



West Virginia Flood Resiliency Plan

WV State Resiliency Office

June 2026

I. Authorization and Document Guide

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[WV Code §29-31-3](#) tasks the West Virginia State Resiliency Office with creating the West Virginia Flood Resiliency Plan (WVFRP). This second version of the WVFRP has incorporated the framework developed for the inaugural 2024 WVFRP, which utilized the 2004 Flood Protection Plan and the 2022 review of that document to provide foundational guidance for the establishment of the Plan. Certain recommendations from the 2004 Plan have been affirmed as remaining relevant through stakeholder review processes, resulting in a list of potential actions aligned with Plan goals. A format which arranges those potential actions by sector and by organization has been utilized to facilitate review and adoption by local, county, state, and non-governmental organizations. This design is intended to allow for simplistic updates and assimilation of the recommendations into other planning efforts.

The components of the West Virginia Flood Resiliency Plan are:

- [I. Authorization and Document Guide](#)
- [II. Executive Summary](#)
- [III. Prioritization of Actions](#)
- [IV. Potential Actions by Sector and Organization](#)
- [V. Monitoring Trends to Guide Future Efforts](#)
- [VI. Appendices](#)
 - Appendix I: Contributing Organizations
 - Appendix II: References
 - Appendix III: Supporting Documents

The West Virginia Flood Resiliency Plan is intended to be used as an internet-connected application. Active links to webpages are used throughout the document to provide the user with fast access to relevant resources and data. Functionality and access to various data components will be lost when used in printed form or in digital format without an internet connection.

This second iteration of the Plan was presented to the Resiliency Office Board on or before June 30th, 2026. Reviews of this plan will be performed in odd years and updates will be performed in even years.

II. Executive Summary

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After recognizing that a long-term strategy was needed to mitigate flooding in our state, the West Virginia Conservation Agency (WVCA) catalyzed the creation of the state's first flood protection plan. Then Senator Robert C. Byrd supported the project by providing funding to the U.S. Army Corps of Engineers to facilitate joint development of the plan with the WVCA. With additional financial and programmatic support from the WV Governor's Office, the WV Legislature, and the Natural Resources Conservation Service, a framework for the statewide plan was created. That framework specified the need for a joint task force that could provide the expertise and experience required to address the complex flooding issues within West Virginia. In turn, the task force, composed of 20 Federal, State, regional, local, and non-governmental agencies, dedicated staff and other resources to the development of the comprehensive strategic plan. Representatives from the Governor's and Senator Byrd's offices attended the task force meetings as well. The [West Virginia Flood Protection Plan \(WVFPP\)](#) was completed in 2004 as a result of those extensive efforts.



Sandstone Falls

Although it was completed over two decades ago, the following excerpt taken from the WVFP provides an accurate description of the history of flooding in West Virginia.

“The State of West Virginia is blessed with great natural beauty and a rugged landscape that enticed the explorer, the pioneer, and the settler to travel through and settle within its majestic countryside. Prior to the advent of modern earth-moving equipment and construction technology, streams and rivers and their narrow floodplains defined the pathways and wagon trails throughout West Virginia. With the exception of recent interstate highways that crisscross numerous watersheds within the State, most U.S. and State highways and Class I railroads extend the length of every major river valley in the State. The historic use of the State’s rivers for commercial navigation further reinforced this floodplain-centered transportation system.



communities and resources development quickly overwhelmed the channel capacity of the resident streams and rivers leading to flooding, losses of life and property damage.



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. Thousands of West Virginians have suffered through damaged homes and businesses, lost loved ones, and deteriorating communities. Addressing a problem of this magnitude and complexity necessitated initiation of a strategic planning process that would be comprehensive in scope, sensitive to the needs of the stakeholders and their environment and well-coordinated. The Statewide Flood Protection Plan is a result of that process.”

Early villages and towns sprang up at the confluence of streams and rivers to take advantage of those transportation opportunities and the nutrient-rich floodplain. Unknowingly, these early settlers initiated patterns of movement and development that would place countless thousands of West Virginians in harm’s way. As abundant natural resources were discovered and exploited, the economic fortunes of the State improved, and floodplain communities increased in size and density to accommodate the inflow of new workers and their families. Thousands of acres of forestland were cleared for resource development. The newly constructed railroads and massive resource processing facilities further crowded the floodplains. Excess runoff generated by the combination of expanding



Transition to the Flood Resiliency Plan

In response to devastating flooding in 2016, the West Virginia State Resiliency Office was created by the West Virginia legislature. One of the tasks delegated to that office was an annual review and biennial update of the Flood Protection Plan. In 2022 the first official review of the 2004 WV Flood Protection Plan was performed. As was employed during the creation of the WVFPP, Federal, State, regional, local, and non-governmental agencies assisted in the process. In addition, a Flood Symposium was held to gather crowdsourced feedback on the status of the plan and to collect data for development of the update. **The consensus determination from that process was that the Goals, Objectives, and Recommendations detailed in the 2004 WVFPP are as relevant today as they were in 2004 when the plan was created.**

The Resiliency Bubble highlights the importance of proactive and holistic measures to enhance resilience, mitigate hazards, recover from impacts, and be prepared for challenges posed by flood hazards.

These definitions of the bubble components demonstrate the State Resiliency Office's approach to resilience:

Preparedness: Modifications in procedures, protocols, and frameworks to mitigate potential risks or capitalize on opportunities by devising adaptation strategies and putting into effect measures to address present and future hazards.

Response: The capability to adapt to potential harm, seize opportunities, or react to outcomes by implementing adaptive measures and strategies to mitigate impacts and risks.

Recovery: The process of making changes in response to current or anticipated events or their impacts to minimize negative consequences or take advantage of positive opportunities. This process includes the restoration of systems, institutions, and communities following a hazardous event or disruption.



Hazard Mitigation: Initiatives, measures, tactics, or guidelines designed to minimize the probability and/or severity of potential negative outcomes following an evaluation of perceived risks.

Resilience: The capability to adapt to potential disruptions, seize opportunities, and effectively respond to outcomes. This involves reorganizing in a manner that preserves communities' fundamental function, identity, and structure, while also facilitating adaptation, learning, and transformation.

As the update of the 2004 WVFPP was contemplated, the legislature made changes to WV §29-31-3 via [Senate Bill 677](#), enacted on May 1, 2023. With adoption of the bill, the update of the WVFPP was replaced with the Resiliency Office's new directive to create the first West Virginia Flood Resiliency Plan (WVFRP). This current update to the WVFRP was completed by June 30th, 2026, with reviews and updates required on a biennial basis in subsequent years.

The 2026 update to the WVFRP incorporates feedback provided by the Resiliency Plan Workgroup and public input gathered through the 2025 Flood Resiliency Plan Symposium. These updates are intended to improve clarity, usability, and implementation value while reinforcing coordination across agencies and organizations involved in flood resiliency throughout the state.

A key focus of the update was refinement and alignment of the plan's goals, objectives, and potential actions. These elements were reviewed and adjusted to resolve any internal inconsistencies and remove overlapping or conflicting concepts. Consistent terminology was applied throughout the document to improve readability and ensure shared understanding among users from different sectors and organizational backgrounds.

The review process also resulted in a significant expansion of the organizational content within the plan. Thirty-five new organizations and sub-organizations were incorporated, reflecting the evolving landscape of flood resiliency activity in West Virginia. Organizations that did not yet have defined potential actions, including fifteen previously reserved organizations, were integrated into the plan. As part of this process, potential actions were reviewed across the full organizational inventory to identify overlaps. Where potential actions were determined to be relevant to multiple organizations, they were intentionally duplicated to reinforce shared responsibility and encourage cross-agency implementation.

These updates strengthen the WVFRP as a clearer, more navigable, and more actionable resource, better supporting coordination and long-term flood resiliency planning across West Virginia.

Six Goals of the WVFRP

Because the 2025 review of the WVFRP determined that the goals, objectives, and potential actions are still relevant, continued utilization of those concepts provides a sound foundation upon which to build this plan.

The six goals, the objectives supporting them, and the broader general potential actions that provide the framework of the WVFRP are as follows:

Goal 1: Reduce the loss of lives due to flooding in West Virginia

Goal 2: Reduce private and public property damage

Goal 3: Develop technical, administrative, regulatory enforcement, and legislative tools that will facilitate the implementation of a sound program of flood loss reduction and floodplain management

Goal 4: Promote technical, administrative, regulatory enforcement, and legislative tools that will reduce incrementally excessive runoff from land-conversion activities in West Virginia

Goal 5: Reduce personal and economic losses due to flooding while supporting a viable State economy

Goal 6: Protect the State's waterway and floodplain environments

These goals, and their corresponding objectives are discussed in more detail here: Goal 1 is to mitigate the impact of flooding, including reducing the loss of life from flood events in West Virginia, through the development of a comprehensive flood preparedness and response strategy. This involves the implementation of an efficient flood warning system, education of individuals residing in flood-prone areas, training of government officials, establishment of evacuation protocols, and prioritization of projects aimed at reducing flood damage.

Goal 1: Reduce the loss of lives due to flooding in West Virginia



Goal 2 is to mitigate flood-related property damage. This involves identifying floodplain mapping needs, securing resources for mapping, improving permitting decisions through capacity development of floodplain managers, encouraging the avoidance of new development of structures and facilities in the floodplain, addressing certification needs for managers, advocating for financial support (both structural and non-structural), and exploring funding sources for flood insurance subsidies for existing structures and facilities in the floodplain.

Goal 2: Reduce private and public property damage

Objective 2.1	Objective 2.2	Objective 2.3	Objective 2.4	Objective 2.5	Objective 2.6	Objective 2.7
Identify floodplain mapping needs for previously unmapped areas and areas with outdated mapping.	Identify financial and technical resources to acquire needed floodplain mapping.	Identify educational data and information that can be disseminated to county and municipal floodplain managers to enable more informed permit decisions.	Promote avoidance of floodplain development (new structures and facilities) by public (Federal, State, county and municipal) agencies.	Identify needs for county and municipal floodplain managers and legislative action to require State certification of floodplain managers.	Promote and identify financial support for both structural and non-structural flood damage reduction measures through Federal and State agencies.	Identify the need for and sources of funding for flood insurance subsidies for existing structures and facilities.

Goal 3 is to facilitate effective floodplain management through the actions of the State Resiliency Office and its partners to develop technical, administrative, regulatory enforcement, and legislative tools. This will involve actions such as identifying reliable hydrologic/hydraulic models, gathering watershed data, formalizing Task Force responsibilities, recommending legislative measures, offering educational resources for floodplain managers, and acknowledging the importance of Watershed Associations through State legislation.

Goal 3: Develop technical, administrative, regulatory enforcement, and legislative tools that will facilitate implementation of a sound program of flood loss reduction and floodplain management

Objective 3.1	Objective 3.2	Objective 3.3	Objective 3.4	Objective 3.5	Objective 3.6
Identify effective hydrologic / hydraulic models that can be implemented at the county and municipal level to predict and plan for future flooding.	Promote continued collection and analysis of watershed level hydrologic and hydraulic data to better define flood frequencies, runoff characteristics, and flooding risks.	Formalize the roles, tasks, and responsibilities of the Task Force and execute a partnership agreement among the members that will ensure its continuation and effectiveness.	Identify legislative proposals (either new legislation or modification of existing law) that will facilitate needed infrastructure protection, establish flood damage reduction funding sources, and enable more effective enforcement of existing programs.	Develop and deploy an education and training package for county and municipal floodplain managers, county commissioners, and city councils based upon existing FEMA data and information.	Recognize and legitimize the role of Watershed Associations in the planning and implementation of flood damage reduction and floodplain management activities through State legislation.

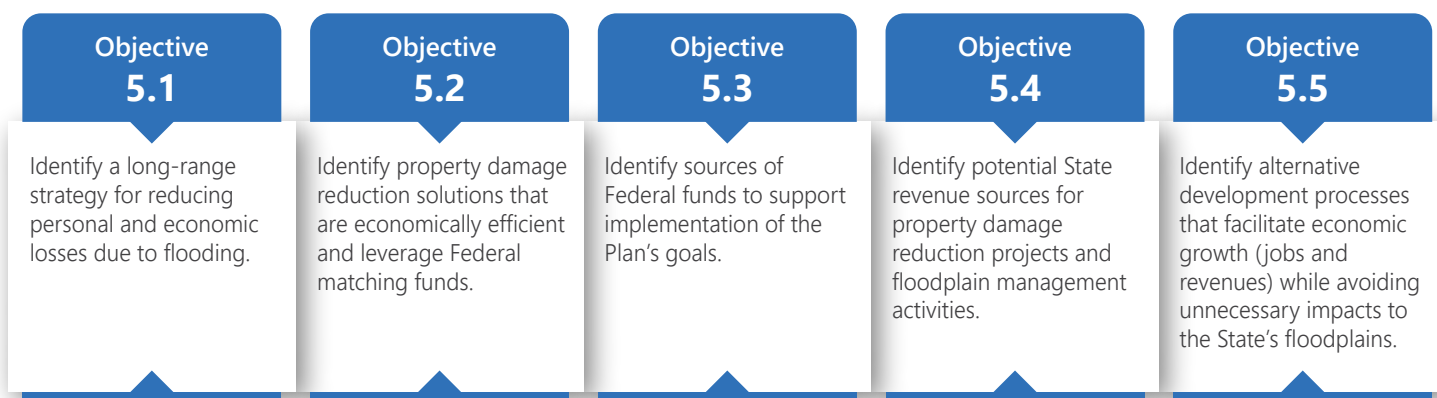
Goal 4 is to facilitate the implementation of tools and regulations for efficient stormwater management. Key initiatives include identifying accountable entities, offering State support for stormwater regulations, and evaluating the impact of runoff resulting from resource extraction on streams and floodplains.

Goal 4: Promote technical, administrative, regulatory enforcement, and legislative tools that will reduce incrementally excessive runoff from land-conversion activities in West Virginia and floodplain management



Goal 5 is to create a comprehensive strategy aimed at reducing flood-related losses and supporting the State's economy. Key initiatives to be led by the State Resiliency Office will involve identifying affordable solutions for minimizing property damage, maximizing Federal funding opportunities, investigating potential State revenue streams, and advocating for development practices that prioritize both economic advancement and floodplain preservation.

Goal 5: Reduce personal and economic losses due to flooding while supporting a viable state economy



Goal 6 is to protect the State's waterways and floodplains by identifying stable stream reaches to prevent dredging, modification, restoration, or inundation. It is important to acknowledge streams with legally protected aquatic or terrestrial resources and to establish a Memorandum of Agreement between Federal and State agencies for stream protection. Restoration efforts should be coordinated using existing State and Federal programs, and education should be promoted to encourage responsible use of streams and floodplains.

Goal 6: Protect the State's waterway and floodplain environments

Objective 6.1

Identify stable reaches of streams to be protected from dredging, modification, restoration, or inundation.

Objective 6.2

Identify streams or reaches of streams with "streams possessing outstanding scenic, recreational, geological, fish and wildlife, botanical, historical, archeological or other scientific or cultural values", as defined in the Natural Streams Preservation Act, and other aquatic or terrestrial resources protected from pollution, damming and diversion, or stream enhancements and modifications by laws or regulations.

Objective 6.3

Prepare and execute a Memorandum of Agreement between Federal and State agencies on protected streams.

Objective 6.4

Identify streams or reaches of streams requiring restoration of aquatic resources that can be addressed by available State and Federal restoration programs.

Objective 6.5

Promote wise use of the State's streams and floodplains through the State's education system.



Glade Creek Grist Mill

General Potential Actions



A. Floodplain Management

Increase resources in the West Virginia Emergency Management Division to support local floodplain managers statewide. Require owners of all new structures to obtain a permit certifying whether or not the structures are in the floodplain. Improve enforcement of floodplain management ordinances.



B. Flood Warning System

Improve and expand the network of existing rain and stream gauges in the State and connect those instruments to a proposed statewide flood warning system. This system would enable the National Weather Service to issue credible and reliable flood warnings. Provide markers along roads and at stream crossings subject to frequent inundation warning motorists of possible hazards at these locations.



C. Floodplain Mapping

Update floodplain mapping to more precisely delineate floodplain areas and create more detailed hydrographic networks to improve flow models and flood risk assessment.



D. Flood Damage Assessment

Designate a single agency or point of contact where flood damage data from Federal and State resources could be stored. Develop a system that integrates the capability of Geographic Information Systems (GIS) with flood damage data so that damage information could be used as the basis for flood protection planning.



E. Building Codes, Permitting and Enforcement

Continue to support and adopt updates of International Building Code, which covers residential building, plumbing, mechanical, fuel-gas and private sewage disposal requirements and meets minimal flood-resistant design standards. Provide education and technical assistance to the public on the regulatory permit process.



F. Environmental Impacts of Flooding

Enact legislation that recognizes the attributes and hazards of the State's floodplains and the needs for stricter enforcement of floodplain ordinances. The legislation should declare floodway zones to be off-limits to new development (with some exceptions) and encourage Federal agencies to evaluate all proposed projects for effects on the State's floodplains. Legislate stricter enforcement of regulations for anchoring floatable materials and structures in the floodway and flood fringe. Convene a "Stream Summit" to formulate a standard classification of stream quality in the State. Enact legislation that supports local regulation of stormwater runoff volume. Enact guidelines for the emergency removal of stream debris to avoid long-term environmental damage. Fund studies for identification of stable stream reaches that require protection from development.

**G. Stream Crossings and Access Roads**

Establish guidelines for the sizing, installation and maintenance of culverts, drainage structures and stream or river crossings. Identify ownership of abandoned stream crossings and move to demolish unused crossings.

**H. Dredging**

The practice of local stream dredging to reduce the damage associated with large regional floods should be terminated. Channel modifications projects (which include some dredging) where economically justified and environmentally sound should be supported to reduce flood damages. Allocate funds for stream restoration projects that can reduce flood damage and return the natural functions of damaged streams and ecosystems.

**I. Resource Extraction**

The Task Force supports the recommendations of the study conducted by WVDEP regarding mining. In addition, the Task Force recommends the WV Division of Forestry accelerate revisions to Best Management Practices to reduce the impacts of forestry operations on flooding and develop BMPs on areas severely burned by wildfire.

**J. Stormwater Management**

The Task Force recommends that all counties implement a stormwater ordinance to control the quantity and quality of stormwater and to guide the development and implementation of a stormwater management plan. It is recommended that a State agency inspects stormwater facilities and serve as a backup for local inspection and enforcement of regulations on design, installation, operation, and maintenance of these facilities. It is also recommended that special stormwater regulations be prepared for karst areas in West Virginia.

**K. Education**

Encourage State, county, and local officials to take the Federal Emergency Management Agency independent study course related to flooding, flood mitigation and floodplain management. Encourage education outlets to develop classes and curriculums that address floodplain and flood issues. Provide visible markers to identify for the public the Base Flood Elevation level.

**L. Existing Flood-Prone Structures and Facilities**

Evaluate the major watersheds in the State to identify opportunities to construct upstream retention facilities for flood control and water supply. Evaluate the existing municipalities in the State to identify opportunities for protection in place of those communities serving as the economic and political centers of their respective counties. Establish a voluntary program of permanent acquisition for structures within the designated floodways and a voluntary program of floodproofing and relocations to address existing structures in the flood fringe areas.

**M. Capacity Building**

Provide strategic training for state and local agency staff, local officials and practitioners on flood mitigation, project development, and recovery activities. Support shared or regional technical resources to assist smaller or under-resourced communities. Encourage workforce development initiatives that build local expertise needed to support mitigation projects.

**N. Collaboration**

Sustain coordination among State agencies, local governments, Federal partners, and other stakeholders involved in flood resiliency activities. Encourage information sharing and alignment of priorities to reduce duplication of effort. Promote ongoing exchange of best practices and implementation strategies across organizations.

**O. Funding and Financing Coordination**

Support the identification and coordination of partnerships that leverage multiple funding sources and technical expertise to maintain and advance flood resiliency projects and programs. Exchange knowledge of grant programs, application processes, financing strategies and funding administration to elevate capacity of entities pursuing resiliency projects to both secure and manage funding.

**P. Planning**

Encourage the consistent integration of flood resiliency considerations across State, regional, and local planning efforts. Promote watershed-based planning approaches that account for cumulative flood impacts. Provide guidance to ensure flood risk information is regularly updated and incorporated into capital planning and investment decisions. Support periodic plan updates to reflect improved data and lessons learned from recent flood events.

Implementation of Resiliency Efforts in West Virginia

As previously detailed, the Goals, Objectives, and Recommendations housed within the 2004 plan are as relevant today as they were when the plan was created. This Flood Resiliency Plan utilizes those 2004 Recommendations as the basis for **potential actions** entities may elect to implement to further resiliency in West Virginia. The 2004 recommendations were classified into 12 categories which captured the primary issues within the state surrounding flooding. **Section IV** of the WVFRP provides a detailed list of each of the potential actions proposed in Chapter 6 of the 2004 FPP. These potential actions have been recategorized by sector and organization as opposed to the issue-centric format previously utilized. The intent is to allow applicable organizations to easily access the potential actions most pertinent to them. This framework also provides for efficient updates as new potential actions are developed, existing ones are implemented, or older ones are determined to no longer be applicable.

Section III of this plan provides guidance on what variables organizations may want to consider when pursuing implementation. It is anticipated that sections III and IV will be used in conjunction. The primary foci for prioritization in this Flood Resiliency Plan include:

- 🔗 A. **Implementing Potential Actions that support existing plans, programs, and laws**
- 🔗 B. **Use of best available data and information in determining where to concentrate efforts**
- 🔗 C. **Implementing a multiple benefit approach**

Details and examples of each are housed in the applicable section.

Monitoring Trends to Guide Future Resiliency Efforts

The 2004 Flood Protection Plan was an expansive document which provided numerous recommendations to address flooding in the Mountain State. Unfortunately, no system or entity was created to track progress or provide guidance in implementation after the plan was created. A State Flood Protection Planning Council was proposed in the 2005 West Virginia legislative session, but the proposed bill failed to make it out of committee. It was not until the West Virginia State Resiliency Office was formed in 2017 that an entity officially had responsibility for the Flood Protection Plan.

Developing this resiliency plan is the next step in creating a more flood resilient West Virginia. This **voluntary** plan cannot be fully implemented without a mechanism for monitoring activities, reviewing recommendations, and assuring that the plan remains relevant. To address these gaps, a dashboard is being constructed to monitor resiliency trends within the state. **Section V** of this plan provides an overview of the concept. Metrics will include monetary expenditures, project completions, education and training participation, recommendation implementation, and crowdsourced ratings. A system of weighting will be utilized to prevent one metric from overshadowing the others. The intended result is a composite score that can be tracked over time to establish a trend line. This will create a mechanism to monitor momentum, catalog resiliency activities, and provide a means to analyze data to inform future guidance on resiliency efforts across West Virginia.

