III, Mitigation Division to respond to requests for information to ensure a timely evaluation and decision on approved project questions.
- b) Monitors and evaluates project accomplishments and adherence to work schedule.
- c) Documenting site visits and performances.
- d) Submits requests for extensions and cost overruns to FEMA 60 days prior to project expiration or need. Extensions are due to our office no later than 90 days prior to the need. Extension requests shall contain:
 - i. Federal HMGP Project Identification Number
 - ii. Reason(s) for the delay
 - iii. Original scheduled completion date
 - iv. New scheduled completion date
 - v. Dates and provisions of any previous extensions
- e) Reviews quarterly progress reports from Sub-Recipients.
- f) Submits quarterly reports to FEMA as required in the format determined by FEMA.
 - i. The Sub-Recipient shall provide quarterly reports and a final report on the progress of work set forth in the Scope of Work. The quarterly reports and final report shall contain the following components:
 - a) A narrative describing in detail the progress of the Sub-Recipient in fulfilling the provisions of the Scope of Services;
 - b) Reimbursement Requests {per 206.437 (b) (4vi)} as needed that itemize the expenses incurred by the Sub-Recipient, including separate columns for the federal, state and the Sub-Recipient's matching contribution to the total cost of services as reflected in the Project Budget (Typically using the State FundTrak III); and
 - c) The schedule of specific project tasks with target completion dates and actual completion dates. The first quarterly report is due to WVDHSEM at the end of the first complete quarter following the award of the grant.
 - ii. Sub-grantee quarterly reports for all active, approved projects will be used by WVDHSEM to compile the required progress report for FEMA. This report will be submitted to the FEMA Regional Administrator no later than the last day of the month (January, April, July and October)



immediately following each federal fiscal quarter.

<u>Reporting Period</u>	<u>Report Due to WVDHSEM</u>
January 1 – March 31	no later than April 15
April 1 – June 30	no later than July 15
July 1 – September 30	no later than October 15
October 1 – December 31	no later than January 15

- g) Reviews requests for funds and approves or denies the request. Prepares Letters of Credit Payment Requests and records requests in the State Mitigation FundTrak III Excel system.
- h) Has LCPR five signatures signed by the Authorized Agent, State Project Officer, Director of Mitigation / Recovery, State Hazard Mitigation Officer and finally GAR (Director WVDHSEM).
- i) Delivers LCPR forms with appropriate support documentation and signatures to the WVDHSEM Administration Section for processing and payment.
- j) Maintain necessary financial documentation and progress reports to support funds distributed to Sub-Recipients.
- k) Review claims, certifications of costs, cost overruns, cost under-runs, audits and appeals, and forward such documentation to the GAR.
- l) Coordinate HMGP project actions with the GAR and FEMA, as necessary, and provide assistance required in administering the program.
- m) Supervises HMGP Project Officers to ensure maintenance of a relationship with their assigned Sub-Recipient and other project stakeholders.
- n) Directs Project Officers in the maintenance of project files which shall contain:
 - i. Verification of local plan status (typically in the project application).
 - ii. Copy of the application.
 - iii. Correspondence
 - iv. Individual Property Inventories and all necessary forms that are specific to an individual item. (Example: Generator location and specification documents for each individual generator in a project).
 - v. Copies of LCPR with its supporting documentation (invoices).
 - vi. Quarterly Reports.
 - vii. Financial Records to support the funds disbursed.
 - viii. Closeout documentation to include the final Quarterly Report and final Fund Trak III showing any funds deobligated and completion status (FINAL).
- o) Prepares and submits final funding source closeout requests to be submitted to FEMA.