Flood Resilience Measurement for Communities...

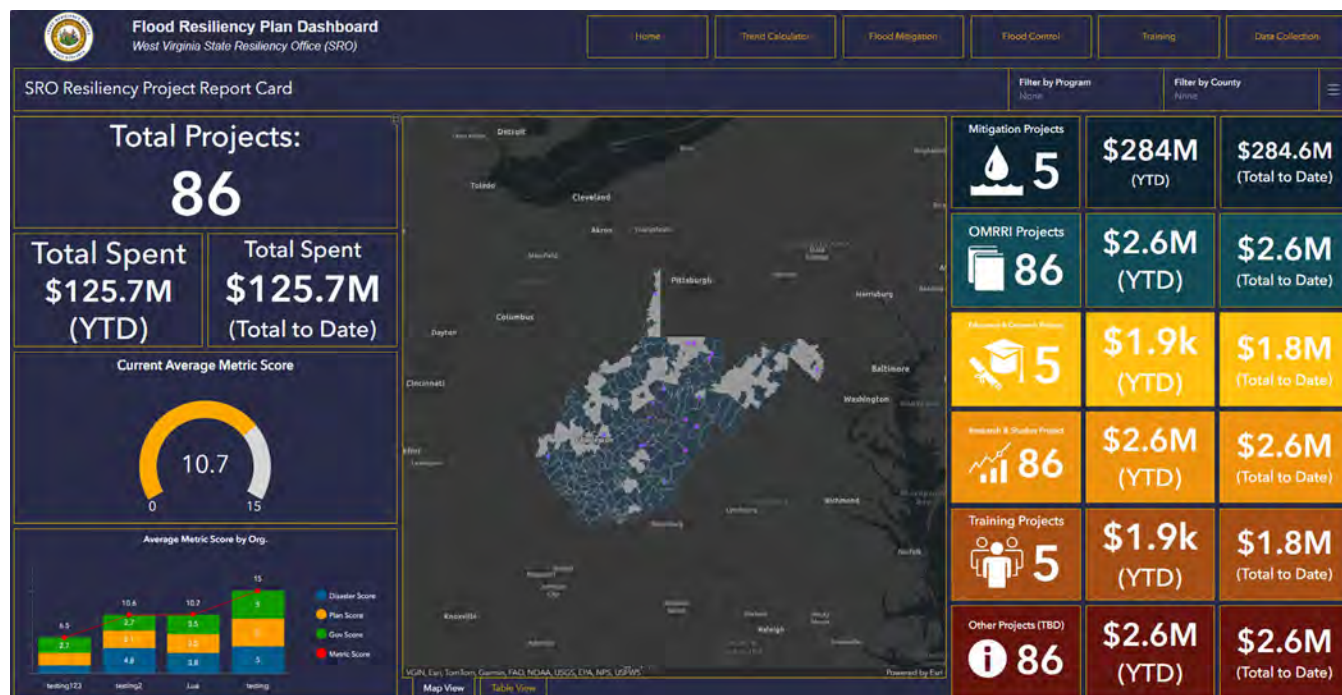
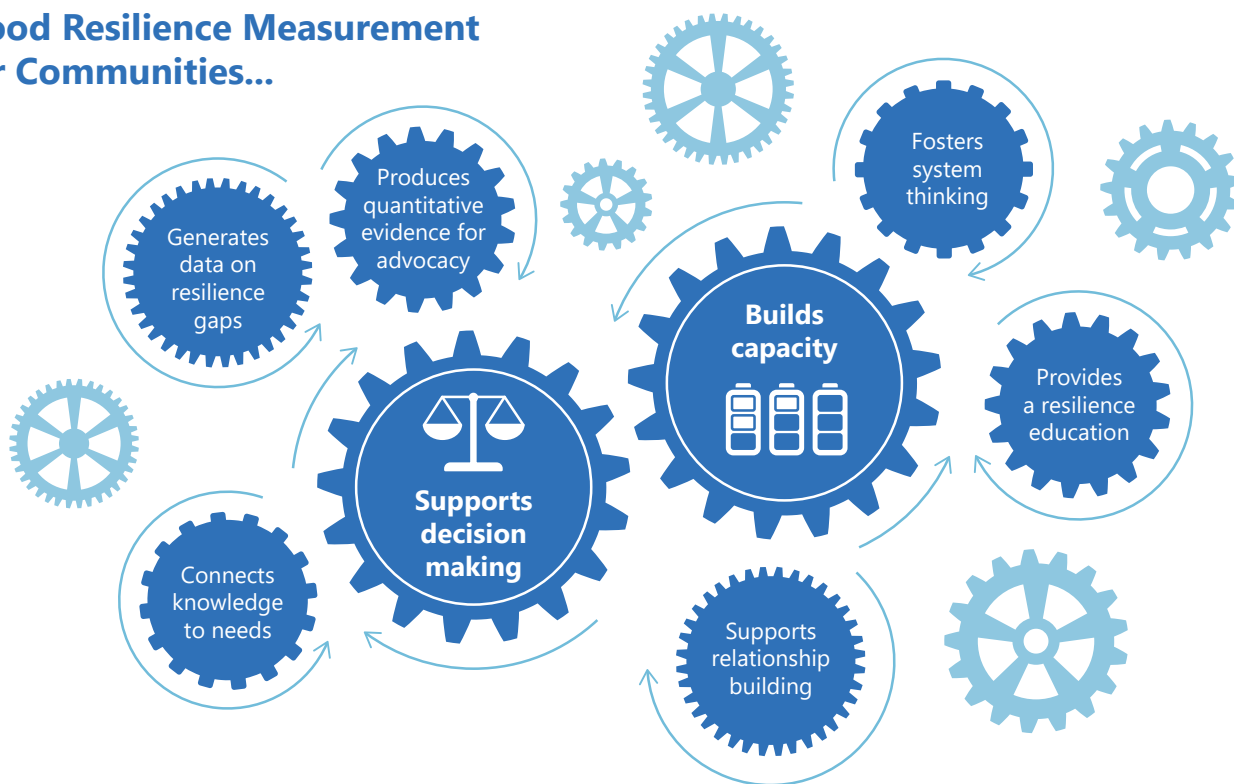


Figure II-1 A screen capture of the West Virginia State Resiliency Office's Flood Resiliency Plan Dashboard, which will allow the SRO team and other stakeholders to measure and monitor flood resiliency actions and outcomes. More information about this tool can be found in Section V

III. Prioritization of Actions

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This section provides guidance on how entities may choose to focus their efforts during the intervening period between plan versions. Three methodologies have been identified that strive to support the goals and objectives of the plan, leverage available funding platforms, and assist in identifying some of the most impactful statutory options for consideration by the legislature, executive branch, local government, and regulatory agencies.

Those methodologies are:

**A****Implement potential actions that support existing plans, programs, and laws as well as leverage grant funding**

- Supports long-term objectives and magnifies impacts
- Sometimes a prerequisite for grant eligibility and/or participation in other programs

**B****Utilize and develop data to determine where to focus efforts**

- Helps to identify regions or localities that may benefit most from measures
- Guides planning efforts for development across the state

**C****Employ a multiple benefit approach**

- Amplifies constrained financial budgets
- Has a positive impact on a range of factors other than flood reduction

Adoption and/or implementation of the Potential Actions detailed in section IV will require a commitment to resiliency investment by all of the entities addressed. Given the number of recommendations, the logistics of implementation, and the costs associated with implementation, deciding which recommendations to focus early efforts upon is crucial to successful implementation of resiliency measures throughout West Virginia.

The remainder of this section provides applicable examples for each of the resiliency prioritizations previously mentioned.



A. Implement Potential Actions that support existing plans, programs, and laws as well leverage grant funding

There are numerous programs and plans implemented at the federal, state, regional and local level that target flood preparedness, recovery, and mitigation. Additionally, participation in some of these programs is a prerequisite for grant eligibility and/or participation in other programs. Implementing actions aligned with these plans and programs, a number of which are defined within the Potential Actions section below, is crucial in accessing available resources. Below we summarize several plans with notable relevance to enhancing flood resiliency in West Virginia.

Plans to Support

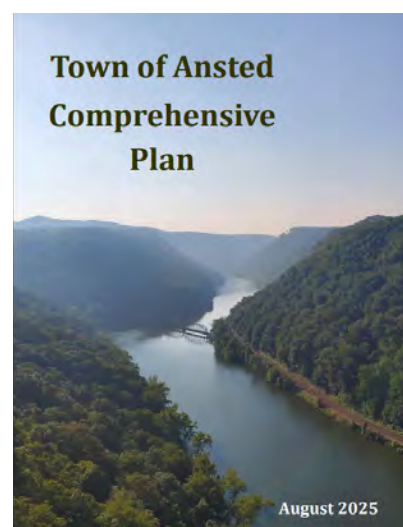
Hazard Mitigation Plans

Hazard Mitigation Plans are used to identify and assess hazards that impact a state, region or community, develop a strategy to reduce losses from those hazards, and establish a coordinated process to implement the strategy (WVEMD, n.d.). The [2023 West Virginia Hazard Mitigation Plan](#) is provided here as an example.

In addition to statewide hazard mitigation plans, each of the twelve Regional Planning and Development Councils in West Virginia generates a hazard mitigation plan specific to their area in order to be eligible for FEMA funding. Click [here](#) to view Region 4's Hazard Mitigation Plan Update.

Comprehensive Plans

Comprehensive Plans are characterized in [WV §8A-3-4](#) as written statements on present and future land use and development patterns consisting of descriptive materials, including text, graphics and maps, covering the objectives, principles and guidelines for the orderly and balanced present and future economic, social, physical, environmental and fiscal development of an area under the jurisdiction of the planning commission. The [WVU Land Use and Sustainable Development Law Clinic](#) has worked with a number of communities across the state to assist in developing these plans. Comprehensive plans completed in whole or in part by the Clinic are provided [here](#) as examples of comprehensive plans.



Agency Guidance

Under [WV § 29A-1-2](#) categories of agency guidance include interpretive rules, procedural rules, and instruction or guidance documents. Agencies periodically create and update guidance documents which provide best practices aligned with flood resiliency objectives.

The West Virginia Department of Environmental Protection's [Stormwater Management and Design Guidance Manual](#) is an illustrative example of robust guidance that provides multiple benefits. These stormwater design and management best practices contained therein are aligned with the MS4 general permit and contain resources to enhance site flood resiliency.

Programs to Support

NRCS Watershed and Flood Prevention Operations Program (NRCS WFPO)

The [NRCS Watershed and Flood Prevention Operations Program \(NRCS WFPO\)](#) provides assistance to help plan and implement watershed projects for flood prevention, watershed protection, recreation, fish and wildlife, water quality, and water supply and management. These projects are uniquely designed for each watershed. WV has a robust watershed program, with 170 dams and other conservation measures in place to protect watersheds and improve resiliency (NRCS, n.d.).



National Flood Insurance Program

Created by Congress in 1968, the [National Flood Insurance Program \(NFIP\)](#) provides insurance to help reduce the socio-economic impact of floods. Flood insurance is a separate policy that can cover buildings, the contents in a building, or both. The NFIP provides flood insurance to property owners, renters, and businesses, and having this coverage helps them recover faster when floodwaters recede (NFIP, n.d.).



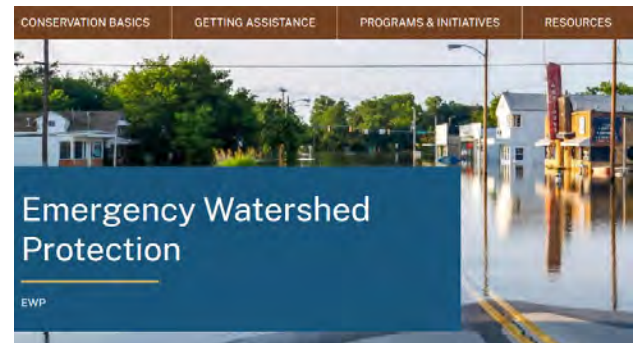
Community Rating System

The [Community Rating System \(CRS\)](#) is a voluntary incentive program that recognizes and encourages community floodplain management practices that exceed the minimum requirements of the NFIP. Over 1,500 communities participate nationwide (FEMA, 2024).



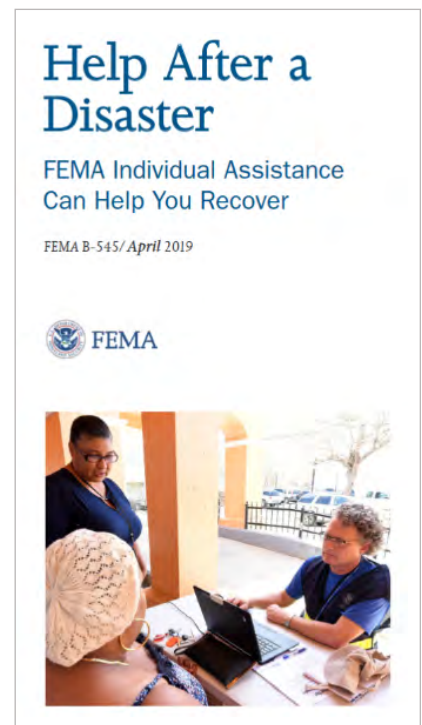
Emergency Watershed Protection Program

The NRCS [Emergency Watershed Protection \(EWP\)](#) program offers technical and financial assistance to help local communities relieve imminent threats to life and property caused by floods, fires, windstorms and other natural disasters that impair a watershed. EWP does not require a disaster declaration by federal or state government officials for program assistance to begin. The NRCS State Conservationist can declare a local watershed emergency and initiate EWP program assistance in cooperation with an eligible sponsor. NRCS will not provide funding for activities undertaken by a sponsor prior to the signing of a cooperative agreement between NRCS and the sponsor. This program can remove debris from stream channels, road culverts and bridges; reshape and protect eroded streambanks; correct damaged or destroyed drainage facilities; establish vegetative cover on critically eroding lands; repair levees and structures; repair certain conservation practices, and purchase of EWP Buyouts (NRCS, n.d.).



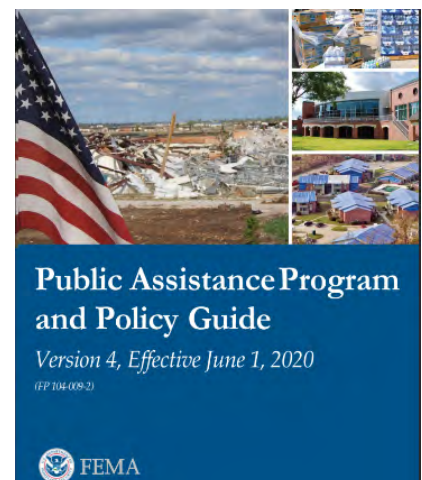
Individuals and Households Program

The [Individuals and Households Program \(IHP\)](#) provides financial and direct services to eligible individuals and households affected by a disaster, who have uninsured or under-insured necessary expenses and serious needs. IHP assistance is not a substitute for insurance and cannot compensate for all losses caused by a disaster. The assistance is intended to meet your basic needs and supplement disaster recovery efforts (FEMA, 2024).



FEMA Public Assistance

FEMA's [Public Assistance \(PA\)](#) Program provides supplemental grants to state, tribal, territorial, and local governments, and certain types of private non-profits so communities can quickly respond to and recover from major disasters or emergencies (FEMA, 2024).



West Virginia Department of Environmental Protection Programs

The [West Virginia Department of Environmental Protection](#) houses two programs related to dam safety. The [Division of Mining and Reclamation](#) provides regulatory oversight of coal impoundments. All other high hazard dams in the state are under the purview of the [WV Dam Safety Section](#) which is housed in the Division of Water and Waste Management. Their mission is to protect lives and property from the danger of a dam failure (WVDEP, n.d.).



Auxiliary Spillway Failure

Codes and Regulations to Support

- [§19-21A. – Conservation Districts](#)
- [§29-31-1. – State Resiliency and Flood Protection Act](#)
- [§7-1-3u. Authority of Counties and Municipalities to Treat Streams to Prevent Floods](#)
- [§15-5-1. Division of Homeland Security and Emergency Management](#)
- [§15A-10-1. State Fire Marshal and Office of the State Fire Marshal](#)
- [§8A. Land Use Planning](#)

Federal Grants to Support Resiliency Actions

Federal Emergency Management Agency

[Federal Emergency Management Agency \(FEMA\)](#) administers multiple grant programs including:

- [Building Resilient Infrastructure and Communities \(BRIC\)](#) supports states, local communities, tribes and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. The program's guiding principles are supporting communities through upgrading and modernizing infrastructure (FEMA, 2026).
- The [Safeguarding Tomorrow through Ongoing Risk Mitigation \(STORM\)](#) Act allows FEMA to award capitalization grants for eligible entities to make funding decisions and award loans directly to local communities (FEMA, 2024).
- The [Flood Mitigation Assistance \(FMA\)](#) grant program is a competitive program that provides funding to states, federally recognized Tribal governments, U.S. territories, and local governments. Since the National Flood Insurance Reform Act of 1994 was signed into law, funds are used for projects that reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program (FEMA, 2024).



The Economic Development Administration

The [Economic Development Administration \(EDA\)](#) mission is to lead the Federal economic development agenda by promoting innovation and competitiveness, and preparing American regions for growth and success in the worldwide economy. Through this [Disaster Supplemental NOFO](#), EDA will award investments in regions experiencing severe economic distress or other economic harm resulting from Hurricanes Ian and Fiona, and of wildfires, flooding, and other natural disasters occurring in calendar years 2021 and 2022. Under this announcement, EDA solicits applications under the authority of its Economic Adjustment Assistance (EAA) program. The EAA program is intended to be flexible and responsive to the economic development needs and priorities of local and regional stakeholders, including those seeking assistance recovering from Federally declared disasters (EDA, n.d.).



The Infrastructure Investment and Jobs Act (IIJA)

The [IIJA](#) establishes the [Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation \(PROTECT\)](#) Program to help make surface transportation more resilient to natural hazards, including climate change, sea level rise, flooding, extreme weather events, and other natural disasters through support of planning activities, resilience improvements, community resilience and evacuation routes, and at-risk coastal infrastructure (Federal Highway Administration, 2022).

The Small Business Administration

The [Small Business Administration \(SBA\)](#) provides low-interest disaster loans to help businesses and homeowners recover from declared disasters (SBA, n.d.).

Department of Housing and Urban Development

The Department of Housing and Urban Development (HUD) provides flexible [Community Development Block Grant Disaster Recovery \(CDBG-DR\)](#) funds to help cities, counties, and states to recover from Presidentially declared disasters (HUD, n.d.).





B. Utilize and develop data in determining where to focus efforts

Utilization of statistical data provides one mechanism to identify regions or localities within the state that may benefit the most from the implementation of measures to improve resiliency. Indicators can include factors such as socioeconomic data, development density in flood prone areas, a community's proximity to emergency services, and the hazard susceptibility of critical infrastructure. Consideration of these types of data can help to identify areas where residents and/or the local economy may be less equipped to respond and recover from a flood event. Incorporating historic flood information can help to identify gaps in data or to validate current flood models. Additionally, the use of predictive modeling can be used in conjunction with these indicators to guide planning efforts for development across the state.

Collecting and manipulating this data can be effectively performed using Geographic Information System (GIS) technologies. A number of options exist to facilitate the use of GIS technology in West Virginia. [The WV Flood Tool](#) is an excellent example of an open-source tool that anyone can access. Created and maintained by the [WV GIS Technical Center](#), this tool provides a user-friendly method of visualizing property boundaries and how those boundaries interact with the 100 year and 500-year flood plains. The [West Virginia Flood Resiliency Framework \(WVFRF\)](#), co-created with civic actors and academic researchers, is a freely available online toolkit designed to serve as a hub of information to assist communities with everything from understanding their unique flood risk to how to prepare for and manage a disaster in the event a flood does occur. The WVFRF is unique in the nation and includes

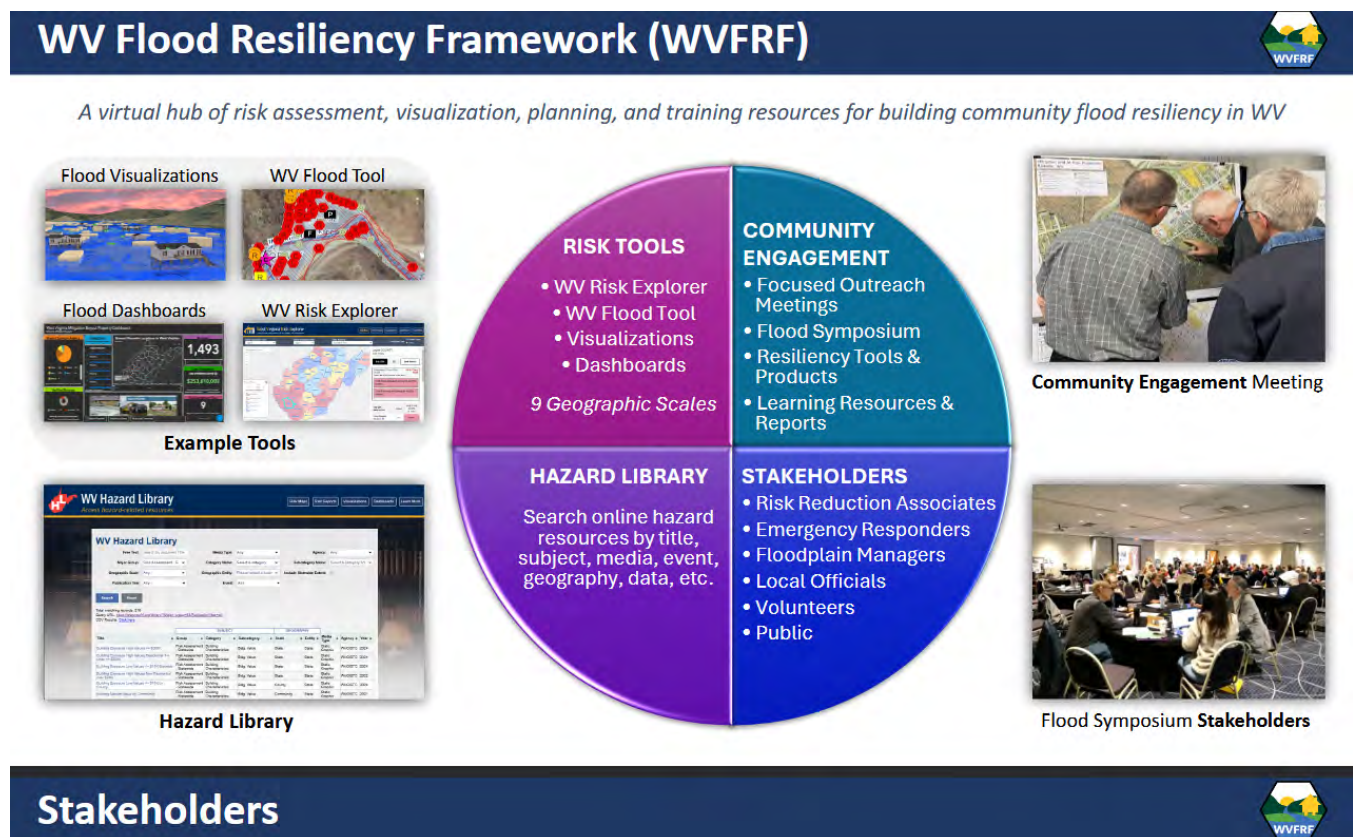


Figure III-1. The West Virginia Flood Resiliency Framework. Source: WV GIS Technical Center

localized analytical and visualization tools combined with quantifiable flood risk factors and cumulative risk scores that can be beneficial in the risk planning and mitigation prioritization of floodprone communities in the state. The project was funded through an award from the National Science Foundation [CIVIC Innovation Challenge](#).

The following examples (Figures III-1 through III-8) utilize some of the most common flood risk indicators such as flood frequency, flood depths, building exposure, building density, building year, repetitive loss, and population ratio to identify areas of West Virginia that may benefit most from resiliency focused investment.

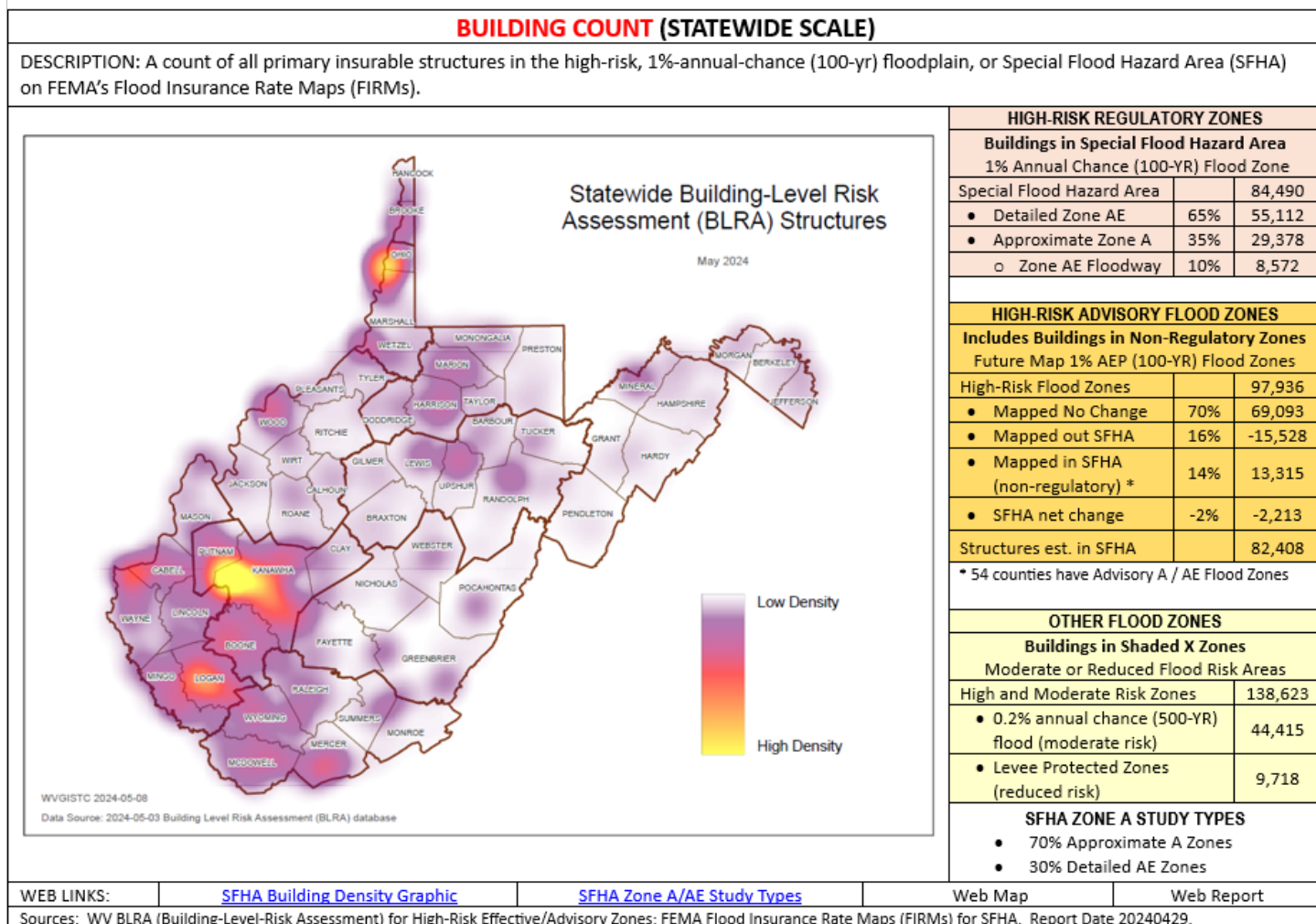
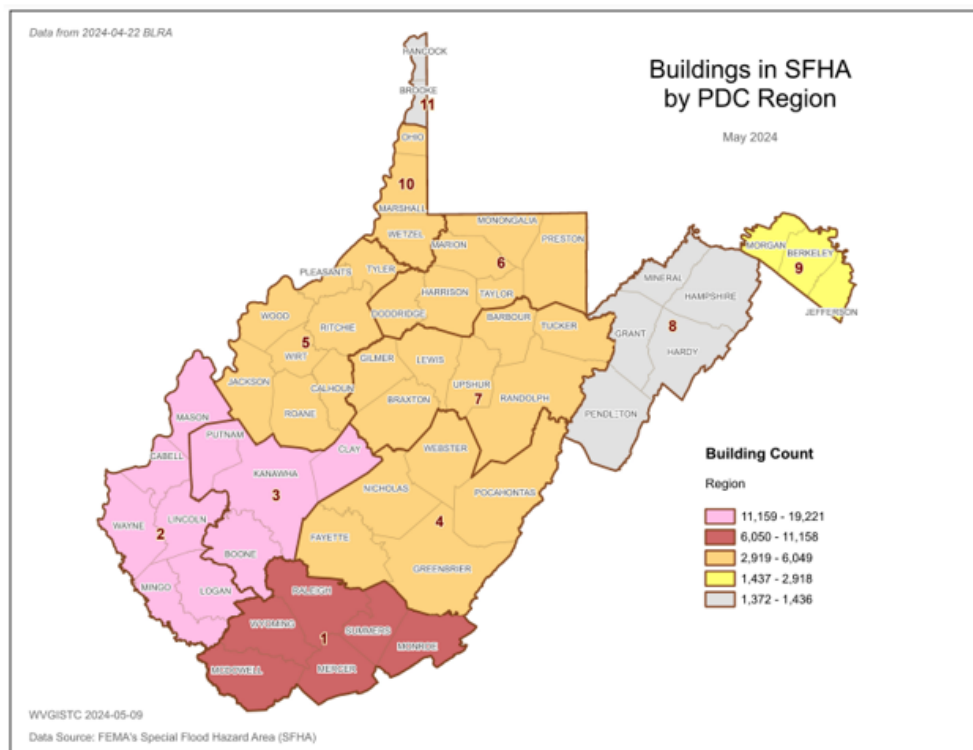


Figure III-2. Building Count in Special Flood Hazard Area (Statewide Scale, 2004)

DESCRIPTION: A count of all primary insurable structures in the high-risk, 1%-annual-chance (100-yr) floodplain, or Special Flood Hazard Area (SFHA) on FEMA's Flood Insurance Rate Maps (FIRMs).



Rank	Region (11)	Count	% Rank
1	Region 3	19,221	92%
2	Region 2	17,016	83%
3	Region 1	11,158	75%
4	Region 6	6,049	67%
5	Region 4	6,044	58%
6	Region 10	6,024	50%
7	Region 5	5,752	42%
8	Region 7	5,418	33%
9	Region 8	2,918	25%
10	Region 9	1,436	17%
11	Region 11	1,372	8%

REGIONAL SCALE STATISTICS

Minimum (REGION 11)	1,372
Maximum (REGION 1)	19,221
Median	6,204
Mean	7,492
Statewide Total	82,408

WEB LINKS:	Natural Break Graphic	Percent Rank Graphic	Web Map	Web Report
Sources: WV BLRA (Building-Level-Risk Assessment) for High-Risk Effective/Advisory Zones; FEMA Flood Insurance Rate Maps (FIRMs) for SFHA. Report Date 20240429.				

Figure III-3. Building Count in Special Flood Hazard Area (Regional Council Scale, 2024)

DESCRIPTION: A count of all primary insurable structures in the high-risk, 1%-annual-chance (100-yr) floodplain, or Special Flood Hazard Area (SFHA) on FEMA's Flood Insurance Rate Maps (FIRMs).



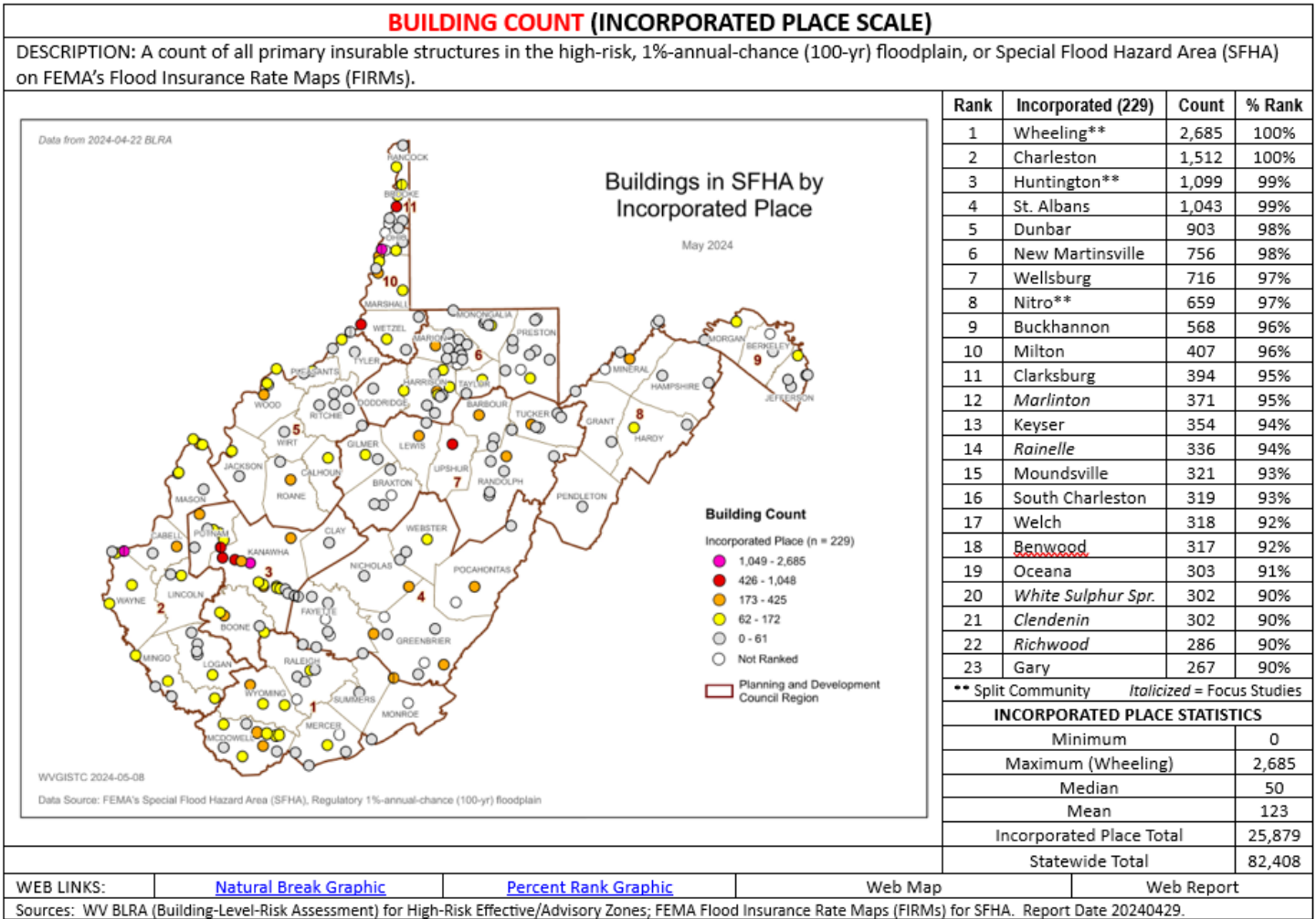
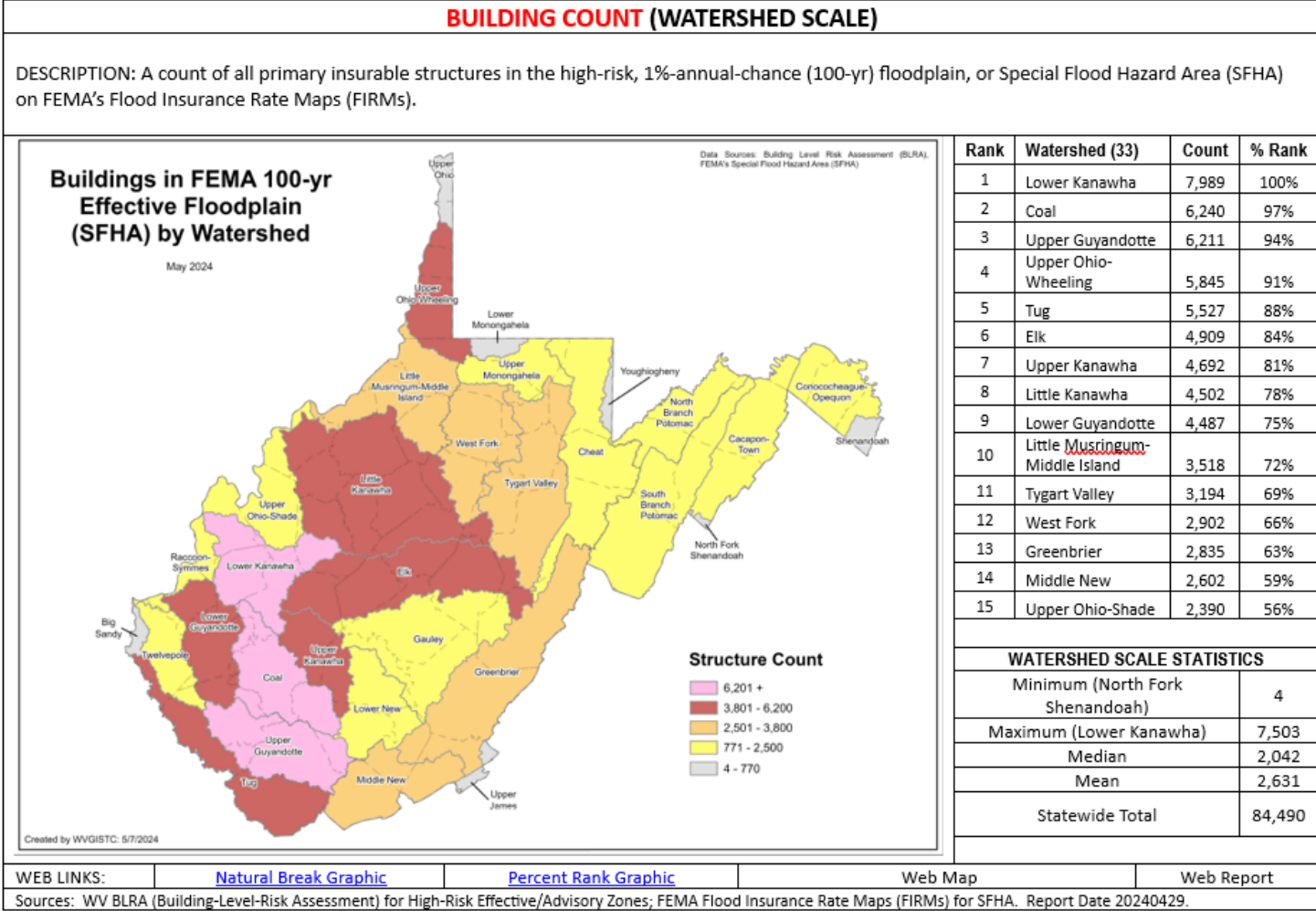


Figure III-7. Building Count in Special Flood Hazard Area (Incorporated Place Scale, 2024)



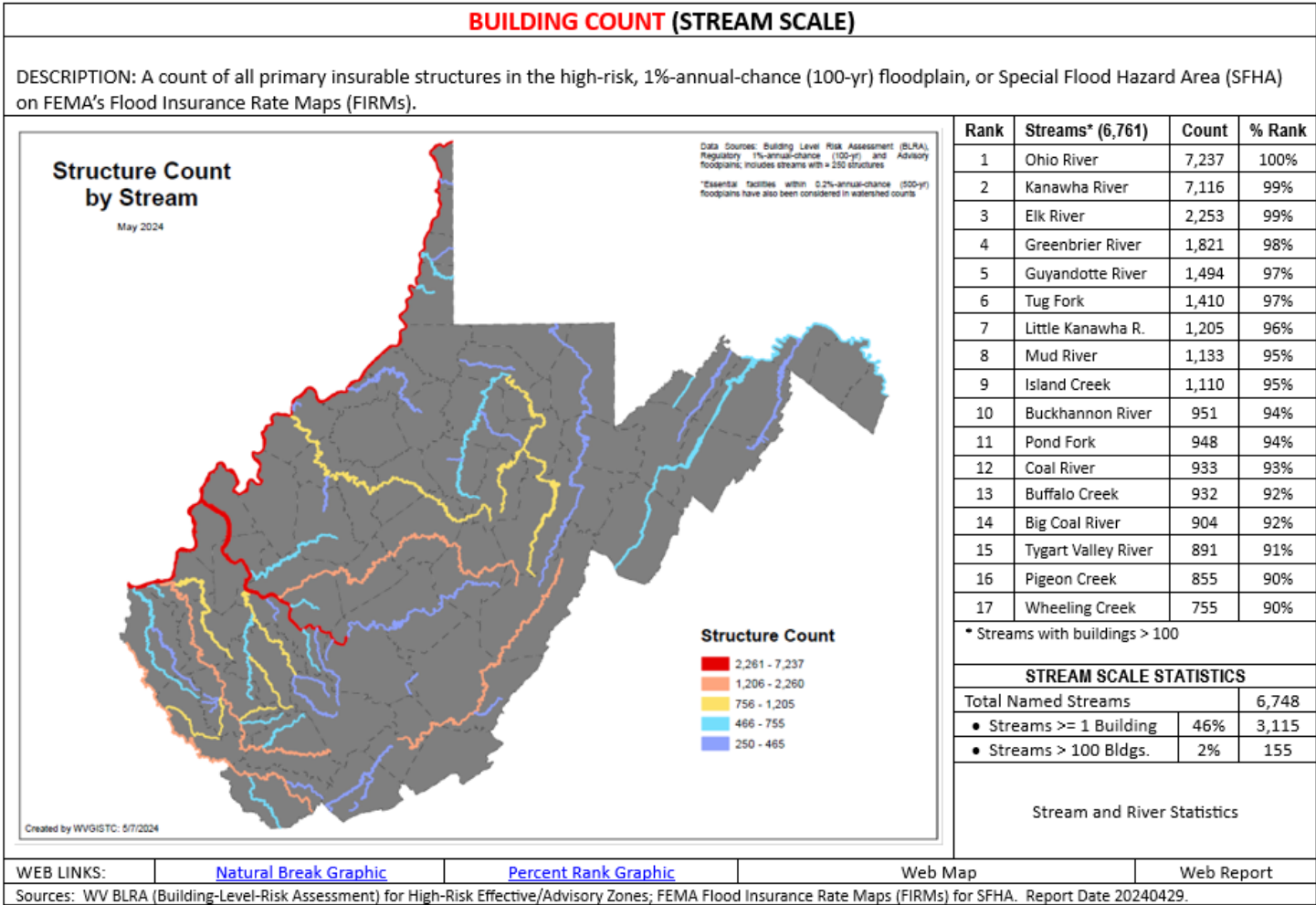


Table 1. Cumulative Flood Risk Index of 29 Flood Factors for Glenville, WV from the Glenville Flood Risk Report (Accessed April 27, 2026)

CATEGORY	FLOOD RISK INDICATOR	VALUE FOR GLENVILLE - INCORPORATED	INDICATOR SCORE (0 - 100%)	INDICATOR RATING
Floodplain Characteristics	Floodplain Area Ratio ?	24.8%	79.3%	Relatively High
	Floodplain Length Ratio ?	0.00697 Miles/Acre	73.2%	Relatively High
	Flood Declared Disasters ?	18	57.4%	Moderate
	Flood Depth Median ?	2.1 Ft	62.2%	Relatively High
	Floodplain Characteristics Index, 38th		83.7%	Very High
Building Exposure	Building Floodplain Count ?	124	78.5%	Relatively High
	Building Floodway Count ?	0	0.0%	Very Low
	Building Floodplain Ratio ?	14.8%	66.2%	Relatively High
	Building Density ?	0.76 /Acre	59.6%	Moderate
	Building Exposure Index, 102nd		55.7%	Moderate
Building Characteristics	Building Median Value ?	\$42,900	61.8%	Relatively High
	Bldg. Mobile Homes Ratio ?	13.9%	61.4%	Relatively High
	Bldg. Subgrade Basements Ratio ?	33.8%	72.8%	Relatively High
	Building 1-Story Ratio ?	67.7%	41.2%	Moderate
	Bldg. Year Pre-FIRM Ratio ?	88.5%	66.6%	Relatively High
	Bldg. Year Minus Rated Post-FIRM Ratio ?	1.6%	52.1%	Moderate
	Building Characteristics Index, 87th		61.8%	Relatively High
Critical Infrastructure	Essential Facilities ?	4	88.5%	Very High
	Roads Inundated Ratio ?	17.8%	74.5%	Relatively High
	Critical Infrastructure Index, 18th		92.5%	VERY HIGH
Community Assets	Community Assets Historical ?	2	83.7%	Very High
	Community Assets Non-Historical ?	7	85.5%	Very High
	Community Assets Index, 22nd		90.3%	VERY HIGH
Building Damage Loss	Bldg. Substantial Damage Count ?	5	77.1%	Relatively High
	Bldg. Substantial Damage Ratio ?	4.0%	72.3%	Relatively High
	Bldg. Previous Damage Claims ?	280	96.9%	VERY HIGH
	Bldg. Repetitive Loss Structures ?	132	98.2%	VERY HIGH
	Building Damage Loss Index, 17th		92.9%	VERY HIGH
People / Social Vulnerabilities	Population in Floodplain Ratio ?	18.1%	64.0%	Relatively High
	Population Displaced Ratio ?	13.9%	70.6%	Relatively High
	WV Social Vulnerability Index ?	-	42.7%	Moderate
	People / Social Vulnerabilities Index, 85th		63.1%	Relatively High
RISK INDEX	CUMULATIVE INDEX ?		87.7%	Very High

Table 2. General Information and Comparison Statistics for Glenville, WV from the Glenville Flood Risk Report (Accessed April 27, 2026)

	TOTAL AREA (ACRES)	TOTAL STRUCTURES	TOTAL POPULATION	POPULATION DENSITY (/SQ MILE)	NUMBER OF HOUSEHOLDS	AVERAGE HOUSEHOLD SIZE
Glenville - Incorporated	660	836	1,220	1,183.0	416	2.7
STATE STATS	15,500,454	1,118,761	1,801,049	74.4	711,352	2.5
INCORPORATED PLACES STATS:						
Median	559	559	940	1,073.6	354	2.5
Mean	1,297	1,475	2,763	1,240.3	1,142	2.6
Minimum	34 (Sylvester - Inc)	28 (Thurmond - Inc)	4 (Thurmond - Inc)	44.1 (Thurmond - Inc)	4 (Thurmond - Inc)	1.0 (Thurmond - Inc)
Maximum	20,648 (Charleston - Inc)	28,045 (Charleston - Inc)	49,055 (Charleston - Inc)	3,895.7 (Windsor Heights - Inc)	21,779 (Charleston - Inc)	4.7 (Pullman - Inc)



C. Employ a Multiple Benefit Approach

Resiliency projects can have a positive impact on a range of issues other than flood reduction. Mitigative efforts such as floodplain restoration and natural stream restoration often reduce sediment and nutrient inputs and increase aquatic habitat connectivity within watersheds. Buyout programs for flood damaged structures create an opportunity to remove blighted buildings and create community green space. Floodproofing existing structures can create jobs and help to stabilize local economies by decreasing flood insurance premiums. Many of these approaches can be implemented in conjunction with one another. Additionally, implementing recommendations or measures that provide benefits across multiple systems is an excellent method of amplifying constrained financial budgets. Considering these additional benefits when implementing potential actions or projects provides another method for prioritizing investment in resiliency.