2. Roles and Responsibilities of HMGP Project Officers
 - a) Be available by phone, and / or in person, to assist applicants who request help in developing the HMGP applications.
 - b) Reviews assigned applications and assists applicants in making sure that the applications are complete and accurate in accordance to the HMA Guidance 2015.
 - c) Prepares the State approved applications for delivery to FEMA and assists the State Hazard Mitigation Officer (SHMO) in the submission process to include entry into the National Emergency Management Information System (NEMIS). The NEMIS entry is limited in scope to data entry ONLY. Only the SHMO or GAR can submit applications in NEMIS to FEMA after review of each entry.
 - d) Offers technical assistance and advice for the implementation and administration of newly approved projects.
 - e) Has regular telephone, and / or in person, contacts with project managers of approved projects to ensure that the project is on schedule and being administered according to the policies and procedures of the State and FEMA.
 - f) Receives and reviews for appropriateness requests for funds for projects.
 - g) Delivers to the State Hazard Mitigation Officer (SHMO) for further action in preparation of the Letter of Credit Payment Request (LCPR) all supporting invoices and other documentation supporting the request.
 - h) Can prepare the LCPR in the case of the absence of the SHMO, but with the concurrence and guidance of the SHMO or GAR, so that project implementation is not delayed.
 - i) After preparation of the LCPR, delivers the LCPR to the project's Authorized Agent. Makes sure that the LCPR has all required signatures and is submitted to the WVDHSEM Administration Section for further processing in a timely manner and maintains copies of all fully signed LCPR documents in the project files.
 - j) Obtains quarterly reports for assigned projects, reviews the reports for accuracy and delivers the reports to the SHMO. For consistency across Hazard Mitigation Assistance (HMA) programs, the same quarterly report form is used for all HMA projects. Electronic copies of the reports are to be kept on a shared resource for future reference.
 - k) Assists the SHMO in filing quarterly reports in the National Emergency Management Information System (NEMIS) or any other system required by FEMA.
 - l) Informs the SHMO, in a timely manner prior to the required 60 day notice time, of any Change in Scope requests, cost overruns, cost under-runs and any other topic that may impact the project. (Example: Weather delays the demolition of structures).
 - m) Upon completion of the project, meets with the Sub-Recipient's Authorized



Agent and / or Project Manager to review the project from start to finish to ensure proper documentation requirements are met and that the project's stated goals and objectives have been accomplished.

- n) Prepares the final project closeout documentation to be submitted to FEMA before the expiration of the Period of Liquidation for that project and submits the documents to the SHMO for review and GAR signature. Closeout documents consist of the following:
- i. The closeout request letter stating:
 - a) The project meets the stated goals and objectives of the project.
 - b) The approved amount of funding.
 - c) The final certification of the expenditures of the project.
 - d) Any amounts to be deobligated or reserved for overrun purposes.
 - e) (Private structural projects only) a listing of properties with full description and the status (acquired / relocated / elevated or withdrawn) of those properties accounting for every property submitted in the original project.
 - f) (Other type projects) a listing of what was accomplished accounting for every aspect of the scope of work. (Example: Final location and disposition of stream gauges or generators).
 - g) Final deliverable disposition if applicable. (Example: A statement that final copies of any plans are included as part of the closeout documents for planning projects.)
 - h) The stated request to close the project.
 - i) A statement that final sites visit was conducted on a date listed in the letter and that all work is completed.
 - j) GAR signature.
 - k) Final quarterly report showing a 100% completion and final financial and project status.
 - l) Revised budget showing final line item expenditures.
 - ii. Community Closeout Request letter stating the following:
 - a) Total project expenditures.
 - b) Accounting for the scope of work to include listing of acquired / relocated / elevated or withdrawn property status if applicable.
 - c) Certification that no further project funds remain in the possession of the community.
 - d) An acknowledgment of future certification requirements stating their first certification date.
 - iii. Acquisition / Demolition and Relocation projects must include the following:
 - a) Final photographs showing the properties acquired in an Open Space condition and identifying the location of the photograph (latitude / longitude) [The standard photographic record document used for submission is recommended for this purpose. If possible, a before and after perspective of each structure is preferred for easier identification /