The following project examples, sourced from FEMA's case study library, illustrate how resiliency projects can impact multiple systems to provide uplift beyond flood mitigation and provide some ideas for entities to help shape future projects.

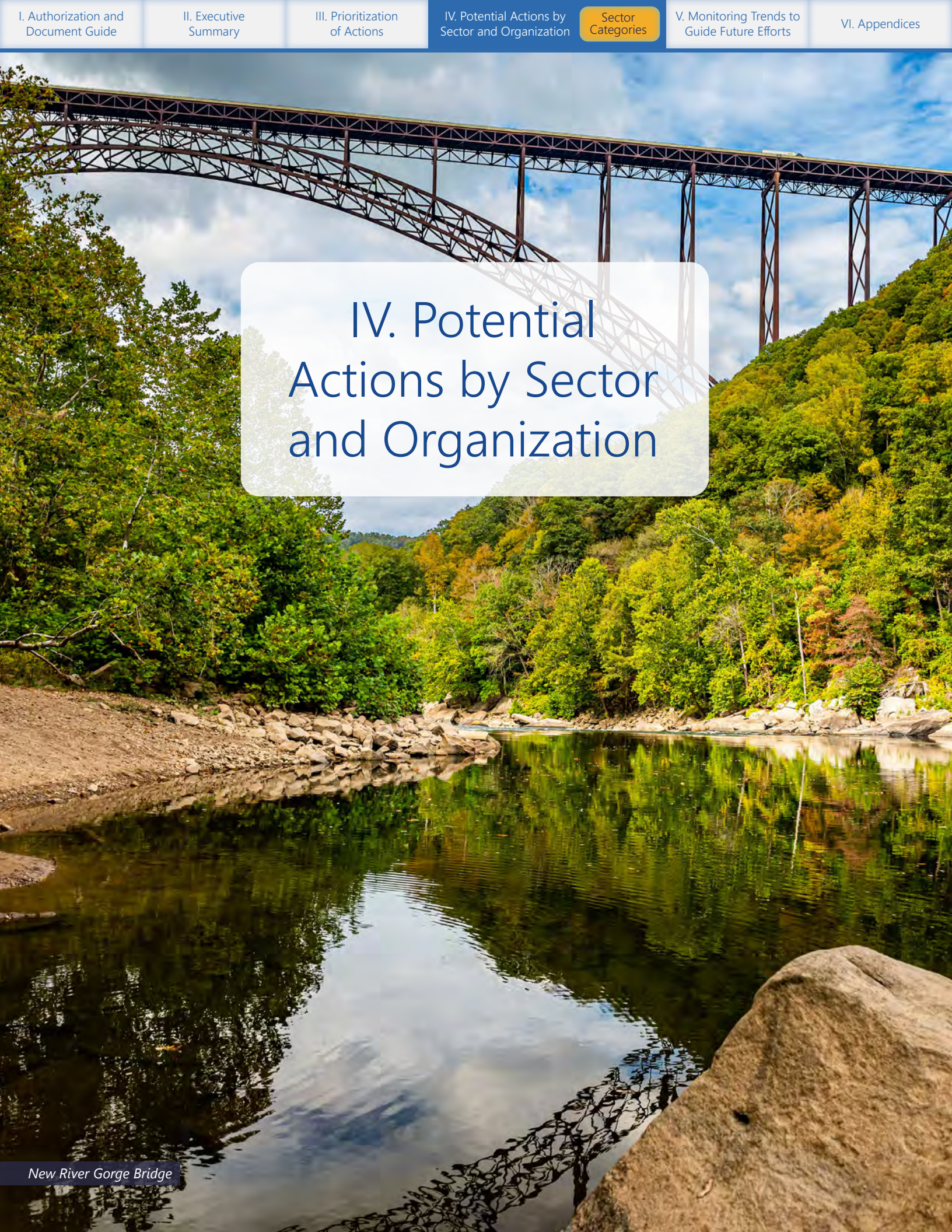
[!\[\]\(42e6e53dd8602edc07c21cbed60a537f_img.jpg\) **Georgia: City of Tennille Drainage Project**](#)
(FEMA, n.d.)

[!\[\]\(e3ed6d26a667a06bd63c73c64e5a5c61_img.jpg\) **West Virginia: West Virginia Flood Tool**](#)
(FEMA, 2021)

[!\[\]\(e714407f005ef639683f169712230fc0_img.jpg\) **Hampshire County, West Virginia: Unger Acquisition**](#)
(FEMA, n.d.)

[!\[\]\(ae5b1580633f7647fa4b992abcd640ba_img.jpg\) **Berkley County, West Virginia: Sportsman's Paradise**](#)
(FEMA, n.d.)

[!\[\]\(cf8bc438bd46d9bf525c4e2ae3e5b47b_img.jpg\) **Wyoming County, West Virginia: Brenton, Wyoming County Pre-Disaster Mitigation**](#)
(FEMA, n.d.)



IV. Potential Actions by Sector and Organization

IV. Potential Actions by Sector and Organization

The goals, objectives, and potential actions generated for the 2004 Flood Protection Plan provide a starting point and the framework upon which this Flood Resiliency Plan has been built. Those original potential actions were grouped by issue. Although that format is informative, the quantity of material an individual must navigate to determine which potential actions are pertinent to their organization is overwhelming. In an effort to improve the ease of use and facilitate the adoption of this Flood Resiliency Plan, those potential actions have been categorized within **ten organizational sectors**. Future updates to the Flood Resiliency Plan will add and remove potential actions and organizations as necessary to remain current. Pertinent organizations which were not addressed by specific potential actions have been labeled as “reserved” for future iterations of this plan.

To navigate this section of the plan, first select the appropriate sector. Organizations within each sector are listed alphabetically. Applicable potential actions are listed for each organization. Please note that some of these potential actions have been edited to adjust for changes throughout the state since the 2004 Flood Protection Plan was released. Access to that document is provided [here](#) for cross reference purposes.

Sector 1: Federal Government

-  Federal Emergency Management Agency (FEMA)
-  National Weather Service (NWS)
-  National Resource Conservation Service (NRCS)
-  U.S. Army Corps of Engineers (USACE)
-  U.S. Department of Housing and Urban Development (HUD)
-  U.S. Fish and Wildlife Service (USFWS)
-  U.S. Forest Service (USFS)
-  U.S. Geological Survey (USGS)
-  U.S. Department of Health and Human Services (HHS)
-  U.S. Department of Agriculture (USDA)
-  U.S. Economic Development Administration (EDA)
-  U.S. Federal Highway Administration (FHWA)
-  U.S. Environmental Protection Agency (EPA)
-  U.S. National Park Service (NPS)
-  U.S. Small Business Administration (SBA)
-  Appalachian Regional Commission (ARC)

Sector 2: State Government

-  Unassigned
-  Policy Makers
-  West Virginia National Guard (WVNG)
-  State Resiliency Office (WVSRO)
-  West Virginia Conservation Agency (WVCA)
-  West Virginia Department of Homeland Security (WVDHS)
-  West Virginia Emergency Management Division (WVEMD)
-  West Virginia Department of Environmental Protection (WVDEP)
-  West Virginia Division of Natural Resources (WVDNR)
-  West Virginia Department of Economic Development (WVDED)
-  West Virginia Department of Transportation (WVDOT)
-  West Virginia Division of Forestry (WVDOF)
-  West Virginia Department of Agriculture (WVDA)
-  Public Service Commission of West Virginia (WVPSC)
-  West Virginia Department of Health (WVDH)
-  West Virginia Department of Human Services (WVDoHS)
-  West Virginia Division of Labor (WVDL)
-  West Virginia Department of Education (WVDE)
-  West Virginia State Historic Preservation Office (WVSHPO)
-  West Virginia Offices of the Insurance Commissioner (WVOIC)
-  West Virginia Economic Development Authority
-  West Virginia State Police
-  West Virginia Fire Marshal
-  West Virginia Fusion Center
-  Ready.WV.Gov
-  West Virginia Department of Tourism
-  Workforce WV
-  Public Service Commission of West Virginia

🔗 Sector 3: Regional Government

🔗 West Virginia Regional Planning and Development Councils

🔗 West Virginia Conservation Districts

🔗 Sector 4: County Government

🔗 County Commissioners Association of West Virginia (CCAWV)

🔗 County Emergency Managers

🔗 County Floodplain Managers

🔗 County Boards of Education

🔗 Sector 5: City Government

🔗 City Government

🔗 City Councils

🔗 Municipal Floodplain Managers

🔗 Solid Waste Authorities

🔗 Sector 6: Non-Governmental Organizations

🔗 West Virginia Voluntary Organizations Active in Disasters (WV VOAD)

🔗 West Virginia Community Action Partnership

🔗 American Red Cross Central Appalachia Region

🔗 Salvation Army

🔗 Faith Based Organizations

🔗 Sector 7: Industries and Utilities

🔗 Power

🔗 Water and Sewer

🔗 Natural Gas

🔗 Liquid Propane and Fuel Oil

🔗 Communications

🔗 Mines and Quarries

🔗 Oil and Gas

🔗 Sector 8: Businesses, and Associations

- 🔗 West Virginia Association of Realtors (WVAR)
- 🔗 West Virginia Association of Insurance Companies (WVAIC)
- 🔗 West Virginia Municipal League (WVML)
- 🔗 West Virginia Floodplain Management Association (WVFMA)
- 🔗 West Virginia Emergency Management Council (WVEMC)
- 🔗 Contractors Association of West Virginia (CAWV)

🔗 Sector 9: Academia

- 🔗 Academia- General
- 🔗 West Virginia University GIS Technical Center
- 🔗 West Virginia Brownfields Center a WVU and Marshall University
- 🔗 Marshall University Appalachian Resiliency Center

🔗 Sector 10: Residents and/or Landowners

West Virginia Railroad Bridge

Completed Actions

The following actions have been completed in the intervening period between the submission of the 2024 WVFRP and the development of the 2026 WVFRP:

- Communications with rain gages have been established via the cellular telephone network to eliminate the dependence upon landlines for communication.
- The West Virginia Flood Resiliency Framework, including the WV Hazard Library, suite of WV Risk Explorer Tools, and training resources has been launched.

Sector 1: Federal Government

Federal Emergency Management Agency (FEMA)

- FEMA and WVEMD could meet FEMA's stated goal of conducting a Community Assistance Visit in every community once every 5 years to ensure that the floodplain ordinances are being properly implemented and enforced. This would require them to conduct approximately 72 Community Assistance Visits each year in West Virginia.
- Prepare and distribute brochures on flood proofing methods, flood resistant construction techniques, and strategies for reducing flood-insurance premiums to all National Flood Insurance Program policyholders in WV.

National Weather Service (NWS)

- Encourage local communities to participate in the StormReady program conducted by the National Weather Service.
- Improve short-range and localized flood forecasting in Appalachian watersheds.
- Provide plain-language flood risk tools to counties and communities to support local decision-making. Include dynamic (analysis and forecast) and static flood inundation mapping capabilities for decision support services to partners.
- Expand partnerships with state emergency managers to ensure forecasts translate into early action.
- Work closely with the US Geological Survey (USGS) and state agencies to identify locations for future stream gages and/or rain gages based on existing network density, flood impacts, and economic vulnerability.
- Establish flood levels/categories for stream gages where flood impacts exist. Work closely with WV Emergency Management Division (WVEMD) and local officials to identify flood impacts at or near gage locations.

Natural Resources Conservation Service (NRCS)

- Review existing BMPs in partnership with the WV Department of Agriculture, and the WV Conservation Agency and expand the number of agricultural facilities adhering to them.
- Through a collaborative effort, the USACE and NRCS work jointly with the WVCA and other applicable agencies to assess the State's major watersheds. The purpose of this assessment would be to determine whether there are any opportunities to construct additional upstream flood storage/retention facilities in the watersheds that would reduce downstream flood damages, potentially provide a reliable source of potable water for communities within the region and provide improvements in downstream water quality and flow. Several of the watersheds shown on the statewide watershed map have existing storage facilities operating for flood control, low-flow augmentation, and water supply. Previous studies conducted for the watersheds by various Federal and State agencies would form the basis for these studies.

This assessment could be funded in part through the USACE Section 22 Planning Assistance to States program for State/regional flood protection studies. Full consideration of the anticipated environmental effects of these potential storage facilities would be coordinated with the WVDNR, WVDEP and USFWS during the assessment. Those potential storage projects generating substantial flood protection benefits would be proposed for more detailed study through existing or new Congressional authorities. More detailed feasibility evaluations would be initiated only after firm commitments from eligible and financially capable non-Federal sponsors.

- Through a collaborative effort of the USACE and NRCS work jointly with WVCA and other applicable agencies to conduct watershed specific assessments that determine whether existing municipalities and major unincorporated commercial/industrial centers within the State need to be protected in place (floodwalls, levees, channel modifications, relocations) to preserve the commercial, service and employment base that now supports the surrounding county population. These protected centers also can serve as relocation sites for commercial and residential development acquired from the floodway (see item 3 below). Existing data from previous protection studies for these communities can form the basis for this assessment. The recommendations of these watershed assessments would form the basis for funding requests to pursue specific protection projects at critical municipal centers.

The watershed assessments may be conducted through programs such as the Section 22 PAS and PL 83-566 Watershed Protection and Flood Prevention Act. Full consideration of the environmental effects of these potential structures would be coordinated with the WVDNR, WVDEP and USFWS during the assessment.

- Update existing damage assessment data for 11-digit Hydrologic Unit Catalog (HUC) code watersheds for use as a planning tool. The U. S. Army Corps of Engineers and the Natural Resources Conservation Service could collaborate to develop flood damage data along all rivers within the State. Individually authorized protection projects will still have to develop damage estimates for their own cost-benefit analyses.
- Provide program funding and technical assistance to West Virginia watershed local sponsors for practices to address watershed impairments resulting from qualifying extreme weather events through the Emergency Watershed Protection Program (EWP).

- Provide program funding and technical assistance to address long-term watershed resource concerns through the Watershed Planning and Operations Program (PL534 and PL566).
- Provide program funding and technical assistance to address aging dams originally built by NRCS through the Rehabilitation Program.

U.S. Army Corps of Engineers (USACE)

- The appropriate Corps of Engineer District offices and State offices involved in the issuance of regulatory permits in West Virginia waters develop and deploy a public information and awareness program for local officials and private landowners.
- Regulatory permit requests for dredging operations in the State as a means of reducing flood damages could be approved only where documentation demonstrates that flooding will be mitigated, environmental impacts are not excessive, and where annual maintenance is assured through executed agreements. This could not hinder permitted channel modifications that are designed and maintained to reduce flood elevations of high frequency floods (low level), stream restoration, or restoration of aquatic environments. Nor could this hinder efforts by any Federal or State agency to address major flood events through an authorized and designed channel modification or a snagging and clearing operation where that activity is proven through engineering documentation to be an effective and cost efficient method for reducing flood heights and where annual maintenance is assured through local agreements.
- Through a collaborative effort, the USACE and NRCS work jointly with the WVCA and other applicable agencies to assess the State's major watersheds. The purpose of this assessment would be to determine whether there are any opportunities to construct additional upstream flood storage/retention facilities in the watersheds that would reduce downstream flood damages, potentially provide a reliable source of potable water for communities within the region and provide improvements in downstream water quality and flow. Several of the watersheds shown on the statewide watershed map (see Figure 1-5) have existing storage facilities (see Appendix L) operating for flood control, low-flow augmentation, and water supply. Previous studies conducted for the watersheds by various Federal and State agencies would form the basis for these studies.

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Potomac River in Harper's Ferry

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- Develop and deploy a public information and awareness program for local officials and private landowners through the Silver Jackets program, in coordination with offices and State offices involved in the issuance of regulatory permits in West Virginia waters.

U.S. Department of Housing and Urban Development (HUD)

- Direct Community Development Block Grant (CDBG) funds to support voluntary buyouts, elevation, and infrastructure protection.
- Identify where HUD housing is located or planned to prioritize investments in new housing outside of repeatedly flooded areas to encourage smart federal housing and infrastructure investments that reduce repeat disaster loss.
- Align Housing Development and Flood Development to provide recovery funding, including low to no-interest housing loans.

U.S. Fish & Wildlife Service (USFWS)

- Through a collaborative effort, the USACE and NRCS work jointly with the WVCA and other applicable agencies to assess the State's major watersheds. The purpose of this assessment would be to determine whether there are any opportunities to construct additional upstream flood storage/retention facilities in the watersheds that would reduce downstream flood damages, potentially provide a reliable source of potable water for communities within the region and provide improvements in downstream water quality and flow. Several of the watersheds shown on the statewide watershed map (see Figure 1-5) have existing storage facilities (see Appendix L) operating for flood control, low-flow augmentation, and water supply. Previous studies conducted for the watersheds by various Federal and State agencies would form the basis for these studies.

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The watershed assessments may be conducted through programs such as the Section 22 PAS and PL 83-566 Watershed Protection and Flood Prevention Act. Full consideration of the environmental effects of these potential structures would be coordinated with the WVDNR, WVDEP and USFWS during the assessment.

U.S. Forest Service (USFS)

- Continue the development of new regional hydrological models specifically for forested areas by the USFS.

U.S. Geological Survey (USGS)

- Develop flood inundation map libraries showing the extent of flooding at different river stages to support emergency responders rapid response to homes, roads and properties which will be affected by floods.
- Update floodplain, landslide, and streamflow data in high-risk West Virginia watersheds.
- Provide non-regulatory hazard assessments that inform state and local investment decisions.
- Continue to deploy crews to measure high water marks to define peak flows to support improvements to future flood forecasts.
- Deploy Rapid Deployment Gages (RDGs) prior to advancing storms to collect data and support early hazard warning systems to potentially affected areas.
- Continue providing data for the West Virginia Flood Tool, including the USGS National Elevation Datasets, to support the identification of floodplains, high-risk areas and potential property damage.
- Provide data requirements for the creation of inundation map libraries showing the extent of flooding at different river stages to support emergency rapid responders to determine which homes, roads and properties will be affected by floods, in collaboration with USACE.
- Improve the maintenance of historical data by providing funding for archiving of data from rain and stream gauges on a statewide level.
- Assist in research about the effectiveness of watershed and stormwater management, and nature based solutions, in mitigating flood risk.
- Provide data required to advance understanding flood hazards in West Virginia's karst (limestone) regions, where sinkholes and underground streams complicate flood mapping.
- Update the regional flow equations and compute flood frequency statistics statewide approximately every 10 years.
- Provide cooperative matching funds programs for rural disadvantaged communities via congressionally-directed funding.
- Collaborate with state agencies and the National Weather Service to develop and maintain flood warning systems (such as IFLOWS) and associated stream gage monitoring networks.
- Support infrastructure planning with maps incorporating risk information to help decision-makers to prioritize investments that prevent avoidable risks.

U.S. Department of Health and Human Services (HHS) Substance Abuse and Mental Health Administration (SAMHSA)

- Prepare for post-flood mental health and substance abuse use impacts to avoid strain on local services.
- Support community-based response capacity for rapid post-disaster behavioral-health readiness.
- Coordinate with emergency response agencies to ensure continuity of care.

U.S. Department of Agriculture (USDA)

- Provide grant funding and technical assistance to West Virginia farmers in their preparations for and response to extreme weather events, such as through the Emergency Commodity Assistance Program, Emergency Livestock Relief Program, Supplemental Disaster Relief Program and General Block Grant Authority.
- Provide technical assistance to West Virginia farmers in applying for and securing crop insurance coverage, and access to the Noninsured Crop Disaster Assistance program.