- verification by FEMA staff].
 - b) Recorded deeds with the FEMA model Exhibit A incorporated as part of the deed.
 - iv. Elevation projects must include the following:
 - a) A final Elevation Certificate showing that the structure complies with the community Floodplain Ordinance to include freeboard.
 - b) Final photographs showing the properties in an elevated condition and identifying the location of the photograph (latitude / longitude) [The standard photographic record document used for submission is recommended for this purpose. If possible, a before and after perspective of each structure is preferred for easier identification / verification by FEMA staff].
 - c) Recorded deeds with the FEMA Non-conversion Agreement incorporated as part of the deed.
 - d) Certification that flood insurance is in effect for the structure.
 - v. Mitigation Reconstruction projects must include the following per HMA Guidance Addendum Section D.3:
 - a) Basic design parameters per structure.
 - b) Building shall be designed and constructed in accordance with ASCE 24-14 or 2009 international residential building code. See HMA Guidance D.3.4 for the full listing.
 - c) A final Elevation Certificate showing that the structure complies with the community Floodplain Ordinance to include freeboard.
 - d) Final photographs showing the properties in an elevated condition and identifying the location of the photograph (latitude / longitude) [The standard photographic record document used for submission is recommended for this purpose. If possible, a before and after perspective of each structure is preferred for easier identification / verification by FEMA staff].
 - e) Recorded deeds with the FEMA Non-conversion Agreement incorporated as part of the deed.
 - f) Certification that flood insurance is in effect for the structure.
 - g) Certification of adoption of building codes by the community.
 - h) Builder certifications must be licensed or registered in the state and maintains appropriate insurance coverage.
 - i) Certificate of occupancy must be issued stating that the property has been inspected and finds no violation of the applicable codes. See HMA Guidance Addendum D.5 for final certification requirements.
 - vi. Other relevant information required to close the project as determined by the SHMO or FEMA.
3. Roles and Responsibilities of the Sub-Recipient.
- a) Duties of the Chief Executive Officer and Project Manager.
 - i. Immediately following notification of project approval, the Chief Executive Officer should announce to the community and all participants



- of the project approval.
- ii. The Project Manager will be responsible for, and oversee, the day-to-day operation of the project.
 - iii. The Project Manager will maintain close contact with the participants and keep them informed of the progress of the project.
 - iv. The Project Manager will submit quarterly reports, beginning the first full quarter after receipt of funding in the National Emergency Management Information System (NEMIS). These reports are due to the State no later than the 15th of the month following the reporting quarter. The Federal Fiscal Year begins October 1st of the calendar year. (See Appendix C for a sample quarterly report).
 - v. Final reports will be a complete assessment of the project.
 - vi. Insure repairs or construction / demolition is in accordance with applicable standards of safety, decency and sanitation and is in conformity with applicable codes, specifications, laws and regulations.
 - vii. Insure that the project is proceeding on schedule. If there are delays, the Project Manager should inform the Project Officer, who informs the State Hazard Mitigation Officer (SHMO), of the reasons for the delay and work with the Project Officer and / or SHMO to develop a new timeline for completion. If the project is expecting significant delays, FEMA should be informed and a request for additional time be made in writing providing a justification for the extension.
- b) The community, in administering the HMGP project, is required to fulfill the following:
- i. Verify the local plan is in an approved state.
 - ii. Update the list of interested participants to determine if all participants in the application are still interested in participating.
 - iii. Advertise for all services and contractors soliciting bids in compliance with Federal Procurement Guidelines in 2 CFR Part 200, The West Virginia Purchasing Guidelines (4/8/2015) and any Local Guidelines.
 - iv. Ensure that all transactions, both financial and contractual, are recorded and maintained in the project files.
 - v. Ensure that all correspondence is recorded and maintained in the project files.
 - vi. Ensure that all contractors are in compliance with all Federal, State and Local licensing requirements and that contract obligations are met.
 - vii. Will avoid conflict of interest or the appearance of conflict of interest.
 - viii. Will treat all participants in the project equitably and fairly and will not use the powers of “imminent domain” should a participant decline an offer.
 - ix. Ensure that public involvement will remain throughout the life of the project. (Example: Public notice requirements).
 - x. Will keep the State and FEMA apprised of the status of the project and report milestones reached and complications encountered.