U.S. Economic Development Administration (EDA)

- Provide thought leadership and technical assistance to economic development organizations focused on steady-state resiliency initiatives. This may include:
 - Engaging in comprehensive planning efforts that involve extensive involvement from the community to define and implement a collective vision for resiliency that includes the integration and/or alignment of other planning efforts (e.g., hazard mitigation plans) and funding sources;
 - Undertaking efforts to broaden the industrial base, such as by targeting the development of emerging clusters or industries that
 - build on the region's unique assets and competitive strengths; and
 - provide stability during downturns that disproportionately impact any single cluster or industry;
 - Adapting business retention and expansion programs (e.g., economic gardening or other enterprise supports) to assist firms with economic recovery post-disruption;
 - Building a resilient workforce that can better shift between jobs or industries when their core employment is threatened through job-driven skills strategies and support organizations;
 - Maintaining geographic information systems (GIS) that link with municipal business licenses, tax information, and other business establishment databases to track local and regional "churn" and available development sites. GIS can also be integrated with hazard information to make rapid post-incident impact assessments;
 - Ensuring redundancy in telecommunications and broadband networks to protect commerce and public safety in the event of natural or manmade disasters;
 - Promoting business continuity and preparedness (i.e., ensuring businesses understand their vulnerabilities—including supply chains—in the face of disruptions and are prepared to take actions to resume operations after an event); and
 - Employing safe development practices in business districts and surrounding communities. Strategies may include locating structures outside of floodplains, preserving natural lands that act as buffers from storms, and protecting downtowns and other existing development from the impacts of extreme weather.
- Provide technical assistance to economic development organizations in West Virginia focused on responsive resiliency efforts, including activities related to:
 - Conducting pre-disaster recovery planning to define key stakeholders, roles, responsibilities, and key actions;
 - Establishing a process for regular communication, monitoring, and updating of business community needs and issues (which can then be used after an incident);
 - Establishing/using a capability to rapidly contact key local, regional, state, and federal officials to communicate business sector needs and coordinate impact assessment efforts; and
 - Establishing/using coordination mechanisms and leadership succession plans for short, intermediate, and long-term recovery needs.

- Provide guidance to West Virginia communities in strategies for developing Comprehensive Economic Development Strategies (CEDS) that integrate a range of economic resiliency measures.
- Continue to provide financial support to West Virginia communities to support recovery via Disaster Supplemental Funding grants.
- Regularly update the EDA's Economic Recovery and Resilience Guides and Tools webpage with the latest resources available to communities preparing for and recovering from disasters.

U.S. Federal Highway Administration (FHWA)

- Support cost-effective upgrades to flood-prone highways, bridges, and culverts using existing federal-aid highway programs.
- Promote resiliency-focused maintenance (e.g., improved drainage, slope stabilization) of West Virginia roadways.
- Provide guidance to communities in West Virginia about how to access funding through the FHWA-Emergency Relief program to rebuild infrastructure to withstand future extreme events and ensure public safety.
- Encourage the use of standardized design approaches to reduce delays and limit project risks.

U.S. Environmental Protection Agency (EPA)

- Focus Clean Water State Revolving Fund (SRF) investments on flood-resiliency wastewater and drinking water systems.
- Support voluntary, incentive-based mitigation measures (e.g., floodproofing critical facilities).
- Coordinate with states to streamline permitting for resiliency measures.

U.S. Environmental Protection Agency (EPA) - Brownfields Program

- Prioritize flood-prone brownfields for cleanup and redevelopment that restores economic value while reducing flood exposure.
- Encourage reuse of brownfields as low-risk uses (storage, green space, small business hubs) rather than high-exposure housing.

U.S. National Park Services (NPS)

- Restore natural floodplains in park lands to reduce downstream impacts to life and property.
- Share land management best practices for flood resiliency with state and local partners.

U.S. Small Business Administration (SBA)

- Expand outreach on pre-disaster mitigation financing for small businesses in flood-prone areas.
- Incentivize protective retrofits (elevated utilities, floodproofing) that reduce reliance on disaster loans.
- Support business continuity planning as a resiliency measure.

Appalachian Regional Commission (ARC)

- Integrate flood resiliency into workforce development, broadband, and infrastructure projects.
- Fund planning that ensures investments are built to be resilient to flood impacts.
- Support locally-driven solutions that align flood mitigation with economic revitalization.



Kanawha Falls

Sector 2: State Government

Please note that many of these potential actions were developed when the Flood Protection Plan was created in 2004 and were affirmed by reviewing stakeholders as relevant when that plan was reviewed in 2026. They are presented as a 'menu' of options for consideration and are in no way the only actions an organization could consider. Adoption of these actions is entirely voluntary.

Unassigned

- Guidelines for the disposal of removed stream obstructions and debris be developed through a joint effort of applicable Federal and State agencies.
- A consistent policy be established for addressing each of the following issues:
 - Areas outside the State's boundaries that affect flooding events within West Virginia,
 - Islands with residences or industry located entirely within the floodplain.
 - County seats located within the floodway,
 - Recreational areas in floodplain, ponds and dams removed or altered and the subsequent planned or inadvertent reduction of flood protection.
- Improve the flood warning system in incremental steps over a 5-year period by:
 - Adding ALERT and GOES transmission equipment at stream gauges.
 - Install additional rain gauges.
 - Install additional stream gauges with ALERT and GOES communications.
 - Install additional radio repeaters for the ALERT communication system.
- Identify a State agency to inspect stormwater facilities and serve as a backup for local inspection and enforcement of regulations on design, installation, operation, and maintenance of these facilities. In the event no suitable State agency is found to provide the technical assistance and enforcement support needed, it is recommended that the regional watershed flood protection authorities based on the eight digit watershed basins be given this responsibility.
- A voluntary program of permanent floodway acquisition could be established to address the inventory of existing structures in the regulatory floodway. These structures and their associated facilities are subject to frequent and severe flooding and impact damage by floating debris. During flood events, these structures can become floatable debris blocking stream crossings and battering other downstream floodplain development. These structures can also serve as point sources of stream pollution. The floodway acquisition program would be initiated in the non-municipal areas to avoid interference with possible structural protection of incorporated cities, towns, villages and communities and commercial centers discussed in item 2 above. The program would be voluntary in nature and relocation benefits and services would be provided to assist families to secure flood-safe replacement housing. Feasible commercial and industrial relocations would be assisted through Federal and State economic development grant and loan programs. Federal, State and local government offices and facilities would be relocated to flood-safe sites.

The proposed floodway acquisition program could be best administered through FEMA (Pre-Disaster Mitigation Program) in cooperation with WVEMD. The WVHDF and WVDO could support this effort through identification and funding of replacement housing and commercial relocation sites. The success of the floodway acquisition program would be partially contingent upon the ability to secure decent, safe, and sanitary replacement housing outside of the floodplain. Equally important would be a site development process for commercial relocations from the floodplain.

Policy Makers

- The appropriate Corps of Engineer District offices and State offices involved in the issuance of regulatory permits in West Virginia waters develop and deploy a public information and awareness program for local officials and private landowners.
- A consistent policy could be established to address the following issues:
 - Areas outside the State's boundaries that affect flooding events within West Virginia,
 - Islands with residences or industry located entirely within the floodplain.
 - County seats located within the floodway,
 - Recreational areas in floodplain, ponds and dams removed or altered and the subsequent planned or inadvertent reduction of flood protection.
- The flood warning system could be improved in incremental steps over a 5-year period by:
 - Adding ALERT and GOES transmission equipment at stream gages.
 - Install additional rain gages.
 - Install additional stream gages with ALERT and GOES communications.
 - Install additional radio repeaters for the ALERT communication system.
- Sufficient funding and staffing should be maintained for the West Virginia Division of Emergency Management to ensure adequate operations and maintenance of the expanded IFLOWS gauges and system.
- The process for dissemination of flood warnings and other disaster warnings could be improved by mandating the rebroadcast of warnings on all fire, police, and emergency medical-service frequencies.
- Individuals and businesses with radio scanners will receive these warnings in a more timely and reliable fashion.
- Local communities could be encouraged to participate in the StormReady program conducted by the National Weather Service. A chart could be developed that identifies specific Federal and State offices where flooding information or assistance may be obtained. This chart should be available in printed and web-based versions.
- The State could create a technical assistance program that includes funding and resources for a State agency to provide assistance in the design, installation, and maintenance of public and private stream crossings.
- Historical data could be better maintained by providing funding for archiving of data from rain and stream gages on a statewide level.
- A single agency could be designated within the State government as a point of contact or clearinghouse where a flood data repository could be established. This agency could be mandated to manage all flood data including an inventory of at-risk structures, repetitive loss data, flood control project data, and other databases. This data should include information on losses sustained by residences, businesses, farms/agricultural losses, roadways, railroads, and other types of losses.
- Flood and flood damage data could be developed with latitude, longitude, and elevation data so that both counties and watersheds can be used as the geographic basis for planning.

- Existing damage assessment data could be updated for 12-digit Hydrologic Unit Catalog (HUC) code watersheds for use as a planning tool. The U. S. Army Corps of Engineers and the Natural Resources Conservation Service should collaborate to develop flood damage data along all rivers within the State.
- Individually authorized protection projects will still have to develop damage estimates for their own cost-benefit analyses. Copies of this project specific data could be provided to the clearinghouse discussed above.
- State guidelines for emergency removal of stream debris could be developed that would guide emergency response agencies and contractors during these removal operations. Such guidelines could be developed through a collaborative effort of applicable agencies. These guidelines would ensure that in-stream debris removal following a flood event would not result in excessive, long-term environmental damage to the stream or river affected. The guidelines would increase awareness of the need for permits for in-stream work and ensure that debris disposal does not further inhibit floodwaters. Included within these guidelines would be information on the location of stable streams and high quality streams (when available) and a series of best management practices to guide response agencies and their contractors.
- The State could provide additional funding for stream restoration programs to match Federal programs and regulations for preservation of stable streams could be developed through a collaborative effort of the WVDEP, WVCA and WVDNR.
- Guidelines for the disposal of removed stream obstructions and debris could be developed through a joint effort of Federal and State agencies.
- A State agency could inspect stormwater facilities and serve as a backup for local inspection and enforcement of regulations on design, installation, operation, and maintenance of these facilities. In the event no suitable State agency is found to provide the technical assistance and enforcement support needed, it is recommended that the regional watershed flood protection authorities based on the eight digit watershed basins be given this responsibility.
- State, county, and municipal officials could be encouraged to get involved in floodplain management, community planning, building inspection, emergency services, or enforcement of land use planning and to take the Federal Emergency Management Agency Independent Study Courses related to flooding, flood mitigation, and floodplain management.
- The State could reimburse qualifying jurisdictions for a portion of the salary of trained and nationally certified floodplain managers and certified building inspectors.
- Participation in floodplain management training activities should be encouraged by providing certification or continuing-education credits for courses and workshops. Attendees could include: (a) State, county, and municipal government, (b) insurance companies, (c) financial institutions, (d) real estate companies, (e) utility companies, (f) watershed associations, (g) professional land surveyors, (h) professional engineers, (i) floodplain managers, (j) public officials, (k) elected officials, (l) building inspectors, (m) community planners, and (n) other interested parties.
- Educational outlets in West Virginia (Vo-tech, Community Colleges, publicly owned colleges, and universities) could be encouraged to develop classes and curriculums that address floodplain and flood issues. Floodplain management and flooding should be addressed during appropriate sessions of the current curriculum.

- Brochures could be prepared and distributed on flood proofing methods, flood resistant construction techniques, and strategies for reducing flood-insurance premiums to all National Flood Insurance Program policyholders in WV.
- A brochure on the values and concepts of protecting stable streams could be prepared and distributed.
- A voluntary program of permanent floodway acquisition could be established to address the inventory of existing structures in the regulatory floodway. These structures and their associated facilities are subject to frequent and severe flooding and impact damage by floating debris. During flood events, these structures can become floatable debris blocking stream crossings and battering other downstream floodplain development. These structures can also serve as point sources of stream pollution. The floodway acquisition program would be initiated in the non-municipal areas to avoid interference with possible structural protection of incorporated cities, towns, villages and communities and commercial centers discussed above. The program would be voluntary in nature and relocation benefits and services would be provided to assist families to secure flood-safe replacement housing. Feasible commercial and industrial relocations would be assisted through Federal and State economic development grant and loan programs. Federal, State and local government offices and facilities would be relocated to flood-safe sites.
- The proposed floodway acquisition program could be best administered through FEMA (Pre-Disaster Mitigation Program) in cooperation with WVEMD. The WVHDF and WVDO could support this effort through identification and funding of replacement housing and commercial relocation sites. The success of the floodway acquisition program would be partially contingent upon the ability to secure decent, safe, and sanitary replacement housing outside of the floodplain. Equally important would be a site development process for commercial relocations from the floodplain.
- Funds could be allocated to the Flood Resiliency Trust Fund This fund could provide: non-federal cost share to match federal funds for flood damage reduction projects (structural or non-structural), standalone funds for State initiated flood damage reduction projects, and grants to improve local floodplain management.
- The State could provide monetary incentives to encourage communities to participate in FEMA's Community Rating System (CRS) program. The State could further promote the CRS by coordinating activities too extensive for every community to do on their own.
- All participating communities could be encouraged to adopt and enforce improved floodplain ordinances or to enter into enforcement compacts with adjacent local governments. Municipalities could also be required to adopt surrounding floodplain maps at some stage in the annexation process.
- All new floodplain ordinances could prohibit storage of floatable materials in the floodway and establish a program to identify and either remove, stabilize, or anchor floatable structures and materials in the floodplain.
- All propane and fuel-oil dealers could be required to ensure that all LPG and propane tanks over 30 pounds in size and all fuel-oil tanks located within the regulated floodplain or within 50 feet of a perennial stream to be anchored to a fixed structure to resist expected flood waters and impact from debris.

- All participating communities could be required to have a certified floodplain manager (CFM) on staff or on retainer by 2030. Where fiscal restraints limit a county or municipal government from complying with this requirement, counties and municipalities could enter into cooperative agreements that allow sharing the costs for a regional floodplain manager.
- The State could encourage participation and membership in the Association of State Floodplain Managers.
- Real Estate Agents could be required to determine location of structures by latitude and longitude, city-style street address, or Tax Parcel number and whether the structure is within the regulated floodplain before the structure is listed for sale. The agent must notify potential purchasers of the location and whether the structure is within the regulated floodplain prior to execution of a purchase agreement.
- Construction, installation, or renovation of a structure within the floodplain without a permit could be made punishable by a fine of not less than \$5,000 and removal of the structure if any deficiencies are not corrected. A copy of this permit must be provided to the utility company before the utility is connected. All utility companies must receive and keep a copy of the approved permit prior to connecting the utility.
- Should no permit be obtained prior to construction, the builder, homeowner, utility company, and property owner could be held liable. Where local communities have adopted combined building code and floodplain ordinance enforcement and permitting, the local code enforcement office may provide such certification if he or she holds the CFM designation and appropriate CABO and/or ICBO certification through the local permitting processes.
- Builders, homeowners, mobile-home installers, or property owners provide a copy of a certification signed and sealed by a WV Registered Professional Engineer, confirming that the manufactured home is properly installed (including anchoring) to the utility company before the utility is connected. All utility companies could be required to receive and keep a copy of this certification. If a certification is unavailable, the manufactured home must be inspected, and a certificate signed and sealed by a WV Registered Professional Engineer. This document could confirm that the manufactured home has been properly installed before any utility can be connected.
- All surveyors and professional engineers could be required to include the floodplain boundaries, when applicable, as delineated on the FIRM on registered plat maps with the latitude, longitude, and elevation of a reference point.
- Development within the floodplain could be discouraged through relocation assistance to property owners in the floodway, floodplain ordinances to forbid future development in floodways, legislation to prohibit installation of new infrastructure in floodways unless there is no other alternative.
- Local governments and public institutions could be discouraged from constructing new buildings or entering into new leases in buildings located in the regulated floodplain.
- If a regional or State agency is providing floodplain management assistance to a local government, that local government could be required to consult with the regional or State agency providing assistance on all proposed variances from the floodplain ordinances.
- All new public structures or significant improvements to existing public structures within the regulated floodplain could be required to be constructed in a flood-resistant manner.

- A program to relocate all critical facilities could be created, such as government administration buildings, hospitals, jails, and water and sewer treatment plants out of the floodway.
- All State agencies could be required to prepare a 10-year plan to eliminate, relocate or renovate structures and facilities within the regulated floodplain that are not constructed in a flood resistant manner.
- Section 7-1-3 of the West Virginia State Code could be amended as follows:
 - Do not restrict local governments to the minimum floodplain standards established in the NFIP.
 - Require all new development to obtain a permit at least to the floodplain determination stage. This permit process would require the developer to obtain documents delineating the site location relative to the floodplain.
 - Mandate that communities must have language in their floodplain management ordinance that requires a buffer zone equal to twice the width of the stream from the top of the bank of all perennial streams without a delineated floodway. The WV Department of Environmental Protection, Division of Water and Waste Management Dam Safety Program could be provided additional staff, resources and funding from the general fund specifically targeted to provide improved capability for Monitoring and Emergency Action Plans (EAP) technical review, approval, and exercise. The dam related EAPs could be improved through public education and enhanced capability to review new and updated plans in coordination with local emergency services offices. Tabletop and field exercises of existing EAPs could be performed.
- The Department of Transportation could design and install signage similar to the "Bridge Freezes Before Road" sign to identify State highways that are frequently blocked by high water.
- Legislation could be enacted that will empower local floodplain management officials to prohibit placement or storage of floatable material within floodways that does not include suitable anchoring. Administration and enforcement of these regulations could be through county and municipal floodplain managers using the enforcement powers contained in the floodplain management ordinances.
- The WV Division of Highways or another state agency could be provided funds from the general fund for a study of abandoned stream crossings (public or private road or railroad bridges or culverts) to ascertain ownership of said facilities and provide recommendations for condemnation and removal if deemed necessary to reduce flood damages.
- Regulations and/or best management practices including minimum criteria for construction and closure, or abandonment of access roads could be developed and applied consistently to all industries throughout West Virginia.
- The WV Emergency Management Division could hire staff to support local floodplain managers statewide. The 55 counties and 248 municipalities may require additional human resources and support could be provided. This increase in staff could include a staff member to handle training and education of State agencies and regional floodplain technical specialists, a staff member to handle disbursement of grant funds and to coordinate regional meetings of floodplain managers that will focus on training and peer support for county and local floodplain managers, and staff members to provide technical support to local government units and State agency projects throughout the State.
- The WV Public Land Corporation through legislative enactment and increased staffing could enforce current permitting requirements for in-stream construction or channel alteration.

- The WV Public Land Corporation could develop and enforce a legal contract requiring permit applicants to agree to maintain a specified minimum hydraulic carrying capacity of the structure being installed.
- The WV Division of Forestry could be provided the resources and authorization to employ additional employees including: Forest Hydrologist, Wildfire Specialists and Foresters to address timber management and field enforcement of BMP's.
- Additional resources in staff and funds could be provided to the WV DOF to address wildfires. Due to rugged terrain and limited access into some areas, wildfires are a serious threat to the forest resources. These forested lands absorb tremendous quantities of rainfall that would otherwise reach the State's streams and rivers. Forests devastated by wildfires do not have the capability to absorb rainfall and therefore increased runoff and erosion occurs
- Continue to provide adequate funds and staffing for the West Virginia Division of Emergency Management to ensure adequate operations and maintenance of the expanded IFLOWS gauges and system.
- Seek funding for stream restoration programs to match existing Federal programs and that regulations for preservation of stable streams be developed through a collaborative effort of the WVDEP, WVCA and WVDNR.

West Virginia National Guard (WVNG)

- Conduct a comprehensive climate-resiliency audit of all state readiness centers and armories to ensure that mission-essential functions, including emergency communications and equipment storage, remain fully operational during extreme (500-year) flooding events.
- Expand specialized joint training initiatives with local first responders and county emergency management agencies, specifically focusing on high-water rescue operations and tactical communication in "comms-dark" environments where traditional infrastructure has failed.
- Refine existing logistics annexes within the State Emergency Operations Plan (SEOP) to implement "trigger-based" prepositioning protocols, allowing the Guard to mobilize and stage life-safety assets based on predictive flood modeling prior to a formal disaster declaration.
- Integrate the State Resiliency Office (SRO) flood vulnerability data and scenarios into annual interagency training exercises (e.g., Vigilant Guard) to ensure state and local response frameworks are validated against the most current flood risk assessments.
- Utilize aviation assets to assist in baseline topographical mapping of high-risk floodplains, establishing protocols to seamlessly transition these assets for rapid post-event damage assessments.
- Assess the viability of utilizing existing readiness centers and armories located outside the 100-year floodplain as secure, pre-planned regional logistics hubs and distribution centers for community relief efforts.

State Resiliency Office (WVSRO)

- Develop a chart that identifies specific Federal and State offices where flooding information or assistance may be obtained. This chart could be available in printed and web-based versions.
- Create a technical assistance program that includes funding and resources for a State agency to provide assistance in the design, installation, and maintenance of public and private stream crossings.
- Continue to enhance and biennially update the Statewide Flood Resiliency Plan to incorporate forward-looking projections, updated flood risk maps, and crucial data on vulnerable populations.
- Continue to serve as the hub of the wheel to align state agencies, federal partners, and local governments around flood risk planning, response and recovery.
- Manage and distribute funds from the Flood Resiliency Trust Fund and the Disaster Recovery Trust Fund through the creation of grant and loan programs for local infrastructure projects, and to provide matching funds to communities applying for federal funds.
- Prioritize infrastructure improvement projects such as upgrades to undersized culverts and private bridges, home resiliency improvements, stormwater system enhancements, evacuation route improvements, and the implementation of nature-based solutions that mitigate flood risk.
- Provide education and training on strategies to enhance resiliency to community leaders and residents.
- Form a working group to develop an enhanced flood warning system, informed by the best available technology, data, and models and with improved communication ability among federal, state, and local emergency services and citizens to respond to flood warnings.
- Implement continuous public relations efforts to enhance the visibility of the WV Flood Resiliency Plan, including conducting enhanced education and outreach, as well as creating a social media component.

West Virginia Conservation Agency (WVCA)

- Review existing BMPs in collaboration with the WV Department of Agriculture, and the USDA – Natural Resources Conservation Service and expand the number of agricultural facilities adhering to them.
- Provide funding for stream restoration programs to match existing Federal programs and that regulations for preservation of stable streams be developed through a collaborative effort of the WVDEP, WVCA and WVDNR.
- Through a collaborative effort, the USACE and NRCS work jointly with the WVCA and other applicable agencies to assess the State's major watersheds. The purpose of this assessment would be to determine whether there are any opportunities to construct additional upstream flood storage/retention facilities in the watersheds that would reduce downstream flood damages, potentially provide a reliable source of potable water for communities within the region and provide improvements in downstream water quality and flow. Several of the watersheds shown on the statewide watershed map (see Figure 1-5) have existing storage facilities (see Appendix L) operating for flood control, low-flow augmentation, and water supply. Previous studies conducted for the watersheds by various Federal and State agencies would form the basis for these studies.

This assessment could be funded in part through the USACE Section 22 Planning Assistance to States program for State/regional flood protection studies. Full consideration of the anticipated environmental effects of these potential storage facilities would be coordinated with the WVDNR, WVDEP and USFWS during the assessment. Those potential storage projects generating substantial flood protection benefits would be proposed for more detailed study through existing or new Congressional authorities. More detailed feasibility evaluations would be initiated only after firm commitments from eligible and financially capable non-Federal sponsors.

- Through a collaborative effort of the USACE and NRCS work jointly with WVCA and other applicable agencies to conduct watershed specific assessments that determine whether existing municipalities and major unincorporated commercial/industrial centers within the State need to be protected in place (floodwalls, levees, channel modifications, relocations) to preserve the commercial, service and employment base that now supports the surrounding county population. These protected centers also can serve as relocation sites for commercial and residential development acquired from the floodway (see item 3 below). Existing data from previous protection studies for these communities can form the basis for this assessment. The recommendations of these watershed assessments would form the basis for funding requests to pursue specific protection projects at critical municipal centers.

The watershed assessments may be conducted through programs such as the Section 22 PAS and PL 83-566 Watershed Protection and Flood Prevention Act. Full consideration of the environmental effects of these potential structures would be coordinated with the WVDNR, WVDEP and USFWS during the assessment.

- Promote and implement green infrastructure (e.g., rain gardens, permeable pavement, and enhanced vegetation buffer strips) to slow water movement, increase absorption, and filtration to reduce runoff, such as through educational workshops.
- Provide advice and assistance for the clearing of debris from streams and improving drainage systems, prior to and post flooding events. This includes putting out contracts and performing construction oversight of debris removal and bank stabilization projects.
- Educate landowners and local governments about local floodplain ordinances and best management practices for land, water and flood control structures to support compliance and reduce future risks.
- Help to educate landowners and local governments to promote best management practices (BMPs) and conservation opportunities for land, water, natural resources, and flood control structures in their jurisdiction. This may include coordinating with the WV Department of Agriculture and the USDA- Natural Resources Conservation Science to review existing BMPs and expand the number of agricultural facilities adhering to them through the Agricultural Enhancement Program (AgEP) that WVCA has created.
- Develop guidelines for emergency removal of stream debris and sediment to guide emergency response agencies and contractors during these removal operations, through a collaborative effort with applicable agencies, including FEMA. These guidelines would ensure that in-stream debris removal following a flood event would not result in excessive, long-term environmental damage to the stream or river affected. The guidelines would increase awareness of the need for permits for in-stream work and ensure that debris and sediment disposal would not further inhibit floodwaters. Information would include the location of stable streams and high quality streams (when available) and a series of best management practices to guide response agencies and their contractors. This guidance would build upon the FEMA USACE Fact Sheet: Best Practices for Waterway Blockages.

West Virginia Department of Homeland Security (WVDHS)

- Select, provide training, and activate when needed work crews to support preventative maintenance to improve flow and decrease flood risks, such as clearing culverts, drainage ditches, and debris from streams and the immediate vicinity of culverts/bridges, and constructing or repairing floodwalls, levees and evacuation routes.
- Improve the dissemination of flood warnings and other disaster warnings by encouraging the rebroadcast of warnings on all fire, police, and emergency medical-service frequencies. Individuals and businesses with radio scanners will receive these warnings in a more timely and reliable fashion.

WV Emergency Management Division (WVEMD)

- Increase staff in West Virginia's Office of Emergency Services to support local floodplain managers statewide. Adequate support to the 55 counties and 248 municipalities requires additional human resources. This increase in staff would include a staff member to handle training and education of State agencies and regional floodplain technical specialists, a staff member to handle disbursement of grant funds and to coordinate regional meetings of floodplain managers that will focus on training and peer support for county and local floodplain managers, and staff members to provide technical support to local government units and State agency projects throughout the State.
- It is recommended that the WV Office of Emergency Services establish procedures for the review and updating of existing county emergency evacuation plans related to flooding.
- WVEMD could present at least one Federal Emergency Management Agency field course specifically addressing flooding each year in West Virginia.
- WVEMD could develop and present at least 1 state-specific workshop each year that is related to flooding in West Virginia. Topics could include:
 - Local floodplain ordinances
 - Relevant sections of the West Virginia State Code
 - Flood Insurance Rate Maps, Digital Flood Insurance Rate Maps, Q3, GIS data and other data sources used to update flood maps
 - Updating flood maps
 - Land-use management
 - Stormwater management
 - Flood damages
 - Floodplain management
 - Floodplain protection
 - Potential impact of flooding in their region
 - Factors contributing to flooding (floatable debris in the floodway, constricted floodways, undersized or poorly constructed stream crossings)
 - Perils of building in the floodplain
 - Flood proofing
 - Flood-resistant construction techniques
 - Reducing flood-insurance premiums
 - Concepts of stable streams.

- Benefit-cost analysis of flood damage reduction
 - Elevation certificates.
 - Dam Safety Monitoring and Emergency Action Plans
 - Natural Stream Restoration and the inter-relationship of stream morphology, land use, channel encroachment, dredging, stormwater/ erosion control, stable streams, and flooding.
- WVEMD could make training in maps and map reading available to all Federal, State, local and volunteer personnel involved in flooding in West Virginia on a regular basis.
 - A program to identify “gap” structures, (structures that affect the flow characteristics of a stream, such as bridges, retaining walls, culverts etc., constructed during the gap between the time the watershed was studied, and the Flood Insurance Rate Map (FIRM) was published) and report them to WVEMD so the appropriate watersheds can be moved to a higher priority for restudy.
 - FEMA and WVEMD could meet FEMA’s stated goal of conducting a Community Assistance Visit in every community once every 5 years to ensure that the floodplain ordinances are being properly implemented and enforced. This would require them to conduct approximately 72 Community Assistance Visits each year in West Virginia.
 - Sufficient funding and staffing could be maintained for the West Virginia Division of Emergency Management to ensure adequate operations and maintenance of the expanded IFLOWS gauges and system.
 - A voluntary program of permanent floodway acquisition could be established to address the inventory of existing structures in the regulatory floodway. These structures and their associated facilities are subject to frequent and severe flooding and impact damage by floating debris. During flood events, these structures can become floatable debris blocking stream crossings and battering other downstream floodplain development. These structures can also serve as point sources of stream pollution. The floodway acquisition program would be initiated in the non-municipal areas to avoid interference with possible structural protection of incorporated cities, towns, villages and communities and commercial centers discussed in item 2 above. The program would be voluntary in nature and relocation benefits and services would be provided to assist families to secure flood-safe replacement housing. Feasible commercial and industrial relocations would be assisted through Federal and State economic development grant and loan programs. Federal, State, and local government offices and facilities would be relocated to flood-safe sites.

The Section 202 Nonstructural Flood Damage Reduction program, being implemented in the Tug Fork Valley since 1985, has acquired several hundred floodway structures in West Virginia and Kentucky. This action has resulted in an overall reduction in flood damage and a reduction in the 100-year frequency flood profile in project areas. In conjunction with this program, three replacement housing sites were constructed to accommodate relocated families. In some cases, commercial structures were acquired in the floodway and relocated within communities protected by local protection projects (floodwalls). WVEMD projects administered through FEMA’s Hazard Mitigation Grant Program have also successfully acquired floodway structures throughout the State.

The proposed floodway acquisition program could be best administered through FEMA (Pre-Disaster Mitigation Program) in cooperation with WVEMD. The WVHDF and WVDO could support this effort through identification and funding of replacement housing and commercial relocation sites. The success

of the floodway acquisition program would be partially contingent upon the ability to secure decent, safe, and sanitary replacement housing outside of the floodplain. Equally important would be a site development process for commercial relocations from the floodplain.

- The NFIP coordinator could prepare and distribute brochures on flood proofing methods, flood resistant construction techniques, and strategies for reducing flood-insurance premiums to all National Flood Insurance Program policyholders in WV.
- The National Flood Insurance Program coordinator, in consultation with the Director of the Division of Emergency Management, and with the assistance of floodplain managers around the state, shall develop and publish a strategic plan to establish shared goals, define a path to meet those goals, and shall invite other governmental units to adopt these goals and objectives as per WV State Code 15-5-20b(d).

West Virginia Department of Environmental Protection (WVDEP)

- Develop location standards that prohibit locating floatable materials within the regulated floodplain at the following types of facilities: Solid Waste non-disposal facilities, Solid Waste disposal facilities, Hazardous Waste treatment, storage and disposal facilities, Natural Gas facilities, and Underground storage tank facilities.
- Any storm water detention facility discharging to a cold-water trout stream could be designed to detain water for no more than 12 hours. In addition, the pond could be designed so that it discharges from the bottom, cooler portion of the pond. Detention facilities discharging into warm water streams could be designed to detain stormwater for at least 24 hours.
- Through a collaborative effort, the USACE and NRCS work jointly with the WVCA and other applicable agencies to assess the State's major watersheds. The purpose of this assessment would be to determine whether there are any opportunities to construct additional upstream flood storage/retention facilities in the watersheds that would reduce downstream flood damages, potentially provide a reliable source of potable water for communities within the region and provide improvements in downstream water quality and flow. Several of the watersheds shown on the statewide watershed map (see Figure 1-5) have existing storage facilities (see Appendix L) operating for flood control, low-flow augmentation, and water supply. Previous studies conducted for the watersheds by various Federal and State agencies would form the basis for these studies.
 - This assessment could be funded in part through the USACE Section 22 Planning Assistance to States program for State/regional flood protection studies. Full consideration of the anticipated environmental effects of these potential storage facilities would be coordinated with the WVDNR, WVDEP and USFWS during the assessment. Those potential storage projects generating substantial flood protection benefits would be proposed for more detailed study through existing or new Congressional authorities. More detailed feasibility evaluations would be initiated only after firm commitments from eligible and financially capable non-Federal sponsors.
- Through a collaborative effort of the USACE and NRCS work jointly with WVCA and other applicable agencies to conduct watershed specific assessments that determine whether existing municipalities and major unincorporated commercial/industrial centers within the State need to be protected in place (floodwalls, levees, channel modifications, relocations) to preserve the commercial, service and employment base that now supports the surrounding county population. These protected centers also

can serve as relocation sites for commercial and residential development acquired from the floodway (see item 3 below). Existing data from previous protection studies for these communities can form the basis for this assessment. The recommendations of these watershed assessments would form the basis for funding requests to pursue specific protection projects at critical municipal centers.

- The watershed assessments may be conducted through programs such as the Section 22 PAS and PL 83-566 Watershed Protection and Flood Prevention Act. Full consideration of the environmental effects of these potential structures would be coordinated with the WVDNR, WVDEP and USFWS during the assessment.
- The State could provide funding for stream restoration programs to match existing Federal programs and that regulations for preservation of stable streams be developed through a collaborative effort of the WVDEP, WVCA and WVDNR.
- The WV Department of Environmental Protection, Division of Water and Waste Management Dam Safety Program could be provided additional staff, resources and funding from the general fund specifically targeted to provide improved capability for Monitoring and Emergency Action Plans (EAP) technical review, approval, and exercise. Improve the dam related EAPs through public education and enhanced capability to review new and updated plans in coordination with local emergency services offices. Perform tabletop and field exercises of existing EAPs.
- The WV DOF and the WV Department of Environmental Protection, Office of Environmental Enforcement determine the need for a Memorandum of Understanding to clearly define each organization's responsibility and improve enforcement efficiency.

West Virginia Division of Natural Resources (WVDNR)

- Enable the WV Public Land Corporation through legislative enactment and increased staffing to enforce current permitting requirements for in-stream construction or channel alteration.
- Enable the WV Public Land Corporation to develop and enforce a legal contract requiring permit applicants to agree to maintain a specified minimum hydraulic carrying capacity of the structure being installed.
- The State could provide funding for stream restoration programs to match existing Federal programs and that regulations for preservation of stable streams be developed through a collaborative effort of the WVDEP, WVCA and WVDNR.
- Through a collaborative effort, the USACE and NRCS could work jointly with the WVCA and other applicable agencies to assess the State's major watersheds. The purpose of this assessment would be to determine whether there are any opportunities to construct additional upstream flood storage/retention facilities in the watersheds that would reduce downstream flood damages, potentially provide a reliable source of potable water for communities within the region and provide improvements in downstream water quality and flow. Several of the watersheds shown on the statewide watershed map (see Figure 1-5) have existing storage facilities (see Appendix L) operating for flood control, low-flow augmentation, and water supply. Previous studies conducted for the watersheds by various Federal and State agencies would form the basis for these studies.

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- Through a collaborative effort of the USACE and NRCS could work jointly with WVCA and other applicable agencies to conduct watershed specific assessments that determine whether existing municipalities and major unincorporated commercial/industrial centers within the State need to be protected in place (floodwalls, levees, channel modifications, relocations) to preserve the commercial, service and employment base that now supports the surrounding county population. These protected centers also can serve as relocation sites for commercial and residential development acquired from the floodway (see item 3 below). Existing data from previous protection studies for these communities can form the basis for this assessment. The recommendations of these watershed assessments would form the basis for funding requests to pursue specific protection projects at critical municipal centers.
 - The watershed assessments may be conducted through programs such as the Section 22 PAS and PL 83-566 Watershed Protection and Flood Prevention Act. Full consideration of the environmental effects of these potential structures would be coordinated with the WVDNR, WVDEP and USFWS during the assessment.
- Provide training to WVDNR law enforcement officers in disaster preparedness and response activities, including swiftwater rescue, diver teams and drone pilots, and support their participation in emergency management coordination efforts.
- Develop education and outreach materials to inform residents and visitors about flood risks and response measures.

West Virginia Department OF Economic Development (WVDED)

- Prepare and disseminate to counties and municipalities a model sub-division regulation that contains a requirement that every residential, commercial, or industrial lot include a portion of developable land that is out of the floodway for construction of a structure.

West Virginia Department of Transportation (WVDOT)

- Develop voluntary guidelines or Best Management Practices (BMP) for the sizing, installation, and maintenance of culverts, drainage structures and stream/river crossings. Municipalities and individuals installing stream crossings could install one with a diameter or cross section at least as large as the closest appropriate downstream Division of Highways crossing unless an alternative size is provided by a professional engineering study that would ensure that these facilities would carry the stream capacity during a 10-year storm event without contributing to flood damages.
- Guidelines or BMPs could be developed for installation and maintenance of stream crossings for the 10-year storm event without causing additional upstream flooding be developed and enforced. Appropriate sizing for culverts and bridge openings must consider the potential for future development

in the watershed. Where such development potential exists, culverts and bridge cross sections could be enlarged to handle anticipated runoff. Establish a program, including a permitting process, within a State agency to control the design, installation, and maintenance of private and public non-highway drainage structures.

- All stormwater conveyances (ditches, culverts, piping etc.) could be sized no smaller than the nearest appropriate downstream Department of Transportation stormwater conveyance unless hydraulic/hydrology studies indicate otherwise. It is further recommended that the Department of Transportation be allocated funding to provide technical assistance on determining the appropriate size for persons installing stormwater conveyances.
- The Department of Transportation could design signage similar to the "Bridge Freezes Before Road" sign to identify roads that are frequently blocked by storm water.
- The WVDOH could establish or reestablish elevation reference marks on all bridges.
- The Department of Transportation could design and install signage similar to the "Bridge Freezes Before Road" sign to identify State highways that are frequently blocked by high water.
- The WV Division of Highways or another state agency could study abandoned stream crossings (public or private road or railroad bridges or culverts) to ascertain ownership of said facilities and provide recommendations for condemnation and removal if deemed necessary to reduce flood damages.
- The Department of Motor Vehicles could identify the dangers of flooded roadways through all drivers' education classes and through the license testing process.

West Virginia Division of Forestry (WVD OF)

- The organizational structure of the WVD OF could be realigned to prioritize as urgent the inspection of each logging job during and at the end of each operation and reemphasize the need for a reduction in the number and severity of wildfires.
- The WVD OF could develop BMPs for the restoration of areas that have been severely burned by wildfire to prevent erosion.
- The WVD OF and the WV Department of Environmental Protection, Office of Environmental Enforcement could determine the need for a Memorandum of Understanding to clearly define each organization's responsibility and improve enforcement efficiency.
- The WVD OF could improve quality control of inspections by publishing an annual report of logging operations and inspections.
- The WVD OF could continue to provide training and technical assistance to loggers in regard to BMPs.
- The WVD OF could prepare educational material on the effects of wildfires and repetitive wildfires on soils and the resulting increase in runoff and flood damages for presentation to high school students, landowners, public officials, floodplain managers and the public.
- The WVD OF could investigate possibilities for economic uses for slash, logging waste and less desirable wood to prevent logging waste from being left in and along streams.

- The WVDOF could be provided the resources and authorization to employ additional employees including: Forest Hydrologist, Wildfire Specialists and Foresters to address timber management and field enforcement of BMP's.
- Additional resources in staff and funds could be provided to the Division of Forestry to address wildfires. Due to rugged terrain and limited access into some areas, wildfires are a serious threat to the forest resources. These forested lands absorb tremendous quantities of rainfall that would otherwise reach the State's streams and rivers. Forests devastated by wildfires do not have the capability to absorb rainfall and therefore increased runoff and erosion occurs.

West Virginia Department of Agriculture (WVDA)

- The WV Department of Agriculture, the WV Conservation Agency, and the USDA – Natural Resources Conservation Service could review existing BMPs and expand the number of agricultural facilities adhering to them.

Public Service Commission of West Virginia (WVPSC)

- Encourage the resiliency of the state's electric, natural gas, landline services, gas and hazardous liquids transmission pipelines, solid waste, and hazardous materials management infrastructure.
- Encourage water utilities to evaluate vulnerabilities, identify critical dependencies that affect sanitation services during outages, incorporate flood-related service continuity considerations into review of capital improvement plans, rate cases and infrastructure investment proposals, and promote redundancy strategies (e.g., isolation valves, sectionalization, backup storage, that help maintain minimum service levels during flood conditions.
- Encourage utilities to incorporate flood resiliency measures into system planning, maintenance, and capital investment programs.
- Encourage coordination between utilities and state agencies (e.g., SRO, EMD) to share data, hazard information, and planning assumptions.
- Encourage utilities to assess vulnerabilities of all water and wastewater infrastructure located along streams, rivers, and flood-prone corridors.
- Encourage utilities to identify exposed or at-risk pipelines as part of routine inspections, engineering reports or asset inventories.
- Encourage coordination between utilities and local floodplain managers to ensure consistency with Flood Insurance Rate Maps (FIRMs) and floodplain management requirements.
- Encourage utilities to proactively identify critical facilities that require alternate or backup power to maintain essential services during flood-related outages.

West Virginia Department of Health (WVDH)

- A study of the expected mortality from flooding at different recurrence levels could be developed.

West Virginia Department of Human Services (WVDoHS)

- Encourage coordinated disaster preparedness, response, and recovery planning across WVDoHS divisions utilizing the capacity of the Center for Threat Preparedness and affiliate health agencies to ensure that health, behavioral health, and human services functions operate in an integrated and mutually supportive manner during flood events.
- Strengthen readiness to request, activate, and rapidly implement Disaster SNAP (D-SNAP; <https://www.fns.usda.gov/disaster/westvirginia>) and other expedited benefit programs following flood events by maintaining streamlined internal procedures and coordination mechanisms with federal and state emergency partners.
- Support timely identification, documentation, and activation of federally funded disaster assistance programs administered by WVDoHS, ensuring the required requests, approvals, and compliance steps are completed efficiently after flood events.
- Provide continuity and coordination of core safety-net services for housed and federally assisted flood survivors by aligning nutrition, income support, housing stability, and related programs to address immediate needs and reduce barriers to assistance.
- Incorporate both short-term emergency assistance and long-term recovery considerations into WVDoHS disaster planning to support sustained stabilization and recovery for individuals and families affected by flooding.
- Promote access to mental, emotional, and behavioral health supports following flood events by integrating trauma-informed, crisis, and recovery-oriented services into WVDoHS disaster response and recovery activities.
- Encourage planning and coordination to ensure continuity of access to critical medical and assistive supplies by highlighting supply chain vulnerabilities and promoting backup and contingency measures for flood disruptions.
- Support the adoption and implementation of Disaster Behavioral Health All-Hazards Planning Guidance across relevant WVDoHS programs to ensure behavioral health preparedness, response, and recovery capabilities are integrated into flood and multi-hazard planning efforts.

West Virginia Division of Labor (WVDL)

- The Department of Labor could require all appropriate staff to become conversant with floodplain management issues and incorporate the use of Flood Insurance Rate Maps in inspection procedures.

West Virginia Department of Education (WVDE)

- The public could be provided with a readily visible indication of the Base Flood Elevation (BFE) (elevation of the 100-year frequency flood), surveying classes could prepare projects that require students to survey the BFE and indicate this elevation on utility poles and/or street signposts, where practical, within a community. These would be general guides and wouldn't be legal reference points for determining flood-insurance premiums.
- All surveying classes (college, university, vocational, and high school levels) could include a session on the completion of elevation certificates, their importance in floodplain management, and a general outline of the floodplain permitting process.

West Virginia State Historic Preservation Office (WVSHPO)

- Create new prioritization criteria for the State Development Grant Program and the Survey and Planning Grant Program that are focused on resiliency measures, such as measures to protect historic buildings from future flooding and natural disasters.
- Identify historic structures that may need to be elevated to two feet above base flood elevation standards to improve their flood resiliency. For structures that cannot be elevated, identify potential floodproofing measures such as window and door shields.
- Provide information resources to grant applicants about how to evaluate flood risk, secure insurance and implement mitigation measures, such as on-site drainage measures, nature based solutions and flood-tolerant building materials.
- Improve post-disaster permitting processes by proactively assessing and refining related review procedures to better accommodate urgent recovery and reconstruction needs following flood events while continuing to protect historic resources.
- Expedite post-disaster review and approval timelines, where allowable, by developing and implementing streamlined internal workflows, prioritization protocols, and pre-identified emergency procedures to support timely recovery actions in flood-affected areas.
- Provide clear, accessible guidance for applicants, local governments, and recovery partners following flood events by coordinating with FEMA and other federal partners, leveraging available subject-matter expertise, and clarifying compliance expectations during emergency and recovery periods.
- Update and make available for use in planning geospatial data sets including modeling outputs critical to resiliency planning, including locations of critical assets, evacuation corridors, building inventories, flood and other hazard maps.
- Encourage relevant personnel to take the Federal Emergency Management Agency Independent Study Courses related to flooding, flood mitigation, and floodplain management.