- xi. Will comply with all audit requirements and submit audits to the State that indicates any findings for the project as well as a corrective plan for any findings against the project.
 - xii. Ensure there are no Duplication of Benefits occurring in the project.
 - xiii. Ensure that all Environmental and Historic Preservation laws and regulations are followed. (Example: Asbestos testing).
- c) A project file shall be maintained which shall include:
- i. The application with Property Inventories and appropriate forms for all participants.
 - ii. Copies of all correspondence.
 - iii. Vouchers.
 - iv. Reports. (Example: Asbestos testing report).
 - v. Receipts / invoices to verify expenditures for HMGP funds.
 - vi. Financial records ensuring that bank accounts are in a non-interest bearing account.
 - vii. Copies of advertising showing public involvement.
 - viii. Bid packages of all bids indicating the selection process and the selected bid.
 - ix. Copies of appraisals.
 - x. Copies of elevation certificates for elevation projects.
 - xi. Copies of recorded deeds with all restrictions incorporated.
 - xii. Maintenance plans for generator and stream gauge projects.
 - xiii. Photographs both pre and post mitigation with documentation showing the location of the photograph.
 - xiv. Copies of audits that relate to the project with any corrective action plan.
 - xv. Any other project oriented documentation.
- d) Cost overruns and under-runs.
- i. Should there be a cost overrun in a project budget line item, the Sub-Recipient may request approval of additional funds be used from another line item within the same project. By providing justification such as invoices, activity reports, progress reports and the like for evaluation by the State Hazard Mitigation Officer (SHMO).
 - ii. The SHMO will make all decisions regarding cost overruns.
 - iii. The SHMO will evaluate each cost overrun and, if justified and additional funds are available in another line item in the same budget, approve an amount not to exceed 10% of the original budgeted line item. The State will notify FEMA Region III of all overruns and / or project re-scopes prior to approving any additional funds to cover cost overruns.
 - iv. The SHMO may offset cost overruns that increase the total budget using cost under-runs from other projects in the same disaster funding. FEMA Region III must be notified and approve any request to increase the total budget and the SHMO must name the project being relieved of funds in the Change of Scope letter. Further, the SHMO must state in the project being relieved of funds closeout letter that the remaining under-run is to be



- assigned to the project with the overrun. Upon approval of the transfer, the SHMO will adjust the State Fund Trak III to reflect the change.
- v. Cost overrun notifications must be accompanied by a new BCA if appropriate.
 - vi. Problems or circumstances affecting project costs shall also be identified through the required quarterly progress reports;
 - vii. Cost overruns request must be accompanied by justification and other pertinent material;
 - viii. Estimate of additional cost to include;
 - a) Original schedule and completion date;
 - b) New projected schedule and completion date.
 - ix. Using funds from differing disasters or other HMA programs to cover overruns (split funding / commingling) is strictly forbidden.
 - x. Anticipated or known overruns will be reported to FEMA on the quarterly report in the quarter that the overrun becomes known and any approved changes in funding will be reflected in the report financial section.
 - xi. Anticipated cost under-runs will be reported to the SHMO by the Project Manager through the State Project Officer and included in the Quarterly Report. The under-run funds may be used to fund overruns in other projects or, should the under-run be of sufficient size to warrant it, fund additional participants in the project area and listed in the over-subscription list for that project after FEMA Region III has been properly notified and has given approval concurrence.
 - xii. Decisions regarding the use of under-run funds will be made by the SHMO.
- e) Change of Scope
- i. A community Project Manager will present requests to change the scope of a project to the State Hazard Mitigation Officer (SHMO), through the State Project Officer, in writing, with all necessary documentation to form a decision.
 - ii. If the SHMO believes the request for Change of Scope to be justified, and funds are available with sufficient time in the project to conduct the change, the request for Change of Scope will be submitted to FEMA for approval 60 days in advance of any action being taken on the change.
 - a) Reason(s) for the change supported by appropriate justification and any relevant documentation: e.g., photographs, standards, etc.;
 - b) Estimate of additional cost (if applicable);
 - c) Original schedule and new projected schedule (if applicable).

IV. CLOSEOUT PROCEDURES

A) Project Closeout

1. The Sub-Recipient will notify the State Hazard Mitigation Officer (SHMO) when



a project is ready to be closed. It is recognized that, based upon performance period deadlines or non-performance of the grant, the SHMO may unilaterally suggest project closure to FEMA.

2. The steps to closure of a project are:
 - a) Agreement between the State and the Sub-Recipient that the project is ready to be closed. Should either not agree, the Project Manager or the State Hazard Mitigation Officer (SHMO) would request an extension, in writing, outlining the request justification.
 - b) The Sub-Recipient, the State (Recipient) and FEMA will coordinate to make sure that funds advanced through the program balance with funds expended by the Recipient and Sub-Recipient. If there is disagreement between the expended funds and the grant amount, FEMA and the Recipient will take steps to reconcile and adjust final project expenditures and Recipient Management Costs.
 - c) The Recipient will conduct a final site visit to verify that all project work was completed and record the date of the final visit for the closeout letter.
 - d) The Recipient will submit required closeout documents as described in Section XVIII.A.2.n above.
 - e) FEMA and the State will coordinate their financial systems to record the amount and date of the final payment(s). Financial files will be closed and excess funds will be de-obligated.

B) Program Closeout.

1. When all projects under a single disaster are closed, the entire program is ready for closure. The steps that comprise program closeout are as follows:
 - a) Any mission assignments and technical assistance contracts will be closed out.
 - b) There will be agreement between FEMA and the Recipient on the final claim amount and concurrence date. The Recipient will submit a concurrence letter and sign FEMA Form 425.
 - c) The HMGP will be closed in program and financial systems. FEMA and the State Hazard Mitigation Officer are responsible for ensuring that Federal and State records are available in the event of an audit.
 - d) The State will retain the paper records for a minimum of 3 years from the date of program closure.
 - e) State records will be retained in perpetuity in electronic files (scanned) available upon request from state archives after 3 years from the date of closure should the paper files be unavailable.

I. AUDITS

A) Federal Audits.

1. The State will comply with the audit requirements under 2 CFR 200 (revised Single Audit Act of 1984, P.L. 98-502, implemented by OMB Circular A-133



“Audit of State and Local Governments”).

2. The Sub-Recipient will maintain complete records of all work, including receipts, checks, job orders, contracts, equipment usage, payroll information, and any other documentation that will be required by an audit. This information will be stored and made available for State or FEMA auditors to review.
 3. The State will retain all backup documentation including but not limited to:
 - a) Invoices and Letters of Credit Payment Requests.
 - b) Real property project records (deeds, titles, easements, etc.) will be maintained in the Sub-Recipient files (project books) and will be made available to the auditor upon request. However, a verification record will be maintained in the HMGP Office project files.
 - c) Engineering certificates.
- B) State Audits.
1. The State and each Sub-Recipient that receives \$300,000 or more in Federal Financial Assistance shall have audits in accordance with 2 CFR Part 200.
 2. The State assures that these audits are performed on a timely basis. If after a review of the audits, adverse findings exist, the State will take appropriate corrective action and report that action to FEMA.
 3. The State will provide a copy of the audit performed on Section 404 projects to the FEMA Inspector General.
 4. The State may request that a specific disaster audit be performed on projects of any size.
 5. Should there appear to be improprieties in the management of accounting for Federal or State funds, a request for review may be requested.