West Virginia Offices of the Insurance Commissioner (WVOIC)

- The WV Insurance Commission could require all insurance agents selling property insurance in West Virginia either offer flood insurance or maintain a referral list of agents who do offer flood insurance in their community.
- Obtain a signature on a statement that acknowledges that the purchaser is aware that flood insurance is not included in their standard policy.
- Obtain a separate signature stating that the client has declined purchase of a separate policy to cover flood damages if they decline to purchase such a policy.
- The Insurance Commission could provide incentives for insurance agents to be educated about the National Flood Insurance Program (NFIP). Ten to twenty agents could be randomly checked each year to ensure that they are offering flood insurance to businesses and residents or providing appropriate referrals; and to determine if flood policies are being rated properly.
- Brochures could be prepared and distributed on flood proofing methods, flood resistant construction techniques, and strategies for reducing flood-insurance premiums to all National Flood Insurance Program policyholders in WV.

West Virginia Economic Development Authority

- Provide educational materials about how to design and implement emergency preparedness plans, such as those produced by WV Department of Emergency Management, the WV State Resiliency Office and FEMA, to businesses receiving funding from the WV Economic Development Authority and encourage the development of such plans.
- Encourage businesses receiving direct lending and loan insurance to engage in proactive discussions with County Floodplain Managers about building code requirements and land-zoning policies that enhance resiliency.
- Encourage relevant personnel to take the Federal Emergency Management Agency Independent Study Courses related to flooding, flood mitigation, and floodplain management.

West Virginia State Police

- Train officers on evacuation protocols for general and specific flood-prone areas including the coordination with county and local Emergency Management for area- specific vulnerable populations, critical facilities and infrastructure.
- Train with county and local government and emergency management officials on flood preparedness and response, establishing and enforcing routes and closures, and ensuring public compliance.
- Utilize established alert systems, press briefings, and social media to broadcast flood warnings, evacuation routes, shelter locations and (storm, weather, disaster) updates.
- Coordinate with county and local law enforcement and emergency management to enhance the security of utilities, hospitals, shelters and emergency operation centers as needed.

West Virginia Fire Marshal

- Provide unified efforts through our staff and the licensing and certification of electrical industry professionals that can provide education to residents and business owners about the risks of electrical system failures, gas leaks, chemical spills, generator use and re-energizing wet equipment after electricity is restored and safety measures that can be taken to mitigate these risks.
- Support the identification of hazardous materials, such as chemical storage tanks or gas pipelines, in flood prone areas and enforce actions to remove or reduce the threats imposed by these potential hazards.
- Participate in planning and training exercises to enhance disaster preparedness.

West Virginia Fusion Center

- Monitor flood risk data and intelligence from internet and open sources in real-time to provide actionable insights that help reduce flooding effects. Actionable items include assisting in identifying blocked critical infrastructure, known flash flood areas, threats to life, missing persons, and critical unmet community needs.
- Utilize our network of Fusion Liaison Officers to maintain on-the-ground intelligence in flood-affected areas for real-time reporting.
- Conduct continuous threat monitoring during hazard events to ensure officer and first responder safety, and actively monitor for post-disaster fraud-related activities.

Ready.WV.Gov

- Sustain public education efforts related to disaster and emergency preparedness and personal safety during floods, such as ReadyWV: A Family Emergency Guide, Personal Prep Starter Kit, and Business Emergency Preparedness

West Virginia Department of Tourism

- Develop materials to educate visitors about safety precautions they can take before, during and after extreme weather events, such as links to weather alert systems and maps of high flood risk locations.

Workforce WV

- Develop job training programs for flood resiliency that bring together traditional construction skills, flood mitigation techniques, nature-based solutions, and the latest building codes for home, business, utilities, and other infrastructure.
- Develop special programs for workers that have been affected or displaced from their place of work because of a natural disaster. Help identify job opportunities, and support businesses whose workers have been affected by natural disasters secure temporary workers to sustain operations until they can return.

Sector 3: Regional Government

Please note that these potential actions were developed when the Flood Protection Plan was created in 2004 and were affirmed by reviewing stakeholders as relevant when that plan was reviewed in 2026. They are presented as a 'menu' of options for consideration and are in no way the only actions an organization should consider. Adoption of these actions is entirely voluntary.

West Virginia Regional Planning and Development Councils (WVRPDCs)

- Embed disaster resiliency into infrastructure and land-use planning coordinated by the RPDCs.
- Coordinate with the associated counties that constitute the RPDC to develop and update the Regional Hazard Mitigation Plans (RHMPs) and get all associated counties to be signatures of the Regional Plan.
- Assist or help to coordinate counties to develop and update Local Hazard Mitigation Plans (LHMPs) and comprehensive disaster plans.
- Coordinate the integration and implementation of the WV Flood Resiliency Plan and Hazard Mitigation Plan, the Regional HMP and local HMPs, pending funding availability.
- Assist local governments with grant application, coordination and administration for flood resiliency/mitigation projects (e.g., hardening critical facilities and retrofitting buildings to be flood resilient).
- Elevate the capacity of the RPDCs to serve as coordinating entities for pre- and post-disaster data collection and GIS repositories for disaster-related datasets.
- Encourage relevant personnel to take the Federal Emergency Management Agency Independent Study Courses related to flooding, flood mitigation, and floodplain management. Serve as primary point of contact and clearinghouse to assist with pre- and post-disaster data collection for infrastructure and housing. Manage all flood data including an inventory of at-risk structures, repetitive loss data, flood control project data, and other databases. This data could include information on losses sustained by residences, businesses, farms/agricultural losses, roadways, railroads, and other types of losses.

West Virginia Conservation Districts (WVCDs)

- Educate landowners and local governments about local floodplain ordinances and best management practices for land, water and flood control structures to support compliance and reduce future risks.

Sector 4: County Government

Please note that these potential actions were developed when the Flood Protection Plan was created in 2004 and were affirmed by reviewing stakeholders as relevant when that plan was reviewed in 2026. They are presented as a 'menu' of options for consideration and are in no way the only actions an organization should consider. Adoption of these actions is entirely voluntary.

County Commissioners Association of West Virginia (CCAWV)

- If a regional or State agency is providing floodplain management assistance to a local government, that local government could be required to consult with the regional or State agency providing assistance on all proposed variances from the floodplain ordinances.
- Every county could identify and prepare relocation areas for use in the event of a disaster. These areas could be provided with water and sewage services. In the interim, these areas could be developed as parks, athletic fields, or similar recreational uses.
- All counties in West Virginia could implement a storm water ordinance to control the quantity and quality of storm water and to guide the development and implementation of a stormwater management plan. These local ordinances must be at least as strict as State regulations. Local jurisdictions must provide for enforcement of their own ordinances.
- Any county with karst topography could develop specific ordinances to protect the karst topography and groundwater supply from the effects of excessive stormwater.
- The Vocational Technical schools could incorporate training on retrofitting floodplain structures and other flood mitigation techniques in all construction-related courses. Individuals receiving such training could be encouraged by counties to work with communities and individuals immediately after a flood event to "build back smarter" and in a sustainable manner.
- All surveying classes (college, university, vocational, and high school levels) could include a session on the completion of elevation certificates, their importance in floodplain management, and a general outline of the floodplain permitting process.
- The public could be provided with a readily visible indication of the Base Flood Elevation (BFE) (elevation of the 100-year frequency flood), surveying classes could prepare projects that require students to survey the BFE and indicate this elevation on utility poles and/or street signposts, where practical, within a community. These would be general guides and wouldn't be legal reference points for determining flood-insurance premiums.

County Emergency Managers

- Establish pre-disaster recovery plans by creating organizational frameworks for recovery before events occur, including "reconstruction ordinances" that encourage resilient rebuilding.
- Encourage the use of communication (COMMEX) and tabletop (TTX) exercises with county leadership (administrators, police/fire chiefs, and public health officers) to evaluate operational gaps during high-risk, emergency and long-term planning scenarios.

- Engage “Trusted Agents/Messengers”, including community foundations, faith-based organizations, and local non-profits, to reach vulnerable or historically marginalized populations in emergency planning, response and long-term resiliency efforts.
- Promote disaster behavioral health by integrating mental health representatives into Emergency Operations Centers (EOC) to address long-term community trauma.
- Utilize Public Sentiment Tools to track community feedback to ensure resiliency strategies are supported by residents.
- Consider conducting educational community outreach programs, symposiums, preparing flyers and meeting with groups and organizations to promote self sufficiency and preparedness that empowers individual and community flood resiliency.
- Consider developing disaster reserve accounts to ensure the County can sustain operations for the first 30 to 60 days before federal assistance becomes available.
- Establish or update mutual aid agreements with neighboring jurisdictions for critical staff like building inspectors and utility crews and equipment to enhance capacity during large-scale events.
- Stay informed on new legislation which may influence eligibility for mitigation projects like utility and broadband resilience and community capacity development programs.
- Map critical assets (hospitals, shelters, and transportation routes) and upgrade/fortify critical infrastructure to withstand extreme heat temperatures, storms, or flooding.
- Foster collaboration between public and private sector partners to reduce vulnerabilities in the delivery of critical goods and services via more resilient supply chains
- Apply for Federal Grants through programs like FEMA’s Building Resilient Infrastructure and Communities (BRIC) and Flood Mitigation Assistance (FMA) to finance large-scale resiliency projects.
- Consider developing local Debris Management Plans and contracts under “blue sky conditions” to expedite debris removal before a disaster, allowing for rapid cleanup and preventing secondary flooding from blocked drainage systems.
- Encourage relevant personnel to take the Federal Emergency Management Agency Independent Study Courses related to flooding, flood mitigation, and floodplain management.

County Floodplain Managers

- Educate residents about the benefits of purchasing FEMA National Flood Insurance Program policies or other available flood insurance policies to accelerate financial recovery for the community after a disaster and coordinate assistance for them in identifying and determining program eligibility.
- Deploy campaigns like “Turn Around Don’t Drown” or FEMA’s High Water Mark Initiative increases local awareness of flood risks.
- Work with FEMA to ensure Flood Insurance Rate Maps (FIRMs) are updated every ten years and reflect current development and implemented mitigation features and strategies changing weather patterns to accurately assess risk and that elevation certificates are taken into account.

- Rigorously review permits to ensure all new development and repairs in the Special Flood Hazard Area (SFHA) comply with state and local ordinances negating new vulnerabilities.
- Provide guidance to homeowners and developers that are rebuilding structures damaged in disasters to ensure structures are rebuilt to modern, flood-resilient standards.
- Create a Floodplain Managers' Mentoring System in West Virginia that connects new FM's to experienced FM's and provides a contact list of the experienced FM's across the state. This Mentoring System, which can be introduced in FM training sessions, is meant to help new FM's navigate their responsibilities and get access to advice from experienced professionals when new or challenging situations arise, including pre and post disaster events.
- Collaborate with the State Resiliency Office, NFIP Coordinator and County Managers to create educational materials, a basic course in floodplain management, and associated outreach plans that are specific to officials in state, county, and municipal government, insurance providers, financial and lending institutions, real estate representatives, utility companies, watershed associations, professional land surveyors, professional engineers, building inspectors, community planners, and other interested parties that inform each entities about the role of the Floodplain Managers, and provides access to key resources for understanding flood risk, stable streams, building codes and land zoning, and implementing flood resiliency measures.
- Update the WVFMA website (<https://wvfma.org>) to include the latest mapping, flood risk mitigation planning, Community Rating Systems (CRS) coordination manuals, and grant programs.
- Expand the number of communities participating in the FEMA Community Rating System program and explore opportunities to further improve scores with communities that are already participating.
- Encourage relevant county personnel to take the Federal Emergency Management Agency Independent Study Courses related to flooding, flood mitigation, and floodplain management.
- The National Flood Insurance Program coordinator, in consultation with the Director of the Division of Emergency Management, and with the assistance of floodplain managers around the state, shall develop and publish a strategic plan to establish shared goals, define a path to meet those goals, and shall invite other governmental units to adopt these goals and objectives, as per WV State Code 15-5-20b(d).

County Boards of Education

- Encourage educational outlets in West Virginia (Vo-tech, Community Colleges, publicly owned colleges, and universities) to develop classes and curriculums that address floodplain and flood issues. Floodplain management and flooding could be addressed during appropriate sessions of the current curriculum.
- All surveying classes (college, university, vocational, and high school levels) could include a session on the completion of elevation certificates, their importance in floodplain management, and a general outline of the floodplain permitting process.
- The public could be provided with a readily visible indication of the Base Flood Elevation (BFE) (elevation of the 100-year frequency flood), surveying classes could prepare projects that require students to survey the BFE and indicate this elevation on utility poles and/or street signposts, where practical, within a community. These would be general guides and wouldn't be legal reference points for determining flood-insurance premiums.

Sector 5: City Government

Please note that these potential actions were developed when the Flood Protection Plan was created in 2004 and were affirmed by reviewing stakeholders as relevant when that plan was reviewed in 2026. They are presented as a 'menu' of options for consideration and are in no way the only actions an organization should consider. Adoption of these actions is entirely voluntary.

City Government

- Encourage and, where relevant, strengthen, regulations that exceed National Flood Insurance Program minimums such as requirements that structures be elevated further above base flood elevations (e.g. higher freeboard) and adopting more stringent 'substantial damage' ratios.
- Secure funding for proactive implementation of home elevation projects and voluntary high-risk property buyout programs with as much relocation assistance as possible to relocate buyout participants within the same community or county.
- Incentivize the implementation of and invest in green infrastructure such as bioswales, permeable pavements and rain gardens to absorb excess water and reduce stormwater runoff in urban and residential areas during new construction, revitalization and recovery
- Protect and restore natural floodplains, wetlands, and riparian buffers.
- Upgrade and maintain culverts, storm drains and stormwater detention.
- Implement a State Code 7-1-3u "Authority of counties and municipalities to treat streams to prevent floods" agreement with the WV Conservation Agency.
- Utilize tools available and developing capabilities of the West Virginia Flood Resiliency Framework (Link: wvfrf.org).
- Participate in the FEMA Community Rating System program and take strategic actions to improve community-scale resilience while earning flood insurance premium discounts for residents
- Educate residents and business about flood insurance options, flood mitigation actions and emergency response planning
- Engage property managers, such as developers, homeowners, homeowners associations, and farmers, to align their land management actions with floodplain managers, hazard mitigation plans, regional watershed management and infrastructure planning goals
- Coordinate with Task local floodplain managers to with promoting disaster resiliency by implementing preventative standards and coordinating post-disaster recovery efforts
- Consider conducting inspections after a disaster to ensure that structures damaged by 50% or more are rebuilt to modern, flood-resilient codes.
- Ensure that all post-flood reconstruction follows local ordinances to maintain the community's standing in the National Flood Insurance Program and prevent future losses.

- Use post-disaster assessments or After-Action Reports to identify system failures and update emergency action plans and hazard mitigation plans accordingly.
- Collaborate with economic development councils to identify and advance investments in resilient utility, transportation and infrastructure systems and provide businesses guidance on land use zoning and building codes that improve community resiliency.
- Encourage relevant city personnel to take Federal Emergency Management Agency Independent Study Courses related to flooding, flood recovery, flood mitigation, and floodplain management.

City Councils

- Obtain the repetitive-loss data from WVEMD and determine latitude, longitude, and elevation figures for each repetitive-loss structure in their jurisdiction so this data can be included in a GIS database for use by local, State, and Federal agencies.
- If a regional or State agency is providing floodplain management assistance to a local government, that local government could consult with the regional or State agency providing assistance on all proposed variances from the floodplain ordinances.

Municipal Floodplain Managers

- Educate residents about the benefits of purchasing FEMA National Flood Insurance Program policies or other available flood insurance policies to accelerate financial recovery for the community after a disaster and coordinate assistance for them in identifying and determining program eligibility.
- Deploy campaigns like “Turn Around Don’t Drown” or FEMA’s High Water Mark Initiative increases local awareness of flood risks.
- Rigorously review permits to ensure all new development and repairs in the Special Flood Hazard Area (SFHA) comply with state and local ordinances negating new vulnerabilities.
- Provide guidance to homeowners and developers that are rebuilding structures damaged in disasters to ensure structures are rebuilt to modern, flood-resilient standards.
- Participate in a Floodplain Managers’ Mentoring System, to be created by the WV Association of Floodplain Managers, collaboratively with regional floodplain managers, that connects new FM’s to experienced FM’s and provides a contact list of the experienced FM’s across the state. This Mentoring System, which can be introduced in FM training sessions, is meant to help new FM’s navigate their responsibilities and get access to advice from experienced professionals when new or challenging situations arise, including pre and post disaster events.
- Collaborate with the State Resiliency Office, NFIP Coordinator and County Managers to disseminate educational materials, a basic course in floodplain management, and associated outreach plans that are specific to officials in state, county, and municipal government, insurance providers, financial and lending institutions, real estate representatives, utility companies, watershed associations, professional land surveyors, professional engineers, building inspectors, community planners, and other interested parties that inform each entities about the role of the Floodplain Managers, and provides access

to key resources for understanding flood risk, stable streams, building codes and land zoning, and implementing flood resiliency measures.

- Expand the number of communities participating in the FEMA Community Rating System program and explore opportunities to further improve scores with communities that are already participating.
- Encourage relevant municipal personnel to take the Federal Emergency Management Agency Independent Study Courses related to flooding, flood mitigation, and floodplain management.
- The National Flood Insurance Program coordinator, in consultation with the Director of the Division of Emergency Management, and with the assistance of floodplain managers around the state, shall develop and publish a strategic plan to establish shared goals, define a path to meet those goals, and shall invite other governmental units to adopt these goals and objectives, as per [WV State Code 15-5-20b\(d\)](#).

Solid Waste Authorities

- Implement proactive, comprehensive planning that includes a disaster debris management plan with and for each county that details post-flood agency recovery strategies to quickly manage waste surges and supports public awareness campaigns to prevent unauthorized dumping.
- Elevate or protect critical waste collection and handling infrastructure and assets.
- Support preventative drain blockage removal with coordinated collections.



Kanawha River

Sector 6: Non-Governmental Organizations

Please note that these potential actions were developed when the Flood Protection Plan was created in 2004 and were affirmed by reviewing stakeholders as relevant when that plan was reviewed in 2026. They are presented as a 'menu' of options for consideration and are in no way the only actions an organization should consider. Adoption of these actions is entirely voluntary.

🔗 West Virginia Voluntary Organizations Active in Disaster (WVVOAD)

- Work with local, state, and federal agencies; and non-governmental organizations to help coordinate disaster response and recovery efforts.
- Work with local, state, and federal agencies; and non-governmental organizations to help coordinate disaster case management support, including planning support for long-term recovery committees, to communities and families affected by flooding and other disasters
- Establish agreements with Emergency Management Division and other agencies as needed to enable WV VOAD to provide support to partner efforts to prepare for and respond to flooding events
- Work with local, state, and federal agencies; and non-governmental organizations to help connect residents, families and business owners with disaster case management support and, where needed, filing claims to FEMA
- Work with local, state, and federal agencies; and non-governmental organizations to help re-establish the Bridge Project to assist with the development of resilient bridges for families affected by flooding.
- Encourage relevant personnel to take the Federal Emergency Management Agency Independent Study Courses related to flooding, flood mitigation, and floodplain management.

🔗 West Virginia Community Action Partnership (WVCAP)

- Leverage the West Virginia Rural Community Assistance Program and its team of Technical Assistance Partners to help property owners understand their flood risk and identify flood risk mitigation solutions (e.g. backflow valves for sewer systems, elevating electrical utilities) to sustain access to clean drinking water and effective sanitation. This support for West Virginia residents could be provided in coordination with local Community Action Agencies that operate the Weatherization Program and the Repair and Replacement Program.
- Provide assistance to water and wastewater utilities in their efforts to identify and implement flood risk mitigation measures, including installation of backflow valves.
- Help assemble and facilitate committees of community leaders and officials to develop strategic recovery plans.
- In coordination with local Community Action Agencies, offer first aid, support for replacing medications/glasses, and emotional support post disasters to support residents recover.
- Train and deploy WV Rural Community Assistance Program staff and Technical Assistance Partners to provide technical assistance to small water/wastewater utilities in their efforts to identify and implement flood resiliency measures.

- Train WVCAP volunteers in disaster response and flood preparedness skills, such as Community Emergency Response Team (CERT) training.
- Partner with WV VOAD and coordinate with Community Action Agencies to leverage WVCAP volunteers and their existing communication networks with local communities to provide assistance in long-term recovery response including case management support.
- Encourage relevant personnel to take the Federal Emergency Management Agency Independent Study Courses related to flooding, flood mitigation, and floodplain management.

American Red Cross Central Appalachia Region

- Support immediate disaster response services to include the operation of shelters, community/mobile feeding, distribution of emergency supplies, providing disaster health, mental health, and spiritual care services, and reunification support utilizing our established trained volunteer workforce and engaging event-based volunteers and partner organizations.
- Establish and/or maintain agreements (e.g. MOU, MOA) to work with WVVOAD and Emergency Management to coordinate post-disaster services.

Salvation Army

- Establish an agreement (e.g. MOU, MOA) to work with WV VOAD and WV Emergency Management to coordinate post-disaster services.
- Sustain disaster response services, including provisioning of food, water, emergency shelter, mobile showers, community health services, emotional and spiritual care, and a range of long-term relief services

Community Action Groups (Reserved)

Faith-Based Organizations

- Sustain immediate disaster response services, including provisioning of shelters, mass feeding, water, first aid, mental health, chaplaincy and psychological aid.
- Manage resources and volunteers in disaster response efforts, including coordinating volunteers and resources to help with the clearing of disaster-damaged area, mud out/ tear out of damaged homes, removal of debris to the curb for pick up, removal of trees from homes and yards and placement in designated areas for pick up, construction of private water crossings (if funding for materials is available), and rebuilding services.
- Connect residents to information about flood preparedness, emergency response, and organizations that can offer additional support services.
- Support community cohesion and coordination pre and post disaster, including opportunities to support vulnerable residents.



Hawks Nest Dam

Sector 7: Industries and Utilities

Please note that these potential actions were developed when the Flood Protection Plan was created in 2004 and were affirmed by reviewing stakeholders as relevant when that plan was reviewed in 2026. They are presented as a 'menu' of options for consideration and are in no way the only actions an organization should consider. Adoption of these actions is entirely voluntary.

Power

- Clear trees around power lines especially those serving rural communities.
- Establish and maintain agreements, such as an MOU or MOA, with other utilities to exchange access to emergency crews, trucks and equipment.
- Stockpile inventories of spare power poles, transformers, lines and other equipment in preparation for future events.
- Share permissible details of emergency action plans with Emergency Management and other key stakeholders to support coordination.
- Develop emergency action plans for safe power shutdown and restoration, rapid post-event damage assessments, staff training and the establishment of standby power generation capabilities. Develop public communication plans and strategies to alert residents of potential outages, updates about power restoration and actions residents can take to stay safe.