II. REVIEW AND UPDATE

- A) The 404 Administrative Plan will be reviewed and updated annually, or immediately following a Presidential Disaster Declaration, to ensure that it is current with 404 policies and procedures. Following the review and / or update, FEMA will be informed that either:
1. No changes are necessary, or;
 2. Presented, in writing, any revisions.


III. APPENDIX

- A) NOI:
- B) WVDHSEM Mitigation, to include the National Flood Insurance Program (NFIP), staffing chart:
- C) Quarterly report sample:



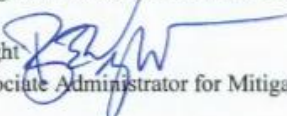
15. Appendix H – FEMA Cost Effectiveness Memo

U.S. Department of Homeland Security
500 C Street, SW
Washington, DC 20472

AUG 15 2013  **FEMA**

MEMORANDUM FOR: Regional Administrators
Regions I-X

ATTENTION: Regional Mitigation Division Directors
Hazard Mitigation Assistance Branch Chiefs

FROM: Roy E. Wright 
Deputy Associate Administrator for Mitigation

SUBJECT: Cost Effectiveness Determinations for Acquisitions and Elevations
in Special Flood Hazard Areas

Projects that are eligible for funding under the Hazard Mitigation Assistance (HMA) programs must be cost effective, i.e., have a Benefit Cost Ratio (BCR) equal to or greater than 1.0. The Risk Reduction Division has completed an analysis of 11,000 acquisition and elevation projects and determined that the average benefits for each type of project were \$276,000 and \$175,000 respectively. Therefore, FEMA has determined that the acquisition or elevation of a structure located in the 100-year floodplain (as delineated on the Flood Insurance Rate Map or based on best available data) that costs less than or equal to the amount of benefits listed above is considered cost effective. For projects that contain multiple structures, the average cost of all structures in the project must meet the stated criterion. There is no need for applicants to conduct a separate benefit cost analysis for a structure that meets this criterion.

Additionally, the specific geographic location of structures can greatly increase acquisition and elevation costs. The amount of benefits identified above may be adjusted by the applicant or subapplicant using locality multipliers that are included in industry accepted cost and pricing guides for construction. If a multiplier is used, a copy of the source document must be included as part of the grant application for review and the methodology demonstrated for the increase of benefits. Also, the applicant or subapplicant should use the most up-to-date locality multiplier at the time of application.

To qualify for these pre-calculated benefits, applicants must provide maps with the structure footprint clearly identified and the 100-year Special Flood Hazard Area (SFHA) delineated (Flood Insurance Rate Map or best available data) as part of the grant application. If the structure or any part of the structure lies in the 100-year SFHA, the structure can utilize the pre-

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Cost Effectiveness Determinations for Acquisitions and Elevations in SFHA

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calculated benefits. Alternatively, first floor elevations (FFE) can be included for each structure as well as the base flood elevation (BFE) for that location. If the FFE is less than BFE, structures can use the pre-calculated benefits. No other detailed analysis will be required. These pre-calculated benefits can be used for structures in 100-year floodplains in riverine and coastal areas that meet the stated criterion.

This methodology satisfies the cost-effective requirements for the Flood Mitigation Assistance program, any disasters with an open grant application period as of the date of this memorandum, and future disasters. We will discuss the methodology used in the analysis in a future call with the HMA Branch Chiefs.

This determination advances FEMA's commitment to streamline the HMA programs by eliminating the need to perform a complete benefit cost analysis for each structure; reducing time involved in data collection, application development and review; and assisting communities in recovering from disaster more quickly. This memorandum does not replace or supersede the substantial damage benefit cost analysis waiver memorandum.

If you have any questions, please contact me directly at (202) 646-3461, or Kayed Lakhia, Deputy Director, Risk Reduction Division at (202) 646-3458.



16. Appendix I – Adoption Letter