Water and Sewer

- Set up quarterly inspections of drinking water and sewer collection lines and assessments of capacity capability to confirm functionality and support potential damage claims.
- Develop emergency action plans for service shutdowns/restoration, rapid damage assessments after events, staff training and establishment of standby power generation capabilities.
- Understand the level of risk of facilities and assets to flooding, identify vulnerable assets and assess criticality of those vulnerable assets.
- Work with Emergency Management, Economic Development Authority, Regional Planning Councils to identify and secure grants to implement resiliency measures.
- Implement floodproofing measures for critical assets, including elevating and relocating equipment, installing flood barriers, bolting down chemical tanks, and waterproofing seals/conduits, etc. and, as needed, wind proofing measures

Natural Gas

- Actively engage with state and local emergency management agencies before, during, after disasters to share vulnerabilities, such as potential washouts or landslides near infrastructure, and discuss disaster response options to facilitate communication pre and post disasters and quick recovery. This may include providing maps of high risk infrastructure.
- Employ remotely operated valves and monitoring in isolated and flood-prone areas. Consider the use of drones to inspect and monitor infrastructure during and immediately after a flooding event.
- Harden critical infrastructure and assets by elevating, flood-proofing, installing flood barriers or relocation. Secure aboveground tanks and buoyant objects. Utilize horizontal drilling technology to bury pipes to deeper depths. Utilize check valves to prevent water intrusion.
- Develop public communication plans and strategies to alert residents of potential energy emergency measures and actions to stay safe, such as: knowing the location of their natural gas meter and shut off valve, how to assess potential damage or leaks following a flood event, could they and how to properly and safely relight gas appliances, and safety measures in the event of a gas smell or if a leak is detected.

Liquid Propane and Fuel Oil

- Propane and fuel-oil dealers could ensure that all LPG and propane tanks over 30 pounds in size and all fuel-oil tanks located within the regulated floodplain or within 50 feet of a perennial stream to be anchored to a fixed structure to resist expected flood waters and impact from debris.

Communications

- Actively engage with state and local emergency management agencies before, during, after disasters to provide maps to identify vulnerabilities, such as potential washouts or landslides near infrastructure to facilitate quick responses and recovery.

- Cellular service providers can establish agreements with state and local emergency management agencies to set up temporary towers to sustain communication services in the event of disasters
- Clear trees or other threats from around communication lines especially those servicing rural communities.
- Understand the level of risk of facilities and assets to flooding, identify vulnerable assets and assess criticality of those vulnerable assets. Implement flood risk mitigation measures, prioritizing vulnerable and critical assets

Mines and Quarries

- Develop public communication plans and strategies to alert local municipalities and residents of potential flooding or disaster related risks to mining infrastructure and mitigating actions that will be taken pre and post events to ensure public safety.
- Develop emergency action plans for flooding events in coordination with state and local emergency management for rapid post-event damage assessments, staff training, and recovery.
- Provide information of operational and non-operational mines to local and regional governments and take actions to reduce the overall risks they pose; where relevant, include floodwater storage and treatment features in reclamation planning as well as other ecosystem enhancement and community benefit design features within these mining facilities.
- Work with Regional Planning and Development Counsel(s) to incorporate geospatial and hazard information about mines, including information provided to West Virginia Department of Environmental Protection, into state and local hazard mitigation planning.

Oil and Gas

- Actively engage with state and local emergency management agencies before, during, after disasters to provide maps to identify vulnerabilities, such as potential washouts or landslides near infrastructure to facilitate quick responses and recovery.
- Understand the level of risk of facilities and assets to flooding, identify vulnerable assets and assess criticality of those vulnerable assets. Implement flood risk mitigation measures, prioritizing vulnerable and critical assets.

Sector 8: Businesses, and Associations

Please note that these potential actions were developed when the Flood Protection Plan was created in 2004 and were affirmed by reviewing stakeholders as relevant when that plan was reviewed in 2026. They are presented as a 'menu' of options for consideration and are in no way the only actions an organization should consider. Adoption of these actions is entirely voluntary.

West Virginia Association of Realtors (WVAR)

- Real Estate Agents could determine location of structures by latitude and longitude, city-style street address, or Tax Parcel number and whether the structure is within the regulated floodplain before the structure is listed for sale. The agent could notify potential purchasers of the location and whether the structure is within the regulated floodplain prior to execution of a purchase agreement.

West Virginia Association of Insurance Companies (WVAIC)

- Brochures could be prepared and distributed on flood proofing methods, flood resistant construction techniques, and strategies for reducing flood-insurance premiums to all flood insurance policyholders in WV.

West Virginia Municipal League (WVML)

- Enhance city engagement with Service Line Warranty Program and the WV Communities Risk Pool.
- Provide education and training focused on flood risk mitigation to WV Municipal League (WVML) members at the WVML Annual Conference.

West Virginia Floodplain Management Association (WVFMA)

- Continue to conduct an annual conference/seminar on floodplain management in West Virginia for all floodplain managers, public officials, and other interested parties to encourage training and develop peer support. If the West Virginia Floodplain Managers Association becomes a reality, the Association could take over this responsibility.
- Create a Floodplain Managers' Mentoring System in West Virginia that introduces new Floodplain Managers (FMs) to experienced FMs and provides a contact list of the experienced FMs across the state. This Mentoring System, which could be introduced in FM mandatory training, is meant to help new FMs navigate their responsibilities and get access to advice from experienced professionals when new or challenging situations arise, including pre and post disaster events.
- Collaborate with the State Resiliency Office, NFIP Coordinator and County Managers to create educational materials, a basic course in floodplain management, and associated outreach plans that are specific to elected officials in state, county, and municipal government, insurance providers, financial and lending institutions, and real estate representatives, utility companies, watershed associations, professional land surveyors, professional engineers, building inspectors, community planners, and other interested parties that inform each entities about the role of the Floodplain Managers, and provides access to key resources for understanding flood risk, stable streams, building codes and land zoning, and implementing flood resiliency measures.

- Update the WVFMA website (<https://wvfma.org>) to include the latest mapping, flood risk mitigation planning, Community Rating Systems (CRS) coordination manuals, and grant programs.
- Seek ways to expand the number of communities participating in the FEMA Community Rating System program and explore opportunities to further improve scores with communities that are already participating.
- Encourage relevant personnel to take the Federal Emergency Management Agency Independent Study Courses related to flooding, flood recovery, flood mitigation, and floodplain management.
- The National Flood Insurance Program coordinator, in consultation with the Director of the Division of Emergency Management, and with the assistance of floodplain managers around the state, shall develop and publish a strategic plan to establish shared goals, define a path to meet those goals, and shall invite other governmental units to adopt these goals and objectives, as per WV State Code 15-5-20b(d).

West Virginia Emergency Management Council (WVEMC)

- Explore opportunities to contribute to FEMA Community Rating System, such as managing stormwater and applying higher regulatory standards for building/structures
- Implement training and educational programs to improve statewide emergency management capacity.
- Facilitate outreach and education to residents and property owners about the actions they can take to mitigate flood risk.
- Encourage relevant personnel to take the Federal Emergency Management Agency Independent Study Courses related to flooding, flood mitigation, and floodplain management.

Contractors Association of West Virginia (CAWV)

- Promote the use of flood risk mitigation practices in construction activities from improving site-level planning to facilitate drainage to using flood-resistance building materials and elevating utilities/service equipment.
- Confer with the local floodplain manager prior to initiating new construction projects to understand flooding risk and identify mitigating solutions where needed.
- Explore opportunities to contribute to FEMA Community Rating System, such as managing stormwater and applying higher regulatory standards for building/structures.
- Encourage relevant personnel to take the Federal Emergency Management Agency Independent Study Courses related to flooding, flood mitigation, and floodplain management.

Sector 9: Academia

Please note that these potential actions were developed when the Flood Protection Plan was created in 2004 and were affirmed by reviewing stakeholders as relevant when that plan was reviewed in 2026. They are presented as a 'menu' of options for consideration and are in no way the only actions an organization should consider. Adoption of these actions is entirely voluntary.

Academia - General

- Encourage educational outlets in West Virginia (Vo-tech, Community Colleges, publicly owned colleges, and universities) to develop classes and curriculums that address floodplain and flood issues. Floodplain management and flooding could be addressed during appropriate sessions of the current curriculum.
- The Vocational Technical schools could incorporate training on retrofitting floodplain structures and other flood mitigation techniques in all construction-related courses. Individuals receiving such training could be encouraged by counties to work with communities and individuals immediately after a flood event to “build back smarter” and in a sustainable manner.
- All surveying classes (college, university, vocational, and high school levels) could include a session on the completion of elevation certificates, their importance in floodplain management, and a general outline of the floodplain permitting process.

West Virginia University (WVU) GIS Technical Center

- Update and make available for use in planning geospatial data sets including modeling outputs critical to resiliency planning, including locations of critical assets, evacuation corridors, building inventories, flood and other hazard maps, with data for both the county and watershed scales.

WV Brownfields Assistance Center at WVU and Marshall University

- Assist in the prioritization, assessment, and remediation of brownfield sites that may pose elevated risks to West Virginia residents, communities, and ecosystems.
- Provide science-based strategies to landowners to improve flood resiliency within brownfield sites, such as through the creation of stormwater management plans, wetlands development, building modifications and/or improved drainage to reduce flooding risk and flood damage.
- Integrate presentations and other education materials focused on flood resiliency at the West Virginia Brownfields & Mainstreet Annual Conference and related Brownfields Assistance Center events.

Marshall University Appalachian Resiliency Center

- Advance research, technology and planning resources focused on: identifying threats to community resiliency, testing solutions to mitigate threats, enhancing West Virginia’s workforce through student training, guiding the planning of future Economic Development outside of flood-prone areas, improving flood modeling and forecasting impacts and facilitating multi-agency coordination.

Sector 10: Residents and/or Landowners

Please note that these potential actions were developed when the Flood Protection Plan was created in 2004 and were affirmed by reviewing stakeholders as relevant when that plan was reviewed in 2026. They are presented as a 'menu' of options for consideration and are in no way the only actions an organization should consider. Adoption of these actions is entirely voluntary.

- Review and follow [FEMA's Protect Your Home from Flooding Guidance](#).
- Know your risk by visiting www.mapwv.gov and reviewing and mapping your location's flood risk, reviewing historical data, talking with neighbors about historic flooding, and inspecting your property for drainage issues.
- Purchase flood insurance and understand coverage limits.
- Explore and, where suitable apply for, grants and incentives for implementing flood mitigation improvements, including property acquisition/buyout programs.
- Reduce your risk through exterior improvements (e.g. reducing impervious surfaces, anchoring outdoor fuel tanks, elevating utilities and service equipment, and improving lot grading) and interior improvements (e.g. seal foundation and basement walls, install flood vents, installation of sewer backflow valves).
- Take protective measures ahead of forecasted flooding events, such as activating, or automating if possible, flood protection devices like sump pumps and close backflow valves, shutting off electricity, safeguarding valuables, elevating appliances onto concrete blocks, cleaning gutters, and deploying temporary flood barriers, like door and window shields.
- Where feasible, elevate homes/buildings two feet above Base Flood Elevation (BFE) to reduce the chance of flood waters entering living spaces.
- Pre-plan multiple emergency evacuation routes, designate a meeting spot, and prepare a go-bag(s) with 3 days of food, water, medications, flashlight, etc. Practice evacuation drills at least yearly.
- Annually update documentation of property conditions with photos and other records to support potential future insurance claims.
- Participate in the StormReady program conducted by the National Weather Service.



V. Monitoring Trends to Guide Future Efforts

V. Monitoring Trends to Guide Future Efforts

This section of the plan is focused on a way of collectively integrating the above actions into an interactive dashboard to track progress. Specifically, documenting, developing, and organizing resiliency activities across the state will provide the information necessary to support data-driven decisions. The state is developing a mechanism to collect and assimilate all of the work being done related to flood resiliency. Organizations are collecting and archiving their own data, but historically this information has been reported separately to various entities. Organizing and aggregating this data will provide information on resiliency investment at each of the sector levels as well as at the organizational level.

A data collection and analysis tool is under construction which, in concept, could allow organizations to upload resiliency projects at completion. Upon submission, the data will automatically be integrated with all other self-reported projects. Additionally, the platform is being designed to accept legacy data to capture as much information as possible. A public and private version of the Resiliency Dashboard will be available to show statewide trends. In addition to monetary investment, other metrics which will be collected and aggregated include education and outreach participation, project type, project progress, flood insurance data, legislation passed, and crowdsourced feedback. The goal is to have a beta version of the dashboard developed in 2024, and a fully operational platform is anticipated to be in place to assist in the mandatory reviews and updates of this resiliency plan by late 2026.

Flood Mitigation



Flood Mitigation Form

Mitigation Measure Type*

- ☐ Buyouts
- ☐ Relocations
- ☐ Retrofits
- ☐ Stream Restoration
- ☒ Floodplain Restoration
- ☐ Floodplain Easements
- ☐ Culvert Enlargement
- ☐ Bridge Enlargement
- ☐ Storm Water Improvements

Figure V-1. West Virginia Flood Resiliency Dashboard Flood Mitigation data entry form

Training, Education & Outreach



Training, Education & Outreach Form

Event Type*

☐ Training

☐ Education

☐ Outreach

☐ Other

Organization Name*

Year/Fiscal Year*

Figure V-2. West Virginia Flood Resiliency Dashboard Training, Education, and Outreach data entry form

Survey & Direct Feedback



Survey & Direct Feedback Form

Organization Name*

Event/Source*

Year/Fiscal Year*

Survey Score Metrics

The following pages will contain criteria that must be ranked from 0 to 5.
Please fill out to the best of your abilities for each metric.

Next

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Figure V-3. West Virginia Flood Resiliency Dashboard Survey & Direct Feedback data entry form

VI. Appendices

Appendix I: Contributing Organizations

West Virginia State Resiliency Office

Robert T. Martin, Director & Edwin R. Martin, Deputy Director

West Virginia Department of Commerce

West Virginia Division of Natural Resources

West Virginia Department of Environmental Protection

West Virginia State Conservation Agency

West Virginia Emergency Management Council

West Virginia Department of Homeland Security

West Virginia Department of Transportation

West Virginia Department of Health

West Virginia National Guard

West Virginia Emergency Management Division

West Virginia Senate

West Virginia House of Delegates

West Virginia Department of Economic Development

West Virginia Floodplain managers Association

National Oceanic and Atmospheric Administration

Federal Emergency Management Agency

Natural Resource Conservation Service

West Virginia University

Appendix II: References

EDA. (n.d.). Funding Opportunity: FY 2023 Disaster Supplemental. Retrieved May 29, 2024, from <https://sfgrants.eda.gov/s/funding-program/a2j3d0000000twKAAQ/fy-2023-disaster-supplemental>

Federal Highway Administration. (2022, July 29). Bipartisan Infrastructure Law - Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT) Formula Program Fact Sheet | Federal Highway Administration. Retrieved May 29, 2024, from https://www.fhwa.dot.gov/bipartisan-infrastructure-law/protect_fact_sheet.cfm

FEMA. (n.d.). Wikipedia. Retrieved May 29, 2024, from <https://www.fema.gov/case-study/north-carolina-upper-yadkin-river-floodplain-resiliency-initiative-town-jonesville>

FEMA. (n.d.). Wikipedia. Retrieved May 29, 2024, from <https://www.fema.gov/case-study/virginia-city-portsmouth-lake-meade-dam-adaptations>

FEMA. (n.d.). Wikipedia. Retrieved May 29, 2024, from <https://www.fema.gov/case-study/georgia-city-tennille-drainage-project>

FEMA. (n.d.). Wikipedia. Retrieved May 29, 2024, from <https://www.fema.gov/case-study/unger-acquisition>

FEMA. (n.d.). Wikipedia. Retrieved May 29, 2024, from <https://www.fema.gov/case-study/sportsmans-paradise>

FEMA. (n.d.). Wikipedia. Retrieved May 29, 2024, from <https://www.fema.gov/case-study/soil-nailing-protects-roads-flood-damage>

FEMA. (n.d.). Wikipedia. Retrieved May 29, 2024, from <https://www.fema.gov/case-study/brenton-wyoming-county-pre-disaster-mitigation>

FEMA. (2021, May 11). West Virginia Flood Tool. FEMA. Retrieved May 29, 2024, from <https://www.fema.gov/case-study/west-virginia-flood-tool>

FEMA. (2024, February 9). Community Rating System. FEMA. Retrieved May 29, 2024, from <https://www.fema.gov/floodplain-management/community-rating-system>

FEMA. (2024, February 10). Assistance for Governments and Private Non-Profits After a Disaster. FEMA. Retrieved May 29, 2024, from <https://www.fema.gov/assistance/public>

FEMA. (2024, February 20). Building Resilient Infrastructure and Communities. FEMA. Retrieved May 29, 2024, from <https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities>

FEMA. (2024, March 1). Safeguarding Tomorrow Revolving Loan Fund Program. FEMA. Retrieved May 29, 2024, from <https://www.fema.gov/grants/mitigation/storm-rlf>

FEMA. (2024, April 8). Flood Mitigation Assistance Grant Program. FEMA. Retrieved May 29, 2024, from <https://www.fema.gov/grants/mitigation/flood-mitigation-assistance>

FEMA. (2024, May 17). Individual Assistance. FEMA. Retrieved May 29, 2024, from <https://www.fema.gov/assistance/individual>

HUD. (n.d.). CDBG-DR: Community Development Block Grant Disaster Recovery Funds. HUD Exchange. Retrieved May 29, 2024, from <https://www.hudexchange.info/programs/cdbg-dr/>

NFIP. (n.d.). Wikipedia. Retrieved May 29, 2024, from https://www.floodsmart.gov/get-flood-insurance?gad_source=1&gclid=CjwKCAjwte-vBhBFEiwAQsv_xdyMuQi3kQo3UKklmumTpwDs-8kqfW0oDXnquaemn-1Mnm-1iUFrDhoCGOAAvD_BwE&gclsrc=aw.ds

NRCS. (n.d.). Emergency Watershed Protection | Natural Resources Conservation Service. Natural Resources Conservation Service. Retrieved May 29, 2024, from <https://www.nrcs.usda.gov/programs-initiatives/ewp-emergency-watershed-protection>

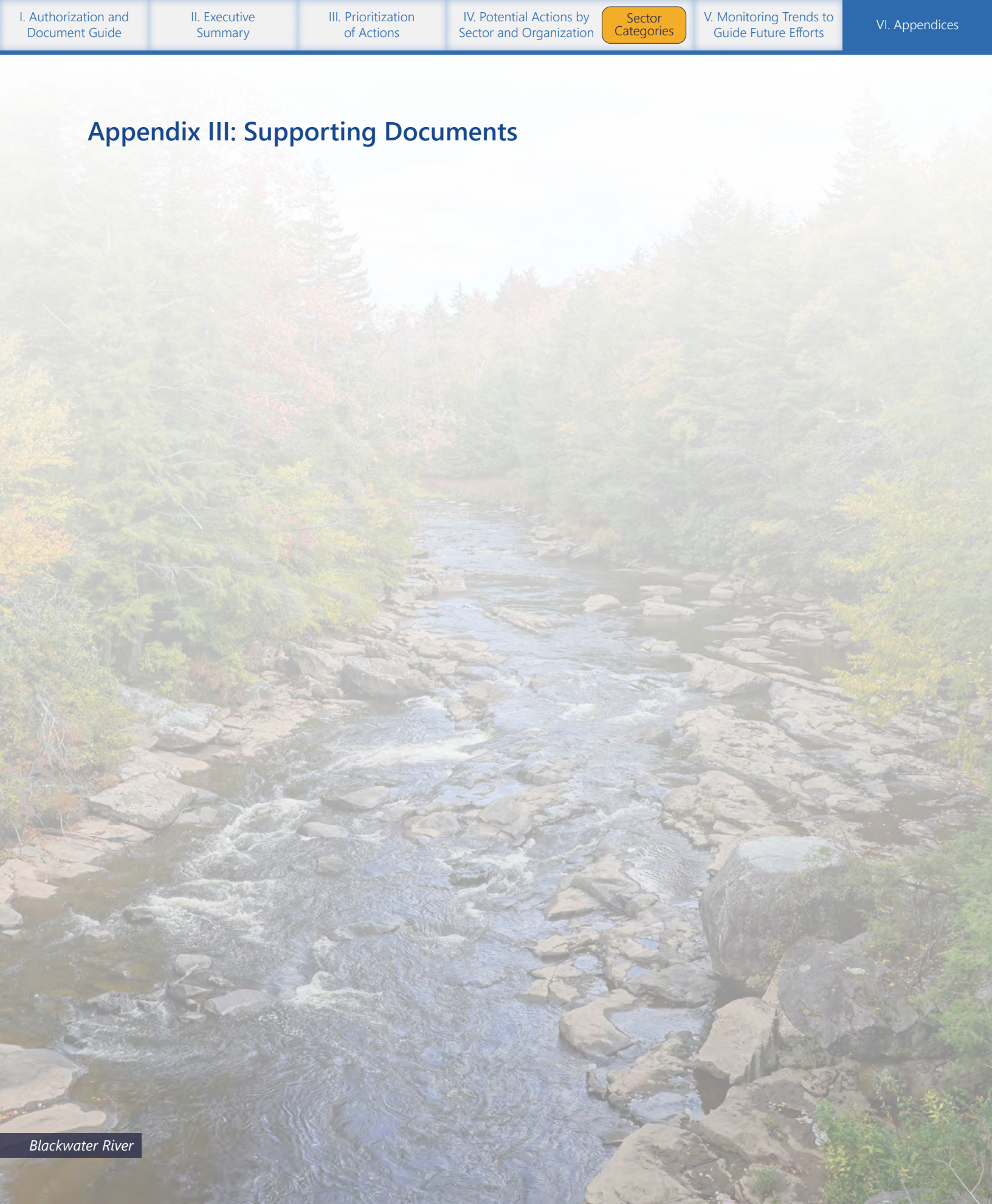
NRCS. (n.d.). Watershed and Flood Prevention Operations (WFPO) Program | Natural Resources Conservation Service. Natural Resources Conservation Service. Retrieved May 29, 2024, from <https://www.nrcs.usda.gov/programs-initiatives/watershed-and-flood-prevention-operations-wfpo-program>

SBA. (n.d.). Disaster assistance | U.S. Small Business Administration. SBA. Retrieved May 29, 2024, from <https://www.sba.gov/funding-programs/disaster-assistance>

WVDEP. (n.d.). Dam Safety Services. West Virginia Department of Environmental Protection. Retrieved May 29, 2024, from <https://dep.wv.gov/WWE/ee/ds/Pages/default.aspx>

WVEMD. (n.d.). West Virginia Hazard Mitigation Plan. WV Emergency Management. Retrieved May 29, 2024, from <https://emd.wv.gov/Grants/Pages/West-Virginia-Hazard-Mitigation-Plan.aspx>

Appendix III: Supporting Documents



Blackwater River

